

**Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Authorizing Permissive Use of the “Next Generation” Broadcast Television Standard)	GN Docket No. 16-142
)	
Joint Petition for Rulemaking Seeking to Amend FCC Rules Section 73.626 on Distributed Transmission Systems)	DA 19-1036
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To: The Commission

Comments of the Merrill Weiss Group, LLC

In response to a Petition for Rulemaking filed jointly by two significant industry organizations¹ seeking to amend Section 73.626 of the Commission’s rules relating to Distributed Transmission Systems (DTS), the Federal Communications Commission issued a Public Notice² seeking comments on the Petition. As the originator of the concept of Single Frequency Networks for digital television in 1990, having developed the technology for synchronizing transmitters operating under the ATSC Digital Television Standard, as a participant in and contributor to development of nearly all of the approximately twenty documents that comprise the ATSC 3.0 standards suite, and as the developer of the concepts and participant in the group of engineers responsible for drafting the proposed rule modifications embodied in the Petition, the Merrill Weiss Group LLC commends the Commission for taking this action and offers the following reply comments and the attached materials in response to certain of the comments submitted by others.

Review of certain of the comments filed by those opposed to the Petition makes clear that there have been either misunderstandings or mischaracterizations of what the changes are that are proposed in the Petition and/or what their impacts will be. To set the record straight and to help

¹ Joint Petition for Rulemaking of America’s Public Television Stations (APTS) and the National Association of Broadcasters (NAB), GN Docket No. 16-142 (filed October 3, 2019).

² DA 19-1036, released October 11, 2019.

those who perhaps have not performed a technical analysis of the proposed rule, the next several pages contain a Frequently Asked Questions (FAQ) document on the proposal. The FAQ is formatted as a standalone document that can be separated from these comments and used for purposes of information and education. It is intended to discuss the changes proposed to the rule itself, provisions of the rule that are proposed not to be changed, and the impacts of the proposed rule changes on various scenarios or other spectrum users.

Even more information about the rationales for the proposed changes in the DTS rule and their impacts on the various interference relationships between digital television stations of different classes can be found in comments made previously in GN Docket No. 16-142 by the Merrill Weiss Group, LLC, filed on May 9, 2017 and posted to ECFS on May 10, 2017.³ Included are both full technical explanations and numerous maps illustrating various scenarios and the resulting interference and service relationships between different classes of stations.

The need for the current rule for DTS operation was first discussed in a Commission rulemaking proceeding in 2000.⁴ By 2004, the FCC had established an interim procedure for permitting DTS operations,⁵ and in 2005 issued an NPRM for rules for routine licensing of DTS facilities.⁶ It wasn't until late 2008 that the Order allowing routine DTS licensing⁷ was issued – less than a year before full-service television stations were required to turn off their analog transmitters and transition to fully digital broadcasting. With only one year remaining in the Analog-to-Digital transition, the Commission began to realize that some stations were unable to provide service with their digital facilities to viewers who previously had received satisfactory analog service. Routine authorization of DTS at the last minute made it too late for widespread adoption; most stations already had committed to transmission system designs using single transmitters, and their capital for significant modifications had been exhausted. Consequently, only a small

³ Comments of the Merrill Weiss Group, LLC, *In the Matter of Authorizing Permissive Use of the "Next Generation" Broadcast Television Standard*, GN Docket No. 16-142, filed May 9, 2017, posted May 10, 2017, pp. 1 – 28.

⁴ Comments of Merrill Weiss Group, LLC, *In the Matter of Review of the Commission's Rules and Practices Affecting the Conversion to Digital Television*, MM Docket No. 00-39, filed May 17, 2000.

⁵ *Second Periodic Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television*, 19 FCC Rcd 18279, 18283, 18355-57, ¶¶ 9, 174-78 (2004).

⁶ Clarification Order and Notice of Proposed Rulemaking *In the Matter of Digital Television Distributed Transmission System Technologies*, MB Docket 05-312, adopted November 3, 2005.

⁷ Report and Order *In the Matter of Digital Television Distributed Transmission System Technologies*, MB Docket 05-312, adopted November 3, 2008.

proportion of stations were able to benefit from the advantages provided by DTS operation (as documented in the DTS Report and Order) prior to the application freeze put in place by the Commission in anticipation of the Incentive Auction and Spectrum Repack.

