- ◊ Repeat steps for other TVs
- Measure injected noise level
  - ◊ Set signal attenuator to 81 dB
  - ◊ Measure the "long average power" twice for use as described following 1st measurements of injected noise level.

Because both the injected noise power measurement and the injected signal measurement were performed using the same vector signal analyzer on the same amplitude range, the CNR is expected to be quite accurate, since it doesn't depend on the absolute calibration accuracy of the measuring instrument.

Additional information on the testing is included in the "Measurement Method" section of Chapter 3.

Minimum Signal Tests

Note that all measurements are performed using the vector signal analyzer (VSA), and all attenuator settings and measurements are entered into a spreadsheet that performs the required computations. The tests are performed for TV channels 3, 10, and 30.

- Connect equipment as shown in Figure A-2.
- VSA setup
  - ◊ Run DTV measurement software*
  - ◊ Set number of averages to 1200
  - ◊ Set selected broadcast channel
  - ◊ Execute "single cal"
  - ◊ Set amplitude range to -50 dBm (most sensitive range)
- RF player setup
  - ◊ Load "Hawaii_ReferenceA" file
  - ◊ Set output channel to selected channel
  - ◊ Set output level to -30 dBm
- Measure VSA self noise three times by connecting a 50-ohm termination to the VSA input and performing a "long average power" measurements. (The average of these measurements will be subtracted—in linear power units—from all subsequent measurements.)
- TV tests. Repeat for each of TV to be tested (typically eight). Include receiver D3 in each test sequence as a consistency check.
  - ◊ Connect output of the test setup through impedance-matching pad MLP#12, as shown by the solid lines on the right side of Figure A-2.
  - ◊ Set signal to a high level and take whatever steps are necessary to ensure that TV is tuned to the signal and producing a picture.
  - ◊ Adjust signal level downward until picture either drops out or exhibits a high visual error rate
  - ◊ Adjust signal level upward in 0.1-steps to achieve the lowest signal level that produces a picture that is free of visual errors for 10 seconds. Record this attenuator setting.
  - ◊ Adjust signal level upward in 0.1-steps as needed to achieve the lowest signal level that produces a picture that is free of visual errors for 60 seconds. Record this attenuator setting.
    - – As a consistency check, the spreadsheet computes difference between attenuator setting in previous step and current attenuator setting. This difference is typically between 0 and 0.2 dB.
  - ◊ Perform "long average power" measurement as described below.
    - – The measurement should be initiated near the end of a playback loop, so that—following initial operations performed when "long average power" is selected—the actual long

* "Control Software for the HP89400 Vector Signal Analyzer for Measuring DTV and NTSC Signals", VSA5.BAS, Version 5.02, Gary Sgrignoli

integration will begin just after the start of the RF playback loop. Confirm that the integration ends before completion of the playback loop.
  - As a consistency check, the spreadsheet calculates the sum of the signal attenuator setting and the measured power level. This sum should be nearly constant across all TV measurements.
  - Spreadsheet calculates injected signal level by subtracting—in linear power units—the VSA self noise from the measured power (a correction that is typically less than 0.1 dB) and then subtracting (in dB) the power loss of impedance-matching pad MLP#12 for the specific TV channel tested.
- ◊ Repeat steps for other TVs

Additional information on the testing is included in the "Measurement Method" section of Chapter 4.

Multipath Tests (RF Captures)

Note that in-band injected signal power (6-MHz bandwidth centered at channel 30) was measured at Pt5a (Figure A-1) using the vector signal analyzer (VSA) for each of the 47 RF captures during tests of the first group of eight receivers. These measurements were not repeated for subsequent receivers because small variations in absolute signal level applied to the receivers were not expected to affect the results.

- Connect equipment as shown in Figure A-1
- VSA setup
  - ◊ Run DTV measurement software*
  - ◊ Set number of averages to 2000
  - ◊ Set broadcast channel 30
  - ◊ Execute "single cal"
  - ◊ Set amplitude range to -20 dBm
- RF player setup
  - ◊ Set output channel to 30
  - ◊ Set output level to -30 dBm
- Signal and noise attenuators
  - ◊ Set signal attenuator to 0 dB. This was found to provide a median in-band signal power of -29.7 dBm across the 47 RF captures. This is 53 dB above the minimum signal level at TOV for typical receivers; consequently, any variations in absolute level among the captures was not expected to affect the test results.
  - ◊ Set the noise attenuator to 81 dB to effectively eliminate injected noise.
- Measure modulation error ratio (MER) as an indication of signal quality.
  - ◊ Load "Hawaii_ReferenceA" file
  - ◊ In the first series of tests, MER was measured twice with internal equalizer off. The average of the measurements was 35.5 dB.
- Tests for a given capture
  (Note that captures are loaded and tested sequentially in groups for which the originating TV broadcast channel is the same. Within each group, captures that are deemed to be easier to acquire—due to benign multipath conditions—are loaded first to increase the likelihood of a successful channel scan on each TV.)
  - ◊ Load the selected RF capture
  - ◊ Ensure signal acquisition for all TVs, to the extent possible
    - If this capture corresponds to a different broadcast TV channel than the last capture, take whatever steps are necessary to ensure that all connected TVs are tuned to the signal and have an opportunity to produce a picture. This may include channel scans or disconnecting power.

* "Control Software for the HP89400 Vector Signal Analyzer for Measuring DTV and NTSC Signals", VSA5.BAS, Version 5.02, Gary Sgrignoli

To improve probability of success, the first capture loaded should have as benign multipath conditions as possible.

- If this capture corresponds to the same broadcast TV channel as the last, then check to see that all TVs have acquired the signal (i.e., are producing a TV picture). If not, try channel scans or returning to a more benign capture from the same broadcast channel to achieve acquisition.

◊ Wait for at least three full playback loops to be completed before judging TV receiver performance.

◊ TV tests. Repeat for each of the connected TVs (typically eight). Include receiver D3 in each test sequence as a consistency check.

- Observe video on the selected TV and count the number of video errors observed during a single playback loop. If performance is monitored over several loops and, if the results vary, select the median number of errors as the value to record. A video error burst lasting more than one second is counted based on the approximate duration in seconds. Thus, an error burst lasting three seconds is counted as three errors. Errors occurring during or immediately after the loop-restart time are not counted, nor are errors associated with known defects (dropped symbols) in eight of the captures, as documented by the ATSC.*
- Repeat for next TV

◊ Repeat for next RF capture

Additional information on the testing is included in the "Measurement Method" section of Chapter 4.

* See Table B-1 in Appendix B of this report, or the "Quality of Capture" column of the continuation of Figure A-1 on p.28 of *"ATSC Recommended Practice: Receiver Performance Guidelines"*, ATSC Doc. A/74, Advanced Television Systems Committee, 17 June 2004.

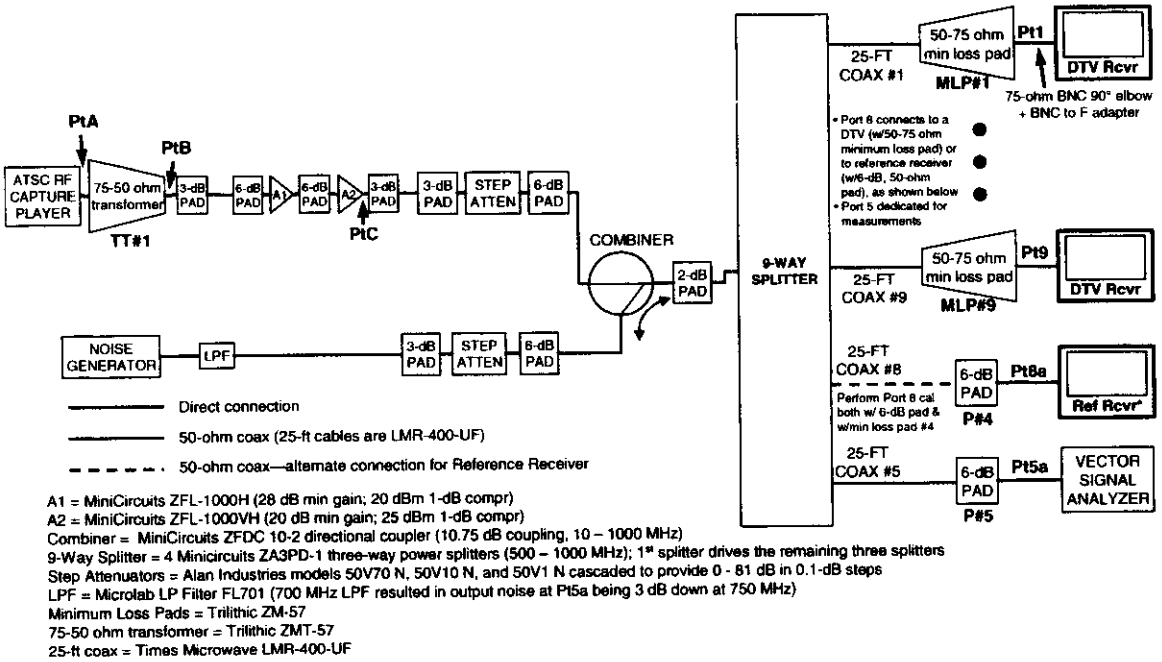
EQUIPMENT

Table A-1 identifies the equipment used for the tests that were conducted for this report.

