Lucent Digital Radio

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Mr. Milford K. Smith Jr.
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Dear Smitty:

Lucent Digital Radio (LDR) is pleased to submit to the NRSC a test result document which captures some of the laboratory testing LDR has performed to date. LDR continues to perform and gather both laboratory and field data as part of an ongoing process.

LDR's test plan is designed to compare the performance of a digital broadcast system with existing analog systems and to test the compatibility of a digital broadcast with the embedded base of analog receivers. In order to ensure commercial acceptance, LDR places considerable emphasis on characterizing suitable benchmarks against which such evaluations can be performed. The LDR test methodology includes four major components, which are explained in more detail in Appendix A:

Proper sampling and characterization of the analog receiver population
Audio sample selection and processing prior to transmission
Subjective audio tests
Careful selection of channel conditions for laboratory testing

The design and testing of digital systems is an iterative process. Testing results will drive design changes and modification. Thus, the results presented in these appendices are not indicative of a final design. Test results gathered after this submission will be made available upon request.

Laboratory test results are primarily used for evaluation. It is generally accepted that laboratory results are more reliable since a broader range of test can be conducted in a controlled environment. Field test should be used to as final checkpoint after extensive laboratory measurements are made. In addition, consistent with the NRSC's recent decision to perform comparative testing, it is most critical that both lab and field-tests be performed on a common and controlled test bed.

Laboratory measurements were obtained at LDR's facilities in Warren, NJ. These facilities were audited by the Department of Commerce's Institute for Telecommunications Sciences (ITS), based in Boulder, Colorado.

LDR carefully tested the latest generation of reference receivers recommended by the NRSC. These receivers were used to process analog audio for compatibility testing. In addition, LDR utilized data supplied by CEA to characterize a broader receiver population. This was done to ensure that the embedded base of receivers is properly represented and characterized.

Subjective testing was performed by Lucent's Multimedia Perception Assessment Center in Holmdel, New Jersey and Red Hill, Illinois as well as Moulton Laboratory in Groton, Mass. Audio selections chosen by LDR were used for testing. These audio selections and the corresponding rational for choosing are given in Appendix B.

FM IBOC Laboratory results are presented in Section F. These include IBOC performance in the presence of noise, 1st adjacent interference and multi-path conditions as defined by the EIA test models. The subjective assessment of audio samples as a function of distance from the transmitter is also provided.

The Compatibility of FM-IBOC is also presented. Section G provides FM-IBOC hybrid performance with the host analog signal and addresses the question of whether the digital signal impacts an analog receiver tuned to an IBOC station. Section H presents hybrid IBOC compatibility with the first adjacent analog signal and addresses the question of whether IBOC will interfere with a receiver tuned to an adjacent analog channel. Consistent with our testing philosophy, subjective testing was primarily used to perform these assessments. The conditions tested include EIA multipath conditions and various levels of signal strength.

The AM IBOC system test results are presented in Appendix J. These results are based upon objective measures (e.g: BER) and include coverage, performance with noise and performance with various interference conditions. LDR will complement this data with subjective test for AM when they become available.

A system description of the LDR hybrid and all digital systems are provided in Appendix D for FM and Appendix I for AM.

Best regards,

(Ben Benjamin)

Enclosures;