

ASSOCIATION OF

# FEDERAL COMMUNICATIONS CONSULTING ENGINEERS

WASHINGTON, D.C.

Before The  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

In the Matter of )  
)  
Media Bureau Seeks Comment on Joint )  
Petition for Rulemaking of America's )  
Public Television Stations, The AWARN )  
Alliance, The Consumer Technology ) GN Docket No. 16-142  
Association, and The National Association )  
of Broadcasters Seeking To Authorize )  
Permissive Use of The "Next Generation )  
TV" Broadcast Television Standard )

### Ex Parte Comments of AFCCE

Established in 1948, the Association of Federal Communications Consulting Engineers ("AFCCE") is an organization that includes approximately 60 full members who are Registered Professional Engineers engaged in the practice of consulting engineering and over 100 members in allied fields of endeavor before the Federal Communications Commission. AFCCE members were involved in the development of the original television transmission system in widespread use in the U.S. (NTSC), the current transmission system (ATSC), and are involved in the development of Next Generation system.

In a recent Petition for Rulemaking,<sup>1</sup> Joint Petitioners asked the Commission to authorize a Next Generation Television broadcast transmission standard and specified certain Rule changes that would be necessary to achieve that result. AFCCE fully supports the proposals set forth in the Petition with regard to authorization of the System Discovery and Signaling Layer of ATSC 3.0 (Standard A/321) as an optional transmission standard that can be utilized by television licensees, and believes that based on known technical data<sup>2</sup> present interference protection requirements are

<sup>1</sup> America's Public Television Stations, The AWARN Alliance, The Consumer Technology Association, and The National Association of Broadcasters, Joint Petition for Rulemaking, April 13, 2016.

<sup>2</sup> It is understood that the following experimental special temporary authorities have been issued. Cleveland channels 9 and 31; Baltimore and DC channel 43; Las Vegas channel 45; Raleigh channel 39 and the just announced Sinclair readies upgraded 3.0 testing. AFCCE looks forward to reviewing the technical data associated with these tests.



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adequate to prevent interference between ATSC 3 systems, between ATSC 1 and ATSC 3 systems, and between ATSC 3 and wireless LTE systems.

AFCCE believes that Next Generation TV offers an opportunity to transform over-the-air broadcast television and finally realize the promise of broadcast/broadband convergence. Without regulatory permission, wireless companies have long been able to periodically upgrade their transmission technologies to realize improved efficiencies and implement new services, but television broadcasters have been locked into a technology that is two-decades old. Authorization by the FCC of ATSC Standard A/321 is a step toward correcting this competitive imbalance, and will allow consumer marketplace forces rather than regulatory mandates to decide the pace of conversion to ATSC 3, or indeed, whether that conversion occurs at all.

In its reply comments,<sup>3</sup> CTIA expressed concern about the interference impact that ATSC 3 technology could have on wireless operations in the 600 MHz band. The April 8, 2016, report of Meintel, Sgrignoli, & Wallace<sup>4</sup> (“MSW Report”) demonstrates that under the conditions tested the interference potential of ATSC 3 is likely to be no greater than that of ATSC 1. Fundamentally, all digital communications systems, including ATSC 1, ATSC 3, and LTE, include signal processing so that the signals transmitted have the properties of random noise. This processing helps maximize the capacity of the transmission channel and thereby the spectral efficiency of the transmission by maximizing the entropy of the source.<sup>5</sup> Because the systems are all noise-like, the co-channel interference potential of each is very similar under the same conditions and very little variation in interference potential would be expected between ATSC 1 and ATSC 3. The MSW Report addresses specifically co-channel, adjacent-channel, and out-of-band emissions from an ATSC 3 transmitter.

With respect to co-channel interference, three parameters are relevant: occupied bandwidth, in-channel power, and peak-to-average power ratio. As noted in the MSW Report,<sup>6</sup> because the occupied bandwidth of ATSC3 is slightly greater than that of ATSC 1 but the total power is the same, the power density over the occupied portion of the 6 MHz TV channel is

<sup>3</sup> <https://ecfsapi.fcc.gov/file/1062775838804/CTIA%20ATSC%203.0%20Reply%20Comments.%206.27.16.pdf>

<sup>4</sup> Appendix B of Joint Petition.

