Conclusion

31. The *Sixth Further Notice* recognizes the value LPTV service and the predicament of how to preserve that service, but it appears to underestimate the impact of the Commission's digital allotment process on the service. The way to approach the problem is to make up one's mind to find solutions at the outset that avoid destruction, not to plunge ahead and destroy and then try to pick up and save the pieces.

32. CBA is aware that the Broadcaster Caucus will be proposing an allotment table different from the Commission's proposal. The differences will go beyond whether or not digital service is confined to "core" channels or uses all of Channels 2-69. The fact that two different tables can be proposed establishes clearly that there is more than one way to achieve a transition from analog to digital broadcast service. A way must be found now, at the outset, starting with the suggestions made in these Comments, to keep the LPTV and translator services intact and to find a permanent home for qualifying LPTV stations. It makes good sense, and it is good policy to preserve the LPTV service. And the law -- Sections 307(b) and 257 of the Communications Act the Small Business Growth and Fairness Act of 1996 -- requires it.

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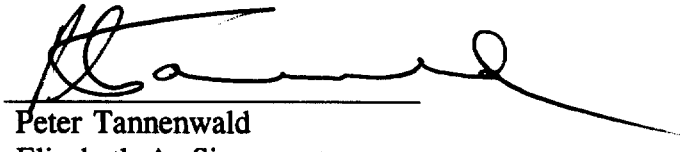
Respectfully submitted,



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November 22, 1996

TECHNICAL EXHIBIT

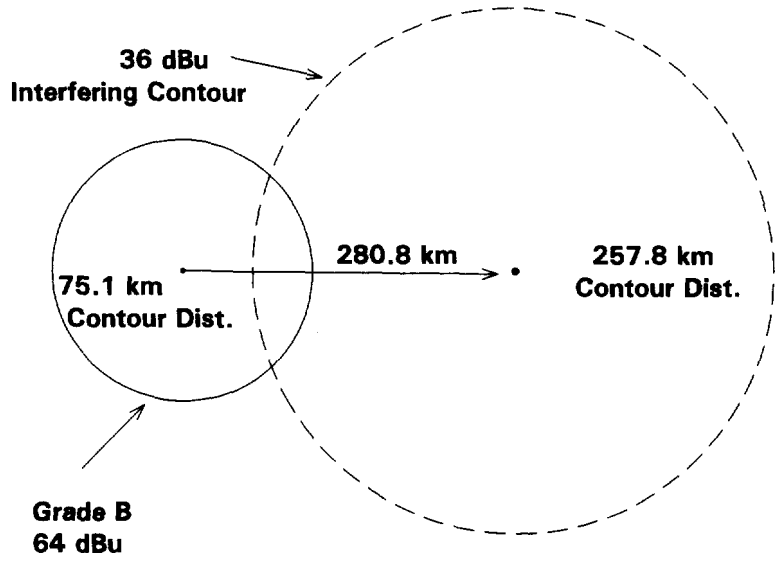
I. NTSC: LPTV Comparable Interference Standards

As indicated by the FCC in the 6th FNPRM, the proposed allotment of DTV channels is not on a "no interference" basis. UHF NTSC television channels have been allotted on a simple distance separation basis. The FCC's minimum co-channel separation requirements are contained in Section 73.610 of the FCC rules. The co-channel separations are:

Zone I	248.6 km	(154.5 mi)
Zone II	280.8 km	(174.5 mi)
Zone III	329.0 km	(204.5 mi)

