

Advanced Television Broadcasting Alliance

July 11, 2014

VIA ECFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12TH Street, SW
Washington, DC 20554

RE: FCC's Office of Engineering and Technology (OET) *Public Notice*, DA 14-852, ET Docket No. 14-14, GN Docket No. 12-268, released June 20, 2014, seeking comment on measurements of Long-Term Evolution (LTE) interference into digital television (DTV) receivers.

Comments Solicited on Inter-Service Methodology Prediction

As stated on the first page of the above-referenced *Public Notice*, the OET, in an earlier *Public Notice*,¹ invited comment on the methodology for predicting inter-service interference between wireless and digital television operations. In response to this earlier *Public Notice*, several commenters raised a number concerns, and among them are some of the assumptions and the lack of empirical data to arrive at the FCC interference analysis methodology.² In April 2014, OET engineers tested the characteristics of LTE-into-DTV interference, and the results of those measurements are presented in a report attached to the *Public Notice*.³

In addition, the Consumer Electronics Association (CEA) submitted measurements of LTE to DTV interference on six newer model television receivers and two older model receivers.⁴ OET now seeks comments on the measurements and observations discussed in both Reports. Specifically, OET seeks comment on whether its measurements, in conjunction with CEA's measurements, support the desired-to-undesired signal (D/U) ratios, the off-frequency rejection (OFR) factor, and the assumed effective radiated power (ERP) power adjustments that appear in Tables 8, 9 and 10 of its earlier *Public Notice*. OET also seeks comments on the

¹ See *Office of Engineering and Technology Seeks to Supplement the Incentive Auction Proceeding Record Regarding Potential Interference Between Broadcast Television and Wireless Services*, GN Docket No. 12-268, ET Docket No. 14-14, *Public Notice*, 29 FCC Rcd 712 (2014).

² OET states that several parties raised concerns about the assumptions which form the basis for the D/U ratios of Table 8, the OFR values of Table 9, and the assumed effective radiated power (ERP) in Table 10 of this earlier PN. NAB is one of the parties listed as having such concerns. NAB respectfully reminds the FCC and OET that the concerns raised in its earlier comments with regard to the interference prediction methodology went beyond those matters listed in the three tables.

³ See FCC/OET Report TA-2014-01, *Measurements of LTE Into DTV Interference* (June 17, 2014).

⁴ See Letter from Julie Kearney, CEA, to Marlene H. Dortch, FCC, GN Docket No. 12-268, ET Docket No. 14-14, (filed May 22, 2014).

relevance of the measurements associated with the 2007 model from the FCC measurements and the two 2006 models included in the CEA measurements.

The ATBA

The Advanced Television Broadcasting Alliance (ATBA) is an organization comprised of hundreds of low-power television (LPTV) broadcasters, owners and operators of translators, and allied industry organizations and companies.

The ATBA welcomes the opportunity to submit these Comments to respond to the FCC's OET Public Notice, DA 14-852, released June 20, 2014, seeking comment on measurements of LTE interference into DTV receivers.

As the FCC moves towards establishing a framework for resolution of the myriad complex issues posed by the incentive auction process, the ATBA submits these Comments to reiterate the factors that should drive the FCC's approach to the auction with respect to LPTV stations and translators. Most of these principles apply equally to all aspects of the auction with regard to minimizing the interference from new LTE systems into DTV signals.

The FCC has consistently held that the public interest is best served by a broad diversity of ownership, maximizing the number of signals and independent "voices" available to citizens, permitting those with less access to capital nonetheless to access the airwaves, and extending service to unserved and underserved areas.⁵ The nation's robust and diverse LPTV and translator industry epitomizes achievement of the FCC's ambitious goals for the broadcasting service. ATBA members provide diverse voices, offer niche programming, and extend full power network and independent stations' free over-the-air television service to areas that otherwise would be unserved.⁶

Regardless of how Section 6403(b)(5) of the Spectrum Act⁷ is interpreted, the ATBA's position is that the Commission's auction planning must consider the impact on LPTV and translator service at every stage of the auction, from planning and execution of the auction, including planning factors to minimize interference from LTE systems to all television licensees in the repacked television portion of the UHF band. The FCC should undertake all reasonable efforts to preserve LPTV and translator facilities to the greatest extent possible. Congress has not

⁵ See, e.g., *In the Matter of Policies to Promote Rural Radio Service and to Streamline Allotment and Assignment Procedures*, 26 FCC Rcd 2556 (2011); see also 47 U.S.C. § 307(b) ("the Commission shall make such distribution of licenses ... as to provide a fair, efficient, and equitable distribution" of service); *In the Matter of Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, 20 FCC Rcd 2755 (2005) (significant public interest benefits include "increased service to unserved or underserved" areas").

