

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

In the Matter of	)	
	)	
Establishment of a Model for Predicting Digital	)	ET Docket No. 10-152
Broadcast Television Field Strength Received at	)	
Individual Locations	)	
	)	
	)	
	)	
	)	

REPORT AND ORDER  
AND  
FURTHER NOTICE OF PROPOSED RULEMAKING

Adopted: November 22, 2010Released: November 23, 2010

Comment Date: [30 days after date of publication in the Federal Register]  
Reply Comment Date: [45 days after date of publication in the Federal Register]

By the Commission:

TABLE OF CONTENTS

Heading	Paragraph #
I. INTRODUCTION .....	1
II. BACKGROUND .....	2
III. REPORT AND ORDER.....	10
A. The ILLR model for digital television signals. ....	13
B. Other issues .....	49
IV. FURTHER NOTICE OF PROPOSED RULEMAKING .....	57
V. PROCEDURAL MATTERS .....	59
A. Final Regulatory Flexibility Analysis .....	59
B. Initial Regulatory Flexibility Certification.....	60
C. Paperwork Reduction Act Analysis .....	63
D. Filing Requirements .....	64
VI. ORDERING CLAUSES .....	67
Appendix A: Final Rules	
Appendix B: OET Bulletin No. 73	
Appendix C: Final Regulatory Flexibility Analysis	

## I. INTRODUCTION

1. The Satellite Television Extension and Localism Act of 2010 (STELA)<sup>1</sup> reauthorizes the Satellite Home Viewer Extension and Reauthorization Act of 2004 (SHVERA)<sup>2</sup> by extending the statutory copyright license for satellite carriage of distant broadcast signals, as well as provisions in the Communications Act,<sup>3</sup> and amending certain provisions in the Communications Act and the Copyright Act. To implement the new statutory regime, the STELA, *inter alia*, requires 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 signals in accordance with the signal intensity standard in Section 73.622(e)(1) of [its rules], or a successor regulation, including to account for the continuing operation of translator stations and low power television stations.”<sup>4</sup> In this action, 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.<sup>5</sup> 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 ILLR model to improve its predictive accuracy as suggested by one of the parties responding to the *Notice* in this proceeding.

<sup>1</sup> See Satellite Television Extension and Localism Act of 2010, Title V of the “American Workers, State, and Business Relief Act of 2010,” Pub. L. 111-175, 124 Stat. 1218 (2010).

<sup>2</sup> See Satellite Home Viewer Extension and Reauthorization Act of 2004, Title IX of the “Consolidated Appropriations Act, 2005,” Pub. L. No. 108-447, § 204, 118 Stat 2809, 3393, 3423-24 (2004), codified at 47 U.S.C. § 339(c)(1).

<sup>3</sup> See, in relevant parts, 17 U.S.C. 119(d)(10)(A), as amended by STELA Section 102, and 47 U.S.C. 339(a)(2)(D)(i) and 47 U.S.C. 339(c)(3), as amended by STELA Section 204.

<sup>4</sup> 47 U.S.C. § 339(c)(3)(A), as amended by STELA Section 204. This section also specifies that the Commission is to adopt the new point-to-point predictive model within 270 days after the date of its February 27, 2010 enactment. Section 307 of STELA specifies that the “date of enactment” is February 27, 2010; thus, the deadline for completing this rulemaking is statutorily established as November 24, 2010. The signal intensity standard in Section 73.622(e) defines the noise-limited service thresholds for digital television signals; these standards are 1) 28 dBu for signals on low-VHF channels (channels 2-6), 2) 36 dBu for signals on high-VHF channels (channels 7-13) and 3) 41 dBu for signals on UHF channels (channels 14-51).

<sup>5</sup> 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.

## II. BACKGROUND

2. Congress initially established statutory provisions governing delivery of distant network-affiliated broadcast television stations by satellite carriers in the 1988 Satellite Home Viewer Act (SHVA), and subsequently revised and extended those provisions in the Satellite Home Viewer Improvement Act of 1999 (SHVIA) and the Satellite Home Viewer Extension and Reauthorization Act of 2004 (SHVERA).<sup>6</sup> These provisions are codified as various amendments to the Copyright Act and the Communications Act.<sup>7</sup> Under the SHVA and its successor acts, households at locations that are unable to receive a local network-affiliated broadcast television station's signal with an antenna at sufficient strength for reception, *i.e.*, where the signal strength is below the threshold level of field strength needed for reception, are defined as "unserved households" and, therefore, are eligible to receive a distant signal of the same network affiliation through their satellite service provider/carrier.<sup>8</sup> Conversely, households at locations that are able to receive a local network-affiliated station's signal with an antenna at sufficient strength, *i.e.*, above the threshold level of field strength needed for reception, are not eligible to receive a distant station affiliated with the same network unless they are granted a waiver by the affiliate whose signal they are able to receive.<sup>9</sup> Determinations of whether a signal can be received are based on whether the signal level present at the household's location is above or below the standard value of field strength needed for service. For analog TV signals, that standard as established in Section 339(c)(3)(D)(i)(I) of the Communications Act (as amended by the STELA) is the Grade B contour levels set forth in Section 73.683(a) of the Commission's rules, and for digital TV signals the standard is the noise-limited contour set forth in Section 73.622(e)(1) of the Commission's rules.<sup>10</sup>

3. In the 1999 SHVIA, Congress, *inter alia*, directed the Commission to amend its rules to prescribe a predictive model for determining whether a household can receive the analog television signal broadcast by a local television station. The SHVIA added a new Section 339(c)(3) to the Communications Act which required that the Commission develop and prescribe by rule a point-to-point predictive model for reliably and presumptively determining the ability of consumers at individual

---

<sup>6</sup> See Satellite Home Viewer Extension and Reauthorization Act of 2004 (SHVERA), Title IX of the "Consolidated Appropriations Act, 2005," Pub. L. No. 108-447, § 204, 118 Stat 2809, 3393 3423-24, (2004), codified at 47 U.S.C. §339(c)(1); Satellite Home Viewer Improvement Act of 1999 (SHVIA), Title I of the Intellectual Property and Communications Omnibus Reform Act of 1999, PL 106-113, § 1000(9), 113 Stat. 1501, Appendix I (1999); 1988 Satellite Home Viewer Act, 17 U.S.C. §119 (1988). Congress enacted the SHVA and its successors to protect television broadcasters' copyright interests while simultaneously enabling satellite carriers to provide the signals of broadcast network stations to those satellite subscribers who are unable to obtain local network stations over-the-air.

<sup>7</sup> The statutory provisions governing satellite retransmission of distant network-affiliated television signals are codified in Section 119 of the Copyright Act, 47 U.S.C. § 119 and Sections 325, 338, 339 and 340 of the Communications Act, 47 U.S.C. § 325, 338, 339 and 340.

<sup>8</sup> SHVA and its successors modify both the copyright statute in Title 17 of the United States Code and the Communications Act in Title 47 of the United States Code. Section 119 of Title 17 provides a statutory copyright license pursuant to which satellite carriers may retransmit the "distant" signals of television broadcast stations that are located outside the market in which the satellite subscriber is located under specific circumstances, including when the subscribers are in "unserved households." 17 U.S.C. § 119(d)(10)(A).

<sup>9</sup> 47 U.S.C. § 339(b)(2).

<sup>10</sup> See 47 U.S.C § 339(a)(2)(D)(i), as amended by STELA Section 204; *see also* 47 C.F.R. §§ 73.622(e)(1), 73.683(a) and 73.683(d). A broadcast station's Grade B and noise-limited contours are the areas within which the station's signal strength is predicted to exceed a level specified by the Commission's rules. As of June 12, 2009, all full power television stations broadcast only a digital signal, but many low power television stations continue to broadcast an analog signal.

locations to receive analog TV signals in accordance with the signal intensity standard in effect under Section 119(d)(10)(A) of Title 17, United States Code, *i.e.* the field strength values that defined the Grade B contours for television stations in Section 73.683(a) of the Commission's rules.<sup>11</sup> Section 339(c)(3) further provided that "in prescribing such a 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. 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."<sup>12</sup> The ILLR model is a computer program designed to predict the field strength of an over-the-air television signal at an individual location, such as a consumer's home, by considering what happens to the signal as it travels between the transmitter and the home (the propagation path).<sup>13</sup> This model accounts for the effects that terrain and other morphological features have on signal strength. The SHVIA did not, however, contain provisions for specification of a model for prediction of the signal levels of digital television signals or for use of a model that would provide such predictions.

4. In compliance with the statutory directive in the SHVIA, the Commission adopted a point-to-point predictive model (SHVIA ILLR model) for determining the ability of individual locations to receive an over-the-air analog television broadcast signal of a specific intensity through the use of a conventional, outdoor rooftop receiving antenna in ET Docket No. 00-11.<sup>14</sup> The SHVIA ILLR model was an improved version of the original ILLR model endorsed by the Commission for use under the SHVA that incorporated features to account for land use and land cover (LULC) as well as terrain variation. The Commission also provided for the SHVIA ILLR model's continued refinement by the use of such additional data as might become available.<sup>15</sup> More specifically, it provided that refinements

<sup>11</sup> See SHVIA, section 1008(a); *see also* 47 C.F.R. § 73.683(a).

<sup>12</sup> 47 U.S.C. § 339(c)(3). *See Report and Order* in CS Docket No. 98-201, 14 FCC Rcd 2654 (1999) (*SHVA Report and Order*).

<sup>13</sup> The ILLR model is used 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. A computer is needed to make these predictions because of the large number of terrain points that must be examined and to ensure consistent results. 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 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 radio propagation model. It is available at the U.S. Department of Commerce Web site, <http://elbert.its.bldrdoc.gov/itm.html>.

<sup>14</sup> *See First Report and Order* in ET Docket No. 00-11, 15 FCC Rcd 12118 (2000) (*SHVIA First Report and Order*). The SHVIA ILLR model is described in detail in our Office of Engineering and Technology's (OET) "OET Bulletin No. 72," which is available on the FCC website at <http://www.fcc.gov/oet/info/documents/bulletins/>. The rules prescribing use of the ILLR model for determining whether a household is served by a local station are set forth in Section 73.683(d) of the Commission's rules. 47 C.F.R. § 73.683(d). In the *SHVIA First Report and Order* action, the Commission also adopted standards for collection of field strength data to determine the intensity of analog television signals at an individual location. Those standards are set forth in Section 73.683(e). 47 C.F.R. § 73.683(e). *See also* 17 U.S.C. § 119(d)(10)(A), as amended by SHVIA, which specifically defined "unserved household" by reference to signal reception with "a conventional, stationary, outdoor rooftop antenna."

<sup>15</sup> Based on the record in the SHVA proceeding, the Commission found that vegetation and buildings affect signal intensity at individual locations. However, it also found that at the time of the *SHVA Report and Order*, there was no standard means of including such information in the SHVIA ILLR model that had been accepted by the technical and scientific community. The Commission therefore stated that land use and cover information would be included in the ILLR when an appropriate method for using such information in the context of determining the field strength (continued....)

based on such additional data could be proposed by referencing the docket of that proceeding, which it held open for that purpose. The SHVIA ILLR model is currently used for making predictions of analog TV field strengths at individual locations.

