Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of **PUBLIC SAFETY AND HOMELAND SECURITY BUREAU SEEKS PARTNERS TO TEST EXPANSION OF COVERAGE FOR WIRELESS EMERGENCY ALERTS WHEN CELL SITES ARE DOWN, INCLUDING THROUGH THE USE OF SATELLITE.**	PS Docket No. 22-160

COMMENTS AND EXPRESSION OF INTEREST OF
PBS NORTH CAROLINA,
NORTH CAROLINA EMERGENCY MANAGEMENT,
DEVICE SOLUTIONS INC.,
TRIVENI DIGITAL INC.,
AND DIGITAL ALERT SYSTEMS INC.

PBS North Carolina and North Carolina Emergency Management, and its partners Device Solutions Inc., Triveni Digital Inc., and Digital Alert Systems Inc., submit our comments herein in response to the Federal Communications Commission's Public Safety and Homeland Security Bureau request to seek partners to test expansion of coverage for wireless emergency alerts when cell sites are down, including the use of satellite.[1] In addition to noting the powerful capabilities of ATSC 3.0, also known as NEXTGEN TV, to transmit data in a ubiquitous fashion, our comments provide one example of how such a system could be implemented to support WEA. In this response we will share information regarding a robust communications system utilizing ATSC 3.0. The proposed system is based both on groundbreaking work to improve communications to first

[1] https://www.fcc.gov/document/fcc-seeks-partners-test-wea-delivery-without-cell-towers

responders over a large reception area, as well as building upon approaches and infrastructure already implemented to support WEA by public broadcasters across the nation.

Background

For six decades, PBS North Carolina has educated, entertained, and evolved in service to the citizens of the state and viewing area. It provides transformational experiences and trusted content to educate, inform, entertain, and inspire the people of North Carolina. With its 12 full power transmission facilities and multiple translator facilities, it is the largest wireless network in the state.[2]

PBS North Carolina subscribes to the vision of public broadcasting as identified by America's Public Television Stations (APTS) and its "three pillars", to provide essential public services in education, public safety, and civic leadership.[3] In the public safety arena, PBS North Carolina plays a vital role in emergency communications as it provides live broadcasts and streams from the North Carolina State Emergency Operations Center's Joint Information Center before, during, and after emergency events.[4] PBS North Carolina also hosts over 40 federal, state, and local agencies' emergency communications systems at its tower facilities.

Most notably, PBS North Carolina is an innovator in utilizing ATSC 3.0 in the development of a new digital paging system to greatly reduce the time it takes to get critical response information to first responders which will likely save lives when fully deployed.[5] PBS North Carolina has won wide recognition for its efforts in this space.[6]

[2] https://www.pbsnc.org/about/
[3] https://apts.org/about/mission
[4] https://www.ncdps.gov/blog/2020/07/31/responding-all-hazards-work-state-emergency-response-team
[5] https://www.pbsnc.org/nextgen-tv/
[6] https://nabpilot.org/announcing-the-2023-winner-of-the-nab-technology-innovation-award/

"ATSC 3.0 is the next generation terrestrial broadcast system designed from the ground up to improve the television viewing experience with higher audio and video quality, improved compression efficiency, robust transmission for reception on both fixed and mobile devices, and more accessibility, personalization, and interactivity. The ATSC 3.0 standard is defined in a suite of more than 20 Standards and companion Recommended Practices".[7] PBS North Carolina, in its NextGen Innovation Lab and through its licensed, WUNK-TV / Greenville, North Carolina full power transmission facility, has demonstrated the capabilities of the technology and its ability to be adapted to applications to provide a variety of services to consumers and public sector communities.

North Carolina Emergency Management "works to enhance the state's resiliency by actively collaborating, communicating and coordinating to prevent, mitigate, respond and recover from disasters."[8]

Device Solutions Inc, is a full-service embedded engineering firm located in Morrisville, North Carolina, specializing in wireless and low power devices; including the design and development of mobile receiver reference designs to support Emergency Digital Paging over Public Television (eDPPT) to provide improved situational awareness and reliable redundant communications via emergency paging over ATSC 3.0 broadcast.[9]

Triveni Digital Inc. "has created innovative solutions for broadcast, cable, telco and IPTV networks."[10] They have assisted in the development of the ATSC 3.0 broadcast standard.

