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In the Matter of FCC NPRM 99-325
Creation of a Digital Audio Broadcasting Service

Other wise known as
The Medium Is The Mess-Up: Why Digital Radio Must Be Better Designed Than IBOC

Contents:

Executive Summary:

The FCC has received abundant comment from the public requesting opportunities for new entrants, which LPFM alone will not be able to accommodate. Current proposals for the digitization of radio before the Commission were designed by incumbent broadcasters. They create no opportunities for new entrants. IBOC requires use of new spectrum, which must be auctioned by law. Numerous other promising models exist for the digitzation of radio, which should be explored before the fate of the new service is resolved. No digital radio standard can be adopted which conflicts with second adjacent spacings without doing substabntial harm. An

open committee should work on the digital standard.

Introduction

The Prometheus Radio Project emerged from the movement to create a low power radio service. We provide assistance to community organizations that seek to start non-commercial neighborhood radio stations. We also actively participate in the rulemaking process to insure that new rules surrounding all forms of radio incorporate significant components which benefit the public interest. We advocate provisions which encourage localism, public service, opportunities for new entrants, first amendment speech and public forum considerations.

1.Let's Get Digital! Digital Radio Has Important Implications For New Entrants

Though the public remains largely unaware, radio stands at a crossroads with the release of FCC NPRM 99-325. For decades, the FCC has rested its authority to regulate the airwaves on the scarcity of bandwidth. The logic and legitimacy of this system is being undermined by advances in technology which allow us to use discrete chunks of bandwidth ever more efficiently. Where today, one analog signal occupies a given segment of bandwidth, a well designed digital broadcasting system can send 5 times more information in the same allocation. Depending how our new digital broadcasting system is designed, this usable data capacity can be used to enhance the capabilities of incumbent broadcasters, to create opportunities for new entrants, or, most hopefully, to do both. Current IBOC proposals only enhance incumbents• holdings.

2. A Can Of Worms -- The FCC•s Legal Obligations

(we thank FCC Counsel David Silberman for the title of this section)
The only reason that the FCC has been able to legitimately abridge the free speech rights of this nation•s citizenry is for the purpose of preventing chaotic interference on the public airwaves. Many desiring to broadcast have been shut out of the mediums of radio and television due to the scarcity of usable bandwidth created by the present allocation system. The recent Dunifer vs. FCC case came dangerously close to undermining the structure of our system of broadcasting. It was not clear that the FCC could pass the statutory test that its bandwidth allocation model was the least harmful model possible to freedom of speech. These issues will continue to be raised in cases related to analog radio broadcasting. Considering that the fate of a great deal of newly usable bandwidth is about to be decided, the FCC may find itself in an even more precarious position. The Commission may have to explain to a court why all the benefits of digitization are retained by the incumbent broadcasters and none are allocated to new entrants.
It is the purpose of the First Amendment to preserve an uninhibited marketplace of ideas in which truth will ultimately prevail, rather than to countenance monopolization of that market, whether it be by the Government itself or a private licensee.
Red Lion Broadcasting Co. v. FCC, 395 U.S. 367, 390 (1969)

The current proposals before the FCC appear to preserve existing relations between media rich and media poor. They are just not fair, and while the FCC

may be politically capable of implementing one of the proposed IBOC systems, the Commission would certainly violate the spirit and the letter of the laws that mandate its role as public guardian of the spectrum.

3. A Can of Extremely Vocal Worms. •- The Public Has Spoken On The Need For New Entrants

The Commission should reflect upon the great public interest generated by its recent LPFM proceeding. It can be discerned from the LPFM rulemaking that there is strong public support for more opportunities for new entrants. However, the public will likely have less input into this digital proceeding because of the complicated technical issues involved. Very few LPFM licenses will be allocated in many cities where demand is the greatest. The Commission must prioritize a digital FM or AM service that accommodates many local new entrants, especially in urban areas. The Commission should consider the interest of the public in LPFM, which is in essence an interest in new broadcast opportunities, and create those opportunities through digital radio.

