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From: <WRFR@aol.com>  
To: K2DOM.K2PO1(GTRISTAN),K4DOM.K4PO2(MPOWELL,SNESS),K5DOM.K5PO2(HF URCHTG),K1DOM.K1PO1(BKENNARD),ROUTE\_A.GWIA1("congressman.klink@mail.house.gov", . . .  
Date: 3/17/00 5:25PM  
Subject: HR3439 "Radio Spectrum Management" counter-testimony as per HonTauzin's offer

RE: Testimony regarding the effect of Low Power FM and other radio spectrum management policy issues at the FCC.

TO:  
Representative W.J. Tauzin  
Chair of Subcommittee on Telecommunications,  
Trade and Consumer Protection  
Committee on Commerce  
C/o Cliff Riccio  
2125 Rayburn House Office Building  
U.S. House of Representatives  
Washington, DC 20515

RECEIVED

MAR 20 2000

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

CC'ed:  
The Richmond Virginia Representatives as well as interested parties and some of the Subcommittee members for whom I had email as well as the FCC Commissioners.

From:  
Christopher Maxwell  
Secretary/Treasurer  
Virginia Center for  
The Public Press  
Radio Free  
Richmond Project  
1621 W Broad St.  
Richmond Va 23220  
Wrfr@aol.com  
804-649-WRFR

Dear Cliff Riccio,

Thank-you very much for taking the time to help us get our story to the Congressmen.

I accompanied Mr. Don Schellhardt of the THE AMHERST ALLIANCE in testifying to the House Committee on Telecommunications regarding "Spectrum Integrity" policies etc. of the FCC.

Mr. Tauzin was very gracious to allow us to place reply-comments into the record 30 days following the hearings.

Work and computer glitches have prevented me from getting hardcopy to you on Friday.

No. of Copies rec'd 0  
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But I am hoping that you will be able to accept this attached document "HR3439-counter-mailver.html as the electronic version of my counter-testimony follow-up.

I chose the HTML format on purpose, because this includes graphics I made for these comments as well as sound samples of interference for the Congressmen to hear!

It is simpler to have that document reach out to our web server for the graphics etc.

I have CC'ed several people involved or interested in the issue including my own Congressmen and Senators (since no doubt many of the same issues will be involved in the Senate version) as well as the FCC commissioners.

SO I THANK YOU for allowing me this opportunity to place our point of view and information into the official record.

I APOLOGIZE for the annoyance of not having the hardcopy there today and hope that you may see fit to allow us to submit them by mail or hand on Monday.

Sincerely, Christopher Maxwell  
Secretary/Treasurer of the Virginia Center for the Public Press  
<http://members.aol.com/wrfr>  
Wrfr@aol.com  
804-649-WRFR

PS: It is my understanding that Wesle Dymoke and Don Schellhardt will ALSO be submitting Supplemental Statements today -- per Chairman Tauzin's invitation at the February 17 Hearings.

=====  
Acii Text Version follows in case the attachment fails:  
<http://wrfr.pibc.com/dab/HR3439-counter.html>  
=====

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Chair of Subcommittee on  
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COUNTER-REPLY TESTIMONY  
TO THE NATIONAL ASSOCIATION OF BROADCASTERS  
TESTIMONY  
OF

Christopher Maxwell,

Secretary/Treasurer

The Virginia Center for the Public Press

BEFORE THE

U.S. HOUSE OF REPRESENTATIVES

SUBCOMMITTEE ON

TELECOMMUNICATIONS,

TRADE AND CONSUMER PROTECTION

Hearings On  
SPECTRUM MANAGEMENT,  
INCLUDING H.R. 3439  
March 17th , 2000  
WASHINGTON, DC

THE FCC'S RADIO

Dear Honored Representatives of the House,

My name is Christopher Maxwell. I was invited to accompany Mr. Don Schellhardt of the Amherst Alliance to provide testimony regarding the claim by NPR and the National Association of Broadcasters (NAB) that the LPFM stations would cause unacceptable levels of interference.

The title of the hearings actually suggested a much broader related issue, "radio spectrum management." As a potential future LPFM broadcaster, it is certainly in my interest that my listeners be able to hear me. Contrary to suggestions otherwise, we are not devoting thousands of dollars of our own money, time and trouble just to jam the signal of the nearest Rock station. We also want to have an effective signal unhampered by significant interference.

Therefore we also hope that you will be as informed as reasonably possible as you are empowered to help express the needs of the American Public through your vote.

The HR3439 hearings held January 17th, 2000, it quickly bogged down into a discussion as to whether the testimony of the FCC or the testimony of the NAB was the more realistic and believable.

The Federal Communication Commission (FCC) engineer testified that they measure potential interference of a new proposed set of rules under laboratory conditions using harmonic distortion as their measure.

The NAB testified that the proper measure of interference is dB of crosstalk. The NAB engineer then played two soundtracks mixed so that one audio track was 1% of the volume of the other, and purported that this represented what 1% crosstalk interference would sound like.

This went on for slightly over an hour as the audience grew agitated at what is widely perceived to be misleading testimony until Dr. Rappaport nearly jumped from his chair exclaiming, "That's not how FM radio works!"

At this point the Chairman of the hearings, Mr. "Billy" Tauzin (R-La) adjourned the meeting with no resolution to the issue.

Thus this counter-reply testimony focuses on the issue: whose testimony is the more believable?

Is the NAB's testimony using crosstalk as a keystone to their argument the more believable, or is the FCC's testimony, using harmonic distortion the more believable?

The reason this is of paramount importance is not just because of the obvious difference in their motivations the NAB gains or loses money if LPFM stations create competition.

