

Bill - this is a docketed proceeding and should be filed in ET 04-352. John Reed Thanks.

ET 04-352

Before the Federal Communications Commission Washington, DC 20554

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OCT - 8 2004

Federal Communications Commission Office of the Secretary

In the Matter of)
MULTI-BAND OFDM ALLIANCE SPECIAL)
INTEREST GROUP)
Petition for Waiver of Measurement Procedures for OFDM Ultrawideband Devices)

DOCKET FILE COPY ORIGINAL

FILE NO. DA 04-2793

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To: Chief, Office of Engineering and Technology

SEP 29 2004

Federal Communication Commission Bureau/Office

COMMENTS

Cingular Wireless LLC ("Cingular") hereby opposes the Petition for Waiver ("Petition") filed August 26, 2004 by the Multi-band OFDM Alliance Special Interest Group ("MBOA-SIG"), concerning measurement procedures for "OFDM Ultrawideband Devices."¹ MBOA-SIG, an organization of companies developing multiband orthogonal frequency division multiplexing ("OFDM") ultra-wideband ("UWB") systems, requests a waiver of the measurement procedures applicable to certain UWB devices. It has failed to meet the standard for waiver of the Commission's prescribed measurement procedures.

Cingular is concerned about the interference potential of all UWB devices. Under the UWB rules, 47 C.F.R. §§ 15.501-525, such devices spread their intentional emissions over a very wide band of spectrum and also cause spurious emissions covering an even greater swath of spectrum. The Commission adopted rules that were intended to minimize the interference to li-

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¹ Public Notice, Office of Engineering and Technology Declares MBOA-SIG Request for a Waiver of Part 15 for an Ultra-Wideband System to be a "Permit-but-Disclose" Proceeding for Ex Parte Purposes, DA 04-2793 (August 30, 2004).

censed services caused by UWB devices in its *UWB Order*,² the technology was new and there had been little testing under real-world conditions. Accordingly, it remains to be seen whether the Commission's rules will provide adequate protection for licensed services.

When a request for waiver of those rules is made, Cingular's concern is even greater. When it adopted the UWB rules, the Commission was in entirely new territory. When a petitioner asks to go beyond those rules or to limit their application, the Commission is essentially flying blind. The potential consequences of an error are enormous, because the wide bandwidth of UWB devices means that if harmful interference occurs, it could affect many different radio services.

MBOA-SIG claims that OFDM UWB devices, under "normal operating conditions," will "pose no greater threat of harmful interference than pulsed UWB devices permitted by the rules."³ This claim implicitly acknowledges that the Commission has not, heretofore, evaluated the interference characteristics of OFDM UWB devices. Accordingly, the Commission must proceed with caution.

The Commission's rules permit waivers to be granted only for good cause.⁴ The burden is on a waiver applicant to show that "special circumstances warrant a deviation from the general rule and such deviation will serve the public interest."⁵ Moreover, the applicant must demonstrate that "the particular facts make strict compliance inconsistent with the public interest if applied to petitioner and when the relief requested would not undermine the policy objective of the

² *Ultra-Wideband Transmission Systems*, ET Docket 98-153, *First Report and Order*, 17 F.C.C.R. 7435 (2002) (*UWB Order*) (subsequent history omitted).

³ Petition at 3.

⁴ 47 C.F.R. § 1.3.

⁵ *Northeast Cellular Telephone v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

rule in question.”⁶ MBOA-SIG has not met these standards. In fact, MBOA-SIG effectively seeks reconsideration of a policy decision consciously made by the Commission to safeguard against harmful interference in the absence of test data permitting a more liberal measurement policy.

MBOA-SIG’s petition illustrates a fundamental problem with the Commission’s decision to adopt specialized Part 15 rules for various technologies.⁷ Each of these rules or groups of rules creates an exception to the general Part 15 emission limits⁸ based on an examination of a very narrowly constrained view of a given technology. While this approach may address the issues that have been raised in connection with a given petition or application, the rules resulting from this process may not be especially useful with respect to determining what requirements apply to new technological applications that vary to one degree or another from those considered when the rule was adopted. A given application or technology may have features that resemble those in the rules, while nevertheless deviating significantly from the assumptions underlying any given rule. In such cases, the Commission should carefully consider the consequences of exempting a new technology from the requirements of a rule simply because there is less than a perfect fit between the rule and the new technology.

In the present case, the waiver request was prompted by the fact that the Commission’s UWB rules were principally based on consideration of pulsed UWB technology.⁹ OFDM, how-

⁶ *National Exchange Carrier Association*, WC Docket No. 04-259, *Order Granting Petition for Rulemaking, Notice of Proposed Rulemaking, and Order Granting Interim Partial Waiver*, FCC 04-174, ¶ 39 & n.95 (July 19, 2004), *citing WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969), *appeal after remand*, 459 F.2d 1203 (D.C. Cir. 1972), *cert. denied*, 409 U.S. 1027 (1972)

⁷ 47 C.F.R. §§ 15.215-15.257, 15.501-525.

