From: Hans Schantz

To: Behnam Ghaffari
Date: November 08, 2007

Subject: FCC File No. 0303-EX-PL-2007

Message:

In response to your questions?

1) If these devices are being tested with the intention to operate them in accordance with 47 CFR, Part 15.219, then why isn't requested peak EIRP 17 nW (10.37 nW ERP)?

Devices we are developing for commercial use are intended to be compliant with the provisions of Part 15.219. Although mobile compact tags with about 1-2in dimension magnetic antennas are likely to have antenna gains on the order of ?65dBi, in some implementations we may seek to employ fixed transmit beacons using as tall as a 3m whip with a nominal antenna gain around ?40dBi. Assuming a +20dBm nominal transmit power into a 3m whip with about ?40dBi gain, a -20dBm (10uW) EIRP would be appropriate for testing these 15.219 compliant systems.

In addition, we are developing systems for use in military applications under a Phase II SBIR contract from the U.S. Army, as well as in mines under a Phase I SBIR contract from NIOSH. Ultimately, we seek to deploy tracking systems in underground environments under the provisions of Part 15.211 which would allow substantially higher power levels than those of Part 15.219 (subject to the provision that emissions outside the underground environment are Part 15-209 compliant). We would like to be able to conduct brief tests of these systems without having to deploy them in a cave or mine. Typical parameters of these systems will be on the order of a ?40dBi antenna gain and +30dBm transmit power, hence our request to be allowed to go as high as ?10dBm (100uW) EIRP.

2) Also, why is the entire AM band being requested? The requested bandwidth is 500 Hz. Why not select a portion of the AM band in your area that is not being used so that interference is not caused?

We request access to select frequencies across the AM band so that we can make detailed evaluations of system performance at the largest possible number of frequencies consistent with our obligation not to cause harmful interference to the commercial broadcast service. For instance, higher frequencies exhibit better antenna performance and higher SNR, but their shorter wavelengths yield smaller near-field zones. Conversely, lower frequencies exhibit worse antenna performance and lower SNR, but their longer wavelengths yield larger near-field zones.

Also, the ultimate commercial system we seek to develop will require large numbers of tags operating in a particular area ? the more the better. We would like to be able to test as many as a hundred tags simultaneously. Although the receiver -3dB bandwidth is 500Hz, we will probably need to space tag channels 1-3kHz apart to achieve good isolation. We can't tell yet whether these tags should be placed toward the upper end, the center, or the lower end of the band, so having many options is important.

We believe a 20kHz guard band (i.e. +/- 10kHz) around commercial broadcast frequencies will provide broadcast stations with adequate protection, particularly since many in the industry are moving closer to 5kHz audio bandwidths [1, 2, 3]. In a quick test using a Realistic DX-302 receiver, we found no interference when a signal generator broadcast a 250mW signal as close as 4kHz to a broadcast station within 10ft of the receiver. An audible tone became evident only within about 3.5kHz. A 10kHz offset from broadcast stations provides a conservative safety margin.

We obtained a list of the 39 stations with signal strength estimated at greater than 0.15mV/m (i.e. a fringe or barely perceptible signal) for our local zip code (35816) from Radio-Locator [4]. The following bands (in kHz) are all 10kHz or more away from one of these local stations: 540-550, 600-680, 700-720, 750-760,

780-790, 820-840, 920-990, 1010-1040, 1090-1100, 1120-1130, 1170-1180, 1200-1220, 1250-1300, 1340-1370, 1410-1440, 1470-1480, 1500-1540, 1560-1590, 1610-1690kHz. We can modify our requested frequency band of operation to include all these bands or equivalently make our request 540-1710kHz subject to the requirement to operate at least 10kHz away from any commercial broadcast station.

Please feel free to contact us with any further questions.

References:

[1] ??an ?above average? receiver today has audio response that is less than 4.5 kHz. In fact most have audio response that is down 10-12 dB at 5 kHz - and the rolloff can start at around 2 kHz. As far as I am aware, there is only one commonly manufactured radio that has more than 4.5 kHz audio bandwidth, the GE SuperRadio (in Wide Band mode); that one is good to about 6 kHz before it's significantly rolled off.? (Jeff Littlejohn, Senior VP, Engineering, Clear Channel as quoted at http://www.rwonline.com/reference-room/iboc/05_rw_bandwidth.shtml).

[2] ?The sub-group [Test Procedures Working Group of the NRSC DAB Subcommittee] chose four radios as representative of the huge number of AM radios in use. Among the findings: The vast majority of the AM radios in use today are very narrow-band. Few have any significant audio output at 4 kHz and no practical output at 8 kHz. There is almost no wide-band listening to AM. Although the GE Super Radios and C. Crane radios being marketed have wide-band switches that provide response beyond 5 kHz, CEA considers the quantity in use to be insignificant. Up until recently, the C. Crane radios were very narrow-band. The company supplied me with a sample during the test procedures process.? (Andy Laird, vice president of radio engineering for Journal Broadcast Group, a member of the DAB subcommittee of the NRSC, chairperson of the Test Procedures Working Group and a member of the Evaluation Working Group as quoted at http://www.rwonline.com/reference-room/iboc/04_rw_am_iboc_6.shtml).

[3] National Radio Systems Committee, Summary Report: Consumer Testing of AM Broadcast Transmission Bandwidth and Audio Performance Measurements of Broadcast AM Receivers, December 2006. See: http://www.nrscstandards.org/AMB/AMSTG%20report%20summary.pdf

[4] See: http://www.radio-locator.com/cgi-bin/locate?select=city&city=35816&state=AL&band=AM&is_lic=Y&is_cp =Y&format=&dx=2&radius=&freq=&sort=freq&sid=