DIGITAL TELEVISION TRANSITION

Digital-to-Analog Converter Box Evaluation Executive Summary

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NAB NATIONAL ASSOCIATION OF BROADCASTERS

MSTV

Executive Summary

The Association for Maximum Service Television (MSTV) and the National Association of Broadcasters (NAB) evaluated a total of 18 different manufacturer/brand models of commercially available digital-to-analog converter boxes, including several with the analog pass-through feature.[1] The boxes were acquired at physical or online retail outlets, and all are certified as coupon-eligible under the National Telecommunications and Information Administration (NTIA) converter box coupon program. They were evaluated based on *Radio Frequency (RF) performance, ease of use, packaging and instructional literature included* as well as *external features*[2]. The evaluation program was conducted during the summer of 2008.

The results found that the RF performance of these boxes met or exceeded the minimum performance requirements adopted by NTIA for certification eligibility. However, some of the boxes failed to achieve the levels of ease of installation, operation and use needed to satisfy the target consumer population. Lack of uniformity in the design and labeling of the various box features, along with generally poor instructional literature included with the packaging, could impact overall consumer satisfaction with these converter boxes.

Listed below are the major findings and observations for each evaluation category:

A. RF Performance

The RF performance category included an assessment of over-the-air reception capability relative to the NAB/MSTV prototype.

- All 18 boxes *equaled or exceeded* the NTIA adjacent channel immunity minimum performance specification.
- All 18 boxes *equaled or exceeded* the NTIA threshold of reception minimum performance specification.
- Some boxes handled multipath conditions (or ghosting) better than others to an extent significant enough to make a difference in the availability of local channels for some consumers with challenging reception conditions. But all boxes *met or exceeded* the NTIA multipath minimum performance specification.
- The amount of analog signal loss as a result of implementing the analog pass-through feature varied between models, but all passed the NTIA criteria of having less than 4 dB loss.

B. User Interface and Ease of Use

The user interface and ease of use category assessed various features associated with the installation and operation of these boxes, including the initial powering/setting-up of the converter box, functionality of the remote control, availability of an advanced program guide and closed captioning, channel scanning and the ability to manually add channels after scanning.

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[1] The digital converter boxes evaluated and place purchased were as follows: **Sansonic** FT-300A,**Tivax** STB-T9, **Lasonic** LTA-260, **MicroGEM** MG2000, **Philco** TB100HH9, **Artec** T3A Pro, **RCA** DTA800, **Magnavox** B100MW, **Insignia** NS-DXA19, **Zenith** DTT900/1, **Access HD** DTA1010D, **Digital Stream** DTX9900, **Channel Master** CM700, **GE** Model 22730, **Coship** N9988T, **Winegard** RC-DT09, **Echostar/DTVpal** TR-40, **Apex** DT-250.

[2] Technical Evaluation of some of these boxes was conducted by the firms of Wavetech Services and Meintel, Sgrignoli & Wallace.

- **Powering/Setting-Up Procedures:** The complexity of the initial powering/setting-up procedures of the converter boxes *varied significantly* by manufacturer. All manufacturers implemented a menu-driven program that walks the user through the initial set-up and installation of the converter box. The menu is displayed on the television screen, and the remote control is used to navigate the menu. The software to execute the set-up commands varied in length and complexity from one box to another, and the instructions furnished with the boxes were either limited or generally confusing to complete installation. While some boxes have a default set-up feature that helped with the initial installation of the box, it limited the functionality of some of the other features, described below, for normal operation.

- **Remote Control:** The number of features and functions on the remote control *varied significantly* by manufacturer. More than half of the boxes had no branding mark on their remote controls, and the total number of buttons on the remote controls varied widely from 26 to 35 buttons. Button labels for the same function were not uniform across manufacturers. For example, some remote controls included a "dash" button to distinguish major and minor channel numbers, while others used a "dot" rather than a dash. Some did not include a button at all, instead electing to use the up/down button to change channels, including minor channels from the same major channel signal. A few manufacturers included inactive buttons on the remote.