⁸ 47 C.F.R. § 15.209.

⁹ *See UWB Order* at ¶ 7.

ever, does not employ pulsed transmission.¹⁰ Instead, it spreads energy over a wide band of spectrum using digital modulation, and the band over which this energy is spread is varied in a manner similar to that employed by non-UWB frequency-hopping spread spectrum systems.

The *UWB Order* paid only passing attention to UWB systems that employ frequency hopping techniques. In the one paragraph that addressed such systems, the order stated:

[T]ransmission systems should not be precluded from the UWB definition simply because the bandwidth of the emission is due to a high speed data rate instead of the width of the pulse or impulse. . . . [V]arious modulation types should be permitted as long as the products comply with *all* of the technical standards that are being adopted in this proceeding. Thus, as long as the transmission system complies with the fractional bandwidth or minimum bandwidth requirements at all times during its transmission, we agree that it should be permitted to operate under the UWB regulations. We recognize that this may preclude certain types of modulations, such as swept frequency (e.g., FMCW), stepped frequency or frequency hopping systems. The current measurement procedures require that measurements of swept frequency devices be made with the frequency sweep stopped. The sweep is stopped because no measurement procedures have been proposed or established for swept frequency devices nor has the interference aspects of swept frequency devices been evaluated based on the different measurement results that would be obtained from measurements taken with the sweep active. Similarly, *measurements on a stepped frequency or frequency hopping modulated system are performed with the stepping sequence or frequency hop stopped*. With the sweep, step function or hopping stopped, it is unlikely that swept frequency (linear FM or FMCW) or stepped frequency modulated emissions would comply with the fractional bandwidth or minimum bandwidth requirements. It also is unlikely that frequency hopping systems would comply unless an extremely wide bandwidth hopping channel is employed.¹¹

¹⁰ The figures in MBOA-SIG's waiver request show that the waveform is transmitted in one "band" and then stepped to another band. In some cases it is actually transmitted in the same band twice before going to the next band. As such, it appears that OFDM is not pulsed in the same way that UWB was conceived in the UWB Order, which is made of wide instantaneous bandwidth pulses. Regardless, this is clearly a concern as the potential interference from one band-stepping pattern may be more or less than from another pattern.

¹¹ *UWB Order* at ¶ 32 (footnote omitted; emphasis added).

The OFDM systems at issue here appear to satisfy the condition stated in the last sentence quoted above, in that they employ hopping channels with a bandwidth in excess of 500 MHz and thus satisfy the bandwidth requirement for UWB.¹² MBOA-SIG nevertheless claims that its technology should not be subject to the requirement that measurements be performed “with the . . . frequency hop stopped,” arguing that the Commission did not intend to require this to apply to frequency hopping systems. Whether MBOA-SIG’s technology is defined as frequency hopping or stepped, however, the Commission’s words speak for themselves. The fact that the Commission was skeptical that swept, stepped, or hopping systems would have sufficient bandwidth to qualify as UWB with the sweep, step function, or hopping stopped does not change the fact that the Commission expressly required that the frequency shifting be stopped for purposes of measurements.

The Commission clearly stated its reasons for requiring the stoppage — it had no measurement procedures in place for such systems and had not studied their interference effects.¹³ Without such study and without a detailed test record permitting evaluation of different measurement procedures, there is no ground for deviating from the Commission’s fully justified cautious approach.¹⁴ A waiver cannot be justified without, at a minimum, tests comparing the measurements that would result with and without the hopping stopped. Instead, MBOA-SIG simply asks the Commission to eliminate the stoppage requirement without any tests. MBOA-SIG’s assurance of no greater threat of harmful interference is not sufficient.

¹² See Petition, Att. B at § 4.2; 47 C.F.R. § 15.503(d).

¹³ *UWB Order* at ¶ 32.

¹⁴ If the FCC grants MBOA-SIG’s waiver request that stepping (or hopping) not be deactivated during testing, equipment must be required to be tested under all possible stepping (hopping) patterns since these patterns are not pseudo-random (as in the case of frequency hopping spread spectrum (FHSS) systems). Said another way, in pseudo-random systems, the interference would look like noise no matter what pseudo-random pattern is used; however, this assumption does not hold when non-random hopping or stepping patterns are used.

In effect, MBOA-SIG wants the Commission to repeal a requirement that the Commission intentionally adopted for conservative interference protection reasons. Any such request should have been made in a petition for reconsideration of the *UWB Order* or in a new petition for rulemaking.

MBOA-SIG argues that the stoppage requirement has only been applied in the context of unlicensed spread-spectrum devices, which are governed by 47 C.F.R. § 15.247, and that its OFDM technology is not subject to that section; it also claims that OFDM technology does not meet the definition of a frequency-hopping spread-spectrum device. These contentions are not persuasive.

