

Section 5.207 Supplemental Report

A) Number of Hours Operated – Approximately 2250 hours. With the exception of approximately 10 days of non-operation, the transmitter has been on the air 24/7 since June 29, 2016.

B) Types of Transmitting and Studio Equipment:

Transmit Antenna	Electronics Research Inc. Model ETU-2U7-ES1C5-39
Mask Filter	Electronics Research Inc. UF10000-63 CH39
Transmitter	Gates Air Maxiva UXLT-20 ATSC30
Exciter	Gates Air XTE ATSC30
Route Encoder & Signaling and Announcement	Triveni GDBRXMLC with ROUTE option
Emergency Alerting decoder/encoder	Monroe Electronics DASDEC
Dash Packager	Keepixo Genova Packager GE-PKG100
HEVC Encoding	Harmonic VIBE 4k-1U-2AC-1CH
HD to 4K upconverter and De-interlace	Teranex EXP12GDL
OTA Receiver	LG Electronics Prototype 4K TV w/ integrated ATSC RF receiver

C) Research and Operation Expenses: In addition to expending significant internal resources on this project, including equipment purchases and the use of WRAL employees, applicant also incurred RF consulting services of approximately \$10,000 and legal services.

D) Power Employed: All full time testing occurred at the full power approved of 40 kW ERP. Applicant conducted as needed field intensity measurements and visual and aural observations.

E) Public Participation: No public participation, with the exception of viewings at the WRAL-TV main studio location.

F) Conclusions: Additional testing is required before applicant can draw conclusive results.

G) Program of Further Developments in Broadcasting: Applicant believes that its ongoing experiments with ATSC 3.0 will contribute greatly to the industry's knowledge base of ATSC 3.0 capabilities, and will help spur further developments.

H) All Developments and Major Changes in Equipment: Applicant believes that additional time is needed in order to determine all developments. No major changes in equipment are proposed, other than to commence the use of a field unit to begin RF testing as further explained below.

I) Any Other Pertinent Developments: None at this time.

Narrative Statement:

To date, applicant has learned a great deal about the nuances of the ATSC 3.0 signal flow in the studio and transmission plants. Unfortunately, however, due to a lack of receivers we are challenged in our testing of over-the-air reception in covered areas.

Currently we have one of only a very few available prototype LG Receivers with an integrated ATSC 3.0 RF receiver. Being that it is a 55" TV with no outputs other than the screen itself, it is problematic to "tote" around town for testing. We expect to have a field unit before the end of the year and will begin RF testing in earnest at that point. We fully intend on driving radials and testing throughput to mobile and indoor locations as well.

Observations:

The Physical layer implementation is as follows:

32k FFT
148 μ S (1024 Symbols) Guard Interval
16k LDPC, 9/15
256 QAM

In this configuration we achieved a payload of approximately 26 Mb/s receivable at a C/N as low as 10.1dB.

Within this payload we have proven the ability of the system to broadcast 3 separate services simultaneously with varying compression schemes.

Currently we are on the air as follows (all are encoded in HEVC):

39.1 - WRAL TV, 1080i de-interlaced and up-converted to be presented as a 1080p SDR signal

39.2 – A loop of the documentary “Take Me Out to the Bull’s Game” – presented in 4K HDR

39.3 – A loop of a number of locally produced segments for our regularly airing show “Out and About” presented in 4K HDR.

In August 2016 we broadcast the full NBC schedule of 4K Olympic coverage including the HDR presentation of the Opening Ceremonies.

We have also performed testing of the new Advanced Emergency Alerting capabilities in ATSC 3.0, triggering banners and delivering non-real-time content to be decoded by the LG TV receiver and presented on screen. This is the technology that the new Advanced Warning and Response Network (AWARN) is based upon.

Overall, the largest observations can be boiled down to two main subjects:

- 1) The IP format of this new standard is very accommodating. While the nuances of handling IP video and signaling are new disciplines for us and our industry, we are truly experiencing the notion of “a packet is a packet”. If you put the streams and bits together the right way, the standard will be limited only by the imagination.
- 2) The Physical Layer is strong and it works. The RF receive antenna is a small MOHU Leaf literally taped to a window beside the TV. The TV Set is receiving a decodable signal with a payload of 26Mb/s at 10.1 dB C/N level which is far better better than we expected.

We are very excited about this standard and look forward to more testing and growth in our understanding of its benefits.