The reason that we want to decide whether the FCC's testimony is more or less credible than the NAB's is twofold:

1. In general, if you can show that misleading testimony was given in one part of an argument, this then calls into question the rest of their argument.
2. In general, a group that stands to gain a lot of money by convincing congress to act on the group's testimony is more likely to give misleading testimony than those who don't have anything to gain one way or the other. This puts the burden of proof firmly on those who do stand to gain money.

It is our contention that the NAB testimony IS MISLEADING.

How? Let us count the 3 ways :

- 1) The NAB themselves defended third-adjacent broadcasting in 1996.

You can verify the results for yourself:

WAVA105.1 in Northern Va. is one of the "Short Spaced Grandfathered" stations cited by the NAB in their comments in the FCC's official record (docket 96-120). [Enclosed]

The NAB cited (see attached page) stations such as 40,000watt WAVA105.1FM and the lack of any interference complaints in the official record for that or any of the other 300+ "short spaced" stations.

The NAB claimed that the increased quality of FM receivers in the last 30+ years since the spacing rules were instituted made the rules "overly restrictive."

Since there were no complaints of interference in the 30+ years since the rules caused these stations to be in violation, the FCC agreed.

The FCC allowed the "Short Spaced" stations such as 40,000 watt WAVA105.1FM in Arlington VA. to continue broadcasting in violation of the spacing rules that made WAVA "Short Spaced" to the other relatively local station 3rd adjacent frequency, 50,000 watt WQSR105.7 a mere 43 miles away in Catonsville MD.

[NOTE:] An LPFM station is nothing but exactly what WAVA is \* a third adjacent station \* but unlike WAVA, an LPFM station will not be allowed to transmit at 40,000 watts. An LPFM station uses the same spacing rules allowed to WAVA \* but only at 100 watts.

[NOTE:] Please see for yourself. Drive around "Short Spaced" WAVA

105.1 in Northern Va., see for yourself that it is not interfering with reception of any other station.

[NOTE:] In fact, you can drive around and see if these other pairs of short spaced Washington area stations interfere with each other either. Low Power FM uses the same rules as the officially short spaced 3<sup>rd</sup> adjacent stations, such as examples as is shown in the table here. Try tuning them in, see for yourself what an LPFM station would sound like KEEPING IN MIND that these stations are many thousands times larger in wattage than an LPFM radio station. WAVA is 40,000watts ... an LPFM is 0.0025 as large as WAVA at 100watts, 1/15th the power of your hair-dryer.

[NOTE:] You may hear some interference between WJFK106.7 and WRQX107.3 because of the additional bleed-over from the IBOC digital carriers. Try some of the other short spaced pairs of stations listed in the table.

(For a larger list and our source for this information, see the enclosed page 35 of 36 excerpted from the NAB comments in the official FCC record on Docket 96-120) \* or click button to see the Adobe Acrobat file (from FCC.gov) that lists some of the Short Spaced stations.

These stations in the table and in the NAB's own supporting documentation are close on the dial and are very near each other. Do they interfere with each other? A drive through test has shown that they do not. Compare their large signal wattage with a 100 watt LPFM station. Would you expect any interference in that case? Under these circumstances, it's obvious you would not.

If we were to take their argument seriously, that HR3439 is designed to prevent a disaster that would result from allowing radio stations to broadcast with only a 400kHz buffer in-between \* then HR3439 also should retroactively ban WAVA, WTOP, as well as hundreds of other short spaced stations and hundreds if not thousands of translators as well!

Furthermore, if the alleged interference caused by less-than-600kHz buffers are really the issue, HR3439 should also ban the proposed In-Band On-Channel Digital Audio Broadcasting proposals that are already causing interference and reduced buffers! (see item #3).

Looking at the graphic representation of the NAB's rhetorical gymnastics over the last four years, we see that not only do reduced buffers **not** appear to be the NAB's real motivation (since the buffers **have** not changed!) \* but the NAB themselves are pressuring the FCC to reduce buffers to nearly zero, and **even** pressuring to allow overlapping signals with a "negative" buffer in some cases.

In 1996, in FCC Docket # 96-120 (enclosed) , the NAB argued that due to advances in receiver technology, the current rules were "overly restrictive." While the NAB is not as glowingly supportive as broadcasters who serve more diverse audiences, such as WCPE, the NAB notably did not suggest that their own existing short spaced stations be taken off the air either!

Public broadcaster WCPE also stated in 96-120 (enclosed) total support for the proposed relaxation of third adjacent restrictions to simply let the rest of us use the bent rules have allowed hundreds of stations such as WCPE to coexist peacefully on third adjacent frequencies.

Then in 1998, since the FCC agreed there was no problem in 1996 \* activists for greater democratic efficiency (more different voices on the public airwaves) argued we should also be able to use third adjacent frequencies, and even offered to come down from WAVA's 40,000 watts to under 3000 watts!

Only two years later in 1998 and the NAB claims it will be a disaster.

And now two years again later (2000) than that and the NAB is arguing that buffers are beside the point with digital IBOC technology. (see below for more information).

2) "FM radio stations don't work like that!!" said Dr. Rappaport, .....nearly leaping from his chair at the hearings in response to the NAB engineer's testimony.

Dr. Rappaport is the James S. Tucker professor of electrical engineering at Virginia Tech, Blacksburg, and have been on the faculty for 12 years. In 1990, he founded Virginia Tech's Mobile and Portable Radio Research Group, one of the world's first research and education centers to specialize in the field of wireless communications. He also serve as Chairman of Wireless Valley Communications, Inc. in Blacksburg, VA.

Dr. Rappaport does not stand to gain or lose any money based on the outcome of these debates. He studied the NAB and the FCC studies and even agreed that there would be very limited interference.

