CPB System Technology Assessment
Final Report

The Corporation for Public Broadcasting commissioned Eagle Hill Consulting to conduct System Technology Assessment project. The project ran from September 2016 through May 2017.

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*Please see the Appendix, provided separately, for additional data visualizations that Eagle Hill Consulting developed from the Assessment data set.

INTRODUCTION

The System Technology Assessment sought to understand the system's current state, and enable future solutions

System Technology Assessment Goals

Understand

How large a technology equipment problem the system faces in the next 2-5 years, and how similar or different Radio is versus TV

Prioritize

Equipment replacement and related station financial needs, after analyzing collected data, focusing on stations' equipment and financial capabilities
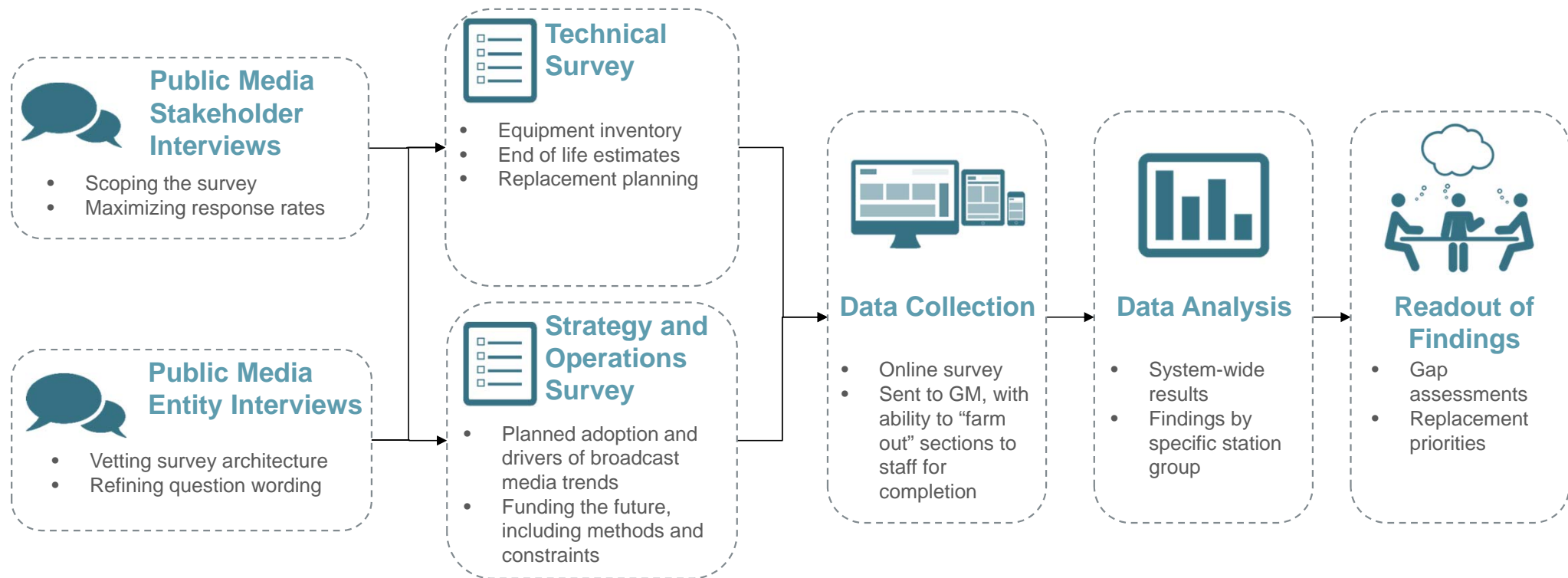
Identify

Resource gaps and offer possible recommendations, including identifying new operating models, technologies, and collaboration opportunities

The Assessment comprised several steps, including stakeholder input, survey development, data collection, analysis, and readouts of results
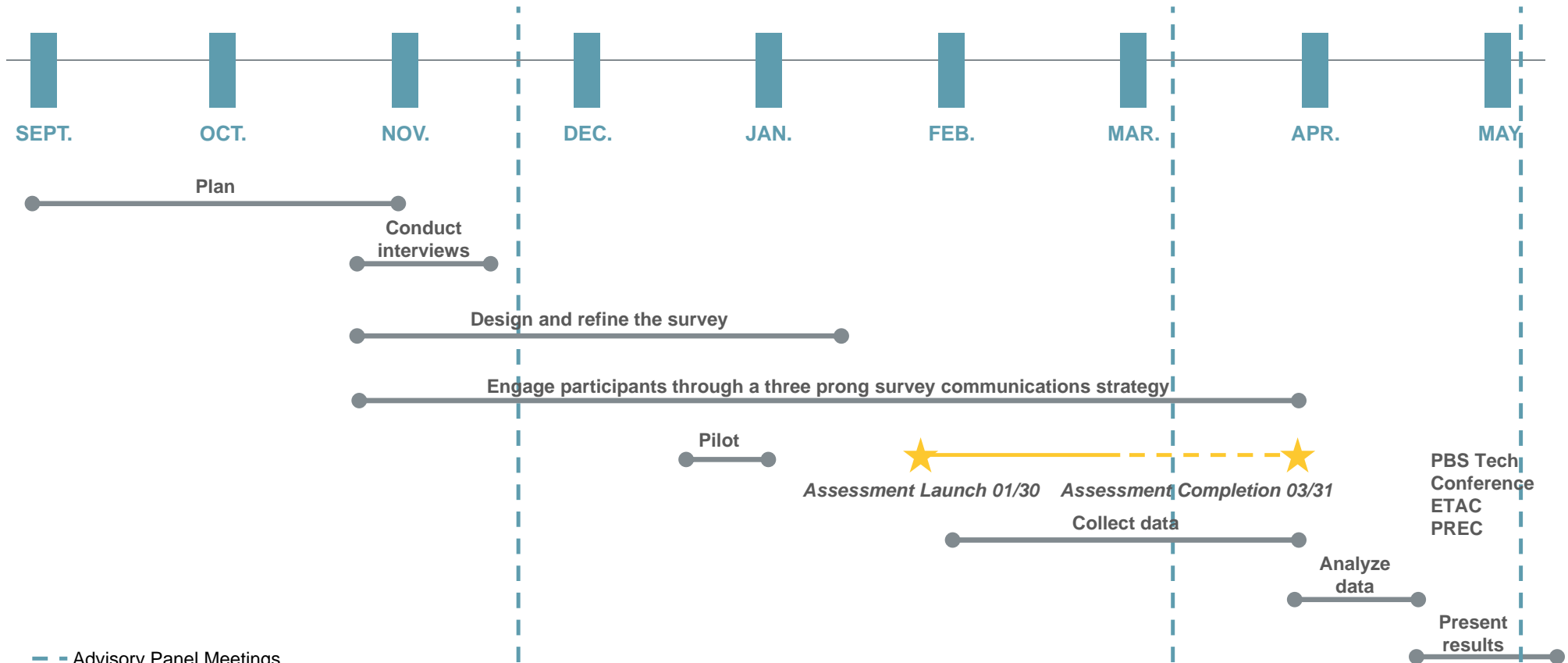
Public Media Stakeholder Interviews
- Scoping the survey
- Maximizing response rates

Public Media Entity Interviews
- Vetting survey architecture
- Refining question wording

Technical Survey
- Equipment inventory
- End of life estimates
- Replacement planning

Strategy and Operations Survey
- Planned adoption and drivers of broadcast media trends
- Funding the future, including methods and constraints

Data Collection
- Online survey
- Sent to GM, with ability to "farm out" sections to staff for completion

Data Analysis
- System-wide results
- Findings by specific station group

Readout of Findings
- Gap assessments
- Replacement priorities

The Assessment involved many project partners and a comprehensive approach that began in September and finished in early May

Corporation for Public Broadcasting

Project Schedule

| SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | APR. | MAY |

Plan

Conduct interviews

Design and refine the survey

Engage participants through a three prong survey communications strategy

Pilot

Assessment Launch 01/30   *Assessment Completion 03/31*

Collect data

PBS Tech Conference ETAC PREC

Analyze data

Present results

Advisory Panel Meetings

CPB extended the survey end date to March 31st to support stations during a particularly busy time

Kicked off the project and began planning phases. CPB prepared for GM conference.

Wrapped up stakeholder interviews. Began refining survey based on stakeholders' feedback. Hosted first Advisory Panel Meeting. Pilot was delayed.

Incorporated additional feedback into survey instrument design. Launched survey. Engaged member organizations in station outreach.

Encouraged station support through mailer and personalized outreach. Analyzed preliminary data. Hosted second Advisory Panel Meeting.

Submitted final deliverables, delivered advisory panel webinar, and wrapped up the project.

OCTOBER

DECEMBER

FEBRUARY

APRIL

SEPTEMBER

NOVEMBER

JANUARY

MARCH

MAY

Continued planning phase, including preparing for interviews. Interview list is expanded to include additional stakeholders. Began two rounds of stakeholder interviews.

Conducted pilot, which pushed into holidays, causing minimized pilot participation. Continued refining the survey. Developed interim report.

Extended survey end date to March 31st to answer station feedback regarding ongoing industry activities. Began developing analysis frameworks and outlined final report.

Finished analyzing the data. Developed final report and advisory panel webinar. Communicated results at industry events.

Eagle Hill and CPB engaged with multiple stakeholders to achieve a successful outcome

Eagle Hill Consulting
John McCoskey, Samir Kassar, Jennifer Keister, Anna Wiinberg-Freitas, Ron Clifton

CPB Project Sponsors
Ted Krichels, Deborah Carr, Tom White, Erica Pulley-Hayes, Jeff Luchsinger, Lainie Tompkins

Advisory Panel
Eric Wolf, Ling Ling Sun, Bill Hayes, Bill Sanford, Stacey Decker, Laura Hunter, Perry Metz, Becky Magura, Lonna Thompson, Victoria St. John, Mike Beach, Tom Thomas, Eric Hyyppa, Bruce Jacobs, Scott McPherson

"Second Prong" Organizations
TV: PBS, Enterprise Technology Advisory Committee (ETAC), America's Public Television Stations (APTS), Independent Public Television Association, Organization of State Broadcasting Executives (OSBE), National Educational Telecommunications Association (NETA), Public Television Major Market Group (MMG), Small Station Association (SSA), University Licensee Association (ULA)
Radio: NPR, Public Radio Satellite System (PRSS), Public Media Business Association (PMBA), Association of Public Radio Engineers (APRE), Latino Public Radio Consortium (LPRC), Station Resource Group (SRG), University Station Alliance (USA), Native Public Media (NPM), National Federation of Community Broadcasters (NFCB), Public Radio in Mid America (PRIMA), Western States Public Radio (WSPR), California Public Radio (CPR), Eastern Regional Public Media (ERPM)
Both: Joint Licensee Group (JLG)
Alaska stations touchpoint
Current Magazine
Public Media Business Association (PMBA)

Round One Interviewees
Sally Kane, Greg Petrowich, Bill Sanford, Tom Thomas, Terry Clifford, Ling Ling Sun, Michael Beach, Eric Wolf, Loris Taylor, Melissa Begay, Bill Hayes, Steve Holmes, Lonna Thompson, Becky Magura, Laura Hunter

Round Two Interviewees
Victoria St. John, Don Mussell, Lille Buck, Perry Metz, Bruce Jacobs, Ralph Hogan, Alan Popkin, Tim Eby, Eric Hyyppa, Mike Starling

Feedback from the advisory panel and interviews helped shape the technology survey and analysis categories

Television Technology Categories

Production and Post	Traffic and Scheduling	Master Control & Operations	RF Broadcast	Common Infrastructure
• Studio & Field Cameras • Switchers and Character Generators • Post Production • Digital Distribution • Remote Studios & Trucks • Other Production & Post	• Traffic Management • Rights Management • Other Traffic & Scheduling	• Station Specific Integrated Receiver/ Decoders • Automation Systems • Archive Storage • Master Control Room • Playout Servers • Branding, Graphics, & EAS • Linear Digital Distribution • Other Master Control & Operations	• Transmitters • Towers & Antennas • STL & TX Distribution Network • Translators • Other RF Broadcast	• Broadband Internet • Cybersecurity • HVAC • Station Generators and UPS • Other Common Infrastructure

Radio Technology Categories

Production & Master Control	Traffic & Automation	RF Broadcast	Common Infrastructure
• Remote & Mobile Studios • Production Control Rooms • Digital Distribution • Other Production & Master Control	• Traffic Management & Scheduling • Metadata Management • Rights Management • Automation • Other Traffic & Automation	• Transmitters • STL & TX Distribution Network Translators • Other RF Broadcast	• Broadband Internet • Cybersecurity • HVAC • Station Generators and UPS • Other Common Infrastructure

The survey also queried general managers on their thoughts on the following broadcast media trends

Key Trends in Broadcast Media

TV and Radio	TV	Radio
IP migration	ATSC 3.0	IBOC/HD Radio
	4K UHDTV	Online Content Delivery
Virtualization & Cloud	Joint Master Control	Radio-Station-in-a-Box
	PTV Interconnection	Public Radio Interconnection

The final survey response numbers exceeded our expectations for the study

Final Survey Response Numbers

Radio Licensees

295

(73%)

Target response rate: 40%

Community	117	69%
Local Authority	20	61%
State	11	85%
University	147	78%

TV Licensees

155

(92%)

Target response rate: 90%

Community	77	89%
Local Authority	6	100%
State	17	94%
University	55	96%

We drew participation from respondents in the lower 48 states, Alaska, Hawaii, Puerto Rico, Guam, and the U.S. Virgin Islands

cpb Corporation for Public Broadcasting

Participation from Continental United States
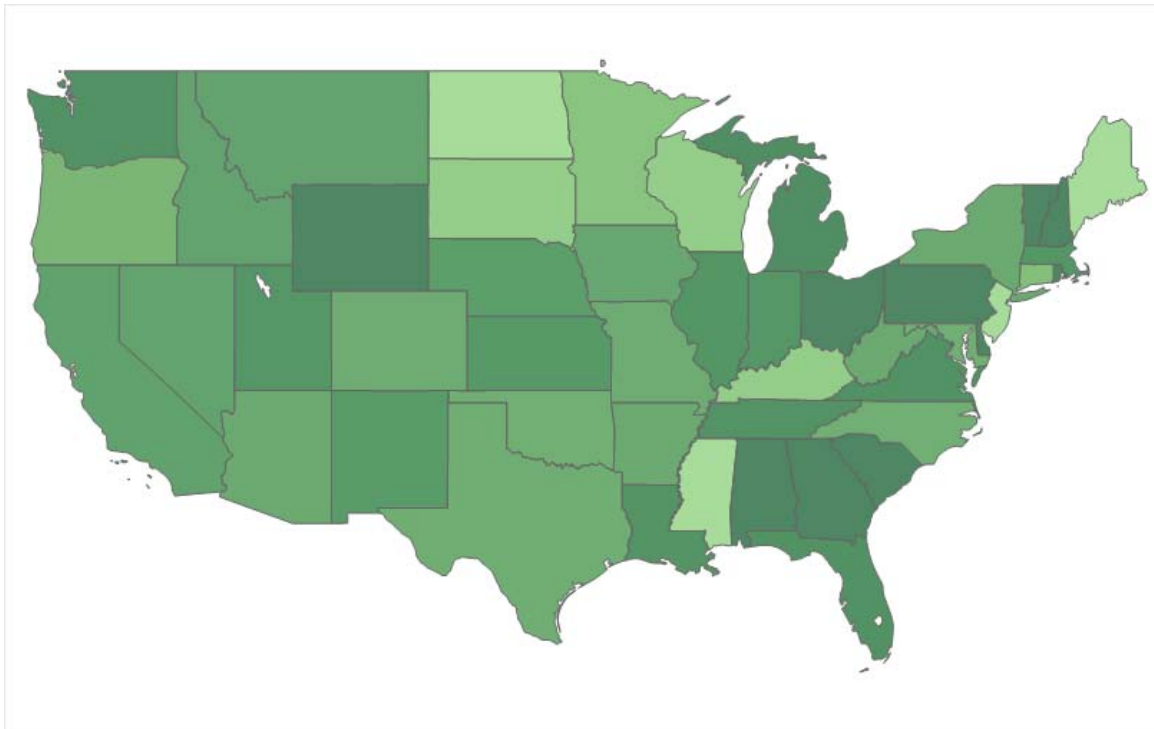
Participation from Non-Continental United States*

Alaska

Guam

Hawaii

Puerto Rico and U.S. Virgin Islands
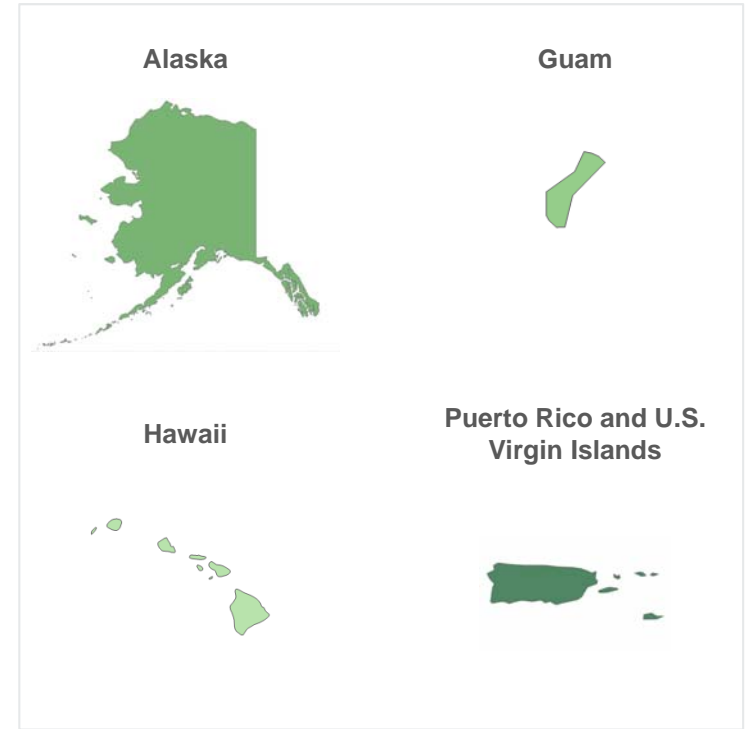
Percent Tech Complete

30.00   100.00   *Not to scale.

KEY INSIGHTS, RECOMMENDATIONS, & PATHS FORWARD

Section Overview

Insights and recommendations are offered throughout this report to accompany the analyses. The key insights outlined in this section represent cross-cutting themes that emerged from the analytical process as a whole. They embrace both TV and radio. The next steps provide a path forward beyond this Assessment towards a system that balances individuality with sustainability

Assessment insights and recommendations follow five themes

Key Insights

FUNDING DEFICIT	STRATEGIC PLANNING	TECHNOLOGICAL MATURITY	SYSTEM-WIDE COLLABORATION	PEOPLE AND SKILLS GAP PREPARATION
Since the cancellation of the Public Telecommunications Facilities Program (PTFP), stations have struggled to finance equipment replacements—often leading to delayed refresh cycles. At the same time, appropriations have remained flat, limiting money coming in to the system. As a result, the system as a whole faces significant gaps in the coming years—across licensees of all sizes and types.	Stations face difficulties planning more than 1-3 years out, in terms of both their needs and estimated available resources. The analysis revealed that stations lack of focus on strategic and operational planning impacts both their current day-to-day operations and their ability to stay ahead of the changing environment.	Stations are having difficulties embracing technology trends that offer them new ways of fulfilling their mission. These innovations shape how stations can produce and broadcast content, personnel requirements, and how stations can take up these technologies' benefits while mitigating their risks.	Faced with a growing gap between resources and equipment needs, stations need to work together to share their knowledge, resources, and collective strength to support the public media mission.	The system has a generous, conscientious, mission-focused, and engaged workforce. However, the system may face skill gaps as personnel retire, new skillsets may be difficult to acquire, and many stations continue to feel understaffed.

The system faces significant funding gaps in the coming years, and will need to find new revenue and minimize expenses

$ FUNDING DEFICIT

Key Insights and Supporting Analysis

Key Insights

Since the cancellation of the Public Telecommunications Facilities Program (PTFP), stations have struggled to finance equipment replacements. At the same time, appropriations have remained flat, limiting money coming in to the system.

As a result, the system as a whole will face significant gaps in the coming years—across licensees of all sizes and types.

Supporting Analysis

- Significant gaps between general managers' estimated funds available, and needs estimated by both general managers and engineers—this gap persists across licensees of all sizes and types.
- A number of equipment groupings show significant replacement needs in the next four years.
- Stations may be hanging on to equipment beyond its optimal end of life, as they defer purchases in the face of financial uncertainty—and this risk has piled up.

Recommendations

01 Advocate for new funding

- Use the Assessment results to support funding requests from all levels of government and private foundations.
- Develop educational packets in collaboration with licensees to support funder education around technology needs and shifts to service-based models.
- Approach less traditional funders whose interests align with public media's mission and reach, for example, Department of Homeland Security.

02 Generate ancillary revenue

- Leverage new technologies to collaborate with commercial broadcasters, for example, ATSC 3.0 lighthouse services.
- Consider alternate funding sources such as public safety datacasting.
- Connect with industry organizations, e.g. APTS, SRG, to target ancillary funding sources.

03 Reduce expenses

- Consider collective purchase agreements to support replacements needed across the system, or particularly expensive equipment groupings.
- Consolidate the variety of technology that stations use to achieve economies of scale, and support national platforms such as PBS interconnection and JMCs.
- Prioritize replacements at the station level to avoid incurring a backlog of expired equipment.

Stations are good stewards of their limited resources, but need to strategically balance risks while looking to the future

STRATEGIC PLANNING

Key Insights and Supporting Analysis

Key Insights

Stations face difficulties planning more than 1-3 years out, in terms of both their needs and estimated available resources.

This "planning cliff" has significant implications for refresh cycles, personnel planning, and station's ability to embrace and fulfill the promise of new technologies.

Supporting Analysis

- Both general managers' and engineers' estimates appear significantly less robust reaching beyond 2019.
- There is a gap between the amount needed to refresh equipment estimated by general managers, and that estimated by engineers.
- Some licensees demonstrate a disconnect between stated interest in pursuing various technology trends, and the equipment replace/refreshment plans outlined for their equipment.
- The system as a whole may be pushing out equipment refresh cycles, incurring risk to on-air time, and mission fulfillment.
- This Assessment collected fairly basic inventory and financial planning information. However, many stations indicated to the HelpDesk a basic unfamiliarity with documenting their equipment holdings.

Recommendations

04 Develop or revise operational plans

- Encourage stations to engage in regular strategic planning that involves all core organizational functions including technology, especially those that don't currently plan because of uncertain funding and the difficulties in managing an ambiguous environment.
- To support stations in developing strategic plans, develop strategic planning toolkits to guide stations through the planning process.

05 Create strategic technology replacement plans

- Develop a technology replacement plan that prioritizes key replacements and balances the need to adopt technology trends that support the mission – and in doing so avoid technological debt.
- Consider the technological shift towards service-based operations and the subsequent impact that has on technology investments (e.g. hardware versus software, cloud-based storage).

06 Manage technological risk

- Strategically balance the risks of overstretching equipment refresh cycles.
- Educate stations and stakeholders on technological risks, such as equipment breakdowns and cybersecurity gaps, and the implications of incurring these risks.

Many stations are excited about new opportunities, but need some support to pursue these strategically on a path towards greater technological maturity

TECHNOLOGICAL MATURITY

Key Insights and Supporting Analysis

Key Insights

Stations have an opportunity to embrace technology trends that offer them new ways of fulfilling their mission.

These innovations shape how stations can produce and broadcast content, personnel requirements, and how stations can take up these technologies' benefits while mitigating their risks.

Supporting Analysis

- A noteworthy proportion of both TV and radio licensees have no plans to embrace IP or cloud-based or virtualized solutions.
- Some stations have a disconnect between the formats that they are planning to replace their equipment with and the indicated interest in moving towards service-based technologies such as cloud i.e. are stations' procurement practices in line with their digital trajectory?
- Some stations have internet access challenges that prevent them from upgrading to newer technologies.

Recommendations

07 Educate stations and stakeholders on new trends

- Educate station GMs and engineers on the technological and financial benefits of changes in equipment formats.
- Encourage greater collaboration between GMs and engineers to help them understand opportunities from new technology solutions, such as IP and cloud, and make sure they are aligned in embracing these technologies.
- Consider subsidizing attendance at annual technical conferences.

08 Develop a maturity path

- Evaluate what supporting technologies are required to adopt certain technologies. For example, if stations want to migrate to IP, then they need to make sure that they have robust cybersecurity.
- Develop a system-wide approach to acquiring new technology, for example, cyber security.

09 Connect stakeholders

- Connect stations that face similar technology challenges to organizations that can advocate for them. For example, connect stations faced with internet access challenges to organizations that can advocate for them.
- Connect university and state stations to their governance boards to explore the possibility of lifting operational constraints that hinder them from adopting new technologies.

National organizations can support greater collaboration within a system under pressure to share resources and minimize expenses

SYSTEM-WIDE COLLABORATION

Key Insights and Supporting Analysis

Key Insights

Faced with a growing gap between resources and equipment needs, stations need to work together to share their knowledge, resources, and collective strength to support the public media mission.

Supporting Analysis

- A large number of key equipment areas with significant buying power are dispersed amongst a variety of vendors.
- The advisory panel, interviews, and some responses on the survey indicated that stations are looking for leadership in how to organize collective activities, guidance on what technologies to purchase, and help in how to plan for the future.

Recommendations

10 Leverage shared buying power

- Leverage shared buying power for collective purchase agreements with equipment and service vendors to support replacements needed across the system, or particularly expensive equipment groupings (see the technology infrastructure section for specific equipment that are recommended for collective purchase agreements).
- Require commitment from stations in pursuing collective purchase agreements and / or develop buy-in to incentivize follow-through.

11 Share operations, personnel, and knowledge

- Further leverage service-based models to explore virtual JMCs that reduce individual stations' overhead costs.
- Consider personnel sharing arrangements between stations.
- Evaluate audience coverage overlap to determine collaboration opportunities.
- Using the Assessment as a basis, and existing collaboration tools like MyPBS, encourage stations to share equipment holdings to learn from each other.

12 Communicate the role of national organizations

- There is an opportunity for national organizations to act as knowledge aggregators and service providers to stations.
- Build a communications plan to articulate this role and educate stakeholders.
- Encourage national organizations to support stations in developing educational packets for specific stations or cohorts.

The public media workforce's tremendous engagement can be more fully aligned with the system's strategic needs

PEOPLE AND SKILLS GAP PREPARATION

Key Insights and Supporting Analysis

Key Insights

The system has a generous, conscientious, mission-focused, and engaged workforce. However, the system may face skill gaps as personnel retire, new skillsets may be difficult to acquire, and many stations continue to feel understaffed.

Supporting Analysis

- High voluntary response rate to this Assessment represents a tremendous investment of time and personnel, which would result only from a high level of engagement.
- Multiple HelpDesk inquires reflected a strong desire to participate, and a concern over making sure they did so appropriately, and provided the most accurate information.
- Interviewees and advisory panel members expressed concerns over public media's aging workforce and lack of modern skills.

Recommendations

13 Develop and / or acquire new skills

- Share personnel e.g. stations are already sharing RF engineers and other engineering skills through their use of contract workers.
- Develop programs to sponsor existing staff for new skills training.
- Develop internship programs to bring in fresh talent.
- Leverage the energy of a highly-engaged workforce into system-wide trainings in key skillsets.

14 Conduct workforce planning

- Conduct succession planning for key positions to make sure that stations have talent continuity.
- Build regular strategic planning into the operations of all stations, regardless of size and type to make sure that plans are documented in case of leadership turnover.

Next steps: towards a system that balances individuality with sustainability

Steps

1 Continue momentum and demonstrate Assessment's immediate value

2 Reach consensus at the national organization level on a blueprint for system collaboration around:
- Education and guidance for stations on technological and business operations, sharing existing knowledge and skills, and gaining skills for the future
- Enabling more robust funding asks and support a cost structure changing to operational expenses
- Leveraging shared market power

3 Build broad, system-wide consensus on this blueprint. Devise initiatives to operationalize this blueprint, and agree on ownership for these initiatives

Considerations

- The Assessment collected a rich dataset that may be mined further, but is perishable.
- The Final Report identifies several low-cost actions that have a high return on investment (e.g. investment in cybersecurity education and systems).
- Releasing the Final Report and the dataset offers value to the system and Assessment participants, and build momentum for paths forward. However, analyzing these data will require experienced analysts.

- No one organization can provide a path forward on all of these issues—national organizations will need to share ownership.
- National organizations need to be prepared to construct initiatives that build in accountability measures.

- Participation in these initiatives should be voluntary but enforceable. Negotiating collective purchase agreements, developing operational and strategic guidance, educational programs, and other paths forward must be coupled with commitments and accountability measures to be worth the investment—and avoid the fate of previous such efforts.
- Ownership and accountability cannot stop with the national-level organizations. Stations and affinity organizations play a vital role in the system's future, and any initiative's success is contingent on shared agreement and participation.

" Be the same in ways that make you stronger: allowing you to be different in ways that matter "

ASSESSMENT METHODOLOGY

ASSESSMENT METHODOLOGY

This section describes the finer details of the data collection, data cleaning, and data analysis processes.

System Technology Assessment Project Charter

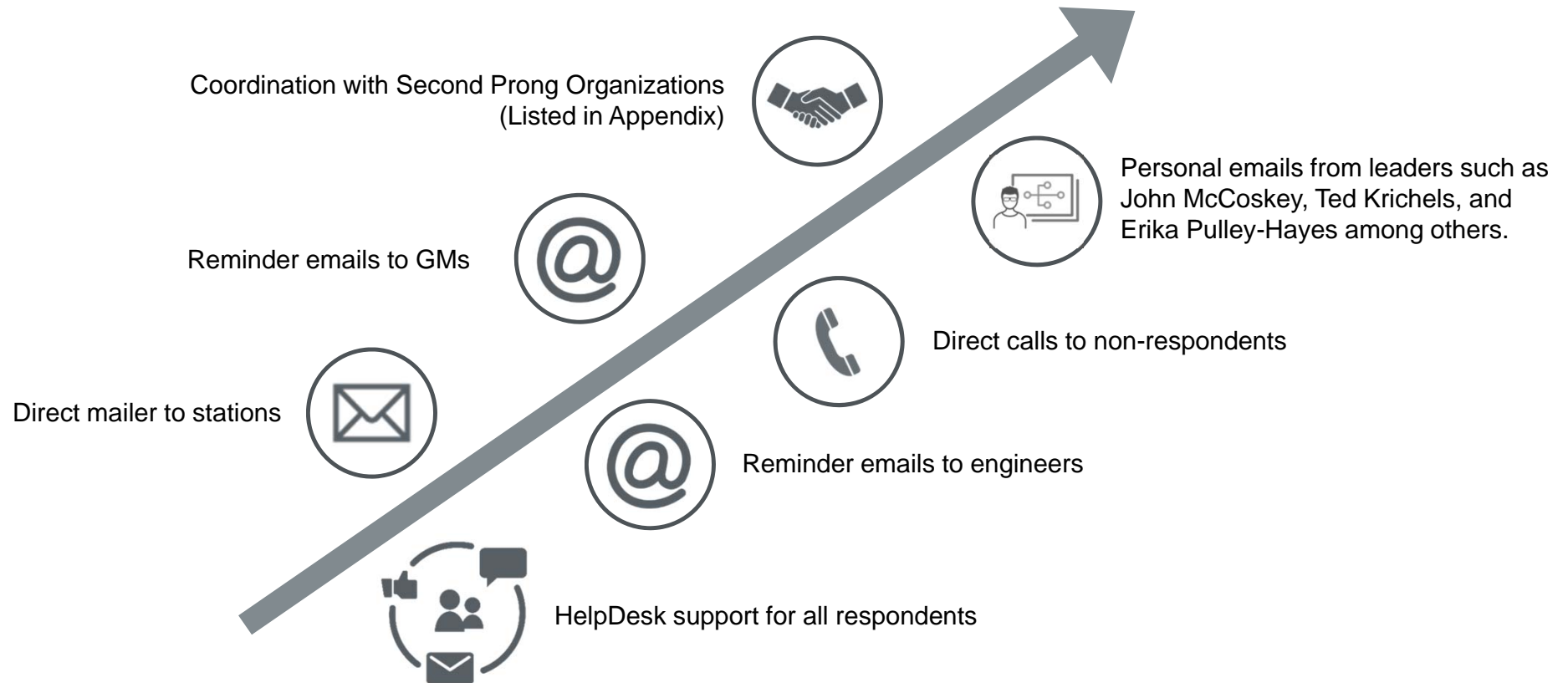| Project Name: CPB System Technology Assessment	Start Date: 20 September 2016	End Date: 8 May 2017

Objectives	Scope
• Survey public media stations (Radio and TV) • Analyze collected data, focusing on stations' equipment and financial capabilities • Prioritize equipment replacement and related station financial needs • Identify resource gaps and offer possible solutions	**Includes:** • Local stations (Radio and TV) • Production and broadcast distribution equipment • Station's financial plans and capabilities

Key Roles and Responsibilities	
• **Project Advisory Panel** – provide overall project guidance and direction • **Project Team** – manages the project and executes project deliverables	• **Key Stakeholders** – Public Media Stakeholders and Public Media Entities participate in interviews to provide insight and guidance for the assessments • **Stations** – complete Technology and Financial survey elements of the Assessment

Excludes:
• Other CPB equipment (e.g. IT, desktop, etc.)
• Other plans and capabilities

Key Steps	Date	Critical Success Factors
Interviews with Public Media Stakeholders to gather context and trends for the Assessment, and suggested outreach methods	October 2016	• Stakeholder engagement including: availability, willingness to share information and participate in interviews/surveys, buy-in, and overall support
Interviews with Public Media Entities to gather specific feedback on the survey instruments, and probe the current relevant knowledge base	October 2016	• Availability of CPB and other relevant public media community data • Clear communication of System Technology Assessment. Well thought-out and executed Communications Plan
Conduct of the Technology Assessment Survey and the Financial Assessment Survey (accompanied by assistance and communications to the public media community)	January 2017-March 2017	• High response rate by stations • Accuracy of data collected
Survey results expected	April 2017	
Survey results analysis	April 2017-May 2017	
Sharing learnings from the Assessment with the public media community	April 2017-May 2017	

We used a multi-strand effort to drive response rates

Summary of Station Survey Engagement Activities

Coordination with Second Prong Organizations (Listed in Appendix)

Personal emails from leaders such as John McCoskey, Ted Krichels, and Erika Pulley-Hayes among others.

