

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

In the matter of
Curtiss-Wright Controls Inc.
Request for Waiver of Part 15 of the
Commission's Rules Applicable to Ultra-
Wideband Devices
ET Docket No. 10-167

ORDER

Adopted: January 11, 2012

Released: January 11, 2012

By the Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this Order, we grant a request by Curtiss-Wright Controls Inc. ("CWCI"), to waive Sections 15.503(d) and 15.521(d) of our ultra-wideband ("UWB") rules for its ground penetrating radar ("GPR") system, known as 3d-Radar.

2. Specifically, we are waiving the definitional requirement in Section 15.503(d), which specifies the minimum operational bandwidth of an UWB transmitter, and the UWB measurement procedure in Section 15.521(d). This action will permit CWCI to manufacture and market the 3d-Radar device upon receiving FCC equipment authorization.

II. BACKGROUND

3. On February 14, 2002, the Commission adopted regulations to permit the operation of UWB transmitters.

1 See "Curtiss-Wright Controls Inc., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices" (CWCI Waiver Request), filed June 10, 2010, ET Docket No. 10-167; see also 47 C.F.R §§15.503(d) and 15.521(d).

2 See First Report and Order ("1st R&O") in ET Docket No. 98-153, 17 FCC Rcd 7435 (2002); Erratum in ET Docket No. 98-153, 17 FCC Rcd 10505 (2002); Memorandum Opinion and Order and Further Notice of Proposed Rule Making in ET Docket No. 98-153, 18 FCC Rcd 3857 (2003); and Second Report and Order and Second (continued...)

basis under the Part 15 regulations include imaging systems, vehicular radars, and indoor communications systems.³ These transmitters operate using spectrum that is allocated to various radio services, including frequency bands that are allocated to both Federal and to non-Federal operations.⁴ They also operate in several restricted frequency bands within which the operation of other types of Part 15 transmitters are prohibited.⁵ No spectrum is allocated to UWB devices, which share these frequency bands with authorized radio services on a sufferance basis and may not cause harmful interference to authorized radio services.⁶

4. Unlicensed UWB GPR devices are governed by Part 15, Subpart F of the Commission's rules. Section 15.503(d) specifies a minimal operational bandwidth in defining an UWB transmitter, *i.e.*, a fractional bandwidth equal to or greater than 0.20 or an UWB bandwidth equal to or greater than 500 megahertz, regardless of the fractional bandwidth.⁷ UWB devices typically employ pulse modulation technologies whereby very short bursts of energy are modulated and emitted to convey information, producing emission bandwidths often exceeding one gigahertz.⁸ When it adopted the UWB rules, the Commission stated that UWB devices could use other modulation types if they meet the minimum bandwidth requirements and that this requirement was intended to avoid having devices designed for the restricted bands if they did not need to operate in those bands.⁹ The Commission further stated that "it was unlikely" that swept frequency, stepped frequency, or frequency hopping systems would comply with the minimum bandwidth requirement because, unlike UWB systems, the emissions for these other systems were typically measured with the sweep/step/hopping function stopped.¹⁰ Section 15.521(d) of the Commission's rules sets forth the measurement procedures for UWB devices to demonstrate compliance with applicable emission limits. For emissions above 960 MHz, this rule requires that, if pulse gating is used and the transmitter is quiescent for longer intervals than the nominal pulse repetition interval, measurements are made with the pulse train gated on; also, the Commission may consider alternate measurement procedures.¹¹

5. On June 10, 2010, Curtiss-Wright Controls, Inc. ("CWCI") filed a request for a waiver of the UWB minimum bandwidth requirement in Section 15.503(d) and the UWB measurement procedures in Section 15.521(d) of the Commission's rules to permit the marketing and operation of its stepped frequency GPR system known as 3d-Radar. CWCI states that its 3d-Radar system operates between 140 MHz and 3 GHz using stepped frequency modulation to achieve superior performance characteristics of deep signal penetration, high resolution imaging, and fast survey speeds. CWCI states that to achieve

(...continued from previous page)

Memorandum Opinion and Order ("2nd R&O") in ET Docket No. 98-153, 19 FCC Rcd 24525 (2004). *See also* 47 C.F.R. §§ 15.501-15.525.

