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# AM Radio's Unique Opportunity



Stations licensed to the U.S. AM radio band are in a time of dramatic change and challenge. In October the Federal Communications Commission took action with a report and order that implements a number of important rule changes. It also laid out additional moves it intends to take.

Paul McLane Editor in Chief

This eBook will help you untangle the details and implications of the big order and understand what else might be coming.

Radio World invited Commissioner Ajit Pai to share with you his thoughts about the revitalization effort to date. I can think of no commissioner since Jim Quello who has taken such an active interest in radio — and AM specifically — as he has.

The translator aspects of the FCC order have been well reported, but how does the situation look now that the first of the four-part window process has begun? Communications attorney and translator guru John Garziglia helps us understand.

The October order enacted more than just translator windows, though, so we turned to AM expert Ron Rackley to dig into the less publicized aspects and analyze them. He discusses day and night community coverage standards, elimination of the ratchet rule, wider implementation of MDCL and more.

Paragraphs 49 to 88 of the order discussed what the FCC proposes to do next, further technical steps that go beyond the rules discussed above. Our longtime contributor Cris Alexander explains these proposals. We're likely to hear a great deal more about some of the ideas discussed there.

Our eBooks are intended to help you do your job, advance in your career and enjoy your profession. Tell me how we're doing and how we might make them even better. Email me at <u>pmclane@nbmedia.com</u>. And if at any time while reading the eBook you wish to read the actual FCC text, I've posted it <u>here</u>.

# AM's Problems Won't Be Solved Overnight

Commissioner Pai writes, "It is important that the discussion about the future of the AM band continue"



**Ajit Pai** was nominated to the FCC by President Obama and in 2012 was confirmed unanimously by the U.S. Senate. He previously worked in the private sector and in all three branches of government, including positions at the FCC, the U.S. Senate, U.S. Department of Justice and a federal court. The son of immigrants from India, Commissioner Pai grew up in Parsons, Kan.

Last October's AM revitalization order was the culmination of three years of hard work by countless AM radio advocates all across the country, including at

the Federal Communications Commission. When I first proposed in the fall of 2012 that the FCC launch an AM Radio Revitalization Initiative, I never expected the issue to take off the way that it did. I've thrown a lot of ideas out there during my time at the commission. But the reaction to the call for AM revitalization has been unique.

It should go without saying that this doesn't have anything to do with me. Instead, it has to do with the continuing importance of AM radio in communities across our country. And it has to do with the widespread recognition that the grand old band is currently facing tremendous problems.

## **TWO-PRONG APPROACH**

These problems were vividly brought home to me when we were in the midst of final negotiations at the commission over the AM revitalization order. That week, I was travelling through the South, driving all the way from Jackson, Miss., to Savannah, Ga., and visiting a number of broadcasters and other communications companies along the way. During those long car rides, I would often flip around the AM dial. It was incredibly difficult to receive a quality AM signal. In some areas, I couldn't find a single AM station. This experience highlighted to me the importance of removing the static surrounding the AM revitalization order.

Much discussion of that order has focused on the issue of FM translators. It's no secret that it was challenging for the commission to reach a consensus here. But we did ultimately reach a compromise. Although the final result wasn't perfect, I hope it will give struggling AM broadcasters a lifeline.

This year, we are opening two windows where AM stations will have greater flexibility to move an FM translator purchased in the secondary market. And later we will open two more windows for AM stations still without an FM translator to apply for a new one.

I've thrown a lot of ideas out there during my time at the commission. But the reaction to the call for AM revitalization has been unique.

Originally, the order that circulated only provided a limited period of time for AM stations to purchase and move FM translators. I had serious concerns with that approach. First, I believed that it would limit the number of AM stations that would be able to obtain FM translators. Second, I was concerned that it would seriously distort the secondary market, giving sellers tremendous leverage over buyers and raising prices. And third, I was worried that it would end up shifting translators from rural areas to urban areas.

That's why I fought hard to include an opportunity for AM stations to obtain new FM translators. I'm optimistic that the resulting two-prong approach will accomplish our goal of distributing FM translators fairly to as many AM stations as want them. It'll also slow the migration of translators from rural to urban areas and limit any distortion in the translator market.



Commissioner Pai is shown at the 2013 fall Radio Show in Dallas, when he proposed an AM Radio Revitalization Initiative. "We should conduct a comprehensive review of all our AM radio rules," he said then. "We should focus on one basic question: Are there regulatory barriers we can remove to help this sector rebound?"

#### **A VITAL BRIDGE**

Some people have asked me why the FM translator issue is so important. After all, translators aren't the answer for the technical problems plaguing the AM band. I agree, and have long said that translators aren't a panacea. But AM's problems aren't going to be solved overnight. An FM translator can serve as a vital bridge to the future for some AM broadcasters as we work on fixing those problems.

Numerous AM broadcasters have spoken to me about the importance of expanding the availability of FM translators. I've heard firsthand how FM translators have helped some stations expand listenership and boost advertising revenue. And I've also heard from others who would like to obtain an FM translator but can't find one. I'm glad that the commission's order directly responds to their concerns.

Of course, the commission's work on AM revitalization is far from over. Last October, we also teed up a number of ideas suggested by stakeholders to help revitalize the AM band. These proposals generally focus on ways to improve AM signal quality and reduce costs for AM stations. I look forward to reviewing the public's input on those ideas. For any that have merit, I hope that the commission will move forward swiftly. And beyond consideration of those specific proposals, we also need to continue the dialogue about the long-term future of the AM band.

Beyond consideration of those specific proposals, we also need to continue the dialogue about the long-term future of the AM band.

To be clear, I don't anticipate that the commission will make any fundamental changes in 2016. But it is important that the discussion about the future of the AM band continue. We need to keep trying to find common ground on the big questions. That will help the FCC move forward faster when the time comes. And that will ensure that AM radio, a communications service older than the FCC itself, thrives well into the 21st century.

