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

In the Matter of	)	
	)	
Establishment of a Model for Predicting	)	ET Docket No. 10-152
Broadcast Television Field Strength	)	
Received at Individual Locations	)	ET Docket No. 06-94
	)	
Measurement Standards for Digital	)	
Television Signals Pursuant to the	)	
Satellite Home Viewer Extension and	)	
Reauthorization Act of 2004	)	

REPLY ENGINEERING STATEMENT OF MEINTEL, SGRIGNOLI, & WALLACE, LLC

1. At the request of the Broadcaster Associations,[1] the undersigned have prepared this Reply Engineering Statement in connection with the Commission's inquiries into establishing a model for predicting broadcast digital television reception and into adopting

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[1] The National Association of Broadcasters is a nonprofit trade association that advocates on behalf of free, local radio and television stations and also broadcast networks before Congress, the Federal Communications Commission and other federal agencies, and the Courts. The ABC Television Affiliates Association is a nonprofit trade association representing television stations affiliated with the ABC Television Network. The CBS Television Network Affiliates Association is a nonprofit trade association representing television stations affiliated with the CBS Television Network. The FBC Television Affiliates Association is a nonprofit trade association representing television stations affiliated with the FOX Television Network. The NBC Television Affiliates is a nonprofit trade association representing television stations affiliated with the NBC Television network. The Association of Maximum Service Television is a nonprofit trade association that advocates, on behalf of local radio and television stations and broadcast networks, before Congress, the Commission and other federal agencies, and the courts. Collectively, the four network affiliate trade associations represent approximately 750 television stations affiliated with the four major broadcast television networks.

measurement standards for over-the-air digital television signals.[2] The Commission's inquiries are in regard to The Satellite Television Extension and Localism Act of 2010 (STELA), which reauthorizes the Satellite Home Viewer Extension and Reauthorization Act of 2004 (SHVERA) by extending the effectiveness of, and in some cases amending, certain provisions in the Communications Act and the Copyright Act.

2. This Reply Engineering Statement is principally directed to the Statement submitted by Christopher Kurby in support of Comments filed jointly by DISH Network, LLC and DIRECTV Inc. on August 24, 2010 in this proceeding. The Kurby statement addresses numerous issues relating to the NPRM. Below we address Mr. Kurby's comments on those issues.

The Popularity of Indoor Antennas in Some Areas Does Not Mean That the Test for Service Should Be Based on Indoor Antennas

3. The fact that indoor antennas are used by some consumers does not mean that they should be the basis for determining eligibility under the STELA regime. The DTV transition would have been crippled had it been based on modeling using indoor antennas, because it would be impossible, as a practical matter, for stations to serve their existing analog service areas with indoor antennas. To be consistent with the basic premises of our television broadcast system, the Commission should continue to assume use of properly located and oriented *outdoor* antennas to determine distant signal eligibility.

4. As the Commission has repeatedly observed, consumers must make some effort to receive the signals of local television broadcasters. This assumption has always been part of the regime when discussing the reception of over-the-air television, whether in analog or digital.

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2 Notice of Proposed Rulemaking and Further Notice of Proposed Rulemaking, ET Docket Nos. 10-152 and 06-94 ("NPRM").

Specifically, the Commission has always assumed that the consumer will make a reasonable effort to obtain an antenna with good performance characteristics, locate it in a reasonable spot, and properly adjust it to receive a broadcast television signal. This was true in the analog days as well as today. And we can confirm, based on our personal experience, that rooftop antennas are common in areas far from TV transmitters.

5. Generally, consumers that use indoor antennas are located near the transmitting tower and have relatively high field strengths at their location. People have come to understand, in the analog as well as in the digital broadcast world, that indoor antennas are an *option* for those viewers located in higher signal level areas or near the transmitter. However, they are not intended, and never were intended, to be used at locations far away from the transmitter location, nor can they be used in far away locations. No engineer would expect an indoor antenna to work at 50^{+} miles from the transmitter location.