³ Imaging systems consist of GPRs, wall imaging systems, through-wall imaging systems, surveillance systems, and medical imaging systems.

⁴ The operation of Federal radio stations is regulated by the National Telecommunications and Information Administration ("NTIA"), while operation of stations by commercial entities, state and local governments, and the general public is regulated by the Commission.

⁵ 47 C.F.R. § 15.205.

⁶ 47 C.F.R. § 15.5.

⁷ 47 C.F.R. § 15.503(d); fractional bandwidth is the bandwidth of a device divided by its center frequency.

⁸ *See* 1st R&O, *supra* at p. 7439. UWB devices can also use "impulse" transmitters, *i.e.*, pulses don't modulate a carrier, but the antenna determines the center frequency of radiated emissions. *Id.*

⁹ *Id.* at p. 7449.

¹⁰ *Id.* at p. 7450.

¹¹ 47 C.F.R. § 15.521(d).

deep signal penetration into the ground, a GPR device must operate at relatively low frequencies, generally below 1 GHz, and to achieve increased image resolution the device must be able to operate over a very large bandwidth, generally 2 GHz or more. CWCI claims that its device accomplishes these two objectives by placing an array of closely spaced antennas that transmit sequentially over a wide band of spectrum and gather a variety of data from underground structures in a single pass. The CWCI 3d-Radar system features an electronically-scanned 31-element antenna array that transmits over 1,431 frequencies in 2-megahertz steps between 140 MHz and 3 GHz with a scan/cycle rate of approximately 2.86 milliseconds. The antenna array is towed (or pushed) approximately 30 cm above the ground by survey vehicles traveling at normal highway speeds. The 3d-Radar system's stepped-frequency technique using a wide bandwidth antenna array allows it to travel at high speeds and eliminate the need for multiple passes. This results in less RF energy being transmitted at any one location, thereby minimizing any risk of potential interference to authorized services. CWCI contends that the 3d-Radar system represents a leap in GPR technology that will increase the efficiency of subsurface imaging, lower the costs of infrastructure repair and improve safety conditions for both infrastructure workers and the general public. CWCI also states that their 3d-Radar system has already been certified for use in the European Union. CWCI seeks a waiver as its 3d-Radar system does not satisfy the definitional requirement of Section 15.503(d) that an UWB transmitter "at any point in time" has a fractional bandwidth equal to or greater than 0.20 or has an UWB bandwidth equal to or greater than 500 megahertz. It also seeks a waiver of the Section 15.521(d) measurement procedure requirement that if pulse gating is used and the transmitter is quiescent for longer intervals than the nominal pulse repetition interval, measurements are made with the pulse train gated on.

6. The Commission issued a public notice on August 19, 2010 soliciting comment on the CWCI request for a waiver.¹² Comments and reply comments were due by September 20, 2010 and October 4, 2010, respectively. A total of six parties, including CWCI, filed comments, and CWCI filed reply comments in response to the public notice. A.P. Annan ("Annan")¹³ and the U.S. GPS Industry Council ("USGPSIC")¹⁴ oppose the waiver request while the Federal Railroad Administration ("FRA"), AKELA Inc., and Robert Bosch GmbH ("Bosch") support the request.

7. Recently, the National Telecommunications and Information Administration ("NTIA"), under its own administrative process, has approved the CWCI 3d-Radar for use by the United States Department of Transportation.¹⁵

III. DISCUSSION

8. 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.¹⁶ Good cause, in turn, may be found and a waiver

¹² See "Office of Engineering and Technology Declares the Curtiss-Wright Controls, Inc. Request for a Waiver of Part 15 Ultra-Wideband Rules for a Stepped Frequency Ground Penetrating Radar System to be a "Permit-But-Disclose" Proceeding for Ex Parte Purposes and Requests Comments", ET Docket No. 10-167, DA 10-1551, August 19, 2010.

¹³ See "A.P. Annan Re: comments on ET Docket N0. 10-167" (Annan Comments), filed September 20, 2010, ET Docket No. 10-167.

¹⁴ See "Comments of the U.S. GPS Industry Council" (USGPSIC Comments), filed September 20, 2010, ET Docket No. 10-167.

¹⁵ See NTIA Certification of Spectrum Support, Control Number SPS-18004/1, (May 18, 2011; Filed in ET Docket No. 10-167 on June 16, 2011).

