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July 12, 2000

00-90

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, S.W., TW-A325
Washington, D.C. 20554

Re: Joint Reply Comments of the ABC, CBS, Fox, and NBC Television Network Affiliate Associations, ET Docket No. 00-90

Dear Ms. Salas:

Enclosed please find the original and nine copies of the Joint Reply Comments of the ABC, CBS, Fox, and NBC Television Network Affiliate Associations in the above-referenced docket.

If any questions should arise during the course of your consideration of this matter, it is respectfully requested that you communicate with the undersigned.

Sincerely,

BROOKS, PIERCE, McLENDON,
HUMPHREY & LEONARD, L.L.P.

David Kushner

David Kushner

Enclosures

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

In the Matter of	)	
	)	
Technical Standards for Determining	)	ET Docket No. 00-90
Eligibility for Satellite-Delivered Network	)	
Signals Pursuant to the Satellite Home	)	
Viewer Improvement Act	)	

To: The Commission

JOINT REPLY COMMENTS OF THE ABC, CBS, FOX, AND NBC TELEVISION NETWORK AFFILIATE ASSOCIATIONS

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Summary

As the record evidence in this proceeding unequivocally demonstrates, there is no valid engineering data that would warrant increasing the Commission's longstanding and time-tested Grade B values. Indeed, the best available engineering data present solid grounds to retain the existing Grade B field strength values, and, if any changes to the values are to be recommended, even to *reduce* the Grade B values.

Hence, the most recent FCC-sanctioned data clearly show that, in each band, a small *decrease* in the Grade B values is warranted (3 dB in the low VHF, 1 dB in the high VHF band, and 2 dB in the UHF band), such that, if the median field intensity were 44 dBu for low VHF, 55 dBu for high VHF, and 62 dBu for UHF, then the median observer would receive an acceptable quality picture at least 90% of time. The increased Grade B values that the satellite industry advocates—as high as or higher than the Grade A values—are not and cannot be supported on any scientific or empirical basis.

Should the Commission determine to recommend changes to Congress, then its action should be to recommend *reductions* in the Grade B field strength values, not increases. In fact, were the Commission inclined to recommend alterations to the Grade B values, then Network Affiliates urge that, to promote localism and the expansion of local television service generally, goals underlying both SHVIA and the Commission's statutory mandate, the Commission should consider revising its planning factors to reflect recent data more favorable to assisting those long-established aims. These more recent data indicate that the current Grade B values are too high by 10 dB for low VHF, more than 12 dB for high VHF, and 12 dB for UHF. Thus, if the Commission were to act to duplicate its intention in 1952 that the median observer receive an acceptable quality picture at least 90% of the

time, then the median field intensity should be 37 dBu for low VHF, 44 dBu for high VHF, and 52 dBu for UHF. Because Network Affiliates do not themselves recommend that the Commission recommend to Congress changes in its longstanding Grade B intensity values, what these figures really indicate is that television viewers receiving a signal of Grade B intensity are actually receiving a picture with a quality essentially two TASO grades better than they are theoretically predicted to receive.

It continues to be appropriate to assume, as the Commission has always done, that homeowners employ an outdoor, directional gain antenna for over-the-air reception of television signals. Moreover, in the areas of weak signal strength of concern here, the use of both antenna-mounted pre-amplifiers and rotors is common. Pre-amplifier net gains (nominal gain less noise figure) on the order of 12 dB to 26 dB are alone sufficient to overcome even the highly spurious Grade B "planning" factors that the satellite industry proposes—without even taking into account the improvements in receiver noise figures and other planning factors. Even with the modest 12 dB gain achievement of the pre-amplifier used by the UHF Comparability Task Force in its 1980 study, the Task Force found that picture quality with the pre-amplifier improved *two or three* TASO grades. Recent evidence submitted to the Commission demonstrates that a conventional rooftop antenna system typical for areas of weak signal strength will consist of an antenna or antennas of appropriate size and design for the distance from the transmitter sites, will have been installed at the location providing optimum signal strength, contains a rotor so that the antenna may be oriented to receive maximum gain from the desired channel, and contains an antenna-mounted pre-amplifier to boost weak signals or enhance moderate signals (or even to counteract the degradation of splitters) so that acceptable, indeed, in many cases, excellent, quality pictures are

received.

Multipath interference should not be incorporated as a factor in the Grade B planning factors. Ghosting is a problem, to the extent it is a serious problem at all, that is largely correctable by the viewer as well as one that is essentially moot for the more than 50% of the population living in urban areas who can get ghost-free local network affiliate signals via satellite. Moreover, EchoStar's elaborate mechanism for evaluating ghosting and performing in-service measurements of multipath impairments, however interesting in theory, absolutely cannot work in the real world of SHVIA eligibility. In order for EchoStar's method to work, one would need objective knowledge, at each location, of the displacement, phase, and magnitude of each ghost. It is essentially impossible to model and predict all these ghosts in a dynamic environment of individual receivers. There is simply no known—let alone practical—way to keep track of all of the variables that affect multipath propagation, let alone consider each of the innumerable potential multipath reflectors and their associated reflection coefficients. EchoStar has certainly not provided such a method.