Reminder emails to GMs

Direct calls to non-respondents

Direct mailer to stations

Reminder emails to engineers

HelpDesk support for all respondents

We corrected for non-responses and missing data

Data Corrections

Non-Responses

- Equipment counts and dollar estimates were weighted to compensate for non-responses by both licensee type (State, University, Local Authority, and Community) and grantee size (Smaller, Medium, and Larger).

  - Response weighting is a standard practice in survey research to compensate for non-responses. However, this method cannot fully account for those who did not participate in the survey. For example, feedback during the survey run indicated that some stations who rely heavily on contract engineers and are particularly strapped for resources, were unable to allocate personnel to complete the survey. Others who are financially secure may also have opted not to participate.

- Multiple-choice questions (e.g. "When do you anticipate that you will migrate your broadcast and production operations to IP?") are presented as unweighted averages among those who chose to answer the questions. A variety of weighting options yielded roughly similar results.

Missing Data

- Some respondents skipped the capital expenses/operating expenses blocks for equipment groupings in which they had indicated that they have equipment, or in which they obviously should have equipment (e.g. a transmitter). To allow greater accuracy in overall estimates on this important metric, we impute their missing values to be the median of those who also had equipment in each grouping, and did provide a capital expenses/operating expenses estimate. We used the median, because it is less sensitive to skewing by outlier observations in smaller data sets such as this one.

- Outside of these cases, there is no way to tell definitively if a survey response was incomplete or not. i.e. whether or not a station simply did not have a piece of equipment, or if they simply skipped that question.

Joint licensees required a tailored approach in both collecting and analyzing data

Joint Licensees

Collecting Data

- Collecting data on joint licensee participants faced three risks:

  - Double-counting equipment shared between TV and radio operations (if both the TV and radio staff listed it)

  - Omitting equipment shared between TV and radio operations (if both the TV and radio staff assumed the other had listed it)

  - Overburdening joint licensee respondents in an effort to avoid either of the above

- Joint licensees were given an option to take a conjoined survey that included both TV and radio questions, or to take these two surveys separately.

- The conjoined survey version allowed space at the end of each major equipment grouping for respondents to list out equipment shared between TV and radio.

Data Cleaning & Analysis

- We reviewed the equipment overlap between TV and radio noted by joint licensee respondents, and determined that these overlaps were not of sufficient size to warrant data alteration or additional computational complexity. Instead, these data sets were analyzed as they were entered—this method risks overcounting for some respondents, but undercounting for others, which we estimated would have a minimal impact on our overall assessment.

- For joint licensees who opted to take the conjoined survey, the general manager's assessment of overall financial needs and resources available included both TV and radio operations. To break these out to apply to TV and radio separately, we applied 90% of these totals to the TV licensee, and 10% to their radio licensee. This breakdown reflects the split between TV and radio licensees who completed the assessment separately.

A few licensees operating under a single general manager opted to complete a single survey

Shared Survey Management

Collecting Data

- A small number of licensees opted to share a single survey response. We discouraged joint responses for licensees of different types (e.g. State and Community), but encouraged it for licensees of similar type who shared a general manager, as this would reduce the participation burden for these respondents.

Data Cleaning & Analysis

- For those who informed us of their intention to share a survey, we simply divided all listed equipment evenly across those licensees who shared that survey response (we received additional information from Nebraska Network and KUON, allowing us to allocate 70% of the equipment to Nebraska Network, and 30% to KUON, and specifically allocate their transmitters). This approach generated some fractional equipment counts for the relevant licensees.

We undertook a multi-stranded effort to manage data quality

Data Quality Assurance

Managing Data Quality

- We issued instructions to respondents in outreach communications, reminder emails, and within each survey.

- We developed FAQs and a glossary of important terms for each survey.

- We provided daily Helpdesk support to help stations with technical questions, survey instrument challenges, and general assessment information. By the time the survey closed, Eagle Hill Consulting had resolved more than 300 helpdesk queries.

- We reached out to those individual stations who had completed the surveys but appeared to be missing content.

- We cleaned the data to remove invalid responses and accounted for missing data.

Threats to Data Validity

- Survey respondents were not likely missing at random (MAR). We have weighted them to compensate for grantee size and licensee type, but other characteristics that may have driven non-responses (e.g. reliance on a contract engineer) were not accounted for.

- Some stations did not have time or resources to fill out the survey completely. We encouraged them to focus on the capital expenses/operating expenses blocks for each equipment grouping and on specific pieces of equipment they deemed most relevant to their situation—ensuring we gathered data necessary to support an overall assessment of financial need, and major pieces of equipment. However, these respondents' omissions reduced the accuracy of overall estimates in equipment categories for which they did not offer data.

The survey period overlapped with the Spectrum Auction's Quiet Period, and some equipment will be affected by the Spectrum Repack

Spectrum Repack

Collecting Data

- Because the survey launched during the Quiet Period, communications and the surveys themselves included explicit instructions to respondents to ignore the impact of the Auction and Repack on their equipment needs. That is, licensees were instructed to describe their equipment replacement plans and needs, regardless of whether they anticipated equipment being replaced (and/or paid for by the Repack)

Data Analysis

- The data collected have been analyzed without taking into account the Spectrum Repack, and any expenses that will or will not be covered by associated funding. Once these are known, the system can more fully assess its needs and expenses in affected equipment groupings.

OPERATING MODEL

Section Overview

The Operating Model section contains content on stations' move to service-based models, how stations deliver their mission in a new digital environment, and more broadly, "How do I, as a station, succeed, adapt, and thrive in this environment?"

Sub-sections:

TRENDS: variety of technology trends are reshaping the media industry. The public media community varies in their interest in adopting these trends and the challenges faced in doing so, but all of these shifts have deep implications for how stations plan for and fund technology replacements.

CYBERSECURITY: In the face of trends towards IP migration, Virtualization, and Cloud service-based models, cybersecurity issues are increasingly pressing for stations. With the advent of the next iteration of the public TV Interconnection system, individual stations' cybersecurity profiles will also impact the community as a whole.

SMALLER STATIONS: Smaller stations face many of the same challenges as their larger colleagues. While smaller in absolute dollars, these challenges may be particularly concerning for smaller stations, given their more limited pool of resources.

TV SPECIFIC TRENDS: Like their commercial colleagues, public television stations have the opportunity to adopt trends like 4K UHDTV and ATSC 3.0 in the coming years.

RADIO SPECIFIC TRENDS: Like their commercial colleagues, public radio stations have the opportunity to adopt trends like online content delivery, renew or adopt IBOC/HD radio capabilities, or move to radio Station-in-a-Box solutions that might ease equipment replacement.
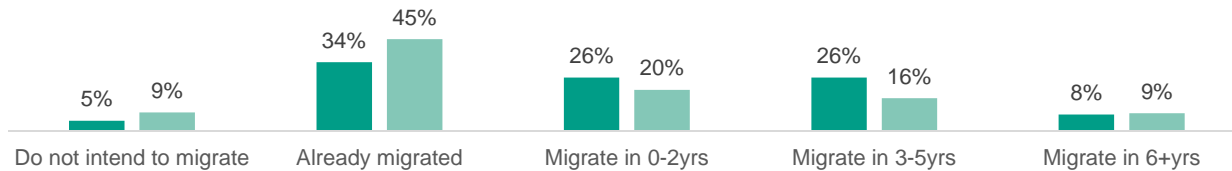
Sub-Section Overview

The Operating Model section contains content on stations' move to service-based models, how stations deliver their mission in a new digital environment, and more broadly, "How do I, as a station, succeed, adapt, and thrive in this environment?"

Sub-sections:

TRENDS: variety of technology trends are reshaping the media industry. The public media community varies in their interest in adopting these trends and the challenges faced in doing so, but all of these shifts have deep implications for how stations plan for and fund technology replacements.

CYBERSECURITY: In the face of trends towards IP migration, Virtualization, and Cloud service-based models, cybersecurity issues are increasingly pressing for stations. With the advent of the next iteration of the public TV Interconnection system, individual stations' cybersecurity profiles will also impact the community as a whole.

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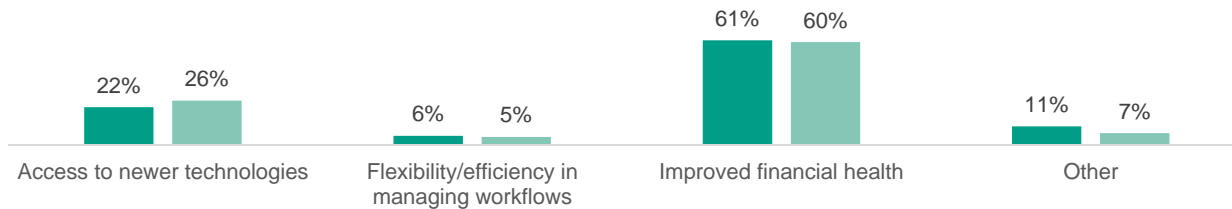# The primary driver for stations migrating to IP is financial health, not technology enablement

Internet Protocol (IP) Migration

Interest in migrating to IP, full system
(% of respondents)

Category	TV	Radio
Do not intend to migrate	5%	9%
Already migrated	34%	45%
Migrate in 0-2yrs	26%	20%
Migrate in 3-5yrs	26%	16%
Migrate in 6+yrs	8%	9%

Reasons for interest in migrating to IP, of those who have already migrated or intend to migrate, full system
(% of respondents)

Category	TV	Radio
Access to newer technologies	22%	26%
Flexibility/efficiency in managing workflows	6%	5%
Improved financial health	61%	60%
Other	11%	7%

■ TV   ■ Radio

Insights

- Almost half of all radio stations and about a third of TV stations have already migrated to IP.

- Television and radio stations plan to adopt IP at a similar pace over the next 6 years.

- Improving their station's financial health is the most important driver for choosing to migrate to IP, which is an admirable, but less forward-looking and strategic driver than an interest in accessing newer technologies.

- Among the 30 respondents indicating no intention to migrate, licensees indicated an inability to afford the investment, a disbelief that migration would improve their workflow, and several wrote in that their bandwidth capabilities limited their options.

Definition

Internet Protocol (IP) is the principal communications protocol in the industry IP suite for relaying packetized information known as datagrams across network boundaries. Its routing function enables internetworking, and essentially establishes the Internet as well as private Local Area Networks (LANs).
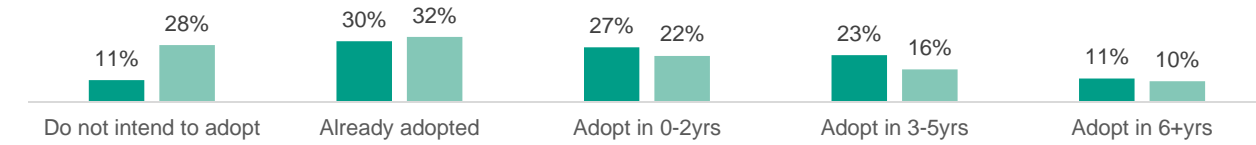
Television stations have expressed greater interest in adopting virtualization and cloud computing than radio stations
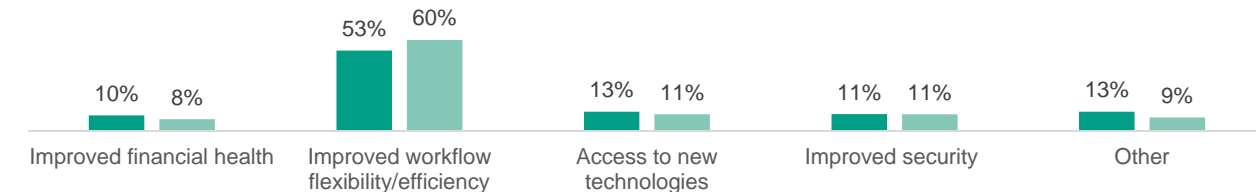
Corporation for Public Broadcasting

Virtualization and Cloud Computing

Interest in adopting virtualization and cloud computing/services, full system
(% of respondents)

	Do not intend to adopt	Already adopted	Adopt in 0-2yrs	Adopt in 3-5yrs	Adopt in 6+yrs
TV	11%	30%	27%	23%	11%
Radio	28%	32%	22%	16%	10%

Reasons for interest in adopting virtualization and cloud computing, of those who have adopted or intend to adopt, full system
(% of respondents)

	Improved financial health	Improved workflow flexibility/efficiency	Access to new technologies	Improved security	Other
TV	10%	53%	13%	11%	13%
Radio	8%	60%	11%	11%	9%

■ TV ■ Radio

While a majority of public media licensees are interested in shifting to IP and Cloud/Virtualization, stations will have to overcome several challenges

Factors Affecting Shift to IP and Virtualization/Cloud

Internet Access

- The public media community is projected to spend about $10 million per year over the next three years on Internet access.

- Many choosing not to migrate to IP and Cloud indicated they do not have enough bandwidth to support these trends.

Funding Constraints

- TV respondents report that some 48% of the funding they use to support broadcast and 44% of the funding they use to support production can be spent only on capital, not operating expenses.

- Radio respondents report that 36% of funds supporting broadcast and 32% of funds supporting production face this restriction.

Education

- A minority of TV and radio licensees are skeptical of migrating to IP and Virtualization/cloud computing.

- University licensees wrote that current campus IT policies prohibit them from taking advantage of IP and virtualization/cloud computing technologies.

- Other non-adopters are concerned about their own IT security if they were to move to IP and/or virtualization/cloud computing.

Considerations

- Consider developing a funding education packet in collaboration with licensees in order to educate funders and stakeholders on topics such as stations' technology needs, importance of specific technologies, and the shift towards operating expenses over time.

- There is an opportunity to connect stations that have internet access challenges with organizations that advocate for broadband access in disadvantaged geographic areas, and an opportunity to create collective purchase agreements with key broadband providers.

Most licensees anticipate replacing existing equipment with "more of the same"

Trends in Equipment Replacement Formats Current Versus Anticipated Equipment Format

(% of pieces of equipment being replaced with identical or more advanced technologies)
(# of pieces of equipment)

	Replacement equipment			
Current equipment	**On-premise dedicated equipment**	**Software running on a dedicated on-premises processor/server**	**Software running on shared (e.g. VM) processor/server**	**Off-premises application, e.g. Cloud-based service**
On-premise dedicated equipment	93% (271)	6% (17)	1% (2)	0% (0)
Software running on a dedicated on-premises processor/server		92% (1,468)	5% (84)	3% (41)
Software running on shared (e.g. VM) processor/server			96% (2,007)	4% (78)
Off-premises application, e.g. Cloud-based service				100% (372)

Insights

- Most engineers anticipate replacing their equipment with "more of the same", regardless of how technologically advanced that equipment is.

- These numbers represent unweighted responses. Our assessment is that the trends shown (particularly in the first row) are actually stronger than they appear here—there is reason to believe that licensees who skipped this question are more likely than not to be replacing "On-premise dedicated equipment" with the same.

Considerations

There is an educational opportunity to help GMs and engineers understand the technological and financial benefits of changes in equipment formats.

Stations interested in migrating to IP do not necessarily have an equipment replacement plan that aligns with this interest

Trends in Equipment Replacement Formats in Stations whose General Managers Indicated an Interest in Migrating to IP Over the Next Six Years

(% of pieces of equipment being replaced with identical or more advanced technologies)
(# of pieces of equipment)

		Replacement equipment			
		On-premise dedicated equipment	Software running on a dedicated on-premises processor/server	Software running on shared (e.g. VM) processor/server	Off-premises application, e.g. Cloud-based service
Current equipment	On-premise dedicated equipment	88% (135)	10% (16)	1% (2)	0% (0)
	Software running on a dedicated on-premises processor/server		92% (1,468)	6% (47)	3% (41)
	Software running on shared (e.g. VM) processor/server			81% (334)	19% (78)
	Off-premises application, e.g. Cloud-based service				100% (372)

Insights

- Despite their GM's interest in IP, a number of licensees' engineers do not plan on replacing on-premise dedicated equipment with available software or Cloud-based services.

- The reverse is also true: some stations whose GM's indicated an interest in migrating to IP (but that had not yet made the leap) are already using a large number of software and Cloud-based solutions.

Considerations

There is an educational opportunity to better-link GM's and engineers around opportunities in IP and cloud-based solutions, and ensure better synchronization between the two on a station's status and goals in embracing these advances.

Initial interviews, advisory panel feedback, and write-in answers on the survey suggest the system may have an educational opportunity around technology trends

Educational Opportunities

> Undecided, need more information [about Cloud and virtualization options]
>
> — Survey respondent

> Don't know enough about [the Cloud]
>
> — Survey respondent

> The "Cloud" does not exist—it is someone else's computer
>
> — Survey respondent

> Some station leaders may be "retired in place," and hold back their stations from taking advantage of new technologies
>
> — Advisory panel discussion

Results

Only five radio respondents, two TV respondents, and one joint licensee indicated that they did "not have the people capabilities to migrate" to either IP or Cloud/Virtualized solutions.

In contrast, a variety of interview subjects and advisory panel members indicated serious concerns about the public media system's human capital skillsets in these areas, as well as digital platforms more broadly.

Insights

Some station leaders may not see the advantages, recognize the risks, or understand the skillsets needed to embrace new technologies.

Many technology trends entail shifting to more operating expenses. However, the data project capital expenses to increase more rapidly than operating expenses
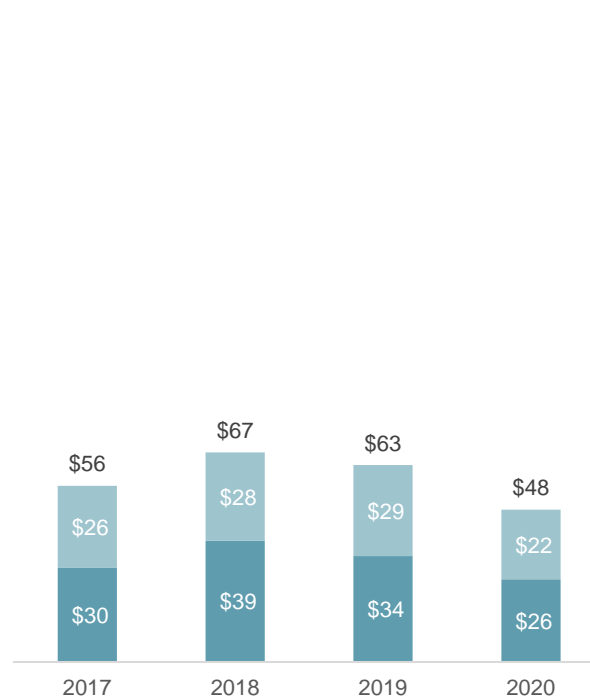
Total Estimated Capital and Operating Expense Needs

All TV
($ millions)

2017	2018	2019	2020
$87	$118	$197	$97
$33	$36	$38	$23
$53	$83	$159	$74

All radio
($ millions)

2017	2018	2019	2020
$56	$67	$63	$48
$26	$28	$29	$22
$30	$39	$34	$26
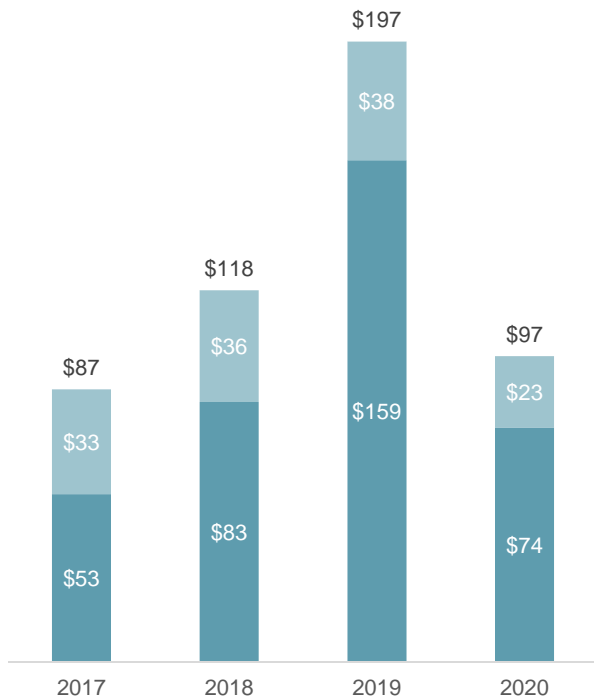
■ Capital Expenses ■ Operating Expenses

Insights

- If licensees move to more IP- and Cloud-based solutions, equipment costs will increasingly become operating expenses rather than capital expenses.

- TV and radio licensees expect to spend more on capital expenses than operating expenses over the next four years.

- TV licensees expect 2019 to be their most expensive year, whereas radio licensees expect 2018 to be their most expensive year.

Considerations

There is an educational opportunity to help GMs and funders better understand an operating expense-focused model.

Production spending is projected to rise in TV, but projected to drop in radio

Estimated need in Production & Master Control, radio
($ millions)

2017	2018	2019	2020
$7	$8	$9	$5
$11	$13	$10	$8
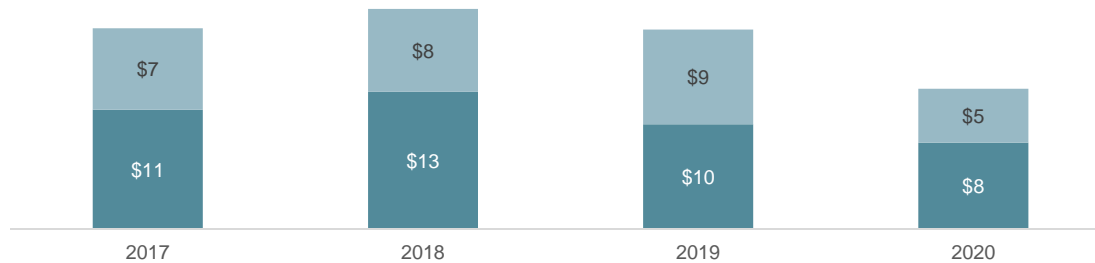
Total estimated need in Production & Post, TV
($ millions)

2017	2018	2019	2020
$4	$4	$6	$3
$17	$26	$39	$24
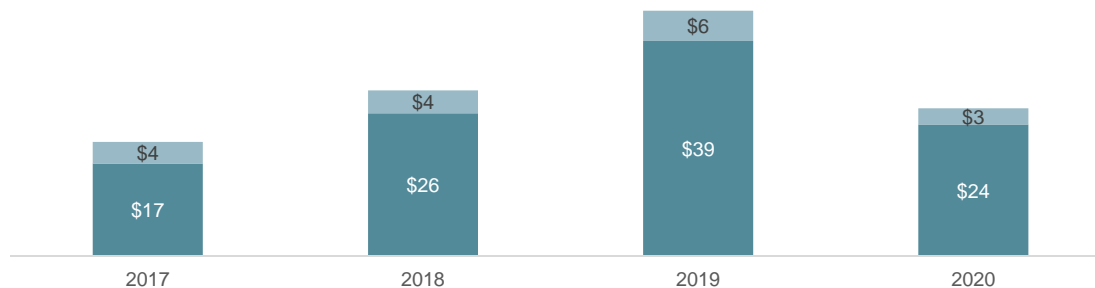
■ Capital Expenses ■ Operating Expenses

Insights

- Compared to TV, radio's production costs appear to be declining over the next four years, and are more operating expense-intensive.

- This difference may reflect the larger amount of equipment needed to produce television content, and the fact that some of this equipment (e.g. cameras) remains capital expense intensive.

- Nearly all respondents, in TV and radio, indicated a strong interest and intention to produce more content locally—particularly for non-broadcast distribution.

Considerations

There may be opportunities to help TV stations leverage cheaper, less-traditional production equipment (e.g. GoPro cameras) in developing content to serve their local communities.

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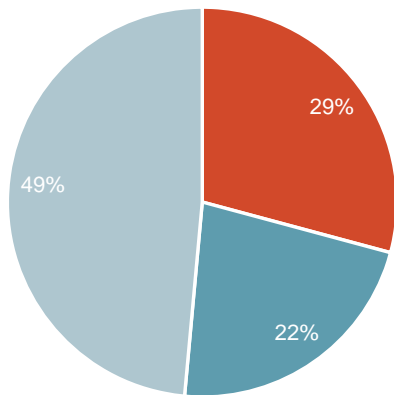
A move towards IP, and Virtualization/Cloud also raises the importance of cybersecurity considerations

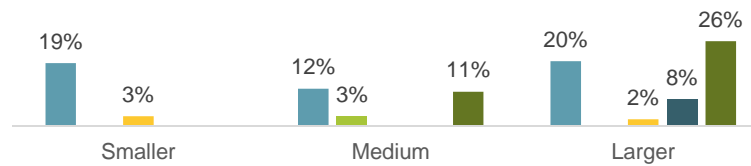## Cybersecurity Solutions

Percentage of stations with cybersecurity
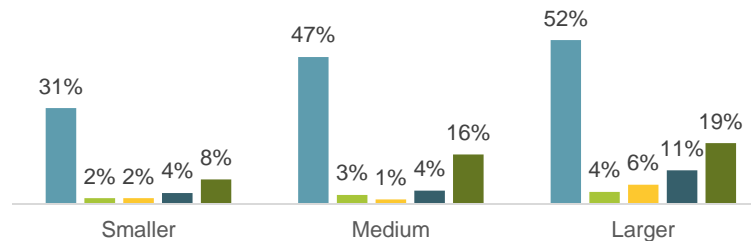
TV and radio
(% of respondents)

49%
29%
22%

- Do not have cybersecurity
- Have cybersecurity separate from backoffice IT
- Have cybersecurity not separate from backoffice IT

Types of cybersecurity, by grantee size

TV
(% of respondents)

Smaller: 19%, 3%
Medium: 12%, 3%, 11%
Larger: 20%, 2%, 8%, 26%

Radio
(% of respondents)

Smaller: 31%, 2%, 2%, 4%, 8%
Medium: 47%, 3%, 1%, 4%, 16%
Larger: 52%, 4%, 6%, 11%, 19%

- Firewall
- Ransomware protection
- Single sign-on
- Network monitoring
- Other

Licensees vary in the recommended cybersecurity footprint appropriate for their situation

Cybersecurity Profile Definitions and Related CSIRC Categories

Cybersecurity Risk Profiles	Lowest-risk licensees	Lower-risk licensees	Mid-risk licensees	Higher-risk licensees	Highest-risk licensees
Definitions	Smaller, rural radio stations	Smaller TV and radio stations (non-rural)	Medium TV and radio stations	Larger TV and radio stations	Major market TV stations
CSIRC's Cybersecurity Categories*	LOCAL SMALL RADIO STATION	BROADCAST HUBBED OPERATION			Local Broadcast Station

*Communications Security, Reliability and Interoperability Council IV Final Report (March 2015), Section 9.1 Broadcast

The system's cybersecurity profile shows gaps, with larger and major-market stations at the most risk

Degree to Which Survey Respondents Align with Target Cybersecurity Profiles

Survey Questions and Answers		Lowest-risk licensees (35 respondents) Smaller, rural radio stations		Lower-risk licensees (112 respondents) Smaller TV and radio stations (non-rural)		Mid-risk licensees (97 respondents) Medium TV and radio stations		Higher-risk licensees (123 respondents) Larger TV and radio stations		Highest-risk licensees (12 respondents) Major market TV stations	
		Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Have Cybersecurity?	Yes, and it is separate from IT/Back office	5%	**20%**	10%	**22%**	<25%	**43%**	50%	**25%**	80%	**33%**
	Yes, and it is integrated with IT/Back office	10%	**37%**	10%	**43%**	50%	**29%**	<50%	**53%**	<10%	**50%**
	No cybersecurity	<85%	**43%**	<80%	**36%**	25%	**28%**	0-1%	**22%**	10%	**17%**
Cybersecurity Type?	Firewall	100%	**43%**	100%	**29%**	100%	**38%**	100%	**49%**	100%	**33%**
	Other Intrusion/Penetration Detection	10%	**0%**	10%	**0%**	50%	**0%**	75%	**0%**	75%	**0%**
	Network Monitoring	10%	**3%**	10%	**3%**	50%	**3%**	75%	**9%**	75%	**33%**
	Single Sign-On Access Control	10%	**0%**	<5%	**4%**	25%	**1%**	50%	**5%**	50%	**8%**
	Ransomware detection/prevention	<5%	**3%**	10%	**1%**	25%	**3%**	50%	**1%**	50%	**0%**
	Other, write-in		**17%**		**3%**		**15%**		**15%**		**83%**

■ Approximately at or better than target   ■ Worse than target

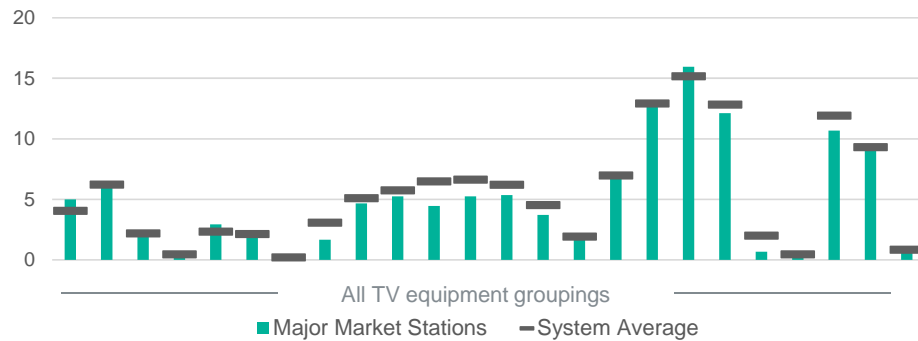WWW.**EAGLEHILLCONSULTING**.COM

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Regardless of their resources, stations may be pushing out equipment replacement cycles
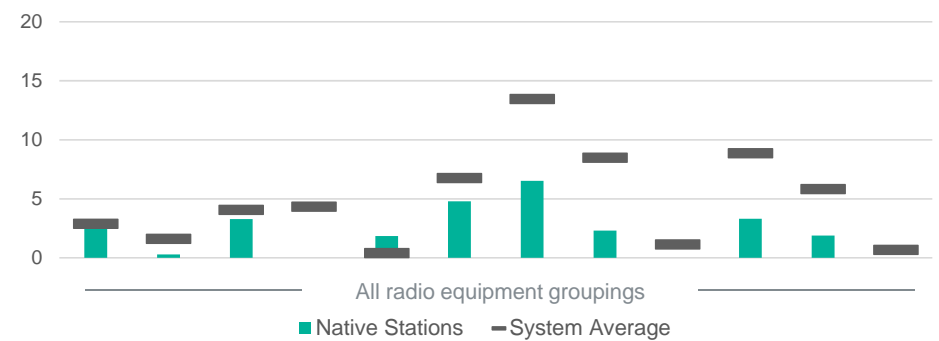
A Comparison of Major Market TV Stations,' and Native Radio Stations' Average Age at Replacement for All Equipment

Major Market TV Stations
(# years)

■ Major Market Stations ▬ System Average

All TV equipment groupings

Native and HBCU Radio Stations
(# years)

■ Native Stations ▬ System Average

All radio equipment groupings

Insights

- Many public media engineers take pride in their ability to "make do" as funding uncertainty shapes their ability to replace/refresh equipment. "Making do" can, however, cause stations to operate under increased risk of lost production and broadcast time as old equipment becomes less reliable.

- Licensees of all types and sizes are relatively similar in their refresh cycles across all equipment groupings (see Appendix for a breakdown of each equipment grouping's average age at expected replacement by licensee type and size). Broadly, it does not appear that stations with smaller budgets are more likely than others to push out replacements—Native radio licensees replace their equipment in nearly all groupings at the radio system average, or on an even shorter refresh cycle. Similarly, major market TV licensees do not appear to have significantly shorter refresh cycles than the PTV system as a whole.

- This suggests that all stations may be pushing out replacements—when asked what they do when they cannot afford a planned replacement, 75% of radio and 86% of TV licensees postpone replacements when they cannot afford the needed equipment (see slide 89).

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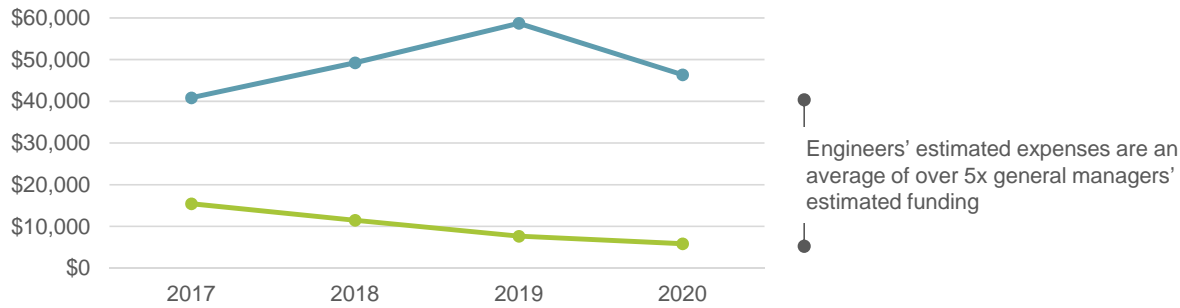
Smaller licensees' funding gap is small in absolute terms, but proportionally significant
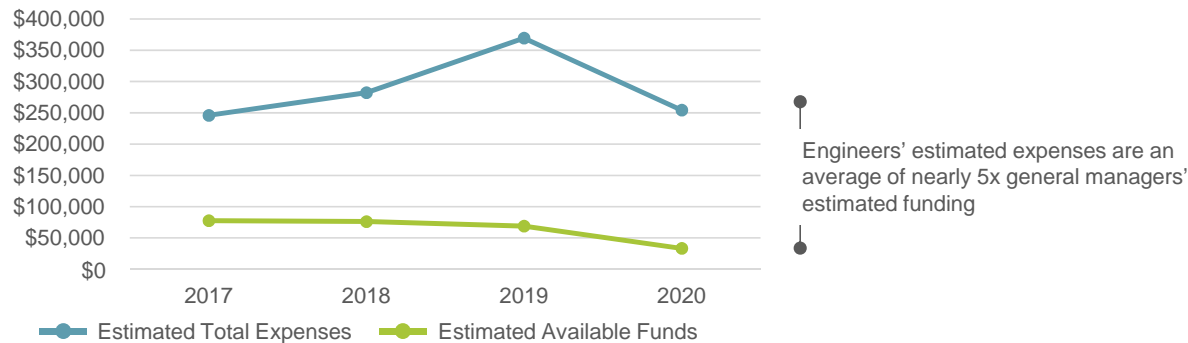
Average Funding Gap Per Station

Smaller radio licensees ($)

Engineers' estimated expenses are an average of over 5x general managers' estimated funding

Smaller TV licensees ($)

Engineers' estimated expenses are an average of nearly 5x general managers' estimated funding

Legend: ● Estimated Total Expenses ● Estimated Available Funds

Insights

- Smaller licensees' funding gap is significant, even if it is a smaller dollar amount than larger licensees'.