Service to Indoor Antennas at Substantial Distances Would Require Astonishing Amounts of Transmitter Power

6. Assuming use of indoor antennas in determining who is "served" by a TV station would have remarkable results. Specifically, if DTV stations wished to preserve their coverage areas and maintain the Commission's policy of replication, they would need to increase their transmitted power by startlingly large factors.

7. Use of indoor antennas was never contemplated by the Commission in determining DTV service areas or coverage during the channel planning and allocation process. The OET-69 Bulletin clearly lays out the model to be used for DTV planning and coverage and makes clear that it assumes an outdoor antenna in its modeling.

8. According to the Kurby Statement at ¶ I.F., stations would need to increase power by 64 dB to account for differences in antenna gains, building penetration losses, antenna height,

time variability, clutter and other factors that he proposes to use for indoor reception. It is important to understand the ramifications of this assumption. An increase of 64 dB would require stations to increase their radiated power 2,511,886 (over two and half million) times their existing ERP's to account for these changes in the predictive model. In other words, a UHF digital television station that currently broadcasts with an ERP (Effective Radiated Power) of 1,000KW would need to increase its ERP to 2,511,886,432 KW (in excess of 2.5 Billion Kilowatts or over 2.5 Trillion Watts) under these assumptions.

9. The station would require truly huge amounts of electricity to operate at these hyper-extreme power levels. In fact, so much electricity would be required to operate a station with a 64 dB increase in power that each digital television station would require its own power plant to operate. If one assumes typical antenna gains for such a station of about 15 dB and system losses of 1.76 dB, a 1000 KW ERP station would need a transmitter output power of approximately 115,933,219 KW to achieve its astronomical ERP. If the transmitter was 50% efficient, its input AC power would be approximately 231,886,4389 KW. Obviously, this is impractical as each station's power plant would need to be some 56 times bigger than the world's largest coal-fired power plant, located in South Africa, which generates only 4.116 billion Watts (4,116,000 KW) of electricity. It is likely that if all network-affiliated stations in the United States operated at this level, it would outstrip the supply of electricity available. And no station could continue to operate if its electric bill were increased by a factor of 2.5 million.

10. This large increase in ERP would create massive amounts of new interference to other stations as well as to translator and low power stations. And it would create a spectrum management nightmare in today's crowded spectrum environment, not to mention creating an enormous RF exposure problem anywhere near any transmitter site.

11. These problems illustrate the infeasibility of an indoor prediction or measurement regime as proposed by Mr. Kurby.

Differences Between Satellite Service and TV Broadcasting Service

12. The carriers argue that broadcasters should be expected to match the signal availability of 99.7% that DISH is required to achieve if it wishes to offer distant signals again. But satellite providers offer a line-of-sight service to their customers, while television broadcasting is a terrestrial service subject to propagation over whatever terrain and other obstructions exist between the transmitting tower and their viewers. Broadcast television is intended as an economical way to provide a local service to a large number of people. Due to the environmental limitations imposed on any terrestrial service, the actual service will vary from location to location. Since it is impossible to provide service to all locations 100% of the time, the FCC developed statistical models to predict service availability and provide a set of acceptable levels of service, taking into consideration the practical limitations on equipment, the effects of RF exposure in areas near transmitting sites, and the availability and cost of electrical power. It would be unreasonable to expect such a terrestrial system to be capable of providing the same level of service as a line-of-sight system. Furthermore, in areas where the statistical model may indicate marginal terrestrial service, the statistics can be improved by use of a higher-gain antenna or a pre-amplifier.

13. In other ways, terrestrial broadcasting has advantages over a line-of-sight satellite service. For example, it is possible to have television reception in *some* areas without the need for an outside antenna due to the proximity to the transmitter site of local broadcast stations. In addition, terrestrial television service is much more robust than satellite service during periods of heavy snow or rain.