⁶ LPTV stations are operated by diverse groups and organizations, including high schools and colleges, religious groups and churches, local governments, large and small businesses, and individual citizens. The programming of LPTV stations fosters diversity. LPTV stations broadcast both local fare and religious programming (through a variety of faith groups/denominations). LPTV stations serve segments of our communities that are not served well by other outlets. LPTV modes of operation and programming also vary widely and include satellite-delivered programming services, syndicated programs, movies and a wide range of locally-produced programs.

⁷ Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. 112-96, H.R. 3630, 126 Stat. 156 (enacted Feb. 22, 2012) ("Spectrum Act"), 47 U.S.C. § 1452(b)(5).

authorized the FCC to disenfranchise LPTV and translator stations simply for the sake of repurposing spectrum that is not actually needed to accommodate broadband growth.

In calculating the effects of LTE into DTV interference, the FCC must pay particular attention to the impact of LTE interference on LPTV and translator stations. These stations are much more vulnerable to LTE signals because of the lower power differentials between the desired and undesired systems.

Methodology

A statistical simulation model has been developed based on the Monte-Carlo method by the European Conference of Postal and Telecommunications Administrations (CEPT), named Spectrum Engineering Advanced Monte Carlo Analysis Tool (SEAMCAT).⁸ This system calculates the interference probability in victim receiver in SEAMCAT. When interference is introduced, the interference adds to the noise floor. The difference between desired received signal strength (dRSS) and the interfering received signal strength (iRSS) is measured in dB, which is defined as the Signal to Interference ratio(C/Itrial). This ratio must be more than the required C/I threshold (C/I target) if interference is to be avoided. The Monte Carlo simulation methodology is used for verification and records whether or not interference is occurring.

The Cases of LTE Base Station Interfering with DTV is very different than the case of LTE handsets interfering with DTV receivers. Both of these conditions need to be studied.

ATBA Position

The ATBA believes that this initial inter-service interference issue testing provides a good first step in the study of the technical aspects of inter-service sharing between broadcast and wireless operations. However, the issue of inter-service interference goes well beyond the measurement of DTV receiver performance in the presence of LTE interference. For broadcasters, the issues are how this information will be used and what rules and regulations will apply to wireless operations in order to protect TV viewers. Also to be determined, does the received signal make a difference if it is transmitted from a LPTV station? Unfortunately, the latest Public Notice sheds little light on how the FCC will use the result of these measurements to determine the technical rules and regulations that will eventual apply to inter-service sharing. Until such specific sharing rules are proposed, the ATBA can only limit its observations on the methodology used to conduct these measurements and the validity of the data presented but cannot adequately analyze the impact and use of such studies in developing inter-service policies and rules. The ATBA looks forward to the release of a Commission NPRM that addresses interference the sharing rules between the two services, and impact on LPTV services.

⁸ See *Analysis of Interference Impact of LTE on DTV*, Inkyoung Cho, Ilkyoo Lee, and Younok Park, MulGraB, Part 1, CCIS 262, pp 344-350, Spring-Verlag Berlin Heidelberg (2011).

Discussion on Measurements

The ATBA concludes that these measurements do not support the interference protection levels identified in the original Public Notice. ATBA also suggests that additional testing and studies be undertaken to better address the inter-service interference issue. These new studies need to take into account factors such as multiple LTE interferers, degradation of DTV receiver performance from third order intermodulation (IM3) interference and real-world transmitter splatter to determine the appropriate interference protection for both services. Clearly the results of both the FCC and CEA tests demonstrate significant variability in receiver performance and the need for more rigorous testing. Such testing needs to include an adequate sample size of old and new receivers and must go beyond testing DTV receiver performance under best-case single impairment conditions to include real-world DTV signal reception conditions with multiple impairments.

Therefore the ATBA supports the need for additional testing and analysis, and additionally, the ATBA continues to believe that a simpler distance approach for inter-service sharing is far more appropriate, and ultimately is more in keeping with the FCC's desire to move expeditiously with the auction, and may have a lesser impact on LPTV stations.

The ATBA believes that:

1. Mobile Hand held Radios Being Used in Nearby Proximity Have Not Been Replicated in any Test, Especially Adjacent Channel, and by Definition, May Not be Able to be Tested.

2. The Selection of TV Receivers Tested Does Not Represent Receivers that are Currently Used by Viewers, and the Interference Protection Levels Should Include Data From All the Receivers Tested; the Development of any Protection Criteria Needs to be Based on a Representative Sample of all DTV Receivers Being Used by Consumers.

As has been previously noted in the record of this proceeding, more and more receivers deployed in the field have inferior rejection as compared to the prototype that was used in initial testing.⁹ The ATBA believes that measurements receivers from 2008 to 2011 should be included as part of the sample.

3. Using "clean" laboratory generated desired and undesired signals that discount the effect of Real-World Transmitter Splatter and Non-linearity induced by third order intermodulation product Underestimates the Interference Protection Levels.

Ignoring real world conditions when conducting interference testing will naturally underestimate the interference measurement and the protection levels needed to protect both services. The ATBA, therefore, urges the FCC and CEA to conduct additional tests that take this real world factors in their testing.