Dr. Rappaport testified that :

My analysis concluded that LPFM will not cause unacceptable levels of interference to existing FM broadcast stations or their listeners. My computer simulations demonstrate that under the conservative proposal adopted by the FCC, in the absolute worst case, if all new LPFM stations used 100 Watts, then at most, 1.6 percent of listeners who could hear a new LPFM station might be unable to receive a currently existing broadcast station.

More importantly, the large majority of the affected listeners would actually be able to receive all current stations, and other affected listeners would be able to receive an incumbent station by simply moving their radios a few feet or by rotating them on their nightstands.

My analysis found that, by using worst case interference assumptions and by relaxing the second and third adjacent channel protections, 626 new LPFM stations could be added in 60 US cities.

My recommendations would have allowed over 81 million new citizen-channels on the FM airways, with a worst case potential interference of 1.2 million citizen-channels (however, since the analysis was worst case, only a small fraction of the 1.2 million citizen-channels actually would have experienced interference of some kind).

However, the FCC adopted a more conservative approach, and insisted that all LPFM stations must obey the existing second adjacent channel projection rule, which reduces the number of new LPFM stations to 247 in the same 60 US markets.

This reduces the number of citizen-channels by almost 300%, and decreases the number of potential interference events by the same factor.

SO Dr. Rappaport agreed in limited part with NAB testimony that there would be some extremely limited interference

\*

And in spite of that very limited agreement, Dr. Rappaport expressed very strong opposition to the misrepresentation of what interference sounds like as provided by the NAB engineer. Dr. Rappaport nearly stood up in the proceedings from his chair, interrupting the NAB engineer only after it became amply

obvious that the hearings would not politely allow a competent technical challenge to the NAB testimony.

Furthermore others who would NOT gain money from ending the LPFM competition, were not allowed to properly address this issue, as Mr. Tauzin adjourned the meeting.

SO THE QUESTION STILL REMAINS. Does the NAB testimony accurately reflect the performance of real FM receivers actually picking up two FM signals simultaneously?

I invite the Congressmen to test whether FM interference is smooth or distorted for yourselves. Does the real world sound anything like the NAB "samples"?

Once again, as with WAVA105.1FM,

If you drive west on I-66, and turn south on I-495, you can pick up two stations for this test.

WPLC94.3FM is a very small station at only 2,000watts over 40 miles WARW from the intersection of I-495 and Highway 50 where the 20,500 watt signal from WARW94.7FM has been recorded intruding on their signal for about 1/16th of a mile.

This recorded sample of actual interference experienced by a radio available by clicking the speaker.

[NOTE:] This sample was taken from a \$25 flea-market purchased third-party car radio tuned to 94.3FM in a moving car heading south on I-495 at the Hwy 50 exit.

[NOTE:] This radio's performance is way below that of most name-brand car radios, and about that of a regular boom box. So a normal car radio would not experience this interference and a boom box user would simply alter the angle of the antenna to tune out the incurring signal. Anything less than a boom box would not be sufficiently sensitive to hear 94.3FM at all thus making it a moot point for radios like walkmen.

This station had been continuously monitored from the Centreville VA exit of I-66 and south of this location and the brief incursion of classic rock (starting at 37 seconds into the clip) you hear on the clip was the only significant interference recorded during the entire time monitoring the station, even after continuing south on I-495.

Note that the signal is so weak, it often cancels itself, or falls just below the threshold of the radio to

detect and creates the intermittent hisses. Those periods of drop-out are not interference, that would happen regardless of any other stations in the area at the limits of the signal's reach.

As you listen to this sample of actual FM interference in the real world, notice a few things:

Is the interaction of the two signals a smooth clean mixing of the two audio tracks?

Our target sample station, the one that the radio is tuned to, the distant 94.3 is playing the Modern Contemporary Music (the foreground music, the guitar strumming). The strong local station 94.7 is playing the Classic Rock song you hear only briefly.

Notice that the pop music is replaced in brief bursts by the distorted oldies rock soundtrack. The first recorded incursion appears at 37 seconds into this clip.

This demonstrates the "capture effect" of FM demodulators \* the FM receiver will lock onto one signal until the other signal absolutely overwhelms it and "jumps" to decoding the other signal, not both signals at the same time.

This jumping can also be rapid like the vibrato on a musical instrument creating a "shimmering" effect that shows distortion, not a smooth crosstalk.

This sample does not sound anything like the "evidence" sample that the NAB provided. You can see from this example (which we urge you to go out and verify with your own radio) that there is significant distortion.

Note that it is levels of harmonic distortion that the FCC used as their measure of alleged interference!

Notice \* the samples provided by the NAB were smooth \* like a studio mixture as if both signals were of equal strength, AND as if both signals were coming from down the block.

In this real example, our target station's signal, the pop music (strumming guitar) on 2000 watt 94.3FM 40+miles away is so weak as to be nearly unlistenable even without the brief incursion of signal bleed over from 94.7FM..

And so you can hear for yourself that the testimonial "samples" mixed together on the NAB engineer's laptop PC are misleading. As Dr. Rappaport said, "That's not how FM radio works!"

This also speaks to one of the questions asked by the Congressmen and never answered, "What is \*acceptable interference\*?"

Nature is not a binary world, it is not day and suddenly completely night. Nature is not completely "on" or "off".  
Radio is no different.

If you then accept that there is no such thing as "no" interference, then it is always a matter levels of "acceptable" interference.

This recording shows that our favored signal, the weak contemporary music station at 94.3FM was so weak and full of noise as to be unlikely to have any significant audience at the point on Highway 495 where 94.7's signal briefly interfered!