There is also no warrant in SHVIA or its legislative history to gut the Section 119 eligibility criterion by erasing the critical distinction between *free*, analog, over-the-air broadcast television and *pay*, digital satellite service. To recast eligibility based on whether a viewer receives a digital satellite quality picture from analog over-the-air broadcast stations, as NRTC advocates, will destroy localism, set back the conversion of terrestrial stations from analog to digital, and eviscerate the property rights that network affiliates hold in their copyrighted programming.

Although EchoStar asserts that the Grade B planning factors must include a factor to account for clutter loss from terrain, building structures, and other land cover variations, the Commission has recently modified the ILLR model to take additional account of such clutter, and the Commission

need not deal with the matter any further in the instant docket.

Based on the record in this proceeding, Network Affiliates urge the Commission to recommend to Congress that no changes be made to its longstanding and thoroughly-vetted Grade B signal intensity standard.

* * *

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

In the Matter of	)	
	)	
Technical Standards for Determining	)	ET Docket No. 00-90
Eligibility for Satellite-Delivered Network	)	
Signals Pursuant to the Satellite Home	)	
Viewer Improvement Act	)	

To: The Commission

JOINT REPLY COMMENTS OF THE
ABC, CBS, FOX, AND NBC
TELEVISION NETWORK AFFILIATE ASSOCIATIONS

The ABC Television Affiliates Association, the CBS Television Network Affiliates Association, the Fox Television Affiliates Association, and the NBC Television Affiliates Association (collectively, the "Network Affiliates"), by their attorneys, hereby submit these Reply Comments in response to the Commission's *Notice of Inquiry* ("*Notice*"), FCC 00-184, released May 26, 2000, in the above-captioned proceeding. Network Affiliates represent more than 800 local television broadcast stations throughout the nation that are affiliated with one of the four major television broadcast networks.

As the record evidence in this proceeding unequivocally demonstrates, there is no valid engineering data that would warrant increasing the Commission's longstanding and time-tested Grade B values. Network Affiliates, therefore, urge the Commission to recommend to Congress that no changes be made to its thoroughly-vetted Grade B signal intensity standard for purposes of the Satellite Home Viewer Improvement Act ("SHVIA").

I. If Anything, Grade B Field Strength Values Should Be Revised Downward, Not Upward

The satellite industry's technical proposals continue to be extreme by any standard and are not supportable from any reasonable factual or engineering viewpoint. As the following technical discussion demonstrates, the best available engineering data present solid grounds to retain the existing Grade B field strength values, and, if any changes to the values are to be recommended, even to *reduce* the Grade B values.

Unfortunately, as seen by their comments, the satellite industry is up to its same old shop-worn tricks again, proposing increases in the Grade B values that are as high as or higher than the Grade A values. For example, the Satellite Broadcasting and Communications Association ("SBCA") has trotted out the same engineering statement it submitted in CS Docket No. 98-201,[1] and it seizes on that statement's higher "recommended" values (70.5 dBu for low VHF, 76.5 dBu for high VHF, and 92.75 dBu for UHF),[2] even though the Commission rejected this approach just last year. All of these wishful Grade B values are higher than the existing Grade A signal intensity values.[3] As the Commission properly concluded last year in CS Docket No. 98-201, "the Grade B

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[1] *See* Comments of the Satellite Broadcasting and Communications Association [hereinafter "SBCA Comments"] at ii; *id.*, Engineering Statement of Hatfield & Dawson [hereinafter "Hatfield & Dawson Statement"].

[2] *See id.* at 3.

[3] Similarly, EchoStar now essentially proposes that the required median field intensity for Grade B be 60 dBu for low VHF, 63 dBu for high VHF, and 72 dBu for UHF, which are nearly as high as the existing Grade A values. *See* Comments of EchoStar Satellite Corporation [hereinafter "EchoStar Comments"] at 17. Actually, EchoStar's planning factor table on page 17 states that the required median field intensity for Grade B should be 66 dBu for low VHF, 77 dBu for high VHF, and 84 dBu for UHF; however, EchoStar obviously incorrectly added the antenna gain figures to the (continued...)

contour must not meet or overlap the Grade A contour . . . [and] the Grade B values [are] naturally constrained by the Grade A values.'[4]

When the most recent, accurate engineering data are considered, it is clear that the Grade B signal intensity standard need not be modified and that more viewers than ever before are able to receive an over-the-air signal whose picture quality is significantly better than that received by their parents and grandparents.