- For both TV and radio, the projected needs represent about five times the funds these licensees' general managers anticipate having on hand to fund broadcast and production equipment.

Similarly, the gap between general managers' predicted needs and engineers' is proportionally large for smaller licensees

cpb Corporation for Public Broadcasting

Gap between Engineers' and General Managers' Average Expense Estimates Per Station

Smaller radio Licensees
($ thousands)

	2017	2018	2019	2020
Engineer's	$41	$49	$59	$46
General Manager's	$20	$25	$18	$9

Engineers' estimated expenses average 3x general managers' estimated expenses
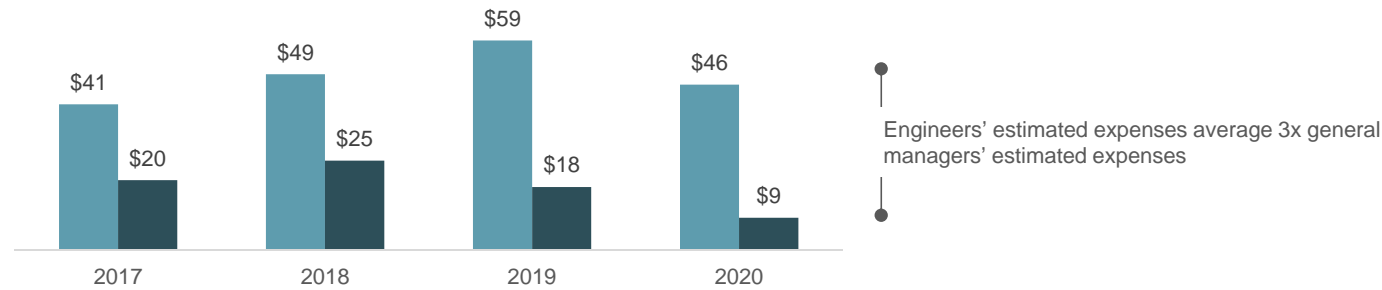
Smaller TV licensees
($ thousands)

	2017	2018	2019	2020
Engineer's	$246	$282	$369	$254
General Manager's	$244	$166	$168	$109

Engineers' estimated expenses average nearly 2x general managers' estimated expenses

■ Engineer's Estimated Total Expenses   ■ General Manager's Estimated Total Expenses
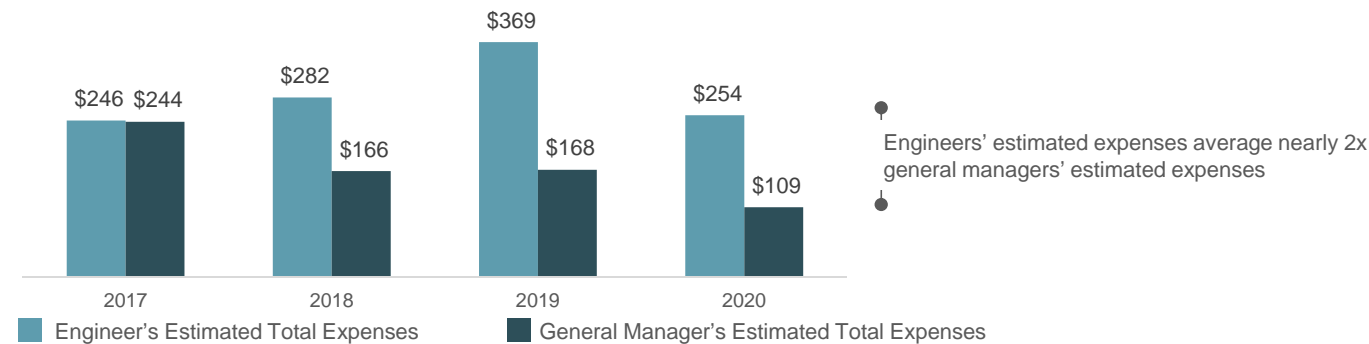
Insights

- Like other licensees, smaller licensees also have a gap between engineers' and general managers' expense estimates.

- This difference may be numerically small, but represents a two-fold difference for radio, and three-fold difference for TV.

Smaller stations are doing well in terms of their overall adoption of cybersecurity, but need to have a more complete set of types of cybersecurity solutions

Degree to Which Survey Respondents Align with Target Cybersecurity Profiles

Survey Questions and Answers		Lowest-risk licensees (35)		Lower-risk licensees (112)	
		Smaller, rural radio stations		Smaller TV and radio stations (non-rural)	
		Target	Actual	Target	Actual
Have cybersecurity?	Yes, and it is separate from IT/Back office	5%	**20%**	10%	**22%**
	Yes, and it is integrated with IT/Back office	10%	**37%**	10%	**43%**
	No cybersecurity	<85%	**43%**	<80%	**36%**
Cybersecurity type?	Firewall	100%	**43%**	100%	**29%**
	Other Intrusion/Penetration Detection	10%	**0%**	10%	**0%**
	Network Monitoring	10%	**3%**	10%	**3%**
	Single Sign-On Access Control	10%	**0%**	<5%	**4%**
	Ransomware detection/prevention	5%	**3%**	10%	**1%**
	Other, write-in		**17%**		**3%**

■ Approximately at or better than target   ■ Worse than target

Insights

- Some 20% of smaller TV licensees indicated that they have already migrated to IP, as did 33% of radio stations. This move positions them well to embrace new technologies, but increases their vulnerability to cyber threats.

- Smaller stations have a risk-appropriate adoption of cybersecurity, but need to build out their approach to ensure that they are using the most appropriate types of cybersecurity to stay protected.

Smaller television stations will need 112 transmitters over the next four years

Anticipated Television Transmitter Replacements (2017-2027)

Smaller TV licensees
(# of transmitters)

Year	Transmitters
2017	14
2018	50
2019	32
2020	16
2021	7
2022	5
2023	1
2024	1
2025	3
2026	0
2027	7
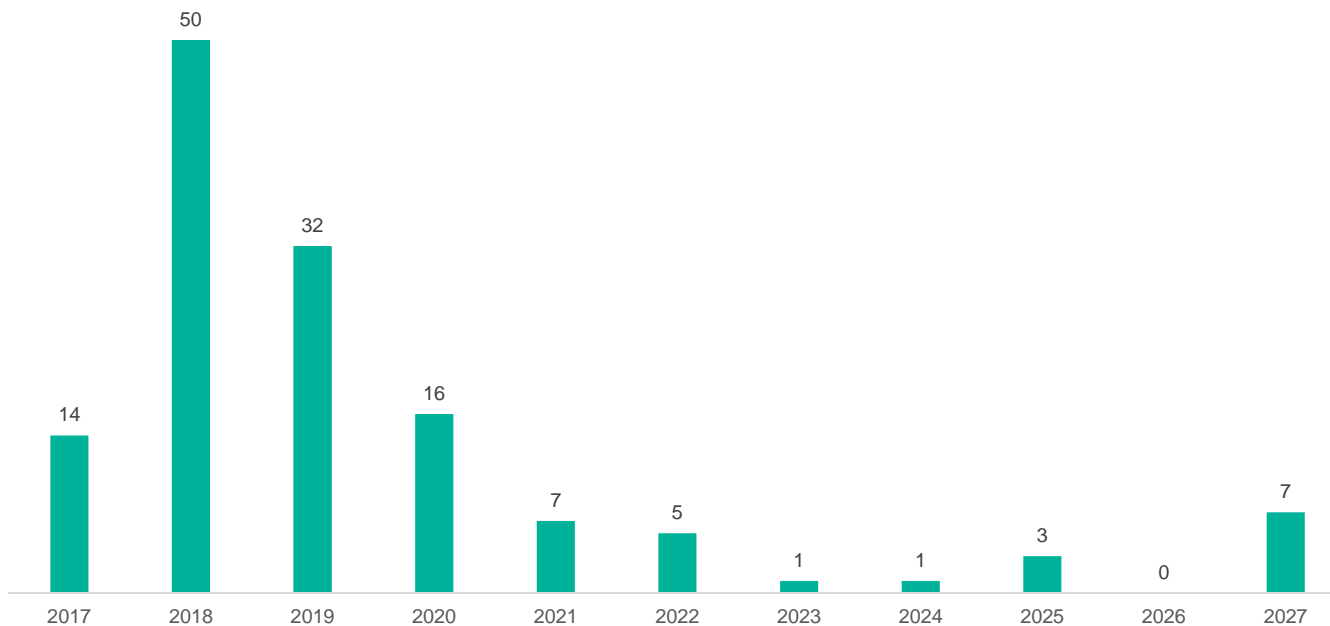
Insights

- Over the next four years, smaller licensees anticipate replacing 112 transmitters.

- Transmitters are a sizable purchase for any station, but with per-station annual funds available to support broadcast and production equipment expected to be around $60,000, this burden is particularly noticeable for smaller stations.

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Public television is interested in 4K UHDTV in order to build OTT capabilities, but does not view adoption as urgent

4K UHDTV

Interest in adopting 4K UHDTV, all TV
(% of respondents)

Do not intend to adopt	Already adopted	Adopt in 0-2yrs	Adopt in 3-5yrs	Adopt in 6+yrs
15%	5%	15%	30%	35%
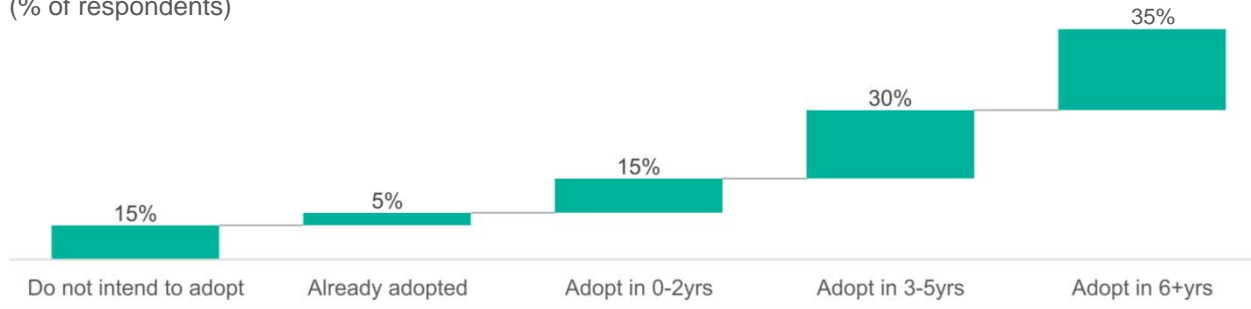
Reasons for interest in 4K UHDTV among those who have already adopted or plan to adopt it, all TV
(% of respondents)

Add non-broadcast distribution	Ability to remain competitive	Ability to serve our audience	Ability to improve TV experience for our audience
40%	24%	27%	5%
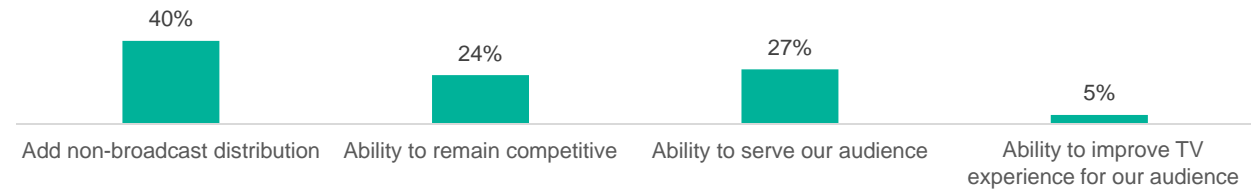
Insights

- The public television community does not view 4K UHDTV as a priority—while the vast majority of respondents are interested in adoption, most plan to do so more than three years in the future.

- Of the 85% of public television licensees interested in 4K UHDTV, most are driven by an interest in adding over-the-top services—accessing a new and growing audience.

- In other words, their focus is on 4K UHDTV production rather than broadcast transmission.

Definition

The next generation of High Definition (HD) TV is referred to as Ultra High Definition TV (UHDTV). 4K is another term used to describe the most common resolution for UHDTV in the U.S.

Nearly all TV licensees are interested in adopting ATSC 3.0 over the next six years

ATSC 3.0

Interest in adopting ATSC 3.0, all TV
(% of respondents)

Do not intend to adopt	Adopt in 0-2yrs	Adopt in 3-5yrs	Adopt in 6+yrs
4%	21%	54%	21%
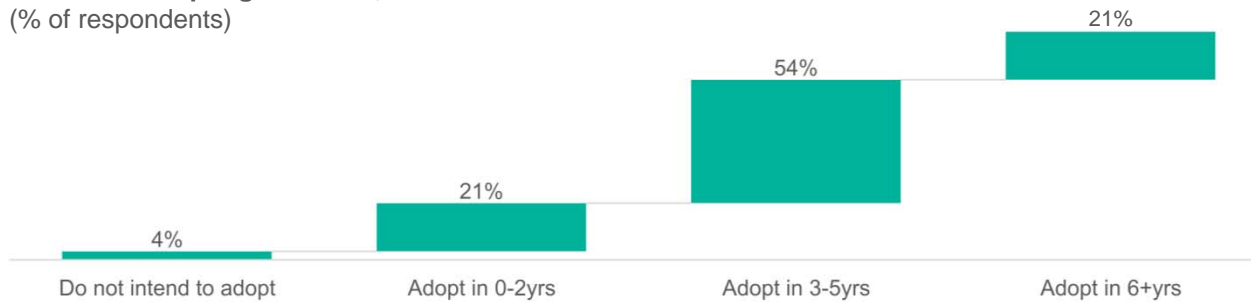
Reasons for interest in ATSC 3.0 among those who have already adopted or plan to adopt it, all TV
(% of respondents)

Ability to distribute more content	Improved financial health	Ability to increase services	Improved market penetration	Other
16%	57%	8%	2%	16%
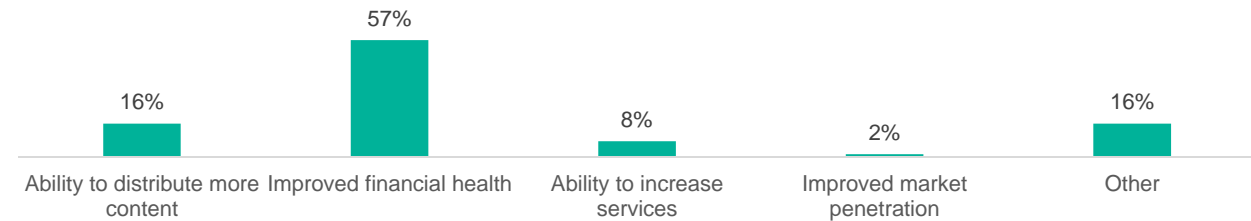
Insights

- More than half of TV respondents plan to adopt ATSC 3.0 in 3-5 years.

- Of these, more than half are driven by a desire to improve their station's financial health, likely through the ability to sell ancillary services.

- It is unclear if all stations fully understand the value of ATSC 3.0 and how to monetize it.

Definition

The next major release of the Advanced Television Systems Committee (ATSC) broadcast television standards. ATSC 3.0, which the FCC is currently reviewing, supports a broader range of content delivery and applications within the existing 6 MHz bandwidth allocated for a television broadcast license, including: mobile television, IP network interactivity, 4K UHDTV, High Dynamic Range (HDR), High Frame Rate (HFR), and Wide Color Gamut (WCG), as well as other services such as datacasting and public safety.

Sub-Section Overview

OPERATING MODEL

The Operating Model section contains content on stations' move to service-based models, how stations deliver their mission in a new digital environment, and more broadly, "How do I, as a station, succeed, adapt, and thrive in this environment?"

Sub-sections:

TRENDS: variety of technology trends are reshaping the media industry. The public media community varies in their interest in adopting these trends and the challenges faced in doing so, but all of these shifts have deep implications for how stations plan for and fund technology replacements.

CYBERSECURITY: In the face of trends towards IP migration, Virtualization, and Cloud service-based models, cybersecurity issues are increasingly pressing for stations. With the advent of the next iteration of the public TV Interconnection system, individual stations' cybersecurity profiles will also impact the community as a whole.

SMALLER STATIONS: Smaller stations face many of the same challenges as their larger colleagues. While smaller in absolute dollars, these challenges may be particularly concerning for smaller stations, given their more limited pool of resources.

TV-SPECIFIC TRENDS: Like their commercial colleagues, public television stations have the opportunity to adopt trends like 4K UHDTV and ATSC 3.0 in the coming years.

RADIO-SPECIFIC TRENDS: Like their commercial colleagues, public radio stations have the opportunity to adopt trends like online content delivery, renew or adopt IBOC/HD radio capabilities, or move to radio Station-in-a-Box solutions that might ease equipment replacement.

Stations that have IBOC/HD Radio today are split in whether or not they plan to replace their equipment at end of life

IBOC/HD Radio

Percentage of radio stations that have or do not have IBOC/HD Radio today
(% of respondents)

65% — Have IBOC

35% — Do not have IBOC

Interest in replacing their IBOC/HD Radio at end of life, of those who have IBOC today
(% of respondents)

56% — Replacing IBOC

44% — Not Replacing IBOC

Interest in adopting IBOC/HD Radio, of those who do not have IBOC today
(% of respondents)

73% — Do not intend to adopt

7% — Adopt in 0-2yrs

14% — Adopt in 3-5yrs

6% — Adopt in 6+ yrs
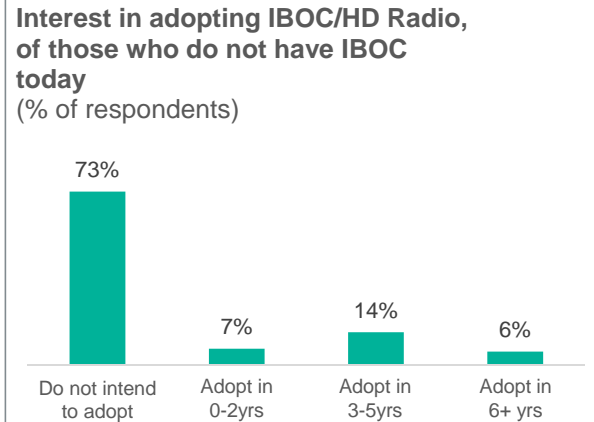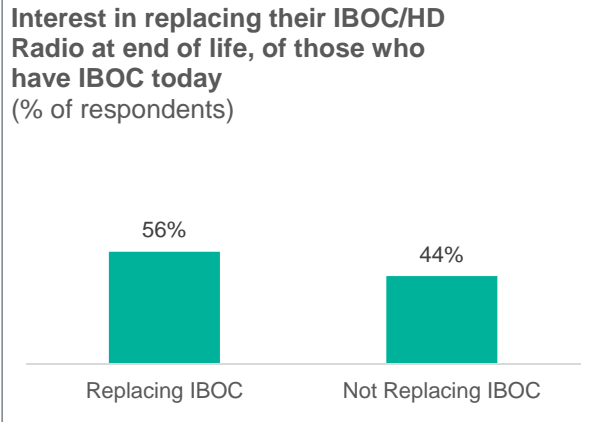
Insights

- Radio stations with IBOC/HD radio are divided in whether to replace their IBOC/HD radio.

- While almost three quarters of stations without IBOC/HD radio do not plan to adopt it, there are still about a quarter that do want to adopt it.

Definition

Digital radio technology to transmit audio and data by using a digital signal embedded "on frequency" immediately above and below a station's standard analog RF signal, providing the means to listen to the same program in either HD (digital radio with less noise) or as a standard broadcast (analog radio with standard sound quality). The HD format also allows a radio station to simultaneously broadcast one or more programs in addition to the program currently being transmitted on the radio station's analog channel.

Radio stations view online content delivery as a way to improve audience reach

Online Content Delivery

Interest in online content delivery, all radio
(% of respondents)

| 6% | 72% | 11% | 7% | 4% |
| Don't intend to migrate | Already migrated | Migrate in 0-2 years | Migrate in 3-5 years | Migrate in 6+ years |
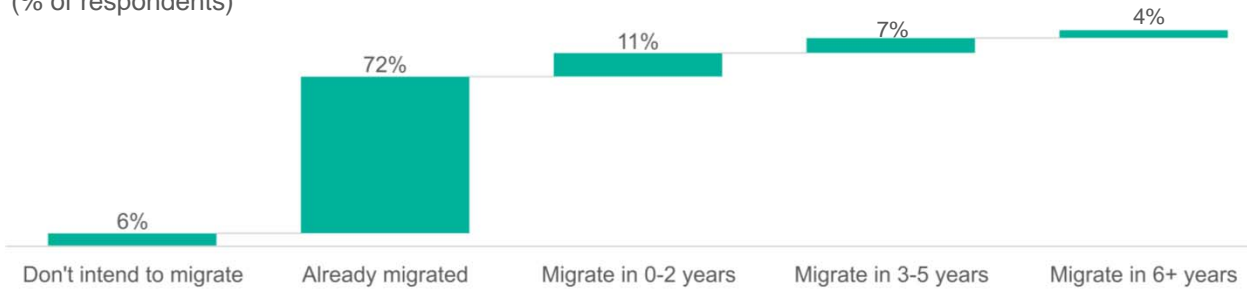
Reasons for interest in online content delivery, among those who have already adopted or plan to adopt it, all radio
(% of respondents)

| 50% | 20% | 27% | 4% |
| Improved ability to reach our audience | Improved ability to remain competitive in our industry | Improved radio experience for our audience | Other |
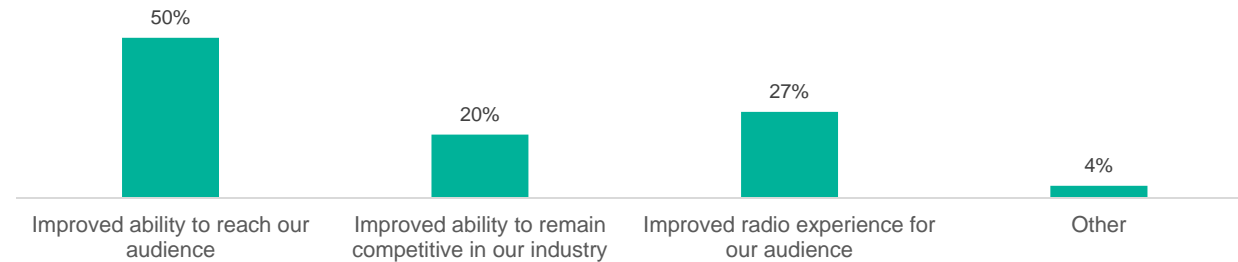
Insights

- Almost three-quarters of radio licensees have already migrated to online content delivery.

- Half of those interested in online content delivery cite an improved ability to reach their audience as the key driver.

- Of the 6% that do not intend to migrate to online content delivery, seven respondents indicated that they could not afford the investment needed to migrate; two did not believe it would improve their audience experience, and six cited a mix of other reasons.

Definition

Migration from legacy Over-the Air (AIR) broadcast to online digital contribution and distribution of both file based on-demand content and live/linear streaming content.

More than half of all radio stations have no intention of adopting radio station-in-a-box

Radio Station-In-A-Box

Interest in radio Station-in-a-Box, all radio
(% of respondents)

Don't intend to adopt	Already adopted	Adopt in 0-2 years	Adopt in 3-5 years	Adopt in 6+ years
58%	10%	7%	14%	10%
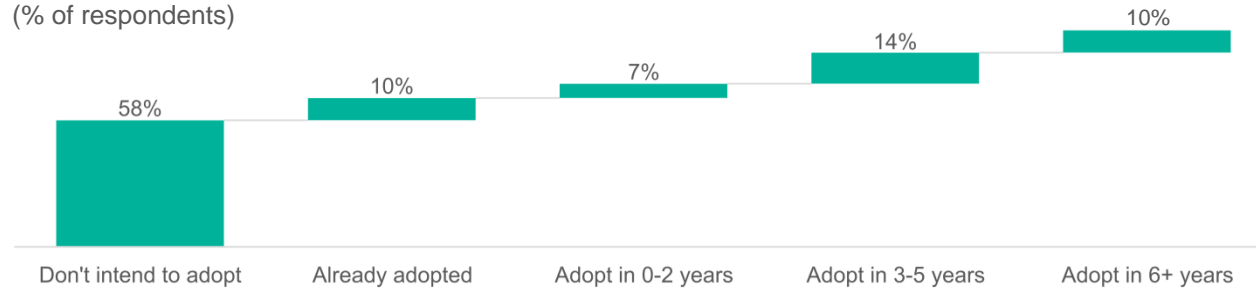
Reasons for disinterest in Radio Station-in-a-Box, all radio
(% of respondents)

Cannot afford the investment to adopt	Do not see the need to adopt	Do not think it will improve financial health	Do not think it will improve operational efficency	Other
16%	45%	3%	17%	19%
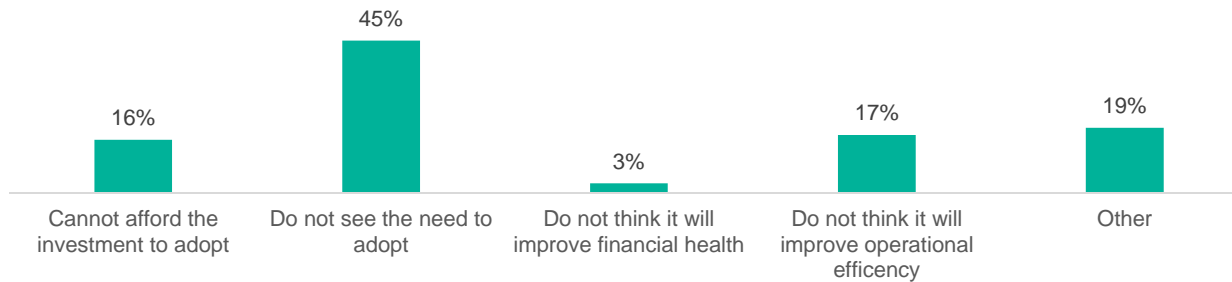
Insights

- Most of the public radio system is uninterested in radio-in-a-box.

- Almost half of those uninterested do not see the need to adopt.

- Likely, this is because their equipment needs are relatively straightforward, and an all-in-one solution offers limited convenience, particularly for those who do not need to replace everything all at once.

Definition

Combining many traditionally separate traffic, automation, production and playout functionalities in a single redundant equipment implementation - referred to occasionally as a "station-in-a-box." This move may help stations reduce costs and take advantage of the potential benefits of advanced server and applications technology.

TECHNOLOGY INFRASTRUCTURE

Section Overview

TECHNOLOGY INFRASTRUCTURE

The Technology Infrastructure section highlights large numbers of anticipated replacements and needed investment in equipment subgroupings, as well as areas of particularly large expenses. These highlighted subgroupings represent the priorities pulled from a full breakdown of all equipment subgroupings (see the Appendix for all subgroupings).

Sub-sections:

TV TECHNOLOGY INFRASTRUCTURE: This subsection contains the prioritized anticipated replacements, investments, and large expenses that are specific to TV licensees.

RADIO TECHNOLOGY INFRASTRUCTURE: This subsection contains the prioritized anticipated replacements, investments, and large expenses that are specific to Radio licensees.

Sub-Section Overview

TECHNOLOGY INFRASTRUCTURE

The Technology Infrastructure section highlights large numbers of anticipated replacements and needed investment in equipment subgroupings, as well as areas of particularly large expenses. These highlighted subgroupings represent the priorities pulled from a full breakdown of all equipment subgroupings (see the Appendix for all subgroupings).

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TV TECHNOLOGY INFRASTRUCTURE: This subsection contains the prioritized anticipated replacements, investments, and large expenses that are specific to TV licensees.

RADIO TECHNOLOGY INFRASTRUCTURE: This subsection contains the prioritized anticipated replacements, investments, and large expenses that are specific to Radio licensees.

TV stations expect to replace 126 transmitters in 2019 – a $40M system-wide investment – and an opportunity for stations to plan strategically about ATSC 3.0

Corporation for Public Broadcasting

Transmitter Replacements and ATSC 3.0, all TV

Interest in adopting ATSC 3.0
(% respondents)

21% interested in adopting ATSC 3.0 in 0-2 years

54% interested in adopting ATSC 3.0 in 3-5 years

Anticipated transmitter replacements, 2017-2020
(# of transmitters)

- 2017: 21
- 2018: 91
- 2019: 126
- 2020: 56
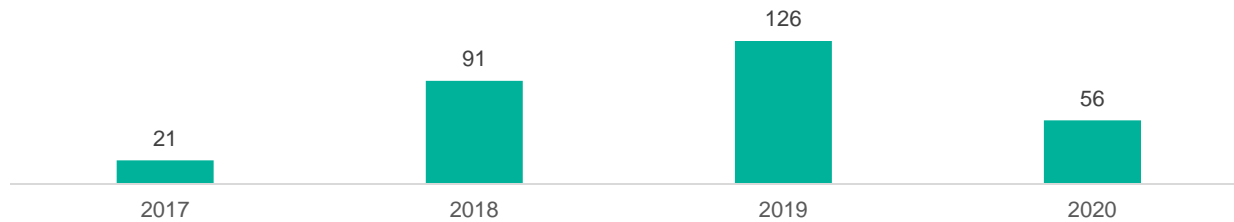
Projected financial needs for transmitters
($ millions)

- 2017: $3
- 2018: $8
- 2019: $40
- 2020: $12

■ Capital Expenses ■ Operating Expenses
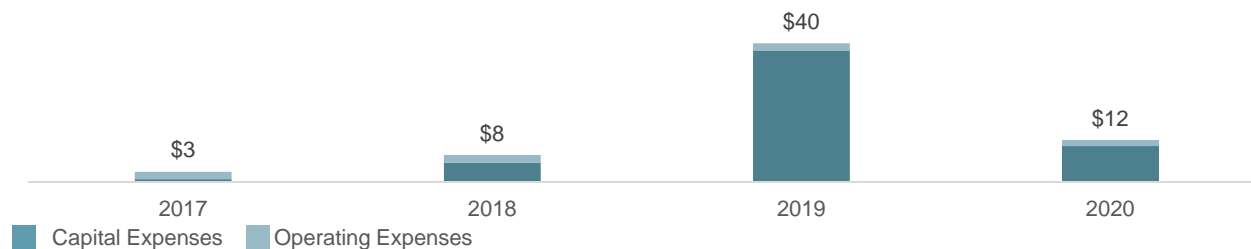
Insights

Public television anticipates replacing a large number of transmitters over the next 2-3 years, which will be a large financial investment but also an opportunity to:

- Explore pricing advantages to a collective purchase agreement around transmitters.

- Embrace ATSC 3.0, by choosing to invest in transmitters capable of supporting this technology – considering additional power requirements, and vertical polarization.

Considerations

Consider a collective purchase agreement on transmitters. Major vendors include Harris, Axcera, and Larcan (for a full listing, see Appendix slide 23).

Public television anticipates a need for a large number of station-based UPSs in 2020, and station-based generators in 2025

Corporation for Public Broadcasting

Station-Based Generators and UPSs, all TV

Anticipated station-based generator replacements, 2017-2020
(# of generators)

Year	Value
2017	4
2018	3
2019	16
2020	1
2021	6
2022	4
2023	1
2024	56
2025	1
2026	6
2027	

(Note: bar values shown — 4, 3, 16, 1, 6, 4, 1, 56, 1, 6)
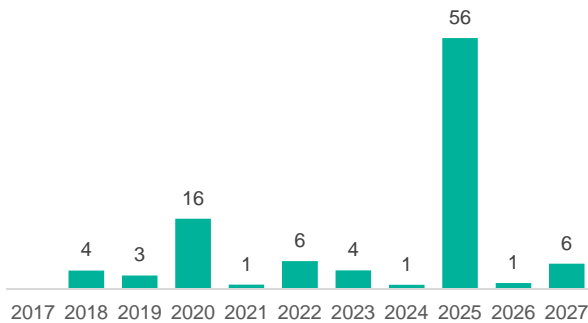
Anticipated station-based UPS replacements, 2017-2020
(# of UPSs)

Year	Value
2017	20
2018	43
2019	47
2020	37
2021	24
2022	5
2023	6
2024	4
2025	20
2026	3
2027	8
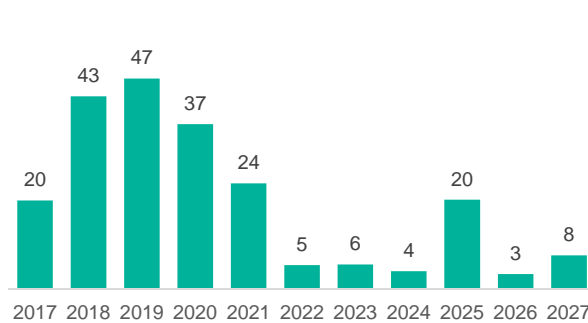
Projected capital and operating expense needs for station-based Generators & UPSs
($ millions)

Year	Total
2017	$1.6
2018	$1.7
2019	$2.7
2020	$2.5

■ Capital Expenses ■ Operating Expenses
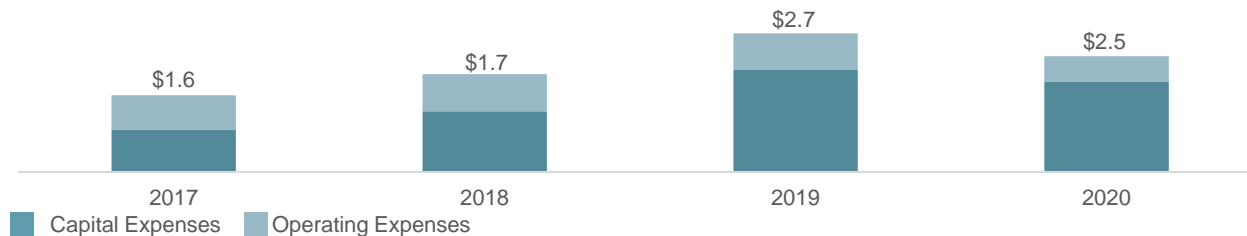
Insights

- While the cost to the system is relatively low (about $2M/year through 2020), licensees anticipate replacing nearly 150 station-based UPSs by 2020.

