

proceeding, Mr. Shumate provides a brief description of a comparison of estimates generated using the current ILLR model and the "ITWOM" with the improvements he suggests. We request additional information on this comparison and also the submission of additional data and information that provides comparative analysis of the two methods. Interested parties are also invited to submit additional proposals and suggestions for improving the digital ILLR model. We are particularly interested in information on any other techniques for improving the degree to which the model accurately represents the propagation of a digital television signal from a transmitter to a specific receive site and any new data that may be available for improving the model's predictions.

V. PROCEDURAL MATTERS

A. Final Regulatory Flexibility Analysis

59. The Final Regulatory Flexibility Analysis, required by the Regulatory Flexibility Act, *see* 5 U.S.C. § 604, is contained in Appendix C.

B. Initial Regulatory Flexibility Certification.

60. The Regulatory Flexibility Act of 1980, as amended (RFA),¹²⁷ requires that an initial regulatory flexibility analysis be prepared for notice and comment rulemaking proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."¹²⁸ The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."¹²⁹ In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.¹³⁰ A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).¹³¹

61. We are providing a plan for the model's continued refinement by use of additional data as it may become available. Under that plan, refinements based on additional data may be proposed by referencing the docket of this proceeding, which will be held open indefinitely for this purpose. Consistent with this intention to refine the model as new information becomes available. We are initiating this Further Notice of Proposed Rulemaking herein to request comment on possible modifications to the methodology in the digital Individual Location Longley-Rice (ILLR) model to improve its predictive accuracy as suggested by one of the parties responding to the Notice in this proceeding. The methodological changes to be addressed in the Further Notice would change the manner in which our predictions are calculated but would not alter the administrative burden on any of the small business entities that would use or be affected by the predictive model. Therefore we do not expect these changes to have any economic impact on small entities.

¹²⁷ The RFA, *see* 5 U.S.C. § 601-612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

¹²⁸ 5 U.S.C. § 605(b).

¹²⁹ 5 U.S.C. § 601(6).

¹³⁰ 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

¹³¹ 15 U.S.C. § 632.

62. Therefore, we certify that the proposals in this Notice of Proposed Rulemaking, if adopted, will not have a significant economic impact on a substantial number of small entities. If commenters believe that the proposals discussed in the Notice require additional RFA analysis, they should include a discussion of these issues in their comments and additionally label them as RFA comments. The Commission will send a copy of the Notice, including a copy of this initial certification, to the Chief Counsel for Advocacy of the SBA.¹³² In addition, a copy of the Notice and this initial certification will be published in the Federal Register.¹³³

C. Paperwork Reduction Act Analysis:

63. This document does not contain proposed information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. In addition, therefore, it does not contain any new or modified "information collection burden for small business concerns with fewer than 25 employees," pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4).

D. Filing Requirements

64. Ex Parte Rules – Permit-But-Disclose Proceeding. This is a permit-but-disclose notice and comment rulemaking proceeding. Ex parte presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in the Commission's rules. *See generally* 47 C.F.R. §§ 1.1202, 1.1203, and 1.1206(a).

65. Pursuant to Sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using: (1) the Commission's Electronic Comment Filing System (ECFS), (2) the Federal Government's eRulemaking Portal, or (3) by filing paper copies. *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- **Electronic Filers:** Comments may be filed electronically using the Internet by accessing the ECFS: <http://fjallfoss.fcc.gov/ecfs2/> or the Federal eRulemaking Portal: <http://www.regulations.gov>.
- **Paper Filers:** Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.

¹³² See 5 U.S.C. § 605(b).

¹³³ See 5 U.S.C. § 605(b).

- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

66. For further information, contact Alan Stillwell, Office of Engineering and Technology, (202) 418-2925 or Robert Weller, Office of Engineering and Technology, (202) 418-7397.

VI. ORDERING CLAUSES

67. Accordingly, IT IS ORDERED that pursuant to Sections 1, 4, 301, and 339(c)(3) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154, 301, 339(c)(3), and Section 119(d)(10)(a) of the Copyright Act, 17 U.S.C. § 119(d)(10)(a), this REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING IS HEREBY ADOPTED.

68. IT IS FURTHER ORDERED that Part 73 of the Commission's rules is amended as specified in Appendix A effective 30 days after the date of publication of a summary of this REPORT AND ORDER in the Federal Register.

69. IT IS ALSO ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this REPORT AND ORDER and FURTHER NOTICE OF PROPOSED RULEMAKING, including the Initial Regulatory Flexibility Certification, and IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION



Marlene H. Dortch
Secretary

APPENDIX A**Final Rules**

For the reasons set forth in the text of the Report and Order above, the Federal Communications Commission amends Part 73 of title 47 of the Code of Federal Regulations to read as follows:

PART 73 – RADIO BROADCAST SERVICES

1. The authority citation for Part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334, 336 and 339.

2. Section 73.683(d) is amended to read as follows:

(d) For purposes of determining the eligibility of individual households for satellite retransmission of distant network signals under the copyright law provisions of 17 U.S.C. 119(d)(10)(A), field strength shall be determined by the Individual Location Longley-Rice (ILLR) propagation prediction model. Such eligibility determinations shall consider only the signals of network stations located in the subscriber's Designated Market Area. Guidance for use of the ILLR model in predicting the field strength of analog television signals for such determinations is provided in OET Bulletin No. 72 (stations operating with analog signals include some Class A stations licensed under Part 73 of this chapter and some licensed low power TV and TV translator stations that operate under Part 74 of this chapter). Guidance for use of the ILLR model in predicting the field strength of digital television signals for such determinations is provided in OET Bulletin No. 73 (stations operating with digital signals include all full service stations and some Class A stations that operate under Part 73 of this chapter and some low power TV and TV translator stations that operate under [I don't think there are LP or Translators covered by Part 73] Part 74 of this chapter). OET Bulletin No. 72 and OET Bulletin No. 73 are available at the FCC's Headquarters Building, 445 12th St., SW, Reference Information Center, Room CY-A257, Washington, DC, or at the FCC's Office of Engineering and Technology (OET) website: <http://www.fcc.gov/oet/info/documents/bulletins/>.

(e) If a location was predicted to be unserved by a local network station using a version of the ILLR model specified in OET Bulletin No. 72 or OET Bulletin No. 73, as appropriate, and the satellite subscriber at that location is receiving a distant signal affiliated with the same network from its satellite provider, the satellite subscriber shall remain eligible for receiving the distant signal from its satellite provider if that location is subsequently predicted to be served by the local station due to either a change in the ILLR model or a change in the station's operations that change its coverage.