¹⁶ 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).

granted “where particular facts would make strict compliance inconsistent with the public interest.”¹⁷ To make this public interest determination, the waiver cannot undermine the purpose of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule.¹⁸ The UWB technical and operational standards in Sections 15.503(d) and 15.521(d) were adopted to ensure that UWB ground penetrating radar systems do not cause harmful interference to authorized radio services, including Federal services. As discussed below, a waiver of the definitional and measurement requirements in 15.503(d) and 15.521(d) for CWCI’s 3d-Radar system would not increase the potential for harmful interference to authorized services, *i.e.*, the 3d-Radar GPR poses no greater risk of harmful interference than any currently operating UWB GPR. Hence, granting this waiver will not undermine the purpose of the rules. Finally, we find that there is a stronger public interest benefit in granting this waiver than in strictly applying the rules. A waiver will allow the marketing of a new category of GPR devices that would increase efficiency in subsurface imaging, thereby potentially lowering costs of infrastructure repair and improving safety conditions for both infrastructure workers and the general public. Moreover, our decision to allow this device to be authorized under the Commission’s equipment authorization processes, along with NTIA’s decision to allow the same device to be used by Federal agencies, will ensure the availability of the 3d-Radar for use by both Federal and non-Federal users alike.¹⁹

A. Waiver of definitional requirement in Section 15.503(d) of the Commission Rules

9. CWCI seeks a waiver of Section 15.503(d) because its 3d-Radar system does not satisfy the definitional requirements for ground penetrating radar systems in the UWB rules. Section 15.503(d) requires that an UWB transmitter “at any point in time” has a fractional bandwidth equal to or greater than 0.20 or has an UWB bandwidth equal to or greater than 500 megahertz. As indicated above, the 3d-Radar system transmits in discrete 2 megahertz steps over 1,431 frequencies between 140 MHz and 3 GHz with a scan/cycle rate of approximately 2.86 milliseconds. Because each transmission is less than 500 megahertz in bandwidth “at any point in time,” CWCI’s 3d-Radar system would not meet the definitional requirement for operation under the UWB rules, even though the total bandwidth needed for optimal system performance exceeds 500 megahertz.

10. The Federal Railroad Administration (FRA), AKELA, and Bosch strongly support the CWCI waiver request. The FRA states that stepped frequency GPR is of particular interest to it for several reasons: (1) the technique enables a good combination of both resolution of captured data and penetration depth of track substructure; (2) better utilization of transmitted power offers the potential for better coverage and higher vehicle assessment speeds on the track, which reduces track closures while increasing productivity during the data collection phase and is of particular relevance for construction of high speed rail corridors throughout the country; and (3) because step frequency GPR sends less power into the ground, there is less susceptibility of other energy sources interfering with the GPR signal and

¹⁷ *Northeast Cellular*, *supra* at 1166; *see also ICO Global Communications*, *supra* at 269 (quoting *Northeast Cellular*); *WAIT Radio*, *supra* at 1157-59.

¹⁸ *See, e.g., WAIT Radio*, *supra* 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).

¹⁹ NTIA’s spectrum certification process is similar to the Commission’s Equipment Authorization Program in that it examines the technical characteristics of proposed equipment to determine compliance with applicable rules. A specific frequency assignment would also be required for Federal Agencies to use the 3d-Radar.

corrupting collected data.²⁰ AKELA states that a grant of the waiver request would enable the development of high performance devices and methods which can serve the public interest in other important areas.²¹ Bosch states that strict construction of the current definition would only allow the use of a continuous-wave signal of at least 500 MHz bandwidth and would preclude the use of essentially all other modulation schemes such as pulsed, frequency-hopping, swept frequency (*e.g.*, FMCW), and stepped frequency emission systems.²²

11. Annan and USGPSIC urge the Commission to deny the waiver request. Annan argues that granting a waiver of the UWB definition would open the door for any device that emits over a wide frequency range but could selectively choose to emit in a narrow band indefinitely, which would contravene the intent of the UWB rules.²³ Annan asserts that if the device can select the transmit frequencies, it could tailor its emissions to avoid certain bands and adjust its emissions in sensitive spectral ranges, thus obviating the need for a waiver of the UWB rules.²⁴ Annan states that such an approach is not available for UWB devices such as its own impulse-generated UWB GPR, which must emit across its entire bandwidth concurrently.