Table A-1. Equipment List

MAKE	MODEL	EQUIPMENT	S/N	CAL DATE	USE
Sencore	RFP910	RF Player	007, Run 11A	8/10/05	ATSC source for all tests
Agilent	89441A	Vector Signal Analyzer	US40514809 /US39313048	9/17/04	CNR measurements before 8/30/05; amplitude of injected captures before 8/30/05
Agilent	89441A	Vector Signal Analyzer	US40514815 /US39313021	8/8/05	CNR measurements after 8/30/05; All minimum signal measurements
Agilent	E7405A	Spectrum Analyzer	US41160406	10/27/04	Calibration of minimum-loss impedance-matching pads (6/7/05)
Agilent	E7405A	Spectrum Analyzer	US41160425	8/16/05	Frequency response of splitter test configuration
Noise/Com	UFX-7110	Noise Generator	P292-0135	**	Noise source for white-noise threshold tests

Notes:
** Last factory calibration was 8/21/01, but for the reported tests, output was calibrated by means of Agilent E7405A spectrum analyzer at the time of each test.



A1 = MiniCircuits ZFL-1000H (28 dB min gain; 20 dBm 1-dB compr)
A2 = MiniCircuits ZFL-1000VH (20 dB min gain; 25 dBm 1-dB compr)
Combiner = MiniCircuits ZFDC 10-2 directional coupler (10.75 dB coupling, 10 – 1000 MHz)
9-Way Splitter = 4 Minicircuits ZA3PD-1 three-way power splitters (500 – 1000 MHz); 1st splitter drives the remaining three splitters
Step Attenuators = Alan Industries models 50V70 N, 50V10 N, and 50V1 N cascaded to provide 0 - 81 dB in 0.1-dB steps
LPF = Microlab LP Filter FL701 (700 MHz LPF resulted in output noise at Pt5a being 3 dB down at 750 MHz)
Minimum Loss Pads = Trilithic ZM-57
75-50 ohm transformer = Trilithic ZMT-57
25-ft coax = Times Microwave LMR-400-UF

Figure A-1. Block Diagram of Test Configuration for Required CNR and RF Capture Tests