APPENDIX B

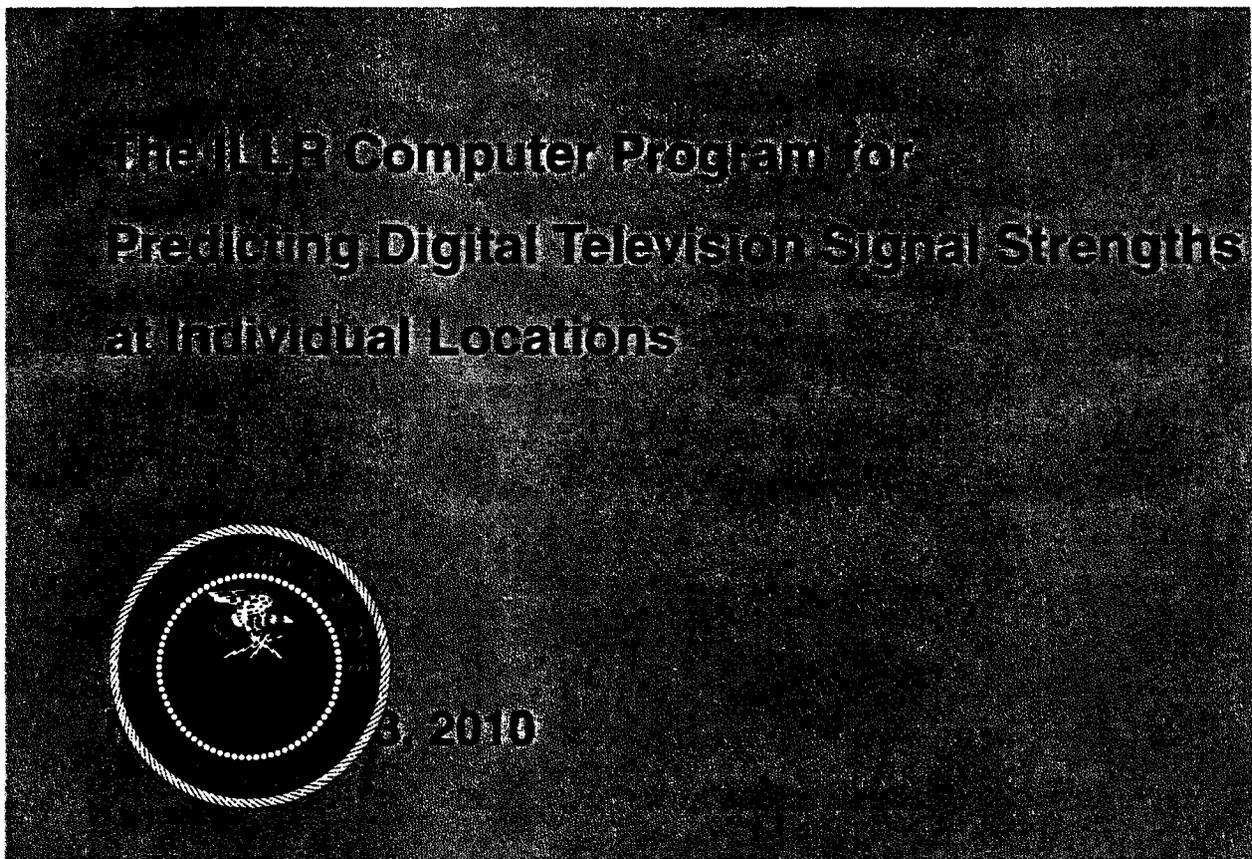
OET Bulletin No. 73

**“The ILLR Computer Program For
Predicting Digital Television Signal Strengths At Individual Locations”**

OET BULLETIN

OFFICE OF ENGINEERING AND TECHNOLOGY

FEDERAL COMMUNICATIONS COMMISSION



**THE ILLR COMPUTER PROGRAM
FOR PREDICTING DIGITAL TELEVISION SIGNAL STRENGTHS
AT INDIVIDUAL LOCATIONS**

November 23, 2010

I. Introduction

In the Satellite Television Extension and Localism Act of 2010 (STELA), Congress instructed the Commission to “develop and prescribe by rule a point-to-point predictive model for reliably and presumptively determining the ability of individual locations, through the use of an antenna, to receive digital television broadcast signals of network affiliated stations in accordance with the signal intensity standard in Section 73.622(e)(1) of title 47, Code of Federal Regulations, or a successor regulation.”¹ As codified in Section 339(c)(3) of the Communication Act, this law further 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.”² Terrain features (such as hills), buildings, and land cover (such as forests) have a major effect on the strength of received signals, and Congress instructed the Commission to make the predictive model as accurate as possible by taking these factors into account. In the Satellite Home Viewer Improvement Act of 1999 (SHVIA), Congress previously required that, in determining household eligibility for reception of satellite retransmission of analog TV broadcast network signals, the courts rely on the ILLR model for making a presumptive determination of whether a household is capable of receiving the over-the-air signal of the local station affiliated with that network with at least a certain threshold intensity of signal strength.³

This bulletin publishes the detailed definition on the model for making point-to-point predictions of the intensity of digital television (DTV) signals adopted by the Commission as prescribed under the STELA. The model uses an ILLR computer program for DTV stations that is based generally on the ILLR program for analog stations previously-established by the Commission in the SHVIA *First Report and Order* in ET Docket No. 00-11 adopted May 22, 2000.⁴ This new version of the ILLR computer program computes the predicted signal strength of DTV stations as received over-the-air at individual viewing locations. Individual locations where a network TV signal is below the prescribed signal strength level are eligible to receive distant network broadcast as subscribers of satellite TV services. The program is used by Satellite TV service providers to determine whether particular TV network signals may be included in the package of channels delivered to individual subscribers. To facilitate use of the program by others, this bulletin provides details for combining the program elements on other computers.

As defined by STELA, a viewer location is “served,” or “unserved,” depending on whether the signal strength received at that location is at least equal to, or is less than, respectively, the noise-limited service level with a certain statistical probability as set forth in the FCC Rules.⁵ A location found by the ILLR

¹ See Satellite Television Extension and Localism Act of 2010, Title V of the American Workers, State, and Business Relief Act of 2010 (“STELA”), Pub.L. 111-175, 124 Stat. 1218 (2010) relating to copyright licensing and carriage of broadcast signals by satellite carriers, codified in scattered sections of 17 and 47 U.S.C.; *see also* 47 C.F.R. § 73.622(e)(1).

² In CS Docket No. 98-201 the Commission endorsed a prediction procedure it referred to as the Individual Location Longley-Rice model. *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*, adopted February 1, 1999, 14 FCC Rcd 2654 (1999).

³ Satellite Home Viewer Improvement Act of 1999 (SHVIA), Pub.L. 106-113, 113 Stat. 1501, 1501A-526 to 1501A-545 (Nov. 29, 1999), codified in the Communications Act at 47 U.S.C. § 339(c)(3). 17 U.S.C. § 119(a)(2)(B)(ii)(I).

⁴ *See Report and Order in CS Docket No. 98-201 (SHVA Report and Order)*, 14 FCC Rcd 2654 (1999).

⁵ *See* 47 C.F.R. § 73.622(e). The signal strength values for noise-limited digital television service are 28 dB μ V/m for TV channels 2-6; 36 dB μ V/m for channels 7-13; and 41 dB μ V/m (adjusted by a dipole factor equal to 20 log [615/(channel mid-frequency in MHz)]) for channels 14 and above. These signal strength values are to be used in all cases, whether the DTV station is full-service, Class A, Low Power, or a DTV Translator.

prediction program to be "served" by the signal of a network affiliated station, *i.e.*, the signal strength at that location is at least the noise-limited value, is not entitled to receive satellite transmission of that same network programming. To complement this predictive model, the STELA also mandated establishment of a procedure for on-site testing that may be used for empirically determining signal strength when satellite carriage of network is denied to a subscriber as a result of a predictive determination by the ILLR program. The Commission's on-site measurement procedure for digital television signals as prescribed under the STELA is set forth in Section 73.686 of the rules.⁶

II. The Individual Location Longley-Rice (ILLR) Computer Program for DTV Stations

A. Availability of Software and Databases

Software and Computer Database Requirements to Implement the ILLR Program model are available from the Department of Commerce as discussed below. The software must be combined with terrain elevation data and also with a database describing the local environment of building structures and vegetation. Terrain elevation data and the Land Use and Land Clutter (LULC) database are both available from the U.S. Geological Survey (USGS). To set up a program to run, the source code for the Department of Commerce's Longley-Rice radio propagation prediction model must be compiled with specific parameter values and linked with the terrain elevation data. Finally, a computerized lookup table of local environment values must be constructed from the USGS LULC database. A computer program complying with the technical details specified herein will qualify as the Individual Location Longley-Rice (ILLR) propagation prediction model for DTV stations.

