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1401 Constitution Avenue, Room 4713
Washington, DC 20230 Pages. 5 (total)

FROM: Steve Kuh DATE: Sept 22, 06

SUBJECT: Comments on NPRM [Docket Number: 060512129-6129-01]
RIN 0660-AA16
Title: Implementation and Administration of a Coupon Program for Digital-to-Analog Converter Boxes

As one of the few remaining manufacturer of DTV receiver products in the USA, I would like to submit my comments on section E of the NPRM.

Section E: Coupon Value and Use Restriction.

In this section, NTIA proposed the following characteristics in certifying a converter box:

a) Appropriately processes all ATSC radio frequency (RF) signals provided to the antenna-only input and then provides output signals in standard definition video for display on an NTSC television receiver/monitor...

Comment: It is our opinion as a potential manufacturer of the digital converter box that the converter boxes shall include signal quality measurement numbers. Without having adequate quality ATSC RF terrestrial broadcast signal present at the output of the receiving antenna, it is not possible to receive, decode, and render video/audio outputs on an NTSC television by the Digital-to-Analog converter box.

Even if a perfect signal with a large amount of RF power is transmitted at a broadcasting station, the nature of the ATSC terrestrial broadcast band is such that it will degrade the RF signal quality and may cause improper reception and produce no video/audio outputs. Typical impairments include a loss of signal, signal blockage and reflection due to mountains, trees, and forests, signal reflecting body of water, rain, clouds, airports, buildings, and a bad antenna.

Thus, it is important for the converter box to be able to display measured signal quality parameters that it sees at its antenna input port and provide such measure of signal quality as received RF power level, received Signal-to-Noise Ratio, received Bit-Error-Rate, and received multi-path distortion.

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Due to unique signal characteristic of a terrestrial digital broadcast channel, the received signal power level may be adequate, but it may also contain severe multi-path distortion that the converter box may not be able to correct. While receiver distortion improvement methods such as equalization and error correction exist, it is often the case that receiver can not recover the terrestrial ATSC signal due to severe channel conditions caused by mountains, trees, signal reflecting body of water, rain, clouds, airports, buildings, and a bad antenna.

In such cases, with displayed signal quality measurements from the converter box, users must correct the situation by re-pointing the receiving antenna. The problem may also be corrected by installing an improved multi-path resistant antenna, installing an external RF low noise amplifier at the output of the receiving antenna, and/or requesting that a local broadcast station install a digital television translator to provide adequate signal coverage in the area

The multi-path interference is produced by RF signals reflecting against the buildings, mountains, water, or trees. When there exists 2 or more strong enough RF signal paths that arrive at the receiving antenna, each of the signals is typically delayed or offset in phase independently. Such difference in phase and time delay between the RF signals that traveled multiple physical paths over-the-air causes a multi-path distortion.

In this case, the data symbols lie on top of each other with time and phase delayed. Under this condition, the receiving symbols are corrupted and cause bit errors This will result in loss of video and audio. Note that this can occur with high signal level and even under a good coverage of the RF terrestrial broadcast signal in the receiving area. While equalization techniques typically employed by the converter boxes improve or take out the multi-path distortion, the real world situation creates such conditions that cannot be corrected alone by a digital signal processing performed in a digital television Digital-to-Analog Converter boxes.

Without the signal quality indicators like the received signal strength level, SNR number, BER number, and a Multi-path Distortion number, it is not possible to ascertain the problem-causing element. Without such information, users will simply return the product, be unsatisfied with the Digital Television experience, and impose unfair financial loss to manufacturers of the converter boxes.

This issue does not enable a consumer to convert any channel broadcast in the digital television service into a format that consumer can display on an NTSC television screen. This is not consistent with those stipulated in the Act.

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However, having the signal quality indicators such as Signal Strength, SNR, BER, and Multi-Path Distortion will inform the users that corrective actions must take place before the converter boxes can operate properly. Signal Strength will inform the user that there is adequate power level received by the antenna. SNR will measure the amount of Signal-to-Noise ratio present on the ATSC RF signals received. BER will measure the amount of bit errors present on the ATSC RF signals received. Multi-Path Distortion will inform the user the amount and severity of channel multi-path distortion present in his/her present antenna location.

While it is true that receiver manufacturers can build the converter boxes in accordance with its best diagnostic tools to help users, it benefits the users and the manufacturers alike to provide the signal quality measurement. As a governing body for execution of the Act to "enable a consumer to convert any channel broadcast in the digital television service...", it makes sense to implement this requirement.