# Of Windows, Waivers and Auctions

John Garziglia on what's next for FM translators in AM revitalization



attorney in the AM Branch and a trial attorney in the Hearing Branch of the Mass Media Bureau. For other publications, see <u>www.linkedin.com/in/johngarziglia</u>. As part of this special eBook, tall towers in large markets are now unlikely. In many

**John Garziglia** is a veteran radio and television attorney offering assistance in all areas of FCC law as a partner in the Washington offices of Womble Carlyle. Clients include many with FM translator interests and he holds an interest in two translator licenses. He served at the FCC as an

Radio World has asked me to discuss what the FCC did in its AM revitalization order specifically

regarding FM translators. The process is fast-moving so let's consider the current situation and the schedule for the next two years.

Also, some have asked whether FM translators obtained through AM revitalization will result in an abandonment of the AM band rather than a revival of its fortunes. My view on this is at the end of this eBook story.

## THE FILING OPPORTUNITY

On Jan. 29, 2016, the FCC opened an FM translator modification application filing opportunity for local (Class C) and daytime-only (Class D) AM stations. In stark contrast to current FCC minor modification limitations, an FM translator proposing the carriage of an AM station under this window may move up to 250 miles and relocate on any non-reserved FM band frequency between 92.1 and 107.9 MHz

More than 400 FM translator modification applications were filed on Jan. 29, the first day of the nine-month filing opportunity. Six months later, on July 29, the filing opportunity expands for the final three months until Oct. 31 to include regional (Class B) and clear-channel (Class A) AM stations.

Much of the first-day filing urgency was driven by a concern that the best FM translator frequencies would be taken by other eligible AM stations if not immediately claimed. AM stations that did not file the first day are not necessarily out of luck, however, as FM spectrum availability varies from region to region.

New 250-watt omnidirectional FM translators on

tall towers in large markets are now unlikely. In many spectrum congested areas, however, it is still possible to design an FM translator with a lower power, a directional antenna or stacked antenna bays for a second- or thirdadjacent channel waiver.

The 90 percent or so of AM stations that have yet to take advantage of FM translators under AM revitalization also have the option of waiting until 2017 when the FCC plans to open a new FM translator auction filing window. But, if there are only several prime FM frequencies remaining in an AM station's area, waiting until the 2017 auction filing window could result in being left out, obtaining a less-than-optimal FM frequency, or going into an FCC auction between two or more AM stations.

In that 2017 FM translator auction filing window, if filed applications conflict with one another, it is currently not known whether the FCC will allow for technical settlement amendments other than to adjacent and I.F. channels, potentially reducing the likelihood of obtaining an FM translator without going to auction. Finally, LPFM proponents are asking for the opportunity to file for FM translators in the 2017 auction filing window, which could either slow the opening of the window or lead to increased competition for available FM translator frequencies.

For the remaining time under the 250-mile window, there appears to be a sliding scale of opportunities. For AM stations in spectrum-available areas, waiting until the 2017 FM translator auction filing window may make sense. Why pay to buy and move an FM translator when one may be obtained for just the cost of equipment and construction?

If FM translator prices substantially decrease in the next several months, an AM station should balance the risk of waiting until 2017 with the fairly certain benefit and



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reduced cost of an immediate FM translator acquisition. At some FM translator price point, it will be imprudent for an AM station to wait for the possibly "free" translator. Nothing is absolutely certain with a future FCC FM translator auction filing window.

#### **CHOOSING THE FM FREQUENCY AND INTERFERENCE**

Assuming that an AM station has a choice of FM channels in applying for a 250-mile move, the physical "driving" of available channels in the anticipated coverage area is a valuable exercise. If another FM signal can be heard on a technically available channel or the firstadjacent channel, the choice of that channel must be evaluated both for the potential of the received station curtailing the coverage of the translator, and for the danger of creating interference to bona-fide listeners of the received station. Longley-Rice coverage maps are highly useful in assessing potential FM translator coverage and the chances for interference to and from an existing station.

Even so, there is always the risk that a newlygranted FM translator carrying an AM station as its primary station will interfere with established radio listening. In the past several years, the FCC has received a number of complaints from existing stations alleging interference from FM translators. While some interference complaints have been legitimate, many other complaints claim signal coverage far beyond any listenable area, with the complaints procured from friends, family and advertisers doing a favor. A number of FM

Much of the first-day filing urgency was driven by a concern that the best FM translator frequencies would be taken by other eligible AM stations if not immediately claimed.

translator licensees have spent significant legal fees and resources defending against ill-founded interference complaints.

Under current FCC rules, there are two opportunities for an existing FM station to object to a new or modified FM translator based upon interference.

The first opportunity is at the translator application stage, when an objection may be filed under Section 74.1204(f) of the commission's rules. A Section 74.1204(f) objection establishes that an existing station has legitimate listeners within the proposed FM translator's 60 dBu contour and such listeners, as a matter of undesired-to-desired predicted signal strengths, will be subject to interference. If there are such legitimate listeners within the translator's proposed 60 dBu contour, the FCC will deny a grant of the FM translator application.

The second opportunity for existing FM stations to object to an FM translator based upon interference is under Section 74.1203(a)(3) of the rules once the FM translator is on the air. If actual interference occurs to the regularly-received signal of a bona-fide disinterested listener, the FM translator must remediate



On the left, nestled into a busy multipurpose communications tower, is a new PSI Model FML-2, 3/4 wave-spaced, transmit antenna for the recentlybuilt W252DC in Reston, Va.

the interference if requested by the listener, or — absent successful remediation — power down or leave the air. This is a harsh result that, at least to date, the FCC has been reluctant to order unless there is clear and unrefuted evidence of interference to the regularlyreceived signal of bona-fide disinterested listeners.

Since AM licensees are now applying for many FM translator facilities, it may be time for the FCC to circumscribe borderline translator interference complaints. There are several ways by which the FCC may do so.

