

APPENDIX B



FACT SHEET

What is Out-of-Band Emission?

Out-of-band emission is the amount of energy a transmitter is allowed to radiate outside its operating channel. For example, if a transmitter is operating on TV channel 50, the out-of-band emission is the amount of energy that a transmitter is allowed to radiate outside TV channel 50 and into the remaining TV band, i.e., on channels 14 through 49, and 51 through 69. Out-of-band emission is sometimes referred to as "transmitter splatter".

In the Commissions' unlicensed devices proceeding, the FCC proposed an out-of-band emission limit of 200 micro Volts per meter (uV/m) measured at a distance of 3 meters using a measurement bandwidth of 120 KHz. This means that an unlicensed transmitter operating on TV channel 50, is allowed to spill over and radiate energy on TV channels 14 through 49 and 51 through 69 as high as 200 uV/m at 3 meters calibrated for a 120 KHz bandwidth within the TV band.

What Does the MSTV Video Demonstrate?

This MSTV video demonstrates the real world devastating effect on digital television reception from an FCC compliant **out-of-band emission that would be generated** by an unlicensed device operating on vacant TV channels. The MSTV video does not demonstrate the operation of an unlicensed device in the TV band, since such a device has not been yet invented. It does, however, demonstrate the effect of the proposed FCC limits for out-of-band emission if an unlicensed transmitter is eventually built. Interference from an unlicensed device transmission operating on the same TV channel as a TV station is not considered in this video.

How Does Out-of-Band Emission Affect TV Reception?

Television receivers cannot differentiate between energy generated from the out-of-band emission of an unlicensed device or its own television signal. The energy splatter radiated from an unlicensed transmitter, if strong enough or located too close to a TV receiver, could prevent TV reception. To illustrate this point, one could compare out-of-band emission to background music. If the source of the background music is too close to an individual ear, the individual will have a difficult time listening to someone speaking in the same room, even if that person is speaking in a very loud voice. The ear, like a TV receiver, reaches a level where the music interferes with its ability to hear a conversation. Among the factors in determining whether the conversation is disrupted are where the source of the music is in relation to the ear

and the loudness of the conversation. The MSTV video effectively demonstrates that point. Specifically, when an unlicensed device out-of-band emission is too high (i.e., the music is too loud), it will interfere with TV reception even though the unlicensed device is transmitting from different rooms in the same house where the TV set is located, or even from the house next door.

How Did MSTV Generate the Out-of-Band Emission in the Video?

MSTV used commercially available devices to generate energy equivalent of the 200 uV/m at 3 meters for every 120 KHz bandwidth segment. These devices, known as “noise generators”, are capable of generating the out-of-band energy level specified by the FCC over a span of only three television channels, not the whole TV band. For example, one device can generate out-of-band emission for every 120 KHz segment over a span of TV channels 48, 49 and 50, another device can be used to generate out-of-band emission on TV channels 14, 15, 16 or the same device could be retuned to generate out-of-band emission on these lower channels, etc. Description of the science behind the demonstration and how these devices were calibrated explained in the attached documents by Meintel, Sgrignoli & Wallace, and the Communications Research Center of Canada, an agency of Industry Canada.

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Meintel, Sgrignoli, & Wallace

The table below shows the emission limits that were set for each channel tested.

Channel	Center Frequency of Channel	Emission Limit for Demonstration
14	473 MHz	-85.99 dBm
15	479 MHz	-86.11 dBm
26	545 MHz	-87.23 dBm
27	551 MHz	-87.32 dBm
34	593 MHz	-87.96 dBm
36	605 MHz	-88.14 dBm
48	677 MHz	-89.11 dBm
50	689 MHz	-89.26 dBm
51	695 MHz	-89.34 dBm

The setup of the demonstration involves a careful calibration of the transmitter system to ensure that the fields are set correctly for each channel at the prescribed 3 meters distance. To calibrate the output level for each channel, the unit was turned on with the band pass filter centered on the desired channel and the UHF vertical whip antenna connected (as shown in Figure 1). A calibrated dipole antenna (NIST Traceable) set for the appropriate frequency was then placed at the prescribed 3 meters distance and oriented in the vertical plane. Then, using a calibrated coaxial cable (measured loss cable) the output level of the transmitter was adjusted to achieve the appropriate power level as measured with a 120 KHz bandpower marker on a vector signal analyzer. (see attached CRC reports for further description)

