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May 4,2007

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

Re: Ex Parte Communication
ET Docket Nos. 04-186 and 02-380

Dear Ms Dortch:

The New America Foundation (NAF) filed an *exparte* letter with the Commission on April 2, 2007 questioning the Association for Maximum Service Television, Inc.'s (MSTV's) position with regard to Part 15.209, as well as MSTV's evidence proving that operation on adjacent channels must be avoided. While NAF made a variety of claims, nothing in its letter altered the record before the Commission, which clearly demonstrates the need for proper out-of-band emission limits and a prohibition on operation on an adjacent channel in order to prevent interference to existing services as well as to ensure a successful DTV transition. MSTV submits this letter to address the statements and technical claims made by NAF with regard to an MSTV *exparte* presentation made to OET downtown staff on March 13,2007 and filed March 14, 2007 and OET laboratory staff on March 22 and filed March 23,2007.

As the Commission is aware, over the next few years the country will be completing a transition to digital television ("DTV"). In preparation for this transition, consumers, broadcasters and the government will continue to spend billions of dollars on new digital equipment. Further, as the digital television world unfolds, new opportunities are emerging for over-the-air television services. The DTV transition, as well as these technological developments, will be seriously jeopardized if TV band devices are allowed to operate in the television spectrum without being accompanied by proper protections to prevent interference with existing services in the band.

As MSTV has consistently demonstrated, the following baseline protections are necessary in order to ensure that harmful interference to TV viewers and other licensed operations does not occur: (1) the development of appropriate out-of-band emission limits, as the current Part 15.209 limits are insufficient to prevent interference; (2) only authorizing fixed TV band devices to operate; personal/portable should not be permitted; (3) utilizing proper interference avoidance mechanisms, including a geolocation method, as sensing alone will be inadequate to prevent interference caused by TV band devices; and (4) ensuring that all TV band devices operate outside the protected contour on both co- and adjacent channels.

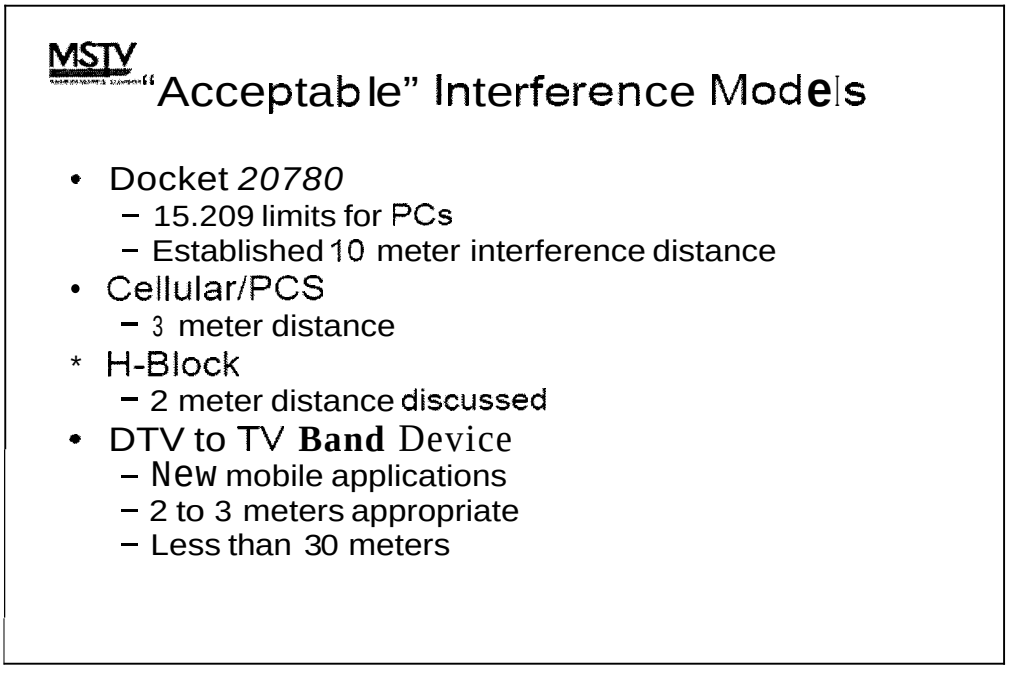
In this regard, MSTV remains committed to helping the Commission develop a fixed broadband approach in this proceeding that will provide a real broadband solution to rural America and ensure that DTV viewers and other authorized users of the TV spectrum are fully protected from interference.