Thermal Noise and **Dipole Factor**. Thermal noise and the dipole factor are functions of the laws of physics. Neither has changed nor will change. EchoStar would revise the planning factors for thermal noise and the dipole factor based on the fact that most existing television receivers operate at an impedance of 75 ohms vis-à-vis the 300 ohm impedance of receivers in the 1950s.[5] However, because both thermal noise and the dipole factor represent power relationships,[6] and because 300 ÷ 75 = 4, or 6 dB, the 6 dB reduction in thermal noise for a receiver operating with an

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[3](...continued)
other losses, rather than subtracting them (or showing them as negative numbers and adding).

[4] Satellite Delivery of Network Signals to Unserved Households for Purposes of the Satellite Home Viewer Act, *Report and Order*, 14 FCC Rcd 2654 (1999) [hereinafter "*SHVA Order*"], ¶ 43 n.123.

[5] *See* EchoStar Comments at 6-7, 13-14.

[6] *See* Gary S. Kalagian, *A Review of the Technical Planning Factors for VHF Television Service*, FCC/OCE Bulletin RS 77-01 (Office of Chief Engineer Mar. 1, 1977) [hereinafter "*Technical Planning Factors Review*"], at 7 & Appendix A (providing a formula for the thermal noise power and deriving the dipole factor from the power available at the antenna terminals); *see also* Robert A. O'Connor, *Understanding Television's Grade A and Grade B Service Contours*, IEEE Transactions on Broadcasting 137, 140-41 (Dec. 1968) [hereinafter "*Understanding Service Contours*"], at 139-40 (showing derivation of the dipole factor and thermal noise factor).

impedance of 75 ohms is exactly canceled by the 6 dB increase in the effect of the dipole factor. In other words, the net effect of changing the impedance of the system components is zero, and it does not make any difference in the ultimate Grade B values.[7] The SBCA/Hatfield & Dawson Statement, submitted in CS Docket No. 98-201 and resubmitted in this proceeding, maintains the original planning factors for thermal noise and the dipole factor.[8]

In the opening comments, both Network Affiliates and NAB suggested, in response to the Commission's query regarding whether the dipole factor should be calculated precisely for each UHF channel,[9] that the UHF band could be divided into five sub-bands, with a 1 dB difference in the dipole factor for each sub-band, as shown in Table 1.[10] This adjustment would result in more accurate Grade B values at some slight increase in complication.

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[7] Mathematical calculations showing that there is no net effect to the Grade B values from changing the system input impedance are provided in the Further Engineering Statement of IIT Research Institute, Center for Electromagnetic Science [hereinafter "IITRI Further Engineering Statement"] (attached hereto as Exhibit 1) at 6-9. As stated therein, "changing the system input impedance does not change the power available from the system." *Id.* at 8.

[8] *See* SBCA Comments, Hatfield & Dawson Statement, Appendix 2.

[9] *See Notice* at ¶ 19.

[10] *See* Joint Comments of the ABC, CBS, Fox, and NBC Television Network Affiliate Associations [hereinafter "Joint Comments of Network Affiliates"], Engineering Statement of IIT Research Institute, Center for Electromagnetic Science [hereinafter "IITRI Engineering Statement"], at 5; Comments of NAB at 51-52; *id.*, Engineering Statement of Jules Cohen [hereinafter "Cohen Engineering Statement"], at ¶ 8.

Frequency-Based Adjustments to the Dipole Factor **Table 1**

Band	Channels	Adjustment to Dipole Factor
Very Low UHF	14-23	-2 dB
Low UHF	24-33	-1 dB
UHF	34-46	No Adjustment
High UHF	47-59	+ 1 dB
Very High UHF	60-69	+ 2 dB

Receiver Noise Figure. The last time VHF receiver noise figures were examined by the Commission's staff, in 1977, the Office of Chief Engineer determined that the average receiver noise figure for low VHF was 6 dB and for high VHF was 7 dB.[11] Several years later, in an examination of UHF noise figures for 200 television receiver models meeting the Commission's 14 dB *maximum* receiver noise figure, the UHF Comparability Task Force, and subsequently the Commission itself, stated that "the *average* [UHF] noise figure is about 9 dB."[12] Even in 1980, the Task Force thought

[11] *See Technical Planning Factors Review* at 9 & 10. This is a slight reduction in the receiver noise figures found by TASO (an average of 6.5 dB for low VHF and an average of 8.5 dB for high VHF), *see* Television Allocations Study Organization, *Engineering Aspects of Television Allocations* (Mar. 16, 1959) [hereinafter "*TASO Report*"], at 121, which, even in 1959, was a substantial improvement over the 12 dB noise figure for both low VHF and high VHF assumed in the original planning factors.

