NEW AMERICA
FOUNDATION

April 2, 2007

Ex Parte

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

Re: TV White Spaces Proceeding, ET Docket Nos. 04-186, 02-380

Dear Ms. Dortch:

This letter addresses misleading statements made by Association for Maximum Service Television, Inc. (MSTV) in an *ex parte* presentation[1] made to the OET staff on March 19, 2007 and filed four days later at FCC on March 23, 2007, in apparent violation of §1.1206(b) of the Commission's Rules.

On p. 14 of the presentation is the chart shown below in Figure 1.

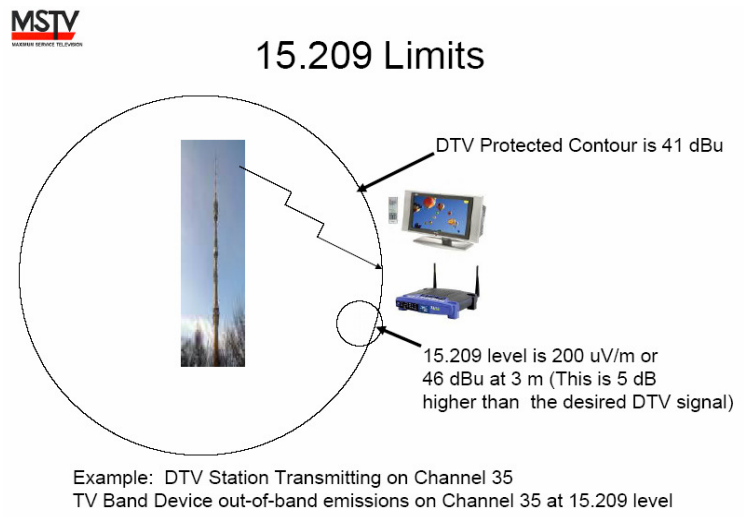

Figure 1. MSTV Presentation page 14

[1] Notice of Ex Parte Communication of Association for Maximum Service Television (MSTV), Docket Nos. 04-186, 02-380, March 23, 2007, http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518914335 and http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518914336.

This chart shows that the present §15.209 limit which the NPRM proposes for TV band devices would result in a 46 dBu signal at the "DTV protected contour" which would be "5 dB higher than the desired DTV signal." MSTV, like Lord Nelson at the Battle of Copenhagen holding his telescope to his blind eye, continues to ignore and fails to even acknowledge the long standing precedent of Docket 20780, which in 1979 set the emission limits for digital devices/personal computers that have successfully protected the minority of homes that use over-the-air reception to view television channels.

Here is the section from the NAF, *et al.* Technical Reply Comments[2] that addresses this important precedent:

> NAF, *et al.* has repeatedly mentioned[3] the 1979 precedent of Docket 20780 that successfully set limits on home computer emissions to protect television reception[4] and other licensed services. No other party has mentioned this precedent and it appears that the opponents of this rulemaking would like to set the emission limits of TV band devices so that they cause no interference at distances less than 1 meter. It is unclear whether existing regulated devices, such as 800 MHz cellular telephones, would meet such a limit, and it is clear that widely used home appliances such as vacuum cleaners can not meet such a limit.[5] Considering the enormous opportunity cost of losing any channels that could be used for low-power home, enterprise and neighborhood networking, it would be unproductive and paternalistic to set an emission limit at any distance that was not considered essential to protect the use of licensed services in *neighboring* households or businesses – certainly not those on the consumer's own premises.
>
> In Docket 20780, the Commission based its emission limit for digital devices/personal computers on the assumption that "the home computing device is at least 10 meters from the receiver. The separation distance is a basic parameter in computing tolerable levels of signal that may be radiated by a computer." The Commission then stated, "(w)e are most interested in protecting

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[2] Technical Reply Comments of NAF, *et al.*, Docket 04-186, March 2, 2007 at p. 6-7 http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518909933.