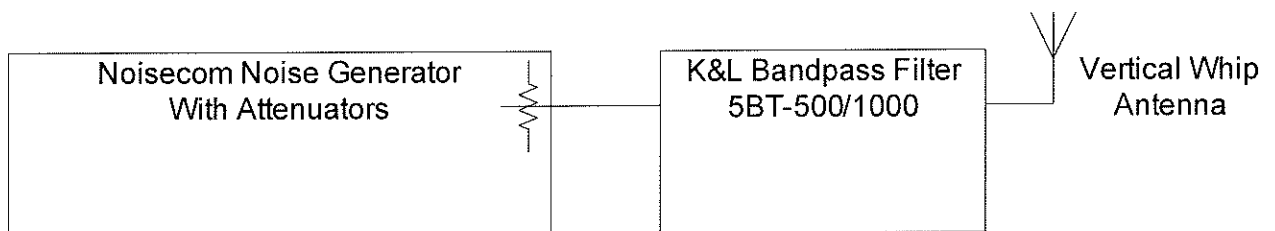


Figure 1

As shown in figure 2, the signal level was measured using a vertically oriented calibrated dipole at a distance of 3 meters. Accounting for the loss of the coaxial cable, the signal power within 120 KHz was measured on a vector signal analyzer.

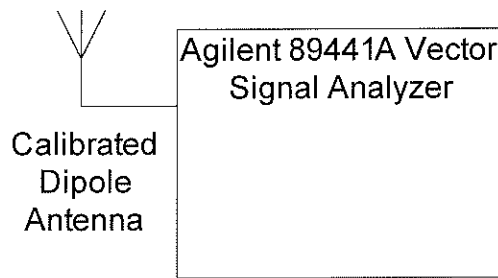


Figure 2

Once the calibration of the power level is set, the device is placed in various rooms of the subject townhome for the experiment. The setup is as shown in Figure 3. The transmitter can be cycle on and off to show the added impairment to both the analog and digital television reception within the home as well as from the adjacent dwelling unit. The desired signal for the TV receiver is the off-air reception of the local Washington, DC area analog and digital television stations. By using real-world television signals, the detrimental effects of the transmitter can be seen on over the air reception using rabbit ears and small indoor antennas. Without the introduced interference, the home receives very good quality analog and digital television signals.

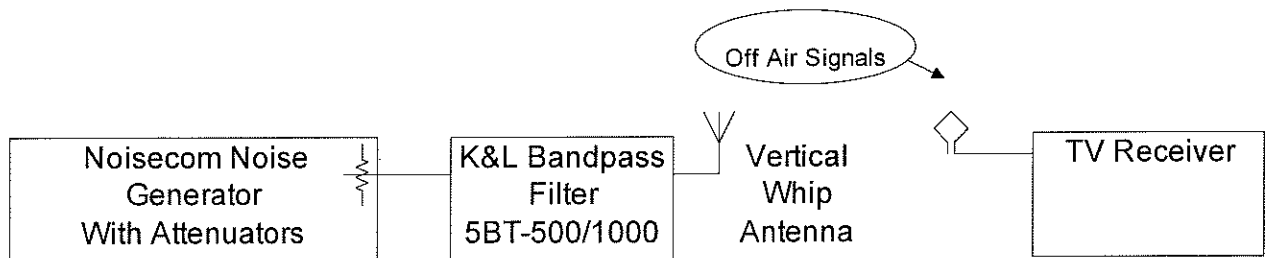


Figure 3



Rebuttal of The New America Foundation Critique of MSTV's "Your Neighbor's Static" Video

The New America Foundations' criticism¹ of the Association for Maximum Service Television's video, "Your Neighbor's Static" was based on the following three points:

- a. ***"MSTV did not include details to show how an independent observer could reproduce its results"***

MSTV's Response: The MSTV video is based on the MSTV original submission to the FCC in its Unlicensed Device Proceeding. The video mentioned the laboratory work of the Communications Research Center (CRC) of Canada, which is the basis for the MSTV video demonstration. The CRC work shows in the laboratory that out-of-band emission generated from an unlicensed device transmitter will cause interference up to 78 feet from a TV set. Specifically, the CRC study describes the equipment used, how the out-of-band emission signals were generated and how the interference numbers were calculated as well as the impact of the out-of-band emission has on three different generations of DTV and NTSC receivers. The MSTV video was created simply to collaborate the laboratory work in the field, using real live TV transmission and actual settings for operating these devices. Note that MSTV selected CRC to conduct the laboratory work since they were deemed to be knowledgeable and credible in modeling both broadcast and wireless interference².