And indeed, nobody is complaining to the FCC!!

Therefore since Warrenton VA's 94.3's signal was already too weak to maintain a consistent delivery regardless of interference from Bethesda MD's 94.7FM, the geographically very limited interference you hear on this clip constitutes an example of "acceptable interference".

This clip also illustrates that the NAB testimony involving two sound tracks mixed in a sound PC was misleading, that indeed, "that's not how FM radio works" does best describe the best thing you can say about the NAB testimony.

- 3) Last but very much not least,  
 ...if it can be shown that the NAB coalition is pressuring the FCC  
 ...for changes in the rules that would create massive interference  
 ...by their own stations on others \*  
 ...might not the NAB's expressed interest in  
 ..."spectrum integrity" be in serious doubt?

As you will see (and hear) in the graph and sound recorded from actual signals from WJFK106.7FM in Northern Virginia, this is exactly what is happening.

WJFK106.7FM in Northern Va. is a test station for a new kind of broadcasting called IBOC-DAB (In-Band, On-Channel Digital Audio Broadcasting).

This new kind of broadcasting sends out sound the same way a fax machine sends out a picture, by

converting the sound into little blocks that are on or off. IBOC means that they plan to "hang" the digital signals like saddlebags on the two outer sides of an existing station.

I urge you to test this for yourself, drive West on I-66 again. While in downtown DC, tune your radio into 106.5FM from Baltimore.

At first you will just hear WJFK occasionally stomping the Baltimore signal, then as you go west, you will hear a distinct "buzz saw" sound. Now tune the radio up past 106.7 from 106.5 to and through 106.9FM. You will notice very distinctively that it sounds as if two fax machines were transmitting on two new stations on either side of WJFK.

Actually, (see graphic IBOC BEFORE and IBOC AFTER) that is almost exactly what is happening. There are two digital transmitters (the red blocks) that are transmitting on the immediate adjacent frequencies of WJFK (the analog portion of which is the green triangle).

You can hear those red blocks as you tune up through WJFK and through to the other side.

By Clicking The Speaker Here, you can also hear a recorded clip of a radio tuning down from 107.3FM

\* through the upper IBOC "saddlebag" \* then 106.7's analog signal (the talk program) and then through the lower IBOC digital "buzz saw" sounding "saddlebag" to 105.9FM and back up thru WJFK returning to the contemporary music on 107.3FM.

[NOTE:] What to listen for. This was recorded several miles west of the intersection of Hwy 66 and I-495 where the digital IBOC carriers are extremely strong and destroy 106.5 WWMX completely \* so you are hearing stations on each side that would normally have empty buffer space in between them and WJFK's signal. Instead you hear their signal is now nearly contiguous to WJFK's spread-out signal.

You can hear for yourself what this already means for listeners of WWMX106.5FM out of Baltimore. If you do not hear that buzz ... inquire as to whether the test has been terminated or paused at the time you listened.

Even more amazing, what you are hearing is only the tip of the impending NAB-sponsored interference iceberg of IBOC-DAB!

The NAB coalition is pressuring the FCC to allow that buzz saw to EXPAND, to double in size to 430kHz in bandwidth.

But the sample you hear and the buzz you will hear if you yourself repeat the test mentioned above is only the 70kHz version that theoretically stays within the currently allowed 200kHz bandwidth!

Please realize the vitally important point here that WJFK is testing the absolute most minimal version of the IBOC sideband digital carriers comprising only 70kHz of bandwidth and supposedly positioned to exist within the space on the FM dial normally legally allowed WJFK.

Wait until the full 430kHz bandwidth version is rolled out!! Those stations above and below WJFK are going to have a rough time reaching anyone.

Not only will you never hear WWMX106.5FM from Baltimore again \* you may not even hear several DC stations either!

When the two sample stations featured earlier, 94.3 and 94.7FM expand in width from the current 200kHz bandwidth to 430kHz \* that short bit of interference will expand tremendously in area covered. It may very well be that those two stations will only be heard in their immediate neighborhoods after IBOC expansion.

At least 94.3 and 94.7 here are 43 miles apart \* what is to happen to the listeners of WRQX and WJFK in downtown Washington?

WRQX-DC and WJFK-VA are only 9 miles apart geographically.

And if a buffer space of only 400kHz is going to be a disaster for 100 watt LPFM stations and listeners \* imagine what a disaster the 22,500 watt WJFK and 34,000 watt WRQX stations will be with only 170kHz of buffer in-between!

[NOTE:] Analog LPFM station would never cause this interference because it would be required to operate no closer than the third adjacent FM frequency or "channel" on the FM dial.

In other words, the LPFM as well as the other already existing 300+ "Short Spaced" third adjacent stations (like WAVA105.1FM and like WRQX--WJFK) must maintain a "buffer" of two channels in between themselves and other stations on the local FM dial.

Thus an LPFM would only be allowed at 106.1FM or 107.3 \* and then only if there are another two unoccupied buffer spaces on the other outer sides of those two slots as well.

This means that Washington DC listeners of WVMX106.5FM from Baltimore would still hear their station with LPFMs, but not with the IBOC-DAB in place.

In Conclusion:

The rhetorical gymnastics the NAB are performing for you should win the Olympics. They claim that LPFM is a threat to "spectrum integrity", that is my ability to hear what I want.

And yet 20% of America rely on the smaller noncommercial, college, community and religious radio stations that create programming the large chain stations do not have staff to produce.

These 20% of smaller stations would be utterly destroyed by the brain-child of the NAB (IBOC-DAB) ... thus reducing the variety of choices for consumers ... while LPFM would open vistas of new programming opportunities and the tradeoff under the worst case scenarios show a loss of about 1% of access in exchange for nearly DOUBLING the number of choices.