5. In the 2004 SHVERA, Congress again amended the Copyright Act<sup>16</sup> and the Communications Act to further aid the competitiveness of satellite carriers and to expand program offerings for satellite subscribers.<sup>17</sup> The SHVERA included new provisions for distant digital signal reception and amended Section 339 of the Communications Act and Section 119 of the Copyright Act to provide three methods by which a subscriber can establish eligibility to receive such signals.<sup>18</sup> First, a subscriber was eligible to receive the distant digital signal of a particular network if his or her household was predicted to be unserved by the over-the-air analog signal of any affiliate of that network (not necessarily the local affiliate), or was determined by on-site testing to be unserved by the over-the-air analog signal of any affiliate of that network. The SHVIA ILLR model was used to make predictions under this provision. Second, a subscriber whose household was predicted to be served by a local station's analog signal could request an on-site signal strength test to determine if his or her household is unable to receive that station's digital signal.<sup>19</sup> Third, a satellite subscriber could receive distant digital signals if the television network station granted a waiver to allow satellite retransmission of the relevant network from a distant station. There was no provision in SHVERA for establishment or use of a predictive model to determine if a specific household can receive a digital TV signal of adequate strength. Rather, presumptive determinations of eligibility to receive a distant network digital signal were based on predictions of whether the household was unserved by the local network affiliate's associated analog signal.<sup>20</sup>

6. The SHVERA also required that the Commission conduct an inquiry and develop recommendations regarding whether the Commission's digital signal strength standard and the signal testing procedures for determining if a household is "unserved" should be revised.<sup>21</sup> The Commission's findings from this inquiry and its recommendations were set forth in a 2005 *Report to Congress*.<sup>22</sup>

(Continued from previous page) \_\_\_\_\_

of broadcast television signals at individual locations has been developed and accepted. *See SHVA Report and Order* at 2692-2693. The Commission reiterated this conclusion in the *Order on Reconsideration* in the SHVA proceeding. *See Order on Reconsideration* in CS Docket No. 98-201, 14 FCC Rcd 17373 (1999), at 17378. In that action, the Commission denied DirecTV's petition for reconsideration, in part, on the basis that it failed to provide the information and details necessary to evaluate an application to consider land use and cover in the ILLR.

<sup>16</sup> Section 103 of the SHVERA created a new 17 U.S.C. § 119(a)(4)(D) to provide satellite carriers with a statutory copyright license to offer distant digital network signals.

<sup>17</sup> *See* 47 U.S.C. §§ 325, 338, 339 and 340.

<sup>18</sup> *See* 17 U.S.C. § 119(d)(10)(A) and 47 U.S.C. § 339(c)(4)(A); *see also* 47 U.S.C. § 339 (a)(2)(D)(i).

<sup>19</sup> Generally, subscribers in the top 100 television markets were allowed to request a digital signal strength test after April 30, 2006 and subscribers in other markets were allowed to request a test after July 15, 2007. *See* 47 U.S.C. § 339(a)(2)(D)(vii)(I)(aa)(bb). The Commission proposed rules for a digital signal strength measurement procedure and that procedure has been used on an interim basis pending its adoption of final rules. *See In the Matter of Measurement Standards for Digital Television Signals Pursuant to the Satellite Home Viewer Extension and Reauthorization Act of 2004*, ET Docket No. 06-94, *Notice of Proposed Rulemaking*, 21 FCC Rcd. 4735 (2006).

<sup>20</sup> 17 U.S.C. 119(a)(4)(D); *see also* 47 U.S.C. 339(a)(2)(D) and 17 U.S.C. 119(d)(10)(A).

<sup>21</sup> *See* SHVERA, section 204(b); section 204(b) was codified in 47 U.S.C. 339(c).

<sup>22</sup> *See Report to Congress: Study Of Digital Television Field Strength Standards And Testing Procedures* in ET Docket No. 05-182, 20 FCC Rcd 19504 (2005) (2005 *Report to Congress*).



Therein, the Commission recommended that the SHVIA ILLR model (the version improved through the addition of land use and land clutter information) be used for predicting whether a household is unserved by digital television signals.<sup>23</sup> The Commission further recommended that Congress authorize adoption of the SHVIA ILLR analog model for use in determining whether households are unserved by local digital signals under the SHVERA. In addition, the Commission stated generally that the digital television measurement procedures should be similar to the existing procedures for measuring the field strength of analog television stations in Section 73.686(d) of the rules, but with certain modifications to address the differences between analog and digital TV signals.<sup>24</sup> Subsequent to its *2005 Report to Congress*, the Commission adopted the *SHVERA NPRM* in which it proposed to amend its rules to provide procedures for measuring the field strength of digital television signals on location for purposes of determining eligibility for reception of distant network television signals from a satellite carrier.<sup>25</sup>

7. In the STELA, Congress again amended the Copyright Act and the Communications Act to renew and make adjustments to the statutory provisions for carriage of distant network television stations by satellite carriers. Under the new regime, eligibility for receiving a distant digital network signal is based on a determination of whether the individual location is unserved by the digital signal of a local station affiliated with that network, as determined from either 1) a prediction of whether the signal of a local station affiliated with the network can be received off-the-air at a specific location or 2) an actual measurement of the local network station's signal strength at that location.<sup>26</sup> The STELA modifies the definition of "unserved household" in the copyright statute by changing the reference from "a conventional, stationary, outdoor rooftop receiving antenna" to "an antenna."<sup>27</sup> The STELA also modifies the signals that are to be considered in the determination of terrestrial service from "an over-the-air signal of a primary network station" to "an over-the-air signal containing the primary stream, or, on or after the qualifying date, the multicast stream, originating in that household's local market."<sup>28</sup> "Local stations" under the STELA are stations in the same Designated Market Area (DMA) as the household location for which eligibility is being assessed.<sup>29</sup> Section 205 of the STELA provides that, with respect to TV translator and low power TV stations, "for purposes of determining whether a subscriber within the local market is eligible to receive distant signals . . . , the rules and regulations of the Federal Communications Commission for determining such subscriber's eligibility as in effect on the day before the date of the enactment of this Act shall apply until the date on which the translator or low power television station is licensed to broadcast a digital signal."<sup>30</sup>

8. With respect to the two methods for determining whether an individual location is unserved by the digital signal of a local network TV station, the STELA first requires that the Commission

---

<sup>23</sup> *2005 Report to Congress*, 20 FCC Rcd 19562-19570.

<sup>24</sup> *Id.*, 20 FCC Rcd 19506.

<sup>25</sup> See Measurement Standards for Digital Television Signals Pursuant to the Satellite Home Viewer Extension and Reauthorization Act of 2004, ET Docket No. 06-94, *Notice of Proposed Rulemaking*, 21 FCC Rcd 4735 (2006) (*SHVERA NPRM*).

<sup>26</sup> 47 U.S.C. 339(a)(2)(D)(i) and 47 U.S.C. 339(c)(3), as amended by STELA Section 204.

<sup>27</sup> See 17 U.S.C. § 119(d)(10)(A), as amended by STELA Section 102.

<sup>28</sup> *Id.*

<sup>29</sup> See 17 U.S.C. § 119(d)(10)(A), (d)(11), as amended by STELA section 102. In the STELA, the reference to a "local" signal refers specifically to "that household's local market" and the definition in 17 U.S.C. § 122.

<sup>30</sup> STELA section 205.

establish a model for predicting the ability of individual locations to receive digital TV signals. Specifically, the STELA amends Section 339(c)(A)(3) of the Communications Act to require that, by November 24, 2010, “the Commission shall 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 signals in accordance with the signal intensity standard in Section 73.622(e)(1) of title 47, Code of Federal Regulations, or a successor regulation, including to account for the continuing operation of translator stations and low power television stations. In prescribing such model,” the STELA provides that “the Commission shall rely on the Individual Location Longley-Rice model set forth by the Commission in CS Docket No. 98–201, as previously revised with respect to analog signals, and as recommended by the Commission with respect to digital signals in its Report to Congress in ET Docket No. 05–182, FCC 05–199 (released December 9, 2005).” The STELA further provides that 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.”<sup>31</sup> Second, with respect to measurement of local network stations signal strength, the STELA requires that, on the same schedule as its final action on the predictive model, the Commission “issue an order completing its rulemaking proceeding in ET Docket No. 06-94 ....”<sup>32</sup>

9. In the *Notice of Proposed Rulemaking and Further Notice of Rulemaking (Notice)* on implementation of the STELA technical requirements, the Commission proposed 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.<sup>33</sup> In that action, the Commission also sought information to update the record in ET Docket No. 06-94 on its proposals for a procedure for measurement of digital television signals at individual locations to address certain statutory mandates in the STELA. As indicated above, concurrent with the instant Report and Order we are issuing a separate *Report and Order* in ET Docket No. 06-94 in which we adopt final rules establishing a procedure for measurement of digital television signal strengths at individual locations. That action completes our rulemaking in ET Docket No. 06-94 as required under the STELA. Six parties submitted filings in response to the *Notice*.<sup>34</sup>

### III. REPORT AND ORDER

10. As directed by Congress in the STELA, we are adopting a new digital ILLR model for

<sup>31</sup> See STELA, section 204(b)(2), amending section 339(c)(3)(A) of the Communications Act, codified at 47 U.S.C. 339(c)(3)(A).

<sup>32</sup> See STELA, section 204(b)(2), amending section 339(c)(3)(B) of the Communications Act, codified at 47 U.S.C. 339(c)(3)(B).

<sup>33</sup> See *Notice of Proposed Rulemaking and Further Notice of Proposed Rulemaking*, ET Docket Nos. 10-152 and 06-94, FCC 10-133 (adopted and released July 28, 2010).

<sup>34</sup> Comments and/or reply comments were submitted by 1) Adaptrum, Inc. (Adaptrum), 2) the National Association of Broadcasters, ABC Television Affiliates, CBS Television Network Affiliates Association, FBC Television Network Affiliates, NBC Television Affiliates and the Association for Maximum Service Television in joint comments as the Broadcaster Associations (Broadcasters), 3) Cohen, Dippell and Everist (CDE), 4) DIRECTV, Inc. and DISH Network, LLC in joint comments (DIRECTV/DISH), 5) Sidney E. Shumate as a petition for rulemaking and comment (Mr. Shumate), and 6) the Named State Broadcasters Association (State Associations). We are addressing the petition for rulemaking aspect Mr. Shumate’s submission as a comment in this proceeding. To the extent necessary, we waive 47 U.S.C. § 1.403 of the Commission’s rules on the ground that the comment procedures in this proceeding will provide the public notice contemplated by our rules.

predicting the ability of individual locations to receive, through use of an antenna, an over-the-air digital television broadcast signal in accordance with the intensity standards specified in Section 73.622(e)(1) of our rules. This new model will be established in our the rules as the point-to-point model for presumptively determining the ability of individual locations to receive with an antenna the digital signals of full service television stations, low power television stations (including digital Class A stations) and TV translator stations. Consistent with the specifications in the STELA, we are basing this new model on the SHVIA ILLR model that the Commission adopted in CS Docket No. 98–201, as revised previously, for use in predicting the signal strengths of analog television signals.<sup>35</sup> The new digital ILLR model incorporates parameters and features appropriate for prediction of the signal strengths of digital television signals. We are also adopting a procedure for continued refinement of this model through use of additional data and information as it may become available. As part of that effort, we are requesting comment on possible revisions to the digital ILLR model in the Further Notice of Proposed Rulemaking herein below.