MSTV Has Acknowledged Both Current Part 15.209 Limits And Docket 20780, And Has Clearly Explained The Inadequacies Of Such Limits As Applied To TV Band Devices.

MSTV has consistently demonstrated that Part 15.209 limits are inadequate as applied to TV band devices. Though MSTV acknowledges the Commission's rulemaking in Docket 20780 and the 15.209 limits established for computers, this rulemaking does not alter the studies proving that Part 15.209 limits will not protect existing services operating in the television band from interference caused by TV band devices.

While NAF stated that MSTV "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 …," MSTV has explicitly referenced the Docket 20780 precedent in its *ex parte* presentation (see slides 9, 12 & 13 below).

SLIDE 9



SLIDE 12

MSTV

15.209 Limits

- Established 1979 in Docket 20780
  - Used Grade **A** of 74 dBu (UHF)
  - S/I of 45 dB "used to represent TV receiver noise tolerance in the narrowband EMI mode!."
    - Ensured a "tolerable interfering signal at the TV receiver"
  - Computers use indoors only

SLIDE 13

MSTV

What's Changed

Late 1970's	Now
• Operations removed from TV spectrum - No operations in TV band	• Possible operatians in TV band
• Narrowband interfering signal	• Wideband interfering signals
• TV signal assumed is relatively strong at 74 dBu level	• DTV signal relatively weak at 41 dBu level
• Interference results in graceful degradation as signal gets noisy but still viewable for considerable increase in interference	• Even slight increase in interference results in abrupt loss of picture and sound

Despite NAF assertions to the contrary, the beginning slides of this presentation accurately reflect current over-the-air viewership and the fact that there are an estimated 70 million TV sets not connected to cable or satellite. In addition, MSTV makes the point in its *ex parte* filing that future over-the-reception may become more important for both viewers and broadcasters given the current lack of multi-channel must carry for DTV and the introduction of new services such as mobile and portable television applications. We also note that Cable Labs recently has announced an initiative to develop specifications for the receipt of off-air digital television signals with a cable set-top box. NAF ignores these facts.

NAF also states that MSTV neglects to mention the fact that DTV is more robust to interference than NTSC. Again this is not true. For example, the fact that DTV operates with a much weaker signal than NTSC is noted in the above slide.' However, whether or not DTV is more robust than NTSC is irrelevant. The question is whether operation of TV band devices under the current Section 15.209 limits will cause interference to DTV receivers and other authorized services – and the answer to that question is yes.

NAF further argues that the Docket 20780 precedent implies that the Commission should adopt an interference separation distance of 10 meters or greater and not a smaller distance as suggested by MSTV. MSTV believes that the 10 meter distance established in Docket 20780 is not the proper separation distance for a number of reasons. For example, we anticipate that DTV services will include new and exciting mobile and portable DTV applications such as those recently announced by Samsung/Rohde and Schwarz and Harris/LG Electronics. As pointed out in our presentation, the Commission has traditionally used interference separation distances smaller than 10 meters for mobile operations. In addition, when interference does occur for DTV the manifestation of the interference for the consumer is much more severe than for analog TV that was the subject of Docket 20780.

Notwithstanding our belief that this distance should be smaller, the MSTV analysis was based on a 10 meter interference distance. Use of a 10 meter distance, for example, does not change the basic and obvious problem with Section 15.209 out-of-band emission requirements. The Section 15.209 level is 200 microvolts at 3 meters or 46 dBu. At 10 meters, the Section 15.209 signal level is approximately 35 dBu. As slide 15 of the presentation shows this value is far from 18 dBu that is required for co-channel interference protection.

