

**Corporation for Public Broadcasting
Appropriation Request and Justification
FY 2021**

*Submitted to the Homeland Security Subcommittee of the House Appropriations Committee
and
the Homeland Security Subcommittee of the Senate Appropriations Committee*

February 10, 2020

This document with links to relevant public broadcasting sites is available on our Website at:

www.cpb.org

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Overview of Public Media

Since the 1920s, people across the United States have launched public broadcasting services in their own communities to champion the principles of diversity and excellence of programming, responsiveness to local communities, and service to all.

Today's public media system reaches nearly 99 percent of the U.S. population with free programming and services. The Corporation for Public Broadcasting (CPB) supports 406 grantees, representing 1,168 public radio stations and 160 grantees representing 355 public television stations. These independently owned and operated local public television and radio stations are each licensed by the Federal Communications Commission and are overseen by a local community board.

Public media creates and distributes content that is for, by and about Americans of all diverse backgrounds; and services that foster dialogue between the American people and the stations that serve them. In addition to providing free high-quality, educational programming for children, arts, and award-winning current affairs programming, public media stations provide life-saving emergency alert services. In a world where there are numerous outlets for information, public media continues to be America's most trusted institution for news and educational programming.

Public television and radio stations have long supported our nation's emergency alert system. Covering nearly 99 percent of the American population, public media's infrastructure represents a significant nationwide communications capability. Further, the national public media organizations and local stations have the resilience requirements that are comparable to those of our nation's public safety systems. With a national-local structure, public media entities can distribute national, state and regional emergency alerts, and provide encrypted, geo-targeted alerts to local communities in times of need.

Section I- Department of Homeland Security Next Generation Resilient Warning System (NGRWS) Funding Request

CPB Supports a \$20 million request for the Next Generation Resilient Warning System (NGRWS) in FY 2021

The Corporation for Public Broadcasting joins with the public broadcasting community in supporting a \$20 million appropriation for a newly created Next Generation Resilient Warning System (NGRWS) within the U.S. Department of Homeland Security's FEMA Federal Assistance account. This new competitive grant program will utilize public broadcasting to enable the expansion of alert, warning and interoperable communications and the incorporation of emerging technology in those activities, consistent with the recommendations in the *Modernizing the Nation's Public Alert and Warning System* report from the FEMA National Advisory Council, February 15, 2019.

NGRWS would allow for public broadcasting entities, as defined in 47 USC 397(11), to procure, construct and improve transmission and other public safety related equipment, software and services, including ATSC 3.0, datacasting and MetaPub. This will result in enhanced alerting and warning capabilities that serve all Americans.

Public Media's Role in Public Safety

Combined, public television and public radio stations cover nearly 99 percent of the American population. Congress and first responders recognize public media stations as a critical component of our nation's public safety network. Since September 11, 2001, CPB has invested in building local station capacity to assist emergency service providers. Currently, in many states and local communities, public media stations' digital and broadcast infrastructure provide a backbone for emergency alert, public safety, first responder and homeland security communications services.

In 2006, Congress passed the WARN Act, which established a voluntary system that allows cellular phone companies to notify their subscribers of imminent threats to life or property. Pursuant to the Act and subsequent FCC rules, the PBS WARN program was initiated to enable all public television stations to send every Wireless Emergency Alert ("WEA") out over every public television transmitter to provide a "hardened, redundant" alternate path for the cellular companies' connection to the alerts. Since 2013, public television has been an essential partner in the WEA system, helping to ensure that every alert reaches every consumer. Public television stations are established lifesaving forces in their communities, even for people who might never turn on a television.

PBS WARN is currently completing a total system overhaul to ensure compliance with the FCC's WEA Report and Order 16-127, which mandates improvements to the WEA system. This update will enable PBS WARN to continue to support the WEA system for the foreseeable future and also provide updated equipment to each public television licensee. These improvements will serve as a starting point for stations to expand their public safety footprint, and the NGRWS grant program will leverage this existing infrastructure to enhance and expand public safety services.

In March 2016, the FCC’s Communications, Security, Reliability and Interoperability Council’s (CSRIC) Working Group 2: “Emergency Alerting Platforms” acknowledged the importance of public broadcasting to alert dissemination, stating “PBS WARN is a safeguard to ensure delivery of the WEA, even in the event that a cybersecurity or other event disrupts the primary WEA delivery path.”¹

In June 2018, the FCC’s CSRIC Working Group 2 issued a final report on “Comprehensive Re-imagining of Emergency Alerting.”² Section 6.4 of the Report identifies three ways NextGen (ATSC 3.0), and specifically public television, can support and improve emergency alerting. Section 6.4 of the Report states:

“PBS and local public television stations play a crucial role in protecting communities by using datacasting to deliver essential information to individuals and first responders. These benefits are all made possible by public broadcasting stations’ unique reach, reliability, and role across America, and are especially vital in rural and underserved areas.”

The Report further states, “we believe that PBS stations and first responders can find even more ways to identify and utilize opportunities presented by ATSC 3.0.”