OFDM does fall within the rules' definition of spread spectrum systems, which are not limited to those governed by the Part 15 spread spectrum rule:

A spread spectrum system is an information bearing communications system in which: (1) information is conveyed by modulation of a carrier by some conventional means, (2) the bandwidth is deliberately widened by means of a spreading function over that which would be needed to transmit the information alone. (In some spread spectrum systems, a portion of the information being conveyed by the system may be contained in the spreading function.)¹⁵

Whether or not OFDM falls within the Part 2 definition of a “frequency hopping system,” as MBOA-SIG claims, due to its deterministic and fixed, rather than random, hopping pattern,¹⁶ it clearly is the type of technology that the Commission was addressing in paragraph 32 of the *UWB Order*. By addressing swept-frequency, stepped-frequency, and frequency-hopping technologies together, the Commission clearly intended all the various techniques that can be used to spread a signal over a much wider bandwidth — and it specifically said that any such system that

¹⁵ 47 C.F.R. § 2.1(c), *Spread spectrum systems*.

¹⁶ Petition at 5.

meets the UWB bandwidth threshold *must* meet “all of the technical standards” for UWB devices, and that it must be tested with its frequency shifting function disabled.

MBOA-SIG’s argument that the stoppage requirement somehow does not apply because OFDM uses digital modulation is unpersuasive. Paragraph 32 did not exempt systems that use digital modulation. The fact that the Commission staff apparently decided not to require stoppage, on one occasion, for the testing of certain other digitally-modulated devices, before the UWB rules were adopted, is irrelevant.¹⁷ Moreover, it cites the fact that the Commission has amended its Part 15 spread-spectrum rule to permit the averaging of transmission power as evidence that this approach is correct,¹⁸ which is at odds with its (correct) contention that the Part 15 spread-spectrum rule is inapplicable to OFDM.¹⁹ It also overlooks the fact that the spread-spectrum rule was amended specifically to harmonize it with the U-NII rules. This provides no support for not applying the stoppage requirement to OFDM UWB systems.

MBOA-SIG, in effect, is trying to obtain the benefits of the spread-spectrum rule change for a system that is clearly not subject to that rule, in order to avoid the application of measurement procedures that have been specifically prescribed for UWB systems. The Commission cannot allow it to selectively apply the most favorable requirements.

MBOA-SIG also asks for a waiver of the “gating-on” requirement of Section 15.521(d), to the extent that section is applicable. Cingular does not agree with this contention based on the information contained in the waiver request. The operation of the MBOA system is clearly gated

¹⁷ MBOA-SIG quotes from an unidentified FCC staff letter without any citation (other than the URL of a Commission search engine). Petition at 5 n.16. The letter it quotes, however, does not appear in Pike and Fischer Communications Regulation, Berry Best’s FCC Library, or the Commission’s EDOCS systems.

¹⁸ Petition at 5 n.16, citing *Unlicensed Devices and Equipment Approval*, ET Docket 03-201, *Report and Order*, FCC 04-165 (July 12, 2004).

¹⁹ See Petition at 5 n.13.

on and off if only a single band is concerned. However, it is assumed that when it is gated off on one band, it is gated on in a different band as is shown in the figures.²⁰ Also, as above, the “gating” or frequency stepping behavior can change depending on which stepping pattern is chosen.

Cingular expresses no opinion at this time concerning the merits of MBOA-SIG’s contention that OFDM UWB signals pose little probability of harmful interference. Evaluation of the technology’s interference potential would be premature until the Commission has resolved the issue of testing methodology.

CONCLUSION

Given that the successful deployment of this technology could result in widespread consumer usage, however, the Commission needs to give careful attention to the testing methodology. The time to ensure noninterference is now, before OFDM UWB networks have been widely deployed. Once these systems are in place and units are in the hands of consumers, it will be too late to address interference issues. Accordingly, the petition for waiver should be denied.

Respectfully submitted,

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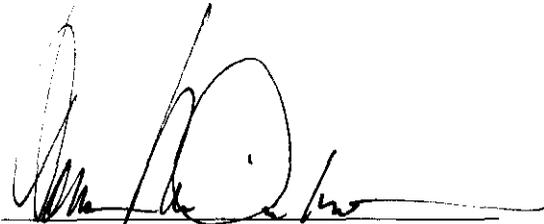
²⁰ See Petition, Attachment A.

CERTIFICATE OF SERVICE

I, Donna M. Crichlow, hereby certify that copies of the foregoing "Comments" were served via U.S. Mail, postage-prepaid, this 29th day of September, 2004, on the parties listed below.

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A handwritten signature in black ink, appearing to read 'Donna M. Crichlow', written over a horizontal line.

Donna M. Crichlow

*Via hand-delivery.