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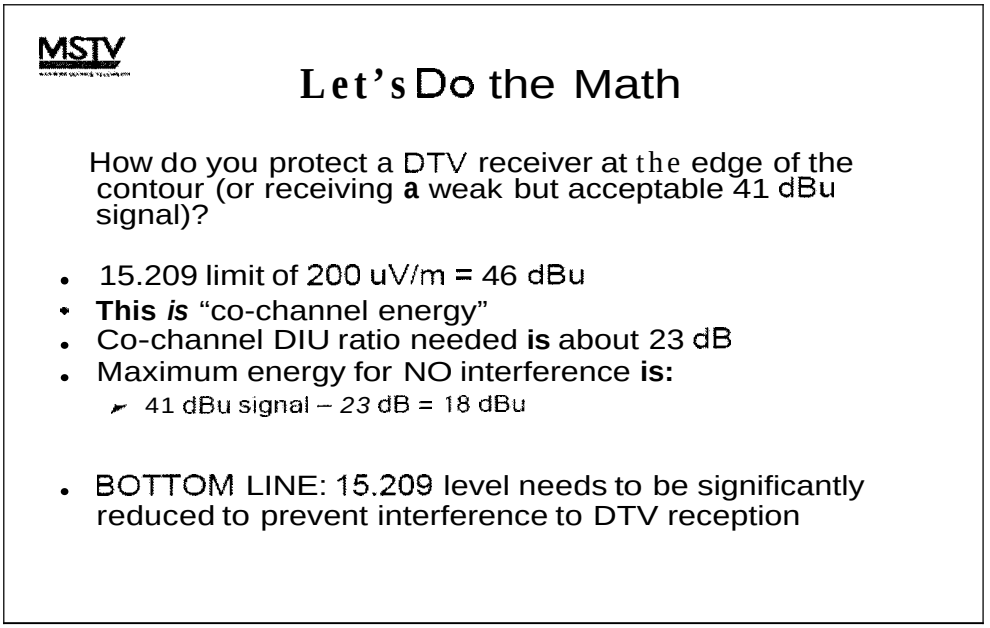
[1] While it is true that the DTV signal is more robust, when interference does occur the impact is much more severe due to the so-called "cliff-effect.'' **As** noted by the FCC in its recent report:

> The DTV broadcast system can achieve flawless picture reception under interference conditions that would produce an unusable picture for analog broadcast TV; however, once an undesired signal reaches a level at which picture impairments become visible on a DTV receiver, the picture degrades extremely rapidly with further increases in undesired signal level—typically going from barely perceptible picture impairments to complete loss of picture with a span of about 1 dB. Similar degradation of analog reception occurs over a span as large as 30 dB, a difference that emphasizes the importance of these measurements for DTV.

See OET Report, FCC/OET 07-TR-1003, *Interference Rejection Thresholds of Consumer Digital Television Receivers Available in 2005 and 2006,* by Stephan R. Martin, Technical Research Branch, Laboratory Division, dated March 30, 2007 at pp 1-4.

SLIDE 15



NAF's Letter Omits Key Facts Regarding Docket 20780

NAF's discussion of Docket 20780 does not address several important facts with regard to the precedent established in Docket 20780. First, the unlicensed device discussed in Docket 20780 was a *personal computer* and not an unlicensed transmitter. NAF claims that the 10 meter distance established in Docket 20780 was considered a very conservative and cautious limit. That is correct. The limit is based on a "worst case" interference scenario. In other words, under this "precedent," all emissions from the personal computer are reviewed and the device's *highest emissions* in the TV band must not exceed the level determined to protect analog TV reception at 10 meters. While NAF attempts to utilize this precedent as support for its position that this 10 meter distance should be increased, we believe that the relevant precedent in Docket 20780 was that the Commission took great care in ensuring that unlicensed devices even those that do not transmit such as personal computers do not cause interference to broadcasters and their viewers as well as other licensed and authorized services. While 10 meters may have been conservative distance when used in the case of a non-transmitter, such as a personal computer whose emissions do not carry actual communications, this logic is not applicable to TV band devices.

In addition, NAF does not mention that the Docket 20780 protection of analog TV reception was based on maintaining a Signal to Interference (S/I) ratio of 45 dB or more. This S/I ratio yields a high quality picture and most analog TV viewers would not notice that interference was present at this protection level. Further, in the analog TV situation, even if interference is significantly increased such that the S/I is considerably less than 45 dB, the picture while degraded would still be viewable. This is unlike the DTV situation where the "cliff effect" causes the picture and

sound to be abruptly lost with the introduction of harmful interference. Therefore, the effect of interference on the DTV viewer is substantially worse than considered by the Commission in Docket 20780.[2] Finally, unlike in 1970s when both personal computer use and TV viewing was limited to indoor use, it is anticipated that TV viewing will include portable and mobile outdoor operations and that TV band devices may also be located outdoors.