[12] Philip B. Gieseler *et al.*, *Comparability for UHF Television: Final Report* (Office of Plans and Policy Sept. 1980) [hereinafter "*UHF Comparability Final Report*"], at 89 (emphasis added); *see also id.* at xv n.3; Improvements to UHF Television Reception, *Report and Order*, FCC 82-333, 90 F.C.C.2d 1121, 51 Rad. Reg. 2d (P & F) 1628 (1982), ¶ 62 n.69 (stating that the "receiver manufacturing industry has achieved an improvement in the average UHF noise figure of 3 dB, from 12 dB to 9 dB"); Television Receiver Equipment Grading, *Report and Order*, FCC 82-334, 47 Fed. Reg. 35,014 (Aug. 12, 1982), ¶ 10 (stating that "[o]ur analysis indicates that most individual receiver models have an average noise figure that is within 1 dB of [9 dB], which is generally not a (continued...)

that further improvements in the next few years would bring the average UHF receiver noise figure down to 8 dB.[13]

Indeed, as long ago as the late 1950s, TASO found that the best receivers exhibited only a noise figure of 4.6 dB for low VHF and 6.5 dB for high VHF.[14] Yet, as the Commission is well-aware, 1950s television tuner technology "consisted of noisy, low cost tubes and related components" whereas, today, "TV tuner technology has progressed dramatically . . . and tuners contain modern solid state components that produce lower set noise."[15] Most of the development in solid-state components and electronic digital tuning has occurred in the last 20 years—since the time the Commission last examined noise figures for analog receivers. As Bronwen Lindsay Jones of CableLabs stated in 1992, in a paper referenced by the Commission in the *Notice*,[16] "[i]n the past two years [i.e., since 1990] television receivers have achieved *vast improvements*."[17]

Based on this well-established technical data, there is no warrant for EchoStar's claim that

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[12](...continued)
perceptible difference"); UHF Television Receiver Noise Figures, *Notice of Proposed Rule Making*, FCC 82-507, 47 Fed. Reg. 55,251 (Dec. 8, 1982), ¶¶ 9, 12 (stating that the "average UHF noise figure is now 9 dB"); Improvements to UHF Television Reception, *Further Notice of Inquiry*, FCC 80-543, 45 Fed. Reg. 70,023, at 70,026 (Oct. 22, 1980) (same).

[13] *See UHF Comparability Final Report* at 89.

[14] *See TASO Report* at 23, 121.

[15] *Notice* at ¶ 12; *see also SHVA Order* at ¶ 41.

[16] *See Notice* at ¶ 14 n.28.

[17] Bronwen Lindsay Jones, *Subjective Assessment of Cable Impairments on Television Picture Quality*, 1992 NCTA Technical Papers, at 9 (emphasis added).

VHF receiver noise figures have actually worsened over the past 40 years.[18] The noise figure study by J.B. O'Neal, relied upon by EchoStar for this dubious proposition,[19] was prepared for the Commission's *UHF* Comparability Task Force. That study is irrelevant to EchoStar's claim of degraded *VHF* receiver noise figures for two reasons: First, and most significantly, the noise figures determined for the 32 receivers studied by the Commission's staff were "measured at *UHF channel 34*."[20] The reported noise figures, therefore, are not VHF receiver noise figures at all! Even so, the EchoStar-reported average noise figure, 11.9 dB,[21] still represents an improvement over the UHF noise figure used in the Grade B planning factors. Second, however, O'Neal states that what the Commission staff measured was the *tuning system* noise figure, not the *receiver* noise figure.[22] Thus, even for UHF noise figure purposes, the data presented in O'Neal is not directly comparable to the average UHF receiver noise figure with which the UHF Comparability Task Force was principally concerned.[23] Even were these data comparable, O'Neal's study only reports the older

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[18] *See* EchoStar Comments at 7-8.

[19] *See id.* at 8 & n.15.

[20] P.J. Fox *et al.*, *Receiver Noise Figures and Receiver Input Levels*, *appearing in* J.B. O'Neal, *Television Receiver Noise Figure Study* (Mar. 1980), Appendix, at 51.

[21] *See* EchoStar Comments at 8.

[22] *See* J.B. O'Neal, *Television Receiver Noise Figure Study* (Mar. 1980), at 33. *See also* IITRI Further Engineering Statement at 4.

[23] Two additional points about O'Neal's study are worth noting: First, the principal conclusion of O'Neal's report was, obviously, not that receiver noise figures (for VHF or UHF) had worsened—the report nowhere, either explicitly or implicitly, makes such a statement—but rather that receiver noise figure and tuning system noise figure do not "accurately measure[] the ability of a television receiver to reproduce good television pictures in a low signal strength environment." O'Neal, *Television Receiver Noise Figure Study*, at 2. Indeed, some receivers with apparently

(continued...)

results for 32 receivers vis-à-vis the Task Force's more recent examination of 200 receivers.

