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
	)	
	)	

COMMENTS OF LG ELECTRONICS, INC.

LG Electronics, Inc. ("LG") is pleased to submit these Comments in response to this Notice of Proposed Rulemaking (the "NPRM").[1] As a leading broadcast technology and consumer electronics innovator, LG strongly supports allowing local television stations to deploy ATSC 3.0 (or the "Next Gen TV" transmission standard) on a voluntary, market-driven basis, while continuing to deliver current-generation DTV broadcast service using the ATSC 1.0 transmission standard.

The ATSC 3.0 standard has the potential to transform the nature of broadcasting, resulting in a myriad of benefits to the public. Accordingly, LG wholeheartedly supports FCC rule changes necessary to allow broadcasters to utilize the Next Gen TV standard on an expedited basis. To facilitate this, LG urges the Commission to incorporate into its rules only those Physical Layer standards within the ATSC 3.0 suite of standards necessary to ensure a stable and predictable RF operating environment – specifically, ATSC A/321:2016 "System Discovery & Signaling" ("SDSS" or "A/321") and ATSC A/322:2016 "Physical Layer Protocol"

[1] In re Authorizing Permissive Use of the "Next Generation" Broadcast Television Standard, *Notice of Proposed Rulemaking*, GN Docket No. 16-142, FCC 17-13 (rel. Feb. 24, 2017). The NPRM was issued pursuant to a Joint Petition for Rulemaking filed by America's Public Television Stations, the AWARN Alliance, the Consumer Technology Association, and the National Association of Broadcasters ("Petitioners"). *See* Media Bureau Seeks Comment on Joint Petition for Rulemaking of America's Public Television Stations, The AWARN Alliance, The Consumer Technology Association, and The National Association of Broadcasters Seeking to Authorize Permissive Use of the "Next Generation TV" Broadcast Television Standard, *Public Notice*, GN Docket No. 16-142, DA 16-451 (rel. Apr. 26, 2016) (the "Petition").

("A/322"), both of which are the key elements of the Physical Layer of the ATSC 3.0 Standard. In addition, given the voluntary, market-driven nature of ATSC 3.0, LG agrees with the Commission's tentative conclusion that neither a tuner mandate nor an HDMI port requirement are necessary at this time.

I. THE ATSC 3.0 TRANSMISSION STANDARD WILL TRANSFORM TELEVISION BROADCASTING

LG has a long history of pursuing innovative television broadcast technologies, and as a leading contributor to the development of ATSC 3.0, LG is well-situated to fully understand and appreciate the transformative potential of Next Gen TV. Zenith Electronics, LG's U.S. R&D subsidiary since 1999, was the primary developer of the current ATSC 1.0 digital television transmission standard beginning in 1987. Now, technologies developed by LG and Zenith are integral to ATSC 3.0, both in the Physical Layer and other aspects. In addition, LG co-founded the AWARN Alliance, a group of leading broadcasters, consumer electronics and technology companies, and public safety organizations working together to pioneer advanced emergency alerting made possible by ATSC 3.0.

Next Gen TV is not just broadcast television as we know it. Rather, it represents the future of mass media communications – a future that is increasingly mobile, interactive and content-rich. Unlike the current broadcast standard, ATSC 3.0 is an IP-based standard that will allow broadcasters to provide viewers with Ultra High Definition video, additional free over-the-air program streams, immersive sound, improved in-home and mobile reception, and new personalization and interactive features that will enhance the experience of watching broadcast content. ATSC 3.0 also enables next-generation business models, including targeted programming and advertising, not possible with the current broadcast standard.

Members of the public safety community and the Americans they serve also will benefit

significantly from ATSC 3.0. The new standard will allow for advanced emergency alerts (including the ability to "wake up" receiving devices) and encrypted, targeted datacasting for law enforcement, first responder, and emergency management organizations. ATSC 3.0 will enable AWARN advanced emergency alerts capable of reaching millions of consumers in times of emergency with rich-media content, including maps, storm tracks and evacuation routes.

Finally, as evidenced by the comments and reply comments filed in response to the Petition, there is broad and strong cross-industry support for ATSC 3.0. Equipment and device manufacturers, technology companies, broadcasters, wireless companies, public interest entities, and others all filed in support of a rule that would permit broadcasters to voluntarily utilize the ATSC 3.0 transmission standard.[2]

II. BOTH A/321 AND A/322 SHOULD BE INCORPORATED INTO THE FCC'S RULES

ATSC 3.0 consists of three major layers, each of which include multiple standards. In the NPRM, the Commission proposes incorporating by reference into its rules only one component of the Physical Layer – specifically, A/321. As explained more fully below, although LG agrees that the Physical Layer is the only layer of ATSC 3.0 that is relevant for purposes of authorizing broadcasters to provide Next Gen TV service, LG urges the Commission to also incorporate by reference into its rules A/322, which is the critical component of the Physical Layer for interference-free delivery of IP signals to both fixed receivers and mobile devices, including new automotive applications.

