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BEFORE THE FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

IN THE MATTER OF: : FCC 96-207

Advanced Television Systems
and Their Impact Upon the : MM Docket No. 87-268
Existing Television Broadcast
Service

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Fifth Further Notice of Proposed Rulemaking

REPLY COMMENTS OF THE BROADCASTERS SUPPORTING LOW POWER STATIONS

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TO: The Commission

BROADCASTERS SUPPORTING LOW POWER STATIONS

Introduction Broadcasters Supporting Low Power Stations is composed of numerous low power stations including Atrium Broadcasting Co., KNET-LP, Channel 38, Los Angeles, CA, Assal Broadcasting Co., WBTL-LP, Channel 5, Toledo, OH, Northridge Community Broadcasting Co., KSFV-LP, Channel 24, San Fernando Valley, CA, W09CF, Jacksonville, Florida, W28AW, Greensburg, PA,

and W20AN, Washington, PA.

Community broadcasting is an industry composed of small independent businesses, rather than one composed of enormous corporations with centralized decision-making authorities and highly expert technical staffs.

These comments were developed by station owners from California, Alaska, and the East Coast. They considered what Digital Television (DTV) means for their stations and discussed via the Internet what technical concerns needed to be explored.

In the development of twenty-first century television, it is regrettable that the previous Chairman of the Federal Communications Commission, Richard Wiele, did not include Low Power (LP) stations in the DTV planning priorities. One disastrous result has been the FCC's allotment-of-spectrum computer program which ignores the very existence of Low Power broadcasters. Such a gross oversight **precludes any possible spectrum protection** for Low Power stations when the FCC assigns second channels to Full Power stations. This omission alone will be extremely costly to the both the Agency and the Low Power industry as each attempt to find corrective measures.

Thus, obliged to play a game of catch-up, Low Power broadcasters are just now exploring their disparate views of how

the Digital Television transition period should be managed for their industry. The points which are unanimously popular among Low Power broadcasters include:

- no spectrum which is currently available for TV broadcast should be sacrificed, auctioned, or removed from television broadcast in any way, i.e. all spectrum currently in use for broadcast should remain so, whether it is VHF or high UHF;

- spectrum should be allotted sparingly to allow the greatest number of TV broadcasters an opportunity to broadcast,

- UHF taboos must be reconsidered in light of improved technologies,

-after channels have been allotted to each Full Power licensee, remaining spectrum should be made available to each Low Power licensee for a DTV simulcast channel before any allotments are made to newcomers.

TECHNICAL WORK GROUP

Broadcasters Supporting Low Power Stations also ask that the FCC commit staff resources to participating in a working group of LP station owners, engineers, and manufacturers. This Technical Work Group would explore the technical constraints and possibilities on key matters, such as: **spectrum-saving technical**

approaches to be used during the transition period; actual broadcasting for community broadcasters in digital format; any new potential interference problems resulting from the proposed transition. Because of the aforementioned planning oversight, the **Low Power television industry requests that the Commission not issue any Report and Order on Technical Standards for Digital Television until such a Working Group issues its recommendations.**

The solutions attached in the Appendix are proposed in a spirit of entering a new technical age in broadcast television. The proposals were developed without consultation with manufacturers and without extensive technical testing and experiments. In that light, we ask that the FCC professional staff bear with us in focussing on the nuggets of gold in this document and overlooking the sand and grit.

APPENDIX

FULL SERVICE STATIONS MAY KEEP EITHER CHANNEL AFTER TRANSITION PERIOD

1. A full service station may or may not build a second channel. If the station elects to do so, it should not be required to meet a minimum power requirement.

2. Thus, if a station finds it difficult or impossible to construct a second channel duplicating the coverage of their present NTSC channel, the station can provide ATV service on a smaller transmitter. In many cases a smaller transmitter could reach most of the population covered by the existing NTSC transmitter.

3. The full service station may operate the new facility in NTSC or ATV mode, and may operate the old transmitter in ATV or NTSC mode, but may not operate both channels in NTSC or ATV modes simultaneously.