It is, therefore, not surprising that the Task Force recommended the use of the VHF noise figures reported by Kalagian in 1977, viz. 6 dB for low VHF and 7 dB for high VHF,[24] (and 9 dB for UHF, as stated above). Moreover, notwithstanding the inapplicability of O'Neal's report, the speculation provided by EchoStar, that the increased penetration of cable television and, with it, a reduced need for improved noise figure performance, together with the high spectral density of signals in cable systems have served to worsen VHF receiver noise figures,[25] is belied by the observation of Jones of CableLabs that television receivers were seeing "vast improvements." Finally, even SBCA "recommends a *reduction* for the receiver noise figure, because improvements in receiver technology have reduced noise at the receiver inputs,"[26] in direct contradiction of

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[23](...continued)
"worse" noise figures can provide better performance by requiring less signal power to give a TASO Grade 3 picture. For example, in one study of 23 receivers,

> the receiver with the best performance (requiring the least signal power, - 67 dBm, to give a TASO Grade 3 picture) had a noise figure of 12.4 dB. This noise figure is higher (worse) than that of 16 other receivers which required a higher signal level to get the same picture quality. In other words, the best receiver in the group had a noise figure which was worse than average.

Id. at 34. Second, O'Neal found that "[p]ictures with overall S/N ratios in the neighborhood of *20 dB* can be usable pictures in many circumstances," because the noise added by the demodulator tends to be picture dependent. *Id.* at 20 (emphasis added). This finding lends further support to maintaining the S/N ratio at 30 dB in order to receive an "acceptable" picture, as shown below.

[24] *See UHF Comparability Final Report* at 89, 247, 252 (Table B-2).

[25] *See* EchoStar Comments at 8.

[26] SBCA Comments at 6.
It is apparent that the receiver noise figures provided in the SBCA/Hatfield & Dawson (continued...)

EchoStar's position which, it is clear, has no empirical support.[27]

In sum, 20-some year old technical data show that average noise figures in the 1970s were 6 dB for low VHF, 7 dB for high VHF, and 9 dB for UHF. At the very least, the Grade B planning factors should incorporate these data. However, with the advances in solid-state components and electronic digital tuning, Network Affiliates believe that the *average* noise figures of receivers today may be as good as those of the best tube receivers examined by TASO in the late 1950s. With this predicate, noise figures today may be taken as 4.6 dB for low VHF, 6.5 dB for high VHF, and 8 dB for UHF.

Signal-to-Noise Ratio. In the 1951 *Third Notice*, the Commission determined that a signal-to-noise ("S/N") ratio of 30 dB would be necessary to provide an acceptable picture to the median observer.[28] Subsequently, TASO, based on an analysis of 38,000 observations made by nearly 200 observers,[29] determined that the median observer found a picture with a S/N ratio of 27.5 dB to be of acceptable quality.[30] A picture with a S/N ratio of 30 dB was found acceptable by

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[26](...continued)
Statement for the "high" estimate are woefully outdated and, even for the "low" estimate, the UHF receiver noise figure is too high by at least 3 dB. *See* SBCA Comments, Hatfield & Dawson Statement, Appendix 2.

[27] It is worth noting that in the table of planning factors recommended by EchoStar, the noise figure for low VHF is actually 4 dB *less than* the original planning factor, *see* EchoStar Comments at 17, which is inconsistent with EchoStar's false claim that noise figures have "*degraded* by over 4 dB," *id.* at 8 (emphasis added).

[28] *See* Television Broadcast Service, *Third Notice of Further Proposed Rule Making*, FCC 51-244, 16 Fed. Reg. 3072, 3080 (Appendix B) (Apr. 7, 1951).

[29] *See TASO Report* at 449, 508.

[30] *See id.* at 533, Figures 38 & 39. Although the figures show that a picture with a S/N ratio
(continued...)

70% of the viewers.[31] Both ratios fall within the standard defined as "passable" or TASO Grade 3: "The picture is of acceptable quality. Interference is not objectionable."[32] Thus, the Commission's theoretical determination of an appropriate S/N ratio actually overshot the empirical confirmation by a few decibels. Because the Commission's intention was to provide for an acceptable quality picture for the *median* observer, the 30 dB S/N figure actually provides a margin of safety of more than 2 dB.[33] There has never been any warrant to increase the percentage of viewers who would find the picture acceptable to the 90th percentile, as the SBCA/Hatfield & Dawson Statement sought to do in CS Docket No. 98-201 and now again here.[34]

The last two times the Commission's staff reviewed the technical planning factors for NTSC purposes, in 1977 and 1980, the staff has maintained the 30 dB S/N ratio.[35] In fact, the UHF Comparability Task Force expressly stated that "[f]or a passable television picture, the

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[30](...continued)
of 27.5 dB to be of acceptable quality for 50% of the observers, the actual text states the 50% value for the S/N ratio as 27 dB. *See id.* at 465.

[31] *See TASO Report* at 533; *see also Understanding Service Contours* at 141.

[32] *See TASO Report* at 453.

[33] *See* Joint Comments of Network Affiliates, IITRI Engineering Statement, at 6-7; IITRI Further Engineering Statement at 11.