Using Indoor Antennas Will Result in Large Variability in Signal Characteristics

14. Mr. Kurby oversimplifies the complexity of the indoor reception environment. Almost all of the references cited in Mr. Kurby's statement are related to mobile communications. Although broadcasters are introducing new mobile and handheld services, they are not the subject of this proceeding. And to adjust the planning factors and propagation models based on data developed with land-mobile, cellular, and satellite telephone applications would reflect a gross misunderstanding of the terrestrial broadcast television environment. Those industries have substantially different frequency bands, use cases, signal characteristics, and usage statistics. To simply apply mobile data to digital television is naïve.

15. We have performed a large number of indoor digital television field test measurements. One thing is clear from our experience and data: no two homes are the same. In other words, "one size fits all" does *not* apply with indoor reception conditions. To believe that the many complex signal propagation factors related with indoor reception can be boiled down to a few constant "fudge factors" to be added to the predictive model results is a gross over-simplification of the complex propagation environment that comprises a home, and would be wrong in many cases. A predictive model for indoor reception would be neither reliable nor accurate.

16. The variety of building designs, construction materials, and styles greatly affect indoor television reception. Reception is affected by which floor level the DTV set is used on. The signal conditions will generally improve the higher the DTV set and antenna are above ground level. The location of the receiver within the building is also important, with interior rooms more challenging than exterior rooms with windows facing the transmitter.

17. Building construction materials can add to the variability in signal level and quality. Plain glass has much less attenuation than wood, which has less attenuation than brick (e.g., thickness matters), which has less attenuation than metal (e.g., wire mesh in plaster walls, aluminized insulation, or aluminum siding). Since signals can enter a building through the windows, walls, or roof and ceilings, the level can vary dramatically.

18. Signal conditions are also affected by people walking around in the room, especially in relationship to the indoor antenna. It is not clear how a predictive model could account for this factor.

19. Mr. Kurby suggests that “the present FCC rules use a rather excessive and unrealistic antenna height for calculation of signal power.” He goes on to say that receive antenna height should be modified to “[p]rovide correction factors for a change in mobile antenna height…” Again, as this is not a mobile service, we fail to see how data and factors intended for mobile communications services apply to the broadcast television service. The models suggested by Mr. Kurby are used for service predictions with mobile services and attempt to compensate for the effects of the surrounding environment based on empirical data. However, mobile systems typically have transmit antennas on relatively short towers with the height above average terrain (HAAT) well under 200 m, whereas the *average* HAAT for a television broadcast station is more than 400 m. This significant height difference can change the dynamics of the environmental effects. As a result, mobile service models are not necessarily applicable to the broadcast service.

20. Mr. Kurby references a report prepared by iBlast related to some indoor reception tests conducted in 2001. He fails to note that the building penetration loss results of that testing

were based on a small sample of only 38 homes in two cities. To extrapolate this data into planning factors to be used for the entire country would be a mistake.

21. As we noted in our initial Engineering Statement in this proceeding, if the Commission were to contemplate any type of indoor predictive model, many years of testing and research would be required before any statistically meaningful data could be analyzed to determine the appropriate factors. To achieve any minimal degree of accuracy, for example, the Commission would need to study the full range of building types and materials (including what specific materials face the station tower), develop specific attenuation factors for each situation, and then develop a nationwide database of detailed information about the construction of individual homes (including the thickness of each material). Even then, there would be no way of knowing where the television was located in the house and whether an antenna would face a window or a brick wall.

Indoor Predictive Modeling Assumptions Are Inadequate

22. Mr. Kurby claims that antenna gains utilized by the predictive model should "reflect typical antenna gains" and therefore be adjusted downward from the currently assumed values in OET-69. He bases this on numbers he says were suggested by the Institute for Telecommunication Sciences ("ITS"), but provides no reference or footnotes regarding this assertion. These low "typical antenna gain" values (actually, losses since they are negative dB values) reflect *indoor* passive dipole-like antennas, i.e., with no directionality to provide antenna gain. However, OET-69 clearly indicates that the "typical" planning factors assume an *outdoor* antenna with gain (directionality). From our experience, the values used in OET-69 are appropriate and justifiable for outdoor antennas, and the range of gain values used are very reasonable.