The FCC could limit complaints to the first year of an FM translator's operations. It could exclude interference complaints to mobile reception. It could give cognizance only to interference claims within an existing station's protected contour as the limitation on the "protected signal" in Section 74.1204(a)(3) appears to dictate. The FCC has never explained how the word "protected" with respect to signal in Section 74.1203(a)(3) can have a completely different and disparate meaning from the word "protected" defined in the immediately following Section 74.1204 of the FCC's rules. The dictate within the Local Community Radio Act of 2010 that FM translators and LPFM stations remain equal in status may also impact

the commission's rules on interference remediation requirements by requiring that LPFMs and FM translators be treated equally when it comes to interference complaints.

Such limitations on interference complaints would protect an existing station's service area from harmful interference while at the same time safeguarding against the potential disruption of an AM station's enhanced FM translator service caused by ill-founded or untimely interference complaints. The vague interference standards that currently apply to FM translators mean that an AM station putting significant resources into buying and building an FM translator is often a risky proposition.

Going forward into AM revitalization, broadcasters and the radio listening public would be well-served by changes in FCC policies that reduce the risks and bring an expectation of continuing service from FM translators rebroadcasting AM primary stations.

#### **OBTAINING THE ACTUAL 250-MILE** WINDOW FM TRANSLATOR

An AM station taking advantage of the 250-mile window must have an FM translator to move. For noncontingent purchases, existing FM translator licenses and construction permits for 250-mile move applications have become a quasi-commodity. Provided the translator being obtained is within 250 miles, there is nothing else other than the translator's price that really matters. Other translators are being offered on a contingency basis where the seller prices the translator higher based upon a success contingency in effectuating the desired move.

There is an obvious risk to an AM station in purchasing

an FM translator on a non-contingent basis for a 250-mile move application. The modification application, when filed, could be unacceptable for filing due to an earlierfiled conflicting FM translator move application for the same or an adjacent channel. Thus, the pricing advantage of a non-contingent purchase must be weighed against the risk of a non-grant of the modification application.

A modification application can conflict with another modification application filed the same day in which case neither will be granted. For conflicting mutually-exclusive modification applications, the FCC will allow technical amendments and settlements, including a change to any channel that could have been originally filed for, provided such a change is filed prior to the Oct. 31 close of the 250-mile window.

If an AM station should find that its newly-acquired FM translator cannot be successfully moved, the FM translator can potentially be sold to another AM station provided the 250-mile move limit from the translator's original location is observed. It is unlikely that the value of the still-distant FM translator would be fully lost as long as the FM translator is offered for sale well prior to the Oct. 31 closing of the 250-mile window.

#### **CONCLUSION: THE FUTURE OF AM**

So what of the future? When substantial numbers of AM stations are re-broadcast on FM translators, has radio effectively abandoned the AM band?

My view is that FM translators for AM stations are a bridge to the all-digital AM future for some AM stations. Once HD Radio reception capability sufficiently proliferates in automobile receivers so that 40 percent

> or so of the radio audience can receive AM in HD, an AM carried as the primary station on an FM translator may consider taking the plunge and asking for FCC authority for all-digital AM operations.

Many HD reception issues now experienced in the hybrid-AM digital mode will be eliminated by all-digital AM. Stations in larger markets that have robust AM day and night signals, and FM translators, will lead with highquality all-digital AM transmissions. Other AM stations will thrive with simply the addition of significant coverage FM translators. Therefore, FM translators now being obtained by AM stations are an essential building block to future AM band revitalization.

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# **AM DETUNING AND COLLOCATION**



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# This Order Is More Than Just Translators

Here's what the FCC decided in October, apart from the well-publicized windows



**Ron Rackley**, P.E., is a partner in duTreil, Lundin & Rackley. He has worked in AM radio engineering for more than 45 years and is among the pioneers who developed modern computer modeling techniques for antenna and RF network analysis, as used in system design and proofing of antenna radiation patterns. He is a past president of the Association of Federal Communications Consulting Engineers and past recipient of the NAB's Radio Engineering Achievement Award.

Several new rules became effective on Feb. 18, 2016, that can significantly impact AM radio station transmission facilities. In

them, the FCC is taking significant steps to make it easier for AM stations to relocate their transmitter sites to better serve their target audiences.

These changes include modification of the city of license coverage requirements to make wider areas for transmitter site relocation possible and increasing the latitude allowed for radiation efficiency to give more flexibility in selecting tower heights and how large ground systems have to be.

The "ratchet rule" that has penalized stations making changes in their nighttime facilities for 25 years is finally being eliminated. Also, the requirements for maintaining operating power are being changed to make possible reduced transmitter power costs using modern technology that up until recently was in use internationally but not here.

# MODIFICATION OF COMMUNITY COVERAGE STANDARDS FOR EXISTING AM STATIONS

Transmitter site relocation is necessary when stations lose their leases on existing transmitter sites or have them taken by eminent domain. Sometimes, selling land and relocating to new transmitter sites is the course licensees choose to be able to keep their stations on the air while reducing debt. Stations find it difficult to meet the old standard for city of license coverage when they move for several reasons.

For one, many stations are licensed to cities that have grown to have much larger boundaries than when the stations were first licensed. For another, available land for constructing new tower sites has been pushed farther away from downtown areas by development. In virtually all cases, the site selection options of AM stations are limited by requirements in the present rules with regard to city of license coverage that often have little to do with where they have listeners today.

It might seem counterintuitive that decreasing the minimum requirements for city of license coverage can help revitalize AM broadcasting. Shouldn't the FCC rather be requiring increased coverage standards?

Important rule changes are being made now that will improve the flexibility AM radio stations have to choose new transmitter sites and design antennas that can more easily be built.

