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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY
Before the

FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

_____)
In the Matter of)
)
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)
_____)

CS Docket No. 98-201 ✓
RM No. 9335
RM No. 9345

**MOTION FOR LEAVE TO FILE RESPONSE TO DIRECTV
"REPLY" IN SUPPORT OF PETITION FOR RECONSIDERATION**

The National Association of Broadcasters hereby requests leave to file the following response to the "Reply" Comments filed by DIRECTV, Inc. on April 26, 1999. The grounds for this motion are as follows: (1) DIRECTV waited until its Reply comments to provide any substantive information about its proposed land use and land cover application, making it impossible for NAB to comment on that information in NAB's Opposition; and (2) after the deadline for filing Reply comments, EchoStar filed an engineering statement in federal court that shows there is not a consensus even within the satellite industry about land use and land cover applications.

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RESPONSE TO DIRECTV REPLY COMMENTS

After providing no detail whatsoever in its Petition for Reconsideration about its proposed land use and land cover application, DIRECTV belatedly includes in its April 26, 1999

Reply a limited amount of information about its proposed application. NAB makes the following brief response to DIRECTV's Reply.

a. DIRECTV *still* does not claim that it has actually developed any application for modifying Longley-Rice to take LULC data into account. Rather, DIRECTV says that it is “actively in the process of developing” such an application, DIRECTV Reply at 3, and discusses how the LULC data “will be implemented” at some time in the future (*id.* at 4).

b. DIRECTV has not provided a copy of its proposed application to the NAB for review, nor, to the best of our knowledge, to the Commission itself. Until broadcasters and the Commission have the opportunity to test the software themselves and determine whether it increases or decreases the accuracy of the Commission's ILLR model, there can be no consensus in the technical and scientific community about DIRECTV's proposed application.

c. To the extent DIRECTV provides a limited amount of information about its proposed application, it appears to have fatal defects. See Further Engineering Statement of Jules Cohen, filed herewith as Exhibit A.

d. An April 26, 1999 filing by EchoStar in federal court in Miami shows that there is no consensus *even within the satellite industry* about incorporating LULC data into the Commission's ILLR model. (A copy of EchoStar's filing, along with the Affidavit of Rober A. Mercer, is attached as Exhibit B.) Specifically, EchoStar's expert witness has told the federal court (under penalty of perjury) the following:

- “land use databases reflecting current conditions with any degree of precision are not available.” (Mercer Aff., ¶ 9)
- “the USGS database is not sufficiently detailed to allow the accurate modeling of signal propagation along paths to individual households.” (*Id.*, ¶ 10)
- “The USGS Land Use and Land Cover Data . . . are quite general and do not include significant geographical detail concerning either vegetation or manmade structures.” (*Id.*, ¶ 11)
- “Classification of land areas [in the LULC database] is based on rather dated information -- aerial photographs dating from the 1970s and 1980s. . . . [L]and areas are classified by irregular polygons of at least 10 (10) acres in area Classification codes in rural and outlying areas . . . are even less precise than those for urban areas.” (*Id.*, ¶ 11)
- “The age of the underlying data . . . some of which was obtained over twenty years ago, if also of significant concern . . . , primarily because of the profound changes in land use across the United States over the past two decades.” (*Id.*, ¶ 13)

CONCLUSION

For the reasons discussed above, the Commission should not endorse any modified method of running the Longley-Rice model until the satellite industry provides a specific software package to the Commission and to broadcasters for technical review. Indeed, the recent EchoStar court filing, by itself, shows that there is no consensus in the technical and

scientific community about the procedure that DIRECTV improperly urges the Commission to
blindly endorse.

Respectfully submitted,



Henry L. Baumann
Benjamin F. P. Ivins

NATIONAL ASSOCIATION OF
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Dated: May 21, 1999

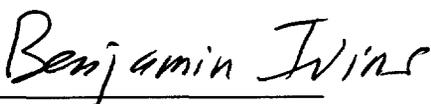
CERTIFICATE OF SERVICE

I hereby certify that I have today arranged for a copy of the foregoing Opposition to be sent by U.S. Mail, first class postage prepaid, addressed as follows:

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May 21, 1999

A

Jules Cohen, P.E.
Consulting Engineer

**ENGINEERING STATEMENT ON BEHALF OF
NATIONAL ASSOCIATION OF BROADCASTERS
IN SUPPORT OF RESPONSE
CS DOCKET NO. 98-201**

This engineering statement, prepared on behalf of the National Association of Broadcasters (NAB), is in support of a response to the Reply of DirectTV, Inc. in CS Docket No. 98-201. The statement is directed particularly to the employment of Land Use and Land Cover (LULC) data in conjunction with the Individual Location Longley-Rice (ILLR) prediction program.