23. In his comments, Mr. Kurby states that "the present FCC rules use a rather excessive and unrealistic antenna height for calculation of signal power." Of course, he is referring to the fact that the FCC assumes an *outdoor* antenna is to be used. As mentioned above, both a 20' AGL and 30' AGL height is used in the ILLR predictive model to account for single-story and two-story buildings, respectively. Mr. Kurby indicates that the antenna height should be set at one meter (presumably above ground level[3]) for the predictive model. Again, this may be due to a lack of Mr. Kurby's experience in the broadcast world. But at this antenna height (1 meter = 3.28 feet) above *ground* level, the antenna would be placed practically on the floor of the home, since most homes are built on a foundation, crawl space, or slab that extends some distance from the ground. This, in many cases, would be lower than the television the antenna would be feeding.

24. A correction for 99% time variability to account for signal fading, which can be exacerbated indoors under certain conditions (e.g., people moving in the room), would require significantly more transmitted power. Mr. Kurby, based on his extensive mobile radio background, states that this signal fading should be accounted for to the extent it cannot be corrected by receivers. He says that "in mobile systems, the 50% to 90% time availability factor is accounted for by forward error correction and repeats, neither of which is available for a stationary TV." But while real-time broadcast systems like broadcast DTV (i.e., not point-to-point communication systems) with no back channel do not have the ability to repeat data received in error, the DTV system does in fact employ forward error correction in the form of a 2/3-rate trellis coding system concatenated with a 10-byte correction per 188-byte MPEG packet

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[3] The receive antenna height that is entered into the predictive model is the height above ground level, as described in the ILLR computer model of OET Bulletin 72 as well as in the proposed modified version of the ILLR model.

(t=10) Reed-Solomon coding system for extensive error correction, which certainly helps to mitigate signal fading.

25. Back in the early NTSC days, theoretical correction factors were added to the FCC(50,50) curves to achieve 90% time variability instead of 50%. The values were 6 dB at low-VHF, 5 dB at high-VHF, and 4 dB at UHF.[4] Since time and location variability are believed to vary statistically in a log normal manner (i.e., like the bell-shaped, Gaussian curve), increases in time variability are non-linear, and an increase to 99% time variability would require significantly more power. Notably, both Mr. Kurby and H&E have suggested correction factors of up to 17 dB (i.e., 50 times higher) from a median value, and 10 dB (i.e., 10 times higher) from the existing 90% value. However, as stated above, the extra power from this and other indoor reception requirements throughout the *entire* service area would prohibit terrestrial broadcast as we know it.

26. Sometimes there is a misconception about 90% time variability. It does *not* mean that the 10% of the time the signal does drop below the critical threshold value for acceptable reception occurs in the entire service area all at once in a contiguous manner. First, it occurs only at the outer most limit of the service area, and is therefore not a "typical" figure across the station's service area. Second, these occurrences are not consecutive nor do they occur at a particular time of day or have a particular duration. Most are likely to occur during parts of the day when a viewer is not watching, and may only cause a momentary service interruption (e.g., short time of pixelization or freeze frame) that will not cause a viewer to stop watching the programming. Third, even for the small percentage of households at the very edge of the station's service area who may be affected, this effect can be mitigated by adding a mast-

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4 Harry Fine, "The Normal Distribution as Applied to VHF Broadcast Service Problems," FCC T.I.D. Report No. 4.2.2, May 1949. P.5.

mounted low-noise amplifier to their directional outdoor antenna. For these and other reasons, in 2005, the FCC found this 99% time variability argument unpersuasive, especially since it is inconsistent with the DTV service model and channel allotment plan.[5]

27. Mr. Kurby suggests other adjustments to be used in predicting indoor reception, including 11.3 dB worse sensitivity as reported in 2005 by H&E in their SHVERA comments. However, these low-cost STB units were *not* the Coupon Eligible Converter Box (CECB) units sold just before the full-power analog turn-off, but rather they were older STB units that were utilized with monitor-only HDTV sets (i.e., they were 2003 & 2004 designs, and 4G units, rather than 5G units like many of the integrated sets). Receiver performance has significantly improved since early 2005 when the FCC did its lab testing on both 4G and 5G ATSC receivers[6]. In the 2009 lab test report from the FCC,[7] the CECB units got high marks for their improved VHF sensitivity, interference, and multipath performance:

> "The converter boxes that ultimately passed the NTIA requirements showed significant median performance improvements in VHF sensitivity, adjacent and taboo channel rejection, rejection of IM3- generating pairs of interfering signals, and multipath-handling capability over DTV receivers that were manufactured just three years earlier."