B. Using the ILLR Computer Program

A determination of the served or unserved status of a particular location is made by finding its latitude and longitude coordinates (typically using GPS, maps or geocoding services) and technical information about the desired network affiliated broadcasting station. The ILLR computer program is applied using this information.

C. Implementation of Computer Source Code

Computer code for the Longley-Rice radio propagation prediction model is published in an appendix to 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. The report may be obtained online from the U.S. Department of Commerce, or from the National Technical Information Service, Springfield, Virginia, by requesting Accession No. PB 82-217977. 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. It is available for downloading at the U.S. Department of Commerce Web site, <http://flattop.its.bldrdoc.gov/itm.html> . This computer software model, when used with the appropriate parameters, is the ILLR model.

The ILLR model was adopted for STELA purposes based on the Commission's experience with using the Longley-Rice radio propagation prediction model for predicting service and interference for digital television (DTV). The parameters to be used in a computer implementation of the ILLR model for STELA purposes are mostly the same as were used for DTV service and interference analysis purposes,

⁶ See 47 C.F.R. § 73.686.

with only a few exceptions, stemming from their somewhat different objectives. Specific parameter values for the ILLR model are given in Table 1 and the text below:

Table 1
Parameter Values for ILLR Implementation of the Longley-Rice Fortran Code

Parameter	Explanation	Value	Units
EPS	Relative Ground Permittivity	15.0	(none)
SGM	Ground Conductivity	0.005	Siemens/meter
ZSYS	(Coordinated with EN0)	0.0	(none)
EN0	Surface refractivity	301.0	N-units
IPOL	Polarization	0	(horizontal)
MDVAR	Calculation Mode	1	(Individual Mode)
KLIM	Climate Code	5	(Continental Temperate)
XI	Terrain sampling interval	0.1	Kilometers
HG(1)	Transmit antenna height above ground	See note	Meters
HG(2)	Receive antenna height above ground	6 or 9	Meters

Note 1. HG(1) in Table 1 is the height of the radiation center above ground. It is determined by subtracting the ground elevation above mean sea level (AMSL) at the transmitter location from the height of the radiation center AMSL. The latter value is contained in the FCC's CDBS, and may be found by query at <http://www.fcc.gov/mb/video/tvq.html>. The former is retrieved from the terrain elevation database as a function of the transmitter site coordinates also found in CDBS. Linear interpolation between the surrounding data points in the terrain database is used to determine the ground elevation. Care should be used to ensure that consistent horizontal and vertical datums are employed among all data sets.

Note 2. HG(2) is 6 m or 9 m. Use 6 m for a one-story building, otherwise use 9 m.

Following are the parameters that describe the unique features of the ILLR prediction procedure for STELA purposes (these distinguish the ILLR model from the use of Longley-Rice for digital television coverage and interference calculations as detailed in OET Bulletin No. 69):

- the time variability factor to be used is 90%, based on the fact that the ILLR field strength prediction is to be compared with a required field strength (the noise-limited field intensity defined in Section 73.622(e) of the FCC rules);
- the confidence variability factor to be used is 50%, indicating median situations;⁷
- receiving antenna height is to be assumed to be 6 m above ground for one-story buildings and 9 m above ground for buildings taller than one-story;
- in those cases that error code 3 occurs (KWX = 3), the predicted field strength is nevertheless to be accepted as indicative of whether the noise-limited field strength is available at that location;

⁷ When point-to-point mode is used, as in ILLR, there are well-defined paths with fixed terminals, so there is no location variability. There is still a "confidence" or "situational" variability factor, which is taken here to be 50%.

- consideration of the land use and land cover (*e.g.*, vegetation and buildings) in the vicinity of the receiving location is to be included through use of a lookup table of clutter losses additional to those inherent in the basic Longley-Rice v1.2.2 model. The lookup table must be constructed from information on the Land Use and Land Cover categories defined by the United States Geological Survey. See Section IV below.

D. Acquiring Terrain Elevation Data

Terrain elevation data for the United States is available from the United States Geological Survey (USGS) in the form of elevations relative to mean sea level at grid points separated by 3 arc-seconds (roughly every 100 feet at mid-latitudes of the U.S.). The Web site for obtaining these data directly from the USGS is <http://edc.usgs.gov/geodata/>. The Commission currently uses digital elevation model (DEM) data taken from 1:250,000 scale maps. The data are also available from several commercial sources. Installation of the ILLR program necessarily entails a computer coding task to link the terrain elevation data to the propagation prediction code. Computer program code must be developed to retrieve data representing the elevations of points along the path from the network affiliate's transmitter to the individual reception point of interest. To determine the elevation of a point at particular geographic coordinates along the path, the elevation of points at each corner of the 3-arc-second grid surrounding that point should be retrieved. The elevation of that point is then calculated by 4-point linear interpolation.