<sup>5</sup> W.H. Tranter, “Coding for Error Detection and Correction,” in K. Feher, *Digital Communications*, Englewood Cliffs, NJ: Prentice-Hall, 1983.

<sup>6</sup> Appendix B, pages 2 and 13. The occupied bandwidth of ATSC 3 is about 8% greater than ATSC 1.



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slightly less than with ATSC 1. This reduction in power density would be expected to slightly reduce the likelihood of interference of ATSC 3 into wireless OFDM systems, such as LTE, at least when the channel overlap between the two systems is less than 100%.

Because OFDM systems inherently have large crest factors,<sup>7</sup> peak-to-average power ratio (PAPR) and crest factor reduction schemes are essential to realizing practical transmitters. These schemes, which are also incorporated into transmitters used by the wireless industry, will ensure that power excursions in ATSC 3 transmissions are not significantly greater than with ATSC 1. The MSW Report states that the PAPR of ATSC 3 transmissions is about 2.5 dB greater (at 99.9% statistical level) than for ATSC 1 transmissions, making the ATSC 3 interference potential “essentially the same” as Additive White Gaussian Noise (“AWGN”).<sup>8</sup> AWGN is the type of interfering signal specified in the LTE receiver standard,<sup>9</sup> which was the basis for the FCC’s interservice interference (ISIX) analysis.<sup>10</sup> Therefore, it appears that the FCC’s ISIX analysis is adequately protective of LTE wireless receivers for ATSC 1 or ATSC 3 operations that are co-channel or partially co-channel.

With regard to adjacent-channel and out-of-band emissions from ATSC transmitters, no change to the existing DTV emission mask<sup>11</sup> is requested or contemplated. Since the permitted levels of out-of-band emission from television transmitters are unchanged, the interference potential of ATSC 3 transmissions should be no greater than that of ATSC 1 when the affected wireless receiver is not co-channel.

In view of the foregoing, AFCCE finds no technical reason to delay the continued processing of the authorization of the ATSC 3 transmission standard, and urges the Commission to take the requisite actions necessary for expedited consideration.

<sup>7</sup> [http://en.wikipedia.org/wiki/Crest\\_factor](http://en.wikipedia.org/wiki/Crest_factor), retrieved July 6, 2016.

<sup>8</sup> Appendix B, page 14.

<sup>9</sup> ETSI, “Evolved Universal Terrestrial Radio Access Base Station Conformance Testing,” 3GPP TS 36.141, version 10.1.0, 2011.

<sup>10</sup> Second Report and Order and FNPRM, GN Docket 12-268, Adopted October 16, 2014, para. 36ff.

<sup>11</sup> [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-14-157A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-157A1.pdf)

47 CFR §73.622(h)



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The above was discussed at the AFCCE Annual Meeting held on June 23-26, 2016 at Estes Park, Colorado and consensus was reached to provide comments concerning Docket 16-142. Further, it has been reviewed and received concurrence of the Board of Directors, and was circulated to the membership before these comments became final.

Respectfully Submitted,


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Date: July 19, 2016

CERTIFICATION

This is to certify that copies of these comments were mailed at the M.L. King Post Office to all available commenters with which there was a full postal address (see the attached list).  
First-class postage was affixed to these comments.

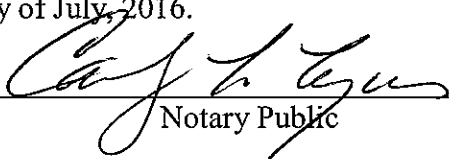
Sincerely,

  
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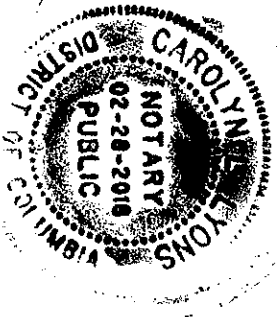
Date: July 19, 2016

City of Washington            )  
  ) ss  
District of Columbia        )

Subscribed and sworn to before me this 19<sup>th</sup> day of July, 2016.

  
\_\_\_\_\_  
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My Commission Expires:  
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