

Via Electronic Filing
May 7, 2010

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

In the Matter of	{	MM Docket No. 99-325
Digital Audio Broadcasting Systems	{	Implementation of: DA 10-208
And Their Impact on the Terrestrial	{	
Radio Broadcast Service	{	

PETITION,
Regarding the Addition of Administrative Tasks in the Implementation of:
DA 10-208, an Order authorizing IBOC Subcarrier Power Increases
for most FM Broadcasting Stations.

Dear Ms. Dortch:

I, Sidney E. Shumate, as President of Givens & Bell, Inc., hereby re-submit this Petition with regard to certain administrative tasks regarding the implementation of the Order, DA 10-208, adopted January 27, 2010, and released January 29, 2010, (Order) authorizing increases in IBOC subcarrier power for most FM Broadcast Stations transmitting in IBOC.

RESUBMISSION STATEMENT:

I originally submitted this Petition on April 5, 2010 via Electronic Filing, in an unintentional untimely manner, in that the original Order had not yet been published in the Federal Register. The original Order now having been published in the Federal Register, I am resubmitting this Petition within the 30 day window following publication, out of an abundance of caution, in that I have observed that other Petitions filed regarding this Order have been dismissed by letter due to their also being filed before the Order was published in the Federal Register. Other than this resubmission statement, and the date of submission, the Petition I am resubmitting is essentially identical to the April 5, 2010 Petition. I ask that this Petition be considered in lieu of the April 5, 2010 Petition I submitted.

I hereby Petition the Federal Communications Commission (Commission) to require that the FM broadcast station licensees applying to increase IBOC sideband power be required to report, on the four times (to -14 dBc) power increase Digital Notification form, or the application to increase IBOC power beyond -14 dBc, the highest mode of subcarrier operation of the Hybrid IBOC standard (normally referred to as MP1 or MP3) that the station intends and proposes to use. I also Petition the Commission to require, in the engineering section of the station's regular license renewal application, a statement or verification of the current IBOC subcarrier mode (MP1 to MP3) of operation in use, if transmitting Hybrid IBOC, in addition to the IBOC subcarrier power level in use.

I also Petition that the Commission require that this information be used to update and expand the "IBOC FLAG" (Flag) datum in the FCC CDBS database, or any related information store that may in the future supplant it, to indicate both the level of IBOC subcarrier power and the IBOC subcarrier operating mode (MP1 or MP3) of the station.

I merely suggest that the Flag be modified to contain 3 digits. I also merely suggest that that the first two digits represent the power, as a percentage referenced to the analog total power, of the IBOC sidebands, and I also merely suggest that the last digit indicate the operating mode (MP1 to MP3) of the IBOC subcarrier. As an example of these suggestions, for an analog-only station, the flag would read "000", and for an FM station transmitting Hybrid IBOC at 10% (-10 dBc), in Mode MP3, the flag would read "103".

WHY:

I ask this to provide for the gathering of information to provide for further study, both by the FCC's audio division engineers, professional consulting engineers, and private research firms including Givens & Bell, Inc., (which produces comprehensive market interference analysis studies, and therefore has standing to Petition) of the higher potential for interference to reception of a first adjacent analog FM station from a station transmitting in IBOC with MP3 mode, as compared to transmitting in MP1 mode. This higher interference includes the potential for interference to the analog FM station within the protected contour of the analog FM station. This higher level of interference, based on the IBOC mode of operation, was measured and reported in the Advanced IBOC Coverage and Compatibility Study (AICCS report) dated Nov. 24, 2009, and presented before the Commission by NPR Labs.

BACKGROUND:

The power increase formula (Formula) proposed by NPR Labs in the AICCS report, agreed to by iBiquity, and adopted by the Commission in the Order, is:

$$\text{Allowable IBOC power} = [2.27 * (60 - (\text{IBOC station F}(50,10)\text{dBu})) - 33.6]$$

The 2.27 term in the formula refers to the ratio of: a four dB increase in IBOC power, from -14 dBc (or 6%) to -10 dBc, (or 10%), to: the accompanying loss in signal-to-noise ratio in the received audio of the interfered-with analog FM station as the IBOC sideband power increases from -14 dBc to -10 dBc, of 1.76 dB (1.76-0), or:

$$2.27 = 4 \text{ dBc} / 1.76 \text{ dB}$$

This is based on the minimum reception interference found, that of an IBOC signal transmitting in Mode MP1 to a first adjacent analog FM signal, at the low signal reception levels generally occurring at the edge of the analog station's protected contour. Less interference is found at these weak signal levels because the input filters of the receivers have automatically narrowed their bandwidth down to receive only monophonic audio, in order to reduce the amount of noise and interference in the received audio.

The average levels of this interference, as measured by NPR Labs, is shown in Figure 37, page 44 of the AICCS report, where the SNR loss of the analog FM audio signal received due to interference from the IBOC signal at MP1 mode at -14 dBc IBOC power is 0 dB, and for -10 dBc IBOC power is 1.76 dB. The line identification key in the box on the right hand side of Figure 37 uses P1 and P3, respectively, to represent the MP1 and MP3 modes of operation.