4. After the transition period the full service station may elect to keep either channel, but may not keep both.

5. The public interest is served in that many stations will be

financially stressed by the obligation to build and operate full broadcast strength second channels. In addition, some markets, especially smaller and rural markets cannot support the investment needed for full power dual channel operations.

6. Financially distressed stations would be forced to reduce public interest programming, greatly reduce coverage to rural areas, or worse, to cease all broadcast operations.

7. It should be expected that many stations would elect to build less powered (lower broadcast capacity) second channels. This would make more spectrum available for other spectrum users, including LPTV stations, and ease the financial burdens on Full Power broadcasters.

REGARDING PROTECTION continuation of **Keeping Either Channel**

1. The second channel would have less protection from other LPTV stations than the existing NTSC channel. The advantage is that full service stations would displace fewer LPTV stations. The disadvantage is that full service stations would be less able to match coverage of their existing stations.

2. The protection ratios could change after the full service station shuts down and returns the license for one of the two stations.

DURING TRANSITION USE LAND SET ASIDES TO ACCOMMODATE LP STATIONS

1. Several channels of spectrum have been set aside for possible land use. These channels should be made available to TV broadcasters during the transition period.

2. Following the transition, after the second FSTV channel is returned, the use of these channels could be reconsidered, accomodating future land mobile growth on 60-69 makes the most sense.

3. It is clear that some kind of digital compression can save considerable spectrum in two way land. On a phone line, using a 28.8 Kb/s modem, the spectrum occupied is 2.8 KHz. Yet in that narrow bandwidth one can transmit good quality radio programming using audio codecs like Real Audio or Xing Technologies.

4. Lower quality radio programming is required by two way land, requiring even less bandwidth. Yet present land mmobile spectrum allocations are much greater per channel.

5. In addition, Code Division Multiple Access, a method of Spread Spectrum is very adaptable to Land , which will allow far greater efficiency in use of the spectrum. A proceeding to take advantage

of these potentials should be instituted by the FCC.

CHANNEL REPACKING IS NOT IN THE PUBLIC INTERESTY

Repacking: Repacking TV stations into a contiguous slice of spectrum will result in a small increase in spectrum efficiency, if any, at enormous social cost.

1. Will consolidation of stations, sometimes called channel repacking, save spectrum? At best, only a little.

2. If by repacking, one means putting channels up against one another, first adjacent, (contiguous spectrum), then one can save from preclusion those areas that are close in to the tower where a close in adjacent signal can spill over from one channel into its neighbor. This repacking can work. In fact, it can work with NTSC stations today.

CHANNEL REPACKING continue

3. In order that first adjacent stations not interfere with one another they must be co-located and have similar power and antenna systems.

4. This places a new limitation on allocation flexibility, and

forces stations to use common towers and antennas, or nearby towers and antennas, something the Commssion has not indicated a willingness to require.

5. Stations operating first adjacent on a common antenna must have filters to keep one stations signals from mixing with the other first adjacent neighbor. Such a filter is not possible without causing some distortion to the transmitted signal.

6. A common antenna could be made to work with less filtering. If for example, there were six stations at one site. This might be done with six stacks of panel antennas, six phase stable 3 dB hybrids, and six phase stable high power co-ax runs up the tower. No one has ever built such a system, and it surely would be far more expensive than one 30 MHZ wide TV channel, one transmitter, and one co-ax.

7. **FCC rules would have to accommodate wider TV channels. The FCC would have to require broadcasters to share transmitters and antennas and towers. Regulations would have to be created governing such arrangements.**

8. In addition, repacking assumes new transmitters, co-ax runs, and antennas at each repacked station.

REPACKING COULD BE DONE TODAY

9. The fact of the matter is that repacking is possible today. I have do co-located NTSC stations in LPTV. It really works, if done right. But in full service, it hasn'nt been attempted. Why?