- In 2025, licensees anticipate replacing more than 50 station-based generators.

- Are the UPSs and generators being replaced taking into consideration new transmitter power needs?

Considerations

Consider a collective purchase agreement for generators and UPSs during this period, and/or a shared service agreement around the operating costs.

Public television anticipates a large number of replacements in Master Control & Operations Switchers

Master Control & Operations Switchers, All TV

Anticipated replacement schedule for switchers in Master Control & Operations
(# of pieces of equipment)

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
42	44	36	63	10	11	1	10	9	1	0
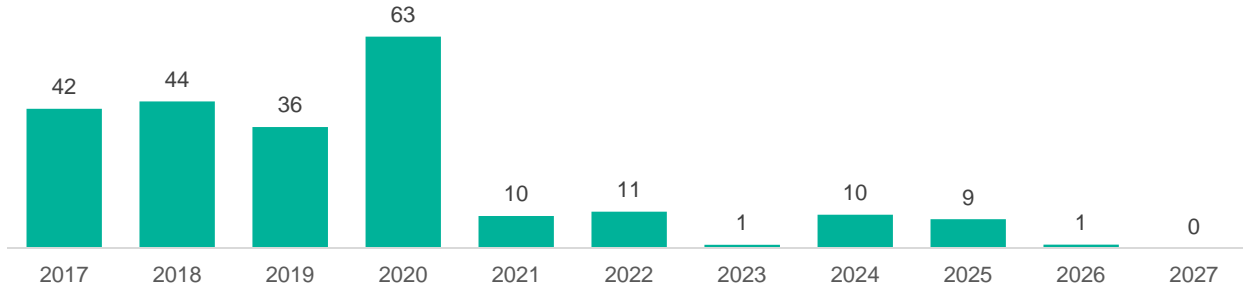
Vendors of currently-used switcher equipment
(size indicates popularity of vendor)

Utah Scientific · Grass Valley/Thomson · Miranda · Harris · Other · Quartz · Philips · ProBel · NVIsion · Chyron · Sigma · BTS · Leitch

Insights

- Over the next four years, the PTV system anticipates needing nearly 200 switchers to support master control and operations.

- Utah scientific, Grass Valley/Thomson, and Miranda are the most popular equipment vendors.

Considerations

Consider a collective purchase agreement around switchers leveraging the three main vendors (Utah Scientific, Grass Valley/Thomson, and Miranda) that dominate their current holdings.

Public TV anticipates a large number of replacements in Encoding, Mux, & PSIP over the next four years

Encoding, Mux, and Program & System Information Protocol (PSIP) Replacements, all TV

Anticipated replacement schedule for Encoding, Mux, & PSIP in RF Broadcast
(# of pieces of equipment)

Year	Count
2017	159
2018	104
2019	105
2020	124
2021	33
2022	84
2023	8
2024	10
2025	38
2026	7
2027	4
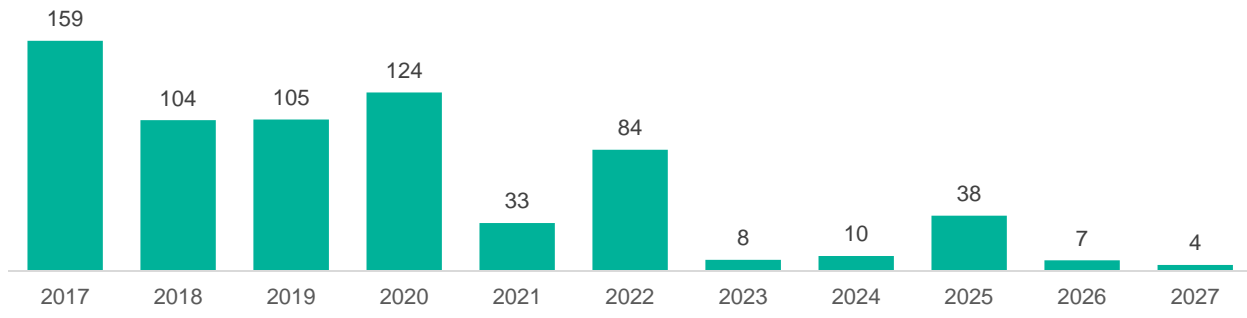
Vendors of currently-used Encoding, Mux, & PSIP equipment
(size indicates popularity of vendor)

Other | Harmonic | Tanberg | Harris | Thales | Tiernan

Insights

- Stations anticipate a large number of equipment replacements this year relative to later years.

- Harmonic, Tanberg, and Harris are the most popular vendors in this category.

Considerations

Consider a collective purchase agreement. Right now, most licensees use a mix of "Other" vendors, but the system could leverage Harmonic, Tanberg, and Harris' relative predominance.

Sub-Section Overview

The Technology Infrastructure section highlights large numbers of anticipated replacements and needed investment in equipment subgroupings, as well as areas of particularly large expenses. These highlighted subgroupings represent the priorities pulled from a full breakdown of all equipment subgroupings (see the Appendix for all subgroupings).

Sub-sections:

TV TECHNOLOGY INFRASTRUCTURE: This subsection contains the prioritized anticipated replacements, investments, and large expenses that are specific to TV licensees.

RADIO TECHNOLOGY INFRASTRUCTURE: This subsection contains the prioritized anticipated replacements, investments, and large expenses that are specific to Radio licensees.

The Radio community anticipates replacing a large number of transmitters over the next four years

Transmitters, all Radio*

Anticipated transmitter replacements, 2017-2027
(# of transmitters)

Year	Value
2017	26
2018	51
2019	44
2020	235
2021	33
2022	37
2023	14
2024	15
2025	114
2026	4
2027	19
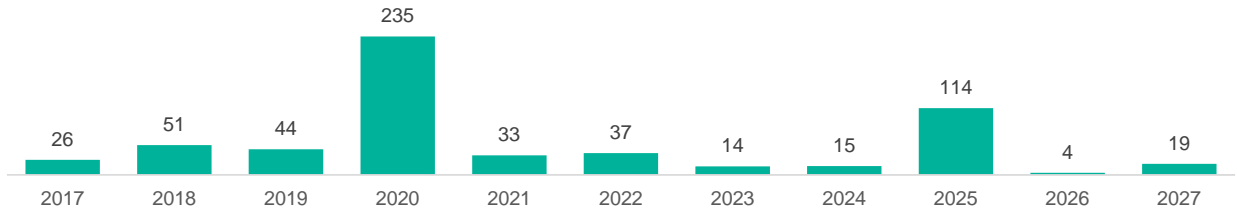
Current transmitter holdings, by transmitter type
(# of transmitters)

Type	Value
Lower Power FM	513
High Power FM	1,116
AM	239
IBOC/HD	623
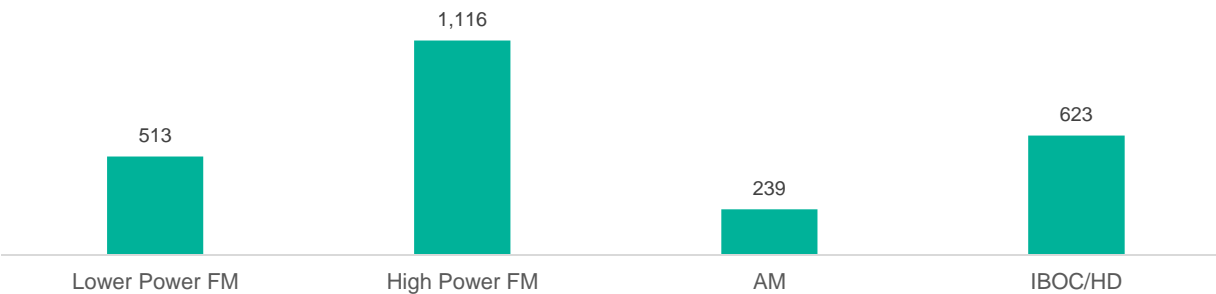
Insights

- The radio community will need a large number of transmitters in 2020 and in 2025.

- About two thirds of survey respondents have IBOC/HD radio today.

Considerations

Consider a collective purchase agreement around transmitters to support the need in 2020.

*In an effort to limit the burden on radio respondents, we did not originally ask them to identify transmitters' end of life. In response to Advisory panel interest, we added this question. The results shown here represents responses from 132 responses to the added question on end-of-life. Overall numbers of transmitters also represent responses from 136 answers to the older version of the survey. Because of this split, these numbers are less robust than those for television.

Public radio anticipates a large number of replacements in production control room equipment in 2018

Production Control Room Equipment, all Radio

Anticipated replacement schedule for equipment in Production Control Rooms, all radio
(# of pieces of equipment)

Year	Value
2017	334
2018	952
2019	394
2020	559
2021	14
2022	341
2023	301
2024	6
2025	269
2026	20
2027	11
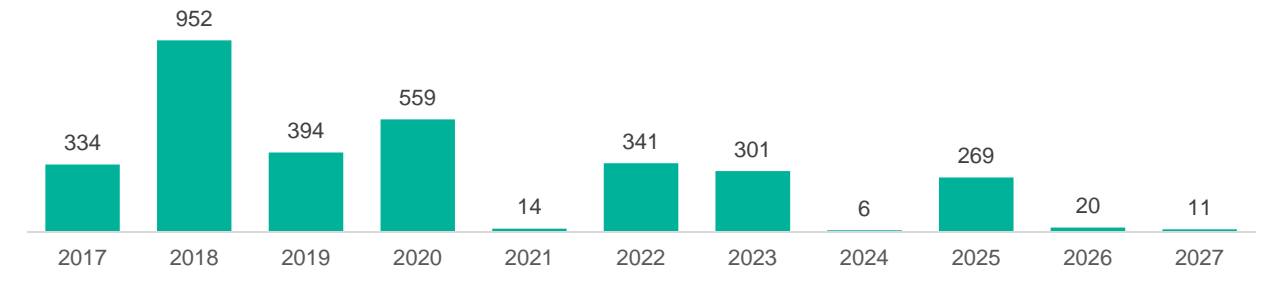
Projected financial needs for production control rooms equipment, all radio
($ millions)

Year	Capital Expenses	Operating Expenses
2017	$9	$4
2018	$9	$4
2019	$6	$4
2020	$6	$2

■ Capital Expenses   ■ Operating Expenses
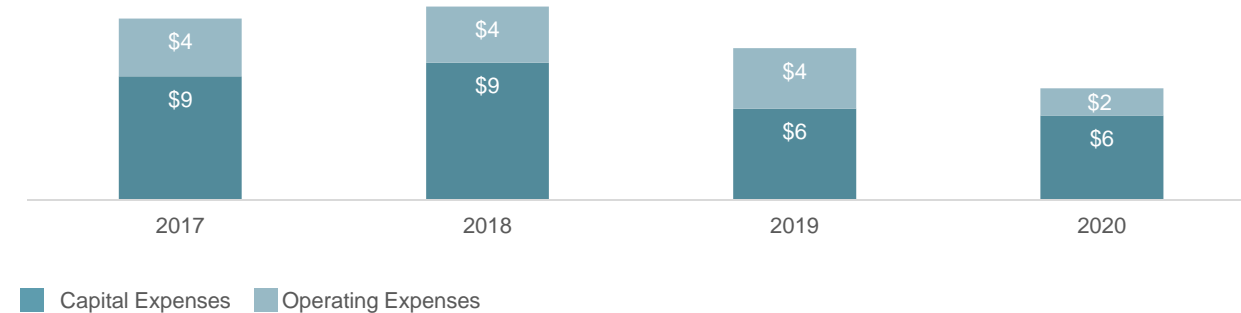
Insights

- In 2019, public radio anticipates replacing nearly 1,000 pieces of equipment in their production control rooms.

- This spike isn't reflected in their 2019 projected financial needs, which implies that these needs are for less-expensive pieces of equipment.

Considerations

Consider a collective purchase agreement to support purchases in this equipment grouping through 2020.

Public radio expects a significant number of replacements in Encoding, Mux, EAS/CAP & Modulators over the next four years

Encoding, Mux, EAS/CAP, and Modulators, all Radio

Anticipated replacement schedule for Encoding, Mux, EAS/CAP, & Modulators
(# of pieces of equipment)

Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Pieces	129	211	235	358	60	182	112	94	298	42	76
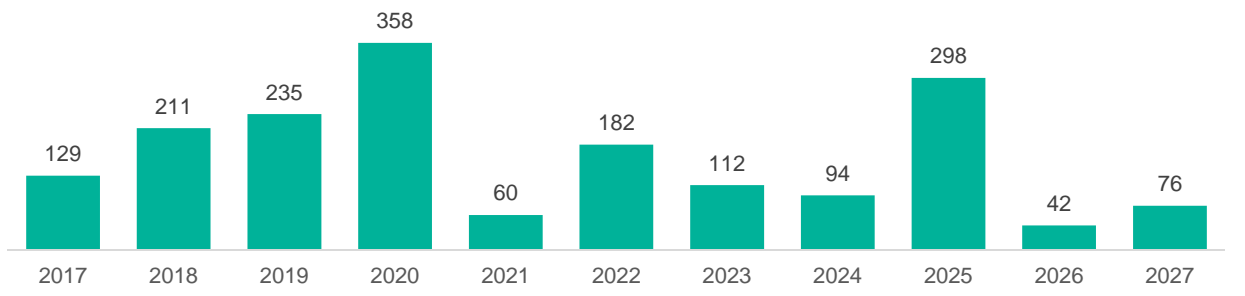
Projected financial needs for encoding, mux, EAS/CAP & modulators equipment
($ millions)

Year	2017	2018	2019	2020
Operating Expenses	$2	$2	$2	$2
Capital Expenses	$2	$3	$3	$3

■ Capital Expenses ■ Operating Expenses
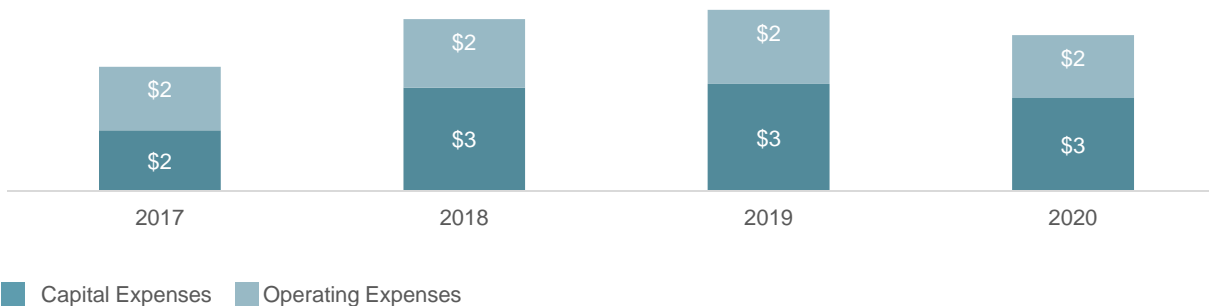
Insights

- The public radio system anticipates needing nearly 1,000 pieces of equipment in encoding, mux, EAS/CAP, and modulators over the next four years.

- This equipment comprises an estimated $19 million investment.

Considerations

Consider a collective purchase agreement to support purchases in this equipment grouping through 2020. Major vendors include Burk, Broadcast Electronics, Harris, Sage. For a full listing, see Appendix (slide 50).

Towers, Transmitters, Encoding, Mux, EAS/CAP & Modulators, and Production Control Rooms are areas of consistently high expense for public radio

Capital and Operating Expenses for RF Broadcast Technology, all Radio
($ millions)

Legend: Capital Expenses ■ Operating Expenses ■
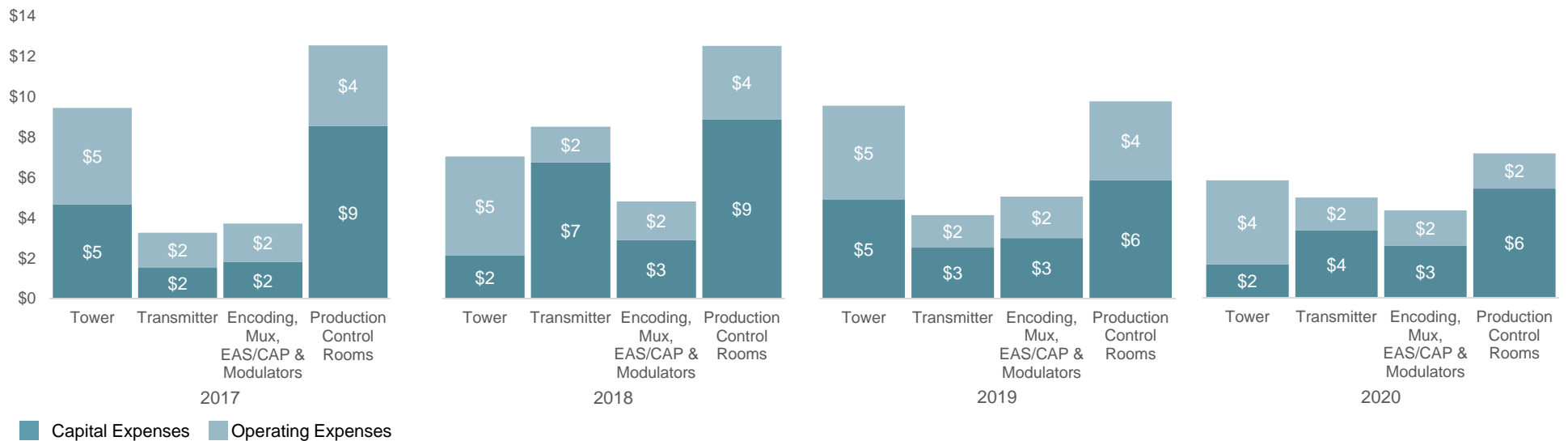
Insights	Considerations
• Production control rooms are the equipment category, within the RF broadcast technology equipment grouping, with the highest expenses in the next four years Currently, purchases in these categories are spread out over a large number of vendors (see Appendix slide 50 for Encoding, Mux, EAS/CAP & Modulators), which dilutes the community's buying power and ability to share tools, tips, and spare parts • Radio stations anticipate to spend almost twice the amount on transmitter replacements in 2018 than in other years	Consider collective purchase agreements to reduce expenses in areas that have a large impact on stations' overall bottom line

Public radio anticipates a large number of replacements in automation systems in 2020

Automation Equipment, all Radio

Anticipated replacement schedule for automation equipment, all radio
(# of pieces of equipment)

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
265	210	242	710	131	125	23	12	32	2	8
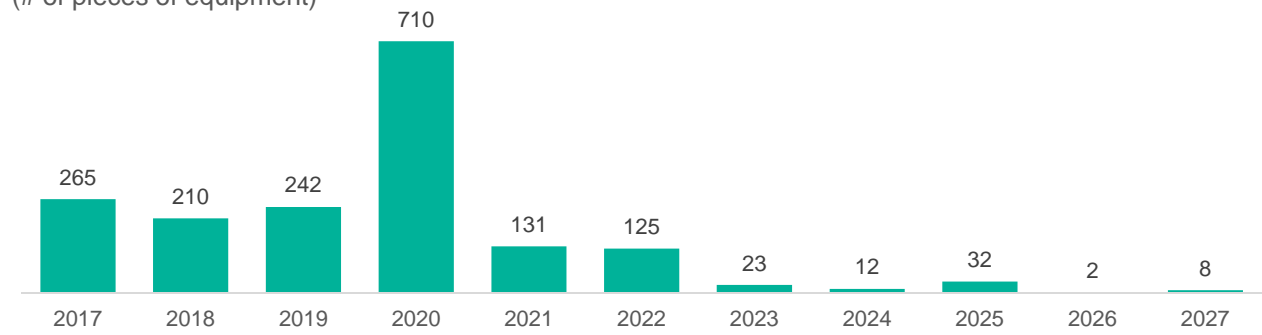
Projected financial needs for automation systems equipment, all radio
($ millions)

Capital Expenses Operating Expenses
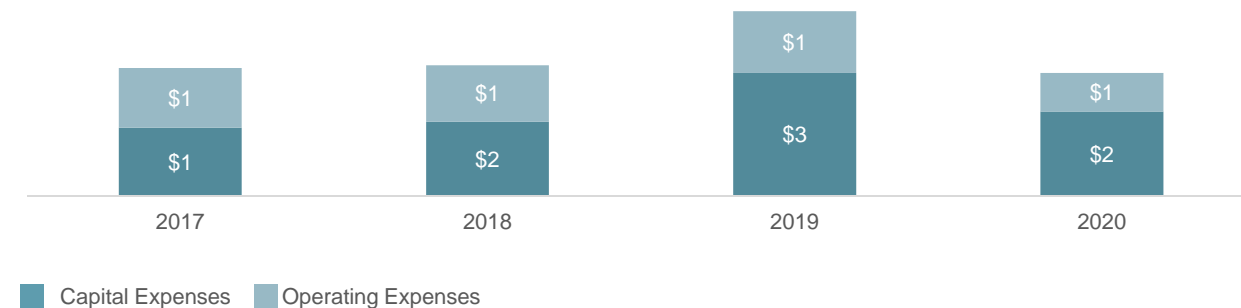
Insights

- Over the next four years, public radio anticipates needing nearly 1,500 pieces of equipment in automation systems.

- While there is a spike in anticipated number of replacements in 2020, the anticipated expenses decline in 2020.

Considerations

Consider a collective purchase agreement to leverage system buying power. Major vendors (and possible targets for collective negotiations) include Broadcast Electronics, Enco, and Wide Orbit. For a full listing, see Appendix (slide 44).

Public radio anticipates a large number of replacements for station-based UPSs in 2020

Station-Based Generators and UPSs, all Radio

Anticipated replacement schedule for Station-Based Generators & UPSs, all radio
 (# of pieces of equipment)

Year	Count
2017	65
2018	153
2019	64
2020	277
2021	34
2022	99
2023	3
2024	24
2025	52
2026	4
2027	34
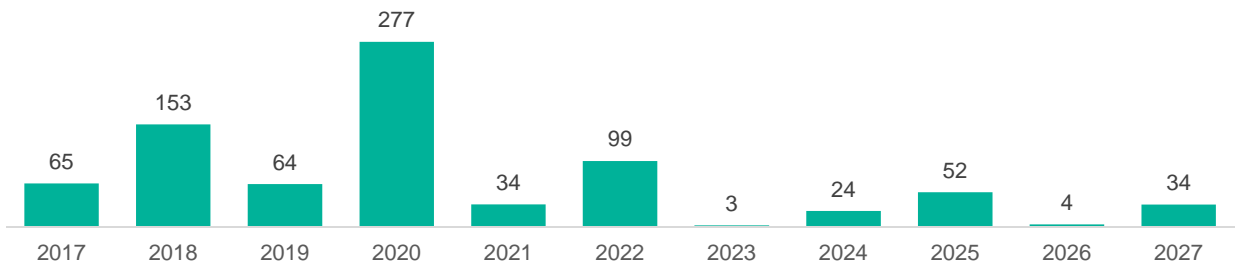
Projected financial needs Station-Based Generators & UPSs, all Radio
($ thousands)
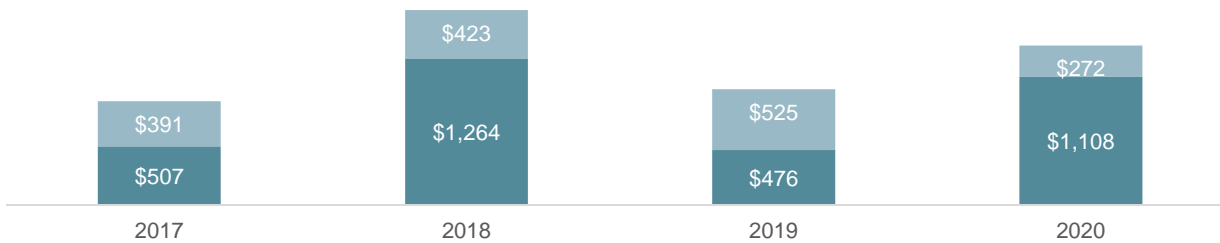
Year	Capital Expenses	Operating Expenses
2017	$507	$391
2018	$1,264	$423
2019	$476	$525
2020	$1,108	$272

■ Capital Expenses ■ Operating Expenses

Insights

- Over the next four years, public radio anticipates replacing over 500 station-based UPSs.

- Combined with generators, these UPSs represent a needed investment of nearly $5 million.

Considerations

Consider a collective purchase agreement for generators and UPSs during this period, and/or a shared service agreement around the operating costs.

FINANCIAL PLANNING

Section Overview

The Financial Planning section examines stations' estimated funding, estimated expenses, funding restrictions, and financial gap contingency planning related to stations' technology. A full breakdown of estimated funding and expenses is available in the Appendix.

Sub-sections:

FUNDING GAPS: Depicts the cumulative and annual funding gaps for 2017-2020 between estimated available funds and expenses for TV and Radio.

DIFFERENCES BETWEEN GENERAL MANAGERS' AND ENGINEERS' PREDICTED NEEDS: Compares General Managers' and Engineers' estimates for expenses between 2017-2020.

FUNDING APPROACHES AND CONSTRAINTS: Examines stations' approaches for managing a deficit in funding, constraints that their funding is subject to, and their approach to funding depreciation.

Sub-Section Overview

FINANCIAL PLANNING

The Financial Planning section examines stations' estimated funding, estimated expenses, funding restrictions, and financial gap contingency planning related to stations' technology. A full breakdown of estimated funding and expenses is available in the Appendix.

Sub-sections:

FUNDING GAPS: Depicts the cumulative and annual funding gaps for 2017-2020 between estimated available funds and expenses for TV and Radio.

DIFFERENCES BETWEEN GENERAL MANAGERS' AND ENGINEERS' PREDICTED NEEDS: Compares General Managers' and Engineers' estimates for expenses between 2017-2020.

FUNDING APPROACHES AND CONSTRAINTS: Examines stations' approaches for managing a deficit in funding, constraints that their funding is subject to, and their approach to funding depreciation.

If funding and needs progress as forecasted, the public media community will face a significant cumulative gap

Cumulative Financial Gap Between Estimated Total Expenses and Available Funds for Broadcast and Production Equipment

All TV
($ millions)

$18 — $87 — $239 — $307

■ Estimated Available Funds   ■ Estimated Total Expenses

All radio
($ millions)

$21 — $43 — $76 — $105

■ Estimated available funds   ■ Estimated total expenses
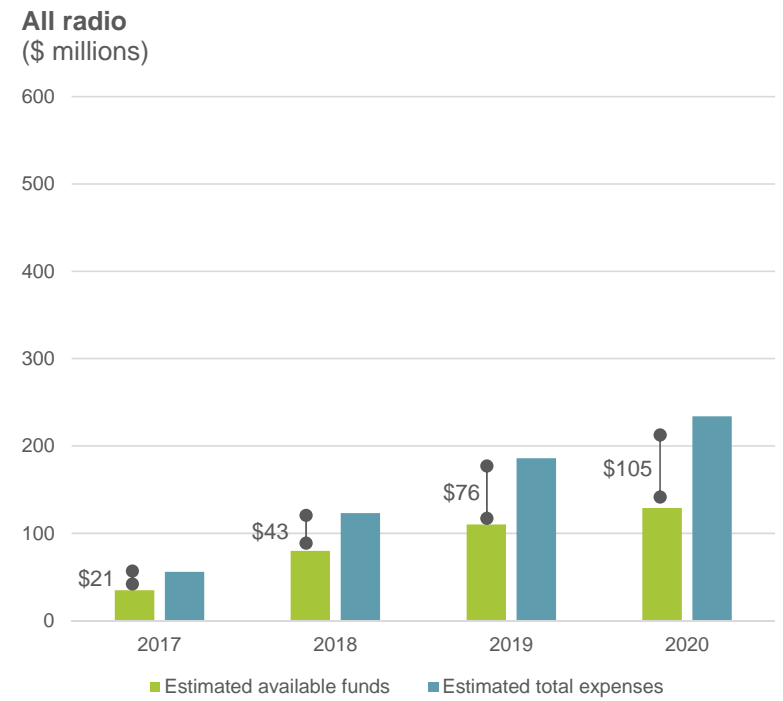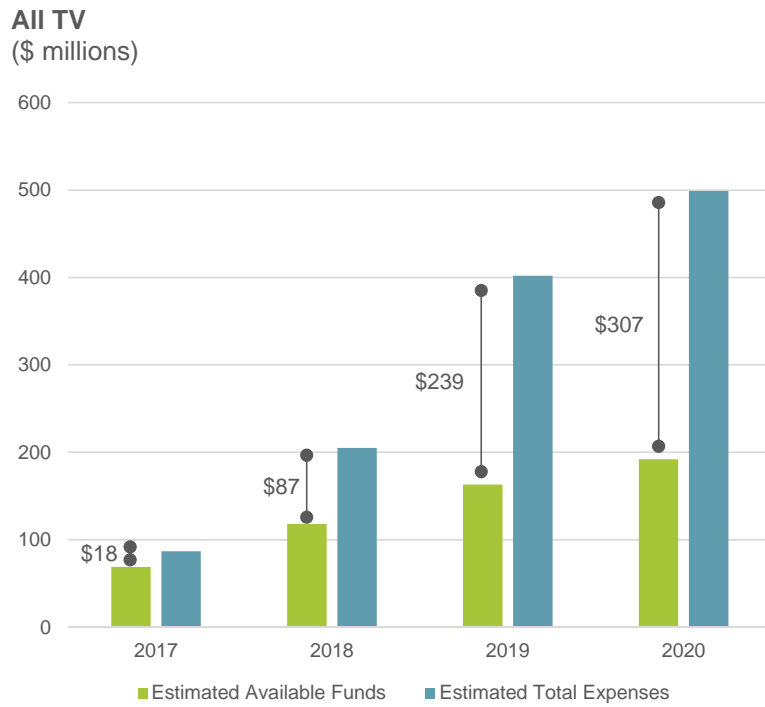
System-wide, stations face a gap between estimated technology needs and funding over the next four years

Financial Gap Between Engineer-Estimated Needs and GM-Estimated Available Funds

All TV
($ millions)

$197

$118

$152M

$87

$97

$69

$49

$45

$29

2017   2018   2019   2020

All radio
($ millions)

$67

$63

$56

$48

$33M

$35

$45

$30

$19
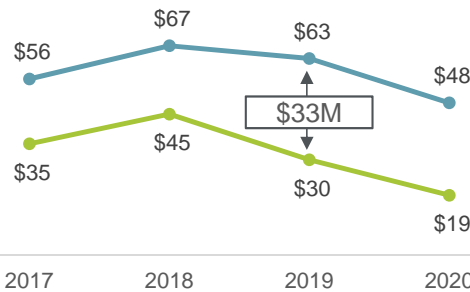
2017   2018   2019   2020

—●— Estimated Total Expenses   —●— Estimated Available Funds

	Average Gap Per Station ($)			
	2017	**2018**	**2019**	**2020**
TV	-$105,239	-$411,759	-$903,562	-$408,466
Radio	-$51,154	-$53,985	-$80,042	-$72,996

Insights

- Stations anticipate a gap between their estimated technology needs (expenses) and their available funding to pay for those needs.

- This financial gap widens substantially in 2019.

Considerations

Public media constituents can use this Assessment to develop robust advocacy for both public and private funders.

Consider partnerships with commercial stations (particularly in conjunction with ATSC 3.0) to develop ancillary revenue.

Consider finding new efficiencies (including increased collaboration) throughout the system to reduce costs.

TV licensees of all sizes predict a funding gap over the next four years

Average Funding Gap Per Station, TV Grantee Size
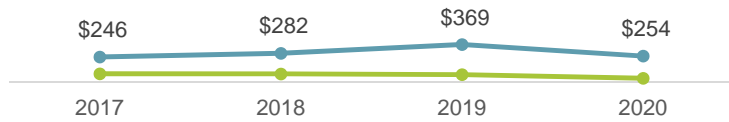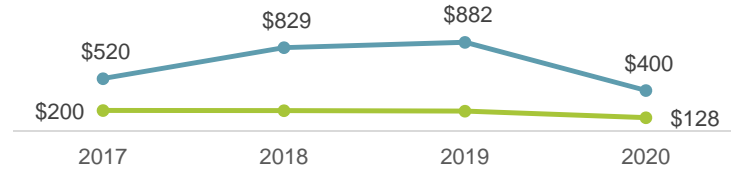
Smaller grantees
($ thousands)

$246 $282 $369 $254

2017   2018   2019   2020

Medium grantees
($ thousands)

$829 $882

$520 $400

$200 $128

2017   2018   2019   2020

Larger grantees
($ thousands)

$2,439

$1,040 $1,093

$734

$561 $679 $623

$401

2017   2018   2019   2020
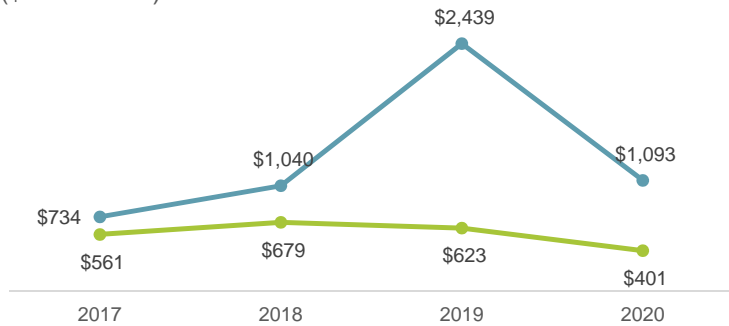
● Estimated Total Expenses   ● Estimated Available Funds

Insights

- Grantees of all sizes predict funding to steadily decline over the next four years.

- Larger grantees are predicting a spike in expenses in 2019.

- Medium-sized grantees expect expenses to rise until 2019, after which they expect them to fall.

- Smaller grantees predict a steady gap in the next four years.