[34] *See* SBCA Comments, Hatfield & Dawson Statement, at 4; *see also* IITRI Further Engineering Statement at 12 (explaining that the Hatfield & Dawson Statement appears to confuse the 90% time variability requirement with a purported requirement to provide a picture acceptable to the 90th percentile of viewers).

[35] *See Technical Planning Factors Review* at 9 & 10; *UHF Comparability Final Report* at 252 (Table B-2).

signal-to-noise ratio required continues to be about 30 dB."[36] Even the SBCA/Hatfield & Dawson Statement admits that the Task Force determined that the signal-to-noise ratio did not need to be revised.[37]

Additional confirmation that a S/N ratio of 30 dB remains appropriate comes from the International Telecommunication Union, Radiocommunication Sector ("ITU-R"). In Recommendation BT.654 (1986), the ITU-R states that the mid-opinion value for the S/N ratio, unweighted, of continuous random noise is 29 dB.[38] The ITU-R notes that its method is applicable to all 525-line systems.[39] Although the mid-opinion value corresponds to the middle rating ("slightly annoying") on the ITU-R's five-point scale, this middle rating is approximately equivalent to TASO's Grade 3. Obviously this 29 dB S/N ratio, currently recommended and issued in 1986, three decades after the Commission established a 30 dB S/N ratio and TASO confirmed that a 27.5 dB S/N ratio results in an "acceptable" picture, strongly indicates that current viewers perceive noise pretty much the way they always have.[40]

The SBCA's continued reliance on the 43 dB carrier-to-noise ("C/N") ratio required of cable

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[36] *UHF Comparability Final Report* at 248 (citing Archer S. Taylor and Robert E. Welch, Jr., *TV Picture Interference Study*, Draft Report Prepared Under National Science Foundation Grant No. APR-76-01246A (May 20, 1977)).

[37] *See* SBCA Comments, Hatfield & Dawson Statement, at 4.

[38] *See* International Telecommunication Union, Radiocommunication Sector, *Subjective Quality of Television Pictures in Relation to the Main Impairments of the Analogue Composite Television Signal*, Recommendation BT.654 (1986), at § 1.

[39] *See id.*

[40] *See* IITRI Further Engineering Statement at 11-12.

systems continues to be as misplaced in this docket as it was in CS Docket No. 98-201.[41] Obviously, an amplitude modulation system such as that utilized for over-the-air broadcast television is significantly different than transmission through cable. As the Commission itself has stated, "[O]ur rules and guidelines set a C/N standard of 36 dB, approximating a Television Allocation[s] Study Organization [TASO] Grade 3 picture: a passable picture, indicating acceptable quality with perceptible but not objectionable impairment."[42] The initial adoption of a 36 dB C/N ratio was therefore predicated on replicating the TASO Grade 3 standard that the Commission's original television service planning factors matched.[43] The Commission has "recognize[d] that requiring a C/N of 36 dB does not necessarily mean that all of a system's subscribers would receive this type of . . . picture. Generally, subscribers closer to the headend of the cable plant will receive better quality pictures by virtue of being exposed to less system-generated or other introduced noise in the cable."[44] The Commission, when it originally adopted its rule for cable in 1972, adopted the higher 36 dB C/N ratio for cable, rather than the 30 dB S/N ratio appropriate for broadcast, because it recognized that there would be *additional* degradation of the signal, not otherwise accounted for, as a result of losses in the transmission line and cable converter box, as well as additional noise

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[41] *See, e.g.*, SBCA Comments, Hatfield & Dawson Statement, Appendix 2.

[42] Cable Television Technical and Operational Requirements, *Report and Order*, FCC 92-61, 70 Rad. Reg. 2d 679 (1992), ¶ 38.

[43] *See, e.g.*, Signal Strength Contours for Purposes of Cable Television Systems Regulations, *Report and Order*, FCC 77-480, 41 Rad. Reg. 2d (P & F) 121 (1977), ¶ 8 (noting that when the Commission adopted the rule implementing the 36 dB C/N ratio the "picture quality" would not be "inferior to that of a Grade B signal"); *see also* Cable Television Rules, *Report and Order*, FCC 72-108, 24 Rad. Reg. 2d (P & F) 1501 (1972), ¶ 159 (adopting rule).

[44] Cable Television Technical and Operational Requirements, *Notice of Proposed Rule Making*, FCC 91-183, 6 FCC Rcd 3673 (1991), ¶ 24.

generated in the converter box itself, before the signal was delivered to the television set. Thus, the only way to replicate broadcast's TASO Grade 3 "acceptable" picture standard for cable was to increase the carrier-to-noise ratio by 6 dB.[45]

In 1992, the Commission expressly sought, in the cable context only and with a factual predicate of cable industry system design, to increase the C/N ratio by one TASO grade, from TASO Grade 3 to TASO Grade 2, which represents a "fine picture." The goal of the Commission was clearly stated: "This single augmentation of our standards would contribute vastly toward improving the quality of signal delivery by a cable operator, and should reduce significantly subscriber signal quality complaints."[46] There is simply no suggestion in the Commission's *Order* that it believed that the over-the-air broadcast television system needed to be revamped so that a median observer at the *perimeter* of a local station's Grade B service area would receive a picture meeting a TASO Grade 2 standard. The Commission was rectifying the signal quality complaints of *paying* cable subscribers, not complaints from viewers of *free*, over-the-air television service.