11. As the Commission observed in the *2005 Report to Congress* and the *Notice*, the SHVIA ILLR model on which we base the new digital ILLR model has proven over time to be an accurate and reliable predictor of analog TV signal strength and has been well accepted by both the broadcast and DBS industries.<sup>36</sup> Through use of this model, consumers, broadcast television stations and satellite television carriers have avoided the need to conduct an actual measurement test each time a satellite customer asserted that he or she is unable to receive an adequate signal off-the-air from a local television network-affiliated station. We expect the digital ILLR model to provide these same benefits in the digital television environment. We also expect that, with the anticipated launch of local-into-local service in all 210 DMAs by Dish Network,<sup>37</sup> the circumstances in which a subscriber would need, or be eligible for, distant signals will be significantly reduced.<sup>38</sup> We therefore anticipate that the new digital

---

<sup>35</sup> The analog SHVIA ILLR model that serves as the basis for our digital TV ILLR model is similar to the service coverage predictive model we established for evaluating television station coverage and interference prediction, as set forth in the Commission's "OET Bulletin No. 69." See FCC "OET Bulletin No. 69, Longley-Rice Methodology for Evaluating TV Coverage and Interference," February 06," (OET Bulletin No. 69 is available on the FCC website at <http://www.fcc.gov/oet/info/documents/bulletins/>). However, whereas the Longley-Rice model for coverage and interference prediction provides estimates of aggregate service availability (including losses due to interference), the SHVIA ILLR model (and the new digital ILLR model) provides estimates only of field strength at individual locations (it does not include consideration of interference). The SHVIA ILLR and digital ILLR models do not replace the current Commission rules for field strength contours in Section 73.683 or for prediction of coverage under Section 73.684 for purposes other than determinations of satellite distant signal eligibility.

<sup>36</sup> See *2005 Report to Congress*, 20 FCC Rcd 19562, and *Notice* at ¶12.

<sup>37</sup> See 17 U.S.C. § 119(g), as amended by STELA section 105 and 47 U.S.C. § 342, as amended by STELA section 206. Dish Network launched 29 markets on June 3, 2010, and now offers local-into-local service in all 210 DMAs. See *DISH Network L.L.C. Application for Qualified Carrier Certification*, MB Docket No. 10-124, Attachment A at ¶ 2 (filed June 30, 2010). See also <http://dish.client.shareholder.com/releasedetail.cfm?ReleaseID=474211>. DIRECTV currently provides the local-into-local package in 150 DMAs, comprising 94% of U.S. households. See <http://www.directv.com/DTVAPP/packProg/localChannels.jsp?assetId=900018>.

<sup>38</sup> The STELA retained the provision that prevents subscribers, in general, from receiving retransmission of distant signals if the local-into-local package is available to them, unless they subscribed to the distant signals before the local package was available. See 47 U.S.C. § 339(a)(2), as amended by STELA section 204; see also 17 U.S.C. § 119(a)(3), as amended by STELA section 102. Given that both DirecTV and DISH are moving towards making local-into-local packages available in all or nearly all markets, only a small fraction of potential subscribers could be eligible for distant signals. Therefore, we expect the need for determinations of eligibility for delivery of distant network signals to individual subscribers to decline significantly.



ILLR model will be needed far less frequently than the analog SHVIA ILLR model was used in previous years.<sup>39</sup>

12. In developing the new model, we considered, in addition to the modifications necessary to enable the model to predict digital television signal strengths, three ways in which the STELA revises the definition of “unserved household”: 1) the definition now references an “antenna” without specifying the kind of antenna or where it is located; 2) the definition specifically recognizes both a “primary stream” and a “multicast stream” affiliated with a network; and 3) the definition now limits network stations whose signals are to be considered to those network affiliates in the same DMA as the subscriber.<sup>40</sup> We discuss below our decision to adopt a version of the ILLR model for digital television signals, including the methodology for prediction of digital signal strength, the STELA definitional changes and other issues. The new STELA digital ILLR model and its specifications are described in OET’s new “OET Bulletin No. 73” in Appendix A.<sup>41</sup>

#### A. The ILLR model for digital television signals.

13. *The methodology for prediction of digital signals.* In the *Notice*, we proposed to use the methodology and parameters describing the radiofrequency environment of the SHVIA ILLR model with appropriate modifications to make it capable of reliably and accurately predicting the field strengths of digital television stations in accordance with the provisions of the STELA.<sup>42</sup> Consistent with the STELA, we proposed to use the DTV noise-limited service contour values in Section 73.622(e)(1) as the standard for determining whether a predicted field strength is sufficient for reception of a signal at an individual location.<sup>43</sup> Inasmuch as the digital signals of digital low power TV (including digital Class A) and digital TV translator stations use the same transmission standard as full service stations, we indicated that we believed that the same model will be capable of providing equally reliable and accurate predictions of the signal strengths of all types of digital TV stations, *i.e.*, full power, TV translator and low power TV (including Class A) stations.

14. The commenting parties submit varying suggestions for modifying the ILLR model for predicting digital signal strengths. Adaptrum and the Broadcasters support the Commission’s proposal to adopt the model with modifications.<sup>44</sup> The Broadcasters state that the ILLR model has been one of the Commission’s great success stories since it was first introduced in 1999 and that this same model should be used for prediction of digital television reception at individual locations. They observe that in the STELA, Congress expressly directs the Commission to adopt a *specific* ILLR predictive digital signal model, *i.e.*, the Individual Location Longley-Rice model that the Commission set forth in CS-Docket No.

<sup>39</sup> The same analysis applies to the need for and use of signal testing, as discussed in our separate *Report and Order* on the digital television signal measurement procedure in ET Docket No. 06-94.

<sup>40</sup> See 17 U.S.C. § 119(d)(10)(A) as amended by STELA section 102. The STELA specifies that network affiliates broadcast on multicast streams will be considered “on or after the qualifying date,” which is defined as “October 1, 2010, for multicast streams that exist on March 31, 2010; and January 1, 2011, for all other multicast streams.” 17 U.S.C. § 119(d)(13), as amended by STELA section 102. See also 17 U.S.C. § 119(d)(10)(A), (d)(14) and (15), as amended by STELA section 102.

<sup>41</sup> OET Bulletin No. 73 is also available on the FCC website at <http://www.fcc.gov/oet/info/documents/bulletins/>.

<sup>42</sup> *Notice* at ¶¶ 13, 15 and 16.

<sup>43</sup> Section 73.622(e)(1) provides separate noise-limited contour levels for channels in the low-VHF band (channels 2-6), high-VHF band (channels 7-13) and UHF band (channels 14-51).

<sup>44</sup> Adaptrum comments at 1; Broadcasters comments at 3 and 4.

98-201 and recommended to Congress in the *2005 Report to Congress*, to determine if a given household can receive a signal satisfying the Commission's noise-limited service contour standard.<sup>45</sup> In their reply comments the State Associations support the positions of the Broadcasters on the ILLR model and urge the Commission to maintain localism by continuing to rely on that model.<sup>46</sup>

15. DIRECTV and DISH submit that the ILLR model should be revised to reflect interference from neighboring broadcast stations.<sup>47</sup> They submit that interference from stations in neighboring areas is a straightforward source of signal strength loss and that it may well make the difference as to whether a household is served. They also state that multipath interference is a problem that should be included in the predictive model.<sup>48</sup> DIRECTV/DISH submit with their comments an Engineering Analysis by Christopher Kurby that states that when the equalizers in currently available television receivers compensate for multipath they degrade the receiver sensitivity by 3 to 4 dB. They submit that, based on Mr. Kurby's recommendation, a 3 dB correction should be applied in the short term and that in the longer term the model should be revised to more fully reflect the effects of multipath interference.<sup>49</sup> In their reply comments, the Broadcasters argue that the STELA does not give the Commission authority to add a new layer of complexity to the model by accounting for interference.<sup>50</sup> They also argue that the STELA does not give the Commission authority to add 3 dB additional signal loss based on multipath problems and that in any event modern receivers do an excellent job at combating multipath, making any such adjustment unnecessary.<sup>51</sup> They further observe that multipath (unlike terrain and clutter) is not a factor that reduces a signal's intensity on the way to a household.<sup>52</sup>

16. Sidney E. Shumate (Mr. Shumate), president of Givens and Bell, Inc., states that the methodology of the current ILLR model has certain deficiencies and requests that the Commission adopt a new model that incorporates improvements that his firm has developed.<sup>53</sup> He states that the prediction methodology in the current ILLR model does not always provide an accurate point-to-point estimate of path loss for two reasons: 1) it is not able to calculate diffraction loss close to an obstacle or leading up to and following a pair of obstacles; 2) there is no factual or scientific basis to explain the additional losses in the line of sight range above and beyond the free space loss and two-ray-loss.<sup>54</sup> Mr. Shumate recommends a new model (which he terms "ITWOM") that replaces the current line-of-sight loss calculation and calculates the losses close to obstructions using a scientifically-based system using Snell's Law, Beer's Law and a set of approximations of the Radiative Engine Transfer Functions to

---

<sup>45</sup> Broadcasters comments at 5.

<sup>46</sup> SBA reply comments at 3.

<sup>47</sup> DIRECTV/DISH comments at 3 and 18.

<sup>48</sup> *Id.* at 3, 18 and 19. Multipath interference involves reflected signals from the desired station that arrive at the receiver at different times.

<sup>49</sup> DIRECTV/DISH comments, Kurby Engineering Analysis at 5.

<sup>50</sup> Broadcasters reply comments at 6.

<sup>51</sup> *Id.* at 5 and 6; MSW Reply Engineering Statement at 11 and 12.

<sup>52</sup> *Id.* at 32.

<sup>53</sup> Mr. Shumate comments at 1. Mr. Shumate's submission is styled as a "Petition for Rulemaking and Comment." We will treat this submission as a comment in response to the *Notice* in the Report and Order portion of this action and as a petition for rulemaking in the Further Notice of Proposed Rulemaking thereof.

<sup>54</sup> *Id.* at 3 and 4.

estimate clutter loss.<sup>55</sup> He claims that the approach he suggests allows calculation of the signal attenuation at all points along a radial and eliminates the three-point averaging system used in the current model to more accurately calculate the losses to single, individual locations. He further argues that the results from the current ILLR model do not improve when better data are used and that improvements are possible only when the model's core estimation methodology is replaced or supplemented. Mr. Shumate submits that Givens and Bell have tested the ITWOM model and compared its results with the ILLR model using the ILLR test measurements and predictions published in the Commission's proceeding in MB Docket No. 87-268 and that these tests show that the average error values from the ITWOM model are lower than those of the current analog ILLR model predictions.<sup>56</sup>

17. Adaptrum asks that the Commission also allow the ILLR model to be used optionally in the database system being implemented for operation of unlicensed devices in the TV band devices (TV white space devices) pursuant to Section 15.711(b) under ET Docket No. 04-186.<sup>57</sup> Specifically, Adaptrum asks that the ILLR-based DTV signal strength prediction model be approved in addition to the FCC curves for optional use in TV station coverage predictions for purposes of identifying unused spectrum in the TV bands where unlicensed transmitters can operate.