Each TV licensee type expects a funding gap over the next four years and all but one type expect 2019 to have the largest gap

Corporation for Public Broadcasting

Average Funding Gap Per Station, TV Licensee Type

Community licensees
($ thousands)

$361 $531 $749 $420
$233 $176
2017 2018 2019 2020

Local authority licensees
($ thousands)

$699 $340 $409 $229
$88 $54
2017 2018 2019 2020

State licensees
($ thousands)

$1,493 $1,832 $2,097 $1,540
$757 $1,073 $779 $433
2017 2018 2019 2020

University licensees
($ thousands)

$424 $647 $1,610 $554
$152 $90
2017 2018 2019 2020
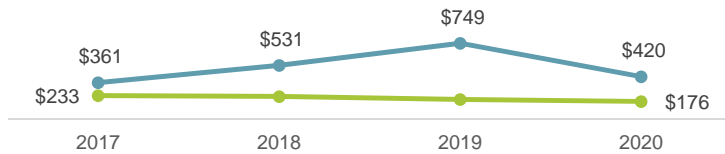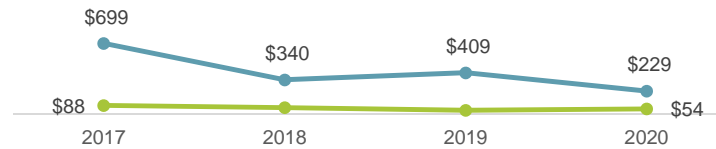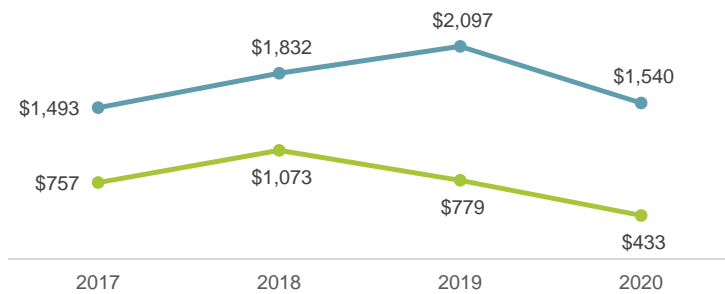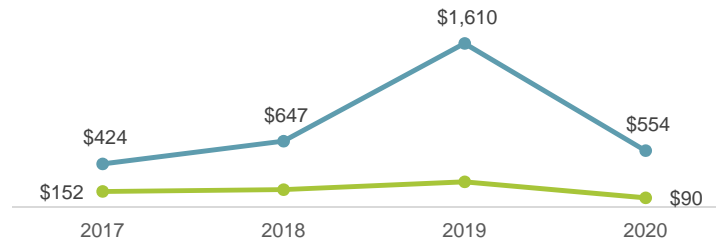
⬤ Estimated Total Expenses   ⬤ Estimated Available Funds

Insights

- Local Authority licensees are predicting their funding gap to narrow over the next four years as their expenses fall.

- Community, State, and University licensees all anticipate to have a particularly large funding gap in 2019.

- All licensee types expect funding to decline over the next four years.

Radio licensees of all sizes also anticipate a funding gap over the next four years

Average Funding Gap Per Station, Radio Grantee Size

Smaller grantees
($ thousands)

$41 $49 $59 $46

2017   2018   2019   2020

Medium grantees
($ thousands)

$134 $118 $125 $85
$68 $17

2017   2018   2019   2020

Larger grantees
($ thousands)

$279 $358 $310 $246
$202 $290 $201 $124

2017   2018   2019   2020
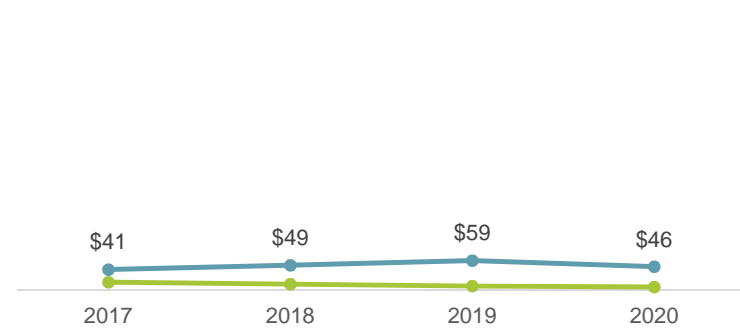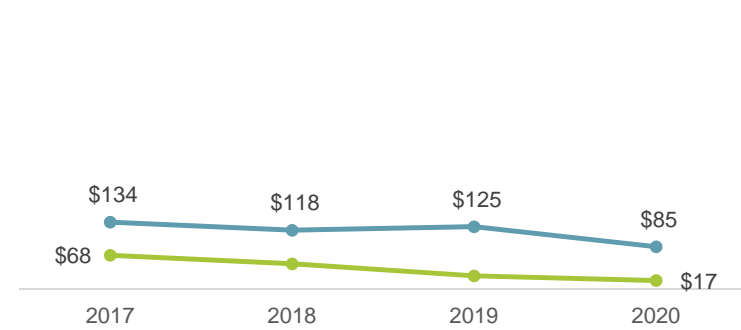
─●─ Estimated Total Expenses   ─●─ Estimated Available Funds
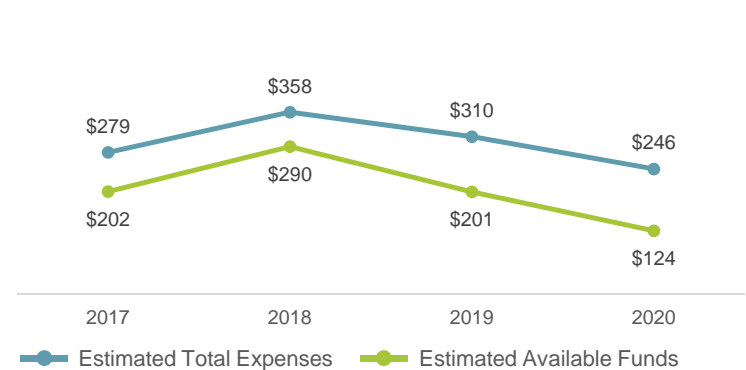
Insights

- Stations of all sizes predict a funding gap.

- While larger licensees have the largest gap, the estimated expenses and funds follow a similar and declining pattern between 2017 and 2020.

- Radio licensees of all sizes expect funding to decline over the next four years.

Corporation for Public Broadcasting

All radio licensee types expect declining funds over the next four years, but differ in their expense forecasts

Corporation for Public Broadcasting

Average Funding Gap Per Station, Radio Licensee Type

Community licensees
($ thousands)

$134 $171 $180 $148
$82 $52

2017   2018   2019   2020

Local authority licensees
($ thousands)

$22 $20 $26 $13

2017   2018   2019   2020

State licensees
($ thousands)

$495
$342 $350
$323
$136
$172 $136 $62

2017   2018   2019   2020

University licensees
($ thousands)

$136 $152 $124 $104
$89 $86 $47

2017   2018   2019   2020
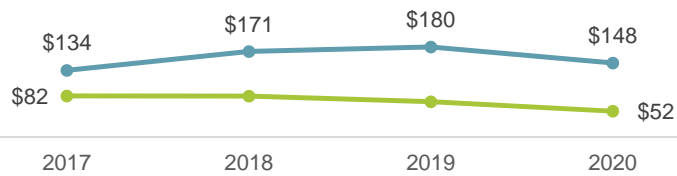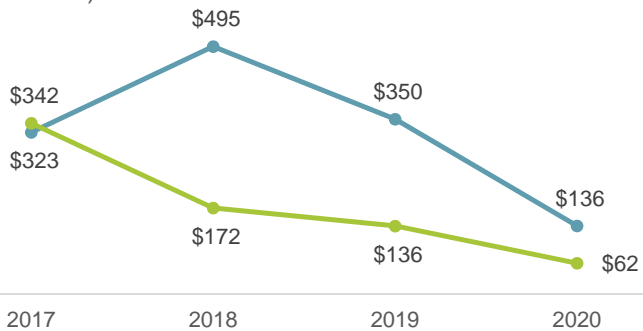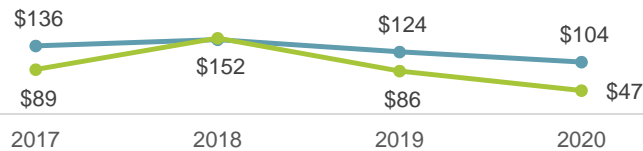
— Estimated Total Expenses   — Estimated Available Funds

Insights

- Community licensees expect their funding gap to widen as expenses continue to rise and funding continues to fall.

- Local Authority licensees predict expenses to drop in half from 2019 to 2020, which may indicate challenges in planning beyond 2019.

- State licensees expect to have a spike in expenses and larger funding gaps in 2018, whereas University licensees expect to have a funding surplus in 2018.

- University licensees are expecting a significant increase in funding in 2018.

Sub-Section Overview

FINANCIAL PLANNING

The Financial Planning section examines stations' estimated funding, estimated expenses, funding restrictions, and financial gap contingency planning related to stations' technology. A full breakdown of estimated funding and expenses is available in the Appendix.

Sub-sections:

FUNDING GAPS: Depicts the cumulative and annual funding gaps for 2017-2020 between estimated available funds and expenses for TV and Radio.

DIFFERENCES BETWEEN GENERAL MANAGERS' AND ENGINEERS' PREDICTED NEEDS: Compares General Managers' and Engineers' estimates for expenses between 2017-2020.

FUNDING APPROACHES AND CONSTRAINTS: Examines stations' approaches for managing a deficit in funding, constraints that their funding is subject to, and their approach to funding depreciation.
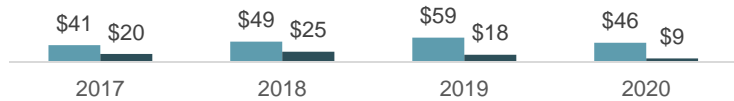
TV engineers across all grantee sizes tend to predict more technology expenses than general managers

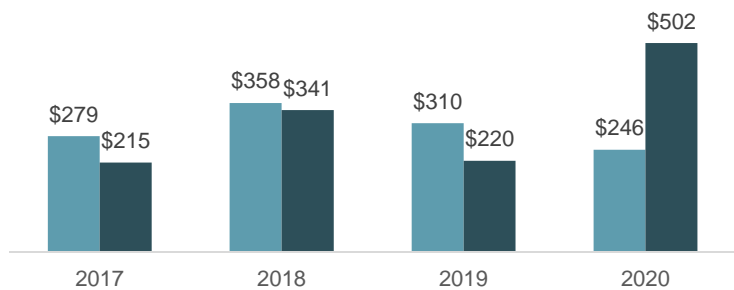**Engineers' and General Managers' Average Expense Estimates Per Station, TV Grantee Size**

Smaller grantees
($ thousands)

	2017	2018	2019	2020
Engineer	$246	$282	$369	$254
GM	$244	$166	$168	$109

Medium grantees
($ thousands)

	2017	2018	2019	2020
Engineer	$520	$829	$882	$400
GM	$322	$447	$223	$175

Larger grantees
($ thousands)

	2017	2018	2019	2020
Engineer	$734	$1,040	$2,439	$1,093
GM	$686	$960	$931	$670
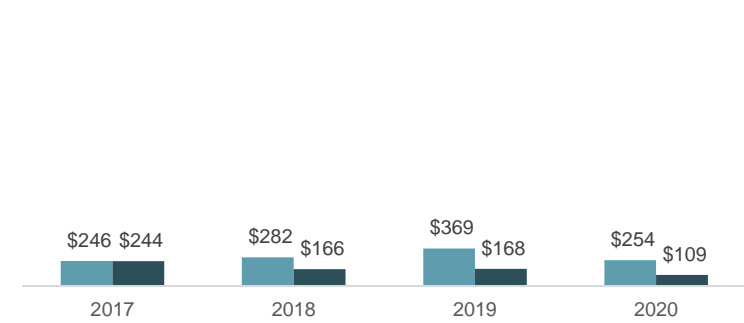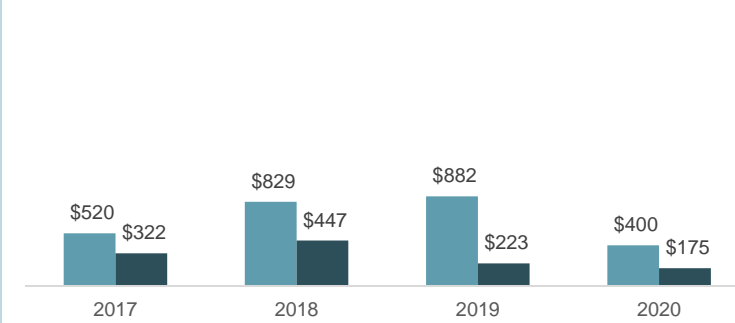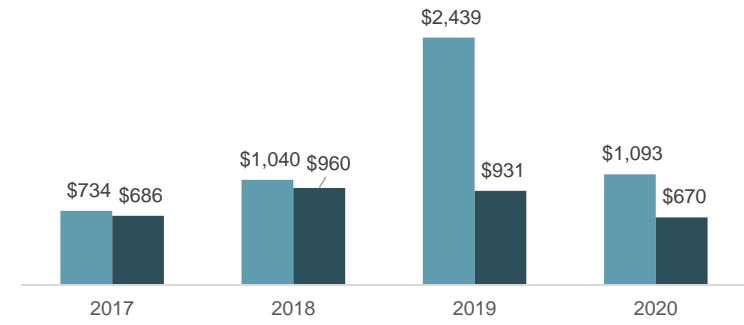
What is causing the consistent planning gap?

■ Engineer's Estimated Total Expenses   ■ General Manager's Estimated Total Expenses

Similarly, TV engineers across all licensee types also predict more technology expenses than general managers

Corporation for Public Broadcasting

Engineers' and General Managers' Average Expense Estimates Per Station, TV Licensee Type

Community licensees
($ thousands)
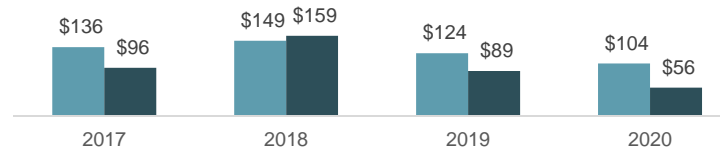
Year	Engineer	GM
2017	$361	$394
2018	$531	$414
2019	$749	$363
2020	$420	$303

Local Authority licensees
($ thousands)

Year	Engineer	GM
2017	$699	$88
2018	$340	$92
2019	$409	$40
2020	$229	$54

State licensees
($ thousands)

Year	Engineer	GM
2017	$1,493	$1,048
2018	$1,832	$1,549
2019	$2,097	$1,425
2020	$1,540	$790

University licensees
($ thousands)

Year	Engineer	GM
2017	$424	$233
2018	$647	$286
2019	$1,610	$214
2020	$554	$156
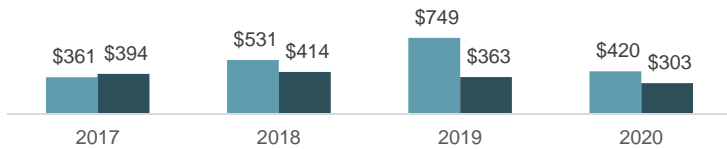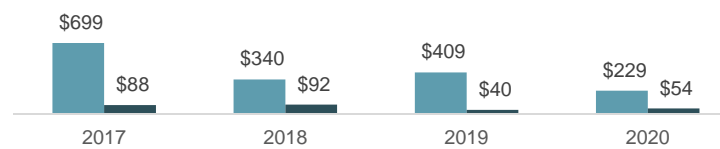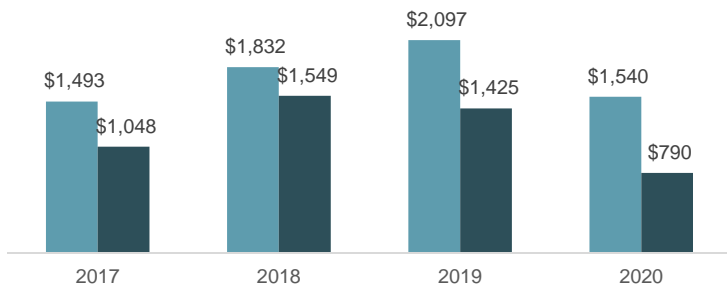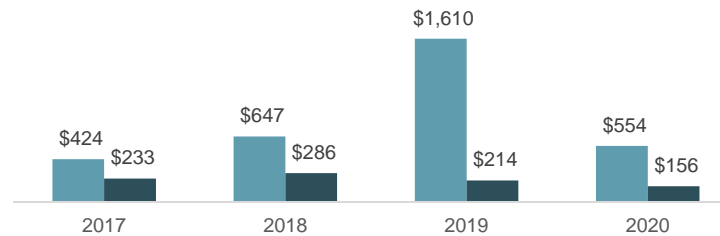
■ Engineer's Estimated Total Expenses   ■ General Manager's Estimated Total Expenses

Insights

- For licensees of all types, engineers' estimates appear consistently larger than GMs'.

- Proportionally, this gap is largest for PTV's six local authority licensees, where engineers' estimated need is approximately ten times GMs' in 2017 and 2019.

- This gap is proportionally smaller for Community and State licensees.

Across all radio grantee sizes, engineers tend to forecast more expenses than general managers

Engineers' and General Managers' Average Expense Estimates Per Station, Radio Grantee Size

Smaller licensees
($ thousands)

	2017	2018	2019	2020
Engineer	$41	$49	$59	$46
General Manager	$20	$25	$18	$9

Medium licensees
($ thousands)
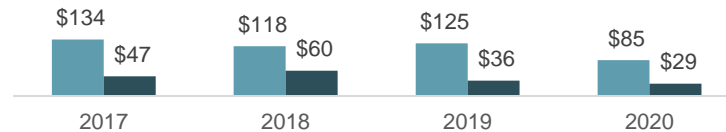
	2017	2018	2019	2020
Engineer	$134	$118	$125	$85
General Manager	$47	$60	$36	$29

Larger licensees
($ thousands)

	2017	2018	2019	2020
Engineer	$279	$358	$310	$246
General Manager	$215	$341	$220	$502

■ Engineer's Estimated Total Expenses　　■ General Manager's Estimated Total Expenses

Insights

- In 2017, smaller stations' engineers expect expenses twice as high as their general managers' predictions.

- By 2020, smaller stations' engineers predictions rise to approximately five times their general managers' estimates.

- Medium licensee engineers consistently forecast two to four times as many expenses as general managers.

- Overall, larger licensees' general managers and engineers appear to be the best aligned, but diverge dramatically in 2020.

Expense estimates for 2020 differ compared to earlier years, suggesting that several radio licensee types may face challenges in planning beyond 2019

Engineers' and General Managers' Average Expense Estimates Per Station, Radio Licensee Type

Community licensees
($ thousands)

Year	Engineer	GM
2017	$134	$93
2018	$171	$113
2019	$180	$93
2020	$148	$95

Local Authority licensees
($ thousands)

Year	Engineer	GM
2017	$22	$3
2018	$20	$3
2019	$26	$4
2020	$13	$2

State licensees
($ thousands)

Year	Engineer	GM
2017	$323	$163
2018	$495	$437
2019	$350	$183
2020	$136	$383

University licensees
($ thousands)

Year	Engineer	GM
2017	$136	$96
2018	$149	$159
2019	$124	$89
2020	$104	$56
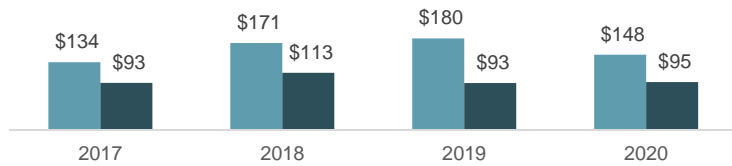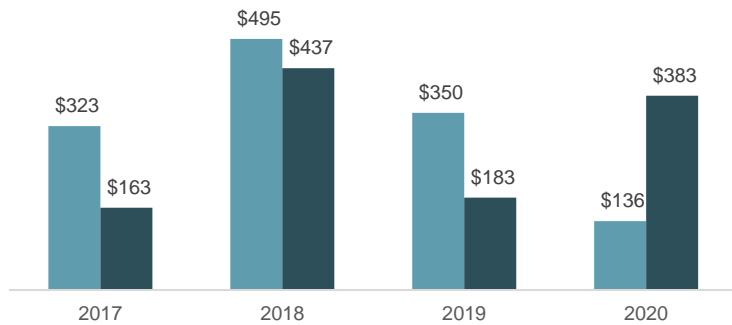
■ Engineer's Estimated Total Expenses   ■ General Manager's Estimated Total Expenses

Insights

- Local authority engineers forecast nearly seven times the expenses their general managers predict.

- State licensee general managers predict nearly three times the amount of expenses in 2020 compared to engineers.

- Engineers and general managers for Community, State, and University licensees expect an increase in expenses in 2018.

- State licensees' general managers predict a need more than twice as large as their engineers' estimate in 2020.

Sub-Section Overview

The Financial Planning section examines stations' estimated funding, estimated expenses, funding restrictions, and financial gap contingency planning related to stations' technology. A full breakdown of estimated funding and expenses is available in the Appendix.

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FUNDING APPROACHES AND CONSTRAINTS: Examines stations' approaches for managing a deficit in funding, constraints that their funding is subject to, and their approach to funding depreciation.

Stations employ a variety of tactics to replace/refresh equipment when faced with a lack of funds

What Stations Do When They Lack Funds to Cover Technology Replacement Costs

All TV
(% TV respondents, answers are not mutually exclusive)

Tactic	%
Cut other budget items	30%
Dip into contingency funds	34%
Start a capital campaign	20%
Borrow money	10%
Scale back replacement	44%
Postpone replacement	86%
Reach out to funders	36%

All radio
(% Radio respondents, answers are not mutually exclusive)

Tactic	%
Cut other budget items	36%
Dip into contingency funds	27%
Start a capital campaign	45%
Borrow money	4%
Scale back replacement	22%
Postpone replacement	75%
Reach out to funders	44%
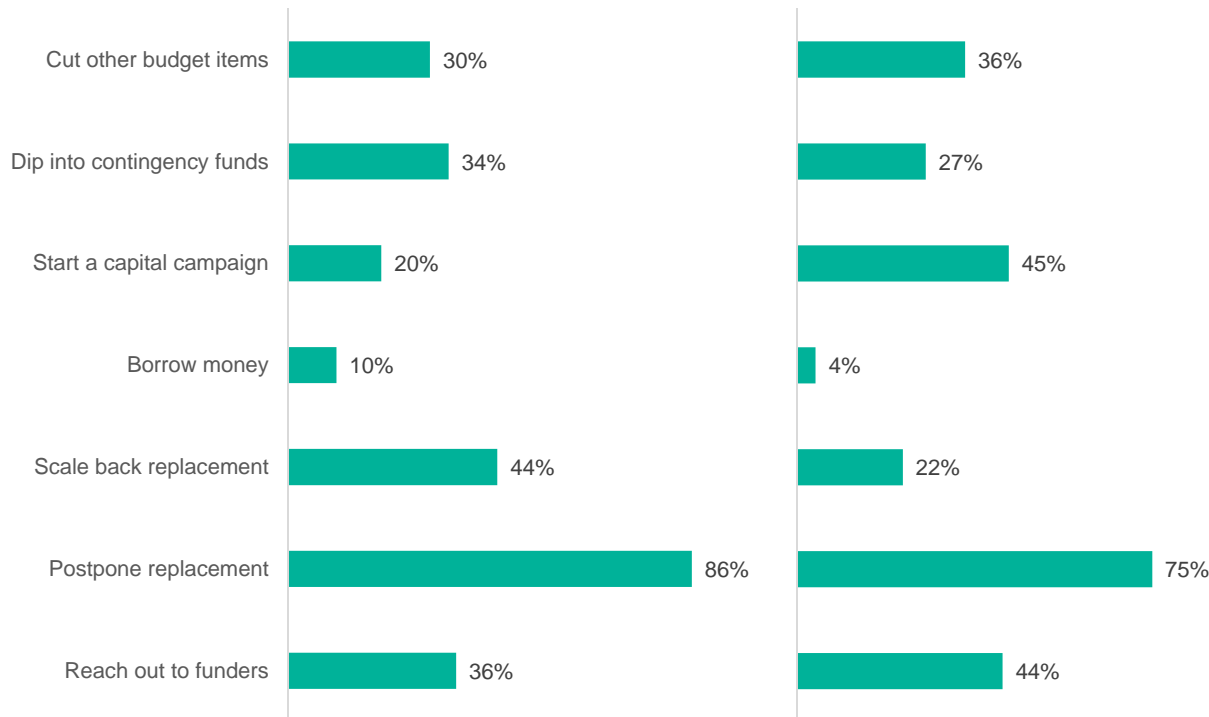
Insights

- 86% of TV stations and 75% 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.

- Almost half of TV stations and a quarter of radio stations will scale back their replacement plans to equipment with less optimal specifications.

Considerations

Consider educating stations on balancing the risk incurred to on-air time and mission fulfillment caused by extensively postponed replacements (see Slide 47).

Public TV and radio stations are restricted in how they acquire and spend their technology funds

Funding Restrictions Affecting Stations

All TV
(% of funds, not mutually exclusive)

	Broadcast	Production
Requires over 1yr of lead time	51%	42%
Requires matching funds	14%	13%
Can be spent only on CapEx	48%	44%
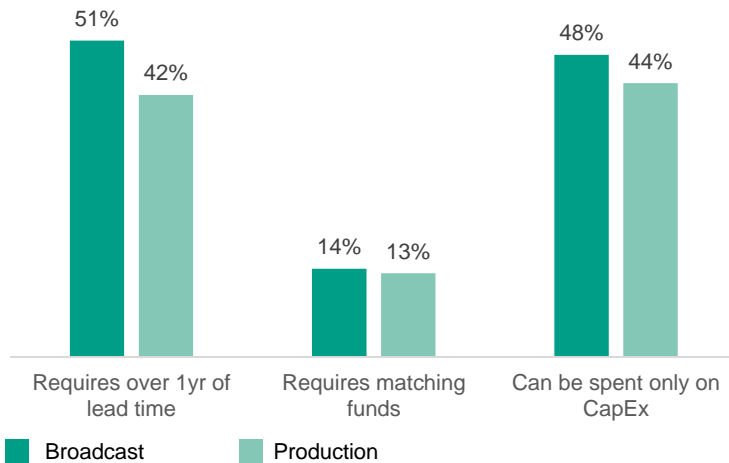
All radio
(% of funds, not mutually exclusive)

	Broadcast	Production
Requires over 1yr of lead time	46%	39%
Requires matching funds	16%	15%
Can be spent only on CapEx	36%	32%

■ Broadcast　■ Production
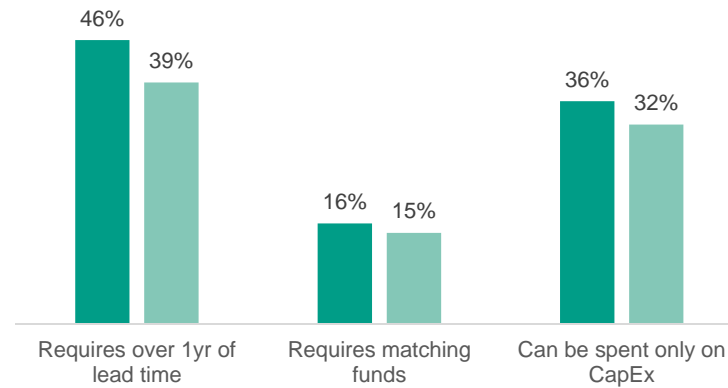
Percentage of Funds Spent on Broadcast and Production		
	TV	Radio
Broadcast	54%	60%
Production	46%	40%

Insights

- Public TV and radio stations face similar challenges in funding restrictions, with a required one year lead time being the largest hurdle.

- The high percentage of funding that must be spent on capital expenses may limit stations' ability to upgrade their technology because vendors increasingly develop operating-expense intensive technologies.

Considerations

Given that many funds require more than a year of lead time, consider helping stations get out ahead of the 2019 need for equipment funding.

Capital expense needs are projected to increase more rapidly than operating expenses over the next four years

cpb Corporation for Public Broadcasting

Total Estimated Capital and Operating Expense Needs

All TV
($ millions)

Year	Operating	Capital	Total
2017	$33	$53	$87
2018	$36	$83	$118
2019	$38	$159	$197
2020	$23	$74	$97

All radio
($ millions)

Year	Operating	Capital	Total
2017	$26	$30	$56
2018	$28	$39	$67
2019	$29	$34	$63
2020	$22	$26	$48
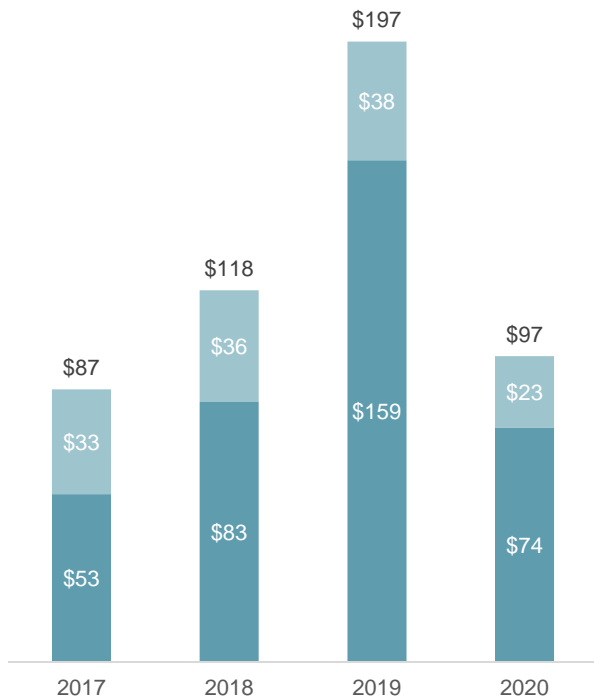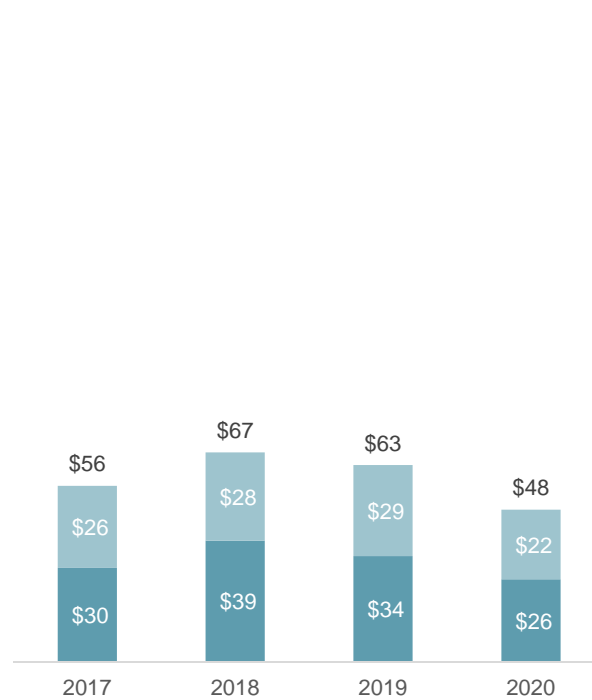
■ Capital Expenses   ■ Operating Expenses

Insights

- TV and radio licensees expect to spend more on capital expenses than operating expenses over the next four years.

- TV licensees expect 2019 to be their most expensive year, whereas radio licensees expect 2018 to be their most expensive year during the 2017-2020 time period.

- For both TV and radio, 30-50% of funding can be spent only on capital expenses.

Considerations

Contemplate helping stations develop an information packet to educate funders about the need for increased operating expenses to leverage newer, service-based models.

Most public media licensees do not depreciate their production and broadcast equipment

Funding Depreciation, TV and Radio, by Size and Type

Use of funding depreciation in accounting, TV and Radio, by grantee size
(% of respondents)

	Smaller	Medium	Larger	Smaller	Medium	Larger
Funds depreciation	27%	23%	26%	40%	27%	46%
Does not fund depreciation	73%	77%	74%	60%	73%	54%
		TV			Radio	
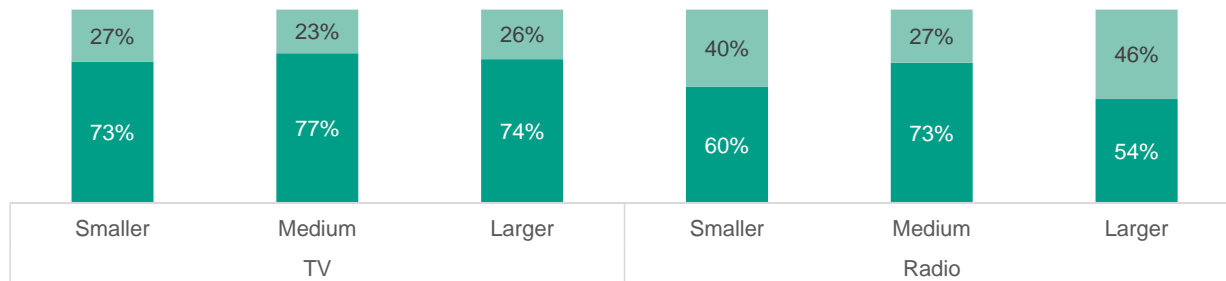
Use of funding depreciation in accounting, TV and Radio, by licensee type
(% of respondents)

	State	University	Local Authority	Community	State	University	Local Authority	Community
Funds depreciation	13%	39%	33%	18%	43%	35%	43%	44%
Does not fund depreciation	87%	61%	67%	82%	57%	65%	57%	56%
		TV				Radio		
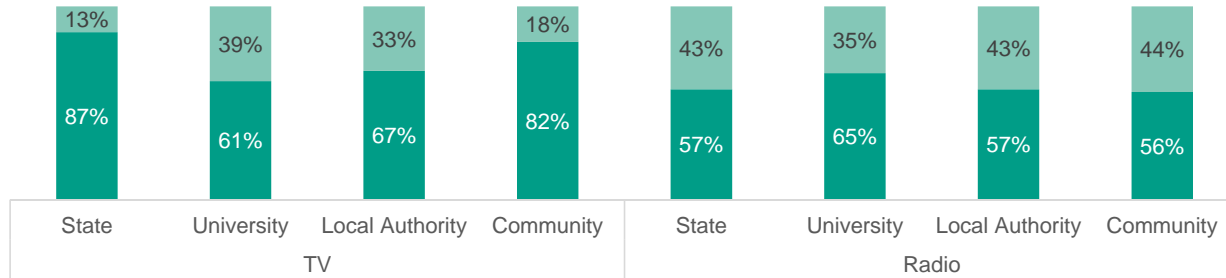
■ Does not fund depreciation ■ Funds depreciation

Insights

- Across the system, about two thirds of licensees do not fund depreciation of equipment.