10. Possibly because the spectral savings after all the cost and heartache of relocation is only a small collection of small geographic preclusion puddles around each of the few towers where common transmission plants can actually be created.

11. The savings due to repacking are small. The cost is high. And in many cases, repacking can't work.

12. In the above argument, I have assumed that interference between first adjacent stations is not allowed.

13. In the Western states translators are extensively used to fill in holes in coverage. If each VHF station relocated to UHF, many more translators will be required to provide ATV coverage than are needed today. These translators will need spectrum in which to operate. The FCC will not allow first adjacent translator operation for the same reasons it is not allowed today, interference. Assuming coverage remains constant, A move to UHF, in some markets, is likely to result in net spectrum loss. Of course, we can assume coverage shrinks by allowing increased

interference or reducing the number of channels.

SAVINGS

Around each transmitter is a small zone in which unintended radio emissions can cause interference to reception of an adjacent channel. This is called first adjacent interference. It can be eliminated if the stations are co-located on the same tower, use the same or a similar antenna, and have similar or the same power. First adjacent interference will be of less power than the desired signal, so this method works.

As an example of an actual adjacent channel operation, an LPTV system at Anchorage Alaska, has channels 63,64,65,and 66 on the air simultaneously. Another at Kenai Alaska broadcasts channels 8, 9, 10 and 12 on the same antenna. So, it is proven that repacking is possible today, with NTSC. Why wait?

The spectrum saved is in that very small zone around each transmitter wherein first adjacent interference would destroy reception its spectral neighbors. We might be talking about two or three square miles, much less area than an LPTV station would cover. There are 1,550 Full Power TV stations in the USA, so total area repacking might save is 4,600 square miles for each adjacency or the about 9,600 square miles if it were one channel. This about the same as the coverage of one full service TV station. So total

spectral savings of repacking will be worth one full service TV channel.

This savings would be at the cost of forced relocation to common sites of all repacked transmitters. It these stations are not relocated, then there is no spectral savings.

COSTS

Transmitters and their sites are, for the most part, owned by private individuals or companies. It is impossible to imagine ALL private entities and governments coming to agreement on issues such as Rents, building space and security, power cost and availability, zoning, tower strength, antennas power capability, radio frequency exposure. Repacking of all stations won't be accomplished without Federal intervention, condemnation, and acquisition of American TV broadcast transmitter plants. Without Federal ownership of TV broadcast facilities, co-location is a pipe dream. Without co-location, spectral savings is fantasy. Repacking without Federal Ownership forcing co-location means there is zero spectral efficiency. Because there is still first adjacent interference.

PROPAGATION MODELS ARE OUTDATED

1. The FCC uses a propagation model created in the 1940's. That model was adopted because it is amenable to manual calculations.

The model uses 8 radials at 45 degrees azimuth from one another. The average height of terrain over the radial from 2 to 10 miles from the transmitter is used to estimate the distance a signal contour will propagate.

2. The ERP and antenna height above the average height of each radial is compared to a table of values that were found to represent typical measurements taken in many early VHF situations.,

3. **The problem with this model is that with the advance of computers, the availability of terrain data in computer readable form, and with advance in knowledge of radio wave propagation, the current FCC method is now extremely outmoded.**

4. **The outmoded model ignores terrain over 10 miles from a transmitter site. It does not account for diffraction and other known propagation effects. In some cases signals go further, in many others far less than that predicted by the present F(50/50) and F(50/10) charts.**

5. The ATSC has proposed an F(50/90) chart that would slightly modify, but perpetuate the use of the old model. The technical knowledge to do much better is now avialble.

6. **During the change to ATV is the best possible time to consider other, more accurate models. While, no model perfectly represents**

the real world, a more sophisticated model is needed.

7. **LPTV now has, embodied in its procedures, recognition of terrain barriers as an allocation tool. That has allowed many stations to exist, that do not interfere with other stations, but that would be prohibited under the pure form of the old model.** As a result, the LPTV industry makes much more efficient use of the spectrum, and brings much more service to the public - per Mgz - than Full Power stations do.