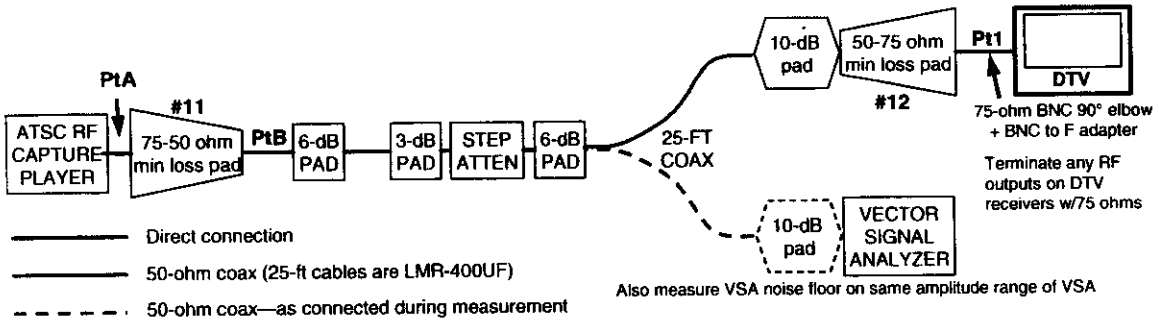


Figure A-2. Block Diagram of Test Configuration for Minimum Signal at TOV

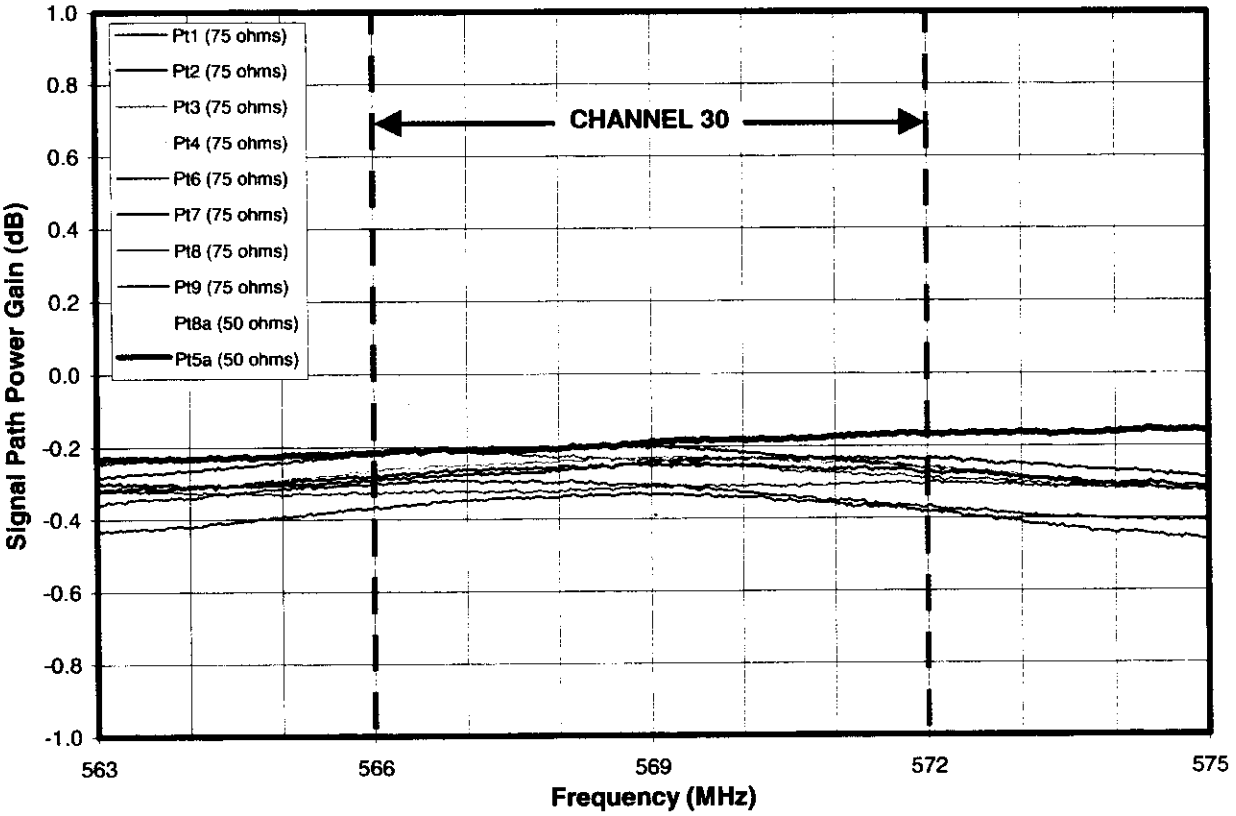


Figure A-3. Frequency Response of Each Port

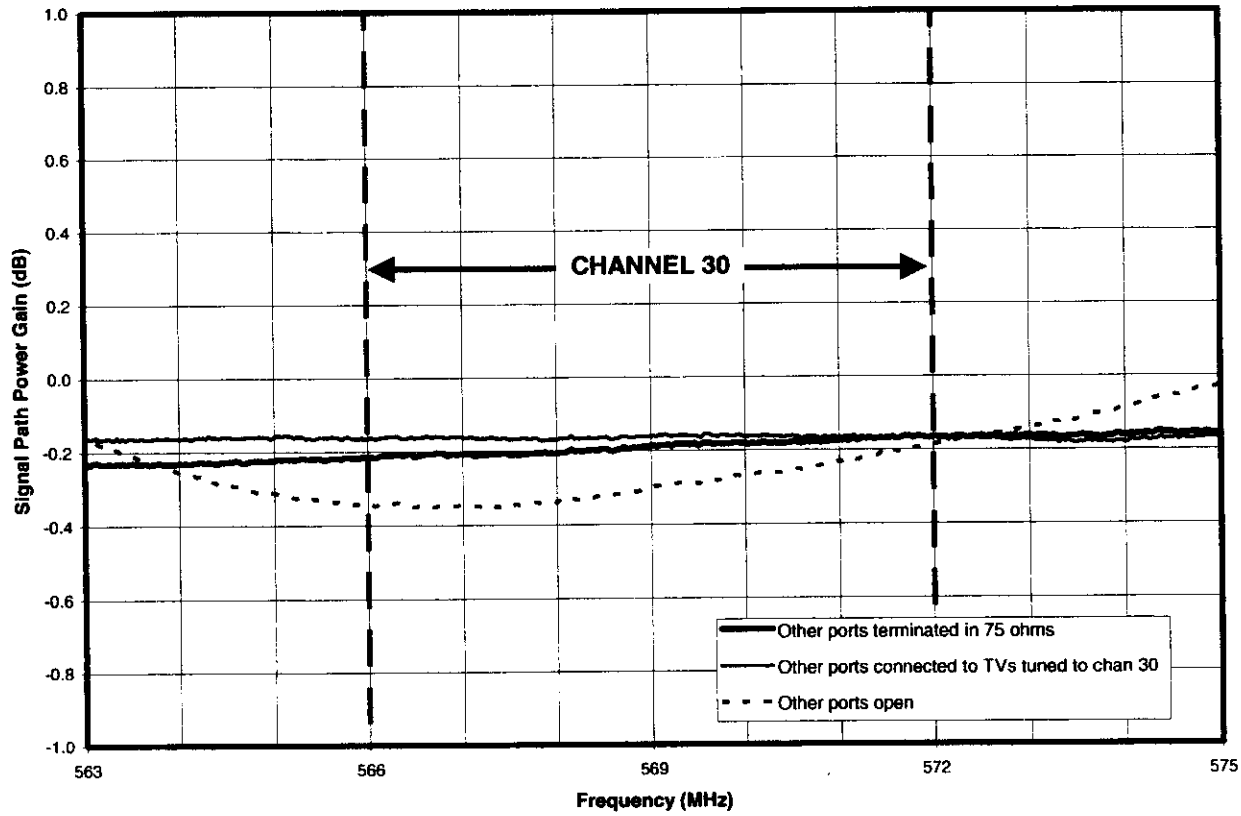


Figure A-4. Effect of Load Impedance Mismatch

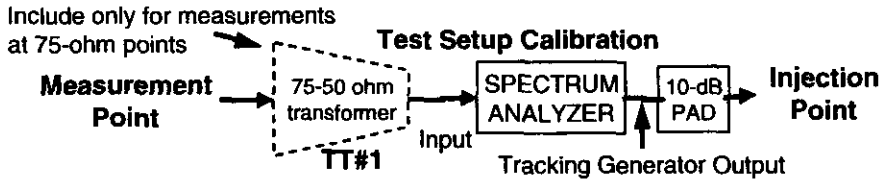


Figure A-5. Calibration Connection for Test Setup for Required CNR and RF Capture Tests

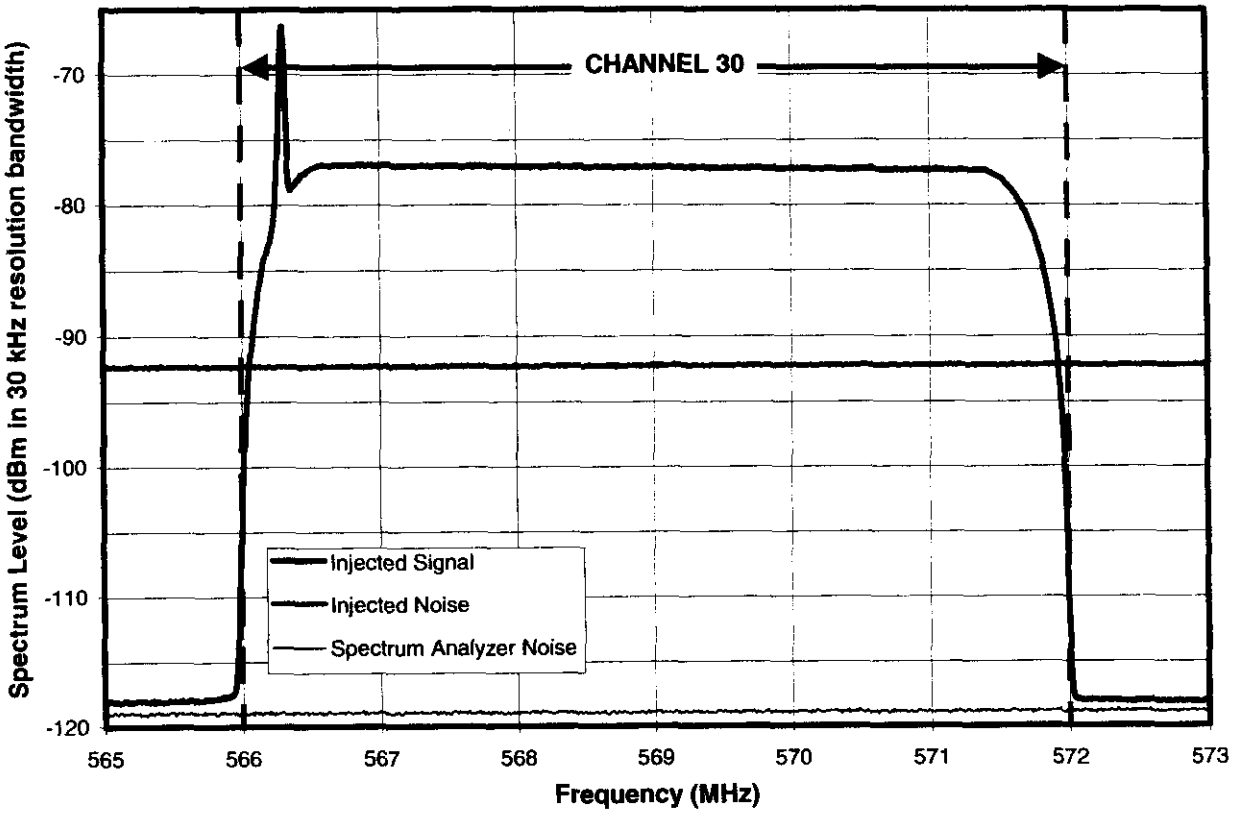


Figure A-6. Spectra of Injected Signal and Noise at 15-dB CNR

APPENDIX B:
SUMMARY OF RF FIELD CAPTURES

Table B-1 lists the 50 ATSC-recommended captures, some of their characteristics, and the number of consumer DTV receivers (of 28) that successfully demodulated each capture in tests for this report.

The three captures having no video content (e.g., grey or black screens) were not tested, except with an instrumented receiver which is not included in the tabulated results. In counting observed video errors, errors coinciding with the locations of known symbol drops, as reported by the ATSC, were not counted. Note that four of the captures on which no tested receiver achieved demodulation free of visual errors were identified by the ATSC as having possible non-linearities caused by high-level adjacent channels overdriving the recording system.