Well, that might sound nice, but we live far from the Utopia where it would be possible — or even the most desirable thing to do. It is a struggle today for stations to find new sites that can be used at all, and having their hands tied behind their backs by requirements that do not allow optimization of coverage for their listeners where they are, and under the conditions of high man-made noise that they face today, do not help. The fact that so many people listen to AM radio in automobiles while driving in suburban areas today, rather than at home listening to radios in their living rooms (as was the case when the present coverage requirements were enacted), changes the dynamic of the coverage question completely.

Often, urbanized areas are much larger than the actual city limits and the requirements for optimal coverage of them are quite different than those for city of license coverage. Additionally, many stations do not meet the present city of license rule requirement because of areas that have been annexed since the stations were built. See Fig. 1.



Fig. 1: Daytime city of license coverage.

At night, the situation is much worse. Nighttime interference free levels are typically much higher than the 5 mV/m level that is required for daytime city of license coverage, and the slightly reduced 80 percent coverage standard at night of the rules we have had up until now does little to allow for that.

The community of license full coverage concept is an obsolete relic dating from the time 75 or more years ago when the FCC was responsible for rationing frequencies to be used by the very limited number of radio stations that would provide 100 percent of the over-the-air entertainment and information available to the public at the time. Today's situation is radically different from that — with AM stations providing a very small segment of the electronically-delivered audio content available to the public from an increasingly diverse number of over-the-air sources — and the FCC has adopted rule changes to recognize this and allow greater flexibility to see normal business forces guide them in how to best serve their actual audiences:

73.24(i) That, for all proposals for new stations, applications to modify a construction permit for an unlicensed station,

and all applications to change a station's community of license, the daytime 5 mV/m contour encompasses the entire principal community to be served. That, for all other applications for modification of licensed stations, the daytime 5 mV/m contour encompasses either 50 percent of the area, or 50 percent of the population, of the principal community to be served. That, for all proposals for new stations in the 535–1605 kHz band, applications to modify a construction permit for an unlicensed station, or applications to change a station's community of license, either 50 percent of the area, or 50 percent of the population of the principal community is encompassed by the nighttime 5 mV/m contour or the nighttime interference-free contour, whichever value is higher. That, for stations in the 1605–1705 kHz band, 50 percent of the principal community is encompassed by the nighttime 5 mV/m contour or the nighttime interference-free contour, whichever value is higher. That Class D stations with nighttime authorizations need not demonstrate such coverage during nighttime operation.

Unpacking this, it means that existing AM stations filing construction permit applications that do not involve changing the city of license will only be required to cover 50 percent of either the area or population of the city of license in the daytime with a 5 mV/m signal, instead of having to have the daytime 5 mV/m contour enclose the entire city limits, and there is no requirement for nighttime coverage at all. This will make possible much greater flexibility in selecting new transmitter sites for presently licensed AM radio stations when they move.

Note that the daytime change does not apply to new stations operating between 540 kilohertz and 1600 kilohertz, but the new station requirement for nighttime 5 mV/m or interference-free coverage is being reduced from 80 percent of the city of license area to 50 percent of either the area or population. The FCC does not wish to lower the daytime standard for new applicants, but recognizes that nighttime interference-free coverage is generally to a much higher signal level and thus is reducing, but not eliminating, the requirement for nighttime coverage by expanded-band stations and daytime-only stations operating between 540 kilohertz and 1600 kilohertz are unchanged.

## MODIFICATION OF AM ANTENNA EFFICIENCY STANDARDS

Efficiency, as referred to in the context of AM antenna radiation, is not expressed in percent. It defines the field strength level (in mV/m) that is produced without ground loss at a reference distance (1.0 kilometer) from a transmitting antenna with a reference power (1.0 kilowatt) fed into it. It is a measure of how much radiation will be produced for a given power level by a transmitting antenna. Antennas with lower efficiency than others can be made to radiate the same amount of signal by increasing their input power accordingly.

It is very difficult to obtain building permits for new towers, especially near residential areas, because of local land use regulations. Transmitter sites with enough land area to enclose standard quarterwave-long radial wire ground systems are increasingly difficult to find, also. Since both tower height and ground system dimensions impact radiation efficiency, the old minimum efficiency requirements have served to limit site location options for AM stations unnecessarily — since an antenna can be made to produce any desired radiation level by setting its input power level taking into account its known efficiency (subject, of course, to not exceeding the upper power limit specified in the rules for the class of station). See Fig. 2.



Fig. 2: Improving radiation efficiency of very short antennas.

Minimum efficiency requirements have been in the rules for over 75 years and were originally developed to ensure that a minimum amount of service would be provided from each of the scarce AM channel assignments at a time when there were no other electronic media services and AM stations were licensed by transmitter power at discrete levels. Electronic media sources are not scarce today and AM stations are no longer limited to operation with just a few discrete power levels. The minimum efficiency requirements of the FCC rules are no longer necessary.

The rules have been revised to reduce the required minimum efficiency for all classes of AM station by nominally 25 percent, as shown in Fig. 3.

Being located well for serving audiences means being near listeners for AM stations. Local regulation of tower construction — coupled with the availability of land to meet the ground system requirements for minimum efficiency — both work against finding optimal locations. The FCC is changing the rules to give more flexibility in choosing tower heights and ground system dimensions and that should make a wider selection of potential transmitter sites possible for use by AM stations that wish to relocate.

## **ELIMINATION OF THE RATCHET RULE**

The "ratchet rule" refers to Footnote 1 of 73.182(q) that was added in a rulemaking that concluded in 1991:

Those interferers that contribute to another station's RSS using the 50% exclusion method are required to either reduce their contributions to that RSS by 10%, or to a level at which their contributions no longer enter into the 50% RSS value, whichever is the lesser amount of reduction.

This just means that stations that enter into nighttime interference calculations of other stations — something that is perfectly normal and very common in the AM

band — must take steps to reduce such interference contributions, rather being allowed to "grandfather" them, when they make changes. This is true whether the changes are to make voluntary station improvements or are due to forced relocation. The net result has been to discourage station improvements and require coverage reductions by stations that are forced to move.