The February 15, 2019 report, *Modernizing the Nation’s Public Alert and Warning System* from the FEMA National Advisory Council, truly cements the importance of public broadcasting’s role in public safety and identifies a need for continued partnerships, recommending that FEMA encourage “use of public broadcast capabilities to expand alert, warning, and interoperable communications capabilities to fill gaps in rural and underserved areas.”³

The Public Radio Satellite System® (PRSS), managed by NPR, receives a national EAS feed directly from FEMA to send Presidential emergency alerts to NPR-member stations. NPR/PRSS also is named as a resource in at least 20 states’ emergency plans, according to the FCC.⁴ Many of the public radio stations in these twenty states serve as Primary Entry Point (PEP) stations. The PRSS network includes almost 400 interconnected public radio and NPR-member stations. This large national network acts as support for secure, reliable communications during emergencies without relying on the Internet, which may be off-line during emergencies.

Over the past five years, NPR/PRSS has been helping public radio stations become “MetaPub-enabled,” meaning those stations would be capable of sending text and image metadata

¹ CSRIC VI, Working Group 2, Emergency Alerting Platforms: WEA Security Sub Final Report. March 2016. <https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability#block-menu-block-4>

² CSRIC Final Report on “Comprehensive Re-imagining of Emergency Alerting.” June 2018 <https://www.fcc.gov/files/csric6wg29junereportcomppdf>

³Modernizing the Nation’s Public Alert and Warning System Report from the FEMA National Advisory Council, February 15, 2019 https://www.fema.gov/media-library-data/1550587427456-30d4179ee4fa8b97ecf4ab6bee76ace6/NAC_IPAWS_Subcommittee_Final_Report.pdf

⁴ <https://www.fcc.gov/public-safety-and-homeland-security/policy-and-licensing-division/alerting/general/state-eas-plans>

simultaneously with their live radio broadcasts.⁵ For example, the information from state, regional and local emergency officials could be heard and seen on mobile phones, HD radios, ‘connected car’ devices, Radio Data System displays, and via online audio streaming. To date, about 10 percent of interconnected public radio stations have the capability to issue live text alerts using the MetaPub system in the event of a natural or humanmade disaster.

Initial grants from CPB enabled MetaPub capability to be installed at stations in California and parts of the Midwest, including “Tornado Alley.” A current project is underway to provide this capability in some stations in the Gulf Coast and southeastern U.S. Funding for the Next Generation Resilient Warning System would provide all public radio stations access to funds to install MetaPub, enabling them to issue and disseminate enhanced local and regional alerts specific to their communities. The cost of installation for other stations across the country would be between \$7.5 million and \$8 million, or about \$15,000 per station.

Public radio also has funding needs to support the refurbishment and maintenance of state and regional public radio networks. These networks enable local stations to expand their reach statewide or regionally by connecting multiple transmitters by satellite. Similar to the national interconnection system, each regional network is a crucial communications link to rural, underserved communities across America – especially during emergencies.

For many years, the U.S. Department of Commerce provided funding to equip and build regional public-radio networks through its Public Telecommunications Facilities Program. However, since that program was defunded, no new networks have been built and many of the existing networks are now nearing the end of their life cycles.

Public Safety Station Examples

Despite Hurricane Florence (2018) decimating parts of North Carolina and severely compromising cellular communication systems, the University of North Carolina Center for Public Television (“UNC-TV”) used its statewide broadcast network, livestreaming capabilities and digital platforms to provide vital information to the public during the storm. UNC-TV is the crucial link between public officials and the over 10 million North Carolina citizens before, during and after emergency situations. This essential service includes:

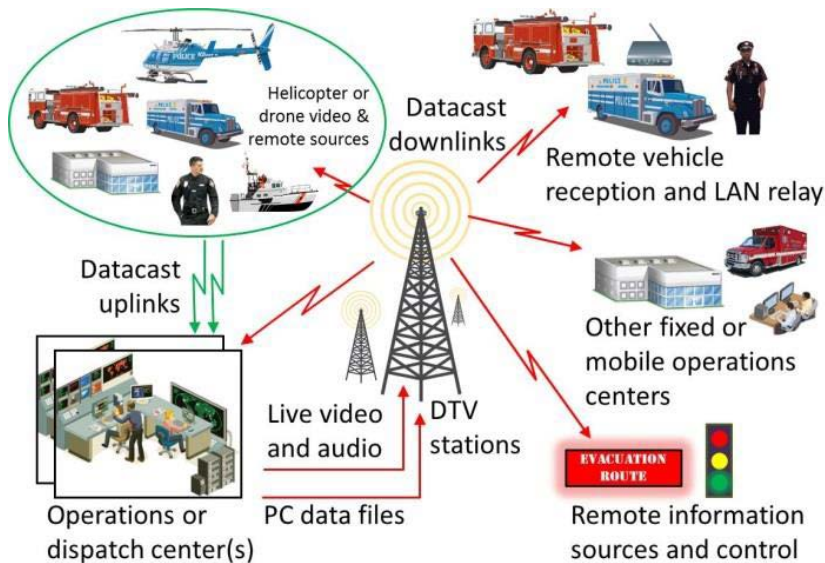
- **UNC-TV Transmission Sites:** Over 40 Federal, State, and Local agencies, including law enforcement and emergency management organizations, depend on 20 UNC-TV towers for their communication systems.
- **UNC-TV Distribution Networks:** The UNC-TV microwave radio infrastructure serves as the critical backbone for the State Highway Patrol and North Carolina Emergency Management communication networks.
- **UNC-TV Emergency Broadcasts:** UNC-TV broadcasts, streams and otherwise distributes vital emergency information accessible via various media and digital

⁵ Metadata is descriptive information about programming (it could be station identification, logo, program, air date, topic, host or reporter names, photos, graphics, maps and the format could be text, images or links).

platforms. This information includes North Carolina Emergency Operations Center briefings from the Governor and other National, State and Local authorities.