Notes on Table B-1 (next page):
All captures have durations of 23 or 25 seconds
* Site: HR = high rise apartment; SF = single family home; TH = townhouse
Antenna: ID = indoors at 6-ft height; OD = outdoors at 30-ft height
**Issues: DS = 48 dropped symbols at specified location; NL = recording may contain nonlinearities due to strong adjacent channel

Table B-1. RF Field Captures

File #	Original data capture filename	Chan	Site / Antenna*	Distance from Tx (Miles)	Known Issues**	# of Receivers w/No Errors	# of Receivers w/≤2 Errors
01	NYC_200_44_10272000_DBT1	44	HR / ID	2.0		10	10
02	NYC_200_44_10272000_LOOP1	44	HR / ID	2.0		0	0
03	NYC_200_44_10272000_MEGA1	44	HR / ID	2.0		10	10
04	NYC_200_44_10272000_RAB1	44	HR / ID	2.0		10	10
05	NYC_200_44_10272000_SSEN1	44	HR / ID	2.0		10	10
06	NYC_200_44_10272000_SSEN2	44	HR / ID	2.0		10	10
07	NYC_200_44_10272000_SSEN3	44	HR / ID	2.0		0	0
08	NYC_200_44_10272000_YAGI1	44	HR / ID	2.0		13	13
09	NYC_200_56_10272000_BWT1	56	HR / ID	2.0		2	10
10	NYC_200_56_10272000_DBT2	56	HR / ID	2.0		10	10
11	NYC_200_56_10272000_DSEN1	56	HR / ID	2.0		10	10
12	NYC_200_56_10272000_DSEN2	56	HR / ID	2.0		1	14
13	NYC_200_56_10272000_LOOP1	56	HR / ID	2.0		10	10
14	NYC_200_56_10272000_MEGA1	56	HR / ID	2.0		11	11
15	NYC_200_56_10272000_RAB1	56	HR / ID	2.0		10	10
16	NYC_200_56_10272000_SSEN1	56	HR / ID	2.0		0	10
17	NYC_200_56_10272000_YAG1	56	HR / ID	2.0		10	10
18	WAS_06_34_06092000_REF	34	SF / OD	10.8		8	10
19	WAS_23_34_06072000_OPT	34	SF / ID	16.7		28	28
20	WAS_23_48_06072000_OPT	48	SF / ID	15.5		0	8
21	WAS_3_27_06022000_REF	27	SF / OD	48.4		9	13
22	WAS_3_35_06022000_REF	35	SF / OD	51.9	No Video	NA	NA
23	WAS_311_34_06052000_OPT	34	HR / ID	4.3	NL	0	0
24	WAS_311_35_06052000_REF	35	HR / OD	3.9	No Video	NA	NA
25	WAS_311_36_06052000_REF	36	HR / OD	4.7		13	14
26	WAS_311_39_06052000_OPT	39	HR / ID	4.3		0	0
27	WAS_311_48_06052000_REF	48	HR / OD	3.9		2	11
28	WAS_32_48_06012000_OPT	48	SF / ID	17.8	NL	0	0
29	WAS_34_27_06082000_OPT	27	TH / ID	7.5		7	27
30	WAS_34_35_06082000_OPT	35	TH / ID	9.6	NL	11	13
31	WAS_34_48_06082000_OPT	48	TH / ID	9.6		7	11
32	WAS_38_34_05312000_OPT	34	TH / ID	14.3	DS@15.0 sec	26	26
33	WAS_38_34_05312000_REF	34	TH / OD	14.3	DS@15.1 sec	27	28
34	WAS_38_36_05312000_OPT	36	TH / ID	14.3	DS@22.2 sec	24	24
35	WAS_47_48_06132000_OPT	48	SF / ID	13.1	DS@13.8 sec	27	28
36	WAS_49_34_06142000_OPT	34	SF / ID	20.2	Possible DS	0	0
37	WAS_49_39_06142000_OPT	39	SF / ID	20.2	DS@24.9 sec	10	11
38	WAS_51_35_05242000_REF	35	SF / OD	20.3		8	8
39	WAS_63_34_06212000_OPT	34	SF / ID	12.7		0	9
40	WAS_68_36_05232000_REF	36	SF / OD	17.7	NL	0	8
41	WAS_75_35_06162000_OPT	35	SF / ID	10.0		0	1
42	WAS_75_36_06162000_OPT	36	SF / ID	10.9	NL	0	0
43	WAS_75_39_06162000_OPT	39	SF / ID	10.5		10	13
44	WAS_80_35_06152000_OPT	35	TH / ID	9.9	No Video	NA	NA
45	WAS_81_36_06192000_OPT	36	SF / ID	9.6		12	27
46	WAS_82_35_06202000_OPT	35	SF / ID	8.3	DS@17.2 sec	27	28
47	WAS_83_36_06222000_OPT	36	TH / ID	3.5	DS@14.9 sec	2	5
48	WAS_83_39_06222000_OPT	39	TH / ID	3.0	DS@12.2 sec	28	28
49	WAS_86_36_07122000_OPT	36	SF / ID	33.3		10	10
50	WAS_86_48_07122000_REF	48	SF / OD	34.4		1	5

See notes on preceding page

APPENDIX D

NOTICE OF INQUIRY

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Technical Standards for Determining Eligibility	)	
For Satellite-Delivered Network Signals Pursuant	)	ET Docket No. 05-182
To the Satellite Home Viewer Extension and	)	
Reauthorization Act		

NOTICE OF INQUIRY

Adopted: April 29, 2005 **Released: May 3, 2005**

Comment Date: 30 Days after Publication in the Federal Register
Reply Comment Date: 45 Days after Publication in the Federal Register

By the Commission:

1. By this action, the Commission begins an inquiry into the adequacy of the digital signal strength standard and testing procedures used to determine whether households are eligible to receive distant broadcast digital television (DTV) network signals from satellite communications providers. We request comment and information on whether the existing statutes and/or regulations concerning the digital television signal strength standard and testing procedures as used for identifying if households are unserved by local network TV signals for purposes of determining eligibility to receive distant signals from satellite services need to be revised. We specifically intend to study whether such statutes and regulations should be revised to take into account the types of antennas that are available to consumers. The record obtained through this inquiry will be used to prepare a report to Congress describing the results of this study and the Commission's recommendations, if any, for changes that should be made to the applicable Federal statutes or regulations. In this proceeding, we are not considering alteration of the DTV signal strength standard for any purpose other than determining household eligibility to receive retransmitted distant network signals. We are initiating this inquiry in response to provisions of Section 204(b) of the Satellite Home Viewer Extension and Reauthorization Act of 2004 (SHVERA).[313]

BACKGROUND

2. Broadcast television stations have rights, through the Copyright Act[314] and private contracts, to control the distribution of the national and local programming that they transmit.[315] In 1988, Congress adopted the Satellite Home Viewer Act (SHVA) as an amendment to the Copyright Act in order to protect

[313] The Satellite Home Viewer Extension and Reauthorization Act of 2004, Pub. L. No. 108-447, § 207, 118 Stat 2809, 3393 (2004) (to be codified at 47 U.S.C. § 325), § 204(b). The SHVERA was enacted as title IX of the "Consolidated Appropriations Act, 2005."

[314] 17 U.S.C. § 119. The Satellite Home Viewer Act is part of this copyright statute.

[315] *Satellite Delivery of Network Signals to Unserved Households for Purposes of the Satellite Home Viewer Act*, CS Docket No. 98-201, *Report and Order*, 14 FCC Rcd 2654 at ¶ 2 (1999) (*SHVA Report and Order*).

the broadcasters' interests in their programming while simultaneously enabling satellite communications providers to provide broadcast programming to those satellite subscribers who are unable to obtain broadcast TV network programming over the air.[316] Under the SHVA, those subscribers were generally considered to be "unserved" by local stations. Pursuant to the requirements of this statute, which linked the definition of "unserved households" to a Commission-defined measure of analog television signal strength known as "Grade B intensity,"[317] the Commission adopted rules for determining whether a household is able to receive a television signal of this strength.[318] In particular, the Commission adopted rules established a standardized method for measuring the strength of television signals at individual locations and endorsed a method for predicting the strength of such signals that could be used in place of actually taking measurements.[319] For DTV stations, the counterparts to the Grade B signal intensity standards for analog television stations are the values set forth in Section 73.622(e) of the Commission's rules describing the DTV noise-limited service contour.[320]

3. In the Satellite Home Viewer Improvement Act of 1999 (SHVIA),[321] Congress revised and extended the statutory provisions established by the 1988 SHVA. With regard to prediction of signal availability, the SHVIA added Section 339(c)(3) to the Communications Act of 1934, as amended (47 U.S.C. § 339(c)(3)), which provides that "[T]he Commission shall take all actions necessary, including any reconsideration, to develop and prescribe by rule a point-to-point predictive model for reliably and presumptively determining the ability of individual locations to receive signals in accordance with the signal intensity standard in effect under Section 119(d)(10)(A) of title 17, United States Code."[322] Section 339(c)(3) further provides that "[I]n prescribing such a model, the Commission shall rely on the Individual Location Longley-Rice model set forth by the Federal Communications Commission in Docket No. 98-201, and ensure that such model takes into account terrain, building structures, and other land cover variations. The Commission shall establish procedures for the continued refinement in the application of the model by the use of additional data as it becomes available."[323] The Individual

[316] 17 U.S.C. §§ 119, 122 (Copyright Act provisions); 47 U.S.C. §§ 325, 338, 339 (Communications Act provisions).