12. USGPSIC is concerned that waiving the definition of an UWB transmission to allow a non-UWB device to operate across the restricted bands, including the GPS bands, would amount to a permanent modification of the rule. USGPSIC asserts that CWCI has not justified its request and favorable Commission action would set a precedent for other similar requests that would be hard to deny. USGPSIC is concerned that CWCI's device would cause direct in-band interference to GPS, not just out-of-band interference²⁵ and would be inconsistent with the cautious approach the Commission has taken from the beginning with respect to implementing carefully-crafted emissions limits and other requirements to avoid harmful interference from UWB devices.²⁶

13. In reply comments, CWCI contends that the risk of interference from the 3d-Radar device will be no greater than that from other GPR devices and believes that its interference potential must be evaluated based on its unique capabilities. CWCI states that notching, as suggested by Annan, causes the subsurface images to become blurred due to higher side lobes and increased "ringing" and tends to mask

²⁰ See U.S. Department of Transportation, Federal Railroad Administration comments for "*Curtiss-Wright Controls Inc., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*" (FRA Comments), filed September 15, 2010, ET Docket No. 10-167.

²¹ See "*AKELA, Inc.*" Comments at p. 2, filed September 20, 2010, ET Docket No. 10-167.

²² See "*REVISED Ex Parte Comments of Robert Bosch, GmbH*" (Bosch Comments), filed March 02, 2011, ET Docket No. 10-167.

²³ See Annan Comments at p. 2; USGPSIC Comments at p. 2.

²⁴ CWCI states that, absent a waiver of the UWB rules, its device would be treated under the FCC rules as a narrowband system and would have to comply with the general radiated emission limits in Section 15.209 and the restricted band requirements in Section 15.205. CWCI claims that, because of its very wideband design, its device would not comply with either rule, See CWCI Waiver Request at p. 4.

²⁵ When the Commission first adopted UWB rules, it limited GPR operations to below 960 MHz and between 3.1 to 10.6 GHz, to avoid co-frequency operation in the bands used by GPS systems. In 2003, the Commission removed this restriction in acting on petitions for reconsideration. USGPSIC had opposed this modification, arguing that co-frequency GPR and GPS operations were not feasible and that GPR emission limits should not be relaxed. The Commission found that the low emissions from GPR devices, coupled with the relatively small number of users and the nature of their operations (*e.g.*, transmissions pointed toward the ground), were unlikely to cause harmful interference to GPS operations. See *Memorandum Opinion and Order and Further Notice of Proposed Rule Making* in ET Docket No. 98-153, 18 FCC Rcd. 3857 (2003), at pp. 3871-3872.

²⁶ See USGPSIC Comments at p. 6.

important features, making it difficult to interpret the data and accurately measure pavement thickness. CWCI further states that, with extensive notching, weak features in subsurfaces may go undetected, which can be problematic for both repair and safety concerns, thereby resulting in degrading the most important attributes the system has to offer - increased image resolution performed efficiently and safely by survey vehicles traveling at normal highway speeds for the benefit of the public.²⁷ CWCI challenges Annan's assertion that the Commission's UWB rules were intended to apply only to impulse GPR devices. CWCI finds this assertion to be incorrect and notes that the Commission has repeatedly made clear that the UWB rules apply to impulse and non-impulse emitters. CWCI also notes that USGPSIC provides no data, studies, or calculations to show that the 3d-Radar device would cause interference to authorized radio services.²⁸

14. We conclude that a waiver of the UWB transmitter definition is warranted in this case. We find that the 3d-Radar device is functionally equivalent to UWB GPR devices and that the risk of interference from the 3d-Radar device will be no greater than from UWB GPR devices; thus, a waiver will not undermine the intent of our rule. At the outset, we emphasize that the 3d-Radar device is a GPR that will operate like UWB GPR devices—*i.e.*, it operates when in contact with or within one meter of the ground for the purpose of detecting or obtaining images of buried objects, and its energy is intentionally directed down into the ground, which absorbs most of its energy.²⁹ In addition to restricting emissions and requiring coordination, the Commission's UWB GPR rules also limit the operation of these devices to certain eligible parties to ensure that proliferation of the devices remains low, thereby further curtailing their interference potential.³⁰ Because we are not waiving the requirements in Section 15.509 of our rules, the 3d-Radar will operate under the same emission limits, marketing and eligibility requirements and will provide the same types of services as UWB GPR devices.