In 2013, WUFT-FM (Gainesville, FL) and the collaboration of public media stations throughout Florida formed the Florida Public Radio Emergency Network or “FPREN,” which has provided multimedia content to public media in Florida for various public safety events such as hurricane’s Irma, Michael and Matthew. Last fall, WUFT began working with SCETV to roll out a similar public safety/emergency messaging service that covers the state of South Carolina (South Carolina Emergency Information Network). FPREN was able to provide SCETV and South Carolina Public Radio (in addition to numerous public radio stations in North Carolina) with live coverage of Hurricane Florence. Both FPREN and the South Carolina Emergency Information Network actively provide multimedia content year-round regarding public safety and emergency messaging to North and South Carolina from the StormCenter operation in Gainesville, FL. SCETV is now considered the “media of record” when it comes to state emergencies.

During Hurricane Harvey and other flooding incidents, the Houston Fire Department and Houston Police Department used Houston Public Media’s datacasting technology to stream live video of flooding conditions and fire hazards to the Emergency Operations Center. Datacasting also provided first responders with the ability to securely communicate during the crisis to help them assess conditions and make informed decisions. Houston Public Media used its radio multicast channels to broadcast multiple programs at once to provide comprehensive storm coverage to listeners. Reporters that were unable to make it to the office used WhatsApp and other mobile applications to edit and publish important public safety information to the web, mobile and social media.



Chicago public television station WTTW partnered with the U.S. Coast Guard to simulate datacasting support for a search and rescue operation on Lake Michigan. When Chicago Police Department video surveillance cameras along the shoreline of Lake Michigan were pointed toward the lake a video simulating a search and rescue operation was shown to the U.S. Coast Guard vessel eight miles from shore. All datacast transmissions – alerts, images, files, and video streams – were successfully received. Even 8 miles from shore, video reception was excellent. Team members used cell phones to measure reception and stream video via YouTube, and verified that the datacasting coverage over Lake Michigan exceeded that of cellular networks.

In Ohio, OEAS Public Alertnet covers the entire state with a joint datacast project that supports emergency alerting bound for the public. A companion to the existing EAS system, Alertnet does not rely on the Internet and provides a common infrastructure tying all eight Ohio public TV licensees and their 12 public television stations together for future public safety needs.⁶ Nationwide deployment of this concept could help meet one of the recommendations from the FEMA National Advisory Council to use “public media broadcasts as one such technology to supplement the national ‘Primary Entry Point’ (PEP) strategy,”⁷ ensuring that all-hazards alerts reach the intended recipients every time.

Twin Cities Public Television provides real-time warning and alerting for multi-lingual audiences. This service fills a communication gap for police, fire, emergency management and other “initiators of warning and alerts” by working with public safety and cultural communities to pre-load or customize messages so broadcast viewers can see and hear television warning and alerts in English, Spanish, Hmong, and Somali.⁸

Maine Public broadcasting network makes its statewide spectrum available to federal and state authorities to communicate with first responders and the media in the event of an emergency. The one-way closed communication system is designed to work even when internet connections are down and/or the power is out.

Vegas Public Television works with Clark County Emergency Management to provide an immediate alternate phone bank, using existing pledge banks, to take non-emergency calls during an incident that taxes primary emergency operations centers. Vegas PBS also has a partnership with emergency officials that includes a database of floor plans and student contact information for more than 400 school buildings, all of it available instantly to first responders via the station’s datacasting system. It was unexpectedly used during a recent forest fire near one school.

New Hampshire PBS (NHPBS) is part of a microwave network across the state that services Homeland Security, the Departments of Safety, Transportation, Economic Development, and National Guard. Funds from a newly created Next Generation Resilient Warning System account would be used to maintain equipment for this important network. Further, NHPBS is located within 30 miles of a nuclear power plant and 90 minutes north of Boston. Should there be a

⁶ <https://www.radioworld.com/news-and-business/ohio-digital-alerting-system-is-active>

⁷ Modernizing the Nation’s Public Alert and Warning System Report from the FEMA National Advisory Council, February 15, 2019 https://www.fema.gov/media-library-data/1550587427456-30d4179ee4fa8b97ecf4ab6bee76ace6/NAC_IPAWS_Subcommittee_Final_Report.pdf

⁸ <https://www.twincities.com/2019/07/07/local-station-wants-to-be-source-for-limited-english-speaking-communities-before-and-after-a-crisis/>

major event along the New Hampshire seacoast or Boston south, the New Hampshire Department of Safety's Interoperability Office is planning for a large influx of people from the south heading to the north and west to evacuate. To provide emergency support services in this scenario, NHPBS would need to 1) upgrade the studio generator to power the entire building including the studio; 2) upgrade the uninterruptable power system (UPS) to handle the entire building; 3) procure a new LED lighting system to reduce power loads; and 4) upgrade the phone system to handle emergency communications for the region.