[3] Technical Comments of NAF, *et al.*, Docket 04-186, Jan. 31, 2007 at p. 8; Michael J. Marcus, Paul Kolodzy, and Andrew Lippman, "Why Unlicensed Use of Vacant TV Spectrum Will Not Cause Interference with Television Reception," New America Foundation Issue Brief #19, July 2006 at p. 4, http://www.newamerica.net/files/IssueBrief19.UnlicensedTVBand.MarcusKolodzyLippman.Final_.pdf.

[4] Some people falsely assume that since computer clock speeds are above 1 GHz at present, that the risk to TV reception from personal computers is historical only. However, as testing records from the Commission's laboratory will confirm, today's personal computers have unintentional emissions at lower frequencies than the well publicized clock rate. Thus, the limits established in Docket 20780 still serve a real role in protecting receivers.

[5] While the Commission does not presently regulate home appliances that are unintentional emitters, §302(a) of the Communications Act of 1934, as amended, clearly gives it such jurisdiction. Thus, the failure to regulate such interference sources is implicit recognition that short range interference is acceptable in a household.

an individual who is receiving interference from his neighbor's computer. To a lesser extent, we are concerned about devices in the same household."[6]

It is important to note that 10 meters was considered a very conservative and cautious limit. In the same Report and Order, the Commission left the door open for minimum protection distances greater than 10 meters, in cases such as the instant proceeding, where the transmissions have communications value, by stating,

> We believe that in most cases interfering radiation from computing devices is a less valuable use of spectrum than the radio and television services that would be interfered with. Therefore, we consider it appropriate that our regulations deny to computing devices an interfering use of the spectrum (except where the interference is to other equipment of the computer owner). We have made this judgment by comparing the benefits of allowing current uses of spectrum to continue without interference from computing equipment with the costs of denying interfering use of the spectrum to computers.[7]

But, since the communications signals of the TV band devices under consideration are not unintentional noise without content as referred to in Docket 20780, the same logic would indicate that higher emissions would be appropriate.

MSTV/NAB has stated, "whenever any device is in proximity to any television receiver, the risk of interference will increase." [8] While this is technically true, it ignores the longstanding approach of Docket 20780 and the fact that many regulated *and* unregulated devices "in proximity to any television receiver" will and do cause interference. In a similar vein, the TV Transmission Antenna Group (TVTAG) states that a "portable device ('TV band device' in the nomenclature of the FNPRM), especially in apartments, could be as close as 0.5m to the nearest indoor TV antenna."[9]

MSTV/NAB, TVTAG, and other opponents seem not to be aware of the Docket 20780 precedent and the success it has had in virtually eliminating interference complaints from digital devices. They advocate an impractical protection standard that, if implemented consistently among electrical and electronic products sold for home use, would escalate consumer costs and restrict spectrum and product availability for no real benefit. This is not the approach the Commission has taken in the past 28 years.

Thus, a major issue in this proceeding is what distance TV receivers should be protected at. While MSTV implies that 3 meters (about 10 feet) is the obvious answer, long standing successful Commission precedent says it should be 10 meters or greater.

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[6] Report and Order, Docket 20780, 79 F.C.C.2d 28 (1979) at ¶¶53-54.
[7] *Id*. at ¶67.
[8] Comments of NAB, MSTV, Docket 04-186, January 31, 2007 at p. 8.
[9] Comments of TVTAG, Docket 04-186, January 31, 2007 at p. 8.