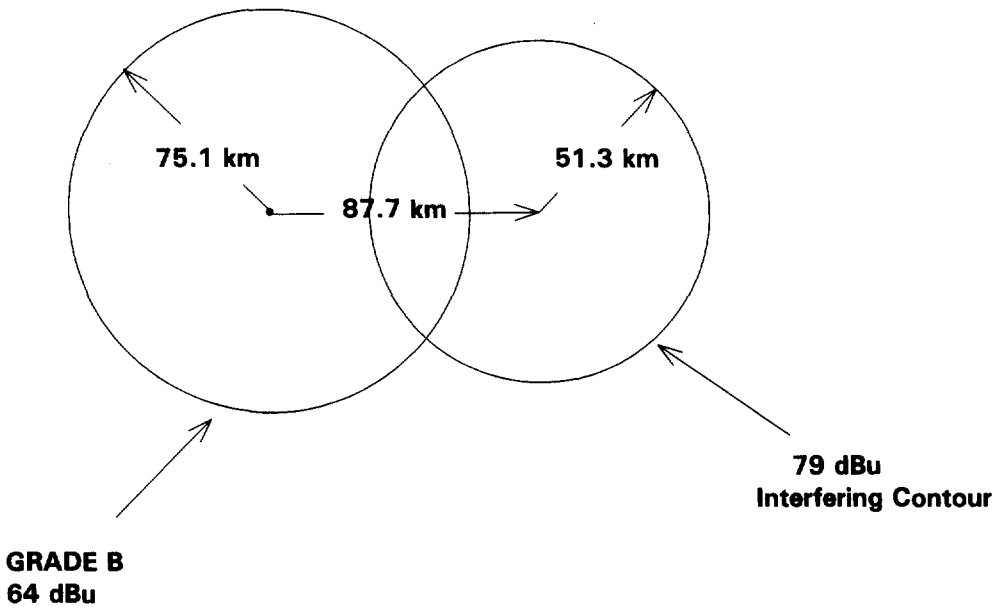
UHF stations meeting the FCC's minimum separation requirements are permitted transmitting facilities consisting of a visual effective radiated power (ERP) of 5000 kilowatts (kW) and an antenna height above average terrain (HAAT) of 610 meters (2000 feet).

Let us assume 2 co-channel UHF stations operating with ERPs of 2000 kW and antenna HAATs of 305 meters (1000 feet). The predicted Grade B contour extends 75.1 kilometers (46.7 miles). Using a 28 dB desired-to-undesired (D/U) interference ratio for co-channel, offset stations, the predicted 36 dBu interfering contour extends 257.8 kilometers (160.2 miles). In order for there to be no overlap of the contours (*i.e.*, no predicted interference), the separation between the stations must be at least 332.9 kilometers (206.9 miles).



Zone II
Co-Channel Example

The same scenario obtains for adjacent channel assignments. The FCC's minimum separation requirement between adjacent channel UHF stations is 87.7 kilometers (54.5 miles). Assuming the same transmitting facilities for the adjacent channel UHF stations (2000 kW, 305 meters or 1000 feet), the predicted Grade B contour extends 75.1 kilometers (46.7 miles). Using a conservative D/U interference ratio of -15 dB as contained in the FCC's LPTV rules, the predicted 79 dBu interfering contour extends approximately 51.3 kilometers (31.9 miles). The separation between the adjacent channel station would need to be at least 126.4 kilometers (78.5 miles) to avoid predicted interference.



Adjacent Channel Example

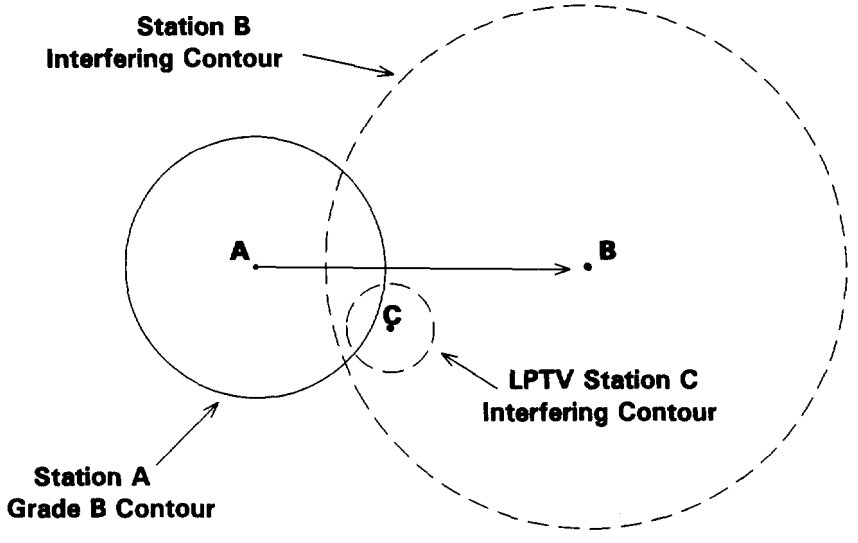
The FCC's 6th FNPRM employs adjacent channel D/U interference ratios of -3 dB (interference to upper channel) and -13 dB (interference to lower channel). With these ratios, the interference contour extends further, requiring more separation to avoid predicted adjacent channel interference.

Even assuming half the permitted antenna height and less than half the permitted power, the above examples demonstrate that predicted interference will obtain. In other words, the FCC's allotment of television channels is not based on "no interference". A certain level of interference is anticipated. The interference caused is considered to be acceptable in order to provide service. This is considered a more efficient use of the spectrum.