- Radio licensees, particularly larger and community licensees, are slightly more likely to fund depreciation of equipment.

- State and community TV licensees are the least likely to fund depreciation of equipment.

Considerations

Think about educating stations on the advantages of planning for and funding equipment depreciation.

**CPB System Technology Assessment
Final Report
Appendix**

Table of Contents

This document is an Appendix to the CPB System Technology Assessment Final Report. It contains additional data visualizations that Eagle Hill Consulting produced, were not prioritized for analysis as part of the final report, and are included here for completeness. It also contains key learnings from the interviews and pilot that were conducted prior to launching the survey. The Appendix is intended as a reference document from which CPB can draw its own conclusions about the data.

Television Technology

Television Technology Survey Equipment Categories

Production and Post	Traffic and Scheduling	Master Control & Operations	RF Broadcast	Common Infrastructure
• Studio & Field Cameras • Switchers and Character Generators • Post Production • Digital Distribution • Remote Studios & Trucks • Other Production & Post	• Traffic Management • Rights Management • Other Traffic & Scheduling	• Station Specific Integrated Receiver/ Decoders • Automation Systems • Archive Storage • Master Control Room • Playout Servers • Branding, Graphics, & EAS • Linear Digital Distribution • Other Master Control & Operations	• Transmitters • Towers & Antennas • STL & TX Distribution Network • Translators • Other RF Broadcast	• Broadband Internet • Cybersecurity • HVAC • Station Generators and UPS • Other Common Infrastructure

All TV Equipment: Estimated Capital and Operating Expense Needs 2017-2020

Millions

$140
$120
$100
$80
$60
$40
$20
$0

2017 — Production & Post, Traffic & Scheduling, Master Control & Operations, RF Broadcast, Common Infrastructure

2018 — Production & Post, Traffic & Scheduling, Master Control & Operations, RF Broadcast, Common Infrastructure

2019 — Production & Post, Traffic & Scheduling, Master Control & Operations, RF Broadcast, Common Infrastructure

2020 — Production & Post, Traffic & Scheduling, Master Control & Operations, RF Broadcast, Common Infrastructure

Capital Expenses   Operating Expenses

TV Production & Post: Estimated Capital and Operating Expense Needs 2017-2020
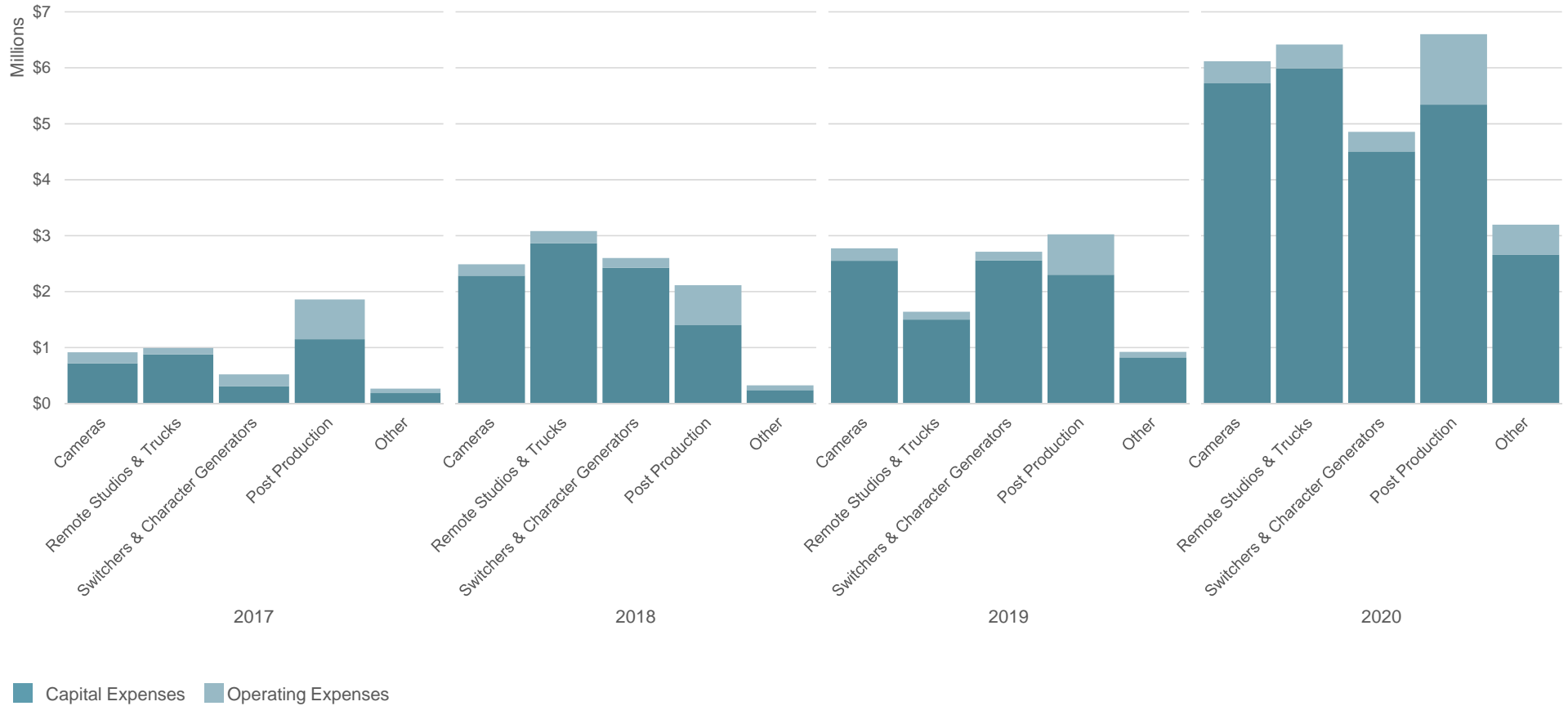
TV Production & Post: Anticipated Replacements 2017-2027

Remote Studios*

(# pieces of equipment)

Trucks

(# pieces of equipment)

Character Generators

(# pieces of equipment)

Switchers

(# pieces of equipment)
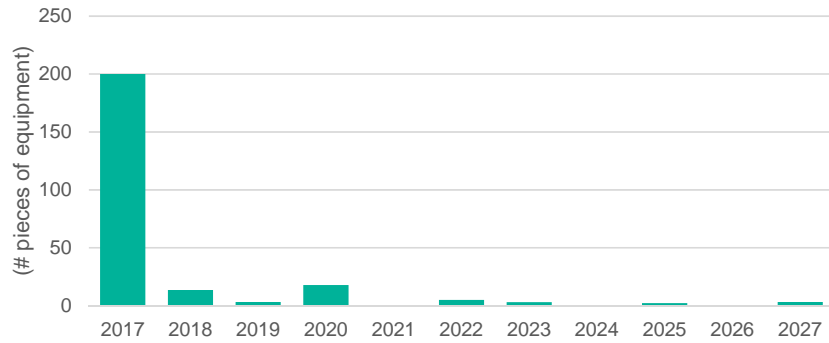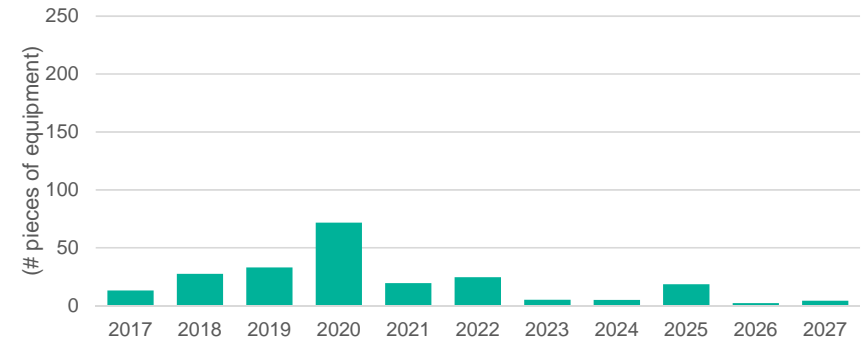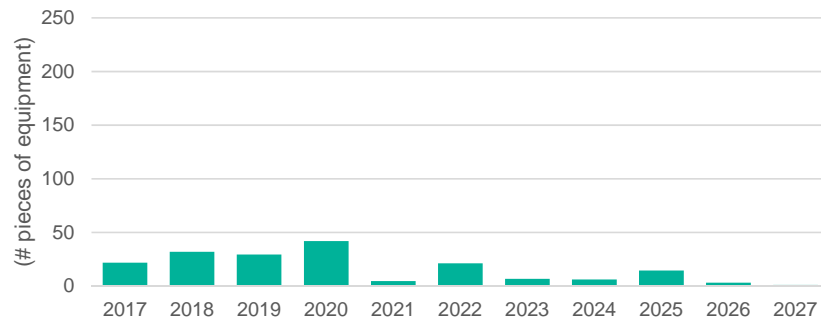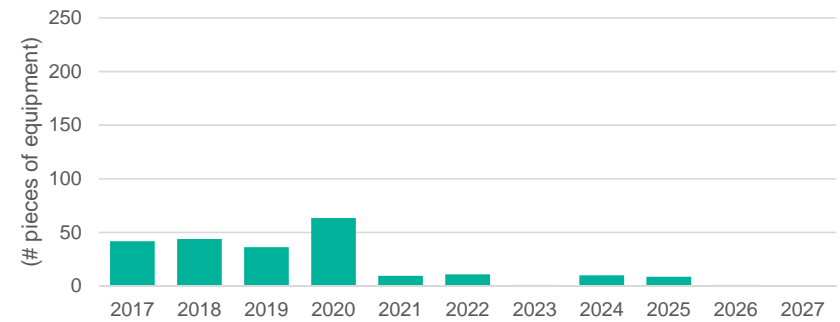
* The 2017 spike in remote studios is driven by WIPR-TV's purchase of 200 Strand Studio lights.

TV Production & Post: Average Age at Expected Replacement, by Grantee Size
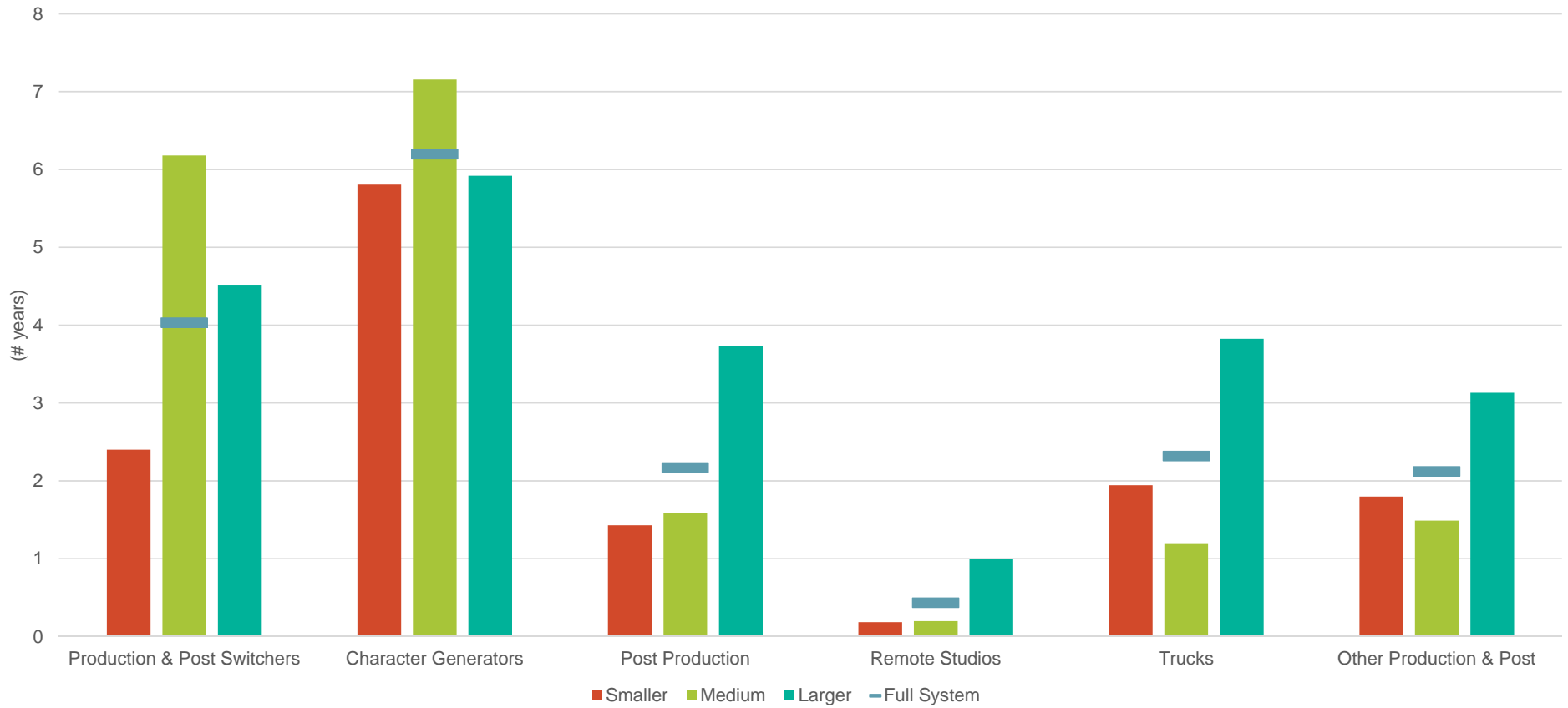
(# years)

Legend: Smaller, Medium, Larger, Full System

Categories: Production & Post Switchers, Character Generators, Post Production, Remote Studios, Trucks, Other Production & Post

TV Production & Post: Average Age at Expected Replacement by Licensee Type

Switchers & Character Generators

Adobe · Avid · Apple · Grass Valley/Thompson · Other

Cameras

Sony · Ikegami · Panasonic · Grass Valley/Thompson · JVC · Canon · Other · Hitachi

Remote Studios

- Other
- Sony
- Ross
- Grass Valley/Thompson
- Harris
- Chyron

Trucks

- Other
- Leitch
- Grass Valley/Thomson
- Sony
- Miranda
- Ross Video
- Chyron
- Harris
- Panasonic
- Tandberg
- Nvision
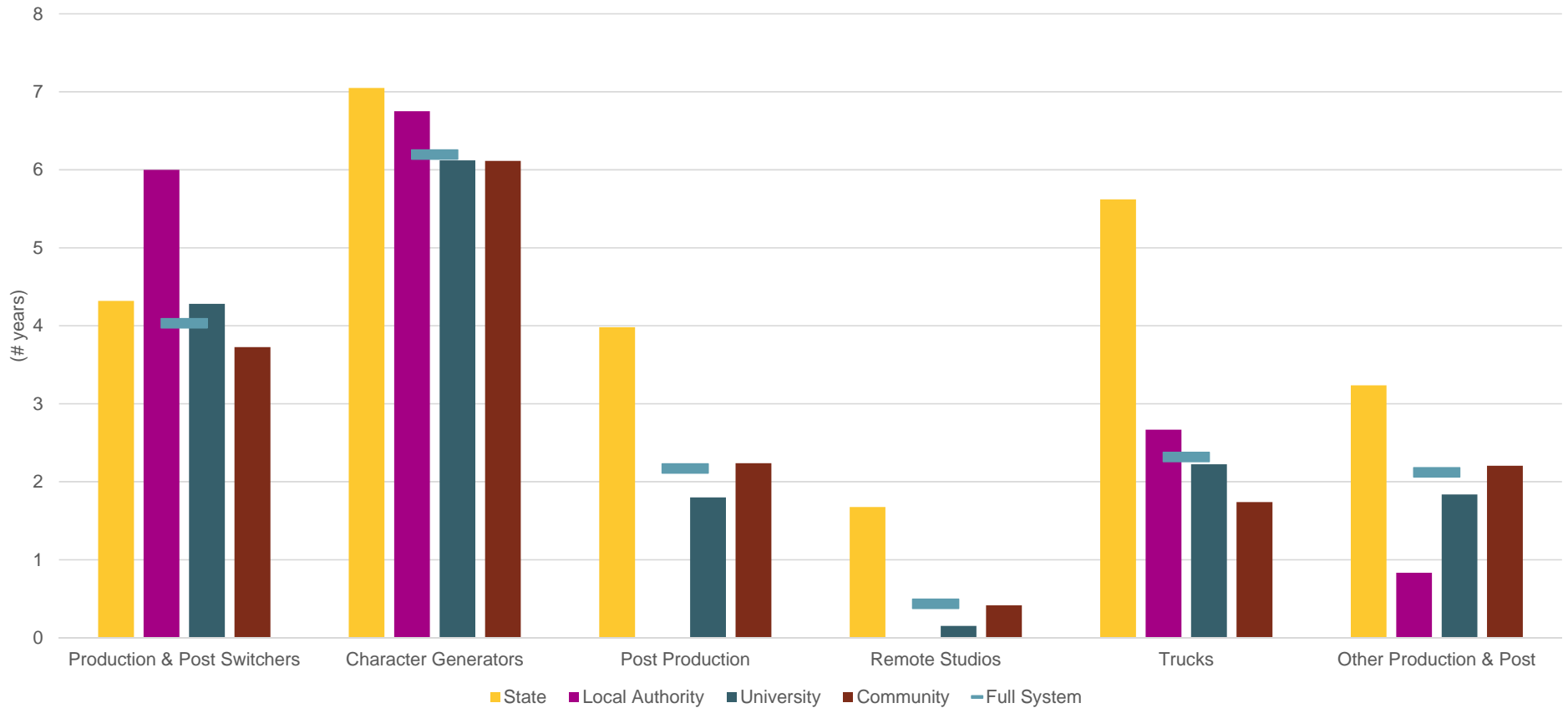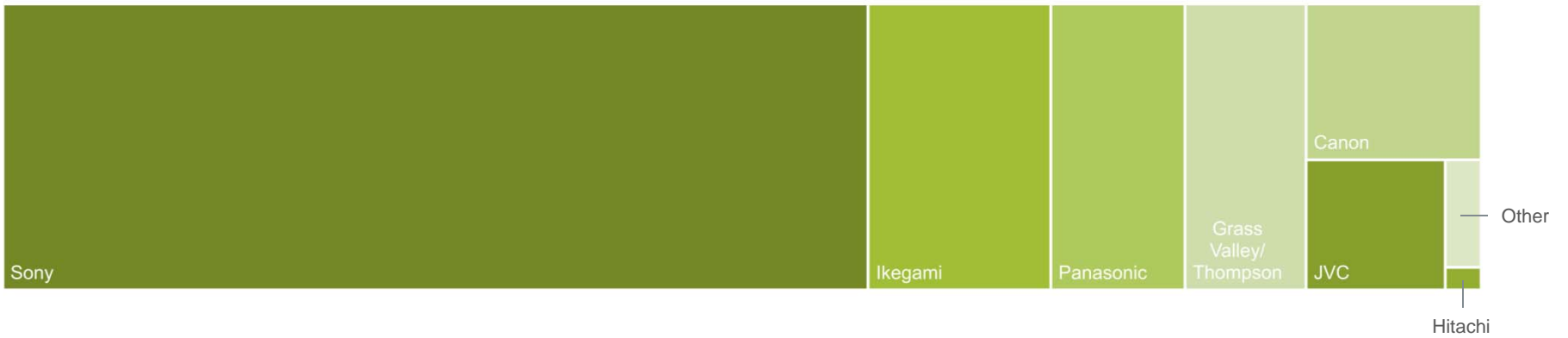
TV Traffic & Scheduling: Estimated Capital and Operating Expense Needs 2017-2020
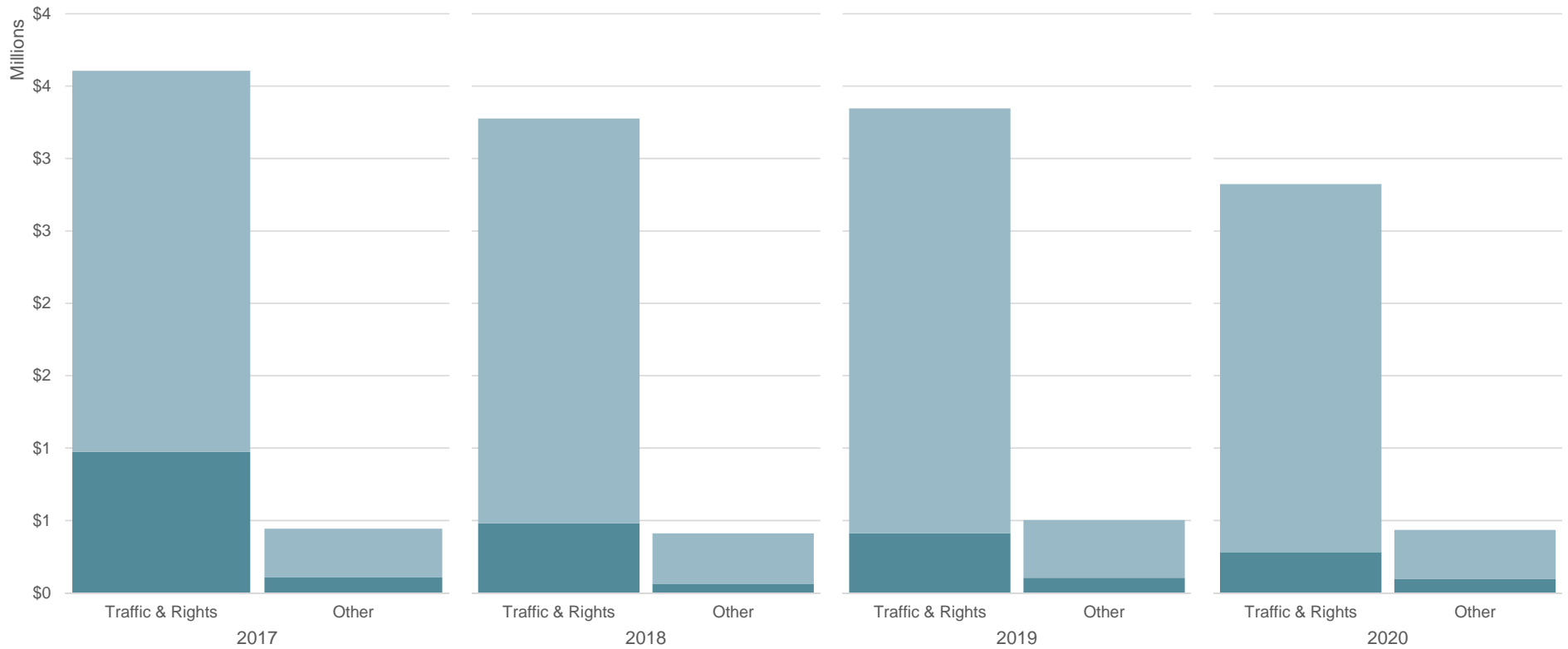
Capital Expenses   Operating Expenses

TV Traffic & Scheduling: Traffic & Rights Management Vendors and Approach

Vendors
97% of respondents use Myers Protrack (a few others use Broadview or Proconsultant Informatique) for Traffic Management

Approach
88% of respondents indicate that their rights management is included in their traffic management solution

TV Master Control & Operations: Estimated Capital and Operating Expense Needs 2017-2020
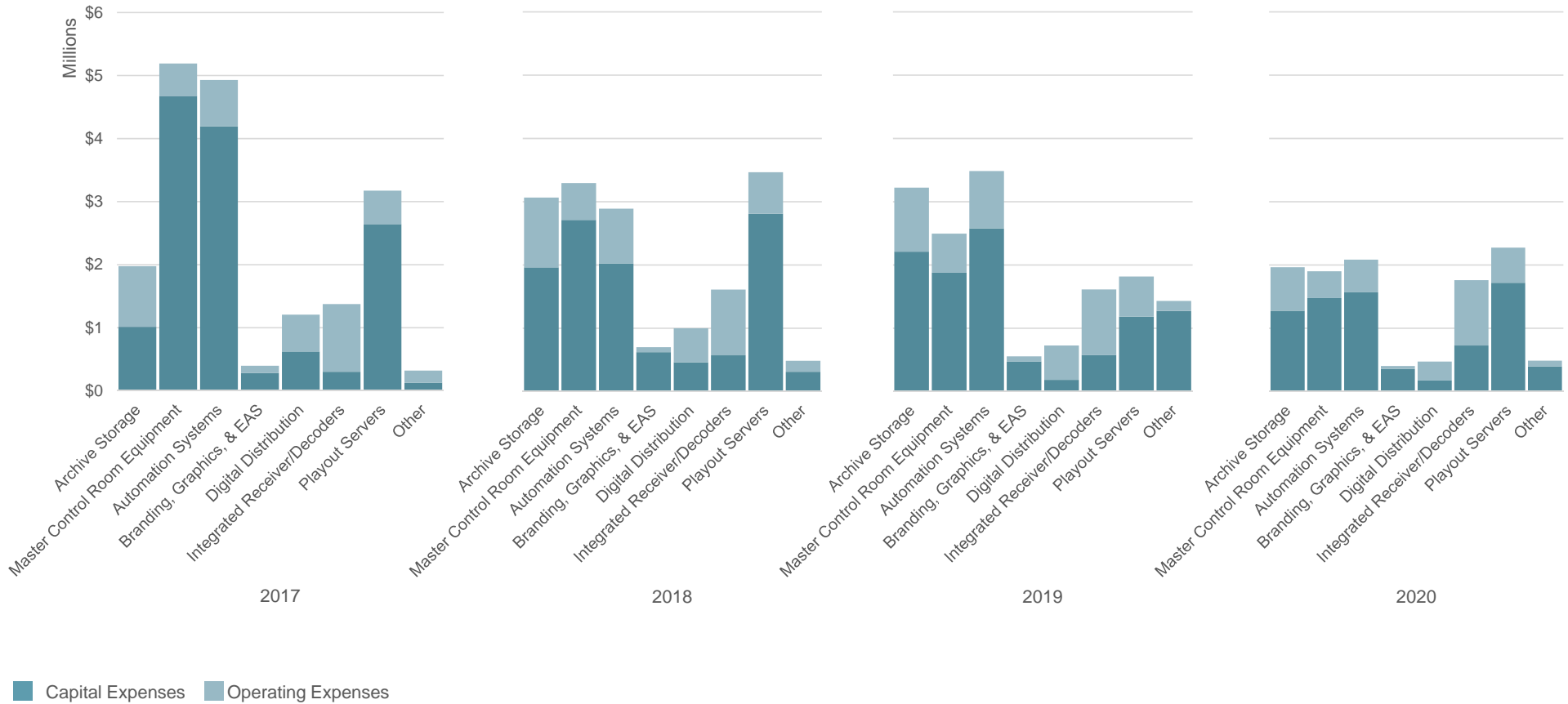
TV Master Control and Operations: Anticipated Number of Replacements 2017-2027
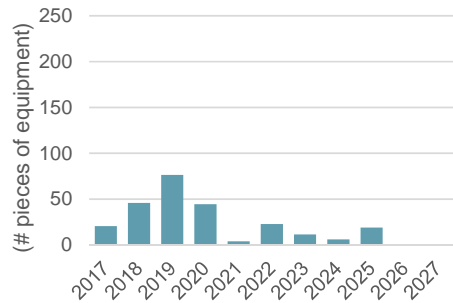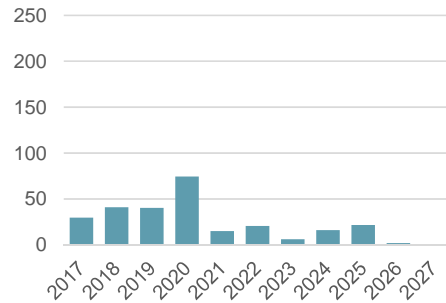
TV Master Control and Operations: Average Age at Expected Replacement, by Grantee Size

(# years)

Legend: Smaller, Medium, Larger, Full System

Categories: Station-Specific Integrated Reciever/Decoders, Automation Systems, Archive Storage, Master Control Room Switchers, A/V Monitors & Other Control Room Equipment, Playout Servers, Branding, Graphics, & EAS, Other Master Control & Operations

TV Master Control and Operations: Average Age at Expected Replacement, by Licensee Type

(# years)

State | Local Authority | University | Community | Full System
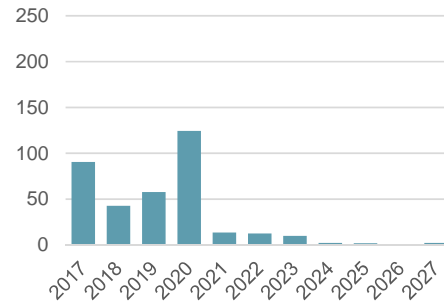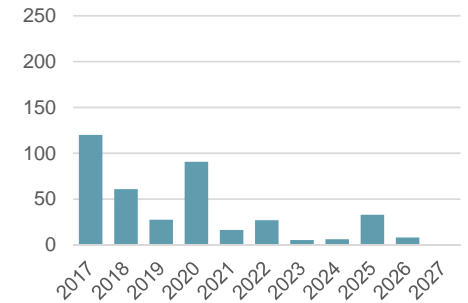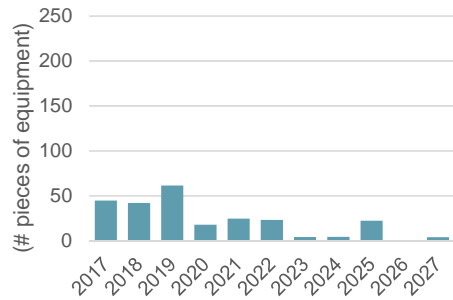
Station-Specific Integrated Reciever/Decoders, Automation Systems, Archive Storage, Master Control Room Switchers, A/V Monitors & Other Control Room Equipment, Playout Servers, Branding, Graphics, & EAS, Other Master Control & Operations
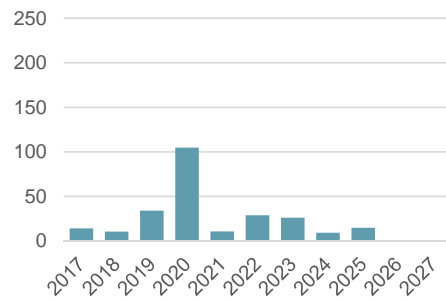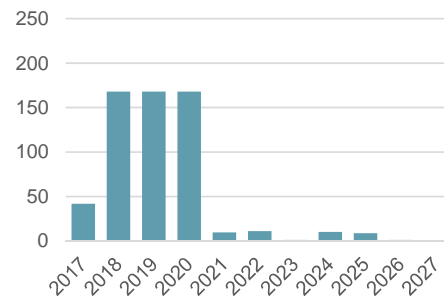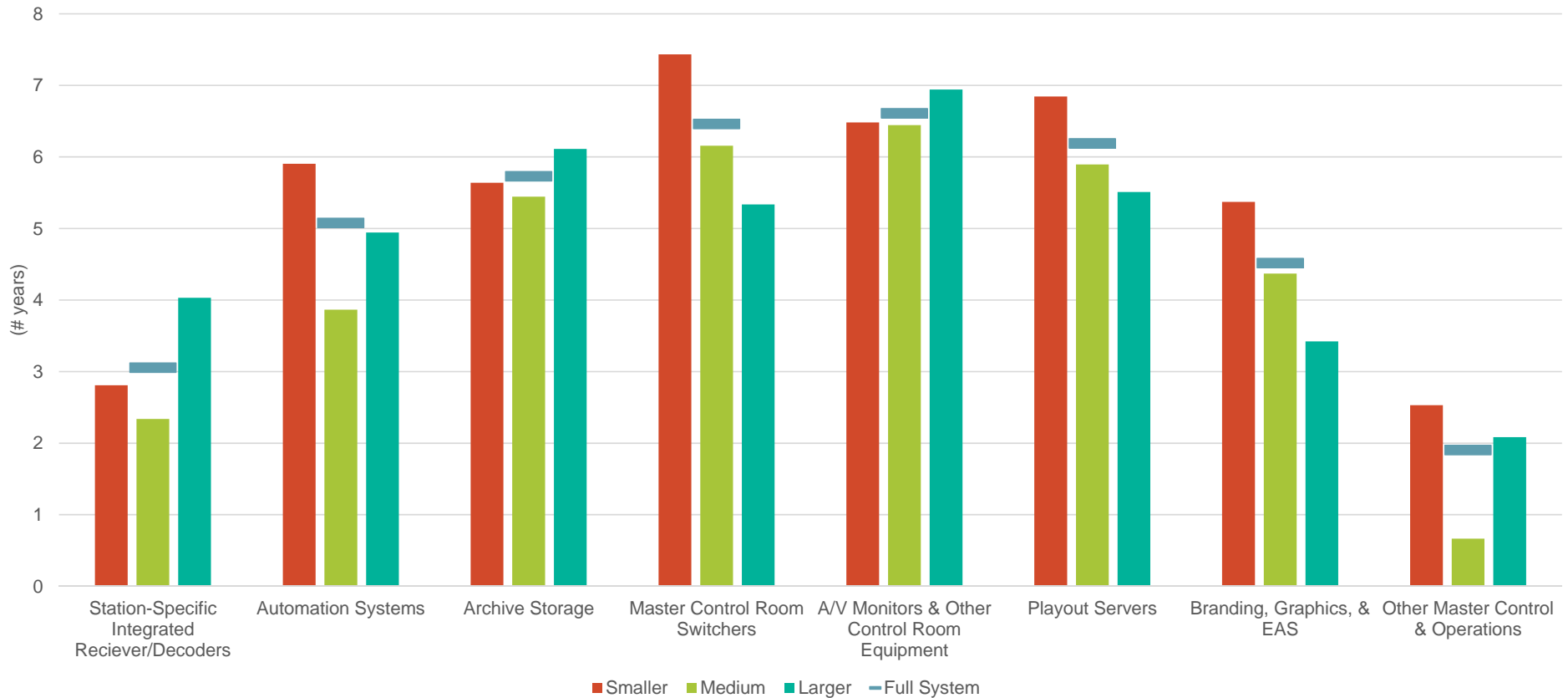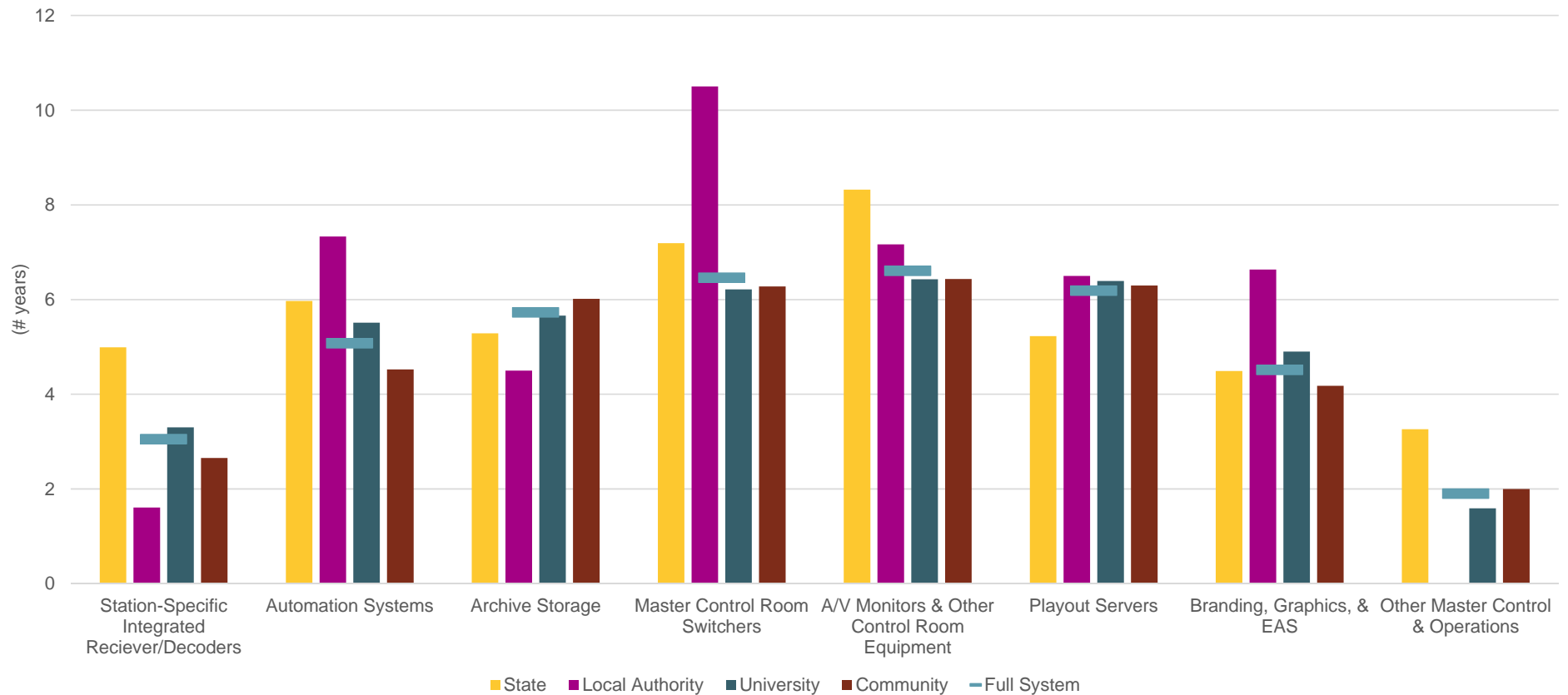
TV Master Control and Operations: Vendors