The MSTV chart in Figure 1 also uses the phrase "protected contour". Let us repeat from our Technical Reply Comments our observation on MSTV's use of this phrase in their comments:

> MSTV/NAB repeatedly use the phrase "protected contour" in their comments but neither define it nor reference its definition. A search of the Commission's Rules shows that this term is only used in §73.6010 and only in the context of a Class A low power television station. We assume they are referring to their licensed service area within the DMA, which does not, of course, include rights to operate on the same frequency in an adjacent market (i.e., co-channel).[10]

The MSTV chart reproduced in Figure 1 implies that the TV set can receive a 41 dBu signal and that the TV band device could be 3 meters away at the same time. This is an example of the rhetorical tricks MSTV has been using consistently—assuming worst cases for every subproblem regardless of whether they could all be true at the same time. Yes, a home TV receiver can receive a 41 dBu signal, but reliable reception of this low a signal level requires an antenna with 10 dB or more antenna gain. Such antennas are typically used in rural areas and are generally roof-mounted due to their size and the desire to use antenna height advantageously. The height of such antennas makes short distances to TV band devices unlikely. Furthermore, such antennas are intrinsically directional, which in turn decreases the likelihood of interference from a given source.

MSTV then quotes a previous NAF filings, saying:

> NAF states that KU data indicates that 100 mW TV band device does not cause interference to DTV receivers tested, "if the channel used is avoided, and **if the adjacent channel is also avoided**."(Emphasis added by MSTV.)

The quote is correct but is misleading in this context. NAF and its collaborators at the University of Kansas could not test every possible TV band device modulation format. For simplicity, KU tested an OFDM signal, like 802.11g and WiMAX, centered in an individual TV channel and occupying the whole channel. This is shown in Figure 2.

MSTV failed to mention the following statement of NAF, *et al.* in its Reply Comments on this issue:

> NAF, *et al.* does acknowledge that 100 mW transmitters occupying a full 6 MHz channel immediately adjacent to a weak TV signal may cause interference, particularly if the device does not employ an especially efficient transmission mask (the ability of devices to do so, now or in the future, should be left to the FCC's device certification process). It would not cause interference to a strong signal, however. It would not cause interference if it was offset by half a channel

[10] Technical Reply Comments of NAF, *et al.*, Docket 04-186, March 2, 2007 at fn. 22.

> as is often done in Part 90 systems. In our comments in this proceeding,[11] we urged the Commission to adopt a model that weights the total power in the bands on either side of the TV band device emission by a reasonable representation of the frequency response of a TV receiver.[12]

The basic problem here is the antiquated nature of the "yard stick" FCC uses to define emissions, focusing on test equipment that emulates the 1940's Stoddart-Singer noise meters with 100 kHz measurement bandwidths. If FCC insists that this is the only way to quantify emissions, then MSTV may well be right and the only possible approach is to avoid completely adjacent channels. (Although, even so, we note that adjacent channel interference can only occur if the desired TV signal is weak -- and a device combining sensing/detection with Total Power Control could make use of the adjacent channel, even if it backs down to a very low power level. New technologies could improve upon this in the future, reducing the underutilization of adjacent channel spectrum.)

The focus on 100 kHz measurements was originally intended to standardize equipment in testing laboratories so that multiple laboratories with modest equipment inventories could do the required tests for manufacturers. However, not only are Stoddart-Singer noise meters no longer used, they are no longer manufactured! The FCC Laboratory and private laboratories use contemporary digital spectrum analyzers such as the Agilent Technologies E7400A Series EMC Analyzers and Precompliance Systems with EMI measurement software,[13] and such contemporary technology is capable of more appropriate measurement techniques and "yard sticks" that relate directly to the interference potential of devices on adjacent band signals.

Since submitting our comments and reply comments, we have become aware that the 3G cellular community is using a technique similar to what we have discussed for quantifying adjacent channel interference. In this context, Adjacent Channel Leakage Power Ratio (ACLR) is defined as the ratio of the transmitted power to the power measured after a receiver filter in the adjacent RF channel.[14]