A. A/321 and A/322 are the only aspects of ATSC 3.0 that require the Commission's approval

[2] *See, e.g.,* Reply Comments of LG Electronics, Inc. (June 27, 2016); Comments of GatesAir Inc. (May 26, 2016); Comments of the Advanced Television Systems Committee, Inc. (May 26, 2016); Comments of AGC Systems LLC (May 26, 2016); Comments of Cox Media Group (May 26, 2016); Comments of AT&T Services, Inc. (May 26, 2016); Comments of Public Knowledge (May 26, 2016); Comments of American Tower Corporation (May 26, 2016).

As noted above, ATSC 3.0 consists of three main layers: the Physical Layer, the Management & Protocols Layer, and the Applications & Presentation Layer. In brief, the Physical Layer (specifically A/322) determines the interference and coverage characteristics of the Next Gen TV standard. The Management & Protocols Layer specifies how information is transported for delivery within an ATSC 3.0 signal. The Applications & Presentation Layer defines the elements that the viewer experiences, including video and audio coding.

Of the three layers, only the functions of the Physical Layer fall within the purview of the Commission's regulatory concern. Because the Management & Protocols Layer and the Applications & Presentation Layer have no effect on the reception and interference characteristics of an ATSC 3.0 signal, they do not need the FCC's imprimatur. Instead, the Management & Protocols and Applications & Presentation layers should be allowed to develop via a market-based approach, like that utilized in the wireless technology industry, so as to ensure that consumers continually have access to the most innovative and dynamic broadcast television services available without requiring needless FCC approval.

B. The Commission should adopt both A/321 and A/322 into its rules

Aside from A/321, the Commission asks in the NPRM whether it is necessary to incorporate any other parts of ATSC 3.0 into its rules.[3] Yes – LG strongly urges the Commission to also include A/322 in its rules, because A/322 is critical for ensuring that an ATSC 3.0 signal is reliably transmitted and received. The Advanced Television Systems Committee ("ATSC") chose the title of A/322 judiciously as "Physical Layer **Protocol**," recognizing that A/322 actually defines the emission (and by association, reception) characteristics of the entire ATSC 3.0 suite of standards. A/321 certainly has value; it was

[3] *Id.*

included in the ATSC 3.0 system as an attempt to future-proof Next Gen TV so that sometime in the distant future, the emitted signal might be upgraded, and existing receiving equipment could still latch onto the newer signal. However, should a new Physical Layer Protocol be developed in the future, it could have different reception and interference characteristics, which should not go unnoticed by the Commission.

As noted above, the Physical Layer is the foundational element of ATSC 3.0 that addresses RF reception and interference considerations, and it defines the core transmission system that allows content to be transmitted by all television stations. Although the Petition makes reference to A/321 as being the only aspect of ATSC 3.0 that the Commission need incorporate into its rules to assure a stable and predictable RF operating environment,[4] to truly ensure stability, reliability and predictability, A/322 also must be incorporated.

A/322 is vitally important to the Physical Layer, as A/322 carries the vast bulk of the data payload that enables all the video, audio and data features delivered by ATSC 3.0. Whereas A/321 allows for a receiver to ***find*** a transmitted ATSC 3.0 signal and latch onto it (*i.e.*, serve as a so-called "bootstrap"), it is A/322 that defines the interference characteristics of the ATSC 3.0 signal and ensures that it does not interfere with ATSC 1.0 signals or other 3.0 signals.[5] Thus, both A/322 and A/321 are necessary for ensuring that an emitted 3.0 signal is reliably delivered to all reception devices, fixed and mobile alike. While A/321 serves an important role for

[4] Petition at 15.

