

**ENGINEERING STATEMENT IN SUPPORT OF
OPPOSITION TO PETITIONS FOR RECONSIDERATION
FEBRUARY 2011**

The following engineering statement has been prepared on behalf of Cellular South, Inc. (“CS”) concerning ET Docket No. 04-186, Unlicensed Operation in the TV Broadcast Bands and ET Docket No. 02-380, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band. The purpose of this statement is to address technical proposals put forth by three parties petitioning the Commission for reconsideration regarding its September 23, 2010 decision in the “white spaces” rulemaking.

The Wi-Fi Alliance Petition

The WI-Fi Alliance petitions the Commission (1) to modify the out of band emission (OOBE) mask to lower equipment costs and (2) to allow personal/portable devices to operate on adjacent channels in urban and suburban environments.

In recognition of the need to protect Lower 700 MHz Block A base stations CS has requested that Section 15.709 OOBE requirements be applied to all CH 51 devices operating with an ERP of 40 mW or less and that any portable device operating with an ERP of 100 mW or greater be precluded from operation in CH 51 anywhere in the United States. This requirement is based on the fact that CH 52 is allocated to the wireless service throughout the United States. Thus, the WI-Fi Alliance proposal for relaxation of the established OOBE requirements, or for allowing operation of 100 mW portable devices on TV Channel 51, would cause significant interference to Lower 700 MHz Block A base stations.

The proposal to allow Personal/Portable devices to operate on adjacent channels in urban and suburban areas suggests that these devices be allowed to operate inside the protected contours of television broadcast stations. This proposal appears unmanageable as there is no precise definition of what constitutes urban and suburban environments. More importantly, the proposal fails to recognize that TV signals are significantly reduced by the attenuation of surrounding structures making them more susceptible to interference. Further, and as stated above, any operation on CH 51 at a power level in excess of 40 mW is likely to be a source of significant impermissible interference to Lower 700 MHz Block A base stations operating in the CH 52 spectrum. Devices operating with a power of 40 mW or less need to be at least 0.1 kilometer or greater from a registered base station location.

The Wi-Fi Alliance admits that GPS devices cannot be relied upon to accurately identify the location of a Mode II Device as it stated “But more likely, insufficient satellite signal detection will make the required geo-location information impossible to discern.” It is believed that the likely result of allowing these devices to operate within adjacent channel contours, without location controls, will be to cause destructive interference.

The Motorola Petition

The Motorola Petition recommends that fixed TVBDs be allowed to operate with less stringent OOB requirements by increasing the distance from the TVBD to the protected station’s contour. Geo-location devices would be employed to confirm that the TVBD is located at or beyond the proposed additional distance from a protected station’s contour. Motorola’s concept would provide a benefit if there were areas where there were no first adjacent channel stations. That is not the case with Channel 51, however. Because Lower 700 MHz Block A base stations may be located on CH 52 anywhere in the United States, the Motorola proposal would be of no benefit to TVBD operation on CH 51 if Lower 700 MHz Block A facilities are provided protection equivalent to other TV band incumbents. If they are not provided that protection, the Motorola proposal would significantly increase destructive interference to those facilities.

Motorola proposes that the adjacent channel OOB limit be increased from -72.8 dBm to -47.8 dBm representing a 25 dB increase in allowable out of band radiation. This is a significant (316 times more power) increase in OOB and would impact Channel 52 base station operation by TVBD operation not just on CH 51 but also CH 50 and CH 49. The reason for this is that the OOB emissions attenuated only -47.8 dBm are strong enough to potentially impact 2nd and 3rd adjacent channels as well as 1st adjacent channels as will be described fully below.

Section 15.709(c)(3) states “At frequencies beyond the television channels immediately adjacent to the channel in which the TVBD is operating, the radiated emissions from TVBDs shall meet the requirements of §15.209.” Section 15.209(a) sets the limit on radiated emission in the UHF TV band at 200 uV/m at a distance of 3 meters from the radiator, which is equivalent to -61 dBm. CS stated in its Petition For Partial Reconsideration that the in-band interference level limit, as established by equipment manufacturers, is -114.5 dBm. Based on free space loss calculations, a CH 51 TVBD signal must be attenuated an additional 53.5 dB, requiring a distance separation of 54 feet from a TVBD employing the Motorola proposed, relaxed, emission mask. This additional separation is not necessary if the FCC maintains the adopted 72.8 dB attenuation value for adjacent channels. The reason is that a ten section

mask filter would typically be expected to be required to achieve this level of attenuation. Adequate OOB attenuation of CH 49 and 50 signals in the CH 52 spectrum would be expected when this type of filter is employed. See *Figure 1* attached for sample 10 pole filter response for purposes of depicting skirt attenuation outside filter passband only.

