

memorandum

DATE: October 28, 2008

TO: The Record

FROM: Julius Knapp
Chief, Office of Engineering and Technology

SUBJECT: Peer Review of Prototype TV White Space Device Phase II Study

The following information and comments are submitted in response to the October 1, 2008 memorandum of the peer review panel that provides their report on the review of the Office of Engineering and Technology's Phase II measurement study of prototype TV-band white space devices (WSDs). The study and its findings are set forth in a report entitled "Evaluation of the Performance of Prototype TV-Band White Space Devices, Phase II", OET Report FCC/OET 08-TR-1005. This study examined the performance of the "detect and avoid" (spectrum sensing) techniques used by several prototype WSDs to evaluate their ability to detect television channels occupied with incumbent signals (digital or analog TV and wireless microphones). The peer review of this study was performed by staff of the Commission's Wireless Telecommunications and Enforcement Bureaus pursuant to the Office of Management and Budget's requirement under the Information Quality Act that influential scientific assessments be subject to peer review to enhance the quality and credibility of the government's scientific information.

The peer review addressed the following subject areas: 1) whether the scope of testing in terms of spectrum sensing abilities and signal conditions examined was appropriate and sufficient; 2) whether the measurement methodologies used in the testing of the prototype devices spectrum sensing abilities was appropriate; 3) whether the scope of testing of the Adaptrum device's transmitting capability for its potential to cause interference to digital TV, analog TV, and wireless microphone signals was appropriate; and 4) whether the various tests performed were properly conducted consistent with the selected methodologies.

Overall the panel found that the testing was appropriate. Specifically, the panel found that (1) the overall scope of the spectrum sensing testing was appropriate; (2) that the measurement methodologies used in the testing of the prototype devices were appropriate; (3) that the scope of the testing of the Adaptrum prototype WSD (the only Phase II device with a transmitting capability) for its potential to cause interference to digital TV and wireless microphones was appropriate, given the study's stated limitations; and, (4) that the tests were properly conducted consistent with the selected methodologies. The review panel further found that the tests were properly performed consistent with the established test plan. In closing, the review panel concluded that it "believes the testing was well done and thorough."

The panel also offered additional comments regarding the subject project. In particular, the panel suggested that additional tests could have been performed in the laboratory for multiple signal types and that a larger number of scans could have been performed per data point. They also wondered if tests could have been performed to investigate potential causes of excessive false detections.

We agree that it may have been useful to have tested multiple, adjacent channel DTV signals at the same time in the adjacent channel measurements performed within the laboratory; however, there was a practical limitation on such tests due to the unavailability of the additional DTV signal generators necessary to simultaneously produce the multiple adjacent-channel signals. In addition, we believe that the field trial component of the test program served to evaluate the scanning/sensing performance of the prototype WSDs over a more diverse set of adjacent channel/amplitude combinations than could have been feasibly simulated on the bench. We also agree that additional data from the field trials, particularly from scans performed at additional locations at each test site, may have been useful. However, we believe that the data collected at all the locations taken together provide a reasonable assessment of the overall performance of the devices under a variety of conditions.

Increasing the number of independent trials from thirty to one thousand was not practical for many of the other devices. For example, the modified Adaptrum WSD has a 185-second scan time, requiring almost two hours to collect a single data point based on thirty independent scans. Increasing the number of independent trials to 1000 would have required more than 51 hours for each data point. Therefore, it was deemed impractical (and often unnecessary) to perform these tests on all of the prototype devices.

The limited measurements of incumbent channel signal strength performed at locations inside and outside at the same site in an effort to provide some data regarding the effects of intervening structures on the desired signal levels. Although we agree that operating the sensing function of the prototype devices at both indoor and outdoor locations at the same site might have been useful; the scan time limitations for the devices made it impractical to perform measurements at additional locations at each site.

The review panel suggests that turning the microphones on and off intermittently during scans would have been beneficial. It is not clear what benefit would derive from this test procedure which would have been difficult and time consuming. Also interpreting the results of such tests would be very difficult. The review panel's comment that an explanation of the cause of the large number of false positives would be helpful is well taken. Limited additional tests were performed to try to understand the test results and it was discovered that the devices produced radiated emissions that were a potential contributor to the reporting of false positives.

In response to the panel's comments regarding additional transmitter tests, we agree that such tests may have been useful; however, we were limited by the fact that only one of the prototype devices provided a transmit capability. We acknowledge that this single device could have been utilized in tests performed at multiple locations to produce a larger data set, but sensitivities regarding the potential for producing interference to the OTA reception of TV signals made us reluctant to activate the transmitter beyond the confines of the laboratory facility. We are not sure that such tests would have added significantly more information.

OET expresses gratitude to the reviewers for conducting a thoughtful review of a voluminous and complex report and for their earlier comments that contributed to development of an improved test plan for our study in Phase II of this project.

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