4. FCC Walking a Tightrope Balancing an 800 Pound Gorilla and an 800 Pound Can of Worms -- Balancing Incumbent vs. New Entrant Interests

The designs submitted for DAB by incumbents have reflected their aversion to competition from new entrants. The record breaking profits in the Radio industry guarantee the resources to maintain a privileged position in designing radio•s future. Unfortunately, those who wish to see new entrants and greater public service from broadcasters have not been included from the beginning of the design process. New entrants lack lobbying, engineering and legal resources. These are necessary to design, test, and implement an entire broadcasting system. Thus, it falls to the FCC to actively defend the interests of the public.

5.Gotten Any Letters From John McCain, Lately? The FCC Protects the Oligopoly of Broadcasters, While New Entrants Clamor to Do Public Service.

As the Commission is aware, campaign finance reform is one of the prime issues in this year's presidential election. Most of this money is typically used to pay for expensive television and radio advertising. Our political system is, in turn, corrupted by the need of candidates to raise money for their campaigns. Publicly-elected politicians are tempted and tainted by the personal agendas of private donors. This serious compromise of our democratic system could be alleviated by requiring a few simple public service requirements from broadcasters. Over the years, there have been many proposals to require free airtime for public candidates. During elections, broadcasters could contribute segments of media time to candidates in order to educate citizens about those who seek elected office.
This would alleviate the financial pressures of campaigning,. Incumbent broadcasters howl with indignation whenever this issue is raised. They favor short term profits over their commitment to public service. Prometheus Radio Project believes these stations should not be granted a government protected monopoly if they are unwilling to make even the most minor concessions to the public interest, particularly when new entrants are clamoring for the opportunity to do the kinds of public service that incumbents refuse to do.

6. Dance To The Muzak • The Development of Subcarriers, And Their Demon Spawn IBOC.

In the early history of the FM band, there was not great demand for FM licenses and regulators were not concerned about issues of spectrum scarcity. There were no competing uses proposed for newly usable bandwidth between channels. Allowing FM broadcasters to add subcarriers seemed reasonable. . Precedent evolved in which FM broadcasters viewed the space between the channels as "theirs." Over the years, the FM band became more popular and spectrum scarcity became more of a consideration. As receivers grew more selective and sophisticated, broadcasters felt reasonable in asking to expand their emissions mask and put more signal closer to the edges of their allocated channel.

Today there are many subsidiary services on subcarriers which occupy the FM broadcast band- a band which was awarded for free as a public trust. Some, including reading services for the blind, are important and worthy. Other subsidiary services are strictly for-profit enterprises, such as data carriers and pager services. Until now, the Commission has not actively regulated the use of these frequencies, so long as they have met certain reasonable technical parameters. (It is worth noting that many reading services for the blind are switching to the use of a third TV audio channel called "Second Audio Program" (SAP) that is available to anyone with a stereo enabled VCR or TV, more universally available than special SCA FM receivers.)

We at Prometheus Radio Project understand and appreciate the restraint that the Commission has shown in the past regarding subcarrier content. We believe, however, that this policy has outlived its usefulness. In the near future, subcarriers may become nearly as important economically as the main carrier of the radio station. With the implementation of more sophisticated radio services, the utilization of the lucrative SCAs may hold the keys to the future business models of radio, perhaps creating interactive opportunities for listeners or other new features for radio. In all likelihood, many of these implementations will be crass revenue generators, including services that permit a listener to directly purchase a recording that is being broadcast. IBOC is, in fact, the demon spawn of the vague subcarrier policy.