[317] *See* 17 U.S.C. § 119(d)(10)(A); *see* also 47 CFR § 73.683(a). Section 119(d)(10) (A) of the Copyright Act defines an unserved household as a "household that cannot receive, through use of a conventional stationary, outdoor rooftop receiving antenna, an over-the-air signal of a primary network television station affiliated with that network of Grade B intensity as defined by the Federal Communications Commission under section 73.683(a) of title 47 of the Code of Federal Regulations, as in effect on January 1, 1999." Section 73.683(a) sets forth field strength levels for the Grade B coverage contours of analog TV stations as follows, units are one micro-volt per meter (dBμ): channels 2-6 47 dBμ, channels 7-13 56 dBμ, channels 14-69 64 dBμ.

[318] *SHVA Report and Order,* 14 FCC Rcd 2654 at ¶ 4.

[319] *Id.* at ¶ 71. The Individual Location Longley-Rice (ILLR) predictive model is used to predict the Grade B signal intensity at a location. 47 CFR Section 73.686(d) specifies the measurement procedure used to obtain the signal intensity at an individual location.

[320] 47 CFR § 73.622(e). *See also* 47 CFR § 73.625(b) (determining coverage).

[321] The Satellite Home Viewer Improvement Act of 1999, Pub.L. No 106-113, 113 Stat. 1501 (1999) (codified in scattered sections of 17 and 47 U.S.C.). The SHVIA was enacted on November 29, 1999, as Title I of the Intellectual Property and Communications Omnibus Reform Act of 1999 (IPACORA) (relating to copyright licensing and carriage of broadcast signals by satellite carriers).

[322] *See* SHVIA, section 1008.

[323] *See Satellite Delivery of Network Signals to Unserved Households for Purposes of the Satellite Home Viewer Act; Part 73 Definition and Measurement of Signals of Grade B Intensity*, Report and Order, CS Docket No., 98-201, 14 FCC Rcd 2654 (1999). A computer is needed to make these predictions because of the large number of reception points that must be individually examined. Computer code for the ILLR point-to-point radio propagation model is published in an appendix of NTIA Report 82-100, *A Guide to the Use of the ITS Irregular*

Location Longley-Rice (ILLR) radio propagation model adopted by the Commission in CS Docket No. 98-201 provides predictions of radio field strength at specific geographic points based on the elevation profile of terrain between the transmitter and each specific reception point.[324] The SHVIA further required that the courts rely on the Individual Location Longley-Rice (ILLR) model established by the Commission for making presumptive determinations of whether a household is capable of receiving broadcast television signals of at least a certain threshold intensity.

4. As indicated above, the threshold signal intensity level for determining eligibility to receive retransmitted distant analog network TV signals is the Grade B standard set forth in Section 73.683(a) of the Commission's rules. The Grade B contour, originally established to describe the service area (or coverage contour) of analog TV stations, defines a geographic boundary curve on which the specified field strength is predicted to be exceeded 50 percent of the time at 50 percent of the locations.[325] However, the values of the Grade B standard are set such that generally, if a household receives a television signal of Grade B intensity, it should receive an acceptable television picture at least 90 percent of the time. More specifically, the Grade B values represent field strengths that are strong enough, in the absence of man-made noise or interference from other stations, to provide at least 90 percent of the time a television picture that the mean observer would classify as "acceptable" using a receiving installation (antenna, transmission line, and receiver) typical of outlying or near-fringe areas.[326]

5. The SHVIA directed the Commission to evaluate all possible standards and factors for determining eligibility for retransmission of signals of network stations to determine whether it may be appropriate to recommend, in a report to Congress, modifying or replacing the Grade B intensity standard for the purpose of determining eligibility, and, if appropriate, to make a further recommendation relating to a standard for digital signals.[327] In November 2000, the Commission issued its Report to Congress in this matter,[328] recommending that the Grade B signal intensity standard and eight of the nine planning

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Terrain Model in the Area Prediction Mode, authors G.A. Hufford, A.G. Longley and W.A. Kissick, U.S. Department of Commerce, April 1982. Some modifications to the code were described by G.A. Hufford in a memorandum to users of the model dated January 30, 1985. With these modifications, the code is referred to as Version 1.2.2 of the Longley-Rice model.

[324] *Id.* at ¶69.

[325] *See* 47 C.F.R. 73.683 (a), and 47 C.F.R. 73.684 (c).

[326] The Grade B signal contour describes a boundary around a television station's transmitter. As set forth in Section 73.683(a), a signal of Grade B intensity is defined as a discrete value measured in units of dBμv/m (dB over a microvolt per meter). However, the absolute intensity of broadcast signals at particular locations and at particular times cannot be precisely determined through predictive means, regardless of the predictive method used. Signal strength varies randomly over location and time, so signal propagation must be considered on a statistical basis. This is true regardless of whether the signal intensity is predicted at a fixed location (such as an individual household) or over an area. Some prediction methods, including the Commission's field strength charts (propagation curves), predict the occurrence of median signal strengths (i.e., signal strengths predicted to be exceeded at 50% of the locations in a particular area at least 50 percent of the time). Using these methods, "location" and "time" variability factors are added to the signal level for an acceptable picture so that the desired statistical reliability, *i.e.*, 50 percent of locations 90 percent of the time, is achieved. The values chosen for the Grade B signal intensity standards account for this variability and, therefore, as indicated above, predict that at least 50 percent of the locations along the Grade B contour will receive an acceptable picture 90 percent of the time. For additional information on Grade B contours, see "Understanding Television's Grade A and Grade B Service Contours."

[327] *See* section 339(c)(1) of the Communications Act of 1934, as amended by the SHVIA, section 1008.

[328] *See Technical Standards for Determining Eligibility for Satellite-Delivered Network Signals Pursuant to the Satellite Home Viewer Improvement Act, Report*, ET Docket No. 00-90, FCC 00-416 (2000); *see also id., Notice of Inquiry*, FCC 00-184, released May 26, 2000.

factors[329] used in that model be retained as the basis for predicting whether a household is eligible to receive retransmitted distant TV network signals under SHVIA. The Commission also recommended modification of the remaining planning factor, *i.e.*, time fading, by replacing its existing fixed values with location-dependent values determined for the actual receiving locations using the ILLR prediction model. Finally, the Commission found that it would be premature to construct a distant network signal eligibility standard for DTV signals at that time. Therefore, the Commission recommended that establishment of a distant network signal eligibility standard for DTV signals be deferred until such time as more substantial DTV penetration is achieved and more experience is gained with DTV operation.

6. The Commission has established a DTV Table of Allotments, which specifies channels for use by DTV stations in individual communities, using a procedure that closely replicates the service areas of the existing Grade B contours for analog TV stations.[330] In particular, the Commission has defined DTV station service areas based on field strength levels that provide noise-limited service (the Grade B signal strength levels define noise-limited service for analog stations).[331] DTV service areas are defined as the geographic area within a station's noise-limited field strength contour where its signal strength is expected to exceed that field strength level at 50 percent of the locations 90 percent of the time F(50,90).[332] Within that contour, service is considered available at locations where a station's signal strength, as predicted using the terrain dependent Longley-Rice point-to-point propagation model, exceeds the noise-limited standards. The DTV noise-limited field strength standards are: channels 2-6 (low VHF)- 28 dBμ, channels 7-13 (high VHF)- 36 dBμ, channels 14-69 (UHF)- 41 dBμ. These criteria presume that households will exert similar efforts to receive DTV broadcast stations as they have always been expected to exert to receive NTSC analog TV signals.

7. In December 2004, Congress enacted the Satellite Home Viewer Extension and Reauthorization Act of 2004,[333] which again amends the copyright laws[334] and the Communications Act[335] to further aid the competitiveness of satellite carriers and expand program offerings for satellite subscribers. Section 204 of the SHVERA provides that no later than one year after the date of enactment of this Act, the Commission is to complete an inquiry regarding whether, for purposes of identifying if a household is unserved by an adequate digital signal under Section 119(d)(10) of title 17 of the United States Code, the digital signal strength standard in Section 73.622(e)(1) of the Commission' rules or the testing procedures in Section 73.686(d) of those rules should be revised to take into account the types of antennas that are available to consumers.[336] Section 204 of the SHVERA also requires the Commission to submit to the

[329] The eight planning factors that the Commission recommended should be unchanged were the: Thermal Noise Factor; Receiver Noise Figure; Signal-to-Noise Ratio and Service Quality; Transmission Line Loss; Receiving Antenna Gain; Dipole Factor; Terrain Variability; and Environmental Noise.