15. The primary difference between the 3d-Radar device and UWB GPR devices is the modulation scheme used to perform the detection function. The UWB GPR rules were designed to accommodate devices that emit impulsive or transient-like signals that are spread across a very wide bandwidth to produce an image of buried objects while making a single pass above the ground. Impulsive GPR devices will make multiple passes above the ground to obtain more complete and accurate information about buried objects.³¹ The 3d-Radar device uses stepped frequency modulation—*i.e.*, an array of closely spaced transmitting/receiving antennas that transmit sequentially over a large band of spectrum—to gather all the needed data in a single pass. As noted above, the 3d-Radar device transmits over 1,431 frequencies in 2 megahertz steps between 140 MHz and 3 GHz with a scan/cycle rate of approximately 2.86 milliseconds. This scheme allows the 3d-Radar device to produce high quality three-dimensional images in a single pass and also to travel at higher survey speeds than an impulsive GPR.

16. We are not persuaded by Annan's argument that we should not allow the 3d-Radar to be certified under the UWB GPR rules because it could avoid transmitting in restricted bands whereas impulse GPR devices cannot avoid these bands due to their impulsive operation. While we do recognize that it is technically possible for stepped frequency GPRs to avoid transmitting on certain frequencies, we accept that the large bandwidth required in the 3d-Radar design is necessary for achieving satisfactory

²⁷ See CWCI Waiver Request at p. 21, ET Docket No. 10-167.

²⁸ See "Reply Comments of Curtiss-Wright Controls Inc." (CWCI Reply Comments) at pp. 2, 7; filed October 04, 2010, ET Docket No. 10-167.

²⁹ We note that the 3d-Radar is intended to be installed and operated on a survey vehicle and is not designed to be operated as a hand-held device.

³⁰ See 1st R&O *supra*. at pp. 7444, 7499.

³¹ CWCI states that most impulsive GPR devices provide two-dimensional images and often have to make multiple passes to provide better resolution (*e.g.*, three-dimensional) images. See CWCI Waiver Request at p. 2.

image resolution as is the case for existing impulse GPR devices. We therefore believe that as long as the 3d-Radar complies with the emission limits allowed for impulse GPRs, there is no greater risk of interference potential from 3d-Radar devices than from existing impulse GPR devices, and we see no need to require extensive frequency notching that might hinder its performance. We note that the NTIA has approved this device for Federal government use with minimal notching, which we will also require of the CWCI 3d-Radar.³² We also disagree with Annan that a waiver of the bandwidth requirements of Section 15.503(d) would open the door for any device that can emit over a wide frequency range but can selectively choose to emit in a specific narrow band indefinitely. Our decision here is narrowly drawn and based on a finding that the 3d-Radar device is functionally equivalent to UWB GPR devices. To ensure that the 3d-Radar does not emit in a specific narrow band indefinitely, we are conditioning this waiver to require that the system not use any single frequency longer than 2 microseconds in any 3 millisecond period of time.³³

17. We also disagree with USGPSIC that a waiver of the UWB transmission definition would effectively modify the UWB rules and would permit either direct in-band or out-of-band interference to GPS. We note that all other technical requirements applicable to UWB GPR devices would continue to apply to the 3d-Radar and CWCI will have to demonstrate that the 3d-Radar meets all of these requirements to be certified and marketed to non-Federal users. The emission limits contained in Section 15.509 were specifically designed to protect GPS systems from interference from UWB GPR devices, and there have been no instances of reported interference to GPS from UWB GPR devices during the more than nine years these rules have been in place. Further, we note that the 3d-Radar device has a uniquely limited professional application and will be used by the same restricted class of users currently allowed to use UWB devices under our rules. This waiver will not create any new class of GPR users; instead it will allow UWB users access to one additional tool that facilitates increased efficiencies and safety in maintaining our transportation infrastructure. Finally, we note that this waiver is based on the specific technical and operational characteristics of the 3d-Radar and does not change our rules and existing prohibition regarding the intentional transmissions in restricted bands in Section 15.205. For these reasons, we disagree with the USGPSIC that this waiver is inconsistent with our conservative approach to UWB devices.