WHRO Public Media in Hampton Roads, Virginia, interconnects the public safety agencies in the area with multiple emergency operation centers (EOCs) and other critical public safety locations via their optical fiber network. Through cooperative efforts, WHRO connects to this network and receives video content from any connected EOC. The use of standard video conferencing equipment turns every EOC into a broadcast-ready location for press briefings and on-air news conferences.

Georgia Public Broadcasting (GPB) is currently partnered with the Georgia Emergency Management Agency (GEMA) to distribute critical information in times of emergency. Along with standard EAS alerts for radio and television. GPB serves as the official distribution of evacuation route information during State ordered evacuations. Evacuation route signs are marked with corresponding radio station frequencies. In an emergency, GPB interrupts regular programming three times per hour with lifesaving information. GPB also works directly with the Governor's office to deliver critical updates from the Governor and GEMA officials over radio and recently over our digital services including web, and mobile apps.

Tennessee public television stations (WKNO, Memphis; WLJT, Lexington; WNPT, Nashville; WCTE, Cookeville; East Tennessee PBS, Knoxville; and WTCL, Chattanooga) use part of their broadcast spectrum to deliver encrypted videos, files, alerts and other data (datacasting) to officials statewide, as needed, during emergencies and natural disasters.

South Carolina Educational Television (SCETV) has the responsibility for ownership and management of all state transmitter sites and interconnecting networks. This responsibility includes infrastructure used by and implemented for state public safety and government operational radio systems. This is one of several examples where public media entities host or share site costs, emergency power and technical staff resources.

In August 2019, the Department of Homeland Security Science and Technology Directorate (DHS S&T) hosted an earthquake preparedness drill in Birmingham, Alabama which utilized public television datacasting over Alabama Public Television as a critical component of the exercise. The event was a drill that involved an earthquake taking place during a football game. The drill planned for thousands of spectators to evacuate, with hundreds being hurt or killed, and responders having to deal with compromised communications. Several technologies were deployed and tested to see how response could be improved. It was assumed that cell towers would be compromised during the earthquake, so mesh networks that do not rely on cellular were deployed. Drone and body camera video used that mesh network to feed into the public television datacasting system, which then broadcast to responders on the scene, as well as operations centers around the state.

In 2018, KVIE public television in Sacramento, CA worked with the California Office of Emergency Services (Cal OES) to figure out how to deliver early earthquake warnings faster. In a field test using public television's datacasting ability, an early earthquake warning was delivered in under three seconds. The previous warning standard was 30 seconds. Four other California public television stations, KPBS in San Diego, CA, KQED, San Francisco, CA, PBS SoCal, Los Angeles, CA and Valley PBS, Fresno, CA, participated in subsequent testing of public television's datacasting system for earthquake early warnings.

System Infrastructure Needs

In 2017, CPB commissioned a comprehensive System Technology Assessment to better understand public television and radio stations' technology challenges and needs. The station response rate was unprecedented (73 percent of radio and 92 percent of television licensees), cataloging more than 60,000 pieces of equipment throughout the system. The assessment found that if equipment needs and available funds progress as forecasted, the system will face more than a cumulative \$300 million shortfall by 2020.⁹ Should this shortfall lead to equipment failure, the critical public safety role that stations play could be compromised.

Eighty-six percent of TV stations and 75 percent of radio stations tend to postpone replacing their technology equipment when faced with a lack of funds. By postponing replacement, stations are at a greater risk of going off the air, not being able to fulfil their missions, and/or are squeezed to make purchases without having the lead time to negotiate better equipment deals. Also, almost half of TV stations and a quarter of radio stations will scale back their replacement plans to equipment with less optimal specifications. As the public media system postpones equipment replacements beyond their optimal end-of-life, the public media system is accruing technological risk that ultimately impacts the educational, cultural and public safety services to their communities.

Without resources to maintain and replace broadcast transmission infrastructure on schedule, TV and radio licensees of all sizes and types could face operating challenges nationwide, disrupting the essential public safety service these stations provide. The elimination of critical federal funding resources has contributed to the growing financial needs for licensees nationwide as aging infrastructure and natural disasters challenge the nation's public media networks.

Eyes on IPAWS: Leveraging stations' existing PBS WARN infrastructure to provide situational awareness tools to emergency management.