Unlike full service TV assignments, LPTV assignments have been traditionally made on a no predicted interference basis. This is much more restrictive and is believed to be less spectrum efficient. During the television industry's transition from NTSC to DTV, LPTV assignments will need some relief in order to continue providing its service to the public. Instead of the FCC requiring "no predicted interference" from the numerous anticipated displaced LPTV assignments, a "no new interference" basis is suggested.

By no new interference it is meant that if a full service or LPTV station would be predicted to receive interference from other authorized services, a displaced LPTV station should be able to cause up to the same level of predicted interference.

An example is given below. Predicted interference is assumed to be caused to full service station A from full service station B. It is proposed that displaced LPTV station C be permitted to provide predicted interference to that portion of station A's predicted Grade B service area where predicted interference would be caused by a fully spaced full service TV station B.



II. NTSC High Stability Oscillator Issues

It is inevitable that some LPTV stations will be displaced and be forced to seek a new channel. LPTV stations which are not designated as offset (including zero offset) block the further use of their channel over a much larger area than those with offset, as there is a 17 dB difference in the required protection. An LPTV station can rarely be located closer than 80 miles to a non-offset co-channel station compared to a typical 50 mile separation between co-channel LPTV stations with different offsets.

To gain the maximum flexibility in finding new channels for displaced stations the following is proposed:

a) A prospective new user of a channel which is co-channel with a non-offset station should be allowed to calculate the predicted interference to the existing non-offset station as though offset existed as well on a non-offset basis. If the ratio is within the 28 dB offset limit but does not meet the non-offset 46 dB rule, then the prospective new user should be required to notify the non-offset station which could respond by either going offset or accepting whatever interference resulted from his continued operation without offset.

b) If the new station is predicted to receive interference from an existing non-offset, the first station should be required, on request, to go on an offset different from the offset chosen by the prospective new station. In retrospect it would have been better if the original LPTV rules had required offset operation for LPTV station above some minimal ERP; and, since maintaining the frequency accuracy and stability required for offset is neither difficult nor costly, it appears reasonable to leave the cost of establishing offset operation of the existing station with the owner of the station.

It is suggested, however, that an exemption be provided from any requirement to change to offset operation for very small power stations which do not have a large protected contour or represent much outgoing interference potential. Probably the limit should be 1 kW ERP and stations not exceeding this ERP should be exempt, or if absolutely necessary, the change should be at the expense of the proposed new station.

III. Relaxation of Interference Protection Ratios

1) Adjacent Channel Taboo

Eleven pair of adjacent channels can now be received in New York City. Measurements indicate that the currently permitted 15 dB maximum difference between adjacent channels is sound, although with weak signals up to 20 dB can be tolerated.

It is proposed that a LPTV application be accepted for filing if the applicant demonstrates that 1) the LPTV signal will not exceed the signal of an adjacent channel NTSC full service station by more that 15 dB in any area in which the full service station signal is significantly received over the air and 2) the LPTV signal will not be more than 20 dB different in level from the signal received by an LPTV operating on an adjacent channel in any area in which the potential victim LPTV is, or is predicted to be, significantly viewed over the air.

It is recognized that co-location, or near co-location, with a full service station may be required, and that the LPTV risks being overwhelmed by the adjacent channel full service station. However, the LPTV must decide if the potential viewership which can receive acceptable picture and sound is sufficient to make it worthwhile. There will be no chance of interference to a full service station.

2) Oscillator (+7 Channel) Taboo

At least six oscillator taboo violations exist in the New York City area, most involving one low power station, but two of these involve pairs of full service stations (Ch 47 and 54 and Ch 43 and 50) which share large coverage areas of significant viewing, and have coexisted successfully for decades.

This interference occurs between two TV receivers tuned to channels 7 apart, the upper channel receiving interference. Current taboos require 100 km spacing LPTV to full service, and significant LPTV to LPTV separation between stations. Test indicate clearly that newer

receivers radiate much lower signal levels; for example a new medium screen size Sony receiver shows no interference whatever to adjacent receivers set seven channels higher (at UHF). This oscillator interference only exists when older receivers are physically close (e.g. under 50 feet apart) and receiving over the air signals seven channels apart, and even then the interference is minor.

It is proposed that this taboo be eliminated for LPTV to LPTV (or a LPTV station be given the option to "accept" such interference). It is also proposed that an LPTV applicant be accepted for filing if the applicant demonstrates that a full service station seven above is not significantly viewed over the air in the area in which the LPTV applied for is likely to be significantly viewed over the air. Based on the above, there is negligible risk, and the probability of interference will diminish as newer receivers are used.