18. We also find that there is a legitimate public interest justification for this waiver. The 3d-Radar device is a new tool for evaluating and improving road and railroad infrastructure and will aid public safety. We disagree with Annan that a waiver is not appropriate because there are other UWB GPR devices available that meet the UWB definition in Section 15.503(d). The 3d-Radar design and functionality makes it more suitable for some applications than other existing GPR devices. Its unique design allows it to gather required information on a wide swath of in-ground and subsurface structures in a single pass while travelling at a relatively high speed—something which current impulse GPR devices, commercially available in the United States and elsewhere, require multiple passes to accomplish. We note that the Federal Railroad Administration, which is under the U.S. Department of Transportation, supports this waiver so that the 3d-Radar device can be included in its evaluation of GPR technologies to support its high speed rail initiatives.

³² NTIA only required notches consistent with Footnote US246 of the Table of Frequency Allocations, which prohibits emissions from authorized stations in frequency bands allocated for passive services. Because we are authorizing the 3d-Radar as an unlicensed device under Part 15 of our Rules rather than as an allocated service, the Table of Frequency Allocations is not applicable. We will, however, apply the same restrictions used by NTIA in order to be consistent and to have a single set of requirements for both Federal and non-Federal users.

³³ Based on a sweep of 1,431 channels in 3 msec, the dwell time on any one frequency would not exceed approximately 2 microseconds.

B. Waiver of measurement procedure in Section 15.521(d) of the Commission Rules

19. CWCI also seeks a waiver of Section 15.521(d) of the Commission's rules, which sets forth the measurement procedures for UWB devices to demonstrate compliance with applicable emissions limits. For emissions above 960 MHz, this rule requires that, if pulse gating is used and the transmitter is quiescent for longer intervals than the nominal pulse repetition interval, measurements are made with the pulse train gated on. The Commission may also consider alternate measurement procedures.³⁴ CWCI asserts that this measurement procedure applies only to pulsed UWB devices but acknowledges that the Commission's staff has in the past applied it to other types of emitters, including stepped frequency systems. CWCI observes that, since this rule was adopted, the Commission has permitted other UWB transmitters operating above 960 MHz that use stepped frequency modulation to be measured using an average detector with the transmitter operating in its normal mode, *i.e.*, with the stepping function active.³⁵ CWCI asserts that if emissions from its 3d-Radar device are measured with the stepping function stopped under the rule, peak emissions would need to be reduced significantly to achieve compliance, and this would force the system to operate at reduced performance levels. CWCI requests that the emissions from its device be measured with the stepping frequency active, either as a waiver of the rule or as an alternate procedure.

20. Bosch agrees with CWCI's assertion that UWB test procedures should accommodate non-impulse transmitters by permitting measurements to be made with any hopping, stepping, or gating functions active. Bosch asserts that the current measurement procedure in Section 15.521(d) was enacted apparently because the measurement procedures for swept frequency devices were undetermined at the time the Commission adopted the UWB rules. Annan states that the measurement procedures, which are premised on impulsive UWB emissions, may not be appropriate for narrow bandwidth devices.

21. We conclude that there is good cause for waiving the rule in this case and that such action would serve the public interest. As CWCI correctly observes, on March 10, 2005, the Commission granted a waiver of the measurement procedures to permit emissions from UWB transmitters operating in the 3.1-5.03 GHz and 5.65-10.6 GHz bands that employ frequency hopping or stepped frequency modulation techniques, or that gate the transmitted signal, to be measured with the transmitter operating in its normal transmission mode.³⁶ This allows the measurements to account for the time averaging during which the UWB emitter is not transmitting.³⁷ In reaching its decision, the Commission recognized that the interference aspects of a transmitter employing frequency hopping, stepped frequency modulation, or gating are quite similar, as viewed by a receiver, in that transmitters using these burst formats appear to the receiver to emit for a short period of time followed by a quiet period.³⁸ The Commission concluded that any requirement to stop the frequency hopping, band sequencing, or system gating serves only to add another unnecessary level of conservatism to already stringent UWB standards.³⁹

³⁴ 47 C.F.R. § 15.521(d).