Motorola notes that land mobile services operating on TV Channels 14-20 are protected from 1st adjacent channel TVBD operation by a 131 kM separation requirement. Logic would indicate that should the Commission decide to relax the OOB mask as proposed by Motorola that fixed TVBD operation on Channels 49-51 should be prohibited for devices operating with the relaxed mask in order to protect Lower 700 MHz Block A operations. Additional adjacent 2nd and 3rd channel protection for land mobile operations on TV Channels 14-20 would also be in order.

It is noted that Motorola states that network capacity is limited by the mask requirements and that there are cost penalties associated with the current narrow mask. This may be true at this point where very little effort has been made in the design and testing of TVBDs. Motorola overlooks the likelihood that as technology continues to evolve, these problems will be surmounted to the betterment of the industry as a whole. Further, in the Second Memorandum Opinion and Order, at paragraph 87, the Commission stated “As noted above, we will assume the maximum transmit bandwidth used to be the full 6 MHz channel. We will therefore base the increase in adjacent channel attenuation on a bandwidth ratio of 6.0 megahertz/100 kHz or 17.8 dB. Thus, we are revising the required adjacent channel attenuation to be 72.8 dB.” The emission mask which Motorola has included on page 4 of its Petition For Reconsideration does not take maximum advantage of the 6 MHz channel as would a modified standard DTV mask filter specified in ATSC A/64B, 26 May 2008 “Recommended Practice: Transmission Measurement and Compliance for Digital Television Document.”

Finally, it should be recognized that the viable operation of TVBD devices requires the incorporation of sharp tuned filters in the receiver in the TVBD device for the purpose of rejecting interference from adjacent channel television broadcast and other emitters. Development of better filter technology at lowered cost will only benefit TVBD operation and reliability.

The Wireless Internet Service Providers Association Petition

The Association, like Motorola, proposes to relax the emission mask to enable the deployment of more affordable fixed TVBDs. The Association would relax the mask as Motorola proposes, from -72.8 dBr to -47.8 dBr. For the reasons stated above, any change in the OOB emission requirements for TVBD fixed facilities operating on TV Channels 49-51 would create increased interference to Lower 700 MHz Block A facilities.

The Association does raise an interesting point through its demonstration that portions of the country are precluded from fixed TVBD operation by the requirement that the ground level HAAT not exceed 76 meters. The proposed solution is to allow a maximum HAAT of 250 meters at all locations in the United States. A simpler solution, and one with far less interference potential, would be to limit antenna elevation AGL at sites with a ground HAAT in excess of 76 meters to 30 meters. The 30 meter AGL solution is believed superior for several reasons. First, it removes the current preclusion for fixed TVBD operation at locations in the United States where the ground elevation HAAT exceeds 76 meters. Second, and most important, it limits the potential for widespread interference in the bulk of the country (see the Association's Appendix B) where the ground elevation HAAT does not exceed 76 meters but the Association proposes that the HAAT can be as great as 250 meters. Operation with a HAAT in excess of 76 meters in low flat areas can significantly extend the interfering contour beyond the 16.1 km radius in which terrain is considered in calculating HAAT. As an example, a 25 dBu F(50,10) interfering contour for a 4 watt ERP on UHF TV Channels extends out 31.3 kilometers for a 76 meter HAAT and 48.8 km for a 250 meter HAAT. Third, in areas where the ground elevation is greater than 76 meters the HAAT on a number of radials is expected to be negative. Further, due to the rough nature of the terrain, even though some radials may show significant HAAT values, there is typically terrain blockage (non-line of sight transmission) resulting in less propagation distance than the HAAT method predicts. It is noted that restricting antenna elevation to no more than 30 meters is believed crucial to limiting interference.

As stated in its Petition for Partial Reconsideration, CS reiterates that any fixed TVBD operation on CH 51 should be prohibited since CH 52 is allocated for use by Lower 700 MHz Wireless Block A license facilities.

The foregoing was prepared on behalf of **Cellular South, Inc.** by Clarence M. Beverage of *Communications Technologies, Inc.*, Marlton, New Jersey, whose qualifications are a matter of record with the Federal Communications Commission. The undersigned certifies, under penalty of perjury, that the statements herein are true and correct of his own knowledge, except such statements made on information and belief, and as to these statements he believes them to be true and correct.

By _____

Clarence M. Beverage
for Communications Technologies, Inc.
Marlton, New Jersey

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FIGURE 1