In the Report and Order of February 1, 1999, relative to satellite delivery of network signals to unserved households, the Commission stated: "land use and land cover (e.g., vegetation and buildings) shall be included when an accurate method for doing so is developed" (§ 71, emphasis added). Contrary to the DirectTV assertion, an accurate method for including LULC data has not been developed.

Two important factors necessary for including LULC do not exist: (1) current data in sufficient detail to be applicable to individual households, and (2) reliable loss factors for each classification of LULC data.

The United States Geological Survey (USGS) LULC data are based on aerial photographs, some of which are more than twenty years old and none is believed to be less

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than ten years old. The timeliness of LULC data is of extreme importance considering continuing suburban and exurban growth resulting in conversion of farm land and treed areas to housing tracts.

The minimum area representing particular man made features includes ten acres with a minimum width of 660 feet. "Non-urban and non-man made features may be mapped with polygons with a minimal area of 40 acres (16 hectares) that have a minimum width of 1320 feet (400 meters)."¹ Such resolution is much too coarse to provide reliable information applicable to individual households.

DirectTV proposes specific loss values to be applied to a listing of classifications simplified from the more detailed USGS categories of LULC. The loss values are taken from Rubinstein² for some values and from unidentified "industry sources" for the rest. The use of unknown "industry sources" is obviously not subject to independent verification for accuracy. And the Rubinstein data themselves do not provide a suitable basis for application to the problem at hand. The loss data provided by Rubinstein are referenced to an adaptation of the *Okumura* prediction method -- not to Longley-Rice. Furthermore, Rubinstein lists

¹ Hatfield and Dawson Engineering Statement prepared for DirectTV, 4/99, Appendix 2, Description of LULC Database from the USGS, p.2, Spatial Resolution.

² Thomas N. Rubinstein, Clutter Losses and Environmental Noise Characteristics Associated with Various LULC Categories, IEEE Transactions on Broadcasting, vol. 44, no. 3, pp 286-293, September 1988.

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Consulting Engineer

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seven potential error sources applicable to both noise and signal difference measurements and an additional four potential error sources applicable specifically to signal difference measurements. (“Signal difference” refers to the spread between calculations using the Okumura algorithm and actual measurements.)

Referencing to Okumura instead of the ILLR is sufficient reason to disqualify use of the additional losses shown by Rubinstein. The multiplicity of potential error sources without some measure of possible error magnitude would also be sufficient grounds to reject the data for the use intended. Surprisingly, Rubinstein provides data to four significant figures whereas, considering potential error sources, even a single significant figure could be in doubt.

For the foregoing reasons, I conclude that DirectTV has not provided a useful method for applying LULC data. In any event, testing of any proposed LULC software against actual measurements would be necessary to determine whether a modification of the Commission’s ILLR model resulted in greater accuracy, or instead reduced the model’s accuracy. Because DirectTV has not made its software public, that determination is impossible to make.

Two sources for such measurement data, including a total of approximately 700 locations are recommended for comparison with predictions. Television channels 6 and 53

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were studied in connection with the field testing of the Grand Alliance HDTV transmission subsystem. Results of the measurements made in the Charlotte, North Carolina, area can be found in document SS/WP2-1354 submitted to the SS/WP2 Field Testing Task Force of the Advisory Committee on Advanced Television Service of the Federal Communications Commission by the Association for Maximum Service Television, Inc., Cable Television Laboratories, Inc. and the Public Broadcasting Service. A second source of actual field strength measurements, including approximately 500 locations divided among five locations, can be found in the record of CBS, Inc. *et al.*, Plaintiff, v. Prime Time 24 Joint Venture, Defendant, United States District Court, Southern District of Florida, Miami Division, No. 96-3650-CIV-Nesbitt. Measurements at specified locations were made on Miami Channels 4 and 7, Baltimore Channel 13, Pittsburgh Channel 53, Durham Channel 11 and Charlotte Channel 3. These sources provide a wealth of information on carefully made measurements during the past five years.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on May 21, 1999.