The same mistake should not be made again as broadcasters seek additional flexibility to deploy DTS when rolling out ATSC 3.0. As broadcast stations contemplate their investments in ATSC 3.0, they already are making decisions about how to provide the best service to the viewing public, with the capital they have available to invest, and under the regulatory regime that exists at the time. Deciding to wait until plans already are made, designs are completed, and commitments for transmission facilities are made will result in missed opportunities, with harm to the television broadcasting business the result. Deciding to wait until more is learned about the operation of DTS networks in an ATSC 3.0 environment will preclude their deployment in a manner permitting full service to broadcasters' service areas from the start, when they perhaps can have the greatest impact. Moreover, the lessons learned using ATSC 1.0 already are fully embodied in ATSC 3.0. The time for enabling improved service to the public through improvements of the DTS rule is now. The Petition should be turned into a Notice of Proposed Rulemaking without delay.

Respectfully submitted,

A handwritten signature in black ink that reads "S. Merrill Weiss". The signature is written in a cursive, flowing style.

S. Merrill Weiss, President
Merrill Weiss Group, LLC

Petition for Rulemaking – Amendment of FCC Rules §73.626 on Distributed Transmission Systems

Frequently Asked Questions (FAQs)

1. Where is the rule for Distributed Transmission Systems (DTS) documented?

47 CFR §73.626

2. Do the proposed DTS rule modifications expand the defined service area beyond the service area defined under the current rules in which a television station can locate DTS transmitters?

No, they do not. The service area remains limited in each direction by the largest of the Table of Distances Service Area distance (having the same value as in the current DTS rule), the Largest-in-Market equivalent distance, or the Reference Facility contour distance.

3. Do the proposed DTS rule modifications expand the defined service area beyond the service area defined under the current rule in which a television station can expect interference protection?

No, they do not. The protected service area defined for each station licensed under the modified DTS rule would be identical to the protected service area defined for that station under the current DTS rule.

4. Do the proposed DTS rule modifications permit a television station to use a combination of antenna height and transmitted power greater than that permitted under the current rules?

No, they do not. There is no change proposed in the modified DTS rule with respect to limits on antenna height and effective radiated power relative to the current rule.

5. What is the primary difference between the current DTS rule and the proposed DTS rule?

The proposed rule changes the way in which the maximum field strength in certain directions from each transmitter in a DTS network is limited.

6. Why is it proposed to change the way in which the maximum field strength from each transmitter in a DTS network is limited?

As described in the FCC Report & Order establishing the DTS rule, a primary purpose of DTS is to enable more-uniform and stronger signal levels throughout a station's service area. Nevertheless, the current rule requires that the field strength (as determined by contour location) of the signals from the station's transmitters not exceed the field strength of the noise-limited contour of the station as licensed or permitted (or of a circle having a defined maximum distance from the station's reference point). That scheme for applying a limit effectively makes it impossible to achieve one of the prime improvements that the R&O says is among the purposes of DTS in the first place, because it forces signals near the edge of a station's service area generally to be too weak to receive.

7. How is the field strength from each transmitter in a DTS network limited under the current rule?

Currently, the Noise-Limited Contour (NLC) from each transmitter in a station's DTS network is not permitted to extend beyond a certain distance. That distance is the farther from the station's reference point in each azimuthal direction either of the NLC of the station, based on its licensed or permitted facilities in a single-transmitter configuration, or of a fixed distance from the reference point called the Table of Distances value. A Table of Distances value is provided in the DTS rule for each combination of TV band and geographic zone (in bands to which zones apply). It is this method for limiting a station's DTS service that precludes providing adequate signal levels for normal reception in a large area near the edge of a station's service area and correspondingly weak signals within the station's service area.

8. How is the Table of Distances distance value determined?

The Table of Distances value for each combination of TV band and geographic zone is the distance to the F(50,90) NLC of a hypothetical facility in that band and zone, operating over flat terrain at the maximum power permitted in that band and zone and at the maximum height of the antenna radiation center above average terrain permitted at that maximum power value, as shown in a corresponding table or described in the text in §73.622(f)(6) of the FCC rules. (Note that this value will be called the Service Area Distance from Reference Point value in the modified Table of Distances under the proposal to the FCC.)