18. 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.<sup>58</sup> Since digital and analog television signals are transmitted in the same frequency 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 discuss the record and our decisions on each of these features in the digital ILLR model separately below. 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

---

<sup>55</sup> *Id.* at 4. Mr. Shumate cites "Deterministic Equations for Computer Approximation of ITU-R P.1546-2", Sid Shumate, Proceedings of the International Symposium on Advanced Radio Technologies (ISART), June 2-4, 2008, Boulder, Colorado to describe the method he suggests to estimate clutter loss.

<sup>56</sup> *Id.* at 7 and 8; *see also* "ADVANCED TELEVISION TEST" in 34 separate .pdf files in MB Docket No. 87-268, available at <http://fjallfoss.fcc.gov/ecfs/document/view?id=1546110001> and subsequent entries from that location.

<sup>57</sup> Adaptrum comments at 1; *see also Second Report and Order and Memorandum Opinion and Order* in ET Docket Nos. 04-186 and 02-380, 23 FCC Rcd 16806 (2008) and *Second Report and Order* in ET Docket No. 04-186 and 02-380, FCC 10-174, adopted and released September 23, 2010.

<sup>58</sup> 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.

specified in Section 73.622(e)(1).

19. We are not including adjustments to account for interference and multipath in the digital ILLR model. As the Commission observed in its *2005 Report to Congress*, a receiver's ability to provide service in the presence of interfering signals is not relevant to the field strength needed to provide service.<sup>59</sup> While the presence of other signals on the same or adjacent channels does have the potential for disrupting service, the effects of other signals are a separate matter from the basic functioning of a receiver in an interference-free environment that forms the basis for the Commission's field strength standards. With regard to multipath, in the *2005 Report to Congress*, the Commission found that while the sensitivity of television receivers may degrade to a small degree when they process multipath signals, the difficult multipath conditions under which degradation of as much as 2 dB could occur are not expected to be the norm.<sup>60</sup> Moreover, the incidence of multipath varies significantly over very short distances and the level of multipath and its character is generally not a predictable factor.<sup>61</sup> Further, we see no indication in the STELA that Congress intended that we add interference or multipath consideration to the signal strength standard. We also observe that at locations where interference or multipath are present, consumers can often take steps such as repositioning or re-orienting their antenna to resolve the impact and achieve reception.<sup>62</sup> Accordingly, we find no basis or need for including adjustments to the digital ILLR model for interference or multipath.

20. 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. 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.

21. *Antenna Location and Performance.* In the *Notice*, we proposed to use the current standard for an outdoor antenna as specified in the DTV planning factors in OET Bulletin No. 69 for predicting digital television signal strengths at individual locations, citing the information and our conclusions regarding outdoor and indoor antennas in the *2005 Report to Congress*.<sup>63</sup> As set forth in the proposed OET Bulletin No. 73, the prediction model would use an antenna at 6 meters (20 feet) for one-story structures and 9 meters (30 feet) for structures taller than one story. Consistent with Congress' modification of the specification of the receiving antenna to simply say an "antenna," and our concern that using the outdoor antenna model may result in instances where a consumer who either cannot use an outdoor antenna or cannot receive service using an outdoor antenna<sup>64</sup> and is not able to receive a

---

<sup>59</sup> See *2005 Report to Congress* at ¶ 101.

<sup>60</sup> See *2005 Report to Congress* at ¶ 78.

<sup>61</sup> *Id.* at ¶ 54.

<sup>62</sup> *Id.* at ¶¶ 54.

<sup>63</sup> *Notice* at ¶¶ 20-27.

<sup>64</sup> For example, a satellite subscriber may only have the option of placing an antenna on the south side of a building along with the satellite dish and be unable to receive over-the-air reception from stations broadcasting from the north.

station's service with an indoor antenna will be found ineligible for satellite delivery of a distant network signal, we again requested comment, suggestions and new information that would provide a solution for satellite television subscribers in such circumstances. In this regard, we indicated that we were particularly interested in new ideas and information that have been developed in the time since the *2005 Report to Congress*.

22. The Broadcasters support the Commission's proposal to specify an outdoor antenna in the digital television signal strength prediction methodology and oppose inclusion of indoor antennas.<sup>65</sup> They argue that the fact that the descriptive phrase "outdoor antenna" was dropped from the STELA was not a signal that Congress intended to abandon the longstanding "outdoor antenna" provision. The Broadcasters next argue that, as explained in an Engineering Statement by Meintel Sgrignoli & Wallace attached to their comments (MSW Engineering Statement), there are many engineering reasons for the Commission to continue to rely on outdoor antennas for both prediction and measurement of signal strength.<sup>66</sup> They first observe that in planning the transition from analog to digital television broadcasting, the Commission expressly assumed that households would, if necessary, rely on a rooftop antenna to receive over-the-air TV signals and that that assumption was built into the planning factors that determined the noise-limited service contours of each station. The Broadcasters submit that if the outdoor antenna standard were abandoned, television stations would need to massively increase their effective radiated power (ERP), on the order of 1000 times (30 dB) more power than is now authorized, to reach consumers using indoor antennas.<sup>67</sup> They next state that there is wide variability in indoor signal strength levels across different homes and in the same home that make it impractical to define an indoor reception model that would accurately take into account these differences. In this regard, they submit that different homes have different designs, different building materials, different heights and different interior decorating that affect signal loss and that these differences add up to large differences in indoor signal strength at different locations.<sup>68</sup> They further submit that there are also substantial variations in signal strength in different locations within the same home. They state that it can make a major difference, for example, whether one is in the basement or on the third floor; whether one is in a windowless interior room or next to an open window; or whether the walls of a room are made of masonry or drywall.<sup>69</sup> The Broadcasters also submit that most households have multiple TVs, that the signal strength available near these different TVs may vary widely, and there would be no principled way to determine which one should be [evaluated by prediction].<sup>70</sup> Lastly, the Broadcasters argue that a standard [*i.e.*, prediction methodology] based on indoor antennas would also be highly problematic because there are wide variations in the types and characteristics of indoor antennas used by consumers.

23. DIRECTV/DISH support inclusion of indoor antennas in the digital signal strength prediction model. They argue that with the deletion of the qualifiers specifying a "conventional, stationary, outdoor rooftop receiving antenna" from the definition of an "unserved household" by the STELA, a household is now unserved, and therefore eligible to receive distant stations, if it cannot receive a signal of sufficient strength by means of a simple indoor antenna.<sup>71</sup> They contend that in

<sup>65</sup> Broadcasters comments at 4 and 5.

<sup>66</sup> *Id.* at 10-13.

<sup>67</sup> Broadcasters comments at 12, *2005 Report to Congress* at ¶ 43.

<sup>68</sup> Broadcasters comments at 11, MSW Engineering Statement at ¶ 11.

<sup>69</sup> Broadcasters comments, MSW Engineering Statement at ¶ 11.

<sup>70</sup> Broadcasters comments at 12.

<sup>71</sup> DIRECTV/DISH comments at 2.



making this change, Congress was responding to the reality that the advent of DTV broadcasting has made indoor “rabbit ears” reception antennas even more overwhelmingly prevalent than they already were. They submit that because most people do not use outdoor rooftop antennas, an unserved household standard referencing such antennas necessarily leaves ineligible for distant signals households that cannot actually receive adequate local signals over the air.<sup>72</sup>

24. DIRECTV/DISH disagree with the Commission’s tentative assessment in the *Notice* that the STELA’s specification of the signal strength intensity standard in Section 73.622(e)(1) is consistent with use of an outdoor antenna to receive service, arguing that the Commission assigns too much weight to the citation to its rule. They submit that in specifying the “values” in this section of the rules, Congress simply endorsed a strength standard, which does not evidence any congressional intent as to the method for predicting or measuring the strength of a signal and for determining whether the strength of that particular signal is lower or higher than the standard.<sup>73</sup> They argue that the *Notice* disregards the coda “or a successor regulation” and “as such regulations may be amended from time to time.”<sup>74</sup> They state that if the Commission believes that its rule’s specification of an outdoor antenna interferes with congressional intent, it should change the rule.

25. DIRECTV/DISH submit that there is no need to adapt the predictive model to the indoor reception circumstances of each individual household.<sup>75</sup> They state that for now, it is enough to assume a uniform lower height and subtract an appropriate “correction factor” [from the signal strength standard] to account for the additional obstructions encountered by indoor reception.<sup>76</sup> This correction factor would be developed from separate adjustments as follows. Based on an engineering analysis by Christopher Kurby (Mr. Kurby) that is attached to their comments they state that the predictive model should assume use of an indoor half-wave dipole with gain 9 dB less than the outdoor antenna gain assumed in the DTV planning factors, at one meter above ground (for a first floor TV receiver).<sup>77</sup> Mr. Kurby also recommends an adjustment of 20 dB to account for the additional signal losses associated with indoor reception and states that this is the common fixed factor used by cellular and land mobile coverage calculations to account for building loss. Using models developed for mobile operations, he next calculates that a correction of 7.7 dB should be applied for the height difference between the 9 meter outdoor antenna used in the standard model of TV reception and a 1 meter indoor antenna. These separate adjustments to reduce the predicted signal strength to account for indoor antenna gain, antenna height and building penetration sum to 36.7 dB (Mr. Kurby also recommends additional adjustments for antenna mismatch, reduced sensitivity in low cost set-top boxes, multipath, and a change to 99% reception availability that would increase the correction factor to 64 dB).<sup>78</sup> DIRECTV/DISH argue that at a minimum, the 36.7 dB of adjustments to the predictive model should be made for all consumers who

---

<sup>72</sup> *Id.* at 6

<sup>73</sup> *Id.* at 13.

<sup>74</sup> *Id.* at 14, citing 47 U.S.C. § 339(c)(3)(A) and 17 U.S.C. § 119(d)(10)(A)(ii).

<sup>75</sup> *Id.* at 15.

<sup>76</sup> DIRECTV/DISH comments at 15.

<sup>77</sup> DIRECTV/DISH comments at 3 and 15 and Kurby Engineering Statement at 2.

<sup>78</sup> Mr Kurby recommends correction factors of 3 dB for antenna mismatch, 3 dB for multipath, 11.3 dB for reduced sensitivity in low cost set top boxes as reported in an unspecified study by Hammett and Edison in 2006 [presumably the study included with comments submitted by EchoStar Satellite LLC to ET Docket No. 06-94, August 2006] and 10 dB for specifying 99% time availability. DIRECTV/DISH comments, Kurby Engineering Analysis at 2-5.

do not have an outdoor rooftop antenna.<sup>79</sup> In addition, they submit that an additional 10 dB adjustment should be applied at locations in urban areas to account for clutter, which would bring the adjustment at such locations to 46.7 dB.<sup>80</sup> They state that while consumers could theoretically have an outdoor antenna, most do not and that a consumers' statement that they do not have an outdoor antenna could be checked by looking on Google Earth.

