NAB TV TechCheck

The Weekly NAB Newsletter for Television Broadcast Engineers

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FCC Releases Phase II White Space Device Test Report

On October 15, the FCC Office of Engineering and Technology (OET) released a report entitled *Evaluation of the Performance of Prototype TV-Band White Space Devices*. The report details the results of tests on prototype TV band white space devices (WSDs). The FCC conducted these laboratory and field tests as part of a rulemaking proceeding (ET Docket No. 04-186) that considers authorizing the operation of unlicensed low power devices on locally vacant TV broadcast channels (TV white spaces). The FCC has already concluded that unlicensed fixed systems (such as wireless broadband services) would be allowed to begin operating in the TV white spaces after the conclusion of the DTV transition on February 17, 2009. The Commission is now considering whether to also allow "personal/portable" WSDs to operate in the TV spectrum. The tests sought to further investigate the viability of using "sensing" as a technology that personal/portable WSDs could use to avoid causing interference to TV reception and broadcaster's wireless microphone operations.

The FCC conducted a first round of tests and issued two reports in July 2007. In January 2008 OET announced a second round of testing and invited interested parties to submit prototypes. Five devices were submitted for examination in the Phase II tests. The WSDs were provided by Adaptrum, The Institute for Infocomm Research (I2R), Microsoft Corporation, Motorola Inc., and Philips Electronics North America (Philips). All of the units consisted of a PC, a project box or rack containing the radio and other electronics and an antenna, similar to the Motorola WSD shown in the photo below.

Motorola Prototype WSD

The operating range of all the prototype devices was limited to detecting TV broadcast signals on UHF channels 21-51.

The tests were divided into three parts with each having a lab and field component:

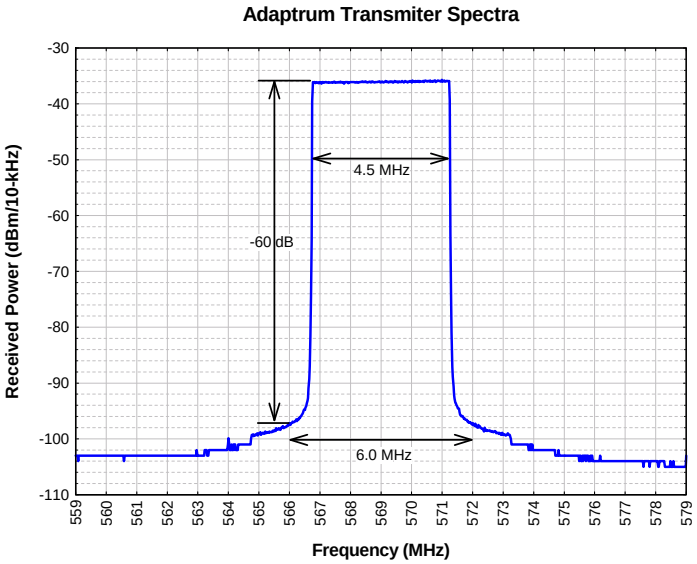
Spectrum Sensing for TV Broadcast Signals

This portion of the study examined the ability of the WSDs to detect whether channels were occupied by ATSC (digital) TV signals. Tests were initially performed in the laboratory under various controlled conditions. The ability to sense clean DTV signals in isolation and also in the presence of TV signals on adjacent channels was measured. In addition, tests were performed using "RF Captures" of off air DTV signals to simulate "real world" conditions. Field tests were conducted at nine sites in Maryland and the District of Columbia to evaluate the DTV sensing performance.

Transmitter Characterization and Interference Testing

The Adaptrum device included transmitting capability. Laboratory tests were performed to characterize the transmitter's signal and field measurements were performed to evaluate potential interference from the Adaptrum transmitter. Further tests were also done in the field to assess the interference of the WSD's signal on cable reception.

Spectrum Sensing for Wireless Microphones
This testing looked at the ability of the WSDs to detect wireless microphones authorized under Part 74 of the FCC rules. Microsoft, Philips and I2R indicated that their devices were capable of sensing wireless microphones. Tests of this capability were initially performed in a controlled environment in the laboratory. Those tests were followed by field tests at two sites, one in Maryland and one in New York City.