At the request of California Governor's Office of Emergency Services (Cal OES), PBS and Sacramento member station KVIE are currently working to develop tools that would provide the state's emergency managers a live feed of WEAs from their local public television station. The alerts would be in the Common Alerting Protocol format, which would allow emergency managers to use the information for both situational awareness and data analytics. The basic tools to view the output from each public television station's PBS WARN feed are currently in place for testing and evaluation. However, more can be done in software development to create a product that meets the needs of emergency managers throughout the country, including: making

⁹ CPB System Technology Assessment Final Report. Eagle Hill Consulting. May 21, 2017.
http://www.cpb.org/files/reports/Final_Report-CPB_System_Technology_Assessment_2017.pdf

the alerts selectable based on alert type, location, originator, and other options; building a look-back function for increased situational awareness; establishing light-up/alarm features to notify that an alert has been issued in the Emergency Operations Center's geographic area. Funding "Eyes on IPAWS" would provide valuable tools to emergency managers nationwide for the incremental costs of software development, testing, installation and training.

Public Safety & ATSC 3.0 ("NextGen TV")

With the transition from analog to digital broadcast television long past, the next major transition on the horizon is from the current broadcast standard Advanced Television Systems Committee (ATSC) 1.0 to ATSC 3.0, or NextGeneration television ("NextGen TV"), an internet protocol-based standard. In February 2018, the Federal Communications Commission published the standard for voluntary adoption by both public and commercial television broadcasters, and it is expected that the new standard will be widely adopted by the industry and by viewers over the next five to ten years. Testing has commenced in several markets around the country, with participation by public television stations in Raleigh, NC, Phoenix, AZ, and East Lansing, MI.

One of the principal benefits of NextGen TV is enhanced public safety alerting, in addition to enhanced accessibility and audio-visual enhancements. The features and functionality of the new standard are particularly well-suited to advancing the public safety work of public television stations. For example, the NextGen TV standard will enable enhanced geo-targeting of alerts and could provide comprehensive auxiliary data, such as evacuation routes and weather maps. The standard also allows broadcasters to "wake up" receiver devices when an emergency alert is transmitted, which will facilitate the dissemination of critical information, particularly at night, when severe weather or other emergencies may occur.

The FCC's Communications, Security, Reliability and Interoperability Council's (CSRIC) Working Group 2 June 2018 final report on "Comprehensive Re-imaging of Emergency Alerting" identifies three ways NextGen TV, and specifically public television, can support and improve emergency alerting. Section 6.4 of the Report provides an example of how a public television station can use the new broadcast standard to improve emergency alerting:

"NextGen TV: Saving Lives One Alert at a Time, UNC-TV (North Carolina) won first place in the National Association of Broadcasters (NAB) Pilot Innovation Challenge for a proposal that uses datacasting technology in broadcast television to update outdated first responder emergency pagers. Initial stages show potential to decrease a fire station's time to respond to a given alert by nearly one minute for each notification. The project currently uses ATSC 1.0 to reach fire stations across the state. Once ATSC 3.0 broadcasting is implemented, updated receivers connected to mobile devices will allow mobile paging for first responders, even in areas where LTE service does not reliably reach."

Another opportunity this new technology could allow is for public broadcasters to better serve those who are hearing and visually impaired. For the first time, stations could transmit closed caption sign language alongside their broadcasts to better serve hearing impaired viewers. In addition, the system would be able to provide greater dialogue intelligibility by allowing users to independently adjust the non-dialogue elements of a program's audio track. Closed captions and subtitles could also be offered in multiple languages and could transmit through either broadcast or broadband.

For public television to provide these enhanced alerting services, stations will have to undertake this costly technology transition. A January 2018 report prepared for CPB by Meintel, Sgrignoli and Wallace, states, “As with any new technology migration, there will be a need to acquire new equipment and integrate that new equipment into an existing operational TV broadcast plan.” There are a variety of new technologies being adopted in ATSC 3.0 that are not “backward-compatible” with existing infrastructure at a “typical” TV station. One study suggests that it will cost a station between \$500,000 and \$3,600,000 to transition to the new broadcast standard, depending on the station’s current infrastructure. This broad range of potential costs depends on how new various station equipment is and if it can be easily updated for ATSC 3.0. Unfortunately, many public television stations have been forced to push their infrastructure and equipment beyond its optimal end of life due to financial uncertainties. As a result, the upgrade to ATSC 3.0 may be on the higher end of this range.

The creation of the Next Generation Resilient Warning System (NGRWS) will enable the expansion and enhance the reliability of the alert, warning and interoperable communications activities that public broadcasting stations are committed to, while providing first responders and public safety officials with critical new communication resources.

FY 2021 PROPOSED APPROPRIATIONS LANGUAGE

Federal Funds

DEPARTMENT OF HOMELAND SECURITY- FEMA, FEDERAL ASSISTANCE

Of the amounts made available to the Department of Homeland Security FEMA Federal Assistance account for fiscal year 2021, not to exceed \$20,000,000 is available for Next Generation Resilient Warning System awards.

Budget Language

Next Generation Resilient Warning System- Provided for in Fiscal Year 2021, \$20,000,000 for public broadcasting entities, as defined in 47 USC 397(11), to procure, construct and improve transmission and other public safety related equipment, software and services, including NextGen TV (ATSC 3.0), datacasting and MetaPub. This will result in enhanced alerting and warning capabilities that serve all Americans.

Appendix A

By The Numbers¹⁰-The total number of transmitters that need to be replaced by 2020.