E. Acquiring TV Engineering Data

Engineering data for DTV stations in the U.S. (including digital Class A, Low Power, and TV Translator stations) is available from the FCC. Data for individual stations can be found at <http://www.fcc.gov/mb/video/tvq.html>, and consolidated data for all authorized stations can be found at <ftp://ftp.fcc.gov/pub/Bureaus/MB/Databases/cdbs/>. Where more than one authorization exists for a particular station, the record associated with the facility actually operating shall be used. Calculation of effective radiated power (ERP) in the direction of the individual location under study is accomplished using the relevant antenna azimuth and elevation patterns (including beam tilt, if any) at the relevant depression angle. Where specific elevation pattern data are not provided in the engineering data, a generic elevation pattern may be used as described generally in OET Bulletin No. 69.

III. Land Use and Land Cover (LULC) Clutter Losses

A. Clutter Losses

The presence of foliage and man-made structures in the radio path tends to reduce the strength of received signals. The Department of Commerce Longley-Rice code was developed from field strength measurements in areas selected for the purpose of investigating effects of terrain elevation profiles, not morphology. Thus, the ILLR computer program defined in this bulletin accounts for additional factors, especially buildings and vegetation, as so-called "clutter losses." The clutter loss, if any, at an individual reception location is determined by reference to the Land Use and Land Cover (LULC) database of the USGS. This database is entered with the geographic coordinates of the reception point to find the point's LULC classification and, subsequently, to determine a clutter loss value from Table 3. Finally, the clutter loss is subtracted from the signal strength predicted by the basic propagation prediction code to determine whether the location is served or unserved.

B. Source of LULC Classification Data

The LULC database is available for downloading at the USGS Web site <http://edc.usgs.gov/geodata/>. The FCC presently uses data from at the 1:250,000 scale. In the FCC's implementation of the ILLR program, the LULC classifications are stored in a rasterized fashion like that used for terrain elevations. That is, the classifications are stored as functions of the latitude and longitude coordinates of points of the Universal Transverse Mercator (UTM) system with 200 meters between grid points. The classification of the nearest grid point is then used as the classification of any particular latitude-longitude point.

C. LULC Categories of the ILLR Program

Since the LULC classifications of the USGS have a broader purpose and are not targeted for application to radio propagation analyses, we have regrouped these classifications into more appropriate categories for use in the ILLR program. Table 2 defines this regrouping. For each computer run of the program, the appropriate ILLR clutter category number should be selected from Table 2 according to environmental conditions in the vicinity of the individual reception point. The clutter loss value, if any, is then determined as a function of the ILLR clutter category number and the channel number of the desired network television affiliate, by referring to Table 3.

Table 2

Regrouping of LULC Categories for ILLR Applications

LULC Classification Number	LULC Classification Description	ILLR Clutter Category	ILLR Clutter Category Description
11	Residential	7	Residential
12	Commercial and Services	9	Commercial / Industrial
13	Industrial	9	Commercial / Industrial
14	Transportation, communications & utilities	1	Open land
15	Industrial and commercial complexes	9	Commercial / Industrial
16	Mixed urban and built-up lands	8	Mixed urban / buildings
17	Other urban and built-up land	8	Mixed urban / buildings
21	Cropland and pasture	2	Agricultural
22	Orchards, groves, vineyards, nurseries, and horticultural	2	Agricultural
23	Confined feeding operations	2	Agricultural
24	Other agricultural land	2	Agricultural
31	Herbaceous rangeland	3	Rangeland
32	Shrub and brush rangeland	3	Rangeland
33	Mixed rangeland	3	Rangeland
41	Deciduous forest land	5	Forest land
42	Evergreen forest land	5	Forest land
43	Mixed forest land	5	Forest land
51	Streams and canals	4	Water
52	Lakes	4	Water
53	Reservoirs	4	Water
54	Bays and estuaries	4	Water
61	Forested wetland	5	Forest land
62	Non-forest wetland	6	Wetland
71	Dry salt flats	1	Open land

72	Beaches	1	Open land
73	Sandy areas other than beaches	1	Open land
74	Bare exposed rock	1	Open land
75	Strip mines, quarries, and gravel pits	1	Open land
76	Transitional areas	1	Open land
77	Mixed Barren land	1	Open land
81	Shrub and brush tundra	1	Open land
82	Herbaceous tundra	1	Open land
83	Bare ground	1	Open land
84	Wet tundra	1	Open land
85	Mixed tundra	1	Open land
91	Perennial snowfields	10	Snow and Ice
92	Glaciers	10	Snow and Ice

This regrouping into 10 categories for use with the ILLR model was designed by EDX Engineering, Inc., now EDX Wireless, LLC, Eugene, Oregon.

Table 3

Clutter Loss as a Function of ILLR LULC Clutter Category and TV Channel

ILLR Clutter Category	ILLR Clutter Category Description	Clutter Loss, decibels (to be subtracted from calculated field strength)			
		Channels 2-6	Channels 7-13	Channels 14-36	Channels 38-69
1	Open land	0	0	4	5
2	Agricultural	0	0	5	6
3	Rangeland	0	0	3	6
4	Water	0	0	0	0
5	Forest land	0	0	5	8
6	Wetland	0	0	0	0
7	Residential	0	0	5	7
8	Mixed Urban / Buildings	0	0	6	6
9	Commercial / Industrial	0	0	5	6
10	Snow and Ice	0	0	0	0

IV. Field Strength Calculation

The field strength of a network TV station at an individual location is predicted as follows:

- 1) Find the engineering facilities data for the network affiliate station of interest by, for example, consulting the TV Query FCC Web site at <http://www.fcc.gov/mb/video/tvq.html> . Necessary technical data include the station latitude and longitude, height above mean sea level of the antenna radiation center, and the effective radiated power (ERP) in the direction of the individual location under study.
- 2) Run Longley-Rice v1.2.2 in point-to-point mode with the parameters specified in Section II.C. above (Table 1 and the following text) to find the propagation path loss relative to free space propagation.