Since this requirement was added, history has shown that it does not serve its intended purpose of nighttime interference reduction. Rather, it has served as a serious impediment for stations wishing to make modifications to alleviate nighttime coverage difficulties due to noise and man-made interference. Stations

with the greatest opportunity to provide interference-free nighttime service have been the ones harmed the most by this requirement.

The ratchet rule has not improved the nighttime interference-free signals of AM stations; it has instead had the opposite effect. Power reduction is generally the only remedy available for addressing its requirements when radiation must be decreased toward a station that receives theoretical interference located anywhere around a nondirectional station or within the major lobe region of an existing nighttime directional antenna

Class of station	1.0 kW Effective field (at 1 km)		
	New Rules	Formerly	
All Class A (except Alaskan)	275 mV/m	362 mV/m	
Class A (Alaskan), B and D	215 mV/m	282 mV/m	
Class C	180 mV/m	241 mV/m	

Fig. 3: Radiation efficiencies.

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pattern. Stations making changes, whether by moving to more advantageous locations or simply changing directional antenna parameters to provide null fill to better serve suburban areas around their existing transmitter sites, have been forced to decrease their overall coverage. The improvements to the coverage areas of protected stations are relatively small when compared with the signal level lost by stations making changes subject to the ratchet rule, in part because a 10 percent reduction of one contributor to a nighttime interference-free RSS having several contributors, which is generally the case in AM nighttime allocations, results in a smaller than 10 percent reduction in the RSS interference-free level while the station making a change has had to reduce its signal by 10 percent. Changes that could improve AM band nighttime service to the public have been unrealized because of the ratchet rule.

The ratchet rule has tended to penalize stations that have been on the air the longest, and therefore have the lowest nighttime interference levels and largest coverage areas of the stations on their channels. Its purpose was to reduce interference to newer stations that went on the air accepting interference from older stations. The newer stations tend to have higher nighttime interference levels and, therefore, smaller coverage areas than the older stations. It is the older stations, with larger coverage areas, that have the most opportunity to optimize service to the public by modifying their facilities. In general, the improvement in coverage of the newer stations from application of the "ratchet rule" has been minimal and, at best, it is a horrendously inefficient process for trying to improve the overall nighttime service of AM radio stations in the United States.

The FCC is eliminating the footnote that contained the ratchet rule. Good riddance! A new day is dawning for AM stations wishing to move transmitter sites and/or make improvements to their nighttime antenna systems.

#### IMPLEMENTATION OF MDCL TECHNOLOGIES

Modulation-dependent carrier level control is a modern technology that lets a transmitter that is designed for it automatically adjust its power level up and down during the transmission of programming to suit the audio content without requiring that the full carrier power be transmitted at all times. The purpose is to reduce power costs. It has been in use for many years at high-power stations overseas and much research has been conducted in how to set it up to result in significant power savings without noticeable degradation of over-the-air reception.

The issue relative to the FCC's requirements is that power levels sometimes are reduced below the minimum levels specified in the rules for conventional, non-MDCL transmission. In recent years, many modern AM transmitter models have been designed to be able to produce MDCL signals and the FCC has allowed a number of stations to operate using the technology — both experimentally and with waivers of the rules.

Based on the experiences of those early adopters and additional studies of the technology, the FCC is making a rule change so it will be possible for AM stations to transmit using MDCL technology without having to have an experimental authorization or a waiver of the operating power rule:

73.1560 (a) AM Stations. (1) Except for AM stations using modulation dependent carrier level (MDCL) control technology, or as provided for in paragraph (d) of this section, the antenna input power of an AM station, as determined by the procedures specified in § 73.51, must be maintained as near as practicable to the authorized antenna input power and may not be less than 90 percent nor greater than 105 percent of the authorized power. AM stations may, without prior Commission authority, commence MDCL control technology use, provided that within 10 days after commencing such operation, the licensee submits an electronic notification of commencement of MDCL control operation using FCC Form 338. The transmitter of an AM station operating using MDCL control technology, regardless of the MDCL control technology employed, must achieve full licensed power at some audio input level or when the MDCL control technology is disabled. MDCL control operation must be disabled before field strength measurements on the station are taken.

Stations commencing MDCL operation must notify the FCC in the prescribed way within 10 days. Their transmissions must produce the licensed power level at some point in the range of volume of their programming and MDCL must be disabled if field strength measurements are being made on the station's signal.

As a practical matter, it may be only stations operating with higher power that realize significant power savings when factoring in the fixed costs of installing MDCL equipment. But, for those stations, the savings can be considerable over time. This change also fits well with the larger environmental picture by reducing energy usage.

#### CONCLUSION

Important rule changes are being made now that will improve the flexibility AM radio stations have to choose new transmitter sites and design antennas that can more easily be built. There will no longer be a penalty for making changes at night. Some stations will be able to operate with higher power without correspondingly higher power bills.

These changes should fit well with more that are on the way in the Further Notice of Proposed Rulemaking to allow stations to better overcome noise and man-made interference, a topic explored in the next article.

# More Changes Coming in Revitalization Push

Make your voice heard on these additional AM technical proposals from the FCC



**Cris Alexander**, CPBE, AMD, DRB, is director of engineering for Crawford Broadcasting Co., a Radio World contributor and a long-time AM rules reform proponent. He is an SBE Fellow and past recipient of the Robert W. Flanders SBE Engineer of the Year award. His employer is among broadcast companies that filed comments in the AM proceeding.

We are deep into the comment period on the FCC's AM Revitalization Report and Order, Further Notice of Proposed Rulemaking and Notice of Inquiry

issued last October. Comments are due March 21 and reply comments April 18.

While much news coverage to date has focused on FM translators and other decisions the FCC actually made in its R&O, there are additional important changes proposed and questions raised in paragraphs 49 to 88, the FNPRM and NOI.

I have found what people have to say about the initiative to be fascinating. Some say the proposed changes don't go far enough. Some say they go too far. Yet others seem to be satisfied with what has been proposed.

