COALITION OF C-BAND CONSTITUENTS

September 29, 2004

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
Portals II
445 12th Street, SW
Washington, D.C. 20554

Re: Opposition of the Coalition of C-Band Constituents, Request for Waiver of Measurement Procedures for OFDM Ultrawideband Devices, ET Docket No. 04-352

Dear Ms. Dortch:

The Coalition of C-Band Constituents ("Coalition") submits this letter and the attached engineering study in opposition to the waiver request submitted by the Multi-band OFDM Alliance Special Interest Group ("MBOA-SIG") requesting a waiver of the Commission's Part 15 rules regarding ultra-wideband ("UWB") systems that employ multi-band orthogonal frequency division multiplexed (MB-OFDM") modulation techniques. MBOA-SIG requests that the average emission levels from UWB MB-OFDM transmitters be measured under normal operating conditions instead of with the band sequencing stopped.

As the attached engineering study demonstrates, the MBOA-SIG proposal would allow an almost four-fold increase in power by means of alternative and flawed metrology. This power increase will cause materially more interference while seeming to be operating in a compliant manner. Even though the pulsations in power will only last 242.2 nS under the MBOA-SIG proposal, it will still result in a material number of symbols in many systems that will suffer interference from the MB-OFDM emissions. This increase in harmful interference is unacceptable and requires Commission rejection of the MBOA-SIG waiver request.

Please address any questions to the undersigned.

Respectfully submitted,

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Enclosure

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C-Band Coalition Response to MBOA-SIG Waiver Request of August 26, 2004

R. Evans Wetmore, P.E.

September 28, 2004

Executive Summary

The Waiver Request of OFDM-SIG, if granted, would result in an almost four-fold increase in power over competing UWB proposals by means of faulty metrology. In the process, the OFDM-SIG signal would also cause materially more interference into other services as its power would be greatly increased. This Waiver attempts to disguise a power increase as a minor change in measurement technique. This is truly a "wolf in sheep's clothing."

1 Background on MBOA-SIG Proposed System

1.1 Frequency Plan

The MBOA-SIG system operates by transmitting one at a time in a simple fixed sequence three clusters of OFDM QPSK-modulated carriers. Each cluster is 528 Mhz wide and occupies one third of the continuous spectrum of a Band Group. A Band Group occupies 3×528 Mhz, *i.e.*, 1584 Mhz. Each OFDM cluster is identified with a Band ID number.

The spectrum from 3,168 Mhz to 10,560 is divided into five Band Groups according to the following table:

Band Group	**Low Frequency Limit**	**High Frequency Limit**
1	3168 Mhz	4752 Mhz
2	4752 Mhz	6336 Mhz
3	6336 Mhz	7920 Mhz
4	7920 Mhz	9504 Mhz
5	9504 Mhz	10560 Mhz

Within each Band Group except #5 there are three 528 Mhz OFDM clusters. Band Group #5 has two 528 Mhz OFDM clusters.

In the Band Groups, each OFDM cluster has a numeric designation (Band ID) as follows:

Band Group	Band ID	Low Frequency Limit	High Frequency Limit
1	1	3168 Mhz	3696 Mhz
	2	3696 Mhz	4224 Mhz
	3	4224 Mhz	4752 Mhz
2	4	4752 Mhz	5280 Mhz
	5	5280 Mhz	5808 Mhz
	6	5808 Mhz	6336 Mhz
3	7	6336 Mhz	6864 Mhz
	8	6864 Mhz	7392 Mhz
	9	7392 Mhz	7920 Mhz
4	10	7920 Mhz	8448 Mhz
	11	8448 Mhz	8976 Mhz
	12	8976 Mhz	9504 Mhz
5	13	9504 Mhz	10032 Mhz
	14	10032 Mhz	10560 Mhz

There are four simple fixed sequences of the alternation of the OFDM clusters (Band ID's). Each sequence is identified by a TFC

(Time Frequency Code). The TFC's for Band Group #1 occur according to the following table:

TFC Number	Band ID Sequence					
1	1	2	3	1	2	3
2	1	3	2	1	3	2
3	1	1	2	2	3	3
4	1	1	3	3	2	2

1.2 Temporal Plan

Each OFDM cluster is transmitted for 242.4 nS. There is a guard time of 70.1 nS between each cluster.

Six clusters are transmitted repeatedly in one of the four sequences shown in the TFC Table above.

The entire sequence takes 1875 nS which consists of six 242.4 nS cluster transmissions and six 70.1 nS guard times.

2 Power Measurement and Conclusion

The FCC rules specifies the maximum power of an ultra-wideband device measured in a 1 Mhz bandwidth. The value measured will vary materially depending on whether the clusters of OFDM emissions are sequencing or have stopped. The following example illustrates the point:

Assume that the measurement of power is being made in a 1 Mhz bandwidth at 3750 Mhz. Band #2, which extends from 3696 to 4224 Mhz will be emitting two times in any TFC sequence. Therefore, the 1 Mhz passband at 3750 Mhz will experience power twice during the

TFC sequence. In fact, it will experience power for 25.9% of the time of the full TFC sequence.

$$\frac{242.4 \times 2}{1875} = 25.9\%$$

In other words the power averaged over time in the 1 Mhz band at 3750 Mhz will measure 5.9 dB less[1] than the actual maximum power measured with sequencing stopped. In effect, the power will pulsate 5.9 dB above the average. This means that OFDM-SIG will cause materially more interference and yet seem to be operating in a compliant manner. In other words, averaging of a sequencing signal hides the fact that OFDM-SIG has gotten a four-fold power increase over competing UWB systems by virtue of a defective measurement technique.

With the OFDM-SIG metrology there will also be an attendant increase in interference into other services due to the "stealth" increase in radiated power permitted by the defective metrology that is proposed in the Waiver Request. Even though the pulsations of power will only last 242.4 nS, this is a material number of symbols in many systems which may suffer interference from the OFDM-SIG emissions[2].

[1] 25.9% computes to 5.9 dB, *i.e.*, 10 $log(.259)$

[2] An 8PSK C-band satellite downlink carrying compressed HDTV at a rate of 90 Mbits/sec has a symbol time of 33.3 nS.