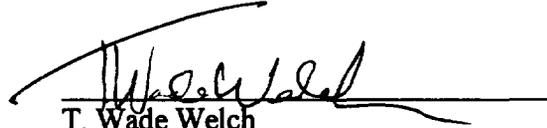


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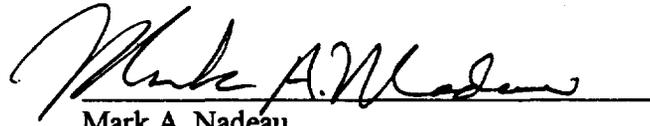
not recommended an acceptable methodology that is reasonably accurate to measure field strength.

See Mercer Affidavit.

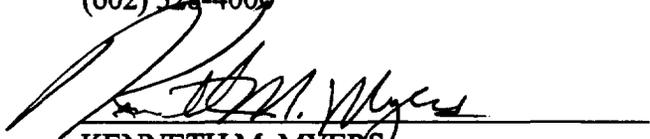
Respectfully submitted this 29th day of April, 1999.



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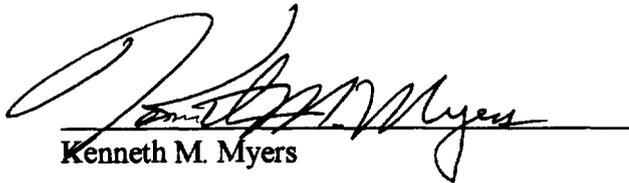
Attorneys for Defendants

CERTIFICATE OF SERVICE

On this 29th day of April, 1999, a copy of Defendants' Notice of Filing of Affidavit in Support of their Preliminary Opposition to Motion for Preliminary Injunction was served upon Plaintiffs by depositing one copy of same in the U.S. Postal Service, first-class postage prepaid, and addressed to their attorneys,

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Kenneth M. Myers

4. Under my direction and supervision, HAI also reviewed and analyzed numerous comments filed by various parties in interest, identified in Appendix C of the FCC Report (collectively, "Comments").

5. Based upon HAI's review and analysis of the FCC Report and the Comments, it is my opinion that the FCC's recommended methodology for determining the field strength of a Grade B signal under the Satellite Home Viewer Act ("SHVA") includes several deficiencies. Because of these deficiencies, which are outlined below, the FCC's recommended methodology is unlikely to measure and/or predict with reasonable certainty those households which do not receive a Grade B signal and thus are "unserved households" under the SHVA.

THE FCC'S RECOMMENDED METHODOLOGY FAILS TO CONSIDER SIGNIFICANT INTERFERENCE FACTORS.

6. In its Report, the FCC endorsed a method for predicting the strength of television signals at individual locations. FCC Report, ¶¶ 61-88.

7. In its Report, the FCC generally recognizes the significant elements required for predicting field strength at individual locations. FCC Report, ¶ 71. The FCC also recognizes the importance of including signal interference in the predictive model and acknowledges that "interference can be reliably included in the predictive model, and so it should be included to create more accurate results." *Id.*, ¶ 84. The FCC, however, does not specify the types of interference to be included in the predictive model. It is my opinion that the following types of interference should be considered in any model designed to predict field strength at a household with an acceptable level of accuracy: cochannel or adjacent channel television signals, UHF taboo frequencies, intermodulation products from other television channels and radio services, or other sources generating electrical noise at significant field strength levels in the television broadcast bands. It is my opinion that each of these interference factors should be included in the

predictive model. These specifications must also address the certain dependence of the desired signal's field strength on the presence of interfering signals at different levels and at different frequencies. Without such specifications, a predictive model cannot determine with reasonable accuracy the field strength at a given household for purposes of the SHVA.

8. Based upon HAI's review and analysis of the FCC Report and the Comments, it is my opinion that interference certainly can, and does, cause television signals of adequate or marginal strength to be unusable at certain households and locations. It is my further opinion that the FCC's failure to provide specific guidance concerning the types of interference and how they are treated in the predictive model clouds the entire predictive modeling of Grade B field strength under the SHVA.

