EXPLORATORY STUDY OF ADVANCED EMERGENCY ALERTING INTEROPERABILITY BETWEEN ATSC 3.0, DVB, AND ISDB

Through support from NAB PILOT, the AWARN Alliance conducted a top-line, exploratory study of the potential interoperability between ATSC 3.0, DVB-T2, and ISDB-T for advanced emergency alerting (AEA). We included A/344, HbbTV, and Hybridcast in our scope of inquiry. On a highly expedited timeline, our methodology included a literature review and interviews with experts in the U.S., Italy, Denmark, and Japan. We subcontracted with Azita Manson and OpenZNet as our technical partner. Although we collected extensive data and information, this document is only intended as an entry-level survey to identify the most promising opportunities in order to inform subsequent decisions about further study.

GLOBAL PERSPECTIVE

The current COVID-19 pandemic starkly illuminates the interconnectedness of all nations regarding the health and safety of their citizens and visitors. Even before the virus began dominating the news and rearranging the way we live, the increases in frequency and severity of natural disasters, driven by global warming, have impacted hundreds of millions of people, often across national borders. At the same time, manmade threats continue unabated. It is also true that humans are a highly adaptable species. Improvements in emergency messaging are a major component of increased resilience.

Cooperation among the world's leading television transmission standards, ranging from information sharing to interoperability to possible future convergence, can bring important advantages. Harmonization and experience sharing can better inform the public, broadcasters, and vendors, as well as emergency managers and first responders. Testing user experience (UX) designs together could lead to at least some elements of a 'common look and feel' for alert messages for global travelers and local residents alike. And consumer electronics manufacturers could build a single feature set into their devices for sales in any country. In short, cooperation can encourage the development a global eco-system for creating, managing, and distributing basic, enhanced, and advanced alerting

OVERVIEW OF ALERTING WITH THE THREE STANDARDS TODAY

ATSC 3.0, DVB, and ISDB all provide capabilities for disseminating alert messages. Japan has been highly aggressive in the use of digital terrestrial television (DTT) with ISDB-T and Hybridcast in its highly integrated J-Alert System. Japanese members of the AWARN Alliance are actively pursuing interoperability with ATSC 3.0. The DVB standard supports the Emergency Warning

System (EWS), an audio-based system. However, EWS is not widely deployed across Europe. The well-developed HbbTV standard and "red button" services hold considerable promise for IP-based hybrid alerting but have been little used for that purpose. The United States maintains the Cold War-era Emergency Alert System, which is declining in usage, and the newer Wireless Emergency Alerts, which primarily provide short geo-targeted text messages. AWARN is pioneering the use of Next Generation Television, based on the ATSC 3.0 standard, for advance emergency alerting.

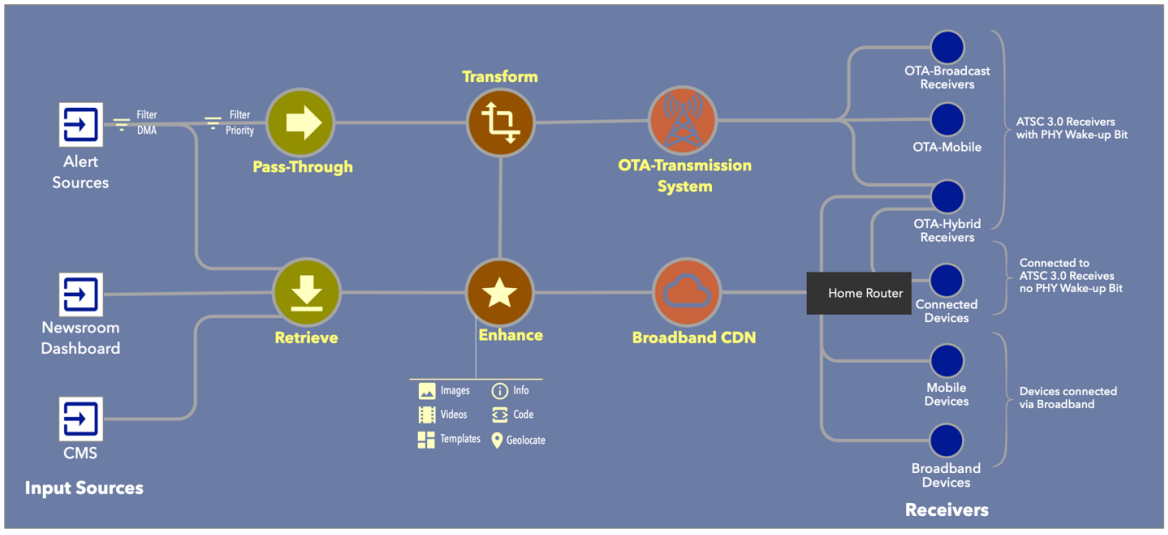
DEFINITION OF ADVANCED EMERGENCY ALERTS

For purposes of this survey, a simple definition of *advanced* emergency alerting (AEA) includes messages that have the following UX and technical characteristics:

- Geo-targeting to enable location-specific messages and avoid the dangerous problem of over-alerting
- Integration of rich media content to provide consumers with the information they need, when they need it, to reduce delay in taking protective action
- Low latency in reception by end-users
- Presentation of the most urgent alerts in a 'common look and feel' so consumers anywhere on any reception device will know that they are being warned of a true threat
- Consumer control over the types and severity of alerts they will receive, and
- Reach to a wide range of consumer devices either directly, through terrestrial transmission, or indirectly through reception and retransmission across a 'network of networks' (which includes terrestrial and satellite broadcast networks, 5G and other mobile networks, and IP networks).

SYSTEMS OVERVIEW

The following diagram describes an AEA system with hybrid distribution.