[5] A/322 also ensures that field testing for ATSC 3.0 can continue apace with a certain, defined interference standard that can be uniformly and consistently applied across the country. The television industry has definite plans for over-the-air field testing of most aspects of the ATSC 3.0 suite of standards utilizing a channel in Cleveland, Ohio, as already authorized by the Commission. Over-the-air testing is needed primarily to verify reception and interference aspects of the new system. In fact, LG and Zenith already have used the same broadcast facilities for extensive over-the-air testing (utilizing A/321 and A/322), and reported their significant findings to the Commission and the broadcast industry. *See* Letter from John M. Burgett, Counsel to LG Electronics, Zenith Electronics, and GatesAir, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 16-142, at Attachment (filed Nov. 23, 2016). Much of that testing was dedicated to evaluating and proving the all-important aspects of mobile reception, the transmission of which is uniquely defined by A/322.

locating the Physical Layer Protocol in the emitted signal, A/322 ***delivers*** the full 6 MHz channel and enables data to be transmitted on it.[6] In other words, if A/321 is the bootstrap, A/322 is the full boot.

LG certainly appreciates the desire for flexibility and future-proofing of ATSC 3.0. However, central to the FCC's core mission in the broadcast context is ensuring proper promulgation of RF emissions so as to avoid impermissible interference to other broadcasters and other communications services, and to protect public health and safety. This mission is perhaps all the more critical in light of the upcoming spectrum repack, when many broadcasters will be switching to new channels, or channel-sharing and operating with new or modified facilities. Incorporating A/322 into the Commission's rules will ensure that all broadcasters are operating from the same playbook and understand the RF characteristics of an ATSC 3.0 signal.

LG notes that in the Petition jumpstarting the Commission's interest in ATSC 3.0, A/321 and A/322 were often conflated, which tended to diminish the importance of A/322 while overstating that of A/321. For example, in explaining why the Commission need only adopt A/321, the Petition stated: "As the SDSS portion of the physical layer ***points to*** the RF characteristics of the standard, which determines interference and coverage, it is also the only aspect that the Commission need approve in order to assure a stable and predictable RF operating environment."[7] However, while A/321 may "point" to the RF characteristics of the standard (in that A/321 merely enables finding the ATSC 3.0 signal), it is A/322, not A/321, that actually determines interference and coverage. A/322 defines what it takes to receive and demodulate the ATSC 3.0 signal as well as the waveform that could impact potential interference characteristics.

[6] In this regard, it is important to note that A/322 occupies the entire 6 MHz broadcast channel, whereas A/321 only occupies 5 MHz.
[7] Petition at 15 (emphasis added).

It is A/322, therefore, that assures "a stable and predictable RF operating environment."

Similarly, in the NPRM, A/321 and the Physical Layer are often conflated. For example, the Commission notes that "the technical means by which broadcasters would be able to satisfy various preexisting regulatory obligations … will be included in layers of the ATSC 3.0 standard that are outside of A/321. As noted above, the technology that enables these services is generally included in the applications and presentation layer of ATSC 3.0, rather than the physical layer."[8] To reiterate, A/321 is not the Physical Layer; rather, it is but one component of the Physical Layer, the other critical component being A/322.

While ATSC 3.0 is considered a "television" broadcast system, it represents much more than television as we know it today. In fact, A/322 has been designed as an extremely flexible Physical Layer Protocol that will enable a wide range of new business models for broadcasters. For example, A/322's Layered Division Multiplex approach will allow broadcasters to simultaneously deliver varying levels of resolution for various devices (*e.g.*, higher-resolution for large fixed receivers and lower resolutions for portable, handheld and mobile devices). This bandwidth efficiency is a key element of A/322's flexibility.

Because of its literally thousands of modes, A/322 is optimized not just for deep indoor reception on fixed devices, but also reliable reception for devices on the move. That means A/322 was designed from the ground up for robust over-the-air local broadcast TV and data services to ATSC 3.0-equipped smartphones, tablets, PCs and back-seat automotive applications. Perhaps even more compelling to some broadcasters are the business-to-business opportunities that A/322 will deliver. Prime examples are vehicular applications: the use of A/322 to deliver firmware updates for safety and sensor systems, and downloadable telematics and navigation

[8] NPRM at ¶ 8, n. 28.

data to vehicles. Thus, thanks to A/322's never-before-possible flexibility and capabilities, broadcasters can play a key role in the connected and autonomous vehicles of tomorrow.

Given the obvious significance of A/322, the fact that the Petition did not request that it be incorporated into the Commission's rules may have been a consequence of timing. When the Petition was filed on April 13, 2016, A/322 was a Candidate Standard nearing finalization by the ATSC. In contrast, A/321 was approved by ATSC members on March 23, 2016, making it an ATSC Final Standard. A/322 was unanimously approved by the ATSC on September 7, 2016. Since then, A/322 has been a full-fledged ATSC Final Standard, in fact already incorporated into chipsets. Finally, requiring A/322 will provide the regulatory certainty, consistent with the Commission's rules (that presumably will carry over to Next Gen TV) requiring broadcasters to provide at least one free programming bitstream. Accordingly, there is no reason that both A/321 and A/322 should not now be incorporated into the FCC's rules.