8. It is now possible to apply a better model on a point to point basis over a wide geographic area. There are a variety of algorithms to chose from. We suggest that the FCC adopt the Institute of Telecommunications Studies, Tech Note 101 model (See National Bureau of Standards, Technical Note 101, Issued May 7th 1965, Revised Jan 7th, 1967; Rice, Longly, Norton, & Borsis).

9. The model would be specifically adopted to use a particular terrain database on a grid of points. Then the computer would connect points that represent the particular contour desired, such as 50% of the locations 90% of the time.

USE OF SPECTRUM & AVAILABILITY

All telecommunications use is subject to the same kind of efficiencies of use that ATV represents. For example, it has been

determined that a standard 6 MHz channel can effectively contain and transmit four to eight standard definition TV programs.

This is done by using compression, a digital process to reduce redundant information, or mask information that is not required to convey the images and sounds.

Other users of the spectrum can benefit from the same techniques. For example, a land station that now transmits voice and occupies a 25 KHz or 12.5 KHz channel might compress. The result can be a 2.5 KHz or 1.25 KHz channel occupancy.

Trunking and cellular frequency reuse, code division of spread spectrum systems and time division multiplexing can greatly increase spectrum efficiency. Still, at some times of the day, even cellular spectrum is lightly used. The demand for land communications changes by the hour. During televison "prime time" the vast majority of existing lalnd mobile spectrum sits empty, unused, silent. Why should the Commission exacerbate this waste?

Digital techniques can vary the compression ratio of land, video, and audio broadcast transmission. All could share the same spectrum. **Allowing digital broadcasters to use the unoccupied land channels during times the land station is off the air should greatly improve efficiency.**

A quick scan with a spectrum analyzer in a large city can show how poor spectrum efficiency really is. At best the spectrum used by land channel at any one moment might show 1 or 2% occupancy. This would indicate that at any one moment, hundreds of Land Mobile megahertz are lying fallow.

Allowing LPTV stations to occupy Land Spectrum on a secondary basis for digital communications during the silent time on a land channel should stimulate an interesting new technology.

KEEPING ALL EXISTING CHANNELS INCLUDING VHF IN BROADCAST

1. Existing channels should be kept. VHF transmission allows over the horizon reception, UHF does not. Rural areas could lose service if VHF TV is eliminated or many more UHF channels will have to be used replicate this rural service.

2. If the government desires to auction spectrum, that can be done by allowing new TV broadcast channels to be awarded at auction. There is no reason to delete channels currently in use from regular over the air broadcast use.

MAXIMUM ERP (OR TPO) AND HEIGHT FOR LPTV

If the FCC establishes a maximum ERP (or TPO) and height for LP service, it should it look like the same rules as now: 1 KW TPO Peak power and no height or ERP limit. The ATV service contour should nearly match the NTSC protected contour. having different "classes" of television service promotes spectrum efficiency by filling in holes in the Full Power station grid too small for added Full Service stations with smaller TV stations that fit. This model has proven itself in FM radio and should be extended to television.

PRECISION OFFSET

This is commonly done by agreements now between stations. Many low band VHF stations utilize this offset technique. For example, in California, KCBS, Channel 2 in Los Angeles and KTVU, Channel 2 in Oakland/San Francisco, reference their exciters to the same frequency and are able to hold a 2 Hz frequency tolerance. By holding to a 2 Hz tolerance as opposed to a 1 kHz tolerance, co-channel interference ratios are not 28 db protected-to-unprotected, but closer to 19 dB for similar protection. A full 8-10 db in protection ratios is arrived at for co-channel interference.

ALL TV BROADCASTERS TO INSTALL DIRECTIONAL ANTENNAS CORRECTLY

Many LPTV and some Full Power stations have installed their directional antennas in the wrong direction. This can be readily confirmed by asking any antenna manufacturer. The LPONE program is designed to operate within 1/10 of a degree, a degree of specificity that very few comply with. It is virtually impossible with the equipment that erection crews utilize. Nevertheless, the more accurately antennas are installed the less interference. The FCC may wish to create a training video or manual for installation crews.