9. How is the field strength from each transmitter in a DTS network proposed to be limited?

The proposal submitted to the FCC is to add a second value to the Table of Distances for each combination of TV band and geographic zone. The original Table of Distances value will be renamed the Service Area Distance from Reference Point value, and the F(50,90) field strength used in its calculation will be added. The distance given in the new Table of Distances for the Service Area value of each of the band/zone combinations will not change from the value in the current Table of Distances. A second pair of values will be added in a section with the heading Interference Area. The Interference Area section will include an F(50,10) field strength value and a Distance from Reference Point value added to the row for each band/zone combination in a pair of columns. The Interference Area columns will provide the values needed to calculate the distances from individual DTS transmitters to the limiting distance in each direction and to establish the limiting distance in each direction based on the farthest of the distance specified in the Distance from Reference Point column in the table or the distance from the station's reference facility to a contour at the field strength given in the Interference Area section. The values in the Service Area section will be used to determine where transmitters can be placed and where the protected service area is (exactly the same as in the current DTS rule). The values in the Interference Area section will be used to determine the limits on the field strength that can be radiated in any direction by each DTS transmitter.

10. How is the Interference Area distance value in the proposed Table of Distances determined?

The Interference Area Distance from Reference Point value for each combination of TV band and geographic zone is the distance to the F(50,10) predicted contour, having the field strength value given on the row for the band/zone combination, of a hypothetical facility in that band and zone, operating over flat terrain at the maximum power permitted in that band and zone and at the maximum height of the antenna radiation center above average terrain permitted at that maximum power value, as shown in a corresponding table or described in the text in §73.622(f)(6) of the FCC rules.

11. What are the benefits to Full-Service broadcasters from the proposed DTS rule modifications?

Full-Service broadcasters will be able to deliver stronger, receivable signals near the edges of their Service Areas (as envisioned by the FCC) instead of being forced to reduce signal levels there to an unusable range. They will be able to have more uniform levels throughout their service areas. These improvements in signal levels will enable more efficient use of the spectrum since transmissions can be at higher bit rates with good robustness when stronger signals are available for reception.

12. What are the benefits to LPTV broadcasters and Translators from the proposed DTS rule modifications?

Because Full-Service broadcasters will be enabled to deliver stronger signals on the peripheries of their service areas, it may be possible to shift operations of a certain number of translators to SFNs over time, making the spectrum currently occupied by those translators available for Class A and LPTV stations or other translators to use. In addition, because the signals of the Full-Service stations will be stronger in those peripheral areas, neighboring LPTV stations and translators will be able to operate at higher power levels without causing impermissible interference to the Full-Service stations, thereby improving their own coverage of their service areas and enabling more reliable service within those service areas

13. What are the benefits to Class A broadcasters from the proposed DTS rule modifications?

Because Full-Service broadcasters will be enabled to deliver stronger signals on the peripheries of their Service Areas, it may be possible to shift operations of a certain number of translators to SFNs over time, making the spectrum occupied by those translators available for Class A and LPTV stations or other translators to use. In addition, because the signals of the Full-Service stations will be stronger in those peripheral areas, neighboring Class A stations will be able to operate at higher power levels without causing impermissible interference to the Full-Service stations, thereby improving their own coverage of their protected service areas and enabling more reliable service within those service areas. These benefits can be multiplied when multiple Class A stations are operated together in a DTS configuration as permitted under the provisions of §73.6023.

14. What interference protection is offered by the proposed DTS rule modification?

Interference protection under the proposed DTS rule modification is two-fold, just as it is under the current rule. First, there are contour limitations that determine how far signals of a given field strength can be projected from each transmitter in a network. Second, an Interference Study conducted using the provisions of OET Bulletin Number 69 and the relevant other Part 73 rules, typically carried out using the FCC's TVStudy software, is the final arbiter of whether impermissible interference is caused by a DTS station's network to another station. No change in the TVStudy software will be required to conduct such interference studies in which a DTS operation is either the Desired or the Undesired station. (As described in 17, minor modification of the current version of TVStudy will be needed to evaluate the location of the F(50,10) Interference Contour of a DTS station under the proposed modified rule.)