3) Aural Image (-14 Channel) Taboo

Six examples exist in the New York City area wherein major areas of coverage exceed the permitted 23 dB aural image taboo by a large amount. Two of these (ch 68 and 54 and Ch 55 and 41) involve full service stations, the others low power and full service stations. Of particular interest is low power ch 17 located 4 1/2 miles from full power ch 31. Measurements were made at various power levels with ch 17 at least 33 dB below ch 31, with no evidence of interference. Similar results were obtained with the two sets of full service channels cited above. It is difficult to achieve a difference greater that 33 dB and still have good clear sound on the weaker signal, but tests are continuing to achieve larger values than 33 dB.

It is proposed that this taboo be eliminated for LPTV to LPTV (or a LPTV station be given the option to "accept" such interference). It is also proposed that an LPTV applicant be accepted for filing if the applicant demonstrates that a full service station on a channel 14 below will not be more than 33 dB (more if later demonstrated to be acceptable) lower in received level at any location at which significant over the air reception of the full service station is probable. Here also the probability of interference is small, and possibly can be corrected if both stations are actually broadcasting.

4) Intermodulation (+/-2,3,4,5 channel) Taboo

Interference from this source can be created by many combinations of received signals, but the most common and severe is two signal third order modulation. This situation has been analyzed and approximate mathematical models derived, from which the current 32 km taboo was determined. Many channel combinations involving full service station as cause, victim, or both, exist in the New York City area. In some cases interference is predicted and observed; in other cases no interference is predicted and none is observed. An example of the former is full service ch 47 and 50, about 13 miles apart, predicting to interfere strongly at the full service ch 52 B grade, and confirmed by tests (this channel combination also causes interference to full service ch 43 and 54, and low power ch 44 and 53). An example of the latter (*i.e.*, no predicted interference) involves full service ch 50 and low power ch 53 both received strongly in the city grade area of full service ch 47. No interference was observed on ch 47, as expected from the

mathematical analysis (based on FCC Report LAB-74-01 Project Number 2229-63, June 1974; and B.C. Docket 78-253, Sept. 1980).

Because the methodology developed in the above referenced reports is supported by tests, and because the example in which no interference was predicted or observed clearly violates the current taboo, it is proposed here that an LPTV applicant be permitted to demonstrate, using these methods, that the specific situation proposed will not cause objectionable interference.

A brief summary of the calculations, based on the above referenced FCC reports, which show that LPTV ch 53 can operate less than 32 km from full service ch 50 without causing interference, will now be given: W53AA, ch 53, operates on Empire State Building, 13 1/2 miles from full service WNJN channel 50. Since twice the ch 50 visual carrier frequency minus the ch 53 visual carrier frequency, intermodulation interference is predicted to occur on full service ch 47, and current rules would not permit ch 53 LPTV to operate, even with a waiver request.

Channel 53 operates at 6.8 Kw ERP with an approx. 90 degree beam facing NE, and ch 50 is 13 1/2 miles west of ch 53 and ch 47 is 3 miles south of ch 53. The ERP of ch 50 is 33 dbk at 1000'; ERP of ch 47 is 37 dbk at 1400'. An approximate determination of potential interference at any chosen location involves determination of the signal levels from each station at that location involves determination of the signal levels from each station at that location using 50/10 curves and the formula P=(F dB + ERP dbk -K) dbm where K=-75.1-20 log Fmhz+3.3= -128 in this case. Using this equation, the P level found for ch 47 id the maximum desired level, and figure 4b if the second reference is used to determine the maximum of undesired signal, Pu (from the "mean" curve). Equation (5) of the same reference states that 2Pa+Pb=3Pu, and since the factor 2 is here associated with the ch 50 level, Pa relates to ch 50, and Pb relates to channel 53 for each case. Four locations were chosen for analysis: 1) 1 mile from ch 47 north toward ch 53, at which Pch50=-28dbm=Pa; Pch47 desired=11 dbm from which Pch47 undesired = -4dbm; Pb max.=44dbm, and Pb actual =-53dbm, much below maximum; 2) 1 mile from ch50 toward ch53, at which Pch50=7dbm=Pa; Pch47 desired=-21dbm, from which Pch47 undesired=-11dbm; Pbmax.=47dbm, and Pb actual =-79dbm, much below maximum; 3) Queens-Nassau line and Little Neck Bay, in beam of ch53, 13 miles away, at which Pch50=-39dbm=Pa; Pch47 desired=-24dbm, from which Pch47 undesired=-12dbm; Pb max.=-42dbm, and Pb actual=-57dbm, much below maximum; 4) 1 mile from ch53 due east, in main beam of ch53, at which Pch50=-31dbm=Pa; Pch47 desired=-3dbm, from which Pch47 undesired=-6dbm; Pb max.=44dbm, and Pb actual=-24dbm. much below maximum. In all locations, the actual predicted level of Pb, the signal due to LPTV ch 53, is very much below the calculated allowable level to cause intermodulation interference. Two locations were chosen in the ch53 beam, one close and one far, and one location was chosen near ch50 and one near ch47. This is sufficient to show that nowhere will there be predicted intermodulation interference, based on the approximate model used. This proves that the blanket 32 km current taboo is "sufficient but not necessary," and that a case by case study is warranted. The examples chosen shows that ch 53 will probably not interfere with ch 47, confirmed by measurements, despite being only 13 1/2 mile (22 km) from ch 50.