Integrated Receiver/ Decoders (IRD) Vendors	Branding, Graphics, & EAS Vendors	Third Party Digital Distribution Vendors
Adtec	Adobe	Alaska Communications
Ateme	Avid	Amazon
Bitlink	Broadstream	Brightcove
Cinegy	Chyron	CenturyLink
Cisco	DASDEC	Comcast
DirectTV	Digital Alert Systems	COVE
Dish Network	DTP	Digital Convergence Alliance
DVB	Evertz	DirecTV
Ericson	Gorman Redlidge	DishTV
Fujitsu	GrassValley/Thompson	Facebook
General Instrument	Harmonic	Fastserve
Harmonic	Omneon	Google
Heartland Video Systems	Harris	Live Stream
Imagine	Imagine Communications	OPB
Immedia	Leitch	OVEE
Live Time Net	Miranda	PBS
LTN	Monroe	Spectrum
Motorola	Orad	TVW
NHK	PIxel Power	Ustream
Power Vu	RGB Networks	U-Vault
Sencore	Ross Video	Verizon
Tandberg	Sage	Westelcom
UpCom	TFT	WHRO
	Utah	Wowza
	Utah Scientific	YouTube
	VizRT	

* Denotes major vendor

TV RF Broadcast: Estimated Capital and Operating Expense Needs 2017-2020

Capital Expenses ■ Operating Expenses
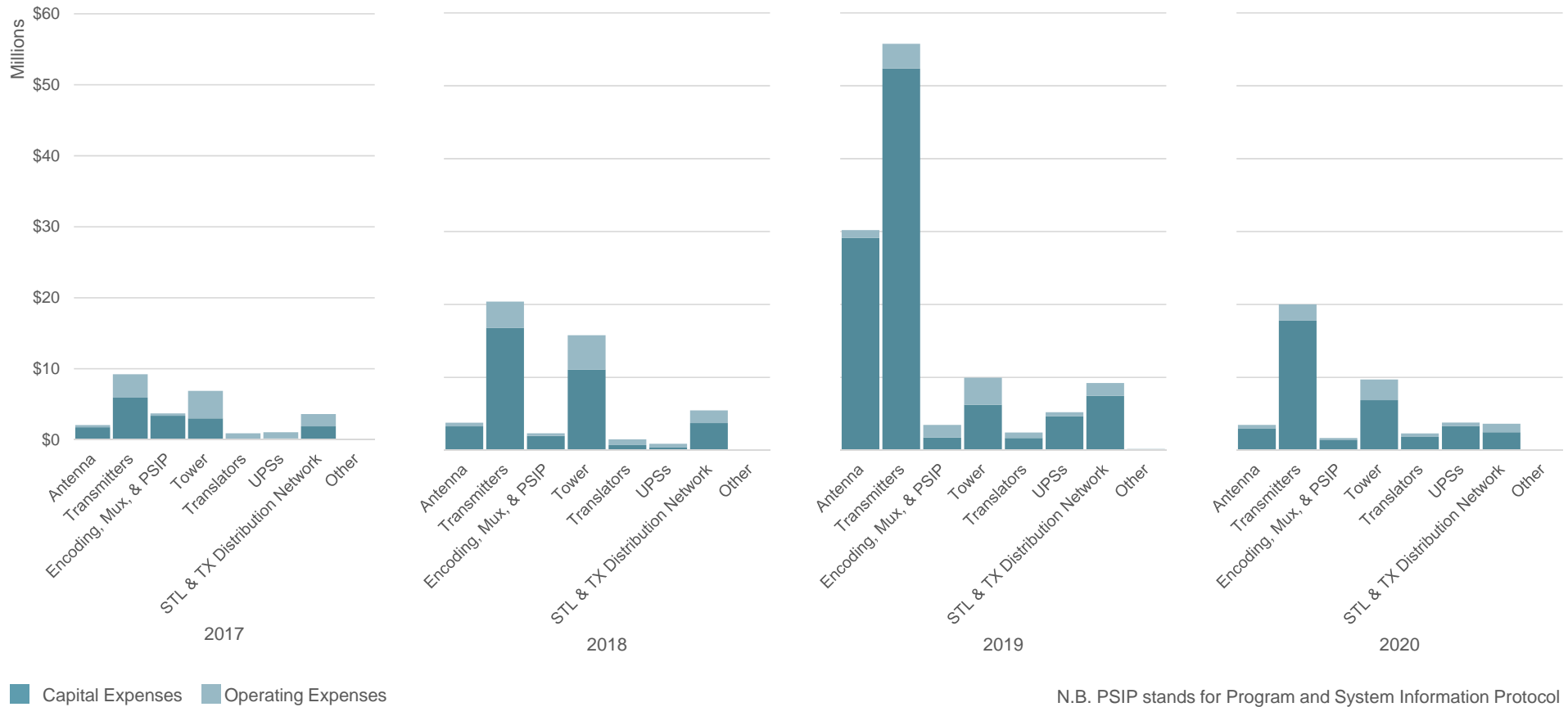
N.B. PSIP stands for Program and System Information Protocol
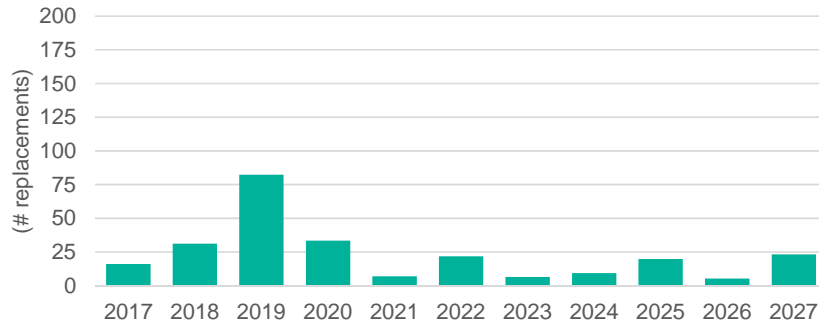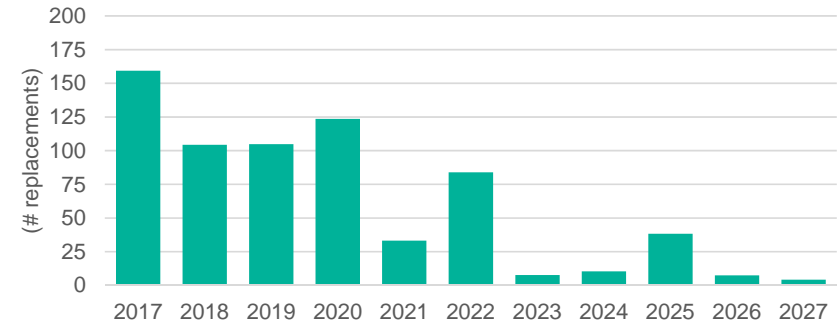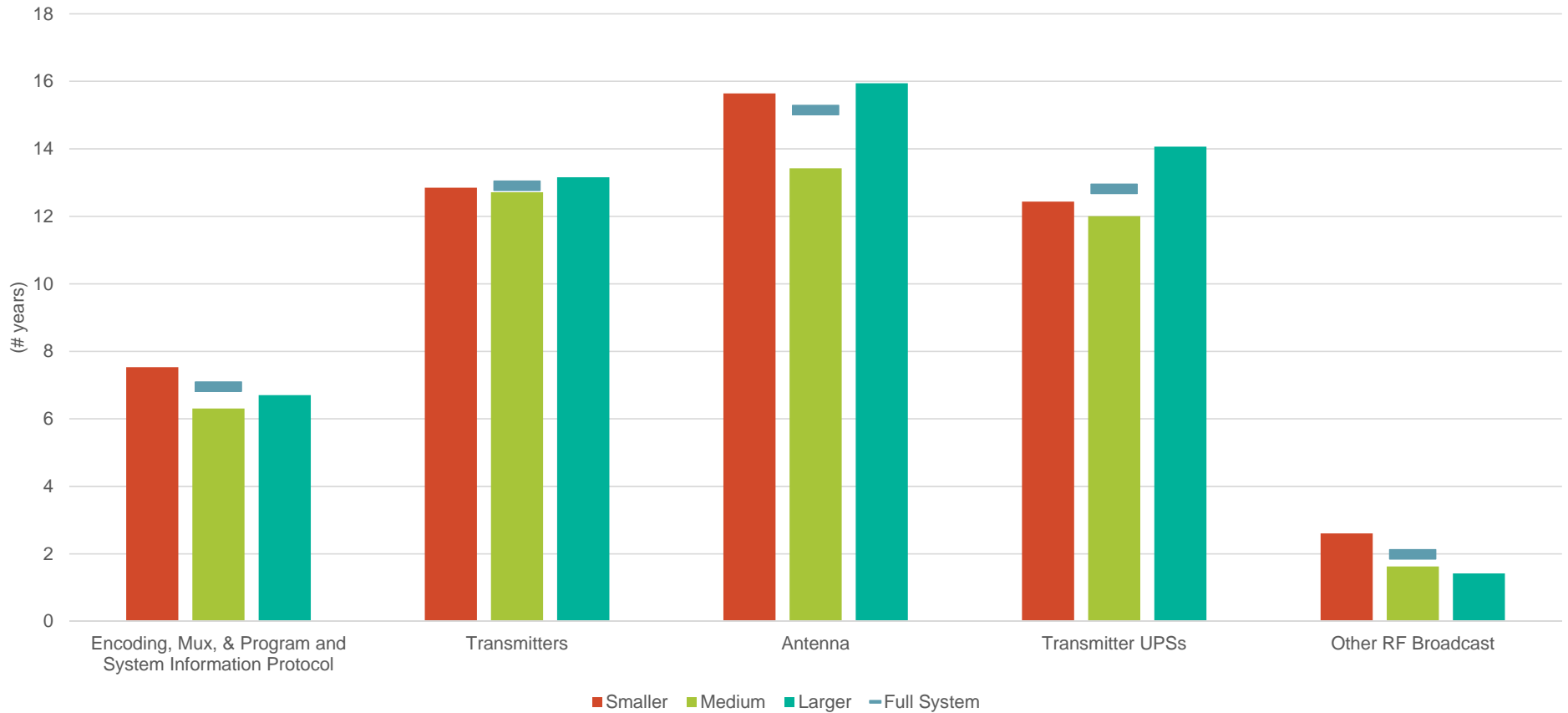
Antennas

UPSs
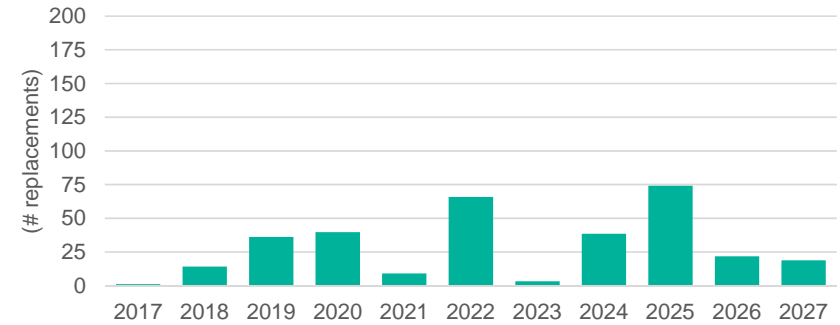
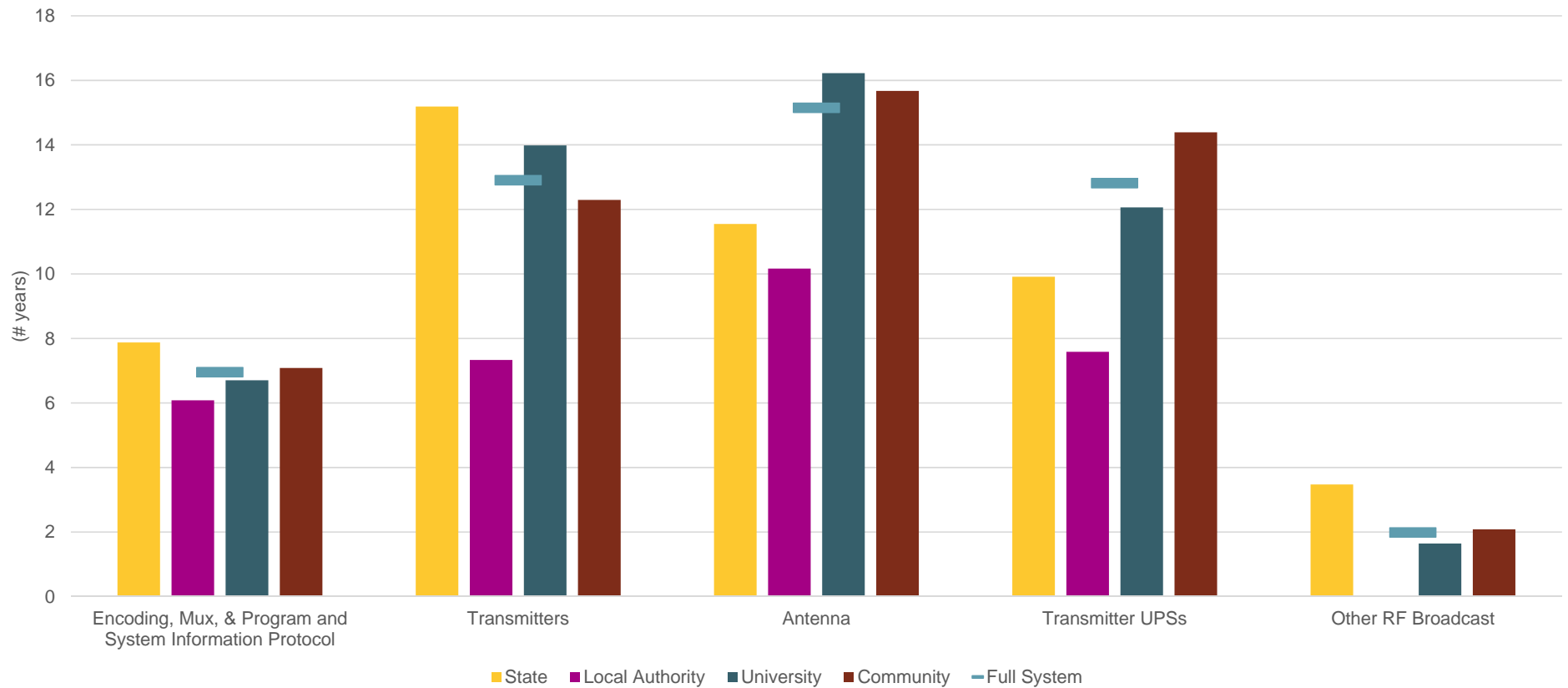**Transmitters**
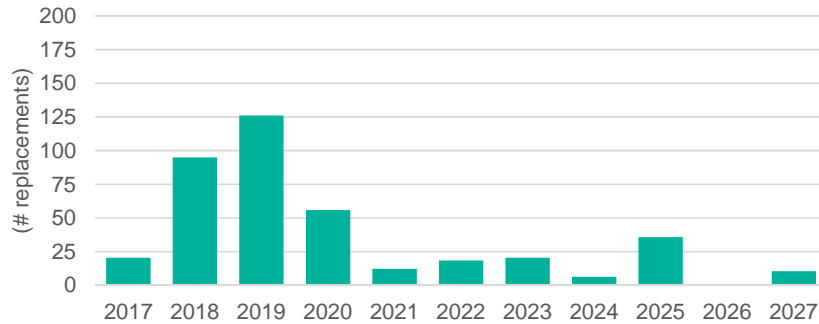
Encoding, Mux, & PSIP

TV RF Broadcast: Average Age at Expected Replacement, by Grantee Size

TV RF Broadcast: Average age at Expected Replacement, by Licensee Type

TV RF Broadcast: Vendors

Antenna Vendors		Transmitters Vendors	STL Vendors	
ADC	RCA	ABS/ATS	Acatel	IMT Microwave
Advance	RFS	ADC Axcera	Adaptive Broadband	Integrated Microwave Technologies
Alan Dick	Rohn	American Technical Services	Alcatel	Larcan
Alive Telcom	Saber	Anywave	Alcatel / Nokia	Level 3 fiber
Allen-Dick/Andrews	Scala	Axcera	Allen Communications	MA
American Tower	Skilling	Comark	Artel	**MCR**
AND	SPX Dielectric	Comark Hitachi	Cambium	Microwave Associates
Andrew	Stainless	Continental	Centralcast JMCO	Microwave Networks
Andrew / AB Dick	Tower Structures	Dialectric	Ceragon	**Microwave Radio**
Antenna Concepts	Trane	Gates	Charter Spectrum Fiber	**Moseley**
BOG	Truscon	Gates Air	Comcast	Motorola
Bogner	Valmont	Harris	DAR	MCR
Dielectric		Hitachi Comark	Dektec	NEC microwave
Dresser		Larcan	Ericsson	Nevion
Electronics Research Inc. (ERI)		Linear	Eurotek	NuComm
General Electric		Rhode & Schwarz	Evertz	RF Central / Vitec
Gray Communications, Inc.		Rhodes and Schwartz	Exalt	Sencore
Harris		Tektronix	Exalt/Nevion	Sho-Me Technologies
Jampro		Thales	Fast Track Fiber	Telecast
Kathrein		Thalus	Force, Inc	The Switch
Kline		Thompson	Frontier	Thompson
Magnum		UBS Axcera	Georgia Public Web	Time Warner
MCI			Gline	Trango
Pirod			Grande Communications, Inc.	Twin Stream Mw
PSI			Harmonic	Verizon
Pyrod			Harris	Vislink
			IDS	

* Denotes major vendor

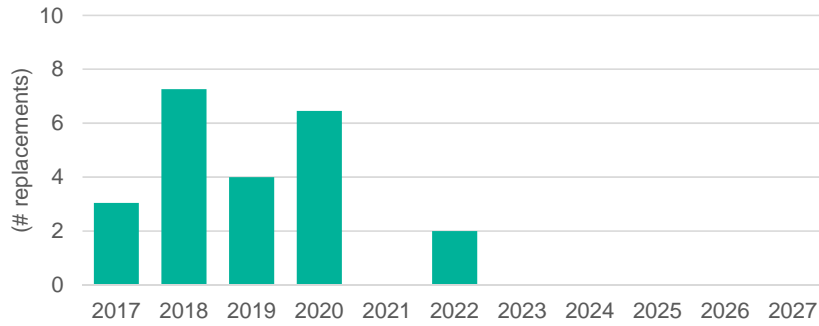# TV Common Infrastructure: Estimated Capital and Operating Expense Needs 2017-2020
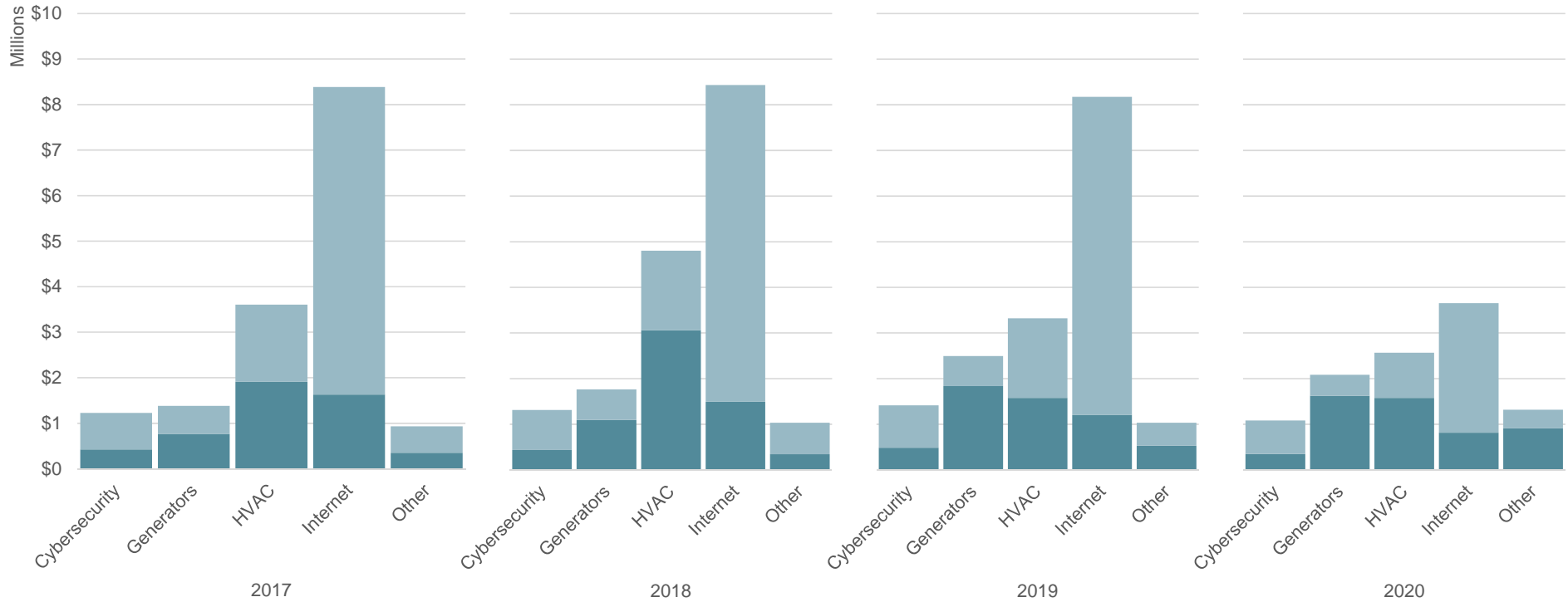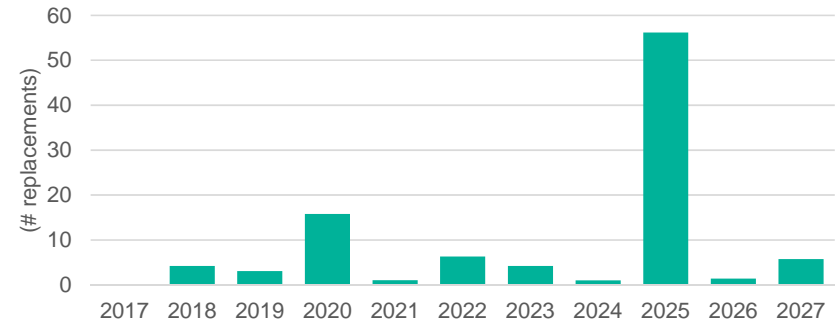
TV Common Infrastructure: Anticipated Replacements 2017-2027*
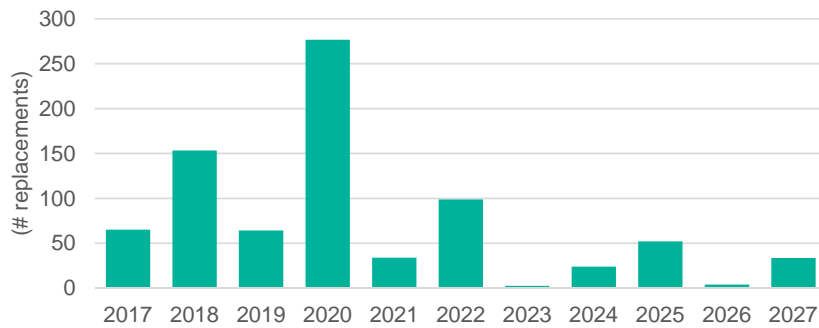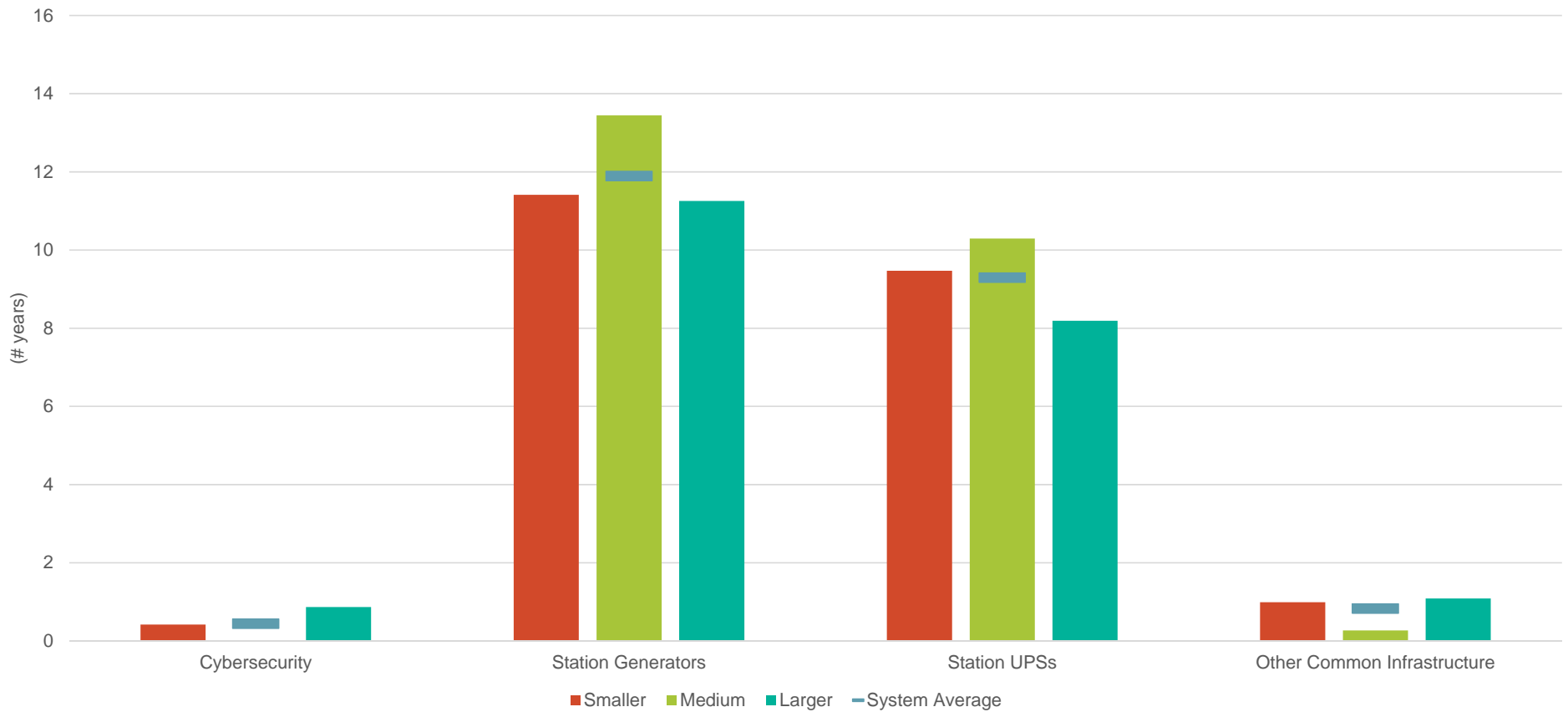
Cyber

Generators

UPSs

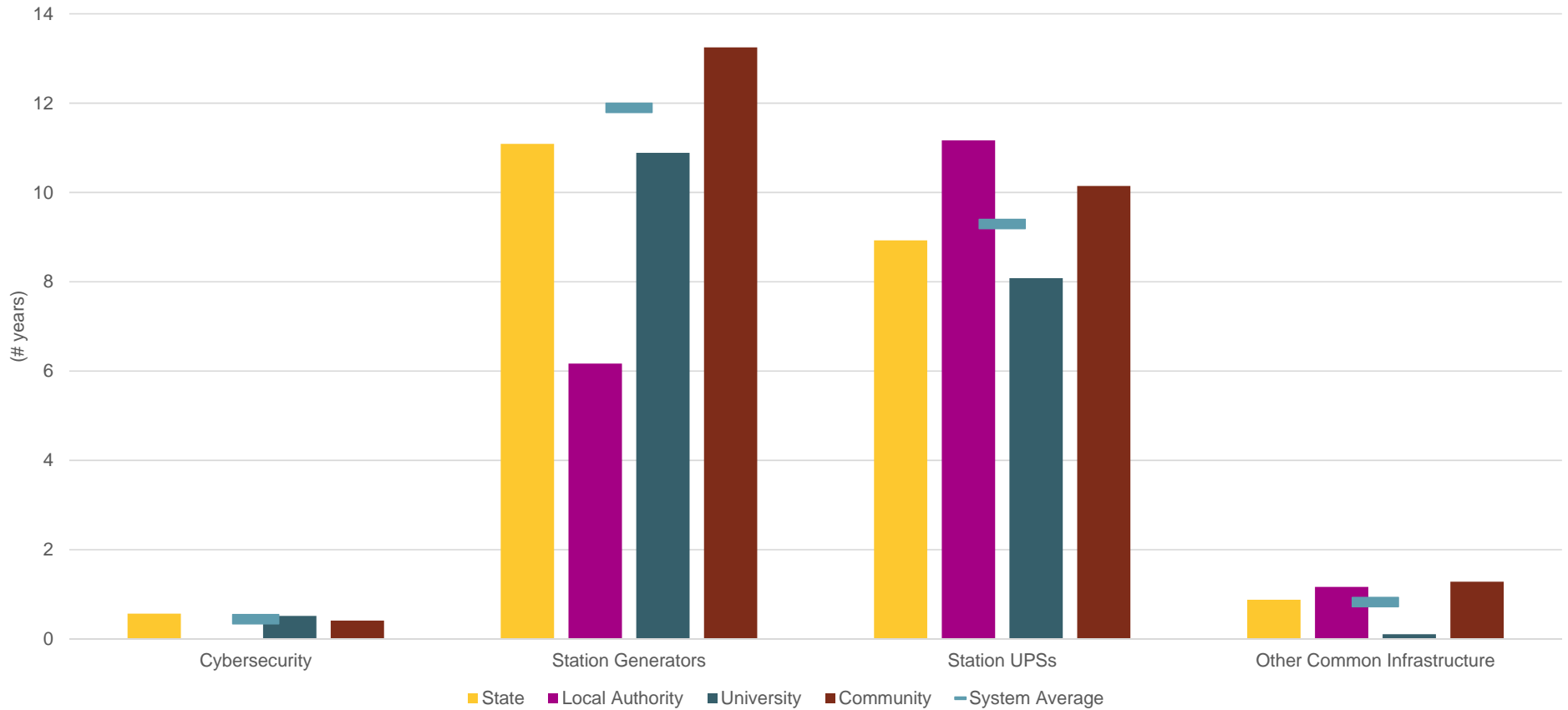*Scales are intentionally different in the graphs.