TRANSMITTERS/ANTENNAS

Largest category of costs: Transmitters and Antennas

TOTAL transmitters replaced by 2020: 294 TV (81% of total of 362) and 356 radio (31% of total of 1157)

Total Cost Transmitter/Antenna Replacement (excludes repack): \$118M (17.5% of total costs)

TV Transmitters: \$44 million

TV Antennas TV: \$44 Million

Radio Transmitters: \$22 million

Radio Antennas: \$8 million

STATIONS BY SIZE

Smaller Station Transmitters Replaced by 2020: 112 (38% of reported replacements)

% of Funding Gap for Smaller station: 24% (182 radio, 73 TV/45% of system)

% of Funding Gap for Medium station: 28% (88 radio, 44 TV/23% of system)

% of Funding Gap for Larger station: 47% (132 radio, 51 TV/32% of system)

Note TV: Smaller = Revenue < 5M, Medium = Revenue <5M and 10M>, Larger = 10M+ revenue

Note Radio: Smaller = Revenue < 1M, Medium = Revenue <1M and 3M>, Larger = 3M+ revenue

¹⁰ Eagle Hill Consulting. May 2017.

Appendix B

Highlights of Public Television and Public Radio Equipment Needs

Alabama Public Television

6 Transmitters and Antennas	\$11,000,000
Microwave replacement	\$3,850,000
Datacasting equipment for each transmitter site	\$450,000
FRQ 3000 for NextGen TV (ATSC 3.0)	\$48,000
Test Equipment for NextGen TV (ATSC 3.0)	\$300,000
TOTAL:	\$15,648,000

Alabama Public Radio

Standby EAS unit-SAGE	\$4,000
Backup RDS Encoder	\$1,100
External Antennas for Monitoring Stations	\$400
Public Service Radio Monitors	\$800
Auxiliary Transmitter	\$70,000
TOTAL:	\$76,300

Alaska Public Radio (KCAW/Sitka)

Angoon Translator Equipment	\$24,970
Pelican Translator Equipment	\$15,400
Elfin Cove Translator Equipment	\$12,650
Tenkaee Springs Translator Equipment	\$15,400
Yakutat Translator Equipment	\$25,300
Port Alexander Translator New Tower and Equipment	\$37,730
Kake Translator Equipment	\$14,850
TOTAL:	\$146,300

Arizona (Tempe) KJZZ and KBAQ Public Radio

Transmission Generators and UPS	\$12,000
STL and TX Distribution Networks	\$160,000
Translators/Single Frequency Network	\$50,000
Other RF Broadcast (replace BPF)	\$160,000
Cybersecurity Software	\$30,000
Station Generator and Uninterruptable Power Supply	\$20,000
Other Common Infrastructure	\$120,000
TOTAL:	\$552,000

Arizona PBS (Phoenix)

HEVC w/ ATSC 3.0 encoders	\$140,000
Mux/modulation & Studio Transmission Line equipment	\$160,000
Transmitter	\$350,000
8 Translators	\$280,000
TOTAL:	\$930,000

Arizona Public Media (Tucson)

2 UHF Transmitters	\$2,719,270
Cooling System	\$93,390
2 Mask Filters	\$102,300
2 Dummy Loads	\$44,924
Couplers, Switches	\$43,728
Spare Parts	\$31,389
2 Antennae Upgrades	\$900,000
Microwave System	\$85,305
	TOTAL: \$4,020,306

California- PBS SoCal

3 NextGen TV Transmitters	\$2,500,000
3 Polarized Antennas	\$850,000
2 Receiver/antenna/synchronization equipment	\$90,000
4 Translator Transmitters	\$270,000
4 Translator Antennas	\$185,000
2 Receivers	\$7,000
4 Microwave Links	\$260,000
2 Routing Remote Access	\$140,000
2 Emergency Alert Service/WARN Links to California Office of Emergency Services	\$50,000
Test and Monitoring Equipment	\$80,000
DA, Modular Equipment	\$25,000
Network Interfaces (network routers, etc.)	\$120,000
Encoding System	\$300,000
Cabling, Racks, Mounting Hardware	\$20,000
	TOTAL: \$4,897,000

Connecticut Public Media

7 Uninterruptible Power Sources (UPS)	\$35,000
WEDN-TV Transmitter	\$100,000
WEDW-FM Radio Transmitter	\$35,000
WPKT-FM Radio Transmitter	\$75,000
WRLI-FM Radio Transmitter	\$80,000
	TOTAL: \$325,000

Idaho Public Television

4 Transmitters (dual Exciter)	\$1,205,000
4 Antennas	\$640,000
4 Transmission lines	\$154,000
4 Duplex Studio Transmission Lines for Single Frequency Network	\$360,000
Delivery & Signaling Server	\$15,000
5 IP Gateway Devices	\$59,500
Virtualized Modulator/IP Switches	\$25,000

Encoding Plant Upgrades	\$125,000
File Server Upgrades	\$250,000
Routing Switcher replace w/IP hybrid	\$275,000
5 Test Monitoring Sets	\$250,000
2 Exciter upgrades	\$10,000
IP Router/Fiber	\$25,000
46 Transcoder Front Ends	\$552,000
30 Backup Generators	\$360,000
	TOTAL: \$4,330,500

