UNITED STATES GOVERNMENT

memorandum

DATE: July 31, 2007

TO: The Record

FROM: Julius Knapp
Chief, Office of Engineering and Technology

SUBJECT: Peer Review of Cable DTV Receiver Direct-Pickup Interference Study

The following information and comments are submitted in response to the July 18, 2007 memorandum of the peer review panel that reports on the panel's review of a study of *in-situ* direct-pickup (DPU) interference susceptibility of consumer digital television (DTV) receivers by the Office of Engineering and Technology's (OET). The study and its findings are set forth in a report entitled "Direct-Pickup Interference Tests of Three Consumer Digital Cable Television Receivers Available in 2005," OET Report FCC/OET 07-TR-1005. This study examined the susceptibility of three consumer digital television receivers to direct-pickup interference while receiving a digital cable-TV signal. The peer review of this study was performed 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 type of receivers chosen for the study was appropriate, given the limited scope of this test, and provides useful information in conjunction with other data submitted into the record to better understand the potential impact of direct-pickup interference to digital cable ready receivers available to consumers for reception of digital cable television signals; 2) whether the scope of testing in terms of the direct pickup interference conditions examined with respect to digital cable signals was appropriate; and, 3) whether the measurement methodologies used to examine the receivers' susceptibility to direct pickup of interference on digital cable channels were appropriate and the tests were properly conducted consistent with those methodologies. The panel found that the sample of TV receivers used in the study was appropriate, given the test's limited scope, that the scope of testing was appropriate and yielded measurements of direct pickup interference levels that could interfere with cable signals in a real-world environment, that the measurement methodologies used in the tests were appropriate; and that the tests were properly conducted consistent with those methodologies. The panel made recommendations regarding sample selection, scope of testing, and measurement methodologies that would be of value in a test program that was less constrained by time and made some recommendations regarding the content of the report on the testing that was performed. The content-related recommendations have been incorporated into the study and report to the extent possible. OET is responding to the panel's comments herein.

First, with regard to the appropriateness of the receiver sample, the panel stated that the "review panel generally feels that the sample of TVs chosen for the study, which included recent models from different manufacturers, was appropriate, given the test's limited scope" and that the tests were "able to provide some indication of the interfering power levels at which current digital TV owners might detect direct pickup interference." The panel also indicated that, if there had been more time to conduct the tests, "it would have been beneficial to have tested newer TVs …[that]could have contained improvements that

might have made them less vulnerable to interference" and that "it would have been beneficial if at least one or two" plasma TVs had been included. The panel also observed that it would have been useful for the report to indicate where the three tested models ranked in performance among the other receivers tested as part of a 2005 study; in response to this comment by the reviewers, we have revised the report to include ranking information based on the earlier tests. We concur that a larger study that included newer receivers and plasma models would have provided more information on susceptibility of the overall population of digital cable ready television receivers to DPU interference.

Regarding the scope of testing, the panel stated that "the review panel believes that the scope of the testing was appropriate and yielded measurements of direct pickup interference levels that could interfere with cable signals in a real-world environment." The panel also indicated that, if there had been more time to conduct the tests, a more complete picture of direct-pickup susceptibility could have been made by: (1) "testing on multiple cable channels, on encrypted channels, and on high definition cable TV signals"; (2) "conducting the tests at one or more higher [cable TV] signal levels"; (3) testing other real-world environments such as "an apartment/condo building – whose units (adjacent, above, and below) are likely to be separated by building materials different than those found in a townhouse or a single family house" and testing with insulated walls; (4) testing with other room furnishings, including TV platforms made of various materials; (5) testing at least eight different angles around the TV; (6) testing more TVs; (7) testing at more distances; (8) and testing on a test range or in an anechoic chamber.

We note that this study was designed as a limited test to help further inform the record in the Commission's TV White Spaces Rule Making. Comments in the record point to additional data on potential the nature of DPU interference. This relatively simple and limited set of tests simply confirmed that DPU interference can occur under certain conditions.

The panel also indicated that it would be helpful to have more information about various factors in the test environment, including: (1) "position of the large metallic garage door (up or down)" and "the location of metal tools and a garage door opener"; (2) "a better description of the wall construction, including insulation, sheathing, wiring, etc. would be useful, as well as a citation, if available, confirming that such materials will not attenuate signals"; (3) verification of "location of items within the wall by use of a stud sensor that can detect metal or electrical wiring or some other method". In response to the first of these comments, we revised the report to specify that the garage door was open during all tests. We concur that a more complete description of wall materials and of their attenuation properties may have been useful, however no attempt was made to extrapolate these results to other types of walls. While wall attenuation is well known to vary greatly, we also note that the walls used in these tests were not unusual and were actual residential construction. We agree that use of an electronic stud finder to attempt to locate metallic components in the townhouse wall may have been useful to better understand the construction of the wall, however that knowledge would not have affected the results. (The steel channels believed to have been used in the firewall are expected to be about 5 inches behind the surface of the outer drywall layer.)

Regarding the measurement methodologies, the panel concluded "that the measurement methodologies used in the test were appropriate and that the tests were properly conducted consistent with those methodologies." However, they stated that, if more time had been available to gather and analyze the results, "certain improvements could be made in the way that measurements were made and analyzed." The improvements suggested by the panel included: (1) use of multiple observers—with results averaged across the observers—to determine audio dropout thresholds; (2) elimination of the 2.4 GHz phone used in intercom mode to monitor TV audio for tests at site 2; (3) testing with narrower and wider bandwidths for the interfering signal "to determine the effects of different-sized and partially and fully overlapping

interfering signals"; and, (4) performing more than one measurement for each condition and at each location. We concur that such improvements would have been useful. With regard to the use of multiple observers and of the 2.4 GHz phone/intercom for audio monitoring, we note that the observed dropouts were complete and of sufficient duration that any observer would have been able to recognize them and that, in our judgment, the phone/intercom audio quality was sufficient to enable easy identification of the dropouts. We also note that the judgment as to whether the dropouts exceeded 50 percent of the observation time was made subjectively, rather than by measuring and summing the actual durations of the dropouts. In this sense, it is plausible that multiple observers might have reached different conclusions; however, during the tests, the audio presence was, in every case, much greater than 50 percent for interference at one tested level and much less than 50 percent for interference at the next higher step in level (*i.e.*, 1 dB higher); consequently, we do not believe that the test results would have been affected by use of multiple observers or by the elimination of the phone/intercom link. In general, the abruptness of the digital cliff effect tends to minimize the impact of observational differences on the quantitative results of the tests—especially with respect to the 1-dB step size used in determining thresholds for these tests.

OET expresses gratitude to the reviewers for conducting a thoughtful review on a tight schedule and providing comments that have improved the quality of the report.

cc: George Dillon, EB
James Higgins, EB/Columbia
Martin Liebman, WTB
Doug Miller, EB/Atlanta
Mary Shultz, WTB