ADOPT LONGLEY RICE PROPOSAL

Adopt the Longley Rice proposal which offers Low Power stations the advantage of not using reliability scaling and takes into account the terrain beyond 16 kilometers beyond the transmitter.

CO-LOCATION

Co-location can raise structural and zoning problems. First, the FCC must impose zoning pre-emption to allow old towers to be rebuilt against present zoning codes. Second, some co-location will result on inadequate coverage for the second channel. I.E., at Goose Bay (KIMO, KTUU, KAKM) here in Alaska, peak DTV UHF ERP must equal 40 megawatts to get similar coverage to VHF. Since, they know they can't do that, VHF stations KAKM, KTUU and KIMO now are working on securing new sites that will allow some preservation of their present coverage.

CO-LOCATION AND TOWER FARMS

Propose that TV stations which are spaced out of the tower farms due to their NTSC channel requirements (32Km, 7,8,14,15,+/-1) should not have the same restrictions applied to their DTV channels. This would permit them to co-locate on the tower farms on adjacent channels (which I think most would like to do) and would free up additional (good) channels which could be used by LPTV. (Every time a DTV doesn't co-locate at the tower farm it locks up 3 channels; co-channel, and 2 adjacent channels.) Modify the table of allotments to set these "found" channels to LPTV.

HIGH STABILITY OFFSET OSCILLATORS MINIMIZE SPACING AND OPTIMIZE CHANNEL RE-USE

Propose that all LPTVs (or possibly just LPs in urbanized areas, depending on the comments from the National Translators Association and rural LPTV operators) operate with high stability offset oscillators to minimize spacing and optimize channel re-use among LP's. Propose settlement agreements which would permit co-channel and adjacent channel LPs to accept minor interference without lotteries or FCC selection.

Respectfully submitted by,

Victoria Leonard
405 Circle Avenue
Takoma Park, MD 20912
301-270-4289
on behalf of:

Lawrence Rogow and the following Low Power stations:

Channel 29 Associates, WTPA-LP, Channel 29, Pittsburgh, PA
Atrium Broadcasting Co., W69CL, Channel 69, Hartford, CT
Atrium Broadcasting Co., KPHZ-LP, Channel 58, Phoenix, AZ
World Television, K38EA, Channel 38, Inland Empire, CA
Ponyland Broadcasting Co., KTAZ-LP, Channel 25, Tucson, AZ
White Sage Broadcasting Co., K38DY, Channel 38, Calabasas, CA
Atrium Broadcasting Co., KNET-LP, Channel 38, Los Angeles, CA
Assal Broadcasting Co., WBTL-LP, Channel 5, Toledo, OH
Northridge Community Broadcasting Co., KSFV-LP, Channel 24, San Fernando Valley, CA

LPTV CP holders:
World Television, K69HJ, Channel 69, Phoenix, AZ
World Television, W30BH, Channel 30, Birmingham, AL
Ponyland Broadcasting Co., K31CK, Channel 31, Tucson, AZ

Assal Broadcasting Co., W54BQ, Channel 54, Providence, RI

Full Power TV station:
Venture Technologies Group, Inc., WTWB-TV, Channel 19, Johnstown, PA

Full Power TV CP holders:
World Television of Washington, LLC, KBCB, Channel 24, Bellingham, WA
Jackson TV Company, WHTV, Channel 18, Jackson, MI

900 SMR licensee:
Allegro Communications Company, WNKX674, Chicago, IL

Cable Television:
Calavision based in Calabasas, CA

Ben Perez of Abacus Television and the following:
Low Power Stations
W09CF, Jacksonville, FL
W28AW Greensburg, PA
W20AN, Washington, PA.

Deborah Goodworth of Goodworth Television for:
Low Power Station

Jeremy Lansman of Fireweed Communciations Corp for:
KYES, Anchorage, AK.