- 3) Find the USGS Land Use and Land Cover classification of the individual receiving location under study by consulting the LULC database, available from the USGS.
- 4) Convert the USGS Land Use and Land Cover classification to the corresponding ILLR clutter category using Table 2, and find the associated clutter loss from Table 3.
- 5) Calculate the ILLR field strength prediction from the formula

$$\text{Field} = (\text{Free Space Field}) - (\text{Longley-Rice 1.2.2 Path Loss}) - (\text{ILLR Clutter Loss})$$

where the Free Space Field in dB = $106.92 + 10\log_{10}(\text{ERP in kW}) - 20\log_{10}(\text{distance in km})$.

The field strength calculated in the last step determines whether the individual location is presumed to be served or unserved. The signal strength values for noise-limited service are 28 dB μ V/m for TV channels 2-6; 36 dB μ V/m for channels 7-13; and 41 dB μ V/m (adjusted by a dipole factor equal to $20 \log [615/(\text{channel mid-frequency in MHz})]$ for channels 14 and above.

APPENDIX C

Final Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (“RFA”)¹ an Initial Regulatory Flexibility Analysis (“IRFA”) was incorporated in the *Notice of Proposed Rulemaking* (“NPRM”) to this proceeding.² The Commission sought written public comment on the proposals in the NPRM, including comment on the IRFA. The Commission received no comments on the IRFA. This present Final Regulatory Flexibility Analysis (“FRFA”) conforms to the RFA.³

A. Need for and Objectives of the Report and Order. In this Report and Order, we are adopting a point-to-point predictive model for determining the ability of individual locations to receive an over-the-air digital television broadcast signal at the intensity level needed for service through the use of an antenna as required by the STELA.⁴ The new digital ILLR model will be used as a means for reliably and presumptively determining whether individual households are eligible to receive the signals of distant network-affiliated digital television stations, including TV translator and low power television stations, from their satellite carrier. The predictive model we are adopting, which is based on the current model for predicting the intensity of analog television signals at individual locations, will allow such determinations to be made in a timely and cost effective manner for all parties involved, including network TV stations, satellite carriers and satellite subscribers. We are also providing a plan for the model’s continued refinement by use of additional data as it may become available. Under that plan, refinements based on additional data may be proposed by referencing the docket of this proceeding, which will be held open indefinitely for this purpose. Consistent with this intention to refine the model as new information becomes available, we are also initiating a Further Notice of Proposed Rulemaking herein to request comment on possible modifications to the methodology in the digital Individual Location Longley-Rice (ILLR) model to improve its predictive accuracy as suggested by one of the parties responding to the *Notice* in this proceeding.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA: There were no comments filed that specifically addressed the rules and policies propose in the IRFA.

C. Description and Estimates of the Number of Small Entities to Which the Rules will apply. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that will be affected by the rules adopted herein.⁵ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”⁶ In addition, the term “small business” has the same meaning as the term

¹ See 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 *et. seq.*, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (“SBREFA”), Pub. L. No. 104-121, Title II, 110 Stat. 847 (1996). The SBREFA was enacted as Title II of the Contract With America Advancement Act of 1996 (“CWAAA”).

² *Implementation of the Satellite Home Viewer Extension and Reauthorization Act of 2004*, 20 FCC Rcd 2983, Appendix C (2005) (“NPRM”).

³ See 5 U.S.C. § 604.

⁴ In its implementation provisions, the STELA also requires that the Commission issue an order completing its rulemaking to establish a procedure for on-site measurement of digital television signals in ET Docket No. 06-94. 47 U.S.C. § 339(c)(3)(B). In the *Notice of Proposed Rulemaking and Further Notice of Rulemaking* (*Notice*) preceding the instant Report and Order, the Commission requested additional comment in the ET Docket No. 06-94 signal measurement proceeding. We are today, in a separate action in that docket, issuing a *Report and Order* to establish the required procedure for on-site measurement of digital television signals. See *Report and Order* in ET Docket No. 06-94, FCC 10-195, adopted November 22, 2010.

⁵ 5 U.S.C. §§ 603(b) (3), 604(a) (3).

⁶ *Id.*, § 601(6).

“small business concern” under the Small Business Act.⁷ A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).⁸

Nationwide, there are a total of approximately 29.6 million small businesses, according to the SBA.⁹ A “small organization” is generally “any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.”¹⁰ Nationwide, as of 2002, there were approximately 1.6 million small organizations.¹¹ The term “small governmental jurisdiction” is defined generally as “governments of cities, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand.”¹² Census Bureau data for 2002 indicate that there were 87,525 local governmental jurisdictions in the United States.¹³ We estimate that, of this total, 84,377 entities were “small governmental jurisdictions.”¹⁴ Thus, we estimate that most governmental jurisdictions are small.