This ratio can more clearly be seen in the navy blue "Wide Space Allowance" line in Figure 28, on page 31 of the AICCS report, where we see, above the -14 dBc Allowable IBOC power (dBc) red line, an increased loss of SNR ratio of 1.76 dB, from 8.62 dB to 10.38 dB, in the F(50,50)-F(50,10) D/U Ratio, (dB), for a four dB increase in Allowable IBOC Power (dBc), in the MP1 Mode of operation. Inverting the slope (1/slope) of this line results in the 2.27 ratio factor.

Therefore, the Formula adopted by the Commission is based on the minimum interference to first adjacent analog FM stations in weak signal areas, received from IBOC-transmitting stations operating in digital sideband mode MP1.

Mode MP1 was the original mode designed for use by IBOC stations transmitting only one program stream in Hybrid mode, where failure of the digital signal causes the receiver to "fade back" to analog reception. IBOC subcarrier mode MP3 generates a wider sideband, providing more digital data throughput, and is therefore preferred for multicast operation, where it is being used to transmit up to four simultaneous digital programs.

Approximately half of the FM IBOC stations now on air are already transmitting multiple digital program streams. Since providing more reliable multicast reception is one of the arguments used to support the IBOC power increase, it can be expected that the power increases granted by the Commission will promote the continued expansion of multicast IBOC transmission. A continuing increase is expected in both the number, and percentage of the total, of FM IBOC stations transmitting in MP3 mode. Additional

technical details and a graphic comparison of the MP1 and MP3 modes can be found in section 7.3.1, Hybrid Service Mode, of the AICCS report.

NPR Labs found that MP3 mode provides higher levels of interference than MP1 mode. Returning to Figure 37 of the AICCS report, and comparing the green MP3 mode line to the navy blue MP1 mode line, it can be seen that the average SNR loss of the first adjacent analog FM station's audio reception is 5 dB at -14 dBc (6% IBOC power) in MP3 mode, a full five dB higher than the 0 dB average measured for MP1 mode. At -10 dBc (10% IBOC power), the average SNR loss of the first adjacent analog FM station's audio reception is 8 dB in MP3 mode, more than four times (6 dB) higher than the 1.76 dB average measured in the MP1 mode.

Therefore, stations transmitting with MP3 mode IBOC subcarriers at -14 dBc will be allowed under the current rules to interfere with their first-adjacent neighbors, causing up to an average 5 dB loss in SNR of the received analog FM audio of the first adjacent analog FM station within the first adjacent station's protected contour. For those stations allowed to transmit with -10 dBc IBOC sideband power, as allowed using the Formula, and operating in MP3 mode, they will be allowed under the current rules to interfere even more with their first-adjacent neighbors, causing up to an average 6.24 dB (8 dB -1.76 dB) loss in SNR of the received analog FM audio of the first adjacent station, within the first adjacent station's protected contour.

As the received signal level increases, the interference increases. This is because the bandwidth of the input filters in the receivers widen at higher signal levels to allow stereo reception, and in doing so also allow in more interference. Figure 38, on page 44 of the AICCS report, shows that this increased level of interference due to MP3 mode operation increases more than the interference from MP1 mode does, as the signal level increases. The average SNR loss due to IBOC interference in MP3 mode at a strong (-45 dBm) signal level increases to 14 dB for MP3 mode at -14 dBc, and to 18 dB at -10 dBc. This is much higher than the measured 3 dB at -14 dBc, and 8 dB at -10 dBc for the MP1 mode. This increases the "swiss cheese" terrain-related spot losses within the protected contour, found at locations where the desired station signal is weakened or blocked by hills and buildings, but the interfering signal is at full strength.

As the use of MP3 mode continues to increase, there is, and will be, a continuing increase in the potential for interference from IBOC stations transmitting in MP3 mode to the reception of analog FM stations. It is because of this new information provided by NPR Labs in the AICCS report, that Givens & Bell has not issued its final report on reception in the Washington D.C. market. We are rewriting our analysis software to reflect this new information, but are currently limited by using a weighted average of IBOC interference in the cases where we do not currently know what mode of operation is being used by a station transmitting IBOC. The earlier preliminary and interim reports from Givens & Bell, Inc. for the Washington, D.C. market, presented before the FCC during the comment period for the power increase, were based on a 3 dB SNR loss in all cases, as measured in the early ATTC receiver laboratory tests for a strong received signal, 1% IBOC power, and MP1 mode.

SUMMARY:

Since the FCC adopted a power increase Formula based only on the minimum average MP1 mode interference level at the protected contour, any FM IBOC station that is multicasting and operating in MP3 mode has significant potential to interfere with its first adjacent analog station neighbors well within their protected contours, even in the absence of short-spacing and terrain factors. To the casual listener this interference sounds similar to incoherent noise interference or to signal weakness due to terrain or multipath fading issues. Since this interference is difficult to recognize and separately identify as IBOC interference, a comprehensive interference prediction analysis is a useful tool to quantify areas at risk of IBOC MP3 vs. MP1 mode interference, and it is very important in this analysis to know whether the interfering station transmitting IBOC is transmitting in MP1 or MP3 mode. Therefore, I have presented this Petition requesting that the Commission gather, as a part of the notification or application process, and make available, information regarding both the IBOC subcarrier power and subcarrier bandwidth (MP1 to MP3) mode used by FM stations transmitting IBOC.

Sincerely yours,

A handwritten signature in black ink that reads "Sidney E. Shumate". The signature is written in a cursive style with a large, prominent initial "S".

Sidney E. Shumate, President
Givens & Bell, Inc.
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