28. We have observed this same performance improvement in our own laboratory RF performance tests.

29. After adding up all of the adjustments, Mr. Kurby arrives at the staggering correction factor of 64 dB. We discussed above the consequences of requiring a TV station to increase its power by 64 dB, or by a factor of more than 2.5 million.

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5 2005 Report to Congress: The Satellite Home Viewer Extension and Reauthorization Act of 2004, "Study of Digital Television Field Strength Standards and Testing Procedures", FCC ET Docket No. 05-182, Adopted December 6, 2005, Released December 9, 2005.

6 "Tests of ATSC 8-VSB Reception Performance of Consumer Digital Television Receivers Available in 2005," Technical Research Branch, Laboratory Division, Office of Engineering and Technology, Federal Communications Commission, FCC/OET TR-05-1017, S. Martin, November 2, 2005.

7 "DTV Converter Box Test Program," Technical Branch Laboratory Division, Office of Engineering & Technology, Federal Communication Commission, FCC/OET 9TR1003, S. Martin, October 9, 2009.

30. In Mr. Kurby's statement, he refers to co-channel interference from another TV station (either analog or digital) as referenced in the FCC's OET Bulletin 69. Co-channel interference is not considered in eligibility determination since it has no affect on the desired signal level, but is merely additive since there is no correlation between the two signals. Additionally, some interference rejection is easily achievable with properly oriented directional roof-top antennas with good front-to-back ratios.

31. Likewise, multipath interference rejection has been heralded as one of the main improvements in DTV receivers over the last few years, especially since the 5th generation (5G) of VSB decoder chips came into the market in 2005. This was verified in the 2005 FCC lab test[8], which measured a large number (28) of then-current receivers made up of both 4G and 5G units. The difference in 4G and 5G units was noticeable particularly in multipath performance. Likewise, a further improvement in multipath performance was observed in the subsequent 2009 FCC lab test,[9] where 6G CECB units were tested. Improvement in multiple areas occurred, but especially in the areas of echo length, echo strength, echo speed, and noise threshold degradation. Likewise, multipath can be further mitigated by using good directional antennas, proper placement, and proper adjustment, which is another reason why use of an outdoor antenna, as assumed by the FCC, is a reasonable effort to be performed by the viewer.

Indoor Test Procedures Are Difficult and Unreliable

32. Mr. Kurby describes a test procedure that is difficult to implement, would provide unreliable data, and is flawed. For instance, if there is more than one TV in the household, which TV is tested? Mr. Kurby indicates the test location "should be the room the TV is

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[8] "Tests of ATSC 8-VSB Reception Performance of Consumer Digital Television Receivers Available in 2005," Technical Research Branch, Laboratory Division, Office of Engineering and Technology, Federal Communications Commission, FCC/OET TR-05-1017, S. Martin, November 2, 2005.

[9] "DTV Converter Box Test Program," Technical Branch Laboratory Division, Office of Engineering & Technology, Federal Communication Commission, FCC/OET 9TR1003, S. Martin, October 9, 2009.

intended to be used in." Will that be the one in the basement or the one in the second-floor bedroom? This could lead to game-playing by the homeowner.

33. The recommended use of a dipole antenna for indoor testing by Mr. Kurby can become challenging for low-VHF, where the proper length varies from 8.6 feet at CH 2 to 5.8 feet at CH 6. In addition, Mr. Kurby does not mention the fact that the antenna under test must be calibrated to properly characterize the site for television reception, but, of course, this is a necessity if one is to obtain accurate, consistent, and reliable data. This means that not just any indoor antenna can be purchased and used "as is," but that the antenna must be calibrated in the laboratory against some reference. The alternative is for the tester to purchase an expensive set (one for VHF and one for UHF) of calibrated dipoles which would cost in excess of $2,000.