I have my own opinions on the various facets, colored no doubt by my own and my company's interests, but I do think I see the big picture. The question that we must ask for each proposed change must be: "Is this good for the overall health and well-being of the AM broadcast medium?" In an effort to answer that rather subjective question, let's take a walk through the NPFRM and see what the FCC has proposed and asked in each section.

## **TOO MUCH PROTECTION?**

First, and rightly so in my view, is a proposal to modify AM protection standards; and first among the standards to be changed would be Class A nighttime and critical hours protections.

Class A stations, what we used to call the "clears," were originally established to provide wide-area service at a time when radio stations were few and far between. A Class A (then Class I) station, with its quiet channel due to extraordinary interference protections, would go a long way daytime and a really, really long way at night, serving areas that were otherwise unserved. Those stations served their purpose well.

We live in a different day and age now. Radio stations, both AM and FM, are ubiquitous. There aren't many places left in this nation where you can't pick up one or more radio stations. So the question being asked, in essence, is this: Are the protections afforded Class A stations still appropriate and in the public interest?



AM REVITALIZATION Radio World | February 2016 The FCC concludes that the co-channel 100 uV/m groundwave contour and first-adjacent channel 0.5 mV/m groundwave contour protections now afforded Class A stations are appropriate, day and night. It also concludes that critical hours protection of Class A stations should be eliminated.

There are a couple of interesting points here.

What is not dealt with in a firm proposal is nighttime skywave service contour protection for Class A stations. This is, without a doubt, the proverbial "elephant in the room," the one Class A protection that has the greatest impact on co-channel stations. It is interesting that very few Class A station licensees have been vocal on the issue. I think that we are going to have to deal with this issue in this proceeding, one way or the other.

The other interesting point that I noticed is that the FCC, at least in my view and interpretation, contradicts itself in the proposal to maintain the 100 uV/m and 0.5 mV/m groundwave contour protections. Later in the notice, the FCC proposes increasing the daytime primary service contour for all except Class A stations to 2 mV/m in order to "... overcome increased environmental noise." While we all likely understand that Class A stations often play a unique role in emergency communications and situations, if signal levels below 2 mV/m are not useful because of environmental noise for all other station classes, is there something different for Class A stations?



A daytime allocation study exhibit made under the existing rules. The proposed rule changes provide an opportunity to reshape the allocation picture on the AM band, among other benefits.

#### **ROOT-SUM-SQUARE**

Next on the list of proposed changes to AM protection standards is a change in the nighttime RSS calculation methodology.

"RSSing" (root sum squaring) of interfering signals really amounts to adding their powers together at the receive location. The problem is, if you RSS in all the signals, you end up with an unreasonably high night limit, i.e. the signal level that is entitled to protection and which is considered "interference-free." You have to employ some kind of cutoff, and for many years that cutoff had been 50 percent. If the next station to be considered produced a night limit of less than 50 percent of the RSS limit calculated thus far, it was excluded from the calculation along with all other arriving signals below that exclusion threshold.

Back in 1991 the FCC overhauled the AM protection rules, and one of the changes was to lower the threshold for stations considered as interfering to other stations to a 25 percent exclusion and to include first-adjacent channel stations in the interference calculations (previously only co-channel stations were considered). This was in an effort to keep interference levels from climbing, but it did not work. Instead, it handcuffed stations and in many cases made it impossible to produce "interference-free" principal community coverage. In some other cases it actually resulted in more real interference to stations. The FCC recognizes all of this in the FNPRM and

> proposed to roll back the 1991 rule changes having to do with RSS calculation methodology, restoring 50 percent as the exclusion level and eliminating first-adjacent channel stations from consideration in night interference calculations. This is a very good thing and I believe most all commenters will support

it for obvious reasons. For a sample RSS calculation, see page 20.

## 0 DB (1:1)

Moving on down the list we come to the aforementioned change in daytime protection to Class B, C and D stations.

There are several proposed changes in this section, including rolling back changes implemented in 1991. These include returning to a 0 dB (1:1) ratio for first-adjacent channel

Continued on page 21 )





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# Tech Talk: A Real-World RSS Calculation

## by W.C. Alexander

To illustrate the process of determining how a station's RSS night limit is calculated and the difference between 50 percent and 25 percent exclusion, here is a look at a real-world calculation.

First, the night limits of all the stations on the channel are calculated. This is done by determining the bearing, vertical angle and radiation at that azimuth/elevation toward the station being studied. A skywave multiplier is then applied (calculated from the FCC algorithm or determined from the tables in the various agreements with neighboring countries). The result is then multiplied by the appropriate co- or adjacent-channel ratio (20 or 2, respectively) to get the night limit

In the example below, the bearing from KSFO in San Francisco to KLZ is 75.8 degrees True and the vertical angle ranges from 1.95 to 5.46 degrees  $E(\varphi, \theta)$ . The maximum field at that azimuth and within that range of vertical angles from KSFO is 381.8 mV/m, determined by calculating using the directional antenna formula.

The FCC skywave algorithm gives the skywave multiplier for the KLZ-to-KSFO path 20.86 uV/m per 100 mV/m radiated. KSFO is co-channel to KLZ, so the D/U ratio is 20. So the KSFO limit to KLZ is 381.8 / 100 x .02086 x 20 = 1.592 mV/m (differences from the numbers in the table below are due to rounding).

The night limits from all the stations on the channel (and for now, the channel on either side as well) are calculated and sorted in order from highest to lowest.