26. In their reply comments, the Broadcasters, CDE and the State Associations oppose DIRECTV/DISH's request to include reception with an indoor antenna in the digital ILLR model. The Broadcasters argue that the current standard for an outdoor antenna is not only required by a full reading of the statutory framework, but is also the only practical standard and one that serves the public interest in access to local programming.<sup>81</sup> These parties submit that the Commission has always assumed that, if an indoor antenna is insufficient for a particular household, it will rely on a rooftop antenna and DIRECTV gives similar advice to its customers.<sup>82</sup> In other words, they maintain that households not needing rooftop antennas typically don't install them, while households that need them do so.

27. In their reply comments, the Broadcasters, CDE and the State Associations also dispute DIRECTV/DISH's proposal for a model of indoor reception, stating that to achieve even minimal accuracy, the Commission would need to conduct extensive engineering research to develop reliable information about building loss and other relevant factors. They contend that an "indoor antenna ILLR" would necessarily make many very inaccurate predictions and therefore violate the Act's requirement that the model be "reliable" and the Copyright Act's requirement that it be "accurate." CDE argues that allowing use of indoor antennas in the digital ILLR model would be unrealistic based on their first-hand and extensive knowledge of installing UHF TV antennas in customers' homes and experience gained over numerous outdoor measurements.<sup>83</sup> The State Associations support use of an outdoor rooftop antenna as the standard of reference. They submit that there are far greater benefits to satellite delivery of local, as opposed to distant, network stations, and Congress and the Commission have repeatedly acknowledged that in the STELA and prior statutes and proceedings.<sup>84</sup> The State Associations argue that DIRECTV/DISH's support for inclusion of indoor antennas that perform poorly in the digital signal strength model is an attempt to increase the number of distant signals they can import at the expense of local broadcast service. They further observe that the use of the unqualified term "antenna" can be interpreted to mean any type of antenna that is available to consumers and so could also include new antennas with higher gain than that of "conventional, outdoor stationary antennas" in determining if it is possible for a household to receive a signal at the specified strength level.<sup>85</sup>

---

<sup>79</sup> *Id.* at 15 and 16.

<sup>80</sup> *Id.* at 15, Kurby Engineering Statement at 4

<sup>81</sup> Broadcasters comments at 2-3.

<sup>82</sup> Broadcasters comments at 5. They quote the following response on DIRECTV's website to the frequently asked question "Can I Use My Current Antenna to Get a Distant Signal?": "In general, as you move further from the transmitter location a broadcast signal becomes weaker. . . . Because indoor units are less likely to have a clear line-of-sight, homes that depend on Rabbit Ear antennas may find it more difficult to receive digital signals. Some locations may need to switch to a roof mounted antenna in order to receive an acceptable digital signal." (DIRECTV website [http://support.directv.com/app/answers/detail/a\\_id/2621](http://support.directv.com/app/answers/detail/a_id/2621) (visited Sept. 1, 2010) (emphasis added).)

<sup>83</sup> CDE reply comments at 2 and 3.

<sup>84</sup> SBA reply comments at 3-5.

<sup>85</sup> SBA reply comments at 10-13.

28. In their reply comments, DIRECTV/DISH challenge the Broadcasters' position that there is too much variability in indoor signal reception to allow for accurate predictions, arguing that outdoor reception, too, presents numerous variables - such as antenna height, antenna location, house location, natural terrain and man-made terrain features - and that the Commission had no problem coming up with simplifying assumptions (30 foot antenna, etc.) that allowed eligibility determinations even at the risk of some inaccuracy.<sup>86</sup>

29. We conclude that the current standard for an outdoor antenna as specified in the digital television planning factors in OET Bulletin No. 69 and on which the digital television signal strength standards in Section 73.622(e)(1) are based, at the alternative heights proposed in the *Notice*, should be used as the basis for predicting digital television signal strengths at individual locations in the digital ILLR model. As discussed in the *Notice*, Congress's use of the term "antenna" in the STELA grants the Commission greater flexibility to take into account different types of antennas than was previously available, without requiring the Commission to incorporate any particular type of antenna into the model.<sup>87</sup> We are not persuaded by the Broadcasters' arguments that the omission of the word "outdoor" from the antenna description in the STELA has no significance and that the Commission is required to assume use of an outdoor antenna in predicting digital television signal strengths. While they are correct that the STELA directs the Commission to rely on the ILLR model recommended with respect to digital signals in the *2005 Report to Congress*, which assumes use of an outdoor antenna,<sup>88</sup> we believe that STELA's use of the term "rely" provides us latitude in the manner in which the ILLR model is implemented. Their argument that the Commission must specify an outdoor antenna because the minimum signal strengths specified by the STELA are premised on use of an outdoor antenna (through the digital television planning factors),<sup>89</sup> is similarly not persuasive in that, as DIRECTV/DISH observe, other specifications of parameters that include an indoor antenna are possible while still adhering to those signal strengths as the standard.

30. We also are not persuaded by DIRECTV/DISH's arguments that Congress' deletion of the qualifiers specifying a "conventional, stationary, outdoor rooftop receiving antenna" from the definition of an "unserved household" from the STELA means that a household is now unserved if it cannot receive a signal of sufficient strength by means of a simple indoor antenna. Again, we believe that this change simply affords the Commission latitude to consider all types of antennas in implementing the digital ILLR model. Even assuming that DIRECTV/DISH is correct that more consumers are now using indoor antennas, their argument that Congress was responding to greater use of indoor antennas by consumers misses the fact that consumers are only using indoor antennas where such antennas provide service. As observed in the *2005 Report to Congress*, the Commission has always assumed that households will use the type of antenna that they need to achieve service; if an indoor antenna is insufficient for a particular household, it generally will rely on a rooftop antenna.<sup>90</sup> Nothing in the STELA reflects a Congressional intent for the Commission to abandon that assumption. Thus, we disagree that households that are not able to receive service with an indoor antenna should be considered unserved simply because they do not use an outdoor antenna. On the basis of the above, we have considered the full range of antenna options in developing the digital TV ILLR prediction model.

---

<sup>86</sup> DIRECTV/DISH reply comments at 4 and 14.

<sup>87</sup> See *Notice* at ¶21.

<sup>88</sup> Broadcasters comments at 5 referencing 47 U.S.C. § 339(c)(3)(A) and the *2005 Report to Congress* at ¶¶ 40-45.

<sup>89</sup> Broadcasters comments at 5 referencing 47 U.S.C § 339(c)(3)(A); see also OET Bulletin No. 69 for a description of the digital television planning factors.

<sup>90</sup> *2005 Report to Congress* at ¶41.

31. Turning then to the specification of antennas in the prediction model, we find that an approach that specifies an outdoor antenna at 6 meters above ground for one-story structures and 9 meters above ground for taller structures (household roof-top levels) with gain as specified in the digital television planning factors is most consistent with the directives for the digital TV signal strength prediction model set forth in the STELA. We reach this conclusion for the following reasons. First, given that the STELA specifies use of the digital television signal strength standard in Section 73.622(e)(1) of the rules as the threshold metric against which predictions are to be compared to make determinations of “served” and “unserved,” it is important and necessary that the signal strengths predicted by the model can be meaningfully compared to that standard. To provide for such comparisons, the signals whose strengths are predicted by the model must have the same qualities as the signal specified in the standard. This can occur only if the assumptions underlying the signal strength needed for reception as described by the standard are the same as the assumptions underlying the signal predicted by the model and their relationship is well defined so that the two represent the same conditions of reception. The Section 73.622(e)(1) digital television signal strength standard is derived from the assumptions in the digital television planning factors as described in OET Bulletin No. 69 and those assumptions include an outdoor antenna as described above. This signal strength standard is important under our rules because it serves to define the service boundary or “service contour” of a digital television station and the threshold at which a station’s service is considered to be available in areas within that service contour. Congress specified this same signal strength standard for defining “served” and “unserved” locations for purposes of determining households’ eligibility for satellite delivery of distant network signals in the STELA. For these reasons, we agree with the Broadcasters that it is appropriate to incorporate into the digital ILLR model the assumptions in the planning factors in OET Bulletin No. 69, including the specified outdoor antenna, to obtain predictions of signal strength for comparison to the standard specified in the STELA.

32. We also reject DIRECTV/DISH’s proposed adjustments to the signal strength standard to account for differences in the expected signal level and in the gain of indoor and outdoor antennas. We find that application of these adjustments would significantly alter the digital television service description as defined in the Section 73.622(e)(1) signal strength standard by reducing the likelihood that a given location would be predicted to receive service. Under the plan they propose, between 36.7 dB and 46.7 dB (depending on whether the location is in an urban area), or more, would be subtracted from the prediction calculated by the ILLR model for locations that do not have an outdoor antenna. They do not offer any additional modifications to the model or its assumptions to compensate for this proposed change in the signal strength standard; nor are we aware of any modifications that would provide such compensation. In application, DIRECTV/DISH’s proposal would raise the signal strength needed for reception of UHF signals from 41 dB $\mu$ V/m to between 77.7 dB $\mu$ V/m and 87.7 dB $\mu$ V/m for households without outdoor antennas.<sup>91</sup> Such a change could, as the broadcasters observe, drastically increase the number of households eligible for satellite delivery of distant network signals. Notwithstanding the difficulties in developing a model that would provide accurate and reliable indoor predictions, we are concerned that many satellite subscribers who could use an outdoor antenna would have an incentive to take the “easy path” and simply report that they cannot use an outdoor antenna and thereby be evaluated under the indoor antenna standard, when in fact they could readily receive a station’s service with outdoor antenna. For example, subscribers located within a station’s service area but at distances from its transmitter where indoor reception is not possible could simply assert that they cannot use an outdoor antenna and thus be eligible to receive a distant network signal. This would remove large numbers of viewers from local stations potential audience. In view of Congress’ selection of the Section 73.622(e)(2) signal strength standard as the threshold for distant signal eligibility in the STELA, we do

---

<sup>91</sup> Under DIRECTV/DISH’s proposal, the same adjustments would be applied to signals on low-VHF, high VHF and UHF channels.

not believe that Congress envisioned or contemplated such an increase in the numbers of satellite subscribers eligible for delivery of distant network signals.

33. In addition, as the Commission discussed in the *2005 Report to Congress* and the *Notice*, there are significant difficulties in achieving accurate and reliable estimates of digital television signal strengths in indoor environments, which make it very difficult if not impossible to obtain accurate and reliable predictions of digital television signal strengths indoors.<sup>92</sup> We are concerned that simplification of indoor antenna reception to a single set of circumstances as suggested by DIRECTV/DISH and Mr. Kurby would ignore the significant differences that exist in indoor reception scenarios, particularly with respect to attenuation of signals due to the materials with which a building is constructed, which vary substantially in the degree to which they absorb or reflect signals, and the antenna's location within the structure, which affects the number and pathways of structural features (walls or ground in the case of basements) that signals must penetrate to reach the antenna. In this regard, we also observe that in the DTV transition, the Commission advised consumers of the wide variability in the performance of antennas generally and indoor antennas in particular in materials provided to the public for the DTV transition.<sup>93</sup> For example, the Commission noted that consumers having problems with indoor antennas needed to check the performance information for the antenna, move the antenna for best reception, place it near a window, as high as possible, away from electronic equipment and change the direction the antenna is facing. Further, the Commission advised that a roof-top antenna may be needed.