34. The testing process is further complicated by the fact that the indoor test must be scheduled with the homeowner in advance, unlike outdoor testing which can be done without any involvement of the homeowner. And will the homeowner be moving around the room while the signal level measurements are being made or will they be sitting down in their usual chairs where they typically watch the television?

35. Where will the indoor antenna be placed within the room? We have found from a number of field tests, particularly after the full-power analog shutdown on June 12, 2009, that indoor VHF reception was hampered by the viewer simply placing their poorly-performing indoor antennas in the worst possible location. Replicating a viewer's poor choice of antenna location would be unwise.

36. As noted above, the EMI-producing consumer electronic equipment further complicates both indoor reception and indoor testing. In recent field testing by MSW it has been determined that indoor television reception is being affected by radiation from various electronic

devices in the home, including television sets, converter boxes, DVD players, cordless phones, computers, and the like. Part 15 of the FCC's rules set radiation limits for such devices. But it is clear from those limits that the FCC never intended these devices to be operated in close proximity to the antenna of a television receiver. If the television antenna is placed outdoors as specified in the planning factors, then under normal circumstances there is ample separation between the Part 15 devices and the television antenna. Part of spectrum management is a delicate balance between all of the uses of the spectrum. In this case it is the balancing of a practical radiation limit for Part 15 devices versus disruption of the primary service intended for the specific frequencies (television). If the FCC was forced to assume that all television service depended on indoor antennas, it would have to impose much greater restrictions on radiation from Part 15 devices at a likely very significant increase in cost.

37. Mr. Kurby suggests a test procedure where the indoor antenna is oriented in the direction of the first transmitter (implying multiple stations are to be tested). He does not suggest how the first station transmitter is to be determined. Should it be a network station or its affiliate (and if so, which one?), a PBS station, or a local independent station?

38. There is no suggestion in Mr. Kurby's recommendation that the antenna be adjusted for maximum signal strength as a viewer is expected to do for best reception (which may not involve pointing the antenna directly at the station). This would be an unfair characterization of indoor antenna use, since the FCC assumes that the viewer must make a reasonable attempt at receiving the signal, which includes selection of good components and proper placement and adjustment of the antenna. Placing the dipole-like antenna (e.g., rabbit ears) with its elements perpendicular to the station and horizontal to the ground is fine, but what if best reception in that specific test location requires a different antenna direction or requires the

antenna elements to not be horizontal to the ground due to signal de-polarization that is common with indoor reception? And if the test antenna has adjustable elements, nothing is mentioned as to how far out the elements should be extended.

39. Mr. Kurby goes on to say that the antenna should not be adjusted further after this first positioning. This will, by design, achieve inaccurate results as to the other stations to be tested. Adjusting the antenna for best reception is certainly within the range of reasonable efforts that the Commission has always expected.

40. A picture test is not supported by the statute, since signal level is the determining factor. However, even if allowed, performing a picture test, as suggested by Mr. Kurby, sounds simple, but in fact is not. The well-known digital cliff effect is called that because it takes a very small amount of signal level change to go from an error-free picture with sound to an all-error frozen picture with muted sound. However, this only exists in a Gaussian or near-Gaussian channel condition, meaning that essentially only white noise is present in the receiver, and there are no other significant degradation effects such as multipath or interference (from other signals or EMI from other devices). When these other effects are present, it is possible to have a very watchable picture that has *occasional* pixelization or very brief freeze frames (just as occurs with cable & satellite). While not desired, these occasional imperfections often do not dissuade a viewer from continuing to watch the program. However, this becomes a subjective test, thus complicating the supposedly objective picture test methodology proposed by Mr. Kurby.

41. The picture test is further complicated by the fact that the viewer may be using a very poor antenna, cable feedline, and even a very poorly performing DTV receiver. The TV and its antenna may also be too close to other electronic equipment, which can create interference, as just discussed. In some cases, the problem of reception may be easily fixed by

replacing one of these items, thus falling in the category of reasonable expectations on the part of the viewer to receive the DTV signal. But the tester could scarcely be expected to function as a TV repair person, and if that system were adopted, test results would vary depending on the skills of the tester in remedying reception problems.