Cable Television Distribution Services. The “Cable and Other Program Distribution” census category includes cable systems operators, closed circuit television services, direct broadcast satellite services, multipoint distribution systems, satellite master antenna systems, and subscription television services. Since 2007, these services have been defined within the broad economic census category of Wired Telecommunications Carriers; that category is defined as follows: “This industry comprises establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services; wired (cable) audio and video programming distribution; and wired broadband Internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.” The SBA has developed a small business size standard for this category, which is: All such firms having 1,500 or fewer employees. To gauge small business prevalence for these cable services the Commission must, however, use current census data that are based on the previous category of Cable and Other Program Distribution and its associated size standard; that size standard was: All such firms having \$13.5 million or less in annual

⁷ 5 U.S.C. § 601(3) (incorporating by reference the definition of “small business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such terms which are appropriate to the activities of the agency and publishes such definitions(s) in the Federal Register.”

⁸ 15 U.S.C. § 632.

⁹ See SBA, Office of Advocacy, “Frequently Asked Questions,” <http://web.sba.gov/faqs/faqindex.cfm?areaID=24> (revised Sept. 2009).

¹⁰ 5 U.S.C. § 601(4).

¹¹ Independent Sector, *The New Nonprofit Almanac & Desk Reference* (2002).

¹² 5 U.S.C. § 601(5).

¹³ U.S. Census Bureau, *Statistical Abstract of the United States: 2006*, Section 8, page 272, Table 415.

¹⁴ We assume that the villages, school districts, and special districts are small, and total 48,558. See U.S. Census Bureau, *Statistical Abstract of the United States: 2006*, section 8, page 273, Table 417. For 2002, Census Bureau data indicate that the total number of county, municipal, and township governments nationwide was 38,967, of which 35,819 were small. *Id.*

receipts. According to Census Bureau data for 2002, there were a total of 1,191 firms in this previous category that operated for the entire year. Of this total, 1,087 firms had annual receipts of under \$10 million, and 43 firms had receipts of \$10 million or more but less than \$25 million. Thus, the majority of these firms can be considered small.

Direct Broadcast Satellite (DBS) Service. DBS service is a nationally distributed subscription service that delivers video and audio programming via satellite to a small parabolic “dish” antenna at the subscriber's location. Because DBS provides subscription services, DBS falls within the SBA-recognized definition of Wired Telecommunications Carriers. However, as discussed above, the Commission relies on the previous size standard, Cable and Other Subscription Programming, which provides that a small entity is one with \$13.5 million or less in annual receipts. Currently, only two operators—DirecTV and EchoStar Communications Corporation (EchoStar)—hold licenses to provide DBS service, which requires a great investment of capital for operation. Both currently offer subscription services and report annual revenues that are in excess of the threshold for a small business. Because DBS service requires significant capital, the Commission believes it is unlikely that a small entity as defined by the SBA would have the financial wherewithal to become a DBS licensee. Nevertheless, given the absence of specific data on this point, the Commission acknowledges the possibility that there are entrants in this field that may not yet have generated \$13.5 million in annual receipts, and therefore may be categorized as a small business, if independently owned and operated.

Television Broadcasting. The rules and policies apply to television broadcast licensees and potential licensees of television service. The SBA defines a television broadcast station as a small business if such station has no more than \$14 million in annual receipts.¹⁵ Business concerns included in this industry are those “primarily engaged in broadcasting images together with sound.”¹⁶ The Commission has estimated the number of licensed commercial television stations to be 1,392.¹⁷ According to Commission staff review of the BIA/Kelsey, MPro Television Database (“BIA”) as of April 7, 2010, about 1,015 of an estimated 1,380 commercial television stations¹⁸ (or about 74 percent) have revenues of \$14 million or less and thus qualify as small entities under the SBA definition. The Commission has estimated the number of licensed non-commercial educational (NCE) television stations to be 390.¹⁹ We note, however, that, in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations²⁰ must be included. Our estimate, therefore, likely

¹⁵ See 13 C.F.R. § 121.201, NAICS Code 515120.

¹⁶ *Id.* This category description continues, “These establishments operate television broadcasting studios and facilities for the programming and transmission of programs to the public. These establishments also produce or transmit visual programming to affiliated broadcast television stations, which in turn broadcast the programs to the public on a predetermined schedule. Programming may originate in their own studios, from an affiliated network, or from external sources.” Separate census categories pertain to businesses primarily engaged in producing programming. See Motion Picture and Video Production, NAICS code 512110; Motion Picture and Video Distribution, NAICS Code 512120; Teleproduction and Other Post-Production Services, NAICS Code 512191; and Other Motion Picture and Video Industries, NAICS Code 512199.

¹⁷ See News Release, “Broadcast Station Totals as of December 31, 2009,” 2010 WL 676084 (F.C.C.) (dated Feb. 26, 2010) (“*Broadcast Station Totals*”); also available at <http://www.fcc.gov/mb/>.

¹⁸ We recognize that this total differs slightly from that contained in *Broadcast Station Totals*, *supra* note 446; however, we are using BIA’s estimate for purposes of this revenue comparison.