Next, the limits are "RSSed." We first apply the exclusion to the first limit. In our example, if we are using a 50 percent exclusion, we would multiply the KSFO limit by .5 to get 0.795. If the next possible contributor on the list produces a limit in excess of 0.795, it is included. In our example, the next possible contributor is KLVI with a limit of 1.25, which exceeds the 0.795 threshold. So we find the root sum square of the KSFO and KLVI limits:

# $2.330 = \sqrt{2.024^2 + 1.155^2}$

Our exclusion now becomes 50 percent of 2.024, or 1.012. The next possible contributor is CMIA with a limit of 1.155, which exceeds 1.012, so we RSS it in:

# $2.024 = \sqrt{1.592^2 + 1.25^2}$

Our exclusion now becomes 50 percent of 2.300, or 1.15. The next possible contributor in the list is KRAI with a limit of 1.111, which is below 1.15, so it and all below it are excluded.

The KLZ RSS night limit (50 percent exclusion), then, is 2.33 mV/m. If we set the exclusion to 25 percent, then six more contributors come in to make the KLZ RSS night limit (25 percent exclusion) 3.40 mV/m.

Having long experience with KLZ and its night signal and coverage, I can tell you that the interference-free signal value is right around 2 mV/m, so the 50 percent exclusion limit is much more realistic than the 25 percent figure.

	KLZ	560 kH	lighttime Skywave L Iz 39-50-36N 104-5 Class:B DENVER, CO	imits Study 7-14W BMM-20100513AI . US	LW	
KSFO KLVI CMIA KRAI	L( ) L( ) L( )	560US 560US 560CU 550US	CA SAN FRANCISCO TX BEAUMONT NO CIEGO DE AVI CO CRAIG	BL-19800506AE BL-20030103ACV	1.592 1.25 1.155 1.111	1525 km 1483 km 3181 km 232 km
WVOC WIND	L( ) L( )	560US 560US 560US	SC COLUMBIA IL CHICAGO SO HUATABAMPO	BHM-20130204ACU	1.048 0.982 0.946	2205 km 1488 km 1512 km
VNAX CJKL XEMZA JBC HJGS	L(A ) P(A ) O( A ) O( ) O( )	570US 560CA 560MX 560JM 560CO	SD YANKTON ON KIRKLAND LAKE JA CIHUATLAN NO NAGGO HEAD NO TUNJA 4	BL-19860411AI	0.871 0.812 0.71 0.661 0.654	722 km 2182 km 2297 km 3629 km 4946 km
XESRD CFOS KTRS KVTO VPO	O( A ) O(A U) L( ) L(AUU)	560MX 560CA 550US 560US	DU SANTIAGO PAPASQ ON OWEN SOUND MO ST. LOUIS MO SPRINGFIELD	BL-20040927APC BL-19890817AC	0.638 0.631 0.619 0.614	1644 km 2041 km 1282 km 1071 km
8RG KFYR	D( )	560GY 550US	NO SPARENDAAM ND BISMARCK	DHR-20120020RCK	0.562	5929 km 857 km
KSFO KLVI CHIA	L( ) L( ) O( )	RS9 560US 560US 560CU	S Protection Limits CA SAN FRANCISCO TX BEAUMONT NO CIEGO DE AVI	with Exclusion LIM:1.592 LIM:1.250 LIN:1.155	RSS:1.59 RSS:2.02 RSS:2.33	1525 km 1483 km 3181 km
KRAI HCBN2 WVOC WIND XEVO	L( ) D( ) L( ) L( ) O( A )	550US 560EC 560US 560US 560US	CO CRAIG NO GUAYAQUIL SC COLUMBIA IL CHICAGO SO HUATABAMPO	LIM:1.111 LIM:1.069 LIM:1.048 LIM:0.982 LIM:0.946	RSS: 2.58 RSS: 2.79 RSS: 2.98 RSS: 3.14 RSS: 3.28	232 km 5286 km 2205 km 1488 km 1512 km
WNAX 25% Exclus	L(A ) sion RSS	570US 3.40	SD YANKTON m∀∕m	LIM:0.871 Requires Protection	RSS:3.40 of 0.849	722 km nV∕m
CJKL	P(A)	560CA	ON KIRKLAND LAKE	LIC. NEXT 0.812 218	32 km	

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#### **)** Continued from page **18**

stations (that ratio had been upped to 6 dB), changing the second-adjacent channel ratio to 0 dB (1:1 — the 1991 rules have a 5/5 mV/m prohibited overlap), and eliminating third-adjacent channel protection altogether (the current rule is a 25/25 mV/m prohibited overlap for third-adjacents). These are all good and they will do away with a lot of grandfathered overlaps, particularly with respect to first-adjacent channel stations, that were created as a result of the 1991 rule change.

The other big proposal in this section is a change in the daytime primary service contour for all except Class A stations from 0.5 mV/m to 2 mV/m.

Again, the reason given for this proposal is to overcome increased levels of environmental noise. I generally see this as a good thing and I personally will support it (I actually proposed this change some 25 years ago in comments), but I also see that it can have a detrimental effect on some stations that are unable to take advantage of the change to increase power and/or modify their directional patterns. It can and will also have a detrimental effect on high-power Class B and Class D stations, since those already operating at 10 kW or more won't have the headroom to make the 12 dB power increase. I really expect a wide spectrum of comments on this proposal.

One thing that is conspicuously missing from this section is an increase in the 1 kW power cap for Class C stations. Originally, Class C (then Class IV) stations were licensed at 250 watts and they protected one another as well as Class B stations on adjacent channels to the 0.5 mV/m contour. Then in the mid-1980s, the FCC allowed a mostly across-the-board power increase to 1 kW, day and night. This had the effect of raising the protected contour of Class C stations to 1 mV/m.

If in this proceeding the FCC raises the protected contour to 2 mV/m, Class C stations will need to increase power to 4 kW just to maintain their current desired-to-undesired interference levels. Some Class C stations out west that have some geographic spacing between themselves and spectrum neighbors may be able to go to 5 kW. That would be my recommendation. We certainly should not leave Class C stations out of the mix.

#### **MORE TRANSLATOR BIZ**

The next section in the FNPRM has to do with siting FM cross-service fill-in translators (known in the biz as "AM on FM"). Currently, such translators must have their 60 dBu (1 mV/m) contours completely within the lesser of the parent AM station's 2 mV/m contour or a 25-mile radius centered on the AM site. This is a real problem especially for AM stations with their transmitter sites located some distance outside of town.