The NAB is willing to create misleading testimony and "samples" of hypothetical third adjacent stations when there are plenty of real-world third adjacent stations right there in your neighborhood.

Furthermore there are a plethora of options that the NAB could have suggested, they could have suggested a law requiring the incumbent broadcasters to open their Subcarriers to nonprofits as are done for many cable companies with "Cable Public Access."

The NAB could have offered a compromise to do the same with the SAP channel on MTS encoded TV sound signals and also for the new multiplexed signals available under digital.

But ~~did~~ they make these suggestions and offers? No.

Instead they cook up a harebrained scheme to sell us something we don't want (IBOC-DAB) by forcing it upon us in the form of "mandatory sunseting of analog" broadcasting.

DAB has been a market FLOP in Europe where they have a choice, and yet ironically in

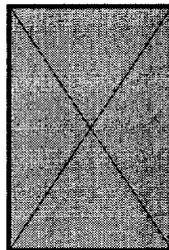
America, supposed land of the free, we may lose that market choice and about half of the smaller niche market stations available now!

Even while they transmit on third adjacent frequencies thus creating room for themselves,

they would deny us equal treatment under the law and regulation; their answer is "There's No Room At The Inn."

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March 17th , 2000

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**[NOTE:]** *An LPFM station is nothing but exactly what WAVA is a third adjacent station but unlike WAVA, an LPFM station will not be allowed to transmit at 40,000 watts. An LPFM station uses the same spacing rules allowed to WAVA but only at 100 watts.*

**[NOTE:]** *Please see for yourself. Drive around "Short Spaced" WAVA 105.1 in Northern Va., see for yourself that it is not interfering with reception of any other station.*

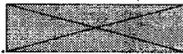
**[NOTE:]** *In fact, you can drive around and see if these other pairs of short spaced Washington area stations interfere with each other either. Low Power FM uses the same rules as the officially short spaced 3<sup>rd</sup> adjacent stations, such as examples as is shown in the table here. Try tuning them in, see for yourself what an LPFM station would sound like KEEPING IN MIND that these stations are many thousands times larger in wattage than an LPFM radio station. WAVA is 40,000watts ... an LPFM is*

0.0025 as large as WAVA at 100watts, 1/15th the power of your hair-dryer.

| Short Spaced<br>First Station                 | Grandfathered FM's<br>Second Station                              |
|---|---|
| WAVA 105.1FM<br>41,000 watts<br>Arlington VA  | WQSR105.7<br>50,000 watts<br>Catonsville MD<br>43 mi NE of WAVA   |
| WTOP107.7FM<br>29,000watts<br>Warrenton VA    | WRQX107.3FM<br>34,000 watts<br>Washington DC<br>43 mi ENE of WTOP |
| WROG 102.5FM<br>3500 watts<br>Winchester VA   | WUSQ102.9FM<br>32,000 watts<br>Cumberland MD<br>44 mi SE of WROG  |
| WJZW 105.9FM<br>28,000 watts<br>Woodbridge VA | WWMX 106.5FM<br>7400 watts<br>Baltimore MD<br>44 mi NE of WJZW    |

**[NOTE:] You may hear some interference between WJFK106.7 and WRQX107.3 because of the additional bleed-over from the IBOC digital carriers. Try some of the other short spaced pairs of stations listed in the table.**

(For a larger list and our source for this information, see the enclosed page 35 of 36 excerpted from the NAB comments in the official FCC record on Docket 96-120) or click button to see the Adobe Acrobat file (from

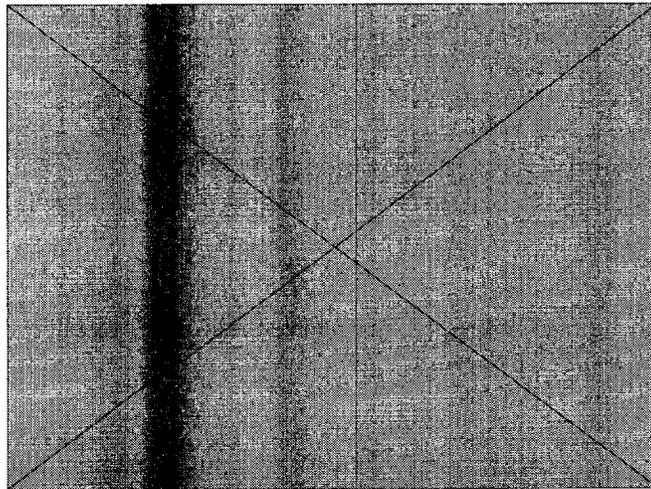
FCC.gov) that lists some of the Short Spaced stations. 

These stations in the table and in the NAB's own supporting documentation are close on the dial and are very near each other. Do they interfere with each other? A drive through test has shown that they do not. Compare their large signal wattage with a 100 watt LPFM station. Would you expect any interference in that case? Under these circumstances, it's obvious you would not.

**If we were to take their argument seriously, that HR3439 is designed to prevent a disaster that would result from allowing radio stations to broadcast with only a 400kHz buffer in-between then HR3439 also should retroactively ban WAVA, WTOP, as well as hundreds of other short spaced stations and hundreds if not**

thousands of translators as well!

Furthermore, if the **alleged** interference caused by ~~less-than-600kHz~~ buffers are *really* the issue, HR3439 should also ban the proposed In-Band On-Channel Digital Audio Broadcasting proposals that are *already* causing interference and reduced buffers! (see item #3).