Idaho Public Radio (KBSU-FM)

Generators, Backup power

YFRP Generator, Transfer Switch, Electrical	\$95,000
Uninterruptible Power Source (UPS) for Library STL	\$2,500
UPS for SMASH Downlink	\$2,500
240v UPS for KBSK, KBSQ, KBSM, battery bank, Share in PSC Generator	\$15,000
KBSW Generator	\$25,000
2 Generators, UPS, Transfer switches	\$45,000
Salmon, Challis UPS & Battery runtime improvements	\$6,000
Stanley School UPS, Generator	\$15,000
2 Uninterruptable Power Sources (UPS)	\$5,000

Emergency messaging and availability

EAS Endecs, receivers, route to air for KBSK, KBSQ, KBSM	\$15,000
Codecs for EAS source audio routing between sites	\$41,500
EAS audio from Elko to KBSJ	\$5,300
Salmon antenna, transmitter, circulator, replacement	\$25,500
Challis Antenna, transmitter, circulator, receiver replacement	\$29,000
No Business Mtn transmitter, antenna, receiver replacement	\$19,000
Cascade School - transmitter, receiver	\$19,000
Stanley Coverage & alert messaging improvements, HD Alerts, Metapub	\$134,700
Ketchum School program feed	\$5,500
KBSS Main Transmitter, Antennas, Filter, HD Alerts, Metapub	\$92,300
KBSW HD Alerting	\$42,000
KBSJ Transmitter, Coverage upgrade, HD Alerts, Metapub	\$133,500
KBSW Coverage improvement	\$168,000
KBSU, KBSX aux site w/ coverage improvement on KBSX	\$566,300
3 Studio Transmission Lines (STL)	\$96,000
2 coverage replacement boosters	\$120,000
Other common infrastructure	\$80,158
	TOTAL \$1,803,758

Kentucky Educational Television (KET)

ATSC 1.0/3.0 EAS Public Safety Capital Proposal

Localized EAS system for statewide ATSC 1.0 network	\$594,766
Datacast IPAWS over IP statewide ATSC 1.0	\$107,000
WKMJ to ATSC 3.0 for Advanced Warning and Datacast Pilot Project	\$227,500
Louisville FirstNet Air-to-Ground Video over Datacast (ATSC 3.0) to First Responders – Pilot Project	\$400,000

Statewide Implementation of FirstNet Video over Datacast (ATSC 3.0) to First Responders

Encapsulation and Reception Devices for End Users	\$800,000
Upgrade of statewide transmission chain to ATSC 3.0	\$3,145,000
	TOTAL: \$5,374,266

Kentucky- Louisville Public Media

New generator at Station	\$75,000
New generator at Tower	\$75,000
Uninterruptible Power Source at Tower	\$60,000
	TOTAL: \$210,000

Kentucky Public Radio (Murray)

Transmitter	\$140,000
Transmitter building air conditioner replacement	\$20,000
Studio Transmission Line (STL)	\$10,000
4 Number EAS Units	\$10,780
2 RDS Units	\$4,780
Mobile Backup Studio	\$100,000
1 Generator	\$40,000
	TOTAL: \$324,780

Louisiana- WYES-TV (New Orleans)

Transmitter including installation	\$1,090,055
Antenna with V polarization	\$466,575
Antenna Installation	\$280,000
Transmitter Remote Control	\$32,700
NextGen TV compatible encoder	\$50,250
NextGen TV encoder upgrade	\$25,000
Miscellaneous Electrical	\$10,000
New Digital 7GHz Duplex Hotstandby Studio Transmission Line	\$69,615
	TOTAL: \$2,024,195

Louisiana- WWNO-FM and WRKF-FM (New Orleans and Baton Rouge)

WWNO

Backup generator	\$125,000
Studio Transmission Line (STL)	\$30,000
Uninterruptible Power Supply (UPS)	\$12,000
Backup Climate Control Studio	\$50,000
EAS Encoder for Transmitter Site	\$5,000

Portable Satellite Downlink System (Shared with WRKF-FM)	\$40,000
Satellite Receivers	\$15,000
KTLN Backup Generator	\$30,000
Codecs (two pairs)	\$20,000
Backup Internet Equipment	\$10,000
Metapub improvements	\$10,000
Digital Online Infrastructure	\$10,000
Weather Equipment (FPREN)	\$50,000
Backup Studio at Office of Emergency Management- shared	\$250,000
	TOTAL: \$682,000

WRKF

Backup generator	\$100,000
Studio Transmission Link (STL)	\$30,000
Uninterruptable Power Supply (UPS)	\$12,000
EAS Encoder for Transmitter Site	\$5,000
Satellite Receivers	\$15,000
Codecs (two pairs)	\$20,000
Backup Internet Equipment	\$10,000
Metapub improvements	\$10,000
Digital Online Infrastructure	\$10,000
Weather Equipment (FPREN)	\$50,000
	TOTAL: \$287,000

