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

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FEDERAL COMMUNICATIONS COMMISSION
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In the Matter of	)	
Satellite Delivery of Network Signals to Unserved Households for Purposes of the Satellite Home Viewer Act	)	CS Docket No. 98-201 RM No. 9335 RM No. 9345
Part 73 Definition and Measurement of Signals of Grade B Intensity	)	DOCKET FILE COPY ORIGINAL

MOTION FOR LEAVE TO FILE
CORRECTED ENGINEERING STATEMENT

The National Association of Broadcasters hereby requests leave to file a corrected Engineering Statement by broadcast engineer Jules Cohen in opposition to the petition for reconsideration filed by EchoStar Communications Corporation on March 15, 1999. The corrected Engineering Statement is necessary to clarify one important point: that simple gain antennas cannot appropriately be used in carrying out signal intensity measurements for purposes of the SHVA because the calibration process for such antennas is extremely complex. As Mr. Cohen explains, only larger gain antennas with more elements can appropriately be used for that purpose.

Should the Commission wish to endorse use of gain antennas for conducting measurements, we suggest that the Commission specify particular brands and models of antennas to eliminate potential disputes about the matter. Mr. Cohen's corrected statement identifies one appropriate model: the Channel Master model 3016.

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Respectfully submitted,

Henry L. Baumann

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Benjamin F. P. Ivins

NATIONAL ASSOCIATION OF
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1771 N Street, N.W.
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Dated: April 26, 1999

CERTIFICATE OF SERVICE

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

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April 26, 1999

Jules Cohen, P.E.
Consulting Engineer

ORIGINAL

REVISED ENGINEERING STATEMENT ON BEHALF OF NATIONAL ASSOCIATION OF BROADCASTERS CS DOCKET NO. 98-201

This revised engineering statement, prepared on behalf of the National Association of Broadcasters, is in support of an Opposition to the EchoStar Communications Corporation ("EchoStar") Petition for Reconsideration and/or Clarification in the matter of Satellite Delivery of Network Signals to Unserved Households for Purposes of the Satellite Home Viewer Act (CS Docket No. 98-201). The statement is directed, particularly, to the EchoStar proposal to permit the use of a fixed-length dipole in making measurements of received television signal strength at households for determining the eligibility of such households to receive network programming from distant stations. In previously submitted engineering statements, I have addressed all of the other engineering matters raised by EchoStar in its petition for reconsideration, such as the proposal to use unknown customer equipment or to make measurements using incorrectly oriented antennas.

Use of a fixed length dipole, in contrast to the standard half-wave dipole specified for use by the Commission, introduces the need for calibration procedures which, if not carried out properly, make measurement results unreliable. (For this purpose, use of printed calibration tables, as EchoStar suggests, is unreliable.) To determine the energy intercepted by an antenna, and derive from that the ambient field strength, the antenna impedance must be "matched" to the measuring device. A basic principle learned by freshman engineering

students is that maximum transfer of energy requires that the energy source and the load must have complementary impedances.

A half-wave dipole set for the appropriate channel provides a constant terminal impedance, no matter what channel is being measured. That balanced impedance can then be matched to the unbalanced coaxial cable leading to the measuring device by the use of a broad-band balun of fixed ratio. The gain of the half-wave dipole is the standard against which other antenna gains are referenced for the broadcast service. On the other hand, the impedance of a fixed dipole varies with channel frequency as does its gain. Furthermore, the impedance is affected also by the ratio of diameter to length. A balun will not match properly the variable impedance of the fixed dipole to the characteristic impedance of the coaxial lead to the measuring instrument. (Of course, the input impedance of the measuring instrument must match the characteristic impedance of the coaxial cable.)

To calibrate the fixed dipole system, a measurement with the fixed dipole must be compared with a measurement made with a standard half-wave dipole at precisely the same point in space and with the same orientation as close in time as feasible. (To repeat: use of pre-existing calibration tables is <u>not</u> reliable.) The empirical calibration procedure must be repeated for each channel to be measured. In addition, the transmission line and measuring instrument used in the calibration must be the same transmission line and measuring

instrument that is to be used for the household measurements. The last point is significant because the instrument is measuring the voltage across its input terminals. Any unintentional mismatch in the system will cause a standing wave to be produced on the coaxial cable and variation in the cable length or characteristics will change the voltage across the instrument's terminals.

The conclusion to be drawn is that the use of a fixed-length dipole is possible but only if a careful, fully-documented calibration procedure is undertaken. Because of the complexity of the calibration procedure, and the fact that tests may be conducted by a wide range of technicians across the country, I respectfully suggest that the use of a fixed-length dipole would be inconsistent with the Commission's goals of having a simple and readily replicable procedure.

By contrast, as I have previously indicated, use of a properly calibrated gain antenna -- the procedure that engineers have used in conducting hundreds of tests in five markets under my direction -- can be a more straightforward process. The simplest all-channel antennas with few elements, or any antenna without channel-by-channel gain and impedance characteristics certified by the manufacturer, must be calibrated in the same, extremely complex manner similar to that described for the fixed-length dipole. I therefore strongly recommend against use of such antennas for this purpose. Antennas with a relatively large

number of elements are likely to have a more consistent input impedance than the simpler types.

An all-band antenna with the gain for every channel, 2 through 69, certified by the manufacturer is the Channel Master Model 3016. A similar antenna from Channel Master or other reputable manufacturer (i.e. , an antenna with a similar number of elements) would be suitable if channel-by-channel gain figures are provided and certified by the manufacturer together with the antenna's input impedance characteristics.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on April 23, 1999.

Jules Cohen

Jules Cohen, P.E.