Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Satellite Delivery of Network Signals	)	CS Docket No. 98-201
To Unserved Households for	)	RM No. 9335
Purposes of the Satellite Home Viewer Act	)	RM No. 9345
	)	
	)	
	)	
	)	
Part 73 Definition and Measurement	)	
Of Signals of Grade B Intensity	)	
	)	

Response to Notice of Proposed Rule Making

Summary
As thoroughly discussed in the FCC's *Request for Comments*, the current methodology for definition of a Grade B contour is clear. It is often referred to as a regulatory tool for administration of spectrum. As also noted, the analytical tools now available to the communications industry are vastly superior to the tools available when the definition of the FCC's contour methodology was created. Newer and more applicable prediction methods exist and should be incorporated into an allowable methodology for prediction of underserved households. While the definition of the grade B contour should not be changed, the commission should support changes in, adoption of, or clarification of its policy, procedures and most beneficially its rules regarding prediction methodology of underserved households.

Contour Methods
The contour method of determination of service areas has served as a simple, clearly defined, repeatable and easily understood method for many years. The derivation of the definitions that went into the creation of the contours is a fascinating history of television and an excellent example of regulatory research at its best. The simple beauty of the contour method includes:

- Computation from know databases
    - Terrain databases
    - Clear and concise computation of distance
    - Speed of computation
- Repeatability of computations
- Facilitates quick overlap / no-overlap allocation and interference determinations

The definition of the Grade B contour should not be changed. It clearly has a continued purpose in the definition of service areas, and has great historical significance that should not be jeopardized or made unclear by a new need.

Some very obvious limitations of the contour method are also well discussed in the request for comments. Some of those comments give question to the methods required to generate a contour, including;

- Contour definition is based on an average of the terrain at distances between (approximately) 2 and 10 miles
- The distances to contour often under discussion fall well outside of the outer distance of the average terrain distances associated (i.e., how can the terrain between 2 and 10 miles predict terrain at 40 miles – a typical contour distance?).
- The number of directions for which the contour boundary is computed is typically limited to 8. This is clearly a mere sampling of the surrounding terrain.
- Huge "wedges" of area are created in which the predicted reception is considered to be homogenous.

Current Issues

As was discussed in the request for rule making, there is a current need to more accurately predict persons who may be underserved, in that they are unable to achieve an acceptable signal quality, even with the use of an outdoor antenna mounted at 30' AGL. As was also discussed in the request, the original definition of the grade B contour was that 50% of the locations would receive an acceptable picture at least 50% of the time with the use of a 30' antenna at the outermost boundary of the contour.

Just analyzing the simple definitions of the contour methodology raise interesting questions. The definition implies that if you were to work backward from the contour limits, location and time reliability would increase, as would picture quality. Eventually, at some point close enough to the transmitter location, an acceptable balance would be found.

However, any argument that all households within the grade B contour are receiving adequate service is obviously flawed.

Current "Trends"

As is obvious to most Americans, cable television and now satellite services are popular means of the distribution of video signals. In addition to virtually eliminating the time and location variability factors from the definition of a contour these services (admittedly not available universally) also increase the delivered picture quality dramatically.

The day of the outside antenna mounted at 30' is gone. A simple survey of any US city will prove that. It is quite true that the chimney or tower mounted antenna is still popular and widely used in more rural areas. This type of antenna is effective in assisting in the reception of both nearby and very distant stations. However casual observation also indicates that the majority of these services are in areas where the house is outside of a

grade B service area, and the housing density is relative low. This information is provided based on personal observation only.

Additionally, as the American consumer has developed a more sophisticated appetite for audio and visual quality, the definitions of "acceptable picture" have changed. Viewers are now longer satisfied with pictures which at the time of the establishment of the Grade B contour were considered "acceptable". These same pictures would now be considered poor.

Thus, if nothing else, the signal levels necessary for an "acceptable picture" has significantly increased, and thus the grade B service areas reduced by a proportionate amount.