In summary, it has been shown that four current taboos governing LPTV-NTSC application acceptability: adjacent channel, oscillator, image and intermodulation are very likely too strict. In their current blanket form, they are unnecessarily limiting use of spectrum, a situation which can no longer be tolerated. Since any relaxation can be easily and readily remedied if proven improper, it is strongly recommended that the proposals contained herein be adopted as part of the FCC's DTV rules.

IV. Effective Radiated Power and Adjacent Channel Operation

As stated in the discussion of proposed NTSC taboo changes for LPTV, we can no longer afford the luxury of wasting spectrum with unneeded restrictions. In addition to certain taboos, a totally devastating and totally unnecessary on LPTV operation is the very low permitted transmitter output power (TPO). Since only ERP (Effective Radiated Power, the product of TPO and antenna "gain") governs coverage (and therefore interference), full service quite properly limits only ERP. LPTV, on the other hand, puts no limit on ERP, but limits TPO severely.

It is essential that the subtle, esoteric, but enormous, difference this makes on the ability of LPTV to use spectrum be understood. In the face of the new DTV service and the second channel, use of an adjacent channel, both NTSC and DTV, is the last remaining hope for LPTV to remain a large viable service. It is accepted that an LPTV, co-located or near located with an adjacent NTSC or DTV channel can survive the interference from this adjacent channel if the LPTV is no weaker than 15 to 20 dB below it. (There is virtually no chance that an LPTV could, or would be permitted to, interfere with a full service NTSC or DTV adjacent channel.)

Present taboos do not permit this co-location, and more important, do not in practice allow the LPTV to be within the required 15 to 20 dB of the full service adjacent channel. This is because, to achieve a high ERP with a limited TPO, an LPTV must use a very high gain antenna. Such an antenna is very large, very expensive, and has either narrow sector coverage, or narrow vertical beamwidth, or both. An LPTV operator cannot afford such an antenna, cannot find or afford an antenna to hold it, and cannot live with the severe coverage restrictions of narrow beams; these beams not only cut the area covered, but reduce the signal within e.g. 10 miles of the antenna, something full service can well afford but LPTV cannot.

If LPTV was allowed a larger TPO, but was still, of course, was held strictly to interference standards, as now, LPTV could easily, in many cases raise the close in received power level so that it could operate and survive collocated with adjacent full service channels. This spectrum is now being totally wasted, for no valid reason. The FCC can easily see to it that no increase in potential or real interference is permitted, since the FCC must, of course, approve every application. And, obviously, any interference found could be summarily eliminated.

PROPOSED TABOO AND POWER LIMIT RULE CHANGES

Based on the above discussions, specific rule changes are recommended below. It is believed that the adoption of these changes will greatly improve the survival probability of many, if not most,

potentially displaced LPTV licensees and permittees without causing any noticeable additional interference to NTSC of DTV full service TV operations in areas where they are or will be significantly viewed over the air.

1. ADJACENT CHANNEL (+/- 1 CHANNEL) PROPOSAL

An application for an NTSC LPTV or translator station will not be refused acceptance for filing due to the proximity of an NTSC full service license or CP on an adjacent channel if it is shown that the signal received from the proposed LPTV or translator will never be greater than 15 dB above the signal received NTSC adjacent channel at any location in which the NTSC adjacent channel is significantly viewed directly over the air.