7. IBAOC In Band, All Over the Channels-

Contrary to what has been claimed, the current IBOC proposal does require new spectrum to be allocated to incumbent broadcasters. This proposal would effectively double the bandwidth radio stations are allowed to use. Incumbent broadcasters argue that this spectrum is unused and is already part of their channel. However, the FCC forbids them from generating emissions outside their currently allotted bandwidth. Since this use of the spectrum may preclude other services, including Low Power FM located on second adjacent channels, it appears that the industry's IBOC proposal is in fact a new allocation. As required under the Telecommunications Act of 1996, this spectrum therefore should be auctioned. We believe many potential licensees in wireless services would happily pay money to the public in order to use this bandwidth. Given recent technological innovations, the FCC could auction those spaces between stations to data services and raise millions of dollars. Only non-commercial licensees may be allocated new spectrum without auction under the Act of 1996. While Prometheus Radio Project does not advocate auctioning the bandwidth in question, we raise the issue to demonstrate the magnitude of subsidy to incumbents that the IBOC plan would create. The question arises -- What, if anything, will

broadcast incumbents give in return for doubling their bandwidth?

8.Competition Means Survival of the Licensed: Broadcast License Holders Are Competing Unfairly In Markets Unrelated To Their Franchise.

Because their license permits them to generate immense profits while using the public airwaves, radio broadcasters should be required to give something back in the form of public service. A pager company might pay the US government millions of dollars at auction to use a new frequency. Alternatively, they may pay an incumbent broadcast station to use bandwidth which the broadcaster received for free. Public service obligations exist for those operating in the broadcast band, however subcarriers have been treated as exempt from this requirement. Ultimately, it appears IBOC is not about the digitization of audio. Rather, it is a spectrum grab on the part of incumbent broadcasters who seek to compete unfairly with other commercial wireless services, services which would otherwise pay top dollar at auctions for use of this valuable public resource. Of course, convergence of technologies is important, and the transition to digital broadcasting is inevitable. However, the broadcasting model that has emerged represents a problematic social and legal experiment. The unfair, oligopolistic franchises that form its basis should not carry forward into the future. Broadcasters must not be allowed to compete unfairly with other wireless services unless they are willing to operate with special obligations to the public interest.

9.ibocIEM - in band on channel Inside Emission Mask!

One possibility is that if incumbent broadcasters want to implement IBOC, they should do so inside their existing subcarrier architecture. This would allow the FCC to implement either LPFM on second adjacent frequencies, or auction off the spaces between stations to non-broadcast services, both of which benefit the public. FM stations should sacrifice their analog subcarriers , if necessary, to implement IBOC. The data that was there can be digitized, and the whole ensemble of services can be implemented without expanding the emissions mask. The broadcast industry could easily come up with a standard for IBOC that requires no changes in FCC rules at all by agreeing on a single bandwidth plan that all stations use for subcarriers.

10. Geese and Gander- What•s Good For Them? Any IBOC Scheme Must be Compatible with Second Adjacent Channel Allocations.

Sometimes, we at Prometheus wonder how much interference industry studies would find if LPFM was a given and IBOC was required to fit around it. In fact, that already happened with grandfathered short space stations. As far as we have been able to surmise, this part of the research has not yet been done for digital radio. IBOC will not perform adequately if it can not tolerate interference from and prevent interference to 2nd adjacent short space stations. There are many hundreds of these stations now, and LPFM can have only a fraction of the impact upon digital radio that these superpower stations have. The redundant signal architecture of digital should be able to take care of any interference to IBOC.

11. Great- Another Meeting To Go To˘We Recommend An Open Committee To Decide The Fate of DAB.

Ford proposed the creation of a public-private committee with open membership, which would achieve consensus and even recommend specific

transmission standard for adoption by the Commission. We at Prometheus Radio Project don't know if Ford Motor Company had the likes of us in mind when they suggested an "open" committee to make recommendations for digital transition, but we're happy to invite ourselves if no one else will. We strongly believe that organizations representing potential new entrants and voices that have been denied access to the airwaves should be invited to participate in the planning stages of the allocations. Public interest groups, new entrants and those groups traditionally denied access to the spectrum should not be presented with a fait acompli at the end of the game, but should instead be part of the dialog from the very beginning of system design though implementation.

12.There•s More Than One Way To Modulate A Cat- Alternatives to Incumbent Broadcaster Proposals.