In summary, MSTV is well aware of the precedent from Docket 20780. This precedent worked because it was based on engineering that took into account both the devices that would receive interference and the devices that would cause interference and the Commission developed a technical solution that ensured that such instances of interference between these devices did not occur. MSTV only requests that the Commission do the same here by preventing interference to millions of DTV viewers.

MSTV's Use of the "Protected contour'' Language is Based on the Commission's Use of Such Language in the NPRM

NAF chides MSTV on the use of the phrase "protected contour" in its slide presentation to OET and its comments in this proceeding. NAF cites to its Technical Reply Comments and states:

> MSTV/NAB repeatedly use the phrase "protected contour" in their comments but neither define it or 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 (NAF) assume they (MSTV/NAB) 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).

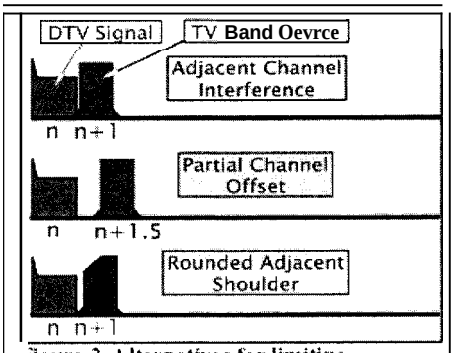
While it is true that MSTV did not define "protected contour" in its comments, the phrase "protected contour" was clearly defined by the FCC in the *Notice of Proposed Rule Making* in this very proceeding, ET Docket Nos. 04-186 and 02-380. The FCC used this phrase repeatedly in the NPRM and the term is specifically defined in Footnote 47 of the NRPM. In addition, the Table describing TV stations protections included in paragraph 29 contains the heading "Protected contour." MSTV's use of this phrase has been consistent with this definition established by the FCC.

Adiacent Channel Use By TV band Devices Will Cause Interference to TV Viewers

NAF appears to suggest that the only problem with adjacent channel operation by TV band devices is the fact that the Commission's measurement methodology is antiquated. (Although NAF does concede that if the FCC concludes that this is the proper way to quantify emissions

[2] The recent FCC Report notes, for example, that "(t)he DTV broadcast system can achieve flawless picture reception under interference conditions that would produce an unusable picture for analog broadcast TV; however, once an undesired signal reaches a level at which picture impairments become visible on a DTV receiver, the picture degrades extremely rapidly with further increases in undesired signal level—typically going from barely perceptible picture impairments to complete loss of picture with a span of about 1 dB. Similar degradation of analog reception occurs over a span as large as 30 dB…." See OET Report, FCC/OET 07-TR-1003, at p.1-4.

that "MSTV may well be right and the only possible approach is to avoid completely adjacent channels.") In Figure 2 (which follows Figure 3) of the NAF filing, shown below, NAF suggests that adjacent channel use might be possible "without interference if either the TV signal is strong or if the TV band 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.



'igure 2. Alternatives for limiting
ıdjacent channel

To begin, we agree with NAF that weak DTV signals are more susceptible to interference than strong DTV signals. However, as noted by the FCC in its recent report on DTV receivers, "fully 84% of the coverage area (of a typical TV station) would experience lower signal levels than the ATSC-designated "weak" signal level of -68 dBm.[3] In other words, most of a TV station's service area receives a weak not a strong DTV signal.

Furthermore, a TV receiver and a TV band device in the same or nearby homes, apartments, condominiums or town homes may see very different signal levels. For example, indoor measurement data submitted by NAF showed that the "average variation across rooms for a given frequency channel was 19.8 dB" for one of the three homes measured.[4] In other words there could be "on average" a 20 dB difference in received signal level received by a TV receiver and a TV band device if they are located in different rooms in this same home. Therefore, the assumption that the TV band device receives a strong signal and therefore the TV receiver in a nearby home, apartment, condominium or town home or even within the same home will also receive a strong signal is obviously problematic and inappropriate. Given both of these conditions, the proper and classic engineering approach is to provide for interference protection for the weak signal condition.[5]

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[3] See OET Report, FCC/OET 07-TR-1003, *Interference Rejection Thresholds of Consumer Digital Television Receivers Available in 2005 and 2006*, by Stephan R. Martin, Technical Research Branch, Laboratory Division, dated March 30, 2007 at pp 2-2, 2-3, and 2-12.