Digital Alert Systems Inc. serves the EAS participant and emergency management communities with a range of systems designed to enhance emergency alerting capabilities. Digital

[7] https://www.atsc.org/nextgen-tv/
[8] https://www.ncdps.gov/our-organization/emergency-management
[9] https://www.device-solutions.com/about
[10] https://www.trivenidigital.com/company/about_us.php

Alert Systems' staff are active participants and leaders in ATSC and NVISA initiatives relating to emergency communications, and its staff have been principal contributors to ATSC 3.0 NextGen TV specifications for EAS and Advanced Emergency Information.[11]

The Challenges Of WEA Alerts During Disasters

The FCC Docket No. 22-160 spells out the recent challenges of Wireless Emergency Alerts during emergencies with a focus on the 2023 wildfires in Maui, Hawaii.[12] Wildfires, earthquakes, flash floods, tropical events, and man-made disasters all can have a debilitating effect on cellular communications. In September 2007, the FCC established the Disaster Information Reporting System (DIRS) in response to Hurricane Katrina in order to provide communications providers a means of self-reporting the status of their systems during and after these events.[13]

In North Carolina, the most recent, wide-area disaster was Hurricane Florence in September 2018. It ravaged the coast of North and South Carolina, caused 26 storm-related fatalities and over $24B in damages.[14]

During Hurricane Florence, the 44 counties involved in the DIRS reporting represented a total population of over 5.8 million.[15] At the height of the storm's impact, there were 1063 cellular sites out of a total of about 5800 sites that failed, or 18.4 %. It took several days to reduce the number of failed sites to under 5%.[16]

[11] https://www.digitalalertsystems.com/
[12] https://www.fcc.gov/document/fcc-seeks-partners-test-wea-delivery-without-cell-towers
[13] https://www.fcc.gov/general/disaster-information-reporting-system-dirs-0
[14] https://coastalreview.org/2020/09/florences-financial-toll-clearer-two-years-on/#:~:text=Damage%20losses%20in%20North%20Carolina,surge%20flooding%20totaled%20%2422%20billion
[15] https://www.osbm.nc.gov/facts-figures/population-demographics/state-demographer/county-population-estimates/certified-county-population-estimates
[16] https://www.fcc.gov/florence

Television Broadcasters were not immune to the effects of the storm, and some suffered outages. However, the very resilient PBS North Carolina network, with emergency power systems designed to respond to such conditions, stayed fully operational during the entirety of the storm and its aftermath.

ATSC 3.0 As A Solution For Alerts To Mobile Devices During A Disaster

ATSC 3.0, often referred to as "NEXTGEN TV," is the next generation of terrestrial television broadcasting. Developed by the Advanced Television System Committee[17], it offers a wide range of improvements for the delivery of over-the-air broadcasts to a large area via "High Power/High Tower" transmission. It is quickly being deployed across the United States, as well as being adopted and launched in South Korea and Jamaica. Several other countries are also considering its adoption.

ATSC 3.0, with its Internet Protocol backbone, allows for the delivery of not only television broadcast streams but data in a robust, highly efficient manner. PBS North Carolina has launched two ATSC 3.0 broadcast facilities and is planning on more deployments soon. This technology was the basis for PBS North Carolina's effort to develop a notification system to complement existing analog voice paging technology with a digital paging system delivered utilizing ATSC 3.0 to reduce the amount of time needed to deliver dispatch information to first responders. Work on this effort is available at the PBSNC.org/NextGen-TV webpage[18].

PBS North Carolina believes that the technology developed for the paging effort could easily be adapted to address the need the FCC has requested responses to in Docket No. 22-160. Through a Department of Homeland Security (DHS) Small Business Innovation Research (SBIR) Phase II

[17] https://www.atsc.org/nextgen-tv/
[18] https://www.pbsnc.org/nextgen-tv/

grant (PIID: 70RSAT21C00000018) titled "Emergency Digital Pager over Public Television (eDPPT)", Device Solutions (together with partners PBS North Carolina and Triveni Digital) successfully demonstrated ATSC 3.0's emergency alert and public safety communications datacasting capability and utilized standard protocols to develop and optimize a public safety digital paging prototype system operating over public television ATSC 3.0 transmissions per Phase II objectives. It was demonstrated that public television ATSC 3.0 broadcasts can be used as a reliable transmission pipe to deliver emergency dispatch information over a large area with superior signal coverage and penetration, as well as reduced latency to a mobile receiver. The system architecture deployed in the prototype deliverable is extendible to support the input of WEA / EAS / IPAWS open managed messaging.

A new IP data input source, WEA, can provide information that can then be delivered using an ATSC 3.0 broadcast signal to an ATSC 3.0 mobile receiver – either as a standalone device or integrated with another device (e.g., smartphone) to take advantage of native smartphone applications (e.g., positioning, uplink data) to augment the WEA data (e.g., images, maps, evacuation routes, etc.)