⁹ See, e.g. Comments of Sinclair Broadcast Group, Inc., ET Docket No. 14-14, GN Docket No. 12-268 (filed March 18, 2014).

4. The Effect of Interference from Multiple DTV or Wireless Sources Needs to be Considered in Determining DTV Interference Protection Levels.

At the very least, in the absence of additional testing that interfering wireless signals be treated similar to DTS and all interfering signals from all base stations should be taken into account and added using the RSS method.

5. The Effect of IM3 Interference Needs to be Taken Into Account.

Given the large number of base stations and handsets in a typical wireless deployment, the probability of having multiple interference sources and of this type of interference occurring is high under the Commission's variable plan approach.¹⁰

6. FCC and CEA Measurements and Test Results Do Not Support the D/U Protection Values or Off-Frequency Rejection Values.

The FCC has proposed that the repacking of television broadcast spectrum will include some variation in the amount of recovered spectrum. This means that there will be signals from co-channel and adjacent channel LTE operations into DTV signals in certain markets and that clear rules and regulatory measures need to be in place to avoid inter-service interference from wireless to broadcast operations. Such rules need to be based on the performance of all DTV receivers being used by consumers and must be representative of that performance in the presence of "real world" conditions, including transmitter splatter, multiple interfering signals and impairments.

7. The Proposal Assumes Unrealistic Wireless Base Station Transmitting Specifications.

The technical specifications presumes that wireless operators will operate in a band that has been touted for its ability to cover wide areas in a manner that significantly reduces their wireless coverage and therefore interference potential despite the fact that higher power and transmit antenna parameters are permitted under the rules. As pointed out in our earlier comments, interference protections need to be based on wireless transmitting facilities that are consistent with the recently adopted rules and better reflect actual wireless operations.

8. Consistent with the Commission's obligation to protect and promote LPTV and translator service in the public interest, we commend the FCC in crafting the proposed LTE to DTV interference minimization rules, and additionally, urge the following measures:

¹⁰ In developing the original DTV Table of Allotments, the DTV-to-DTV IM3 interference situation was minimized through the use of spacing requirements that ensured adjacent channel operations were either co-located or sufficiently distant to reduce the probability of equal power situations and thereby minimize IM3 interference. Any repacking of DTV should also implement similar spacing restrictions to reduce this situation from a DTV-into-DTV interference perspective. Such an approach would not work for wireless operations where the Commission does not restrict or authorize the location of base stations or handsets. In this case, new and added margin in the protection criteria is the only way to minimize interference.

Feasibility Checks and Optimization Planning. Should the FCC adopt an auction format that relies on repacking “feasibility checks” between bidding rounds,¹¹ the staff should be required to assess the net impact on LPTV and translator facilities. This becomes more important to LPTV in the power relationship to LTE stations. The Commission must leave a reasonable amount of “headroom”, both to account for inevitable errors in replication of predicted coverage areas for full power stations, but also to provide a reasonable opportunity for displaced LPTV and translator stations to find displacement channels. In addition, any post-auction “optimization” phase should permit adequate time for selection of optimization scenarios that preserve the greatest degree of LPTV and translator service.

The need to consider LPTV and translator impact during the feasibility checking and optimization phases is a prime example of why it is imperative that the FCC undertake a rulemaking proceeding to address LPTV issues *now*, before final resolution of other auction issues. With the statutory deadline for the auction still eight years away, the FCC has more than ample time to consider LPTV and translator issues and still conclude the auction at an early date.

Full Transparency. Finally, ATBA joins other commenters who have noted that the FCC must design and conduct the auction, repacking and displacement processes with the utmost transparency. Critically important decisions that are, in actual effect, agency rules, should not be delegated to the staff. They should be voted on by the full Commission. Similarly, the FCC must release all software, manuals, procedures, selection criteria and all other data, information and factors that it will employ in the conduct of the auction for public comment well in advance of the auction. It must release final versions of the same materials, must strictly adhere to those published rules in the conduct of the auction, and must give the public the opportunity to review all intermediate decisions made during the auction. Unlike prior auctions, in which the parameters of what was being auctioned were fixed and known well in advance of the auction, the FCC staff here will be making a series of subjective value judgments. Interested parties have a right to know the foundation or rules on which those judgments will be made, and the agency must be accountable for adherence to those rules. These same rules of full transparency need to be in force for LTE into DTV testing as well. The types of receivers and all the technical parameters need to be well understood.

The ATBA acknowledges the complexity of the task Congress has given to the Commission, and urges the Commissioners and staff to work with us constructively to find solutions that adhere to the statute and respect the interests of all stakeholders.

Respectfully submitted,

/s/

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¹¹ See *Incentive Auction Task Force Releases Information Related to Incentive Auction Repacking*, GN Docket No. 12-268, ET Docket No. 13-26, Public Notice, 28 FCC Rcd 10370, 10371 (WTB 2013).