42. Mr. Kurby then recommends that an additional correction factor for indoor on-site testing be made to adjust to 99% time variability. He states "(t)he value calculated above results in an estimate of the local mean and represents **50%** time variability." In the H&E SHVERA NPRM Comments, H&E states the same thing in regard to the lack of *specific* F(50,90) curves for DTV, *i.e.*, field strength prediction curves that do not have to be generated using F(50,50) and F(50,10) curves. H&E further states that "…in order to conduct measurements of actual conditions, which are intended by the proposed measurement protocols to be **median** F(50,50) values, either the F(50,90) service definition levels would need to be adjusted upward to an equivalent F(50,50) value, or the measured F(50,50) values would need to be adjusted downward to an equivalent F(50,90) value." In both cases, there is an assumption that the signal measured at any given testing moment in time is equal to the median (i.e., the 50%) time variability value. This is not the case, and adding a significant correction factor to supposedly reach the 90% time variability level would be quite unfair and biased. Of course, adding an even larger correction factor to get to the extreme case of 99% time variability would be even more draconian.

43. Mr. Kurby incorrectly suggests that a correction factor of 37.3 dB (over 5000 times) be added to the measurements to account for a poorly implemented viewer receive system. But these factors, which supposedly account for receiver noise figure degradation due to antenna mismatch, receiver sensitivity degradation, equalizer noise enhancement, and test receiver noise floor effects, are not needed in this field strength measurement procedure.

According to the law, measurement of the *actual* field strength is the ultimate goal. Again, Mr. Kurby's proposal would create a large number of homes considered erroneously to be "unserved."

<u>Outdoor Antennas Avoid Indoor Prediction Pitfalls</u>

44. The Commission's assumption of outdoor antennas from the very beginning of broadcast television avoids all of these problematic indoor variables, since the television antenna typically resides a few feet above the roofline and several feet away from (or above) nearby structures such as chimneys. Outdoor antennas increase the chance for line-of-sight or near line-of-sight conditions, avoid the variable attenuation loss that comes with different building construction styles and materials, and avoid the effects of people near the antenna. Therefore, outdoor antenna performance is much easier to define and characterize, and is fairly similar for every household of similar height. The FCC has even taken the extra step to accommodate the difference in height between single-story and two-story structures by allowing a lower receive antenna height for a single-story structure in the inputs to the ILLR model.

45. The ILLR model with outdoor antennas has been tested against real-world measurements, and found to be highly accurate. *2005 Report to Congress*¸ ¶ 143. To the best of our knowledge, no one has ever developed an "indoor ILLR" model of television reception, much less tested the accuracy of such a model against actual measurements.

46. Installation of outdoor antennas has not changed very much from years ago, and can be done by "do-it-yourselfers" today, with many more options for antennas, tripods, pre-amplifiers, and coaxial cable. If anything, it has gotten easier to install downlead coaxial cable as compared to flat twin-lead used decades ago, since coaxial cable (with its inherent shielding) is not as critical in its placement near metal objects as was twin-lead.

47. However, for those who prefer not to install antennas themselves, there are still antenna installers available for hire, including many who also install satellite dishes on roofs. Whether or not they work for antenna manufacturers or are just independent contractors, in our experience traveling around the United States, there is no shortage of antenna installers.

48. Satellite dishes cannot be installed indoors: they need a clear line of sight to the desired satellite. It is therefore surprising that DBS companies should take the position that broadcasters must be judged by their performance using only indoor antennas.

49. For the reasons we have discussed, continuing the assumption of outdoor antenna use avoids the difficult, and in some cases fatal, problems that would arise in both service prediction and signal measurement from the use of an indoor antenna model.

Respectfully submitted:

/s/

William Meintel

/s/

Gary Sgrignoli

/s/

Dennis Wallace

September 3, 2010