- b. ***"Informal discussions with an individual involved with the production reveal that the simulated unlicensed device exploited a longstanding loophole in the FCC Rules that has never caused a problem using real transmitters" and "...the device demonstrated is reported to be 54-MHz wide noise generator.." and "...this device will be normally forbidden by the FCC proposed rules, but a loophole permits it to be used in the***

¹ The criticism of the MSTV video tape is described in Section III of a document by the New America Foundation entitled "Reclaiming the Vast Wasteland: Why Unlicensed use of the White Space in the TV Bands will not Cause Interference to DTV viewers", authored by Michael J. Marcus, Paul Kolodzy and Andrew Lipman.

² CRC submitted a study on behalf of Intel, Inc. to determine the necessary parameters relating to co-channel and adjacent channel interference from wireless devices in the TV bands.

existing unlicensed band in conjunction with a more powerful signal limited to 6 MHz.”

MSTV’s Response: The information reported by NAF is false and does not represent the actual video demonstration parameters. MSTV’s video did not exploit “a long standing loophole in the FCC Rules.” The MSTV tests merely demonstrated the significant interference impact that signals at the out-of-band emission level contained in Part 15 and proposed for unlicensed devices in the broadcast band would have on TV reception. If NAF is confused as to why “this has never caused a problem using real transmitters,” the answer is quite simple. To date, Part 15 transmitting devices have not been allowed to operate in the broadcast television band.

NAF also claims that the device demonstrated by MSTV was a 54 MHz white noise generator. This is also false and misleading. The device used by MSTV in the demonstration generated out-of-band signals on only 18 MHz of spectrum not the 54 MHz purported by NAF. Given that the proposed unlicensed device is for “broadband” operations, we believe that it is not unreasonable that out-of-band emissions would be generated across such a bandwidth. Further, the device actually operated below the permitted FCC limit. In fact, the MSTV device was calibrated to generate a signal equivalent to **3dB LESS than the FCC limit of 200 uV at 3 meters for a NARROW bandwidth of 120 kHz wide. This is not only the methodology specified by the FCC to measure out-of-band emissions but it is also approved internationally by the International Special Committee on Radio Interference (CISPR).** Moreover, the out-of-band emission problem highlighted by MSTV was independently studied by a working group³ of the 802 IEEE Wireless Society, (IEEE-802.22), and tentatively determined that the FCC out-of-band limits are insufficient to protect DTV receivers by some 33 dB.

MSTV’s work is based on good science, well-established scientific methodology and sound engineering practice. NAF criticism is based on perceived FCC loopholes, hearsay and unlicensed transmitters not yet invented or proven to work.

- c. ***“The FCC rules were written two decades ago when instrumentation was less advanced than it is today...” and “..this loophole in the Part 15 unlicensed rules, which would theoretically permit emissions in the TV***

³ The IEEE 802.22 is the Working Group responsible for developing standards for operating Wireless RANs within the TV bands. In September 2005, the Working Group filed an ex parte filing with the FCC to report on its activities and findings to date. The Report concluded that unlicensed systems should not operate within a co- and first adjacent channel contour of a DTV station and that the out-of-band emission are insufficient to protect DTV receivers for 2nd adjacent channels and beyond by some 33 dB for 1 dB desensitization of DTV receivers.

band can be closed once the FCC includes it in its Reports and Order in this proceeding an additional easily-measured total limit on power in the TV bands for out-of-band emissions.”

MSTV's Response: The out-of-band emission rules specified in the FCC rules are independent of the instrumentation used to measure them. Basically, The FCC rules only define three parameters: a field strength level (200 uV/m at 3 meters); a bandwidth (120 kHz); and, a specific measurement methodology (the CISPR standard) to insure compliance with the out-of-band limits. It does not specify the instrumentation that should be used to measure these limits. Advances in measurement instrumentation will not change the values specified by the FCC for out-of-band emission.

MSTV and others have shown that the proposed FCC out-of-band emission limits are inadequate and do cause unacceptable interference to TV receivers. Changes in the instrumentation will not change that fact. Moreover, NAF did not propose an alternate measurement technique to either the FCC or the scientific community to replace the current technique or deal with the perceived loophole for evaluation and peer review. It left that task to the FCC. Changes in the FCC Part 15 Standards impact many products, and incumbent users. It is, therefore, imperative that such an undertaking be properly evaluated and accepted by the scientific and international community before FCC adoption.

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