KEY FINDINGSG

Based on our preliminary examination, we have found that interoperability between ATSC 3.0, DVB-T2, and ISDB-T for AEA is possible. There are several avenues that could be further explored. However, we found that the most promising area for harmonization among the standards lies in presentation, since all three systems are already HTML5/JS/CSS compatible. Although there are possibilities for harmonization at the protocol and signaling layers, we believe that utilization of web technologies via a broadcaster application framework will be the most efficient method for creating interoperability.

We examined several key protocol layers in our search for convergence opportunities: source of ingest, distribution & delivery, device wake-up process, signaling, alert content, communication layer between receiver and the application, and presentation layer and navigation. Several layers offered technical harmonization opportunities but challenges as well. For example, our study indicated that many countries have yet to adopt common alerting protocols for ingesting content, while the U.S. has adopted the Common Alerting Protocol (CAP), based on an international standard.

Therefore, we recommend that focusing on the presentation layer will yield the most for the effort across all eco-systems. In the context of this initiative, presentation layer represents the elements that the viewer experiences, which is the display of information received over the signaling layer that can be further augmented by other information. Not only can common web protocols be used, but the broadcasting chain impacts would be reduced and triggering mechanisms of the different standards can be easily adapted.

Yet-to-be developed API's through broadcaster applications may be the most straightforward path to interoperability, but even focusing on the browser will still impact current schemes. API development will need to take into account the effect on the current systems in order to minimize the need for changes. The basic workflow and differences between the standards in sending and receiving information will also need to be considered in the development process.

The use of a harmonized AEA application may appeal to consumer electronics manufacturers as well, since a browser-based receiver can present the content without the need to interpret the information that is delivered. Interoperability at the presentation layer enables some elements of a common look and feel for the AEA message user experience (UX) regardless of the delivery system. Very importantly, interoperability also promotes development of a system of common universal symbols. Both common look and feel and the universal symbology are vital for ensuring that consumers across the globe recognize AEA messages as urgent warnings regardless of their linguistic or cultural backgrounds.

ATSC 3.0 AS THE FOCUS OF ATTENTION

Conversations with experts in all three standards pointed to the advanced nature of ATSC 3.0 for both commercial and alerting applications. ATSC 3.0 is 'all-IP' and fully compatible with the W3C standards with its WebSocket interface. The other standards discussed in this paper need to create extended browsers in the receivers to accept alert messages from the signaling layer. Several commentators also acknowledged the pioneering work of the AWARN Alliance in Next Gen TV advanced alerting. Given the advanced nature of ATSC 3.0, the U.S. adoption of CAP, and AWARN's head start, harmonization around ATSC 3.0 is recommended for joint development of AEA.

RECOMMENDATIONS FOR NEXT STEPS

European and Japanese firms consulted for this survey all expressed interest in collaborative projects to harmonize alerting. A prominent firm in Denmark, mediathand, is preparing to pioneer Next Gen TV alerting, news, and information for broadband distribution only, as a precursor to hybrid distribution. Fincons, an innovative firm in Italy - which specializes in Hybrid TV solutions and is an active member of both HbbTV and ATSC - has been focusing research and development on improving accessibility of TV messages (e.g. to the hearing impaired), which could further enhance universal alert effectiveness. AWARN Alliance members T-NET Japan and Internet Initiative Japan are proposing a Proof-of-Concept project for cloud-based management of advanced emergency information in the U.S.

In the U.S., we also consulted with the Advanced Television Systems Committee (ATSC) and Triveni Digital, which has played a key role in pioneering interactivity for AEA in the ATSC 3.0 suite of standards. All parties are interested the Washington, DC pilot project being initiated from Sinclair Broadcasting Group's WJLA, in cooperation with the AWARN Alliance and other TV broadcasters in the market.

Another opportunity for cooperation created by harmonization, as noted above, is development of UX design elements, including common symbology, that lead to global awareness of alert messages. Input from television news and creative professionals, social scientists, and consumer testing would be keys to such a research project. International cooperation would require a coordinated, sustained effort. The AWARN Alliance, an independent organization that is supported by the industry and already has an international footprint, could play a key role in coordination of the necessary efforts.

ABOUT THE AWARN ALLIANCE

The Advanced Warning and Response Network (AWARN) Alliance was founded in 2016 to coalesce ideas and support for using the ATSC 3.0 standard to greatly improve emergency alerting in the U.S. The Alliance has an international membership of commercial and public broadcasters, CE makers, B2B tech companies, and trade associations. The Alliance pioneered the use NAB's runtime environment and HTML5 to create effective UX designs and alert messages that present in a 'common look and feel' on any ATSC 3.0 TV receive device that supports the broadcaster application framework. In 2020, the Alliance is focused on

working with its industry partners to launch Washington, DC as a pilot market for originating advanced emergency alerting, news, and information.

The Alliance and NAB signed an MoU in 2018 to work with South Korean partners toward a global alliance for advanced alerting. In 2019, two major Japanese firms with deep expertise in Hybridcast joined the Alliance. And our colleagues at ATSC formed Planning Team 6, Global Recognition of ATSC 3.0. NAB is a founding member of the AWARN Alliance, and their support for this survey was a natural extension of our mutual long-term international engagement.

John Lawson, Executive Director
AWARN Alliance, Alexandria, VA USA
Jlawson@AWARN.org; www.AWARN.org

May 1, 2020

Note: For NAB Show Express, we produced a 30-minute webinar that was based on the survey. *Global Harmonization for Advanced Emergency Alerting: ATSC 3.0, DVB, and ISDB* features panelists from Copenhagen, Rome, and Tokyo. The video can be accessed on-demand beginning May 13 for anyone registered for the virtual NAB Show.