[330] The DTV Table of Allotments is set forth in Section 73.622(b) of the rules, 47 C.F.R. § 73.622(b).

[331] "Noise-limited" service means that reception of service at the described signal level is only limited by the presence of radiofrequency noise that is expected to be present at the same level as the desired signal.

[332] *See* 47 C.F.R. § 73.622 (e)(1) and (2). The F(50,90) level of service was established for DTV service areas to account for the fact that DTV service is subject to a "cliff effect" by which full quality service becomes totally unavailable within a very small decrease in signal strength whereas analog TV service quality degrades gradually with declining signal strength. The distance to field strength contours with service at the F(50, 90) levels of service is determined using the charts in Section 73.699 of the rules, 47 C.F.R. § 73.699.

[333] *See SHVERA, supra* note 1.

[334] Section 102 of the SHVERA creates a new 17 U.S.C. § 119(a)(3) to provide satellite carriers with a statutory copyright license to offer "significantly viewed" signals as part of their local service to subscribers. 17 U.S.C. § 119(a)(3).

[335] *See* 47 U.S.C. §§ 325, 338, 339 and 340.

[336] *See* 17 U.S.C. § 119(d)(10); 47 C.F.R. § 73.622(e)(1); 47 C.F.R. § 73.686(d).

Congress a report containing the results of that study and recommendations, if any, for what changes should be made to Federal statutes or regulations. The SHVERA specifies that in conducting this inquiry the Commission is to consider the following six specific factors:[337]

- whether to account for the fact that an antenna can be mounted on a roof or placed in a home and can be fixed or capable of rotating;

- whether Section 73.686(d) of title 47, Code of Federal Regulations, should be amended to create different procedures for determining if the requisite digital signal strength is present than for determining if the requisite analog signal strength is present;

- whether a standard should be used other than the presence of a signal of a certain strength to ensure that a household can receive a high-quality picture using antennas of reasonable cost and ease of installation;

- whether to develop a predictive methodology for determining whether a household is unserved by an adequate digital signal under section 119(d)(10) of title 17, United States Code;

- whether there is a wide variation in the ability of reasonably priced consumer digital television sets to receive over-the-air signals, such that at a given signal strength some may be able to display high-quality pictures while others cannot, whether such variation is related to the price of the television set, and whether such variation should be factored into setting a standard for determining whether a household is unserved by an adequate digital signal; and

- whether to account for factors such as building loss, external interference sources, or undesired signals from both digital television and analog television stations using either the same or adjacent channels in nearby markets, foliage, and man-made clutter.

DISCUSSION

8. As specified above, Congress has directed the Commission to take six specific considerations into account during the course of this inquiry. Below, we deal with each of these areas in turn.

9. *Antenna placement.* We request comment, analysis, and information on whether the procedures and standards for determining if any specific household should be deemed unserved by an adequate DTV network signal, should account for the fact that a receiving antenna can be mounted on a roof or placed in a home and can be fixed or capable of rotating. As an initial matter, we note that the effectiveness of receiving antennas is determined both by factors intrinsic to the specific antenna design and by external factors. More specifically, antennas are designed with varying amounts of antenna gain or directivity. The greater the gain of a receiving antenna, the greater is the antenna's ability to capture weak signals. However, there is a significant tradeoff when incorporating additional gain in an antenna design. That is, designing an antenna with greater gain requires that it also be designed to have a narrower beamwidth. Beamwidth, in turn, refers to the antenna's angle of orientation within which the gain occurs. The narrower the beamwidth of a receiving antenna, the more critical it is to accurately aim the antenna directly at the source of the signal of interest. The signal strength of a transmission that is received by an antenna's main lobe beamwidth will be stronger than if that transmission were received from a direction outside that main lobe. Other factors, such as antenna placement, also affect the ability of a household to receive an adequate DTV signal. For example, because structures located within the line of sight between the transmitter and the receiving antenna can block or weaken the strength of received signals, an outdoor antenna installation, such as upon a rooftop, will generally allow a stronger signal to be received by the

[337] *See* SHVERA, *supra* note 1, at § 204(b)(1)(B).

antenna than will an indoor antenna installation. Thus, households in which the antenna is placed indoors will generally need an antenna with greater gain than will a household in which the antenna is placed outdoors.

10. As indicated above, the Commission defines digital television service areas on the basis of stations' noise-limited F(50,90) contour. Within this contour, the Longley-Rice model is used to predict areas where the DTV signal strength level exceeds the noise limited service level.[338] Inherent in this method of predicting received signal strength levels are certain assumptions regarding the receiving system. For DTV, the Commission assumes that the receiving antenna is located outdoors at a height of 10 meters above ground.[339] In addition, the Commission's procedures for evaluating DTV service areas set forth specific values for antenna gain that depend upon the specific DTV channel band, namely, 4 dB for low VHF, 6 dB for high VHF, and 10 dB for UHF and that the antenna be oriented in the direction which maximizes the values for field strength for the signal being measured.[340]

11. With regard to the general characterization of antennas described above, we seek comment on whether there is a need to revise the standard by which adequate DTV network signals are deemed available to households in order to account for the facts that DTV antennas can be mounted on a roof or within a home and can be installed in a fixed position or in a mounting that allows them to be rotated. Specifically, we ask if the inherent assumptions regarding DTV antenna receiving systems should be modified or extended insofar as they relate to the proper determination of whether households are unserved by adequate broadcast DTV network signals and are thus eligible to receive distant DTV network signals from a satellite service provider. To properly evaluate this issue, we must have up-to-date reliable information regarding antennas that are available to the public. Therefore, commenting parties are requested to provide information on the types of antennas that are in use currently, or soon to be available for outdoor or indoor residential use. For these antennas, we request that relevant technical specifications such as size, gain, and beamwidth be provided. In addition, we request that commenting parties provide information on how these factors affect antenna cost and deployment. Further, we request information on the availability and cost of various devices that can be used to aim these antennas (*e.g.*, rotors) toward DTV transmitters. In this regard, we request comment on how the addition of a rotor would affect the antenna size and thus the ability of consumers to mount the antenna indoors. We ask that commenters provide an evaluation of whether the use of an indoor antenna with or without a rotor would provide similar performance to that expected based on the Commission's assumed planning factors. If commenting parties believe that performance would differ significantly, we request that they provide detailed analytical information and explain how they believe our procedures should be modified.

12. *Signal strength measurement.* Congress has requested that the Commission consider whether Section 73.686(d) of the rules should be amended to specify procedures for determining if the requisite digital signal strength is present that are different from the procedures used for determining analog signal strength. Currently, Section 73.686(d) requires that field strength measurements be made using either a half–wave dipole antenna that is tuned to the station's visual carrier frequency or a gain antenna, provided that the antenna factor for the channel under test is known.[341] In addition, the rules specify that the intermediate frequency (i.f.) bandwidth of the measuring instrumentation be at least 200 kilohertz but no more than 1,000 kilohertz. Measurements are to be taken in five locations, preferably close to the actual antenna or where one is likely to be mounted. In addition, the rules specify that the measurement antenna is to be raised to a height of 6.1 meters (20 feet) above ground for one story structures and 9.1 meters (30 feet) above ground for two story or taller structures. Finally, because the current rule was written specifically to determine the field strength of analog TV signals, the procedures specify that the field

[338] *See* 47 C.F.R. § 73.622(e).

[339] *See* OET Bulletin 69, "Longley-Rice Methodology for Evaluating TV Coverage and Interference".

[340] *Id.*

[341] *See* 47 CFR 73.686(d).

strength measurement is to be made on the visual carrier.[342] The measured values can then be compared to the field strength that defines the Grade B contour for the station in question to determine if the measured location is receiving a signal of sufficient intensity for analog television reception.