Prometheus Radio Project supports the exploration of alternatives to the proposals of the incumbent broadcasters. Alternative spectrum allocation models exist. There are a thousand conceivable ways that radio can be digitized- each creating different winners and losers. We have not conducted exhaustive research of these alternatives, nor have we even exhaustively researched their viability in relation to IBOC. We hope to accomplish more during reply comments. However, we believe they are worthy of the commission•s consideration as the staff examine the possibility of creating space for new entrants in Digital Radio Broadcasting.

A . Thars Gold In Them Thar Aether- the Fate Of Eureka 147
While we hate to be "behind the curve," Prometheus Radio Project feels compelled to point out that the failure to implement Eureka 147 in the United States will mean a significant loss for the public. Special radios will be required to listen to IBOC broadcasts, and these radios will be of no use anywhere else in the world. We cannot expect these consumer radios to be as cheap as those manufactured for a world market. Eureka also uses proven, implemented technology and an intelligent, highly efficient use of a new spectrum allocation as opposed to the "wheels-within-wheels-within-wheels" "carrier-subcarrier-sub-sub-carrier" architecture of IBOC.
Our understanding is the US military is unwilling to give up the spectrum that the rest of the world is using for DAB. (And how the military intends to continue to use it to navigate their missiles or aircraft without interference from pop music stations is beyond us -- it would be quite a disaster if missiles begin taking their directions from Rage Against the Machine lyrics, or the Talking Heads "Burning Down the House."). As noted, receivers using a standard based on Eureka but manufactured to receive on a different set of frequencies will be much closer to compatible with radios throughout the world and will be much cheaper to manufacture due to the economics of scale. Compatibility is particularly important in an era of increasing globalization. Eureka has some disadvantages, but we should consider its advantages when trying to find a solution for the United States.

B.Jeremy Lansman•s Proposal For The Poetic Return Of FM Broadcast To Armstrongs Original 42-50 MhZ band.

Included as an appendix is an excerpt from a letter written to Commissioner Kennard about one possible scheme for a Eureka like service. The service described sounds agreeable to us, but we have not thoroughly researched the current users of that spectrum. There are some concerns about the noisiness

of that particular swath of spectrum, which may be attenuated by using newer, COFDM modulation techniques. All new spectrum solutions carry the risk that incumbents will try to get out of returning their analog allocation for as long as possible. Some other possible pieces of spectrum that could be used for such a plan might be 2300-2305MHz, No primary use is allocated to that band. Amateurs have secondary use at this time, and have requested primary use. that has not been granted.. Unlike many other bands, there is no Congressional requirement specifically to auction this band. Some other pieces of spectrum that may be available are 139-140.5 & 141.5-143 MHz. These should be considered for all digital radio proposals.

C. Time And Space Are Sometimes Warped: Other Eureka-Like Systems

Comments have been submitted for the Japanese ISDB-tn system. It•s been suggested that this system may be a good candidate for the 82-88MHz plan. We are generally supportive of the idea of using new spectrum for digital broadcasting. 82-88MHz is problematic because it may not be availiable for quite a while. We generally think that it is better to find spectrum that is not currently in use for digital radio. A new spectrum proposal coupled with IBOC could be very interesting, but we don•t really understand how it could work.
One possible scenario that could work for a large part of the country (where there are no current channel 6 allocations) would be the following: All current (and some new) broadcasters would be given a tight, eureka style allocation (unencumbered by analog) allocation in 82-88. LPFM goes ahead without care for the second adjacents, since IBOC is not implemented. Once DAB is firmly established in 82-88 (or other available spectrum), 88-108 sunsets its analog and becomes fully digital, with all kinds of possiblities for everyone. 102-108 MHz could probably even be given back for other purposes, if sufficient new opportunities are created. As demonstrated in REC network comments, a large portion of the country has no channel 6 allocations. Although not optimal, digital could start immediately. The rest of the country could phase it in as analog broadcasters phased out. It should be noted that many times, there is not geographical equity in the implementation of a new service: witness LPFM, Cable, and high speed internet services.

D) Perhaps AM Can Be First Again?

One further possibility should be noted. While the benefits of DAB are clear cut in AM, the record is more muddy on the benefits of FM. Perhaps digital IBOC should be done first in AM on a short timetable, and FM could be implemented later after lessons are learned from the AM experience. An interesting effect of this might be to restore vigor to the competitiveness of AM broadcasting, since the digital signal would be of comparable quality to FM.