THE DATABASES RECOMMENDED BY THE FCC DO NOT CONTAIN SUFFICIENT INFORMATION TO ADEQUATELY PREDICT FIELD STRENGTH.

9. Based upon HAI's review and analysis of the FCC Report and the Comments, it is my further opinion that existing databases do not encompass or include all of the factors that the FCC identifies in its Report that should be included in any predictive model. Although detailed topological databases, databases containing television transmitter locations and electrical characteristics, and geocoding databases are available, land use databases reflecting current conditions with any degree of precision are not available. Weakness in existing land use databases underscores the deficiencies in the methodology recommended by the FCC and the likelihood that the methodology recommended by the FCC will not predict field strength at given households with the desired degree of certainty.

10. In its Report, the FCC discusses the USGS Global Land Information System ("GLIS") databases and states that "this information is both credible and useful." Report, ¶ 83.

The FCC, however, does not justify its assessment of the credibility of the USGS database, nor does it explain how such data, even if credible, is useful to the field strength modeling process. It is my opinion that the USGS database is not sufficiently detailed to allow the accurate modeling of signal propagation along paths to individual households. Inclusion of data from this database, without modification, is unlikely to allow the accurate prediction of field strength at given households in keeping with the terms of the SHVA.

11. The USGS Land Use and Land Cover Data included within the GLIS are quite general and do not include significant geographical detail concerning either vegetation or manmade structures. Instead, the GLIS contains nine classification codes for land use, each of which has a few subcategories. Classification code 1, for example, describes "urban or built-up land," and comprises seven second-level categories: 11 -- residential; 12 - commercial services; 13 -- industrial; 14 -- transportation and communications; 15 -- industrial and commercial; 16 -- mixed urban or built-up land; and 17 -- other urban or built up land. Classification of land areas is based on rather dated information -- aerial photographs dating from the 1970s and 1980s. The photographs were manually interpreted, and land areas are classified by irregular polygons of at least ten (10) acres in area and plotted on maps of specified scale, which were then digitized. This process produces a land use database that is imprecise for the purposes of propagation modeling. Rather than locating known man-made structures, for example, it merely classifies areas containing concentrations of large structures into a general "urban" subcategory without providing internal detail for such areas. Classification codes in rural and outlying areas in which field strengths are more likely to be marginal are even less precise than those for urban areas.

12. The lack of appropriate detail calls into question the completeness of these databases for predicting with a reasonable degree of certainty the field strength at an individual household. It is the field strength of given households that is the relevant consideration under the SHVA.

13. The age of the underlying data included in these databases, some of which was obtained over twenty years ago, is also of significant concern to the overall accuracy of any method designed to predict field strength at a given household, primarily because of the profound changes in land use across the United States over the past two decades.

THERE IS CONSIDERABLE UNCERTAINTY IN THE OVERALL PRECISION OF THE PREDICTIVE TECHNIQUE RECOMMENDED BY THE FCC

14. Based upon HAI's review and analysis of the FCC Report and the Comments, it is my opinion that there is considerable uncertainty as to the overall "precision" or usefulness of the methodology or model recommended by the FCC in its Report for purposes of determining the Grade B field strength under the SHVA; that is, estimating field strength at an individual subscriber's street address and adequately considering the effects of various interference mechanisms.

15. An inherent limitation of existing models, including Longley-Rice, is that these models consider only geographical features lying along the straight line connecting the transmitter and receiver. In practice, however, a transmitting antenna radiates in all directions, and some signal components arrive at the receiver as a result of having been reflected, possibly several times, from objects such as buildings, hills, cliffs, and other obstructions. This phenomenon, known as multipath propagation, causes the (delayed) reflected signal components to enhance or degrade the resultant received signal and nearly always increases the variability of the received field strength. Although existing models may include general factors that recognize

multipath in an average way, variability over physical transmission paths will often be considerably greater than that allowed for by the model proposed by the FCC.

IT WAS TECHNICALLY UNREASONABLE FOR THE FCC NOT TO REDEFINE GRADE B FIELD STRENGTH FOR PURPOSES OF THE SHVA.