13. It is readily apparent that Section 73.686(d) needs some modification in order to be applied to digital TV signals. Unlike the analog signal, the digital signal does not contain a visual carrier. Therefore, at a minimum the rule must distinguish between analog and digital signals as it relates to the specific frequency on which to tune. We note that the digital TV signal does have a pilot signal that is used by the tuner to lock in on the desired received signal.[343] Given this fundamental difference between the analog and digital signal, we ask commenting parties to provide information on the signal characteristics to which the measurement instrumentation should be tuned. For example, we believe that it makes most sense to tune the instrumentation either to the pilot signal or to the center of the channel. We also ask for comments on whether the i.f. bandwidth of the measurement equipment that is specified for analog TV signals is also appropriate for digital TV signals. Commenting parties who propose i.f. bandwidths that differ from the current specification should provide specific reasons for their proposals. We also request comment on the height that should be specified for the use of antenna equipment to measure outdoor signals, and on whether specific procedures should be created for measuring indoor signals. Further, if an indoor measurement procedure were adopted for determining signal availability, we seek comment on what criteria should be applied to determine whether an indoor or an outdoor measurement would be performed at a specific location. Finally, we seek comment on whether any other aspects of our measurement procedures need to be modified for the purpose of determining if households are unserved by an adequate digital TV signal. Commenting parties should provide specific technical justification for any aspects that they believe should be modified.

14. *Signal strength standard.* Currently, the rules specify that the field strength of the Grade B contour of an analog TV station be used as the standard for a determination of adequate signal strength. In the SHVERA, Congress requests that that Commission consider, for digital TV signals, whether a standard other than the presence of a signal of certain strength be used to ensure that a household can receive a high-quality picture using antennas of reasonable cost and ease of installation. We request comment on whether the current signal strength standard for noise-limited service should be used to define the availability of a DTV signal for determining whether a household is eligible to receive distant DTV signals from DBS services. In this connection, we also seek comment on whether there is a standard other than one based on signal strength that could be used to determine if a household is capable of receiving a high-quality digital TV picture. Commenting parties who propose a standard not based on signal strength should provide sufficient detail describing how their method would ensure reception of service and should explain how the proposed standard would be affected by the various technical characteristics the various specific antennas that are available or will soon be available for the residential market.

15. *Development of a predictive model.* The SHVERA requires that the Commission consider whether to develop a predictive methodology for determining whether a household is unserved by an adequate digital TV network signal under section 119(d)(10) of title 17, United States Code.[344] As

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[342] *See* 47 C.F.R. §§ 73.686(d)(1)(i) and 73.686(d)(2)(i).

[343] The pilot signal is located 0.31 MHz inside the lower band edge of the spectrum and is 3 dB lower than the average power of the signal.

[344] 17 U.S.C. § 119(d)(10) provides the following definition of unserved household:

> *(10) Unserved household.— The term "unserved household", with respect to a particular television network, means a household that—*
> *(A) cannot receive, through the use of a conventional, stationary, outdoor rooftop receiving antenna, an over-the-air signal of a primary network station affiliated with that network of Grade B intensity as defined by the Federal Communications Commission under section 73.683(a) of title 47 of the Code of*

indicated above, the Commission has already established a predictive model that evaluates the signal strength of a particular digital TV station at a specific location. This model, described in OET Bulletin 69, uses the Longley-Rice radio propagation model to make predictions of radio field strength at specific geographic points based on the elevation profile of terrain between the transmitter and each specific reception point.[345] The Commission, in accordance with SHVIA, has also implemented the use of a modified Longley-Rice model for identifying unserved households attempting to receive analog broadcast signals.[346] We implemented the use of a modified Longley-Rice model in order to make the predictive model as accurate as possible by taking terrain features (such as hills), buildings, and land cover (such as forests) into account.[347] We believe that the modified Longley-Rice is an accurate, practical, and readily available model for determining signal intensity at individual locations when used with analog signals. The modified Longley-Rice has several characteristics, discussed in detail below, which make it unique:

- The time variability factor is 50% and the confidence variability factor is 50%;
- The model is run in individual mode;
- Terrain elevation is considered every 1/10 of a kilometer;
- Receiving antenna height is assumed to be 20 feet above ground for one-story buildings and 30 feet above ground for buildings taller than one-story;
- Land use and land cover (*e.g.*, vegetation and buildings) is accounted for;
- Where error codes appear, they shall be ignored and the predicted value accepted or the result shall be tested with an on-site measurement;
- Locations both within and beyond a station's Grade B contour shall be examined.[348]

Federal Regulations, as in effect on January 1, 1999;
(B) is subject to a waiver granted under regulations established under section 339(c)(2) of the Communications Act of 1934;
(C) is a subscriber to whom subsection (e) applies;
(D) is a subscriber to whom subsection (a)(11) applies; or
(E) is a subscriber to whom the exemption under subsection (a)(2)(B)(iii) applies.

[345] *See* OET Bulletin 69, "Longley-Rice Methodology for Evaluating TV Coverage and Interference". A computer is needed to make these predictions because of the large number of reception points that must be individually examined. Computer code for the Longley-Rice point-to-point radio propagation model is published in an appendix of NTIA Report 82-100, A Guide to the Use of the ITS Irregular Terrain Model in the Area Prediction Mode, authors G.A. Hufford, A.G. Longley and W.A. Kissick, U.S. Department of Commerce, April 1982. Some modifications to the code were described by G.A. Hufford in a memorandum to users of the model dated January 30, 1985. With these modifications, the code is referred to as Version 1.2.2 of the Longley-Rice model. This version is used by the FCC for its evaluations.

[346] *See* OET Bulletin 72, "The ILLR Computer Program". OET Bulletin 72 details the computer program that the Commission was instructed by Congress to established under SHVIA in Section 339(c)(3) of the Communication Act. It provides that "[i]n prescribing such model, the Commission shall rely on the Individual Location Longley-Rice [ILLR] model set forth by the Federal Communications Commission in Docket No. 98-201 and ensure that such model takes into account terrain, building structures, and other land cover variations." *See* also *Report and Order* CS Docket No. 98-201 *supra* note 315, and *Satellite Delivery of Network Signals to Unserved Households for Purposes of the Satellite Home Viewer Act*, CS Docket No.98-201, *Memorandum Opinion and Order*, 14 FCC Rcd 31 17373. (1999).

[347] *Id.*

[348] *See Report and Order* in CS Docket No. 98-201 ¶71 *supra* note 315.

The Commission requests comment on whether the modified Longley-Rice, with appropriate modifications, would accurately predict digital signal coverage at a specific location, or whether there is some other predictive model that would be more appropriate for this purpose. Commenting parties who propose either specific modifications to the modified Longley-Rice or alternative models should provide detailed analysis as to how their proposed modifications will improve the modified Longley-Rice's prediction characteristics and/or an explanation of how the changes or alternatives more accurately model the available signal level when accounting for terrain and possible signal interference.

16. *DTV receiver threshold variation.* We request comment on whether there is a wide variation in the ability of reasonably priced consumer digital television sets to receive over-the-air signals, so that at given signal strengths some sets are able to display high-quality pictures while other sets cannot, and if so, whether this variation is related to the price of the television set. We also request comment on whether such variation should be factored into setting a standard for determining whether a household is unserved by an adequate DTV network signal. We are aware that there are a wide variety of digital TV sets available to consumers which are offered at various prices. We do not know, however, whether the difference in prices correlates to better receiver performance. We further note that many satellite reception set-top-boxes also contain DTV tuners, and seek comment on their reception capabilities. In the *Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order,* the Commission noted that receiver performance involves trade-offs among many factors and that equipment manufacturers were in the best position to determine how best to meet consumer demand.[349] We also noted that we would continue to monitor DTV receiver development, in particular with regard to indoor reception and multi-path signal rejection performance.[350] On this point, we plan to conduct measurements on a variety of digital TV sets and factor the results of those measurements into the report that we will present to Congress as required by the SHVERA.

17. We seek information regarding the performance of digital receivers. Specifically, commenting parties should provide information regarding the sensitivity of various receivers and their interference rejection capability and should point out if there are different receiver signal processing algorithms for interpreting digital TV signals and their level of sophistication. This technical information should be accompanied by price data and analysis regarding the correlation between performance and price. Given that the Commission intends to independently conduct measurements on a sample of digital TV receivers, we ask if there are specific parameters that we should measure. If so, which parameters should we measure and what useful information will they provide? Finally, we ask if there are significant differences in digital receiver performance quality, should those differences be factored into the determination of whether a household is unserved by an adequate digital signal? Are consumers aware of any such differences so that they can take them into account when obtaining DTV equipment in order to assure themselves that they can receive signals at the levels available at their residences? Commenting parties who believe that digital receiver quality should be a factor are requested to provide detailed analysis and explain how receiver quality can be used in ascertaining whether a household is unserved. Finally, we ask commenters to discuss how any limitations in receivers can be mitigated by using higher performance antennas or auxiliary devices.