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[11] Technical Comments of NAF, *et al.*, Docket 04-186, January 31, 2007 at pp. 29-30.
[12] Technical Reply Comments of NAF, *et al.*, Docket 04-186, March 2, 2007 at p. 15.
[13] *See* http://www.home.agilent.com/agilent/redirector.jspx?action=obs&nid=-536900158.3.00&lc=eng&cc=US&ckey=1000033133%3Aepsg%3Adow&pubno=5968-2516E&ltype=LitStation&ctype=AGILENT_EDITORIAL and http://www.home.agilent.com/agilent/redirector.jspx?action=obs&nid=-536900158.3.00&lc=eng&cc=US&ckey=1000082804%3Aepsg%3Adow&pubno=5988-3290EN&ltype=LitStation&ctype=AGILENT_EDITORIAL.
[14] *See* http://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_03/Docs/Pdfs/RP-99231.pdf and http://wireless.agilent.com/rfcomms/refdocs/wcdma/wcdma_meas_aclr_desc.php.

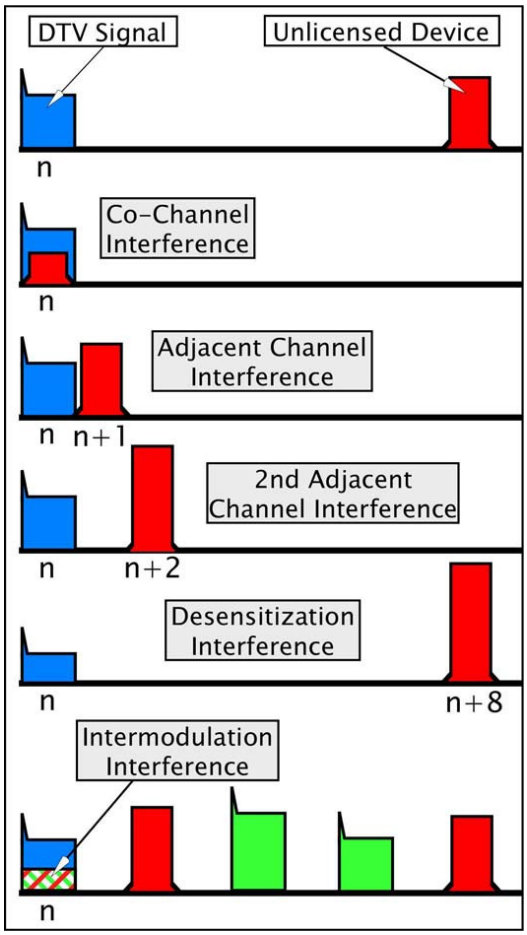

Figure 3. KU test scenarios (Figure 2 of KU report)

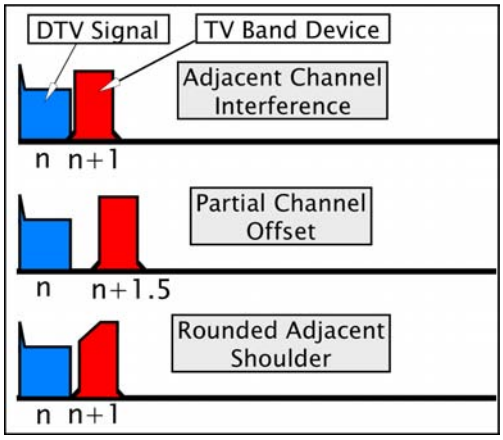

Figure 2. Alternatives for limiting adjacent channel

If the designer of a TV band device wishes to use a channel adjacent to an occupied TV channel, this can be done without interference if either the TV signal is strong or if the TV band device signal is offset from the channel edge or has a rounded shoulder next to the occupied channel that limits how much power leaks into the TV receiver due to its filtering limitations. This is shown in Figure 3 where the original adjacent channel configuration of Figure 2 is compared with partial channel offset and rounded shoulders.

Note that under the literal rules proposed in the FNPRM with 100 kHz measurements, all three options in Figure 3 would meet the same limit, but in reality they differ greatly in interference potential. A measurement approach based on ACLR would quantify the potential objectively and could be easily implemented with widely available test equipment. Such a measurement approach would also avoid requiring the Commission to choose among the approaches of Figure 3 but would allow system designers to use any technical approach consistent with protecting adjacent channel TV receivers.