2. OSCILLATOR (+ 7 CHANNEL) PROPOSAL

An application for an NTSC LPTV or translator station will not be refused acceptance for filing due to the proximity of an NTSC full service license or CP on a channel 7 above the LPTV/translator if it is shown that the NTSC full service station is not or predicts not to be significantly viewed directly over the air.

3. AURAL IMAGE (- 14 CHANNEL) PROPOSAL

An application for an NTSC LPTV or translator station will not be refused acceptance for filing due to the proximity of an NTSC full service license or CP on a channel 14 below the LPTV/translator if it is shown that the full service station is not predicted to receive a signal lower than 33 db below the LPTV/translator predicted received signal level in any area in which the full service station is, or is predicted to be significantly viewed directly over the air.

4. INTERMODULATION (+/- 2,3,4,5 CHANNEL) PROPOSAL

An application for an NTSC LPTV or translator station will not be refused acceptance for filing due to the proximity of a full service NTSC station on a channel 2,3,4 or 5 above or below the LPTV/translator, if it is shown that two channel third order intermodulation products predict to be below the maximum allowable level, calculated based on the procedure outlined in B.C.Docket 78-253, Sept. 1980 using the mean curve of Fig. 4b, at every location at which a potential victim channel; is significantly viewed directly over the air.

5. ERP LIMIT PROPOSAL

An application for an NTSC LPTV or translator will be accepted for filing with the only power limitation being specification of an ERP value in any azimuth or elevation direction which is no greater than 3 KW for low VHF, 10 KW for high VHF, and 150 KW for UHF, and meets all other interference criteria then in effect and not waived. However, such interference shall not be avoided by a predicted signal level more than 30db lower than the maximum ERP proposed, unless supported by a special showing.

In all of the above, full support for claims by a applicant concerning areas of significant viewership directly over the air, and areas in which a directive receiving antenna can be assumed, must be provided as part of the application. Any interference to a cable head end only may be cured by the LPTV or translator through use of an alternate signal delivery method, at the expense of the applicant.

V. Adjacent Channel and High Stability Oscillator Issues

Situations will certainly arise where an NTSC, LPTV station will be on a channel which is adjacent to a DTV station. Cooperation of the DTV station should be required to minimize the impact of the adjacent channel operation.

a) Maintaining the optimum frequency difference:

The new DTV station should be required to cooperate with the LPTV station to make it possible to maintain the precise frequency separation of the two stations within the 6 Hz tolerance that minimizes the beat between the DTV carrier and the NTSC Color subcarrier which shows up as interference in the NTSC picture. The requirement for cooperation will become most critical when the NTSC LPTV station must operate with a (+) or (-) 10 kHz, as appropriate, from the nominal frequency for its channel. Only in this way can the NTSC station establish the optimum "delta f" from the higher DTV carrier while at the same time satisfying its offset requirement.

Further, the DTV station should be required to cooperate in such matters as locking to an external reference which is also available to the NTSC LPTV station whether this is a frequency source on a collocated site or a more remote source such as a global positioning satellite or Loran station. In short, whatever ground rules are established for the combination of a lower adjacent full service NTSC station and an upper adjacent DTV station should also apply as a minimum requirement when the lower adjacent station is an NTSC LPTV station.

b) DTV Adjacent Channel Spurious Emissions:

In most instances the LPTV station will be considerably lower in power than the adjacent DTV station. Whether the NTSC LPTV station can operate successfully is heavily dependent upon the spurious output energy from the adjacent channel DTV station.

1) Emission Mask of the DTV Station:
The adjacent DTV station should be required to provide the tightest emission mask (minimum sideband spurious energy) that the state of the art allows, and, as the state of the art improves, the DTV station should be required to install available improvements if adjacent channel spurious energy is impacting the NTSC LPTV station.

2) Linearity of the DTV Station:
The out-of-band spurious energy is partly generated by the non-linearity of the amplifiers in the DTV transmitter. Thus the transmitter linearity has a major impact on the adjacent channel spurious energy. If extra suppression of adjacent channel spurious energy is required by an NTSC station, either full service or LPTV, the DTV station should be required to operate with

the highest achievable linearity. For instance, running the output stage of the transmitter more nearly class A than normal will improve the linearity. However, the transmitter becomes less efficient and generates a larger power bill. A DTV license might be reluctant to so operate, but should be required to do so when necessary to protect an adjacent channel station.

Just because LPTV station are secondary is no excuse for DTV stations not be required to take all technically feasible measures to minimize interference, going beyond the normally required technical standards in the final FCC DTV rules to a higher performance standard when necessary.