³⁵ See CWCI Waiver Request at 11-12 (citing "*Petition for Waiver of the Part 15 UWB Regulations Filed by the Multi-band OFDM Alliance Special Interest Group*," ("MBOA-SIG Waiver"), ET Docket No. 04-352, FCC 05-58, released March 11, 2005, 20 FCC Rcd 5528).

³⁶ See "*Petition for Waiver of the Part 15 UWB Regulations Filed by the Multi-band OFDM Alliance Special Interest Group*," ("MBOA-SIG Waiver"), ET Docket No. 04-352, FCC 05-58, Released March 11, 2005, 20 FCC Rcd 5528.

³⁷ *Id.*

³⁸ *Id.* at p. 7443.

³⁹ *Id.* at p. 7441.

22. Because the *MBOA-SIG Waiver* was for devices that, unlike the 3d-Radar device, met the UWB bandwidth requirements of 15.503(d), we conclude that the 3d-Radar devices cannot rely on this earlier decision and thus require a new waiver of this rule. However, the Commission's finding in the *MBOA-SIG Waiver* that emission measurements could be made for a stepped frequency modulated transmitter operating in its normal mode is equally valid for the 3d-Radar device. The Commission, in conjunction with the NTIA, determined that allowing stepped frequency devices to be measured with the stepping function on will not increase the interference potential of the device above that of impulse UWB devices if all other emission limits and technical requirements are met. Similarly, we conclude here that a waiver of the measurement procedure in Section 15.521(d) will not increase the potential for harmful interference to authorized services.⁴⁰ CWCI may demonstrate compliance with the UWB GPR emission limits with the stepping function active.

23. Annan further asserts that a waiver would allow for any device to use a 'typical operation' duty cycle or PRF rather than the worst case as now required while measuring emissions.⁴¹ We disagree with Annan's assertion that the Commission requires a worst-case scenario for measuring emissions. Impulsive GPRs are required to show compliance with the emission limits using the actual PRF used by the device. The 3d-Radar device will be required to show compliance with the actual sweep rate it employs to receive certification. For this reason, we do not find the measurement procedures to prescribe a worst-case scenario; rather, they establish a quantification of the actual emissions from the devices.

IV. CONCLUSION

24. In conclusion, we are waiving: (1) Section 15.503(d) which would require the 3d-Radar transmitter to have a fractional bandwidth equal to or greater than 0.20 or UWB bandwidth equal to or greater than 500 MHz; and (2) the requirement in Section 15.521(d) which directs that the emissions from the 3d-Radar device to be measured with the transmitter operating with the stepping function stopped. This waiver is subject to the following conditions:

- The 3d-Radar device shall be certified by the Commission. The device shall operate with stepped frequency modulation in 2 megahertz steps between 140 MHz and 3 GHz with a scan/cycle rate of approximately 3 milliseconds. The system may not use any single frequency longer than 2 microseconds in any 3 millisecond period of time.
- Measurements of emissions from the 3d-Radar device shall be conducted with the stepping function active.
- The 3d-Radar device shall not be sold in any hand-held configurations.
- The 3d-Radar device shall comply with all other technical and operational requirements applicable to UWB GPR devices under Part 15, Subpart F of the Commission's rules.
- The 3d-Radar device shall implement frequency notching to avoid placing intentional transmissions in the bands 608-614 MHz, 1400-1427 MHz, 1660.5-1668.4 MHz, and 2690-2700 MHz.

⁴⁰ We specifically note that our reliance on the MBOA-SIG Waiver decision in this instance is only relative to the measurement procedure in Section 15.521(d).

⁴¹ See Annan Comments at p. 2.

V. ORDERING CLAUSES

25. Accordingly, pursuant to authority in Sections 0.31, 0.241, and 1.3 of the Commission's rules, 47 C.F.R. §§ 0.21, 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. §§ 154(i), 302, 303(e), and 303(r), IT IS ORDERED that the Request for Waiver filed by Curtiss-Wright Controls Inc., IS GRANTED, consistent with the terms of this Order. This action is effective upon release of this Order.

FEDERAL COMMUNICATIONS COMMISSION

Julius P. Knapp
Chief, Office of Engineering and Technology