Looking at the graphic representation of the NAB's rhetorical gymnastics over the last four years, we see that not only do reduced buffers *not appear* to be the NAB's *real* motivation (since the buffers have *not* changed!) but the NAB themselves are pressuring the FCC to reduce buffers to nearly zero, and even pressuring to allow *overlapping* signals with a "negative" buffer in some cases.

In 1996, in FCC Docket # 96-120 (enclosed), the NAB argued that due to advances in receiver technology, the current rules were "overly restrictive." While the NAB is *not* as glowingly supportive as broadcasters who serve more diverse audiences, such as WCPE, the NAB notably *did not suggest that their own existing short spaced*

*stations be taken off the air either!*

Public broadcaster WCPE also stated in 96-120 (enclosed) support for the proposed relaxation of third adjacent restrictions to simply let the rest of us use the bent rules have allowed hundreds of stations such as WCPE to

coexist peacefully on third adjacent frequencies.

Then in 1998, since the FCC agreed there was no problem in 1996 activists for greater *democratic* efficiency (more different voices on the public airwaves) argued we should *also* be able to use third adjacent frequencies, and even offered to come down from WAVA's 40,000 watts to under 3000 watts!

Only two years later in 1998 and the NAB claims it will be a disaster.

And now two years again later (2000) than that and the NAB is arguing that buffers are beside the point with digital

IBOC technology. (see below for more information).

**2) "FM radio stations don't work like that!!" said Dr. Rappaport, nearly leaping from his chair at the hearings in response to the NAB engineer's testimony.**

Dr. Rappaport is the James S. Tucker professor of electrical engineering at Virginia Tech, Blacksburg, and have been on the faculty for 12 years. In 1990, he founded Virginia Tech's Mobile and Portable Radio Research Group, one of the world's first research and education centers to specialize in the field of wireless communications. He also serve as Chairman of Wireless Valley Communications, Inc. in Blacksburg, VA.

Dr. Rappaport does not stand to gain or lose any money based on the outcome of these debates. He studied the NAB and the FCC studies and even agreed that there would be *very limited* interference.

Dr. Rappaport testified that :

My analysis concluded that LPFM will not cause unacceptable levels of interference to existing FM broadcast stations or their listeners. My computer simulations demonstrate that under the conservative proposal adopted by the FCC, in the absolute *worst* case, if all new LPFM stations used 100 Watts, then *at most*, 1.6 percent of listeners who could hear a new LPFM station might be unable to receive a currently existing broadcast station.

More importantly, the large majority of the affected listeners would actually be able to receive all current stations, and other affected listeners would be able to receive an incumbent station by simply moving their radios a few feet or by rotating them on their nightstands.

My analysis found that, by *using worst case interference assumptions* and by relaxing the second and third adjacent channel protections, 626 new LPFM stations could be added in 60 US cities.

My recommendations would have allowed over 81 million new citizen-channels on the FM airways, with a worst case potential interference of 1.2 million citizen-channels (however, since the analysis was worst case, only a small fraction of the 1.2 million citizen-channels actually would have experienced interference of some kind).

However, the FCC adopted a more conservative approach, and insisted that all LPFM stations must obey the existing second adjacent channel projection rule, which reduces the number of new LPFM stations to 247 in the same 60 US markets.

This reduces the number of citizens-channels by almost 300%, and decreases the number of potential interference events by the same factor.

SO Dr. Rappaport agreed *in limited part* with NAB testimony that there would be *some extremely limited* interference

And *in spite* of that *very limited agreement*, Dr. Rappaport expressed very strong opposition to the misrepresentation of what interference sounds like as provided by the NAB engineer. Dr. Rappaport nearly stood up in the proceedings from his chair, interrupting the NAB engineer only after it became amply obvious that the hearings would not *politely* allow a competent technical challenge to the NAB testimony.

Furthermore others who would NOT gain money from ending the LPFM competition, were not allowed to properly address this issue, as Mr. Tauzin adjourned the meeting.

SO THE QUESTION STILL REMAINS. Does the NAB testimony accurately reflect the performance of real FM receivers actually picking up two FM signals simultaneously?

**I invite the Congressmen to test whether FM interference is smooth or distorted for yourselves. Does the real world sound anything like the NAB "samples"?**

Once again, as with WAVA105.1FM,

If you drive west on I-66, and turn south on I-495, you can pick up two stations for this test.

WPLC94.3FM is a very small station at only 2,000watts over 40 miles WARW from the intersection of I-495 and Highway 50 where the 20,500 watt signal from WARW94.7FM has been recorded intruding on their signal for about 1/16<sup>th</sup> of a mile.



This recorded sample of actual interference experienced by a radio available by clicking the speaker.

**[NOTE:]** This sample was taken from a \$25 flea-market purchased third-party car radio tuned to 94.3FM in a moving car heading south on I-495 at the Hwy 50 exit.

**[NOTE:]** This radio's performance is way below that of most name-brand car radios, and about that of a regular boom box. So a normal car radio would not experience this interference and a boom box user would simply alter the angle of the antenna to tune out the incurring signal. Anything less than a boom box would not be sufficiently sensitive to hear 94.3FM *at all* thus making it a moot point for radios like walkmen.

This station had been continuously monitored from the Centreville VA exit of I-66

and south of this location and the *brief* incursion of classic rock (starting at 37 seconds into the clip) you hear on the clip was the only significant interference recorded during the entire time monitoring the station, even after continuing south on I-495.

Note that the signal is so weak, it often cancels itself, or falls just below the threshold of the radio to detect and creates the intermittent hisses. Those periods of drop-out are *not* interference, that would happen regardless of any other stations in the area at the limits of the signal's reach.

**As you listen to this sample of actual FM interference in the real world, notice a few things:**

Is the **interaction** of the two signals a smooth clean mixing of the two audio tracks?