34. These differences in indoor reception scenarios are very difficult to account for properly in a model's input values and can also be challenging for a user of a model to assess so as to specify appropriate input values for any particular location. These factors together greatly reduce the reliability and accuracy of any indoor signal strength predictions that might be provided by a model.<sup>94</sup> While we understand that there are also variations in signal strength across outdoor receive locations due to terrain and the presence of man-made terrain features, including aspects of the structure on which an antenna is mounted, that variability is generally much less than the variability of signal strengths indoors which are affected by building materials and location within the building as well as the same terrain and man-made features that affect signals received outdoors. As indicated above, we would also expect that there would be an incentive for households in areas where service is not available with an indoor antenna to simply submit that they have an indoor antenna in order to be eligible for distant signal delivery when in fact they could receive that signal with an outdoor antenna under the standard specified in the STELA. This type of behavior would, to the extent it occurred, undermine broadcasters' coverage and complicate our administration of an indoor antenna standard. We are also not persuaded that any of the options for modifying their proposed adjustments that DIRECTV-DISH have submitted in recent *ex parte*

---

<sup>92</sup> See *2005 Report to Congress* at ¶43; see also *Notice* at ¶22.

<sup>93</sup> See for example, "Fix Reception Problems" at <http://www.dtv.gov/fixreception.html> and "FCC Consumer Facts: Antennas and Digital Television" at <http://www.fcc.gov/cgb/consumerfacts/dtvantennas.html>

<sup>94</sup> On November 16, 2010, DIRECTV-DISH filed an *ex parte* statement in which they requested that the Commission make three adjustments to the predictive model, at least for households without an outdoor antenna: 1) reduce antenna height, 2) account for wall penetration and 3) permit use of an antenna that is "readily available for purchase." They further suggested that the Commission could account for the mix of indoor and outdoor antennas by either applying these adjustments only to households without an outdoor antenna or using a "weighted average" option whereby the Commission would apply a percentage of the adjustments above based on the CEA-reported percentage of antenna users with indoor antennas. See *ex parte* letter of November 16, 2010 submitted by Pantelis Michalopoulos in behalf of DIRECTV-DISH, DIRECTV-DISH subsequently submitted an *ex parte* letter in which they suggested that an alternative to changing the predictive model across the board, the Commission simply to apply the adjustments they propose only to those consumers who do not in fact have an outdoor antenna. See *ex parte* letter of November 17, 2010 submitted by Pantelis Michalopoulos on behalf of DIRECTV-DISH.



presentations would remedy the problems discussed. None of those suggestions would provide reliable and accurate estimates of indoor signal strengths; nor do they offer modifications that would compensate for change they would make to digital signal strength standard set forth in the STELA. Accordingly, we will use the current standard for an outdoor antenna as specified in the digital television planning factors in OET Bulletin No. 69 in the digital ILLR model.

35. Notwithstanding this decision, we remain aware and concerned that using the outdoor reception model may result in instances where a consumer who either cannot use an outdoor antenna or cannot receive service using an outdoor antenna<sup>95</sup> and is not able to receive a station's service with an indoor antenna will be found ineligible for satellite delivery of a distant network signal. Our concern is mitigated by new local-into-local offerings by satellite carriers, which we believe will significantly reduce the number of instances where satellite subscribers would need to consider requesting delivery of distant network signals. Dish Network now provides local network stations (local-into-local service) in all 210 DMAs.<sup>96</sup> In addition, DIRECTV now provides local-into-local service in all but 60 relatively small markets. We recognize that DIRECTV/DISH will still have to qualify some distant signals even after they provide local-into-local service in all 210 DMAs. However, the locations that they will not reach with local-into-local service are likely to be in areas with relatively small populations that are at the edge of some DMAs that are served by satellite service "spot beams" that provide localized service to the major portion of a DMA, including its center of population. Those populations are served by their carrier's larger regional coverage signals that do not have the local signals carried on the spot beams. Moreover, the areas not reached by the spot beams will generally be in less densely populated areas where there are generally fewer residences that are not able to use an outdoor antenna. In concluding that the outdoor antenna standard remains appropriate, we have also considered that most subscribers who will request distant signals from their satellite carriers are likely to be in rural areas where use of outdoor antennas is more common and practical than in urban areas. As noted above, Dish now serves all 210 DMAs and only a small number of Dish subscribers are beyond the spot beams serving those DMAs and therefore potentially eligible for distant signals.<sup>97</sup> Although DIRECTV does not offer local stations in 60 DMAs, these are small market areas and mostly in rural areas where outdoor antennas are likely to be more prevalent.

36. We also observe that under Section 339(a)(2)(E) of the Communications Act, satellite TV subscribers who are denied delivery of a distant network signal based on the signal strength predictive model or a measurement may request a waiver, through the subscriber's satellite carrier, from the station that asserts that such retransmission is prohibited.<sup>98</sup> While we do not know the extent to which stations

---

<sup>95</sup> For example, a satellite subscriber may only have the option of placing an antenna on the south side of a building along with the satellite dish and be unable to receive over-the-air reception from television stations broadcasting from the north.

<sup>96</sup> See note 37, *supra*.

<sup>97</sup> See, Application for Qualified Carrier Certification of DISH Network, LLC (MB Docket No. 10-124, filed June 30, 2010) ("DISH Application"), at Attachment A (Affidavit of David Shull). they are required to provide service to at least 90% of households in every DMA in order to retain their qualified carrier status, and they have retained their status, so it would not be unreasonable to assume they are in fact serving at least that many customers. The STELA requires that DISH maintain actual local-into-local service in all 210 DMAs (codified at 17 USC 119(g)(4)(A)(i)), and defines local-into-local service, in part, as serving at least 90% of households in a DMA (17 USC 119(g)(7)(B)). In the 29 new markets being served by DISH, its signals are predicted to serve at least 90% of households, see DISH Application at Attachment D (DMA Specific Information and Maps). See also footnote 37, *supra*.

<sup>98</sup> 47 U.S.C. 339(a)(2)(E). This section of the Communications Act provides that "[T]his paragraph shall not prohibit retransmission of a distant signal of any distant network station to any subscriber to whom the signal of the local network station affiliated with the same network is available, if and to the extent that such local network (continued....)

have granted such waivers, the waiver process is available. We hope that stations receiving such waiver requests will consider whether the subscriber is in an urban area or residing in a multiple dwelling unit, and therefore confined to reliance on an indoor antenna, and that the stations will act accordingly to grant the waiver request on a case-by-case basis in such circumstances. Finally, we will remain open to consideration of new ideas, approaches and methods for identifying households that cannot use or receive service with an outdoor antenna that are predicted to be served by our digital ILLR predictive model. As discussed below, we are holding this proceeding open for continued refinement of the digital TV ILLR Model, so parties may submit proposals for such new ideas, approaches and methods.

37. *Time and Location Variability Factors.* The field strength of radio signals, including television signals, at a given distance from a transmitter vary by location and with time due to factors affecting their propagation. The time and location (situational) variability factors are commonly represented using the notation “F(L,T),” where a signal of a specified strength level will be available at L percent of locations T percent of the time.<sup>99</sup> The variations over time are also known as “fading.” In the *Notice*, the Commission proposed to use 50% as the location variability factor and 90% as the time variability factor in the digital ILLR model, in accordance with the DTV planning factors. The SHVIA ILLR model applicable to analog stations uses 50% as the location variability and 50% as the time variability factor.<sup>100</sup>

38. The Broadcasters support the Commission’s proposal to set location and time variability for the digital ILLR model at F(50,90).<sup>101</sup> They submit that, as explained in the MSW Engineering Statement, radio signal propagation is by its very nature statistical and changing the long-standing statistical rules would unfairly penalize stations. They note that while the proposed location and time variability settings mean that at least 50% of locations (at the edges of the station’s service area) will receive a signal of the required strength at least 90% of the time, this does not mean that households at the margins of a station’s service area can receive signals only 90% of the time. MSW explains that there are many steps that such a household can take to improve their reception, including use of “low-noise preamplifiers, higher gain antennas, and lower loss download cables.”<sup>102</sup>

(Continued from previous page)

stations has affirmatively granted a waiver from the requirements of this paragraph to such satellite carrier with respect to retransmission of such distant network station to such subscriber.” Similar waiver authority is provided in Section 119(a)(13) of the Copyright Act, 17 U.S.C. 119(a)(13). That section of the Copyright Act provides that “[a] subscriber who is denied the secondary transmission of a signal of a network station under subsection (a)(2)(B) may request a waiver from such denial by submitting a request, through the subscriber’s satellite carrier, to the network station asserting that the secondary transmission is prohibited. The network station shall accept or reject a subscriber’s request for a waiver within 30 days after receipt of the request. If a television network station fails to accept or reject a subscriber’s request for a waiver within the 30-day period after receipt of the request, that station shall be deemed to agree to the waiver request and have filed such written waiver.”

<sup>99</sup> 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 “situation” variability factor of 50% that is sometimes called “location” variability, but the proper term is “situation” probability. The terms are used interchangeably here. See George Hufford, “The ITS Irregular Terrain Model, version 1.2.2: The Algorithm” for more information.

<sup>100</sup> In the case of analog TV service, the planning factors include adjustments to the time variability factors in order to provide for service at 50% of locations 90% of the time. Those values add 6 dB at low VHF, 5 dB at high VHF, and 4 dB at UHF to the F(50,90) contour values to define the analog F(50,50) Grade B contour values. See Robert A. O’Connor, “Understanding Television’s Grade A and Grade B Service Contours,” *IEEE Trans. Broadcasting*, Vol. BC14, No. 4, December 1968, for more information.

<sup>101</sup> Broadcasters comments at 13 and MSW Engineering Statement at ¶¶ 17-19.

<sup>102</sup> Broadcasters comments, MSW Engineering Statement at ¶ 18.

39. DIRECTV/DISH argue that the predictive model should use 99% time variability instead of 90%.<sup>103</sup> That is, they believe that a household should not count as served unless it is predicted to receive a signal of sufficient strength 99% of the time. While they acknowledge the Commission's reasons for rejecting a 99% time variability factor in 2005, they submit that those reasons have been overtaken by yet another change made by STELA: to qualify a satellite carrier as providing local service to a new DMA with a good quality signal, the new law requires satellite signal availability of 99.7%. They state that Congress merely codified its view of what consumers expect and contend that reception of broadcast signals should not be held to a lower standard. DIRECTV/DISH argue that the Commission should not reject improvements to the predictive model to manage the size of the increase in the number of unserved households.<sup>104</sup>

40. In their reply comments, the Broadcasters state that the carriers' proposal to raise time variability for TV broadcast stations from 90% to 99% has been carefully considered and rejected by the Commission in earlier proceedings.<sup>105</sup> They submit that the most important reason to reject the carriers' proposal is that 90% time variability applies only at the edges of a station's service area, and even in those areas homeowners can improve their reception by use of a directional rooftop antenna and a preamplifier.