Furthermore, the median observer would view a picture with an S/N of 41 dB as a TASO Grade 1 "excellent" picture, the highest possible rating.[47] A S/N ratio of 43 dB in the over-the-air

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[45] It is simply incorrect for the satellite industry to assume and imply that the Commission was somehow "redefining" what an acceptable quality picture meant. That the Commission was not doing this is obviously confirmed by the fact that, subsequent to the 1972 adoption of the cable rule, the Commission's staff twice, in 1977 and 1980, as explained above, concluded that a S/N ratio of 30 dB remained appropriate in the broadcast context.

[46] Cable Television Technical and Operational Requirements, *Report and Order*, FCC 92-61, 70 Rad. Reg. 2d 679 (1992), ¶ 38 (quoting Cable Television Technical and Operational Requirements, *Notice of Proposed Rule Making*, FCC 91-183, 6 FCC Rcd 3673 (1991), ¶ 24).

[47] *See Understanding Service Contours* at 141 (Figure 3).

broadcast context would mean that 65% of the observers would rate the picture as TASO Grade 1.[48] If that were the standard broadcasters had to meet, the nation's free, local analog television service would have never become the success that it is today.

In short, although the median observer would rate a picture with a S/N ratio of 27.5 dB as acceptable, the Commission's original S/N ratio of 30 dB should be retained as the basis upon which to predicate analog television service. The only ground upon which the 30 dB S/N ratio should be changed is proper empirical demonstration. However, *all* the parties in this proceeding are in agreement that there appears to be no scientifically-valid study that is meaningfully comparable to the TASO study that empirically demonstrates an increase in consumer expectations that would warrant an increase in the 30 dB S/N ratio.[49] As Network Affiliates and NAB showed in their

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[48] *See id.*

[49] *See* SBCA Comments at 9 (acknowledging the "absence of current studies documenting [a] change in viewer expectations" and stating that SBCA is "not able to advise the Commission on how changes in viewer expectations should be accounted for in revising the Grade B signal standard"); Comments of National Rural Telecommunications Cooperative [hereinafter "NRTC Comments"] at 6 (stating that "NRTC is unaware of any current studies that indicate the precise degree to which viewer expectations have changed"); Comments of Fox Television Stations, Inc. and Fox Broadcasting Company ("Fox") at 3 ("Absolutely no empirical evidence suggests that viewers' perception of an acceptable picture has changed since the initial TASO study that correlated signal strength with picture quality."); Comments of the Association for Maximum Service Television, Inc. ("MSTV") at 15 ("To date, there still have been no comprehensive engineering analyses comparable to the TASO study and no scientific studies that refute the picture quality standards underlying the Grade B signal intensity standard."); Comments of Richard L. Biby at 7 (stating that a study "could" be done to determine whether viewer expectations of acceptable television picture quality have changed and thereby implying the absence of any such existing studies (emphasis in original)); Comments of NAB at 44; Joint Comments of Network Affiliates at 14-15, 17; *cf.* EchoStar Comments at 9 (stating that it "submits"—but proffering no evidence—that a higher S/N ratio is necessary as "passable").

opening comments, the Jones study is not such a study.[50] There is no basis upon which to increase the S/N ratio.

Transmission Line Loss. SBCA proposes transmission line loss figures that are simply outdated or incorrect.[51] The SBCA/Hatfield & Dawson Statement relies, in the first instance, on values contained in an appendix to the *UHF Comparability Final Report*. Those values, however, in turn rely upon figures previously determined by the Office of Chief Engineer,[52] which average losses for 50 feet of new, dry twinlead line and for 50 feet of old, wet twinlead line.[53] The text of the *UHF Comparability Final Report*, however, recommends the use of RG-6 coaxial cable,[54] a shielded cable for which "wetness and metal proximity ma[k]e no change in the attenuation characteristics."[55] Even EchoStar concedes that "the effects of aging and moisture" are much less apparent for coaxial cable than for 300-ohm twinlead cable.[56]

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[50] *See* Joint Comments of Network Affiliates at 15-17; Comments of NAB at 44-45; *id.*, Cohen Engineering Statement at ¶ 4.

[51] *See* SBCA Comments at 5; *id.*, Hatfield & Dawson Statement, at 3 & Appendix 2.

[52] *See UHF Comparability Final Report* at 248.