15. Are there specific provisions in the proposal to provide interference protection to Class A and LPTV stations?

Yes. The field strength value used in setting the Interference Area distance and in limiting signal levels at that distance is the value needed to protect Class A and LPTV stations in the relevant band. At UHF, for example, that field strength value is 10 dB higher than would be used for protecting only Full-Service facilities and moves the limiting line much closer to the reference point for a DTS network that must protect Class A stations. An LPTV station having the same facilities as a Class A station would have at a given location at the Interference Area distance or beyond would receive the same protection as would a Class A station at that location.

16. Are the contour limits imposed by the Table of Distances for both the Service Area and the Interference Area plus the other limiting factors the only limits on the signal levels that can be radiated in each direction.

No. The final limitation in all cases will remain the Interference Analysis procedure described in OET Bulletin Number 69 and implemented in the TVStudy program, along with the other relevant Part 73 rules.

17. Will the TVStudy program require revision to properly evaluate DTS facilities according to the proposed modification of the DTS rule?

Yes, but to a minimal extent. The current version of TVStudy already can evaluate the placement of DTS transmitters within the Service Area of a station. It will require modification to add evaluation of the locations of the F(50,10) Interference Contours of the several transmitters in a DTS network with respect to the Interference Area Distance from Reference Point value. This evaluation would replace comparison of the NLC location to the Table of Distances value or other relevant limiting distance and would be equivalent in function to that determination, possibly using the same code with a minor parameter adjustment. The OET-69-based Interference Analysis portion of TVStudy that determines the proportion of served population of a Desired Station that would receive new interference from a proposed facility of a DTS Undesired Station will require no change for use with the proposed modified rule. Indeed, the current TVStudy version as it exists today can process that evaluation.

18. Will the proposed modified rule permit DTS transmitters to be located outside a broadcaster's Service Area?

No. As explained in 2, the definition of a broadcaster's Service Area is not proposed to be changed from the current definition, and the requirement of the rule that all DTS transmitters be located within a station's DTS Service Area also is not proposed to be changed.

19. Are any limits imposed on a broadcaster's ability to expand its Service Area beyond that authorized as long as the broadcaster does not increase emissions outside the Interference Contour?

Yes. There are at least three such limits that impact a broadcaster's ability to expand its Service Area beyond that authorized but within its interference contour. They are: (1) DTS networks must be evaluated using the Longley-Rice terrain-dependent methods specified in OET Bulletin Number 69, along with the provisions of Part 73 of the FCC Rules, to determine that no new impermissible interference will be caused by a proposed facility to other stations entitled to protection. Most stations already are constrained by such limits. (2) In smaller markets, the capital and operational costs of adding transmitters and/or increasing their power of operation is proportionately larger relative to the area that must be covered and the population that can be reached in that area. Thus, such potential expansions are self-limiting on the basis of the economics of the returns they can produce relative to the required investments. (3) All transmitters still would be required to be located within a station's authorized Service Area, and tall towers capable of supporting antennas that can project signals long distances typically are not located in the peripheries of markets, especially smaller ones, thereby making it difficult and costly to fill in the area outside a station's Service Area with strong signals in any affordable way.

20. Is this a “give-away” of large coverage areas to broadcasters without a need to apply for a “major change” – a de facto expansion of licensed operation – without reconciling interference with other users?

No. The proposal would not change the Service Area in which a broadcaster can obtain protection from interference for its DTS operations. The proposal would limit potential interference to other stations – even those that do not exist at the time of filing of an application for DTS operation – to that which could be caused by a hypothetical fully-maximized, single-transmitter facility at the station’s reference point. Moreover, the proposal retains the requirement that predicted new interference to individual stations existing or authorized at the time of filing of an application for DTS operation be studied and shown not to receive new impermissible interference from the proposed DTS operation.

21. Wouldn’t this make TV White Spaces all but unusable, denying the potential for high speed broadband service to much of Rural America?

No. As described in 18 and 19, by virtue of the limitations on transmitter placement, tall tower availability, and the relatively high costs and low returns of building large facilities in the sparsely populated areas at the peripheries of the small markets that exist in Rural America, there are inherent limits on expansion of broadcast signal delivery outside of rural Service Areas. Thus, as a practical matter, in the places where TV White Space Devices might be used to serve Rural America, the likelihood of economical implementations of extensive DTS networks offering adequate financial returns to support their ongoing operations is quite small. Consequently, the White Spaces of concern in those areas are likely to remain as White Spaces and still provide the potential for use by high-speed broadband services.