41. We continue to believe that the F(50,90) specifications for time and location variability set forth in the digital television planning factors are the appropriate values for those factors in the digital ILLR model. While we understand DIRECTV/DISH's position that viewers desire service to be available nearly all the time and that digital television service does not degrade gradually, the fact is that the propagation paths of terrestrial broadcast television signals are much different than those of sky-based satellite signals and this affects the practically achievable degree of broadcast signal availability. As we observed in the *Notice*, terrestrial signals follow paths that are close to the surface and are attenuated by the natural and man-made surface features they encounter along those paths. The attenuation caused by those features results in propagation conditions whereby signal strength varies statistically by location and time. The power and/or antenna height needed to improve broadcast television signal availability increase in a non-linear manner such that it is unrealistic to require such availability to approach 100%. These propagation conditions are much different than those faced by satellite signals, which travel over paths that are generally affected only by weather and other atmospheric conditions.

42. The F(50,90) values for digital television service availability were established based on an industry-Government consensus that relied on the traditional TV service model that worked well for analog TV service and that, as argued by the broadcasters, is also appropriate for digital TV service. Changing the time variability factor value to 99% reliability as requested by the satellite providers would greatly shrink the predicted local DTV service areas and would not reflect the capability of the vast majority of viewers to receive signals. Moreover, as pointed out by the Broadcasters and in MSW's Engineering Statement, the assumed 10% reduction in signal availability over time occurs at the outermost limit of a station's service area and is not the typical statistical figure for reliable reception across a station's entire service area. As the distance to a station's transmitter decreases, time availability of the signal above the noise-limited threshold value also increases. We also observe that households at the edge of a station's service area can often improve their reception (and thereby reduce

<sup>103</sup> DIRECTV/DISH comments at 3, 17 and 18.

<sup>104</sup> *Id.* at 17.

<sup>105</sup> Broadcasters reply comments at 6.

or eliminate periods when the station's signal is not available) by mounting their antennas higher, using higher gain antennas, or using low-noise pre-amplifiers at their antennas. In addition, it is more likely that a station's signal strength at a household that is located near the edge of its service area will be predicted to be below the threshold needed for reception and therefore eligible for delivery of a distant signal by its satellite provider. Accordingly, we find no basis for modifying the time variability factor for broadcast television signals for purposes of determining a household's eligibility for delivery of distant network signals and therefore will specify the time and availability factors in the digital ILLR model as F(50,90).

43. *Land Use and Land Cover Factors.* The land use and land cover ("LULC") data provides information on building structures and other man-made terrestrial features and on land cover features such as forests and open land that can affect radio propagation. Inclusion of this data in the prediction methodology of the SHVIA ILLR TV computer model significantly enhanced the accuracy and reliability of its signal strength predictions. The method for considering these land cover factors is to assign certain signal loss values, in addition to those already factored in the model for terrain variation, as a function of the LULC category of the reception point.<sup>106</sup> More specifically, the field strength predicted by the basic Longley-Rice model is reduced by the clutter loss value associated with the respective LULC category.<sup>107</sup> Reception point environments at individual locations are classified in terms of the codes used in the LULC database of the United States Geological Survey (USGS).<sup>108</sup> In the *Notice*, we proposed to apply the LULC categories and clutter loss values for describing land use and land cover features in the digital TV ILLR model in the same manner as currently incorporated into the SHVIA ILLR model. These values were specified in the *SHVIA First Report and Order*.<sup>109</sup>

44. The Broadcasters state that the Commission should continue to rely on its current approaches to land use and land cover for prediction of digital television signal strengths.<sup>110</sup> DIRECTV/DISH state that the Commission should incorporate much more granular factors into the digital TV signal strength prediction model to reflect obstructions associated with land use and land cover.<sup>111</sup> They observe that the analog ILLR model makes no adjustment at all for the effects of land use and land cover on the propagation of VHF signals, as if those signals propagated in perfectly open space. They submit that this treatment is a plainly unrealistic reflection of the obstructions that TV signals encounter on their path to households. They also submit that in the era of Google Earth, it is no longer acceptable for the model to content itself with a blunt tool such as the Land Use Land Cover ("LULC") database of the U.S. Geological Service. As an alternative, they suggest that the Commission consider adjusting the LULC database to compensate for the increased obstructions associated with lower antenna height.<sup>112</sup> They submit also that, based on the assessment in Mr. Kurby's Engineering Statement, an additional 10 dB adjustment is needed to account for land clutter in urban areas above the 5-7 dB correction already

<sup>106</sup> A full description and discussion of the modifications that were made to the Longley-Rice 1.2.2 model to include the LULC data is provided in the *SHVIA First Report and Order*, 15 FCC Rcd 12122-12127.

<sup>107</sup> The current 10 environmental LULC classes and values used with the SHVIA ILLR model are shown in Tables 2 and 3 of OET Bulletin No. 72.

<sup>108</sup> The LULC database is provided by the USGS. This database is available on the USGS website at [http://edcwww.cr.usgs.gov/glis/hyper/guide/1\\_250\\_lulc](http://edcwww.cr.usgs.gov/glis/hyper/guide/1_250_lulc).

<sup>109</sup> See *SHVIA First Report and Order*, 15 FCC Rcd 12126.

<sup>110</sup> 457 F.3d 31 (D.C. Cir. 2006).

<sup>111</sup> DIRECTV/DISH comments at 3.

<sup>112</sup> DIRECTV/DISH comments at 16.

applied by the ILLR model for land clutter.<sup>113</sup> Mr. Shumate submits that the LULC data needs to be applied by introducing clutter height and density factors into the clutter calculations, not by adding preset values of attenuation to the results of the ILLR model.<sup>114</sup> He states that the clutter calculations developed for the ITWOM model he recommends recognize that the attenuating effect of the clutter varies with distance from the transmitter and the terrain location.

45. In their reply comments, the Broadcasters argue that DIRECTV/DISH's proposals for modifying the manner in which the ILLR model takes into account land use and land cover are too vague and that in any event, the Commission's existing approach to land use and land cover has worked well and is not in need of repair.<sup>115</sup> They also submit that, as the Commission indicated in the *2005 Report to Congress*, the clutter values were at zero for VHF signals not because there are no clutter losses, but because adding clutter loss would cause the ILLR model to be tilted in favor of under predictions for VHF stations.<sup>116</sup> In their reply comments, DIRECTV/DISH argue that the adjustments for VHF stations should not be set at zero and state that this elimination of land use as a factor was based on studies conducted in some of the flattest states in the country.<sup>117</sup>

46. We conclude that the LULC categories and clutter loss values for describing land use and land cover features in the digital TV ILLR model should be applied in the digital ILLR in the same manner as currently applied in the SHVIA ILLR model. While we understand the seeming inconsistency of using no LULC corrections for VHF signals, we have found previously that the clutter loss values used in the current SHVIA ILLR model, including zero values for VHF signals, strike the correct balance. Analysis of the data on the model's performance shows that using the values used in the SHVIA ILLR model produce approximately an equal number of over-predictions as under-predictions.<sup>118</sup> Thus, we have found a range of clutter values, including zero, that correspond to different land cover types are valid. We see no merit in DIRECTV/DISH's argument that the studies used by the Commission in determining that the LULC adjustment for VHF signals should be zero were conducted in some of the flattest states in the country. Rather, we find that the 5 markets examined have varied terrain characteristics that are sufficient to represent the terrain in television markets across the nation.<sup>119</sup> Also, at this time, we are not aware of any LULC database that would provide more refined or granular information on land use and land clutter than that provided by the USGS LULC database. In this regard, DIRECTV/DISH's suggestion to use Google Earth is not practical as that service provides does not provide data on terrain and surface clutter variation. We also are not altering the LULC correction factors to add additional attenuation to account for lower antenna heights as the model will continue to use the same 30 foot (9 meters) and 20 foot (6 meters) antenna heights used in the SHVIA ILLR model. We also find that it would not be practical to introduce clutter height and density factors into the clutter calculations of the ILLR software at this time as suggested by Mr. Shumate. Also, there is no height and density information available for the current LULC data. Accordingly, we will apply the land use and

<sup>113</sup> DIRECTV/DISH comments at 15 and, Kurby Engineering Statement at 3 and 4.

<sup>114</sup> Mr. Shumate comments at 9.

<sup>115</sup> Broadcasters reply comments at 6.

<sup>116</sup> Broadcasters reply comments at 33-34, citing the *2005 Report to Congress* at ¶ 148.

<sup>117</sup> DIRECTV/DISH reply comments at 14, citing the *SHVIA First Report and Order*, 15 FCC Rcd 12118, 12126 (2000).

<sup>118</sup> See *2005 Report to Congress* at ¶ 148.

<sup>119</sup> The markets examined included Miami, Baltimore, Pittsburgh, Raleigh/Durham and Charlotte, NC. See *SHVIA First Report and Order* at ¶¶ 13-15 and footnote 14.



land cover categories and USGS clutter loss values for describing land use and land cover features in the digital TV ILLR model in the same manner as these elements are currently incorporated into the SHVIA ILLR model.

47. *Multicast program streams.* In the *Notice*, we stated that we believed that the proposed digital signal strength prediction model would account for multicast as well as primary streams that are transmitted by a station and affiliated with one or more networks. We therefore proposed to provide no special adjustment in the model to predict the availability of network signals that are transmitted on multicast streams, rather than on a station's primary program stream. In their comments, the Broadcasters agree with the Commission's position in the *Notice* that all multicast streams can be treated equally for purposes of both prediction and measurement of signal strength.<sup>120</sup> They note that all of the streams arrive on the same signal and at the same strength and that the different programming on multicast channels simply consists of different packets within a station's transport stream.

48. As discussed in the *Notice* and by the Broadcasters, there is no need for adjusting predictions from the digital ILLR model to reflect the added reference to network affiliated multicast streams in the STELA. The prediction of signal strength for a digital television broadcast signal applies regardless of the content, including the presence of multicast program streams. If a household is predicted to receive a station, then all of that station's program streams would be received equally. Accordingly, we are providing no special adjustment or procedure in the model for network signals carried on multicast program streams.

## **B. Other issues**

49. *Previous findings of eligibility.* In the *Notice*, the Commission proposed to uphold any previous findings of eligibility for delivery of distant signals based on the predictive model, in the event that it were to update the digital TV ILLR model and a prediction from the updated model were to indicate that a previously unserved location could receive service from a local network station. In its comments, CDE observes that because of changes many television stations are still making to their digital operations, the potential situation arises for those stations that a lack-of-service determination under STELA may be rendered moot at a later date by an upgrade in their television facilities and improved off-the-air service.<sup>121</sup> It asks that the Commission clarify how the predictive model is to be administered for those viewers who opted at one juncture to choose satellite service due to lack of off-the-air service but later are predicted to receive off-the-air service.

50. We continue to believe that it is appropriate to "grandfather" the eligibility of households in cases where a location was predicted to be unserved by a local network station using an adopted version of the digital ILLR model and the household at that location is receiving a signal of that network from a distant station by its satellite provider. This provision will avoid disruption of the existing services to which households have been accustomed to receiving. This grandfathering will apply only in cases where the household already is receiving a distant signal from its satellite provider prior to a change in the digital ILLR prediction model or in the coverage of the local station.

51. *Analog Low Power TV and TV Translator Stations.* Although all full-service television stations converted fully to digital operation on June 12, 2009, TV translator and low power/Class A TV stations were not required to make that conversion and many of those stations continue to broadcast in

<sup>120</sup> Broadcasters comments at 13 and MSW Engineering Statement at ¶ 20.