VI. Predicted DTV: LPTV Interference

According to footnote 68 in the 6th Further Notice of Rulemaking, it is presumed by the Commission that the impact of DTV on the LPTV stations could be estimated by calculating a separation distance approach. The Commission proposes the use of a co-channel separation distance of 70-80 Miles and an adjacent channel distance of 60 to 70 miles. Due to the fact that there is a wide range of ERP power levels used in the proposed DTV facilities, and that the co-channel and adjacent channel interferences are based on the ratio of signal strengths received at the viewers' homes, further analysis was done on the LPTV to DTV interference and the DTV to LPTV interference. A different conclusion about the co-channel and adjacent channel spacing was reached, based on the ratios of interference caused by the various DTV ERPs.

In analyzing the LPTV to DTV co-channel interference, the following calculations were made (UHF example):

DTV Protected Contour	43.80 dBu
Co-channel Protection Ratio (From Appendix A, II)	1.81 dB
Co-channel LPTV to DTV Interference Contour	**41.99 dBu**

LPTV Protected Contour	74.0 dBu
Co-channel Protection Ratio (From Appendix A,II)	34.44 dB
Co-channel DTV to LPTV Interference Contour	**39.56 dBu**

The interference contours are the signal strengths which would cause interference from one station to the protected contour of the other stations, and these areas can be plotted on a map, much the same way that coverage contours can be plotted. In plotting these contours, it can be presumed that any co-channel station's coverage area within the interference contour of the other station would receive interference, unless terrain shielding is a factor. In this analysis, it is shown that the signal strength of the DTV to LPTV interference contour is 2.43 dB lower than the LPTV to DTV interference contour.

The average 43.4 dBu 50/90 DTV protected contour is 90 km (from Proposed Table of Allotments ERP, HAAT and 50/90 curves) and the typical LPTV protected contour is

approximately 24 km (20 Kw ERP at 182 meters HAAT). The average DTV 50/10 39.56 dBu interference contour is 192 km (119 mi) and the typical LPTV 50/10 41.99 dBu contour is 97 km (60 mi.). Therefore, using a spacing criteria for co-channel yields the following figures:

Average DTV 43.4 dBu Protected Contour:	90 km
Typical LPTV Interference Contour:	97 km
Typical Spacing Requirement LPTV to DTV to prevent interference:	**187 km** (116 mi)

Typical LPTV Protected Contour:	24 km
Average DTV to LPTV Interference Contour:	192 km
Typical Spacing Requirement DTV to LPTV to prevent interference:	**216 km** (134 mi)

Using the FCC 50/10 interference contours, the LPTV 74 dBu protected contour and the TV 43.8 dBu protected contour, it is shown that an LPTV station is more likely to receive interference from a DTV station than to cause it. All of these analyses presume an omnidirectional antenna, which represent a worst case situation.

However, in the FCC's analysis for the proposed Table of Allotments, an advanced technique of using directionality of receive antennas (in a grid within the protected station's contour) was used to indicate the received co-channel interference more accurately. Using the directional antenna analysis, it appears that the average DTV to LPTV spacing could be reduced by at least an additional 24 km to 192 km (119 mi.) and the LPTV to DTV spacing could be reduced by at least 90 km to a typical 97 km. In this case, as well, the LPTV is more likely to receive interference than to cause it. In some instances, LPTV stations accept interference from NTSC TV stations, and this will likely occur with DTV stations. However, it appears that the typical LPTV station will receive interference from the average DTV facility at a distance of 119 to 134 miles. This will have a greater co-channel impact on LPTV than the 70-80 mile figure predicted by the Commission in footnote 68.

With regard to adjacent channel spacing, an analysis was done using the worst case desired to undesired ratio of upper DTV to lower LPTV and the lower channel LPTV into the upper channel DTV. These two conditions represent the worst case ratios.

For adjacent channel protection, the following calculations were made:

In the adjacent channel scenario, an analysis was made under three conditions; co-located, mid range nearby (at 40 km) and close to the contour edge of the DTV protected contour.