For additional information on the eDPPT project, refer to the White Paper "ATSC 3.0 as a Use Case for Public Safety Communications – Development Milestones."[19] A video overview of the project is available at https://youtu.be/pBM4ATF3xfQ.[20]

One benefit of this approach is the integration of emergency alerting systems already in place at the large majority of broadcasters across the nation, with the enhanced dissemination capabilities

[19] https://bento.pbs.org/prod/filer_public/pbsnc-redesign-phase-1/services/next-gen-tv/c7722a68ff_2022-BEIT-Conference-Proceedings-Paper-PBS-North-Carolina.pdf

[20] PBS North Carolina. (2023, March 8). NEXTGEN TV and PBS North Carolina: Improving emergency services response time [Video]. YouTube. https://www.youtube.com/watch?v=pBM4ATF3xfQ

of ATSC 3.0 and redistribution over other non-proprietary formats, such as Bluetooth and WiFi.

Additional Capabilities For Enhanced WEA Preparedness Over ATSC 3.0

As described earlier, the ATSC 3.0/WEA receiver will connect to the cellular device via Bluetooth connectivity. But what if there was the ability to send additional information, critical to civilians to not only warn them, but to give them instructions and mapping directions to seek safe evacuation during a crisis? PBS North Carolina, working in concert with North Carolina Emergency Management, is exploring the ability to use existing, enhanced mapping data to provide the civilian population instructions and options to avoid hazardous routes, provide safe evacuations routes, and perhaps provide direction to needed resources. With the absence of cellular data for mapping, the application on the cellular device would utilize its internal GPS capability to overlay the location information on top of the mapping information sent in parallel with the WEA data. PBS North Carolina anticipates many states and municipalities have similar mapping information that could be utilized.

This solution provides a communications channel similar to NOAA weather radio but based on IP data and is capable of transporting audio, video, and other critical data such as mapping files or evacuation instructions.

PBS North Carolina, Public Television and WEA

We would also like to note that America's public television stations have already established a nationwide broadcast data backbone relay network for WEA, utilizing the existing infrastructure of public television stations. This network was initiated by Congress via the "WARN" Act and funded by the Department of Commerce's NTIA.[21] As described by FEMA, this "Warning, Alert, Response

[21] The Warning, Alert, and Response Network Act, Title VI of the Security and Accountability for Every Port Act of 2006. An example of how this has been implemented across the nation can be seen at https://www.oeta.tv/about/warn/

Network" provides a backup dissemination method of Wireless Emergency Alerts (WEAs) should IPAWS connection to wireless providers ever be interrupted.[22] The system is intended to enable public television stations to help ensure uninterrupted distribution of geo-targeted WEA messages to participating mobile carriers.

The examples we have provided above in our comments show how this infrastructure could potentially be expanded to not only interface with participating wireless carriers, but also provide a direct connection of WEA messaging to mobile devices used by the public. PBS North Carolina, Device Solutions, Digital Alert Systems, and Triveni Digital would be pleased to be considered part of a partnership to further explore these types of solutions.

Conclusion

Building on the successful delivery of the DHS Phase II eDPPT working prototype solution for the first responder paging effort over ATSC 3.0, PBS North Carolina, in partnership with Device Solutions, Inc., Triveni Digital and Digital Alert Systems, believe WEA alerts can be successfully delivered to cellular devices over an ATSC 3.0 transmission via a portable, companion ATSC 3.0 receiver device via wireless connectivity. The ATSC 3.0 receivers can be low-cost, low-power consumption and suitable for integration into NOAA weather radios, smart speakers, automobile infotainment systems and other devices.

During the emergency paging field trials, propagation models for analyzing ATSC 3.0 coverage were generated for three ATSC 3.0 transmitters and coverage maps incorporating transmitter data from the three targeted geographic locations were developed. This data was

[22] https://www.fema.gov/emergency-managers/practitioners/integrated-public-alert-warning-system/public/wireless-emergency-alerts

used to model and estimate coverage areas, identify areas with coverage impediments, and establish drive routes. The live testing results show good correlation with the field measurements and predict excellent ATSC 3.0 coverage for public safety. For example, the PBS North Carolina ATSC 3.0 WUNK broadcast tower covering much of coastal eastern North Carolina performed well beyond the expected modeling.

Consumers are better served by WEA alerts being available at low cost (device and infrastructure), on more devices, and with more reliable up-time, and improved coverage and penetration.

PBS North Carolina, North Carolina Emergency Management and business partners Device Solutions Inc, Triveni Digital Inc., and Digital Alert Systems Inc., utilizing ATSC 3.0 broadcast technology, offer a potential solution for this vexing problem.

Respectfully submitted,

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