C. A/322 enables Single Frequency Networks ("SFNs"), but does not foreclose different synchronization standards

In the NPRM, the Commission characterizes comments filed by LG in support of the Petition as "claim[ing] that A/322 should be incorporated by reference into the rules along with A/321 to ensure that SFN is authorized."[9] The Commission tentatively concludes that it should decline to incorporate A/322 by reference because "there is no need to require a specific synchronization standard" so long as "the synchronization used to implement an SFN/DTS minimizes interference within the network and provides adequate service."[10]

To clarify, LG supports incorporation of A/322 in part because A/322 actually enables SFNs, which are important to some broadcasters and their ability to provide good-quality,

[9] *Id.* at ¶ 62.
[10] *Id.* The NPRM's reference to "SFN/DTS" is with regard to Distributed Transmission Systems, which the Commission notes are the functional equivalent of SFNs.

interference-free signals even in shadowed areas. Contrary to the NPRM's implication indicating otherwise, A/322 does not foreclose the development and use of other synchronization standards to be utilized by SFNs. A/322 is a flexible toolbox that broadcasters can use to configure features of their transmissions, including the implementation of SFNs. And, while A/322 does not establish a set-in-stone synchronization standard for SFNs, the interference-rejection characteristics of A/322 are critical to SFNs. Thus, the Commission's tentative conclusion discussed above is based on a misunderstanding of A/322's role with respect to SFNs.

III. NEITHER A TV TUNER MANDATE NOR AN HDMI PORT REQUIREMENT IS NECESSARY BECAUSE THE MARKET WILL ENSURE THAT CONSUMERS HAVE ACCESS TO ATSC 3.0 SIGNALS

In the NPRM, the Commission tentatively concludes that a "Next Gen TV tuner mandate is not necessary at this time because a potential transition would be voluntary and market-driven."[11] LG agrees. ATSC 3.0 always has been envisioned as a voluntary standard that broadcasters are expected to implement on a timeline that makes sense from business, financial, viewership and public interest perspectives. Declining to impose a Next Gen TV tuner mandate is in keeping with the voluntary nature of ATSC 3.0.

In addition, there are already strong market incentives for manufacturers to develop receivers capable of receiving ATSC 3.0 signals (including receivers equipped with HDMI ports to which an adapter or other external receiver could be attached). For example, 4K Ultra HD TVs, with 3840 x 2160 resolution, are gaining popularity[12] and will likely drive consumer demand for ATSC 3.0-enabled sets capable of taking advantage of the higher resolution and

[11] *Id.* at ¶ 71.

[12] 4K UHD TVs represent one of the consumer technology industry's fastest growing segments. U.S. shipments of 4K UHD displays are projected to reach 15.6 million units in 2017, a 51 percent increase over 2016. *See* Consumer Technology Association, Press Release, *Record Year Ahead: Consumer Enthusiasm for Connectivity to Propel Tech Industry to Record-Setting Revenues, Says CTA* (Jan. 3, 2017), https://cta.tech/News/Press-Releases/2016/January/Record-Year-Ahead-Consumer-Enthusiasm-for-Connect.aspx.

higher dynamic range broadcast signals enabled by ATSC 3.0. In fact, in South Korea LG already is introducing ATSC 3.0-enabled 4K Ultra HD TVs. South Korean broadcasters are launching Next Gen TV service using the ATSC 3.0 Standard this year ahead of the 2018 Winter Olympic Games. South Korea's early deployment of ATSC 3.0 also suggests that substantial amounts of research and development necessary to build ATSC 3.0-capable consumer devices will already be done by the time ATSC 3.0 is deployed in the United States. Given that a voluntary, market-driven transition to ATSC 3.0-enabled television receivers and devices already is underway, there is no need for a government mandate that could slow innovation.

IV. CONCLUSION

LG appreciates the opportunity to submit these Comments. The company is proud of the work it has done in helping to develop ATSC 3.0 alongside its U.S. R&D subsidiary, Zenith. LG also is encouraged by the speed at which the Commission is moving this important item through the regulatory process and hopes that the FCC's efforts to bring the benefits of Next Gen TV to the American public will continue apace. LG is very optimistic about ATSC 3.0 and the future of television, and LG looks forward to working with the Commission in this proceeding.

Respectfully submitted,

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