The OET report stated that the prototype WSDs have met the burden of "proof of concept." It stated that, in the lab tests, the WSDs were able to sense DTV signals down to levels of between -106 dBm to -128 dBm when recorded off-air DTV signals, which included multi-path fading and other "real-world" distortion, were used. However, in the presence of first adjacent DTV signals, the sensing capabilities of the WSDs diminished as much as 60-70 dB. For the field tests, the report said "In most cases, the devices correctly reported channels as occupied when the device was operated within the service contour of the stations broadcasting on those channels and viewable signals were observed on the channels." The transmitter characterization and interference tests revealed that a WSD has the potential to create co-channel interference at distances up to 1.2 km. While the laboratory testing showed that the WSDs could detect wireless microphone signals down to threshold levels ranging from -103 dBm to -129 dBm, in the field tests one device reported all the channels on which the microphones were transmitting as occupied whether the mic was transmitting or not and the other device indicated several channels as available even when the microphones were on.

NAB does not believe that the test data supports the conclusion that the prototype WSDs have met the burden of proof that sensing is a viable option for unlicensed personal portable operation in the TV bands. In fact, it appears that the data shows conclusively that sensing is unreliable. In addition, in an uncharacteristic move the FCC has released the report without asking for formal comment. NAB and MSTV have filed an Emergency Request with the Commission asking that the report be placed on public comment and the FCC fully consider those comments before adopting any final rules.

All 400 pages of the report are available on the OET's TV Band White Space Testing Web page at http://www.fcc.gov/oet/projects/tvbanddevice/Welcome.html. For questions concerning OET's test report, please contact Alan Stillwell, (202) 418-2925, e-mail Alan.Stillwell@fcc.gov.

FCC Enforcement Alert – Check Your Station's PSIP Settings

NAB has received inquiries from the FCC about the daylight savings time settings in some DTV stations' PSIP. FCC staff indicated that PSIP errors are a citable infraction of the Rules. In particular, Section 73.682 (d) of the FCC Rules incorporate by reference the ATSC PSIP standard (A65) in addition to the other ATSC Standards A52 and A53. This means that these ATSC standards are now part of the Rules and, by strict interpretation, a station must be in complete compliance with these standards. In December of 2007, In the Report and Order (R&O) in the Third Periodic DTV Review, the Commission amended this Rule adopting the most recent versions of these ATSC standards. What is significant about this is that, in the text of the R&O, the FCC essentially stated that they expect DTV stations' PSIP to be correct. Just reading the actual text in the published Code of Federal Regulations volumes is not enough, as those standards are legally part of that rule book.
This means that given the right set of circumstances, the FCC could cite a station for having PSIP errors. A link to the R&O is below. See paragraphs 185 - 189. Also see Appendix B for the modified Rule (starts on page 120 of the pdf).http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-07-228A1.pdf

Right now Daylight Savings Time (DST in the United States) ends at 2:00 a.m. local time on November 2, 2008. In order to technically comply with 47 CFR 73.682(d), all stations, effective October 3, 2008 (between 12:00 and 12:01 a.m.) should have been sending DS_day_of_month set to '2' with DS_status = '1' in their STT. The value for DS_hour normally needs to be set to '2' (unless for programmatic reasons you shift out of DST at another time). Please refer to A/65C, Annex A for exactly when the DS_status changes to '0' if the STT is provided by the network and/or more than one time zone is covered.

In following up, we have learned that some PSIP generators may be “hard coded” to send the “old” date (October 2) for the “fall back” to standard time, instead of November 2. The PSIP parameters above should be changeable locally by a station. Stations should contact their encoder manufacturers if necessary to ensure these parameters are set correctly. It should be clear to all that the FCC is watching and the risk of enforcement action may have increased.

Share Your Expertise with Your Fellow Engineers
Deadline Extended for 63rd NAB Broadcast Engineering Conference
Call for Papers

The NAB Show will host the 63rd NAB Broadcast Engineering Conference (BEC) on April 18 – 23 at the Las Vegas Convention Center in Las Vegas, Nev. This world-class conference addresses the most recent developments in broadcast technology and focuses on the opportunities and challenges that face broadcast engineering professionals around the world. The BEC is a highly technical conference where presenters deliver technical papers ranging over a variety of topics relevant to the broadcast and allied industries. We invite you to submit a proposal to present a technical paper at our conference. The deadline for submitting your proposal is **October 27, 2008**.

To submit a technical paper proposal, click here and complete the electronic form. If you have questions regarding the NAB Broadcast Engineering Conference, please contact John Marino.