Nature of Propagation Predictions

Propagation prediction methodology is at least a (major) step in the right direction for the prediction of receive signal levels. Modern propagation prediction methodologies reliably predict the receive signal strength in an area. Widely available terrain databases allow propagation prediction software to predict signal strength to an area approximately 90 meters on a side, if not even smaller with newly available data sources. While the relative merits of any propagation model are subject to dispute, the Longley-Rice model has clear precedent within the FCC. The Longley-Rice model is currently used for the allocation of digital television stations and for some land-mobile applications. The model is a clear de-facto standard within the country. This engineering firm has used this model for some time and is very satisfied with the model's performance in the UHF and VHF frequencies, especially in comparison with other models in use. This is not to say that many improvements are not now possible to the Longley-Rice model, however, the Longley-Rice model serves as an excellent platform for additional work to be done to improve its statistical performance.

One major shortcoming of the Longley-Rice model is that of terrestrial clutter, including urbanized areas, open areas, forested areas, etc. Much work has been done to increase the model's performance in these types of situations and will not be further discussed here. The use of the Longley-Rice model, or an improvement thereof is highly encouraged.

By the very nature of propagation predictions, a highly detailed map may be generated to clearly define the areas that have a level of signal present for the reception of an adequate signal.

Propagation Model Statistics

Through the first hand knowledge this firm has gained in many years of working closely with the Longley-Rice model, many of the discussions and arguments about location, time and confidence reliability appear to need rethinking. The statistical routines in Longley-Rice are not well understood and through examination of the detailed workings of the program, these statistical routines would appear to be questionable at best. Most certainly, any discussion of a 100% time or location variability (as proposed by one proponent in this proceeding) is statistically unreasonable, if not physically impossible to

realize and thus unreasonable to predict or compute. 90% and 95% time and location reliabilities have been used for some time and there has been a chance for adequate study of the model's results at these percentages. While 50% time and 50% location is most arguably unreasonably low, 99% and 100% are arguably impractical, and too high, and this firm is skeptical of the applicability of the Longley-Rice statistical performance at these extremely high confidence levels.

The Longley-Rice model is really two components; the terrain dependent propagation prediction portion, and a separate module for computing excess attenuation to realize statistical performance criteria. Our experience in many field measurement activities gives us every confidence that the terrain dependent propagation prediction portion of the model is adequate as it is and as an established and accepted model, it is reasonable to keep it in use. However, there are significant improvements that can be easily made to the model, including the addition of land use and land cover information and a reexamination of the statistical analysis.

Measurements

The discussion of measurement techniques in the request for comments was rather well descriptive of the process currently in the FCC rules. As noted, the cost of such a measurement procedure is exorbitant relative to the cost of the service a satellite service provider or other company could hope to receive. In addition to the difficulties mentioned in the request for comment, it should also be noted that there has been a loss of life and property over the years as a result of making such measurements. The process of making measurements at individual houses should remain as the conclusive determination of service, however with the predictive methods discussed herein, measurements should be a rare event.

Which Households Are Underserved?

Geological Information Systems (GIS) technologies allow for most individual households to be identified by street name and address and translated into a latitude and longitude. While these techniques are not completely reliable, we stress that there is no methodology that is completely reliable, and this firm has had quite satisfactory results with the process described above, known as "geocoding". Geocoding of addresses would produce a latitude and longitude from which the predicted signal strength is produced from any number of propagation models. This methodology is clearly superior to the method discussed by the commission of determining percentage of zip code areas and not selling satellite service to anyone in a zip code area that is in excess of a percentage limit.

Clearly, predictive methodologies combined with modern GIS tools allow the individual household to be located within an area much, much smaller then a zip code, for the predictive signal strength to be determined much more accurately then the grade B contour analysis techniques currently employed.

What To Do Now?

To support the satellite home viewer act, and to establish clear and concise methodologies for the determination of a household that is underserved, it is recommended that:

1. The definition of the grade B contour not change
2. Individual household locations should be allowed to be determined by common GIS geocoding techniques
3. The predicted signal strength at the geocoded household location be predicted by use of the Longley-Rice model or other such derived models
4. The grade B signal strength contour is delineated as the "farthest-most distance from a transmitter" where a household may be considered served (e.g. the OET-69 Grade B "clipping")

Respectfully submitted,

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