<sup>121</sup> CDE comments at 2.

analog format.<sup>122</sup> In the *Notice* the Commission, recognizing the provisions of Section 205 of the STELA and that many TV translators and low power TV stations continue to transmit analog signals, tentatively concluded that it would continue to apply the existing analog SHVIA ILLR model specified in OET Bulletin No. 72 for predicting signal strengths in distant network eligibility cases involving TV translator and low-power/Class A television stations that use the analog TV standard to broadcast their own programming or to retransmit the content of local digital network stations. In their comments, the Broadcasters support the Commission's proposal to continue to use the analog SHVIA ILLR model for LPTV, Class A, and translator stations that are still broadcasting using the analog transmission standard.<sup>123</sup> They state that, to the extent such stations continue broadcasting in analog, it makes sense to continue to use the Commission's existing tools for predicting analog signal reception, including OET Bulletin 72. They state that those tools have worked well for years and there is no reason not to continue to employ them with this category of stations.

52. Consistent with Section 205 of the STELA, we will continue to apply the methods in OET Bulletin No. 72 for predicting the signal strengths of TV translator and low power/Class A stations that operate using the analog TV standard. We see no reason or basis for changing from the use of the SHVIA ILLR model for obtaining predictions of signal strength for determining eligibility for satellite delivery of distant network signals for those stations.

53. *Procedure for Continued Refinement of the Digital TV ILLR Model.* As indicated above, the STELA requires that the Commission establish procedures for continued refinement in the application of the digital TV ILLR model through use of additional data as it becomes available. In the *Notice*, the Commission proposed to comply with this requirement by establishing a procedure under which it would consider possible changes to OET Bulletin No. 73 (which describes the model and is referenced in the rules) to implement improvements to the model. The commenting parties did not address our proposals for the procedures for continued refinement of the application of the digital TV ILLR model.

54. We continue to believe the most efficient, effective, fair, transparent and timely approach for revising the digital TV ILLR model if new information becomes available is to hold open the docket in this proceeding and then conduct further rule making as proposed in the *Notice*. This plan is consistent with the Commission's past action concerning the SHVIA model. Given that the digital ILLR model is being incorporated into our rules, we believe that this plan also is consistent with the requirements of Section 553 of the Administrative Procedures Act.<sup>124</sup> Parties with new data, analysis or other information relating to improving the predictive model will be able to submit requests to modify the model in the instant docket. We are instructing OET to evaluate such requests and, as appropriate, prepare a Notice of Proposed Rulemaking for consideration by the Commission. The Commission also could initiate rulemaking action on its own motion.

55. *Stations to Consider for Distant Signals.* As discussed above, under the SHVIA and the SHVERA, the predicted signal strengths of all the stations affiliated with the same network were

---

<sup>122</sup> In its recently issued *Further Notice of Proposed Rulemaking and Memorandum Opinion and Order* in MB Docket No. 03-185, FCC 10-172, adopted and released September 17, 2010, addressing rules for digital low power television stations, the Commission reported that while there has been a rapid increase in the licensing of digital low power television facilities over the past year, only 56% of the existing 7536 stations in the low power television services have taken steps to move toward digital operation.

<sup>123</sup> Broadcasters comments at 14.

<sup>124</sup> See 5 U.S.C. 553.

considered, regardless of those stations' DMAs.<sup>125</sup> That is, if a satellite subscriber desired to receive the distant signal of the "XYZ" network, then the predicted results from any stations affiliated with the XYZ network would be analyzed for that subscriber's location. If one or more of those affiliated stations were predicted to deliver a signal of the requisite intensity, the subscriber would be predicted "served" by that network and not eligible for a distant signal from that network unless each of the stations predicted to serve the subscriber granted a waiver.<sup>126</sup> Section 102 of the STELA changes this regime by specifying that only "local" stations are to be considered, *i.e.*, stations that are located in the same DMA as the satellite subscriber. In the *Notice*, the Commission proposed to address this statutory modification by changing the way the digital ILLR model's results are to be used, rather than through a change in the digital TV ILLR model itself that would limit the signals examined to those located in the same DMA as the subscriber. That is, instead of having the computer software for the model limit consideration of network stations to any such stations in the subscriber's DMA that the model predicts to be available, we proposed to amend our rules to specify that satellite carriers are required to consider only the signals of network stations located in the subscriber's DMA in determining whether a subscriber is eligible for delivery of distant network signals. The commenting parties did not address this issue.

56. We adopt our proposal to address the statutory change to limit the network stations to be considered in satellite signal delivery eligibility cases to those stations that are located in the same DMA as the satellite subscriber by amending our rules to specify that eligibility determinations are to consider only the signals of network stations located in the subscriber's DMA. We note that this statutory change will also reduce the burden associated with distant network signal eligibility waiver requests by reducing the number of stations from which a waiver would need to be requested. This change will also reduce the burden of on-site measurement of signal strengths where such tests are performed for the purpose of determining a satellite subscriber's eligibility to receive distant signals.

#### IV. FURTHER NOTICE OF PROPOSED RULEMAKING

57. In the Report and Order above we adopt a new digital TV ILLR model that complies with the requirements and provisions of the STELA. This model will provide a method for accurately, reliably and presumptively estimating the signal strength of digital television stations at individual locations for purposes of determining whether a subscriber to a satellite television service is eligible for delivery of distant network signals from that service. With this model in place, we seek to further investigate and consider the suggestions submitted by Mr. Shumate, as discussed above, for possible modifications to the digital ILLR model that would further improve the accuracy and reliability of its predictions. We would adopt such modifications in a subsequent Report and Order in this proceeding.

58. In this regard, we invite the submission of additional information concerning the methodological changes Mr. Shumate suggests for the digital ILLR model with respect to 1) calculation of diffraction loss close to an obstacle or leading up to and following a pair of obstacles and 2) a factual or scientific basis for explaining the additional losses in the line of sight range above and beyond the free space loss and two-ray-loss. We are requesting a detailed description of the methodological changes that would be offered for addressing these aspects of the model and how they would improve the model to better estimate digital television signal strengths at individual locations. Such additional submissions should also include computer software that implements these methodological changes, to the extent that it is available, for evaluation by our engineering staff. We also request comment and technical evaluations from interested parties on the changes Mr. Shumate proposes. In his submission in this

<sup>125</sup> See previous definition of "unserved household" in 17 U.S.C. § 119(d)(10)(A), prior to amendment by STELA section 102.

<sup>126</sup> 47 U.S.C. § 339(c)(2).

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),<sup>127</sup> 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.”<sup>128</sup> The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”<sup>129</sup> In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.<sup>130</sup> 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).<sup>131</sup>

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.

<sup>127</sup> 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).

<sup>128</sup> 5 U.S.C. § 605(b).

<sup>129</sup> 5 U.S.C. § 601(6).

<sup>130</sup> 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.”

<sup>131</sup> 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.<sup>132</sup> In addition, a copy of the Notice and this initial certification will be published in the Federal Register.<sup>133</sup>

### 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 12<sup>th</sup> 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.

---

<sup>132</sup> *See* 5 U.S.C. § 605(b).

<sup>133</sup> *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 12<sup>th</sup> 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](mailto: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 12<sup>th</sup> 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”**

FCC/OET-73

# 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**



**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.”<sup>1</sup> 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.”<sup>2</sup> 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.<sup>3</sup>

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.<sup>4</sup> 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.<sup>5</sup> A location found by the ILLR

---

<sup>1</sup> 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).

<sup>2</sup> 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).

<sup>3</sup> 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).

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

<sup>5</sup> See 47 C.F.R. § 73.622(e). The signal strength values for noise-limited digital television service are 28 dBμV/m for TV channels 2-6; 36 dBμV/m for channels 7-13; and 41 dBμV/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.<sup>6</sup>

## **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,

---

<sup>6</sup> 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;<sup>7</sup>
- 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;

<sup>7</sup> 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**

		Clutter Loss, decibels (to be subtracted from calculated field strength)			
ILLR Clutter Category	ILLR Clutter Category Description	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 dBμV/m for TV channels 2-6; 36 dBμV/m for channels 7-13; and 41 dBμV/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”)<sup>1</sup> an Initial Regulatory Flexibility Analysis (“IRFA”) was incorporated in the *Notice of Proposed Rulemaking* (“NPRM”) to this proceeding.<sup>2</sup> 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.<sup>3</sup>

**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.<sup>4</sup> 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.<sup>5</sup> The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”<sup>6</sup> In addition, the term “small business” has the same meaning as the term

<sup>1</sup> 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”).

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

<sup>3</sup> See 5 U.S.C. § 604.

<sup>4</sup> 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.

<sup>5</sup> 5 U.S.C. §§ 603(b) (3), 604(a) (3).

<sup>6</sup> *Id.*, § 601(6).

“small business concern” under the Small Business Act.<sup>7</sup> 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).<sup>8</sup>

Nationwide, there are a total of approximately 29.6 million small businesses, according to the SBA.<sup>9</sup> A “small organization” is generally “any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.”<sup>10</sup> Nationwide, as of 2002, there were approximately 1.6 million small organizations.<sup>11</sup> 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.”<sup>12</sup> Census Bureau data for 2002 indicate that there were 87,525 local governmental jurisdictions in the United States.<sup>13</sup> We estimate that, of this total, 84,377 entities were “small governmental jurisdictions.”<sup>14</sup> 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

---

<sup>7</sup> 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.”

<sup>8</sup> 15 U.S.C. § 632.

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

<sup>10</sup> 5 U.S.C. § 601(4).

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

<sup>12</sup> 5 U.S.C. § 601(5).

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

<sup>14</sup> 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.<sup>15</sup> Business concerns included in this industry are those “primarily engaged in broadcasting images together with sound.”<sup>16</sup> The Commission has estimated the number of licensed commercial television stations to be 1,392.<sup>17</sup> 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 stations<sup>18</sup> (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.<sup>19</sup> We note, however, that, in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations<sup>20</sup> must be included. Our estimate, therefore, likely

<sup>15</sup> See 13 C.F.R. § 121.201, NAICS Code 515120.

<sup>16</sup> *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.

<sup>17</sup> 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/>.

<sup>18</sup> 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.

<sup>19</sup> See *Broadcast Station Totals*, *supra* note 239.

<sup>20</sup> “[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.<sup>21</sup> Currently, there are approximately 537 licensed Class A stations, 2,386 licensed LPTV stations, and 4,359 licensed TV translators.<sup>22</sup> 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.<sup>23</sup> Since digital and analog television signals are transmitted in the same frequency

---

<sup>21</sup> See 13 C.F.R. § 121.201, NAICS Code 515120.

<sup>22</sup> See *Broadcast Station Totals*, *supra* note 239.

<sup>23</sup> 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’Conner, “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.<sup>24</sup>

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.<sup>25</sup> 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.<sup>26</sup>

***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.<sup>27</sup> 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.

---

<sup>24</sup> 5 U.S.C. § 603(c).

<sup>25</sup> See para.16, *supra*.

<sup>26</sup> See para.17, *supra*.

<sup>27</sup> See 5 U.S.C. § 801(a)(1)(A).