We would like to remind the Commission that while consumer grade TV receivers are somewhat susceptible to adjacent channel interference, stronger adjacent channel signals only lead to interference if they are significantly stronger than the intended signal. This is illustrated in the real world of Lawrence, Kansas, where there are two pairs of adjacent channel DTV signals—channels 23 and 24 and channels 47 and 48—with differing signal strengths, each occupying a full 6 MHz channel with "square shoulders" up to the band edge. All four can be received successfully with consumer DTV receivers. The relative signal strengths are shown in Figures 4 and 5.

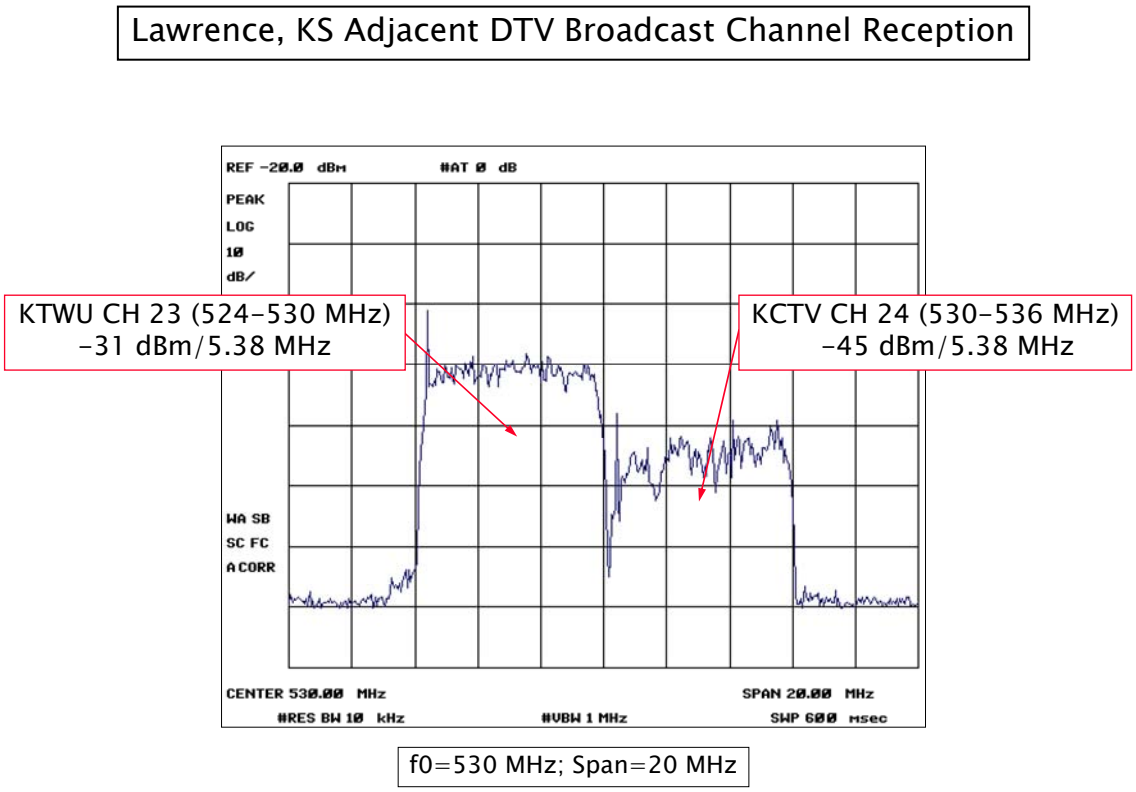

Figure 4. Channels 23 and 24

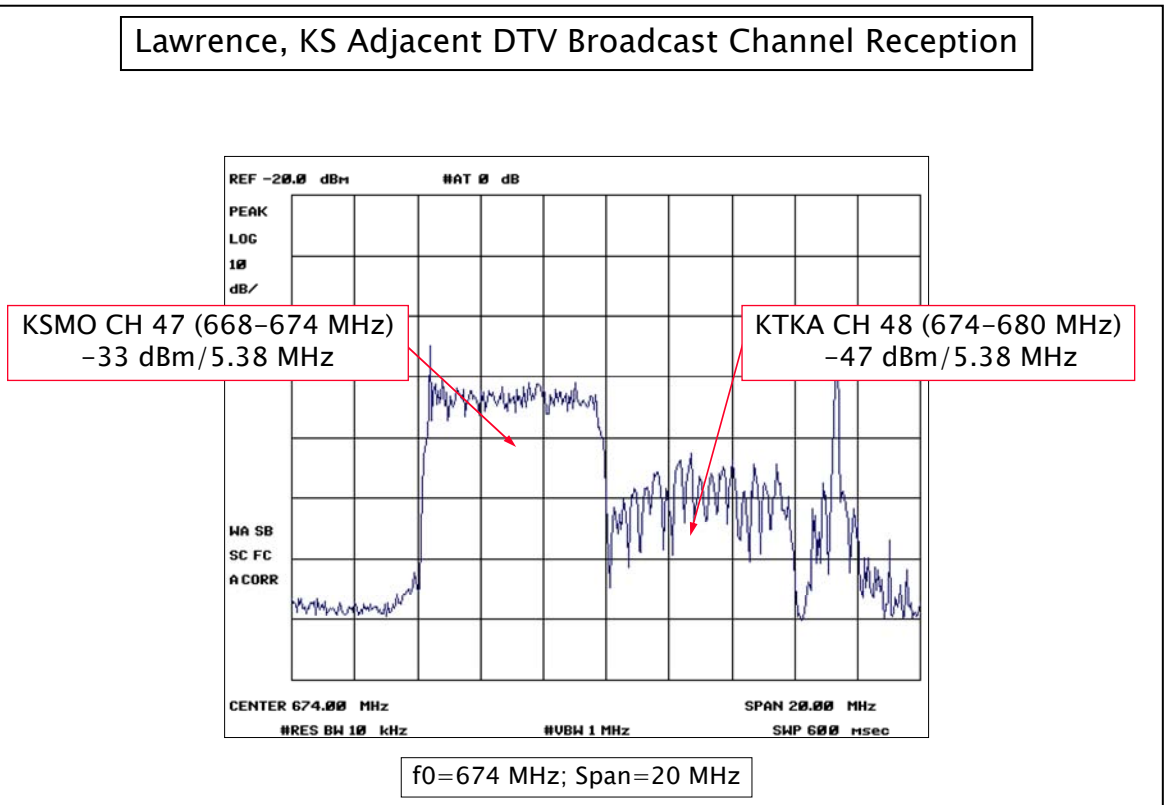

Figure 5. Channels 47 and 48

We note that automatic transmitter power control also has the effect of limiting this type of interference, as MSTV assumes **both** that TV signals will always be weak and that TV band devices will always be transmitting at maximum power near the minority of households that use over-the-air reception.

Page 12 of the MSTV presentation focuses on what has changed since 15.209 was adopted. While the facts stated are correct, MSTV clearly has "cherry picked" the facts here. They neglect to mention the largest change in the home TV market: the market share of over-the-air reception of TV stations such as their members has dropped precipitously, as the Commission has documented in its Annual Video Competition Reports to Congress. A technical fact that MSTV neglects to mention here, although they mentioned it repeatedly in the DTV rulemakings, is that DTV is much more robust to interference than NTSC is. Is it bulletproof? No. But it is not a fragile system that collapses at the first twinge of interference.

We appreciate this opportunity to correct the misleading statements of MSTV and urge the Commission to proceed in allowing TV band devices with technically sound provisions to prevent interference to DTV reception.

Respectfully submitted,

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