18. *DTV receiver interference.* A radio receiver's immunity to interference is dependent on a number of factors in its technical design and, in addition, on the characteristics of the signals it receives. These factors may be closely related and possibly interdependent, and a receiver's performance in one factor may often affect its performance in others. The factors determining receiver immunity performance generally include selectivity, sensitivity, dynamic range, automatic RF gain control, shielding, modulation

[349] *See* In The Matter of Advanced Television Systems And Their Impact Upon the Existing Television Broadcast Service, *Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order*, MM Docket No. 87-268, 13 FCC Rcd. 7418, 7551 (1998) ¶ 171.

[350] *See Report and Order and Further Notice of Proposed Rulemaking*, in MM Docket No.00-39 (first DTV periodic review proceeding), 16 FCC Rcd 5946 at ¶ 96.

method, and signal processing. Receiver selectivity is the ability to isolate and acquire the desired signal from among all of the undesired signals that may be present on other channels. Sensitivity is the measure of a receiver's ability to receive signals of low strength. Greater sensitivity means a receiver can pick up weaker signals.[351] Dynamic range is the range of the highest and lowest received signal strength levels over which the receiver can satisfactorily operate. The upper side of a receiver's dynamic range determines how strong a received signal can be before failure due to overloading occurs. Automatic RF gain control allows a receiver to adjust the level of a received signal as it appears at the unit's signal processing and demodulation sections.

19. We request comment information on whether, and if so, how to account for factors such as signal attenuation from structural penetration, external interference sources (that is, undesired signals from both digital television and analog television stations using either the same or adjacent channels in nearby markets), foliage, and man-made clutter when determining whether a household is unserved by an adequate digital signal. We note that many factors can affect the reception of radio frequency signals and the ability of a receiver to resolve these signals and produce a picture. Most notably, interference from both co-channel and adjacent channel TV transmitters could cause interference to the desired signal. Selectivity is a central factor in the control of adjacent channel interference.[352] However, we also note that different receiver designs may account for the differing abilities of receivers to reject greater or lesser amounts of interference. We request comment on the interference rejection capabilities of digital TV receivers and satellite set-top-boxes with built-in off-air receivers.

20. We also note that external forces can affect the signal that ultimately reaches a TV receiver. These include natural and man-made structures, such as structures, terrain, trees, *etc.*, that lie between the transmitter and the receiver. These types of obstructions can affect a signal in various ways. First, they attenuate the signal so that the actual signal received is weaker than that predicted in the absence of any such obstructions. In this connection, we again note that indoor-mounted antennas will generally receive weaker signals than outdoor-mounted antennas. Second, obstructions can create multipath interference where signals that bounce off structures arrive at the receiver at different times. Multipath interference occurs when DTV signals arrive at the receiver via different paths. These signals, although they originate from the same transmitting source, are out of phase and can cause severe interference that can result in the complete loss of the digital service. Given these effects, we request comment on how well digital TV receivers and satellite set-top-boxes with built-in off-air receivers perform in these less than ideal conditions. Should such performance specifications be taken into account by the Commission in determining whether a household is unserved by an adequate digital signal? Commenting parties who propose that such factors be accounted for should provide detailed information regarding how these factors could be used and applied to individual situations. What additional factors, if any, should be included when determining the availability of a DTV signal at an individual location?

21. *Summary.* In sum, we request comment and information regarding how to determine whether any household is unserved by an adequate digital television network signal. This instant inquiry addresses the particular concerns that Congress has specified in section 204(b) of the SHVERA, and the information gathered here will be used to prepare the requisite report to Congress. Commenting parties should be as specific as possible in providing information and describing how such information can be applied to the determination of household eligibility for reception of satellite providers' retransmissions of distant DTV

[351] Greater sensitivity can also result in reception of unwanted signals at low levels that then must be eliminated or attenuated by the selectivity characteristics of the receiver.

[352] There are several ways to describe the selectivity of a radio receiver. One way is to simply give the bandwidth of the receiver over which its response level is within 3 dB of its response level at the center frequency of the desired signal. This measure is often termed the "bandwidth over the -3db points." This bandwidth, however, is not necessarily a good means of determining how well the receiver will reject unwanted frequencies. Consequently, it is common to give the receiver bandwidth at two levels of attenuation; for example, -3dB and -60 dB. The ratio of these two bandwidths is called the shape factor. Ideally, the two bandwidths would be equal and the shape factor would be one. However, this value is very difficult to achieve in a practical circuit.

network signals. Finally, commenting parties who believe that our applicable rules or Federal statutes should be modified are requested to state with particularity the rule and/or statutory modifications they advocate.

ORDERING CLAUSE

22. Accordingly, IT IS ORDERED that, pursuant to Section 339(c) of the Communications Act of 1934, as amended by the Satellite Home Viewer Extension and Reauthorization Act of 2004, this Notice of Inquiry IS ADOPTED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch

Marlene H. Dortch
Secretary

APPENDIX E

COMMENTS AND REPLY COMMENTS TO NOTICE OF INQUIRY

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Technical Standards for Determining	)	ET Docket No. 05-182
Eligibility for Satellite-Delivered Network Signals	)	
Pursuant to the Satellite Home Viewer	)	
Extension and Reauthorization Act of 2004	)	

COMMENTS OF THE ABC, CBS, AND NBC TELEVISION AFFILIATE ASSOCIATIONS

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June 17, 2005

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Summary

SHVERA requires the Commission to report to Congress on a variety of factors that may ultimately affect whether a household is deemed to be "unserved" by a digital television signal as that term is defined in 17 U.S.C. § 119(d)(10). While SHVERA specifies certain particular considerations the Commission is to study, as the *Notice* recognizes, the Commission's inquiry must be predicated upon the fundamental nature of the "unserved household" limitation set forth in the Copyright Act. That fundamental nature is a compulsory license operating in derogation of the property rights of copyright holders which should, accordingly, always be conservatively construed in favor of the local broadcast station.

In its *SHVA Order*, and in keeping with the narrow purpose of the distant signal compulsory license, the Commission properly allowed the principle of localism and several important corollaries to guide its decision to recommend to Congress the Individual Location Longley-Rice ("ILLR") predictive model in the form that it did. *First*, the Commission respected the fact that SHVA reflected "Congress' intent to protect the role of local broadcasters in providing free, over-the-air television to American families." *Second*, the Commission sought to formulate an approach whose effect would neither "increase the number of unserved households that already exist, nor . . . reduce the size of local stations' markets by subtracting viewers who are able to receive their signal." *Third*, the Commission properly observed that "when served households are deemed eligible for satellite-delivered broadcast network service, network affiliates are harmed and the SHVA's intent is also thwarted." *Fourth*, and finally, the Commission recognized that a "predictive model that includes truly served households in an unserved category, even temporarily, creates . . . undesired effects." These same principles should continue to guide the Commission in the instant proceeding.

The Commission should also be mindful that SHVERA is not merely a continuation of the Section 119 *status quo ante*. Rather, SHVERA, building upon the local-into-local Section 122 compulsory license enacted in SHVIA, begins to *phase out* the Section 119 distant compulsory license. Although the definition of "unserved household" has not been substantively changed, the class of viewers to whom satellite carriers may retransmit distant duplicating network signals has been considerably narrowed through the principle of "if local, no distant." The new, fundamental limitation imposed by SHVERA is the *ineligibility* for distant network signals of satellite subscribers who are able to obtain access to the local network signals of local broadcast stations via local-into-local service offered pursuant to the Section 122 license. This principle applies as fully to digital signals as it does to analog signals.

In fact, the primary category of satellite subscribers for whom site testing is even statutorily authorized (and, hence, for whom this proceeding is even relevant) is narrower still: Where a satellite carrier does not offer local-into-local digital service but does offer local-into-local analog service, if the satellite subscriber is *served* over the air by the local station's analog signal, then such a subscriber *may* be eligible for distant digital service provided a site test measurement, under certain further conditions as to market, date, and DTV build-out status and conducted pursuant to the current test methodology set forth in Section 73.686(d), demonstrates that the household cannot receive a digital signal of signal intensity that exceeds the DTV signal intensity standards set forth in Section 73.622(e)(1).

Accordingly, what is left, then, for the Commission in this proceeding, like the Section 119 license itself, is narrow, requiring a conservative approach to respect the limited nature of the compulsory license and to preserve the integrity of the localism principle. Although SHVERA lists six specific items that the Commission is to study in this proceeding, logically these items may be