For non co-located LPTV-DTV stations where the LPTV transmitter is located outside the DTV contour:

DTV Protected Contour	43.4 dBu
Lower LPTV into DTV Protection Ratio (from Appendix A, II)	-47.73 dB
LPTV Signal Strength Required to Cause Interference	**91.13 dBu**

DTV Protected Contour	43.4 dBu
Upper LPTV into DTV Protection Ratio (from Appendix A, II)	-48.71 dB
LPTV Signal Strength Required to Cause Interference	**92.11 dBu**

LPTV Protected Contour	74 dBu
Upper DTV into NTSC Protection Ratio (from Appendix A, II)	-11.95 dB
Upper DTV into LPTV Signal Strength Required to Cause Interference	**85.95 dBu**

It is shown in these calculations that the LPTV station is more likely to receive interference than to create it. In the worst case scenario of the lower adjacent LPTV channel into the DTV channel it is shown that an LPTV could overlap a DTV station with its protected contour and not cause interference, providing the LPTV did not exceed 91.13 dBu. In the upper LPTV to DTV case, the LPTV contour at the DTV protected contour could be 92.11 dBu. In the areas where the LPTV is located outside the contour of a DTV station, the Commission should permit LPTVs where this ratio is met.

With the LPTV located at a distance of 40 km from the DTV transmitter:

Average DTV Signal Strength at 40 km (1.0 MW @ 390 meter HAAT) dBu	84.3
Lower LPTV into DTV Protection Ratio (from Appendix A, II)	-47.73 dB
LPTV Signal Strength Required to Cause Interference	**132.03 dBu**

LPTV Protected Contour	74 dBu
Upper DTV into NTSC Protection Ratio (from Appendix A, II)	-11.95 dB
Upper DTV into LPTV Signal Strength Required to Cause Interference	**85.95 dBu**

According to the calculations for the LPTV station located at an arbitrary distance of 40 km from the DTV station, it can be shown that the two stations can co-exist without causing or receiving interference. In the case of the potential for interference to be caused by the LPTV into the DTV station, in this area it would require an extremely high signal level (132.03 dBu) which is very unlikely to be caused by the LPTV station at any location on the ground. Therefore, no interference would be caused by the LPTV to the DTV. In the other case, where the LPTV would receive interference at that location, it is shown that the average DTV station would not create a high enough signal strength to cause interference to the LPTV station.

All of the DTV stations in the proposed table of Allotments were analyzed to determine the distances where the DTV station would create a signal which would exceed the LPTV protected contour by greater than 11.95 dB and which would therefore cause interference to a lower adjacent channel LPTV. These figures were averaged and found to be 31.5 km., average. In many instances in the UHF frequencies, it was found that the DTV channel was assigned to an adjacent channel NTSC TV station and many LPTVs which were adjacent to the DTV allotments were already spaced over 32 km from the DTV by requirement of 47 C.F.R. § 74.705(b),(5).

In the mid-range area, the Commission should permit the location of an LPTV station within the contour of a DTV station where a showing can be made that there would be no interference would be caused to the DTV station, according to the proposed ratios.

In both of the above cases, additional accuracy could be achieved by the use of the Commission's directional antenna and grid analysis and this should also be permitted in any required showings of interference protection.

For co-located (and near-located) LPTV stations and DTV stations, the LPTV would have to exceed the power of the DTV by a huge amount to cause interference to the DTV. The LPTV in a worst case would have to be 59,292 times greater power than the DTV to cause interference (lower LPTV channel into DTV). This is an impossibility, and this interference scenario would not be caused. In the case of the DTV causing interference to the LPTV, with the worst case scenario of upper DTV into LPTV, if the DTV station is more than 11.95 dB above the LPTV station (or 15.66 times the power of the LPTV station), then interference will be caused to the LPTV station. In this case, the Commission should permit co-location of adjacent channel LPTV and DTV stations without any showing of interference protection, and permit co-located LPTV stations to increase their power to reduce received adjacent channel interference from the DTV stations.

In conclusion, as is shown by the calculations of co-channel and adjacent channel spacing, the co-channel impact will be significantly greater than indicated in footnote 68.

However, according to the calculations, adjacent channel stations can exist without causing or receiving interference in co-located situations, provided the Commission permits the LPTVs to adjust their power to the necessary ratios with the DTV stations. They can also exist without interference in areas in the middle of the DTV coverage areas, and if they accepted interference from the DTV could operate in most areas within the DTV stations contour. Only in the areas near the edge of the DTV station's contour would the LPTV station be predicted to cause interference. Therefore, the Commission should permit co-located stations and should permit the location of LPTV stations within the DTV station's contour, providing that a showing is made that no interference is caused to the DTV station. With the Commission permitting the co-location, near location and "mid-location" of LPTVs within the DTV contour, the adjacent channel impact would be dramatically less than that indicated in footnote 68, and in most

instances would eliminate the adjacent channel DTV to LPTV impact. This is significant because an adjacent channel restriction would block two LPTV channels for each DTV station.

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November 22, 1996