¹⁹ See *Broadcast Station Totals*, *supra* note 239.

²⁰ “[Business concerns] are affiliates of each other when one concern controls or has the power to control the other or a third party or parties controls or has the power to control both.” 13 C.F.R. § 121.103(a)(1).

overstates the number of small entities that might be affected by our action, because the revenue figure on which it is based does not include or aggregate revenues from affiliated companies. The Commission does not compile and otherwise does not have access to information on the revenue of NCE stations that would permit it to determine how many such stations would qualify as small entities.

In addition, an element of the definition of "small business" is that the entity not be dominant in its field of operation. We are unable at this time to define or quantify the criteria that would establish whether a specific television station is dominant in its field of operation. Accordingly, the estimates of small businesses to which rules may apply do not exclude any television station from the definition of a small business on this basis and are therefore over-inclusive to that extent. Also as noted, an additional element of the definition of "small business" is that the entity must be independently owned and operated. We note that it is difficult at times to assess these criteria in the context of media entities and our estimates of small businesses to which they apply may be over-inclusive to this extent.

Class A TV, LPTV, and TV translator stations. The rules and policies adopted in this Report and Order include licensees of Class A TV stations, low power television (LPTV) stations, and TV translator stations, as well as potential licensees in these television services. The same SBA definition that applies to television broadcast licensees would apply to these stations. The SBA defines a television broadcast station as a small business if such station has no more than \$14 million in annual receipts.²¹ Currently, there are approximately 537 licensed Class A stations, 2,386 licensed LPTV stations, and 4,359 licensed TV translators.²² Given the nature of these services, we will presume that all of these licensees qualify as small entities under the SBA definition. We note, however, that under the SBA's definition, revenue of affiliates that are not LPTV stations should be aggregated with the LPTV station revenues in determining whether a concern is small. Our estimate may thus overstate the number of small entities since the revenue figure on which it is based does not include or aggregate revenues from non-LPTV affiliated companies. We do not have data on revenues of TV translator or TV booster stations, but virtually all of these entities are also likely to have revenues of less than \$14 million and thus may be categorized as small, except to the extent that revenues of affiliated non-translator or booster entities should be considered.

D. Description of Projected Reporting, Recordkeeping and Other Compliance Requirement for Small Entities. We are adopting the methodology and parameters for describing the basic radiofrequency environment of the SHVIA ILLR model as proposed in the *Notice* for the digital ILLR model. As indicated by the Broadcasters and CDE, the methodology in the ILLR model as modified over time has been time-tested and proven successful. We expect that the new digital ILLR model will provide the same reliable and accurate predictions of signal availability as the analog SHVIA ILLR model. Like its predecessor, the new model incorporates features to account for the radio propagation environment through which television signals pass and the receiving systems used by consumers. These features are described in the "planning factors" that describe a set of assumptions for digital and analog television reception systems.²³ Since digital and analog television signals are transmitted in the same frequency

²¹ See 13 C.F.R. § 121.201, NAICS Code 515120.

²² See *Broadcast Station Totals*, *supra* note 239.

²³ The planning factors for analog television assume a height of 30 feet, which is slightly different from the height of 10 meters (33 feet) used in the digital planning factors. The planning factors for analog TV are provided in Robert A. O'Connor, "Understanding Television's Grade A and Grade B Service Contours," *IEEE Transactions on Broadcasting*, Vol. BC-14, No. 4, December 1968 (O'Connor) at page 142; the planning factors of digital TV are set forth in OET Bulletin No. 69 at Table 3.

bands, the planning factors affecting basic propagation of signals using the two different modulation methods and the background noise level are the same. We therefore have not modified in the digital ILLR model any of the parameters of the SHVIA ILLR model that describe basic propagation and the background noise levels. The planning factors that are different for digital and analog signals include antenna location (outdoor vs. indoor) and performance, time and location variability, and land use and land cover. We also observe that the planning factor differences for antenna location and performance and for time and location variability are incorporated into the threshold signal level for reception for digital television service, which the STELA directs to be set at the noise-limited levels specified in Section 73.622(e)(1).

E. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.²⁴

We are not adopting the revisions to the estimating methodology proposed by Mr. Shumate as we have not had an opportunity to fully explore the changes he suggests.²⁵ Nonetheless, we believe there may be merit in the improvements he describes for the methodology for predicting digital television signal strengths at individual locations and perhaps more generally, and that they warrant our further investigation as possible modifications to the digital ILLR model. We are therefore addressing his proposals for improving the ILLR methodology in the Further Notice of Proposed Rulemaking herein. We also are not acting on Adaptrum's suggestion that we allow optional use of the digital ILLR model for prediction of signal strengths for purposes of identifying unused spectrum in the TV bands where unlicensed devices could operate as it is beyond the scope of this proceeding.²⁶

Report to Congress: The Commission will send a copy of the Report and Order, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.²⁷ In addition, the Commission will send a copy of the Report and Order, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the Report and Order and FRFA (or summaries thereof) will also be published in the Federal Register.

²⁴ 5 U.S.C. § 603(c).

²⁵ See para.16, *supra*.

²⁶ See para.17, *supra*.

²⁷ See 5 U.S.C. § 801(a)(1)(A).