Maryland Public Television

18 Exciter upgrades to NextGen TV	\$90,000
18 Microwave Distribution upgrades	\$180,000
3 Fiber Modems	\$30,000
4 A/V Encoding / Statmux	\$120,000
1 Route Signaling / Announcement	\$35,000
5 Integration, rack and cabling	\$25,000
Integration, rack and cabling for MPT Studios	\$15,000
	TOTAL: \$485,000

Maryland- Baltimore Public Radio (WYPR-FM)

Replacement Transmitter	\$136,000
Studio generator and electric work	\$100,000
Transmitter and generator	\$75,000
New microwave links to WYPR	\$20,000
3 audio over IP encoders/decoders	\$13,617
10 KVA Ups	\$10,000
Updated HD equipment for enhanced meta data and datacasting	\$20,500
	TOTAL: \$375,117

Mississippi Public Broadcasting

5 DTV transmitters	\$4,180,000
4 Transmitters	\$800,000
8 Emergency Generators	\$760,000
5 (sets) high intensity LED tower lights	\$1,200,000
7 HDFM antennas with de-icer	\$997,000
8 LAN switches	\$32,000
1 Extract Transform Load (ETL) DTV analyzer	\$80,000
Elevator inspection and repair at 8 tower sites	\$400,000
8 Module Conversions to ASI/SMPTE	\$24,000
3 Monitor DTV/Radio transport signal	\$15,000

For Microwave Sites

10 Emergency Generators	\$210,000
11 Microwave Radio Switches	\$33,000

Missouri- KCPT Public Television (Kansas City)

NextGen TV Transmitter	\$2,200,000
Antenna with 30% Vertical Polarization	\$750,000
Studio Transmitter Link (STL)	\$100,000
Testing and Monitoring Equipment	\$50,000
TOTAL:	\$3,100,000

Missouri- St. Louis Public Radio

3 HD Transmitters	\$413,800
TOTAL:	\$413,800

New Hampshire Public Television

UHF Transmitter	\$117,659
Mask Filter and RF Line	\$5,788
Surge Protector	\$1,619
Digital Television Transmitter	\$493,940
Liquid-Cooled VHF Transmitter System	\$105,349
Liquid-Cooled Digital Transmitter	\$211,535
TOTAL:	\$935,890

New Hampshire Public Radio

Studio Transmitter Link (STL)	\$11,000
Backup HVAC System for Technical Operation Center	\$25,000
TOTAL:	\$36,000

North Carolina UNC-TV

12 Primary Uninterruptable Power Supply (UPS)	\$7,200,000
12 Primary Emergency Power Generators	\$3,200,000
12 Redundant Emergency Power Generators	\$3,200,000
Microwave System Replacement (All Sites)	\$2,500,000
TOTAL:	\$16,300,000

North Dakota Public Media (Prairie Public)

Microwave system	\$2,200,000
Studio Transmitter Line (STL)	\$100,000
9 Transmitters	\$7,500,000
Generator	\$200,000
TOTAL:	\$10,000,000

Oklahoma Public Television (OETA)

Tube Transmitter (Eufaula, OK)	\$1,700,000
TOTAL:	\$1,700,000

Oklahoma Public Radio- KOSU-FM (Oklahoma City/Stillwater)

2 Studio Transmitter Link (STL)	\$45,000
FM Exciter	\$9,000
TOTAL:	\$54,000

Oklahoma Public Radio- KGOU (Norman)

3 Generators	\$135,000
2 Exciters	\$18,000
Broadcast Microwave System	\$6,500
Remote Control	\$1,200
Processor	\$9,000
Studio Transmission Line (STL)	\$15,000
2 Studio Consoles with Nodes	\$28,000
Audiovault Software & Hardware	\$25,000
Backup broadcast and digital studio	\$75,000
Backup A/C	\$10,000
Portable Emergency Transmitter	\$20,000
TOTAL:	\$342,700

Vermont PBS

2 Transmitters	\$300,000
4 Uninterrupted Power Supply (UPS)	\$1,250,000
5 Microwaves	\$351,000
1 Repeater Microwave	\$40,000
4 Transfer Switches	\$48,000
3 HVACs	\$90,000
TOTAL:	\$2,079,000

Vermont Public Radio

Transmitter and Generator (WVPS-FM)	\$211,000
TOTAL:	211,000

Washington- KBTC Public Television (Tacoma)

Transmitters – Full Power with redundant exciters and drivers	\$1,625,000
Antennas – Circular Polarized	\$535,000
Transmission Line	\$273,000
Generators	\$900,000
UPS Systems	\$150,000
Test and Compliance Monitoring	\$205,000
Encoding	\$250,000
Studio Transmission Line (STL)	\$375,000
Remote Control	\$75,000
Tower Lighting	\$55,000

West Virginia Public Media

NextGen TV antennas and 5 NextGenTV translators	\$2,200,000
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TOTAL: \$2,200,000

Wisconsin Public Radio- WERN, WHAD, WHA and WLSU

21 Transmitters	\$1,730,000
7 Generators	\$1,250,000
19 Uninterruptable Power Supplies (UPS)	\$95,000
10 Antennas	\$790,000
14 Studio Transmission Lines (STL)	\$600,000

TOTAL: \$4,465,000