[4] These measurements were for a residence (identified as Residence 1) in the Los Angeles area located approximately 25 miles from the TV transmitters. See NAF's Working paper #16.

[5] Even if the "home" is receiving a strong outdoor DTV signal, the viewer may be using an indoor antenna and therefore is actually receiving and using a weak DTV signal.

NAF's suggestion, to offset the TV band transmission from the DTV channel edge or to employ a rounded shoulder next to the occupied DTV channel to limit how much power leaks into the TV receiver, ignores NAF's own University of Kansas receiver measurement data. This data shows a TV band device 10 meters away operating at 100 mW on even the 2nd adjacent channel (a full 6 MHz away from the band edge) resulted in interference to two of the three tested receivers when the device was operating on the second lower adjacent channel and to one of the three receivers when operating on the upper second adjacent channel. In addition, these tests were conducted at a DTV desired signal level of -68 dBm. If the desired DTV signal is only slightly weaker at -72 dBm, all of the receivers would experience interference.[6] Clearly, a partial channel off-set or "rounded shoulders" is not supported by NAF's own reported measurement data.[7]

NAF's suggestions with regard to channel off-set are also not supported by recent FCC receiver measurements. As pointed out by the Commission in its recent report on DTV receiver measurements:

> At low desired signal levels the DTV receivers are as susceptible to interference from the second adjacent channels (N-2 and N+2) as from first-adjacent channels (N-1 and N+1). In terms of worst and second-worst performance, the receivers are actually *more* susceptible to interference from second-adjacent than fi-om first-adjacent channels.[8]

<u>MSTV Has Shown Unlicensed TV Band Devices Will Cause Interference To TV Viewers In Valid Real Life Situations</u>

NAF accuses MSTV of "assuming worst cases for every sub problem regardless of whether they could all be true at the same time." They assert that "(y)es, a home TV receiver can receive a 41 dBu signal, but reliable reception of this low level requires an antenna with 10 dB or more antenna gain..." and the "height of such antennas makes short distances to TV band devices unlikely." Contrary to NAF's claim of using "worst case" situations, MSTV has shown that interference from TV band devices will be caused to TV viewers using *both* indoor and outdoor antennas in valid real world situations.

For example, it is not a "worst case" situation to assume that TV viewers using an indoor antenna can and will receive "weak" DTV signals.' NAF's own submitted indoor measurement data

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[6] **A** DTV signal level of -72 is still 12 dB stronger than the minimum DTV signal level that yields error-free reception in the absence of such interference described above.

[7] Recent FCC receiver measurements showed some receivers more susceptible to interference on second adjacent channels than from interference on the first adjacent channel.

[8] See OET Report, FCC/OET 07-TR-1003, *Interference Rejection Thresholds of Consumer Digital Television Receivers Available in 2005 and 2006,* by Stephan R. Martin, Technical Research Branch, Laboratory Division, dated March 30, 2007 at p. **xi.**

[9] Such signals can be at or close to the minimal receivable signal (i.e., TOV of -84 dBm) and still provide the viewer with a perfect error-free picture.

confirms this situation is likely to occur.[10] In this real-world situation, a TV band device can easily be within 10 meters of such an antenna and cause interference. In fact, as shown above, even if the desired DTV signal received using an indoor antenna was -72 dBm, all of the DTV receivers measured by NAF would experience interference from an unlicensed TV band device 10 meters away. Such interference could occur in apartments, condominiums and town homes where indoor reception of DTV is being used.

Furthermore, this same interference situation can also occur with regard to homes using outdoor reception. In fact, an adjacent channel TV band device could cause adjacent channel interfere with even a DTV receiver that fully complies with the voluntary ATSC A/74 recommended practices at distances of 40 meters.

In closing, we urge the Commission to examine the technical analysis and data in the record – all of which suggests that protections that have been suggested by MSTV the correct and technically sound provision needed to prevent interference to DTV reception and ensure that the important benefits of the DTV transition are not put in jeopardy.

Respectfully submitted,

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[10] For example, see measured signal levels in residences 1 and 3 of NAF's Working Paper #16.