16. In its Report, the FCC declined to change the definition of a Grade B intensity signal. FCC Report, ¶¶ 32-44.

17. Based upon HAI's review and analysis of the FCC Report and the Comments, it is my opinion that it is technically unreasonable for the FCC not to have defined a new Grade B field strength for purposes of the SHVA. It is my further opinion that there is no reasonable support for the FCC's proposition that a SHVA-specific Grade B value would cause confusion.

18. As the FCC has noted, the Grade B definition "was not. . . created for evaluating picture quality in individual households. Rather, the system was developed to address the very different problem of creating station service areas and to determine the proper allocation of television channels in the early days of television." FCC Order, ¶33.

19. The Grade B definition, which the FCC found is equally applicable for purposes of the SHVA, has remained unchanged for nearly fifty years. Some of the factors included in this fifty-year-old definition should reasonably have been reconsidered by the FCC for purposes of the application of this definition to the SHVA (i.e., identifying which locations are "unserved households"). For example, viewer perception of displayed picture quality has almost certainly changed during the last fifty years as users have become almost accustomed to high-quality video displays, including those of television receivers and high-resolution computer monitors.

20. Studies of user acceptance of picture quality should begin with a definition of a range of carrier to noise (plus interference) ratios at the inputs to the receiver used by the subject viewers. This ratio will be determined by a number of factors, including the received field

strength, type and condition of the receiving antenna and the transmission line connecting it to the receiver, presence of splitters to allow several television sets to use a single receiving antenna, the noise figure of the television set, and the presence of interfering signals at the antenna. The receiver noise figure is a measure of the amount of electrical noise generated within the television receiver's input circuitry. Receiver design has changed profoundly over the past five decades, and it seems obvious that noise figures will have changed because of the availability of new radio technologies, components and designs.

21. In homes in the United States with two or more television sets, it is common for more than one television set in a single household to be in use at . Consequently, signal splitters are commonly used and are necessary, for a single receiving antenna to serve multiple television sets within a household. Although splitters allow multiple receivers to share a single antenna, a splitter necessarily reduces the signal level at the inputs to each set and thus reduces the carrier to noise ratio at each set. If the intent is to increase the accuracy of the predicted field strength at individual households, as the language in the SHVA suggests, then it is not reasonable for a definition of the Grade B field strength to fail to take into consideration the effects of signal splitters, for instance. In my opinion, it is unreasonable for the FCC not to redefine the Grade B field strength for purposes of the SHVA. The net impact of the FCC's failure to take into account such effects is that viewers in areas of marginal broadcast coverage must restrict themselves to a single television set.

THE FCC HAS NOT RECOMMENDED AN ACCEPTABLE METHODOLOGY THAT IS REASONABLY ACCURATE TO MEASURE FIELD STRENGTH.

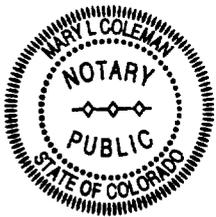
22. Based upon HAI's review and analysis of the FCC Report and the Comments, it is my further opinion that the FCC's recommended methodology fails to recognize that field

strength at any given location varies over time. This variability is due to a large number of contributing factors, some of which are seasonal.

23. For instance, foliage-caused signal losses can be considerable for the television broadcast frequencies. Consequently, the received field strengths can vary dramatically from highly usable to completely worthless as the seasons change. Other effects, such as passing weather fronts, can cause shorter-term variation in field strength. The FCC's recommended methodology will not capture any such temporal variability and instead apparently requires only a single reading at each of five physically removed points.

24. A method for measuring field strength must take into consideration these variables. It is only by considering these variables that a reasonably accurate estimate of the field strength received by a household may be made.

25. For these reasons, and others, it is my opinion that the methodology recommended by the FCC in its Report is not a generally accepted method for measuring field strength at any given household, and the FCC erred when it failed to reconsider the factors that contribute to determining an acceptable Grade B field strength for purposes of the SHVA.



MY COMMISSION EXPIRES:
October 28, 2002

Robert A. Mercer

Robert A. Mercer

SUBSCRIBED AND SWORN TO before me this 27 day of April, 1999, by Robert A.

Mercer.

Mary L. Coleman
Notary Public

My Commission Expires:

Oct. 28, 2002