In addition, having a simple bar graph to indicate the Signal Strength level, the SNR, the BER, and/or the Multi-path Distortion level is not accurate enough information as users will have to report such conditions to local broadcast stations or the converter box manufactures. The combined information of the signal strength level number, SNR number, BER number, and Multi-path Distortion number will enable accurate description of the signal quality at the output of the receiving antenna. Manufacturers of the converter boxes will need the information to provide proper technical support, gain insight on the condition of the received ATSC RF signal quality at user's location, and make appropriate recommendations for a possible corrective action by the consumer.

The figure of merit numbers can be used to determine if a good RF signal is present before the digital converter box can operate successfully. This helps ease of installation and operation, consistent with NTIA proposal. Cost to add such feature is minimal and does not pose a substantial increase in the cost of the box. However, it will be critical that such information is available to inform the user that a good RF signal is present at the antenna.

It is recommend that the digital converter box shall provide RF signal quality measurement for measured RF power level received in dBm, measured Signal-to-Noise Ratio number in dB, measured Bit Error Rate number, and measured Multi-path Distortion amount and display the signal quality information through video output upon user command on NTSC video base-band output and NTSC channel 3 or 4 modulated RF output as part of a specification.

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b) Delivers NTSC composite video and stereo audio to drive NTSC Monitors
I agree with this specification.

c) Delivers Channel 3 or 4 switchable (NTSC) RF output for television receivers
I agree with this specification

d) Complies with FCC requirements for Closed Captioned, Emergency Alert System (EAS) and the required parental controls
I agree with this specification

e) Operable by and includes a remote control
I agree with this specification.

f) Tunes to all television channels 2-69
I agree with this specification.

NTIA also proposed to accept certification for converter boxes that are capable of only receiving over-the-air broadcast signals for display over analog-only (NTSC) receivers/monitors to firmly control the nature of the input and output signals and connectors on the box. The only input of the converter box shall be for an external antenna.

COMMENT: It is our opinion that there is another input specified: AC or DC power input. AC or DC power input connector is essential for the converter box to power up and operate its functions. The current proposed specification does not allow for external power input to be connected to the converter box. **It is recommended that external AC/DC power input connector is allowed on the converter box.**

In addition, it is our opinion that there may be an output display such as power light implemented by a Light Emitting Diode (LED) to allow users to determine if the external AC/DC power is connected to the unit. This LED conditions will show if the unit is up and powered-up. Typically, this is an important parameter to show health and status of the unit. The current NTIA proposed specification does not allow having such LED indications. **It is recommended that "power-good" display function is allowed on the converter box as a possible health and status display of the unit.**

NTIA also proposes to require manufacturers to self-certify that the converter boxes meet the stands outlined in the rules.

COMMENT: It is our opinion that such self-certification by the manufacture is acceptable so long as NTIA publish the test conditions, test equipment to be used for the self-certification, what items are to be tested and clearly define what is acceptable. **It is recommended that NTIA publish pass/fail parameters for acceptable criteria.**

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At minimum, this should include minimum/maximum power level defined over 6MHZ channel bandwidth, channel multi-path characteristics in terms of fading model typical of rural America, 8VSB modulator source signal characteristic such as transmitted 8VSB SNR, MER, Group Delay, Magnitude response, and Phase noise.

In particular, the channel multi-path simulator representative of UHF terrestrial broadcast channel model product is available from our company. This product employs actual physical delays on multiple signal paths to simulate typical delay spread characteristics.

Finally, NTIA is seeking comments on how the converter boxes eligible for participation in the coupon program should be identified for the consumer.

COMMENT: It is our opinion that a logo unique to this class of Digital-to-Analog Converter product is specified and units certified display the logo on the front of the unit. NTIA should show this logo as part of consumer education such that it is easy to identify those that are certified and those that are not. So long as the retailer is required to show proof that they sold the certified converter boxes and coupons are used to accept as a part of the payment, it is felt that the coupons program would meet the requirements stipulated by the Act. Publication of the approved and certified converter boxes in the form of manufacturer name and its model numbers on NTIA web site is also acceptable. **It is recommended that NTIA issue a standard logo to certified manufacturers and that NTIA include the logo as part of the consumer education campaign.**

Regards,

Steve Kuh
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