Our **target** sample station, the one that the radio is tuned to, the distant 94.3 is playing the Modern Contemporary Music (the foreground music, the guitar strumming). The **strong** local station 94.7 is playing the *Classic Rock* song you hear only briefly.

Notice **that** the pop music is *replaced* in brief bursts by **the distorted** oldies rock soundtrack. The first **recorded** incursion appears at 37 seconds into this **clip**.

This **demonstrates** the "capture effect" of FM demodulators the FM receiver will lock onto one signal **until** the other signal absolutely overwhelms it and "jumps" to decoding the other signal, *not both signals at the same time*.

This **jumping** can also be rapid like the vibrato on a musical instrument creating a "shimmering" effect **that** shows *distortion*, not a smooth crosstalk.

This **sample** does *not* sound anything like the "evidence" sample that the NAB provided. You can see **from** this example (which we urge you to go out and verify with your own radio) that there is **significant distortion**.

Note **that** it is levels of *harmonic distortion* that the FCC used as their measure of alleged interference!

Notice the samples provided by the NAB were smooth like a studio mixture *as if both signals were of equal strength, AND as if both signals were coming from down the block*.

In this **real** example, our target station's signal, the pop music (strumming guitar) on 2000 watt 94.3FM 40+miles away *is so weak as to be nearly unlistenable even without the brief incursion of signal bleed over from 94.7FM..*

And so you can hear for yourself that the testimonial "samples" mixed together on the NAB engineer's laptop PC are misleading. As Dr. Rappaport said, "That's not how FM radio works!"

**This also speaks to one of the questions asked by the Congressmen and never answered, "What is acceptable interference?"**

Nature is not a binary world, it is not day and suddenly completely night. Nature is not completely "on" or "off". Radio is no different.

If you then accept that there is no such thing as "no" interference, then it is *always* a matter *levels* of "acceptable" interference.

This recording shows that our favored signal, **the** weak contemporary music station at 94.3FM was so **weak** and full of noise as to be unlikely to have any significant audience at the point on Highway 495 where 94.7 s signal briefly **interfered!**

And indeed, *nobody is is on record complaining of interference between short-spaced stations to the FCC!!*

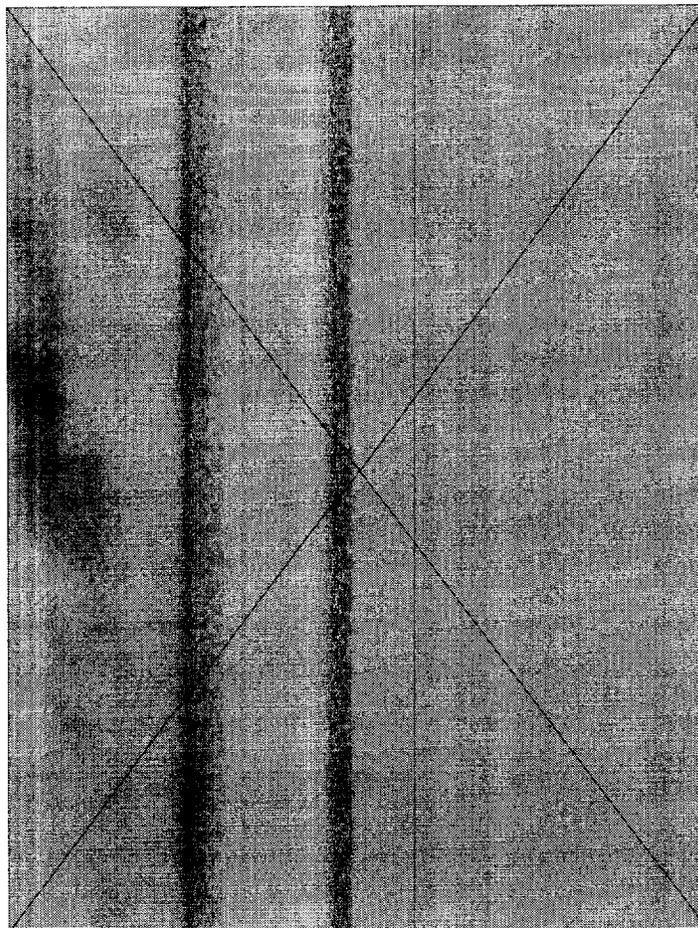
Therefore since Warrenton VA s 2000 watt 94.3 s signal was *already too weak to maintain a consistent delivery* regardless of interference from Bethesda MD s 94.7FM, the geographically very limited interference you hear on this clip **constitutes** and example of "acceptable interference".

**This clip also illustrates that the NAB testimony involving two sound tracks mixed in a sound PC was misleading, that indeed, "that s not how FM radio works" does best describe the best thing you can say about the NAB testimony.**

### **3) Last but very much *not* least,**

**if it can be shown that the NAB coalition is pressuring the FCC for changes in the rules that would create *massive* interference by *their own stations on others* might not the NAB's expressed interest in "spectrum integrity" be in serious doubt?**

As you will see (and hear) in the graph and **sound** recorded from actual signals from WJFK 106.7FM in Northern Virginia, this is **exactly** what is happening.



WJFK106.7FM in Northern Va. is a test station for a new kind of broadcasting called IBOC-DAB (In-Band, On-Channel Digital Audio Broadcasting).

This new kind of broadcasting sends out sound the same way a fax machine sends out a picture, by converting the sound into little blocks that are on or off. IBOC means that they plan to "hang" the digital signals like saddlebags on the two outer sides of an existing station.

For more information, please [visit this link](#) and view some of the Virginia Center for the Public Press comments and reply-comments regarding IBOC-DAB (FCC Docket 99-325).