  Wording on the remotes to describe the same function also differed. For example, some manufacturers used "zoom", "wide" and "display" interchangeably to change a program's aspect ratio, while others used those words to execute different settings on the display. Moreover, the instructions furnished with the boxes were either limited or difficult to comprehend by an average consumer.

- **Scanning and Manually Adding Channels:** All boxes included a channel scan feature, but the amount of time required to complete a full scan *varied significantly* by manufacturer. A full scan ranged from as low as 40 seconds to as high as seven minutes and 30 seconds. Moreover, the ability of the boxes to detect all DTV channels during scanning varied from manufacturer to manufacturer, and the length of the scan did not correlate with the box's ability to detect DTV channels. For some boxes, the automated scan feature was the only way to add new channels or channels that were not detected during the original scan, while the remote control could be used for others. This feature, however, requires the consumer to know the actual RF channel of the DTV station, not the channel by which Program and System Information Protocol (PSIP) major and minor channel numbers identify the station. Many of the set-top boxes do not permanently store manually added channels, which are thus lost once the converter box is turned off. Some can permanently store manually added channels, but require a lengthy and somewhat complicated process of navigating through the menu to add them permanently. Here again, the instructions furnished with the boxes for these features were generally limited in detail or difficult to comprehend by an average consumer.

- **Program Guide:** Most manufacturers included a program guide, although a few did not. The majority included a simple program guide capable of carrying a minimum of six hours of programming. A few included a full and complete guide comparable to an electronic GEMSTAR TV Guide. Accessing the program guide using the remote was simple, but navigating the guide was generally somewhat complicated. Moreover, the instructions furnished with the boxes for these features were generally limited in detail or difficult to comprehend by an average consumer.

- **Closed Captioning:** All manufacturers implemented closed captioning (CEA 608/708 capable). Most boxes had a closed captioning button, but a few did not and required the user to navigate a menu to activate it. Most boxes also included a button for a secondary audio channel.

- **Energy Star Features and Automatic Shut-off:** All boxes implemented a four-hour automatic shut-off feature. While some boxes allow the user to disable this feature via a remote control button, others do not and require accessing the menu to reset this feature. Some boxes did not permit disabling this feature, but allowed resetting it to a shorter or longer period not to exceed eight hours.

C. External Features, Accessories and Packaging

The external features, accessories and packaging category included an assessment of the size, weight and shape/construction of the converter boxes, as well as front and back panel features, accessories and instructional literature included in the packaging.

- **Size, Weight, Shape and External Features:** The size, weight and shape/construction of the converter boxes, as well as the features on the front and back panels, *varied significantly* by manufacturer. The box size varied from small to quite large. Some had built-in power supplies, while others used external "brick" power supplies. They varied in weight and construction (plastic versus metal) and on the number of features on the front and back panel of the box. Labeling for the same function/feature on the box differed among manufacturers, which could be a potential source of confusion during initial installation. The instructions furnished with the boxes were generally adequate to resolve the labeling problem.

- **Accessories, Instructional Literature and Packaging:** Some manufacturers included an Audio/Visual (AV) and RF cable in the packaging; others only included an RF cable. Some included both an installation and operation manual, while others provided an installation manual only. The manuals were generally too technical for the average consumer, and most did not detail step-by-step installation or troubleshooting instructions. The outer packaging of the boxes was typically used for extensive marketing of the converter box and its features. The messaging on the packaging was prominent and colorful; in many cases, five sides of the packaging displayed marketing and/or informational material.

D. Conclusion

Based on the results of this evaluation program, it appears that coupon-eligible digital converter boxes currently available in the marketplace are likely to meet the minimum RF performance requirements specified by NTIA for its coupon eligibility program. However, there are significant performance differences among boxes, which may affect consumers' access to their local DTV stations in challenging reception conditions or may require different antenna configurations than are currently in place for their analog TVs. Generally, setting up and operating the converter boxes are not intuitive and may be confusing for some of the targeted consumer populations, resulting in consumers seeking outside assistance to maintain their local television reception.