[53] *See, e.g., Technical Planning Factors Review* at 10.

[54] *See UHF Comparability Final Report* at 69 (stating that "RG-6 coax offers very good performance" and that "an RG-6 system is a good value because the coaxial systems offer even less performance variability than shielded twin-lead; and coax is much easier to manipulate than shielded twin-lead, and, therefore, presents fewer installation problems").

[55] *Id.* at 60. *See also* Improvements to UHF Television Reception, *Report and Order*, FCC 82-333, 90 F.C.C.2d 1121, 51 Rad. Reg. 2d (P & F) 1628 (1982), ¶ 50 (noting that RG-6 is a good quality cable).

[56] EchoStar Comments at 11. *See also* IITRI Further Engineering Statement at 4-5.

EchoStar, however, cites line loss figures for RG-59 coaxial cable,[57] despite (1) the UHF Comparability Task Force's recommendation that RG-6 cable be used; (2) the contrary finding of the NTIA study, relied upon by EchoStar, that, for the longer, outdoor run, "RG-6 type coaxial cable would usually be used between the antenna and the wall outlet" whereas for the indoor, short "connection between the TV receiver and the wall outlet RG-59 type coaxial cable is usually used"[58]; and (3) *EchoStar's own specification and supply* of RG-6 for home satellite installations.[59] In any event, the use of RG-59 cable, with its slightly higher attenuation than RG-6, for the short run (three feet) from the wall outlet to the television receiver would have a negligible impact on the overall attenuation of 50 feet of transmission line.[60]

RG-6 coax cable is commonly available. Based on current specifications for RG-6, attenuation for 50 feet is as follows[61]:

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[57] *See* EchoStar Comments at 10.

[58] R.G. FitzGerrel *et al.*, Television Receiving Antenna System Component Measurements, NTIA Report 79-22 (June 1979) [hereinafter "*Receiving Antenna System Report*"], at 37.

[59] *See* Dish Network, *The Self Installation Kit from DISH Network* (visited July 11, 2000) <http://www.dishnetwork.com/customer_service/third_level_content/installation/self_install/index.asp> (stating that EchoStar's installation kit supplies one 85 foot length of RG-6 coaxial cable and a second 2 to 15 foot length of RG-6 coaxial cable); *see also* IITRI Further Engineering Statement at 4-5.

[60] In addition, it is worth noting that the line losses for RG-59 cable cited by EchoStar from the NTIA report, viz. 1.2 dB for low VHF, 2.3 dB for high VHF, and 4.5 dB for UHF, *see* EchoStar Comments at 10, are the same as the original planning factors (1 dB, 2 dB, and 5 dB, respectively). Therefore, EchoStar's own figures demonstrate the glaring falsity of its assertion that "[a]ll available data indicate substantially *higher* average losses for 75 ohm cable" so that the "Commission must also change its outdated transmission line loss assumption underlying the Grade B planning factors." EchoStar Comments at 9 (emphasis added).

[61] *See* Winegard Amp & Accessories Catalog, *Cable* (visited June 26, 2000) (continued...)

Low VHF	0.80 dB to 0.94 dB
High VHF	1.3 dB to 1.4 dB
UHF	2.2 dB to 2.9 dB

where the range provides the loss from the lowest to the highest channel in each band. Based on these current data, it is plain that transmission line loss occurring in 50 feet of recommended RG-6 coaxial cable is, for low VHF, less than 1 dB; for high VHF, less than 1.5 dB; and for UHF, less than 3 dB.

In any event, the Commission has recently evaluated transmission line loss in determining the downlead line loss used as a planning factor in the DTV proceedings. Obviously, line loss will be the same in either the analog or digital context. Line loss in the planning factors for DTV reception is assumed to be 1 dB for low VHF, 2 dB for high VHF, and 4 dB for UHF.[62] These are, accordingly, the most recent, official line loss figures, utilized by the Commission as recently as 1997.

Not only does SBCA use out-of-date figures for degraded lines, but it also attempts to jack-up those figures by including an additional 3 dB to account for splitters.[63] However, the Section 119 compulsory copyright license has absolutely nothing to do with the number of television sets a household owns and operates. The unserved household restriction is—and should be—based

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[61](...continued)
<http://www.winegard.com/cable.html> (providing cable attenuation values at various frequencies); Joint Comments of Network Affiliates, IITRI Engineering Statement, at 6; Comments of NAB at 50; *id.*, Cohen Engineering Statement at ¶ 6.

[62] *See Longley-Rice Methodology for Evaluating TV Coverage and Interference*, OET Bulletin No. 69 (FCC July 2, 1997), at 4 (Table 3). Although the DTV planning factor figures for line loss are conservative, Network Affiliates will rely on them since they are FCC-sanctioned.

[63] *See* SBCA Comments at 5; *id.*, Hatfield & Dawson Statement, at 3 & Appendix 2.