# AM Stations With Dual Standard-Band/Expanded-Band Licenses

Call Sign	Community	Frequency
KSMH	West Sacramento, CA	1620 kHz
KAHI	Auburn, CA	950 kHz
KOZN	Bellevue, NE	1620 kHz
KZOT	Bellevue, NE	1180 kHz
WTAW	College Station, TX	1620 kHz
KZNE	College Station, TX	1150 kHz
KYIZ	Renton, WA	1620 kHz
KRIZ	Renton, WA	1420 kHz
WDND	South Bend, IN	1620 kHz
WHLY	South Bend, IN	1580 kHz
KKGM	Fort Worth, TX	1630 kHz
KHVN	Fort Worth, TX	970 kHz
KRND	Fox Farm, WY	1630 kHz
KJUA	Cheyenne, WY	1380 kHz
KDIA	Vallejo, CA	1640 kHz
KDYA	Vallejo, CA	1190 kHz
KZLS	Enid, OK	1640 kHz
KCRC	Enid, OK	1390 kHz
КВЈА	Sandy, UT	1640 kHz
КТКК	Sandy, UT	630 kHz
KBJD	Denver, CO	1650 kHz
KRKS	Denver, CO	990 kHz
KCNZ	Cedar Falls, IA	1650 kHz
KCFI	Cedar Falls, IA	1250 kHz
KSVE	El Paso, TX	1650 kHz
KHRO	El Paso, TX	1150 kHz
WHKT	Portsmouth, VA	1650 kHz
WPMH	Portsmouth, VA	1010 kHz
WCNZ	Marco Island, FL	1660 kHz
WVOI	Marco Island, FL	1480 kHz
KWOD	Kansas City, KS	1660 kHz
KYYS	Kansas City, KS	1250 kHz
WWRU	Jersey City, NJ	1660 kHz
WJDM	Elizabeth, NJ	1530 kHz
WOZN	Madison, WI	1670 kHz
WLMV	Madison, WI	1480 kHz
KGED	Fresno, CA	1680 kHz
KXEX	Fresno, CA	1550 kHz
WOKB	Winter Garden, FL Winter Garden, FL	1680 kHz 1600 kHz
WTTM	Lindenwold, NJ Princeton, NJ	1680 kHz 1350 kHz
KNTS	Seattle, WA	1680 kHz
KLFE	Seattle, WA	1590 kHz
KFSG	Roseville, CA	1690 kHz
KLIB	Roseville, CA	1110 kHz
WEUP	Huntsville, AL Huntsville, AL	1700 kHz 1600 kHz
WJCC WNMA	Miami Springs, FL Miami Springs, FL	1700 kHz

The FCC proposes to change the rule to the greater of those same two criteria instead of the lesser. This would be perfect if the FCC hadn't also thrown in another restriction that the translator's 1 mV/m contour cannot extend beyond a 40-mile radius centered on the AM site.

That restriction is going to be a killer for stations with a large 2 mV/m contour radius. Why shouldn't an AM station that puts a 2 mV/m contour over a community 50 miles away be able to site a fill-in translator in that community? Hopefully we will see a lot of comments in support of the "greater of" change but in opposition to the 40-mile restriction.

#### **SIMPLER PROOFS**

The next two sections have to do with proofs.

First, the FCC proposes to further pare down the partial proof requirements to include only monitored radials (i.e., those that have a licensed monitor point on them). The current partial proof rule requires that adjacent radials also be included if there are fewer than four monitored radials. This is a good proposal and will reduce the burden on and cost to many AM licensees, a good number of which may be avoiding running a needed partial proof because of the trouble and costs.

Next the FCC deals with a laundry list of items with respect to method-of-moments (MoM) proofs and recertifications. Since the MoM proof rules went into effect in early 2009, we as an industry (and consulting engineers in particular) have learned a great deal about what in the MoM rules works and what doesn't, what's necessary and what isn't. Many of these items were dealt with in a public notice a few years ago, and I won't deal with them here. The FCC seeks to codify these changes.

There is one change that commenters to the underlying AM Revitalization NOI requested that is specifically not proposed in the FNPRM: elimination of the requirement for reference field strength measurements.

Having done a lot of MoM proofs and recertifications over the last almost seven years, the one thing that takes

the most time is making the reference field strength measurements. There is no requirement for maintaining any specific field strength or cap in the rules, so the measurements are really pointless.

I can understand and perhaps even support making the measurements as part of the initial proof. That makes the fields part of the permanent record so that engineers can at least see if things are in the ballpark when there is a question. But the requirement to repeat the measurements in the biennial recertification should be dropped. It is a big waste of time, effort, money and fossil fuel.

#### **ARE YOU MOVING OR NOT?**

Finally, the FCC has at long last gotten around to proposing that those expanded-band licensees who requested and received waivers of the requirement to submit either their parent regular-band or expandedband station license make a choice and submit one or the other for cancellation.

My personal feeling is that this is a very good thing. For one thing, my company complied with the sundown rule in a timely manner and submitted its standard-band parent station license. Also I'd simply like to see the migration to the expanded band complete. Arguably those 25 expanded-band licensees who have held onto their standard-band parent station licenses have not migrated. (See the list on page 21.) I hope we can wrap this up and perhaps, as the notice of inquiry that follows the FNPRM suggests, open up the expanded band for further development.

These proposed AM rule changes without a doubt represent our "last best chance" to revitalize AM. With them we have the opportunity to reshape the allocation picture on the AM band, improve both coverage and signal levels within coverage areas, improve signal-tonoise ratios, open more opportunities for AM-on-FM cross-service translators, streamline partial and MoM proof procedures and reduce the burdens thereof, and wrap up the expanded band migration. It's going to be interesting to see what happens.

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