E. ibocIEM

We note that possibilities for truly in-band-on-channel-inside-emission-mask Digital radio have been explored. We have not yet gained access to this document, but we are under the impression that it may hold some answers regarding inside current emmission mask IBOC. : Proceedings of NAB Broadcast Engineering Conference, 1996
ON-CARRIER DIGITAL FM TECHNOLOGY: A NEW APPROACH FOR DIGITAL AUDIO BROADCASTING AND EXTRA HIGH SPEED DATA TRANSMISSION
-- David P. Maxson, WCRB 102.5 FM and Dr. David K. Murotake, Sanders [Page

F. Multi Media Broadcast Service

We also note with interest the CEMA (now CEA) proposal for a multi-media broadcast service. We think that the possiblity of such a service is interesting, and hope that other spectrum can be found to implement such a service. We petition that the implementation of any such broadcasting service be accompanied by the presence of reserved, educational bands as an integral part of the service. We further petition that a decent number (let•s say thirty) of audio channels for new entrants be included.

Appendix 1:
Excerpted from a letter to Chairman Kennard From Jeremy Lansman, Owner KYES TV Alaska
We are thinking of proposing a radio broadcast transition to digital, that might be seen as having a parallel in DTV.
Core (no pun intended) concepts are:
1. Give existing AM &FM stations a digital channel (100 kHz in two 50 kHz slices for close multipath protection).
2. Reallocate 42-50 MHz to Digital Radio. 42-50 is noisy & requires large antennas making it less favored for land mobile use. However it would be quite fine for high powered broadcast use. It was the original FM broadcast band. Features would be;
a. COFDM modulation somewhat like the IBOC proposal by Lucent.
b. Allow on channel boosters. These work very well with COFDM.
c. Allocate each station a geographical boundary, field strength not to exceed a limit on the boundary. Transmitters can be anywhere. No prior FCC permission needed to build except on boundary as with cellular telephone.
d. Occupied spectrum in a 50 kHz channel would be less (40-45 kHz?) eliminating the need for adjacent channel protection.
e. Near 80% spectrum efficiency. Present efficiency is less than 20%. The broadcaster can chose 96 kb/s for an extremely robust signal, or higher data rates at the cost of coverage which could be replaced by careful placement of on channel boosters.
f. Very high spectrum efficiency should allow every AM & FM station replication coverage in the new 42-50 band.
g. 42-50 MHz dual digital-analog operation would be permissive, not required.
h. After a future deadline, analog stations must be turned off. Stations not broadcasting in 42-50 MHz must convert to digital in their present band. 42-50 broadcasters can choose to stay, or go digital in the old analog band.
i. Present land mobile licensees of 42-50 would be required to prove they actually use their license, or lose it. If used, the prospective digital broadcaster must pay to relocate the land mobile station, or may, by agreement, allow the LM station to use some of the broadcast bitstream for dispatch. Those few LM operations that need low band VHF due to rugged terrain, etc. might be relocated below 42 MHz.

Can this be a win win? Total #of usable channels in 42-50=80. Since D/U ratios would be almost 1/1 at low bit rate, and no taboos would be required, every existing analog station should be able find a home with equal or better coverage in the new band. Many land mobile users should be happy to have facilities upgraded. If no one wants to pay them to leave, they could

stay. We think this idea could get support from every constituency.
In most places the 42-50 band will not be filled by existing broadcasters. This might leave a bit of room for new stations following the wave of applications by existing stations.
After full conversion to digital, there would be not just 8 MHz (80 channels) low VHF broadcast spectrum, but 88-108 digital as well for a total of 28MHz (280 channels). Since spectrum use would be close to 100% we think a typical listener could hear almost all 280 stations. There would be a lot of room for new VHF broadcasters in the digital future, assuming ownership limits were not increased from the present values. In a universe where one can hear over 200 stations, I have no problem with one broadcaster owning 8.

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