**I urge you to test this for yourself**, drive West on I-66 again. While in downtown DC, tune your radio into 106.5FM from Baltimore.

At first you will just hear WJFK occasionally stomping the Baltimore signal, then as you go west, you will hear a distinct "buzz saw" sound. Now tune the radio up past 106.7 from 106.5 to and through 106.9FM. You will notice *very distinctively* that it sounds as if two

fax machines were transmitting on **two** new stations on either side of WJFK.

Actually, (see graphic IBOC BEFORE and IBOC AFTER) that is almost exactly what *is* happening. There are two digital transmitters (the red blocks) that are transmitting on the immediate adjacent frequencies of WJFK (the analog portion of which is the green triangle).

You can *hear* those red blocks as you tune up through WJFK and through to the other side.



By Clicking The Speaker Here, you can also hear a recorded clip of a radio tuning down from 107.3FM through the upper IBOC "saddlebag" then 106.7's analog signal (the talk program) and then through the lower IBOC digital "buzz saw" sounding "saddlebag" to 105.9FM and back up thru WJFK returning to the contemporary music on 107.3FM.

**[NOTE:]** What to listen for. This was recorded several miles west of the intersection of Hwy 66 and I-495 where the digital IBOC carriers are extremely strong and destroy 106.5 WWMX completely so you are hearing stations on each side that would normally have empty buffer space in between them and WJFK's signal. Instead you hear their signal is now nearly contiguous to WJFK's spread-out signal.

You can hear for yourself what this *already* means for listeners of WWMX106.5FM out of Baltimore. If you do not hear that buzz ... inquire as to whether the test has been terminated or paused at the time you listened.

**Even *more* amazing, what you are hearing is only the *tip* of the impending NAB-sponsored interference iceberg of IBOC-DAB!**

**The NAB coalition is pressuring the FCC to allow that buzz saw to EXPAND, to *double* in size to 430kHz in bandwidth.**

**But the sample you hear and the buzz you will hear if you yourself repeat the test mentioned above is only the 70kHz version that theoretically stays within the currently allowed 200kHz bandwidth!**

Please realize the vitally important point here that WJFK is testing the absolute most *minimal* version of the IBOC sideband digital carriers comprising only 70kHz of bandwidth and *supposedly* positioned to exist *within* the space on the FM dial normally legally allowed WJFK.

Wait until the full 430kHz bandwidth version is rolled out!! Those stations above and below WJFK are going to have a rough time reaching anyone.

Not only will you *never* hear WWMX106.5FM from Baltimore again you may not even hear

several DC stations either!

When the two sample stations featured earlier, 94.3 and 94.7FM expand in width from the current 200kHz bandwidth to 430kHz that short bit of interference will expand tremendously in area covered. It may very well be that those two stations will only be heard in their immediate neighborhoods after IBOC expansion.

At least 94.3 and 94.7 here are 43 miles apart what is to happen to the listeners of WRQX and WJFK in downtown Washington?

WRQX-DC and WJFK-VA are only 9 miles apart geographically.

And if a buffer space of only 400kHz is going to be a disaster for 100 watt LPFM stations and listeners imagine what a disaster the 22,500 watt WJFK and 34,000 watt WRQX stations will be with only 170kHz of buffer in-between!

[NOTE:] Analog LPFM station would never cause this interference because it would be required to operate no closer than the third adjacent FM frequency or "channel" on the FM dial.

In other words, the LPFM *as well as the other already existing 300+ "Short Spaced" third adjacent stations* (like WAVA105.1FM and like WRQX--WJFK) must maintain a "buffer" of two channels in between themselves and other stations on the local FM dial.

Thus an LPFM would only be allowed at 106.1FM or 107.3 and then only if there are *another* two unoccupied buffer spaces on the other outer sides of those two slots *as well*.

This means that Washington DC listeners of WWMX106.5FM from Baltimore would still hear their station with LPFMs, but *not* with the IBOC-DAB in place.

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### **In Conclusion:**

**The rhetorical gymnastics the NAB are performing for you should**

**win the Olympics. They claim that LPFM is a threat to "spectrum integrity", that is my ability to hear what I want.**

**And yet 20% of America rely on the smaller noncommercial, college, community and religious radio stations that create programming the large chain stations do not have staff to produce.**

**These 20% of smaller stations would be utterly destroyed by the brain-child of the NAB (IBOC-DAB) ... thus *reducing* the variety of choices for consumers ... while LPFM would open vistas of new programming opportunities and the tradeoff under the *worst* case scenarios show a loss of about 1% of access in exchange for nearly DOUBLING the number of choices.**

**The NAB is willing to create misleading testimony and "samples" of hypothetical third adjacent stations when there are plenty of real-world third adjacent stations right there in your neighborhood.**

**Furthermore there are a plethora of options that the NAB could have suggested, they could have suggested a law requiring the incumbent broadcasters to open their Subcarriers to nonprofits as are done for many cable companies with "Cable Public Access."**

**The NAB could have offered a compromise to do the same with the SAP channel on MTS encoded TV sound signals and also for the new multiplexed signals available under digital.**

**But did they make these suggestions and offers? No.**

**Instead they cook up a harebrained scheme to sell us something we don't want (IBOC-DAB) by *forcing* it upon us in the form of "mandatory sunsetting of analog" broadcasting.**

**DAB has been a market FLOP in Europe where they have a *choice*, and yet ironically in America, supposed land of the free, we may lose**

**that market choice and about half of the smaller niche market stations available now!**

**Even while they transmit on third adjacent frequencies thus creating room for *themselves*, they would *deny us equal treatment under the law and regulation*; their answer is "There's No Room At The Inn."**