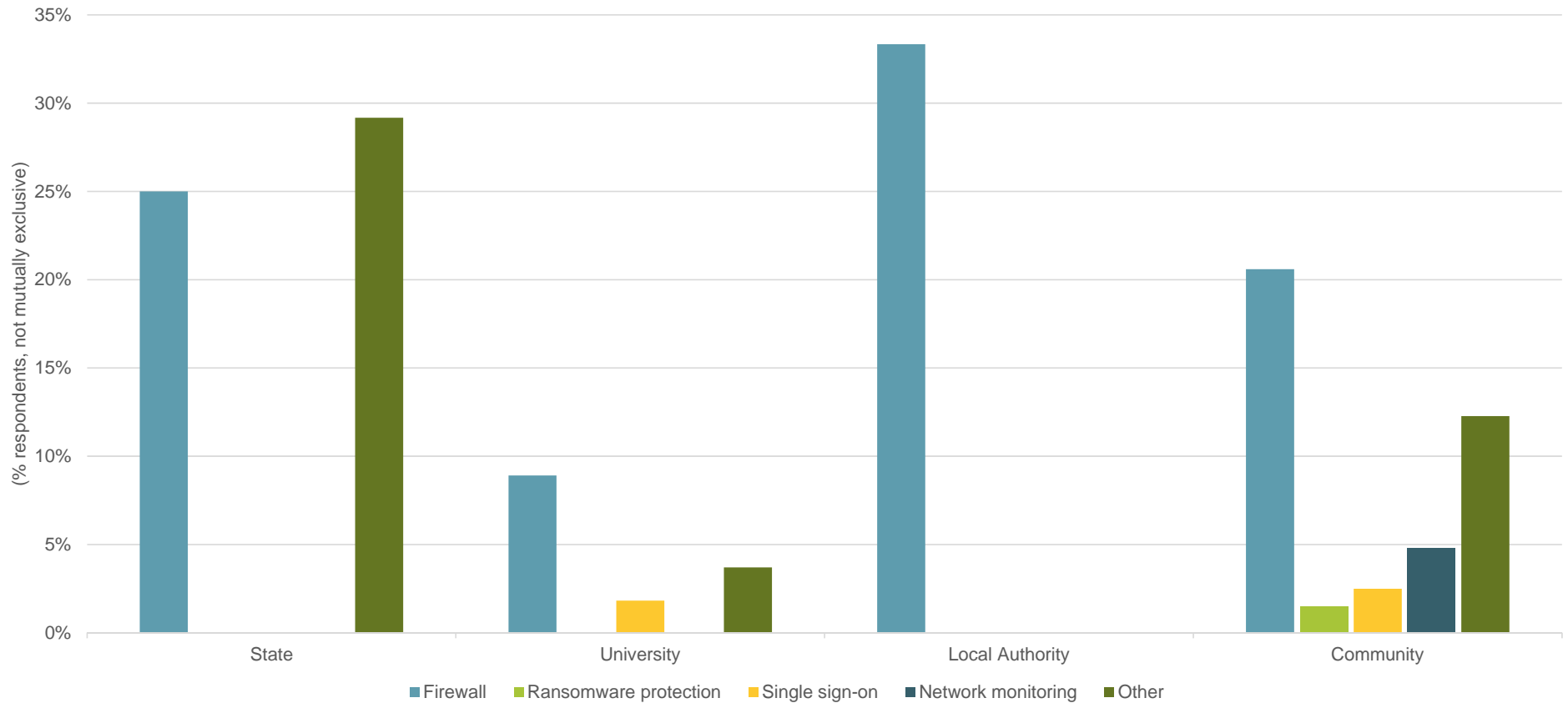# TV Common Infrastructure: Average Age at Expected Replacement by Grantee Size

TV Common Infrastructure: Average Age at Expected Replacement by Licensee Type

(# years)

Legend: State, Local Authority, University, Community, System Average

Categories: Cybersecurity, Station Generators, Station UPSs, Other Common Infrastructure

TV Common Infrastructure: Cybersecurity solutions, by Licensee Type

(% respondents, not mutually exclusive)

Legend: ■ Firewall ■ Ransomware protection ■ Single sign-on ■ Network monitoring ■ Other

Categories: State, University, Local Authority, Community

TV Common Infrastructure: Cybersecurity vendors

Cybersecurity Vendors	
Applied Trust	Norton
Astaro	Okta
BAE Systems	Qualsys
Checkpoint	Raytheon
Cisco	Service
Cloud Watcher	Sky High
Dell	SonicWall
Fortinet	Sophos
GFI	Splunk
Ideal Integrators	Symantec
i-Evolve Technology Services	Trustwave
Juniper	Watchguard
Malware	Webroot
MicroTik	
NetGate	

TV Joint Master Control: Interest in Joining a JMC

(% of those licensees that are allowed to join a JMC*)

- Do not intend to join: 40%
- Already joined: 40%
- Join in 0-2 years: 10%
- Join in 3-5 years: 4%
- Join in 6+ years: 6%
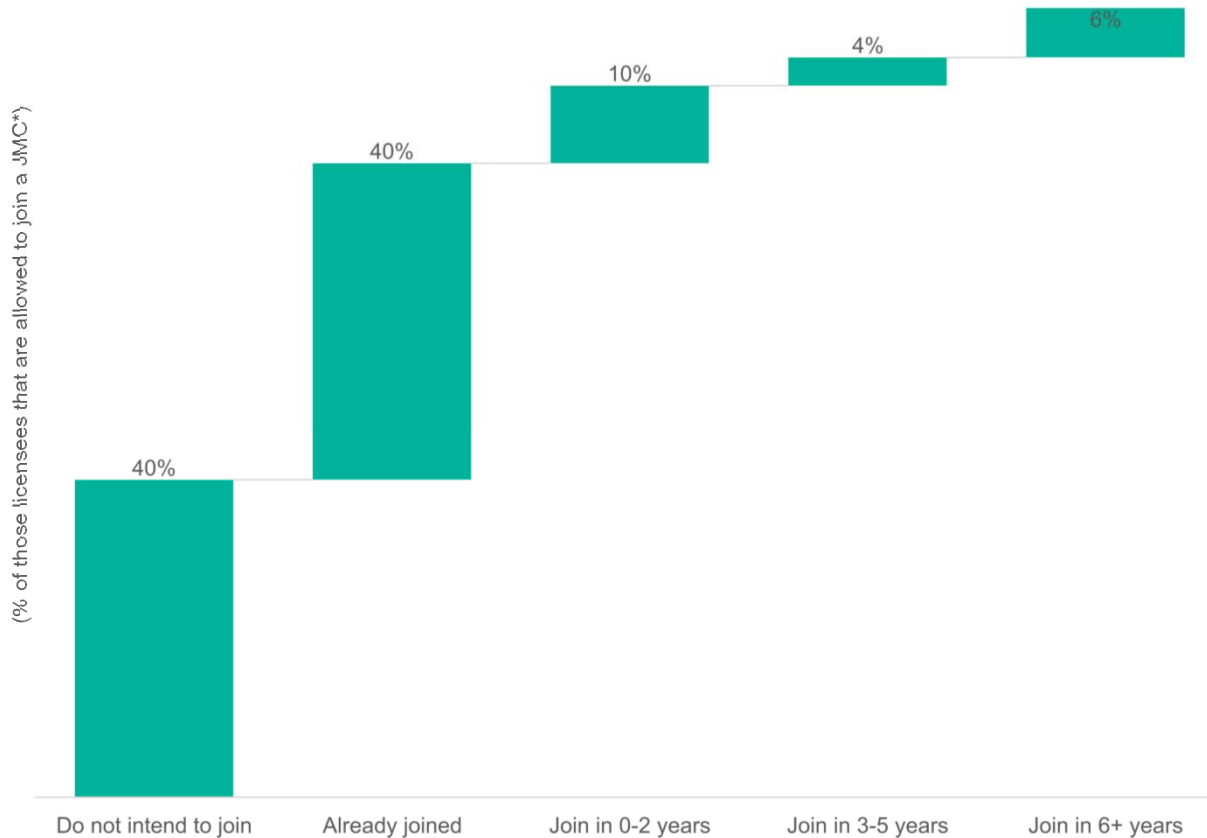
Definition

Joint Master Control (JMC), is defined as the combination of master control operations among several stations. JMCs may allow stations to reduce their operating costs by pooling ingest, automation, master control, and playout resources, and take advantage of the potential benefits of advanced automation and connectivity technology. JMC's can help stations to shift long-term capital expense spending to predictable recurring operating expense spending.
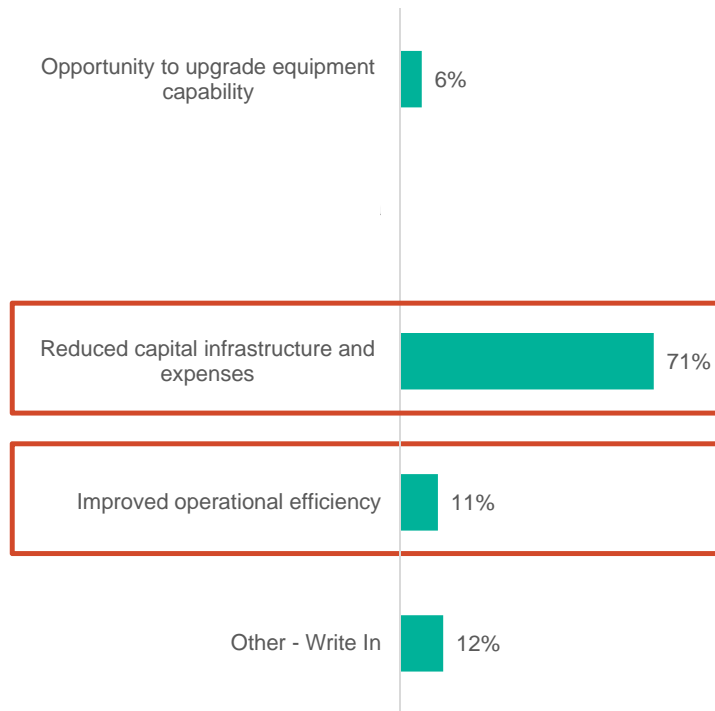
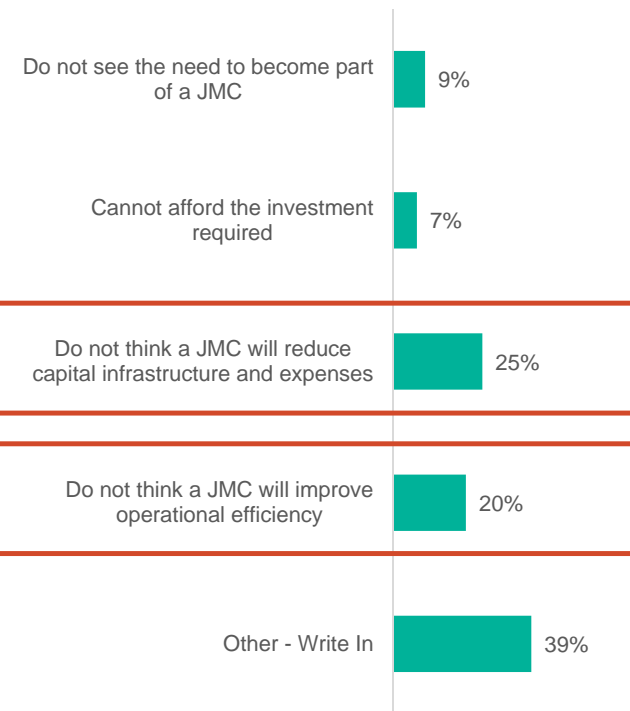*89% of public television stations are allowed to join a JMC by their governance

TV Joint Master Control: Motivations for and Against Joining JMCs

Why General Managers want to join JMCs, of those that have already or plan to join a JMC
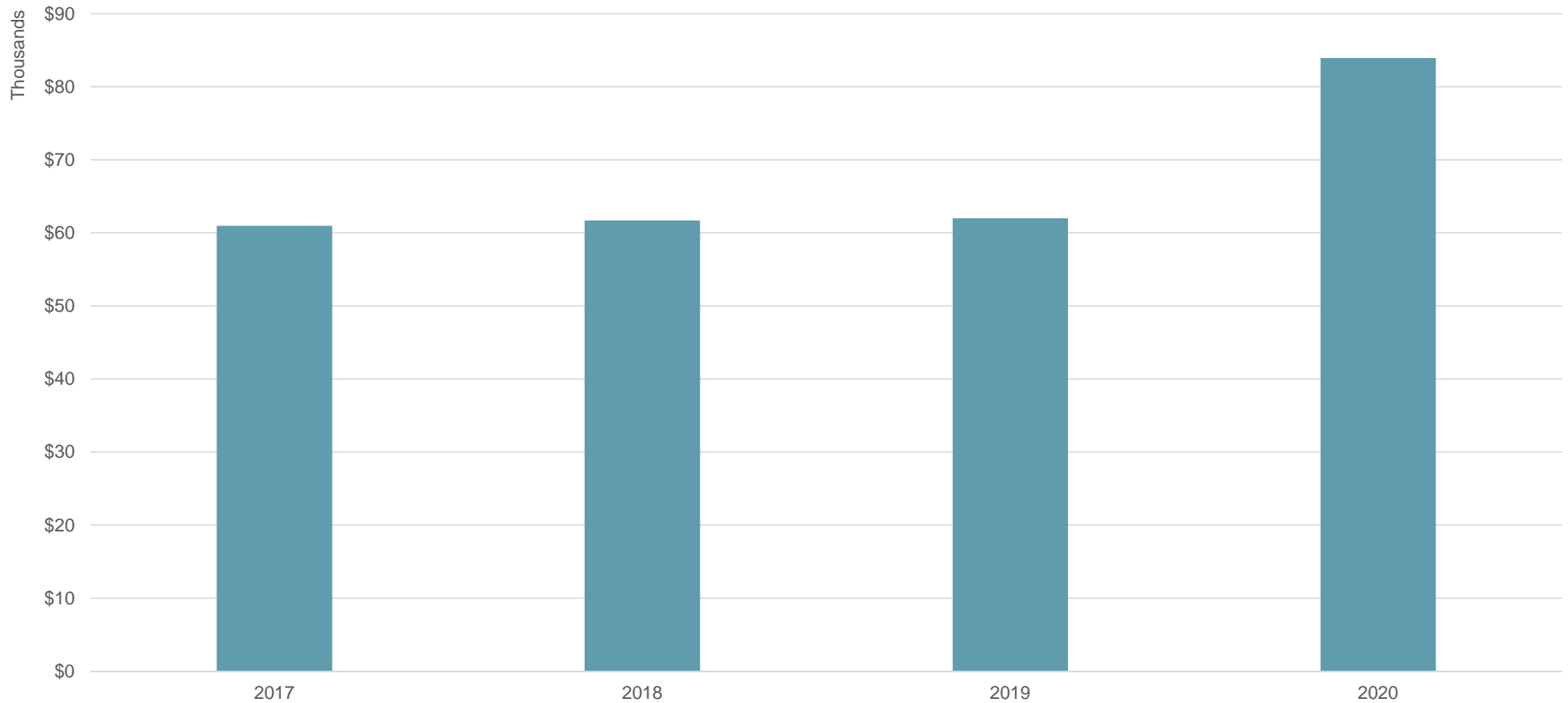(% of respondents)

Opportunity to upgrade equipment capability	6%
Reduced capital infrastructure and expenses	71%
Improved operational efficiency	11%
Other - Write In	12%

Why General Managers do not want to join JMCs, of those that do not plan to join a JMC
(% of respondents)

Do not see the need to become part of a JMC	9%
Cannot afford the investment required	7%
Do not think a JMC will reduce capital infrastructure and expenses	25%
Do not think a JMC will improve operational efficiency	20%
Other - Write In	39%

TV Joint Master Control: Weighted Average Annual Fees Per Licensee for JMC Membership

Radio Technology

# Radio Technology Survey Equipment Categories

| Production & Master Control	Traffic & Automation	RF Broadcast	Common Infrastructure
• Remote & Mobile Studios • Production Control Rooms • Digital Distribution • Other Production & Master Control	• Traffic Management & Scheduling • Metadata Management • Rights Management • Automation • Other Traffic & Automation	• Transmitters • STL & TX Distribution Network Translators • Other RF Broadcast	• Broadband Internet • Cybersecurity • HVAC • Station Generators and UPS • Other Common Infrastructure

All Radio Equipment: Estimated Capital and Operating Expense Needs 2017-2020

Legend: Capital Expenses, Operating Expenses
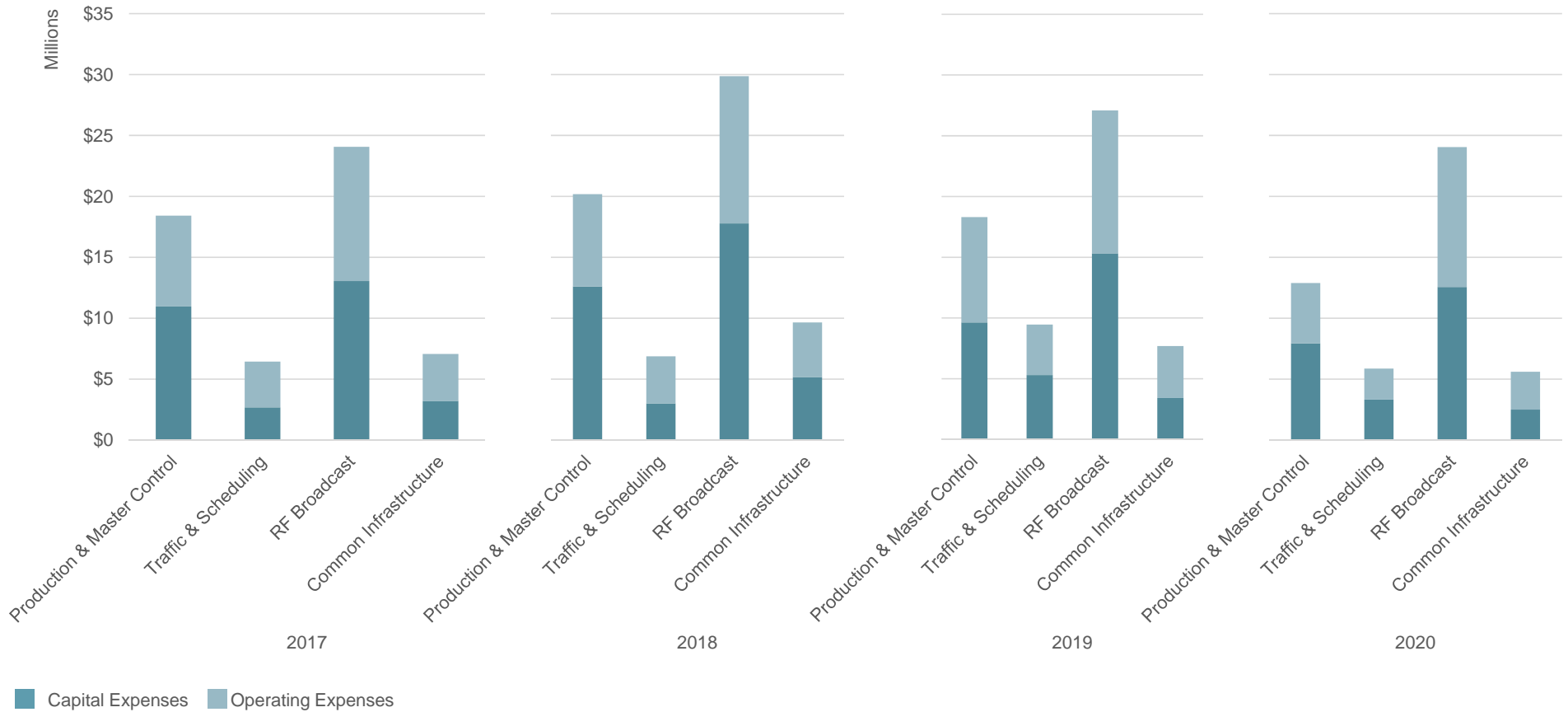
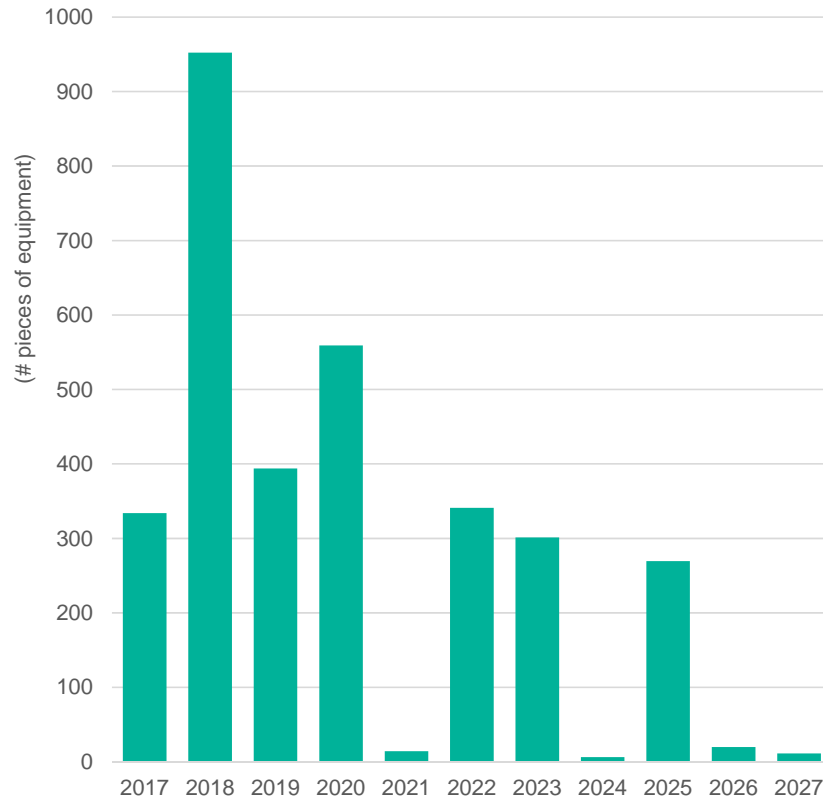Radio Production and Master Control: Estimated Capital and Operating Expense Needs 2017-2020
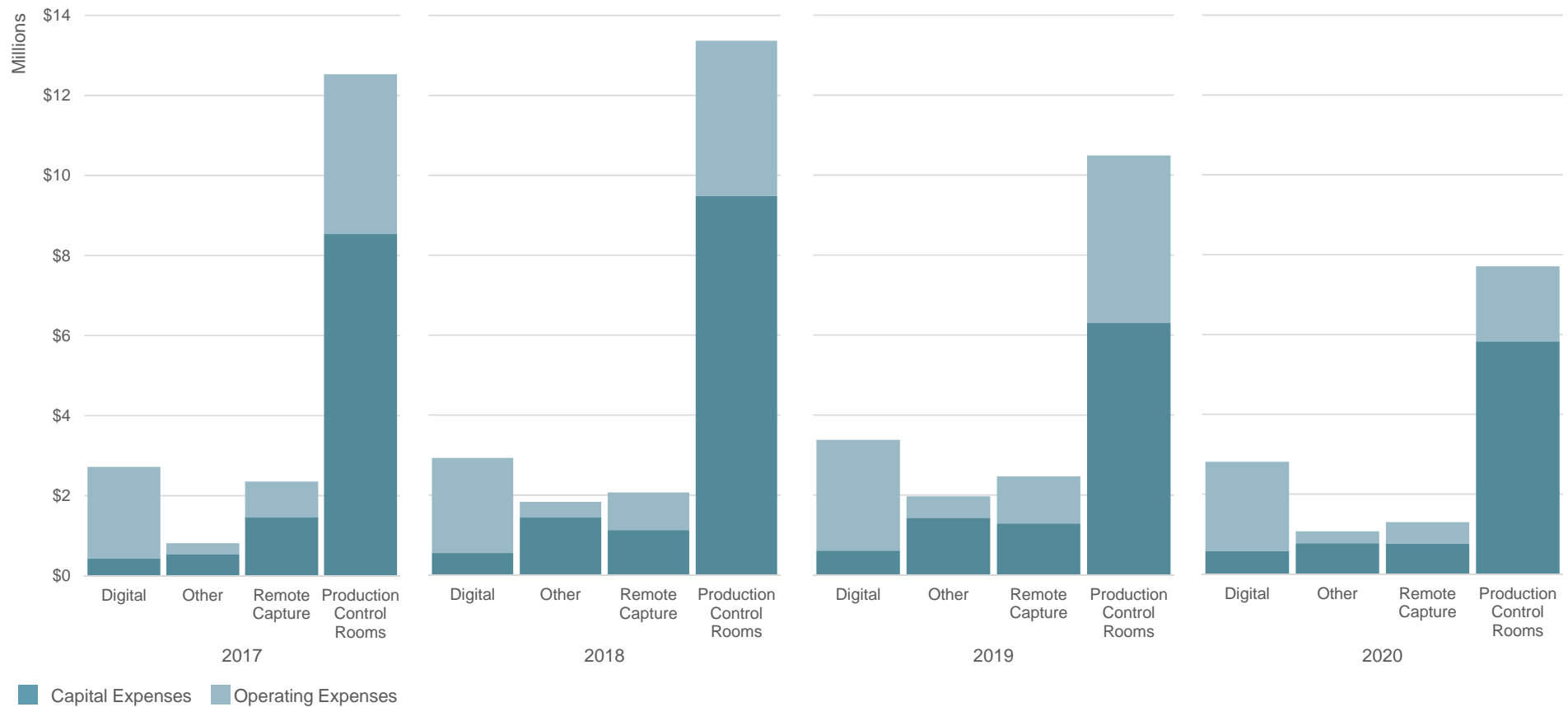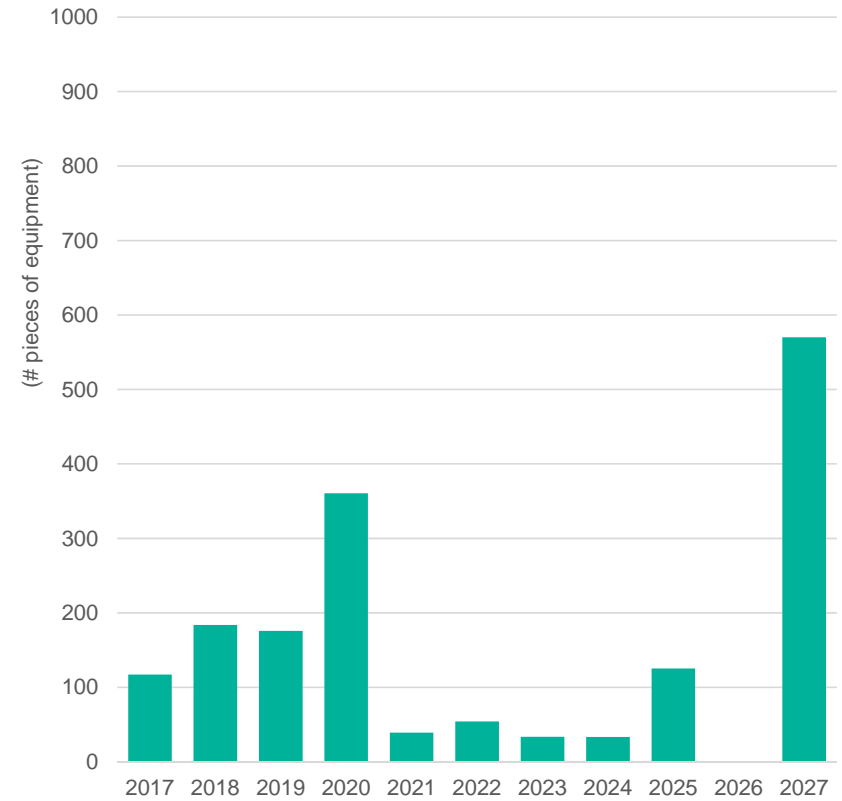
Radio Production and Master Control: Anticipated Replacements 2017-2027
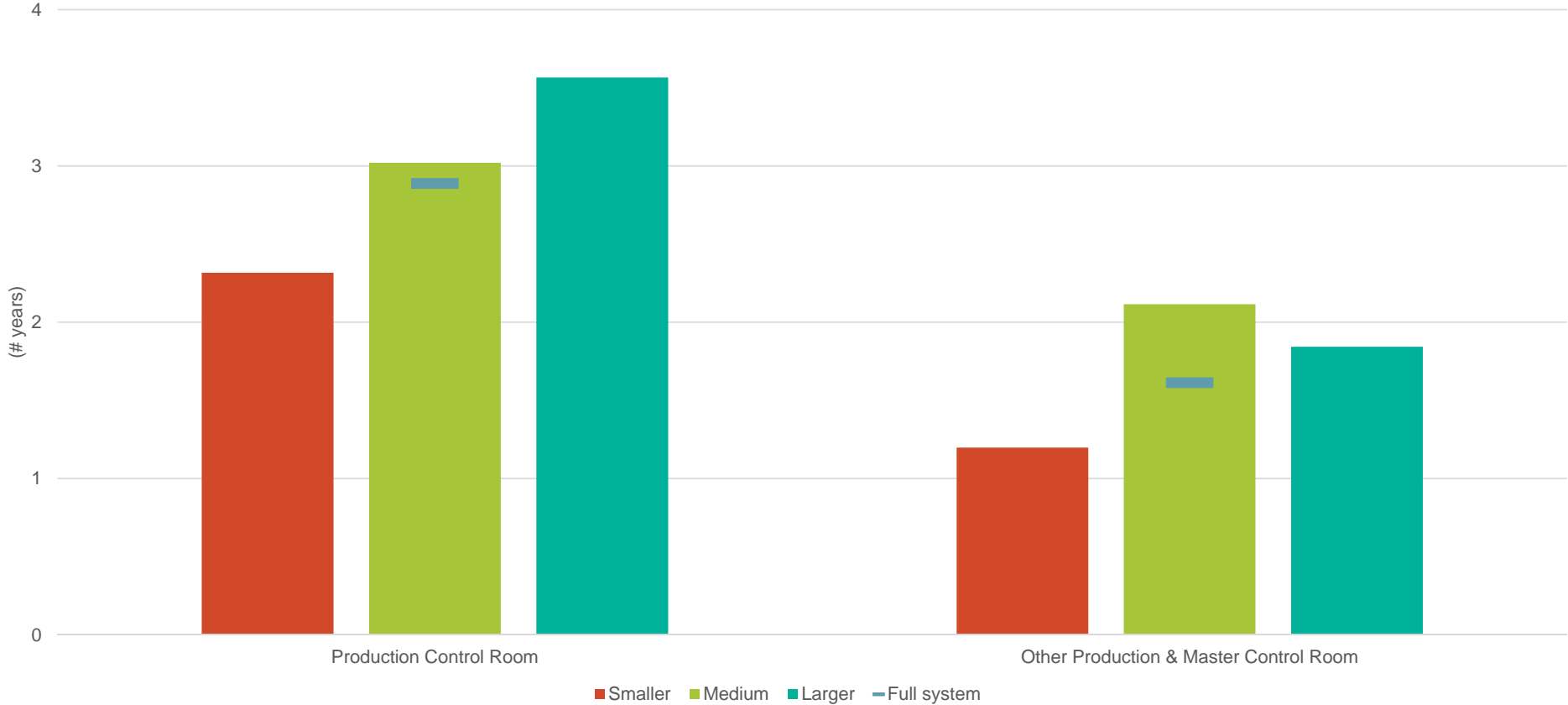
Production Control Rooms
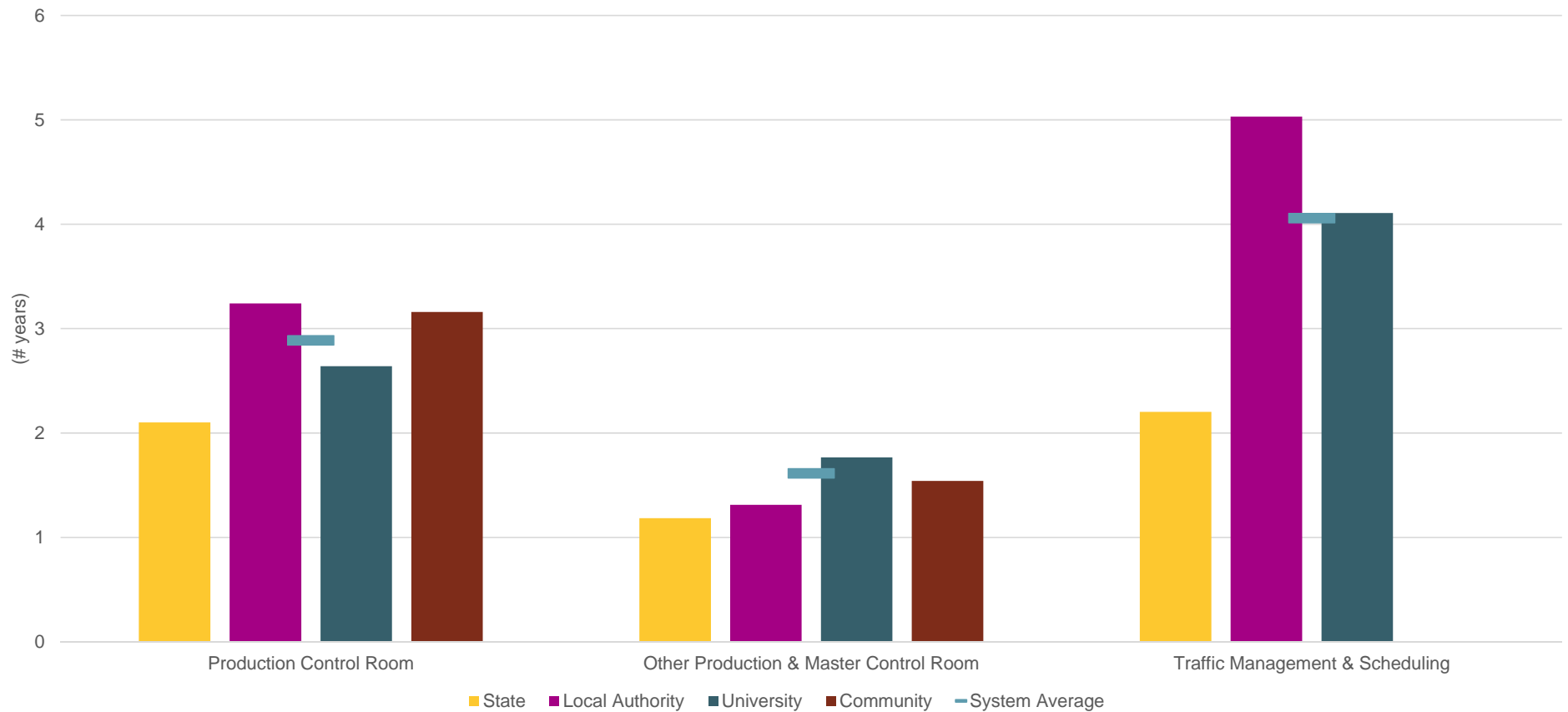
Remote & Mobile Studios

Radio Production and Master Control: Average Age at Expected Replacement by Grantee Size
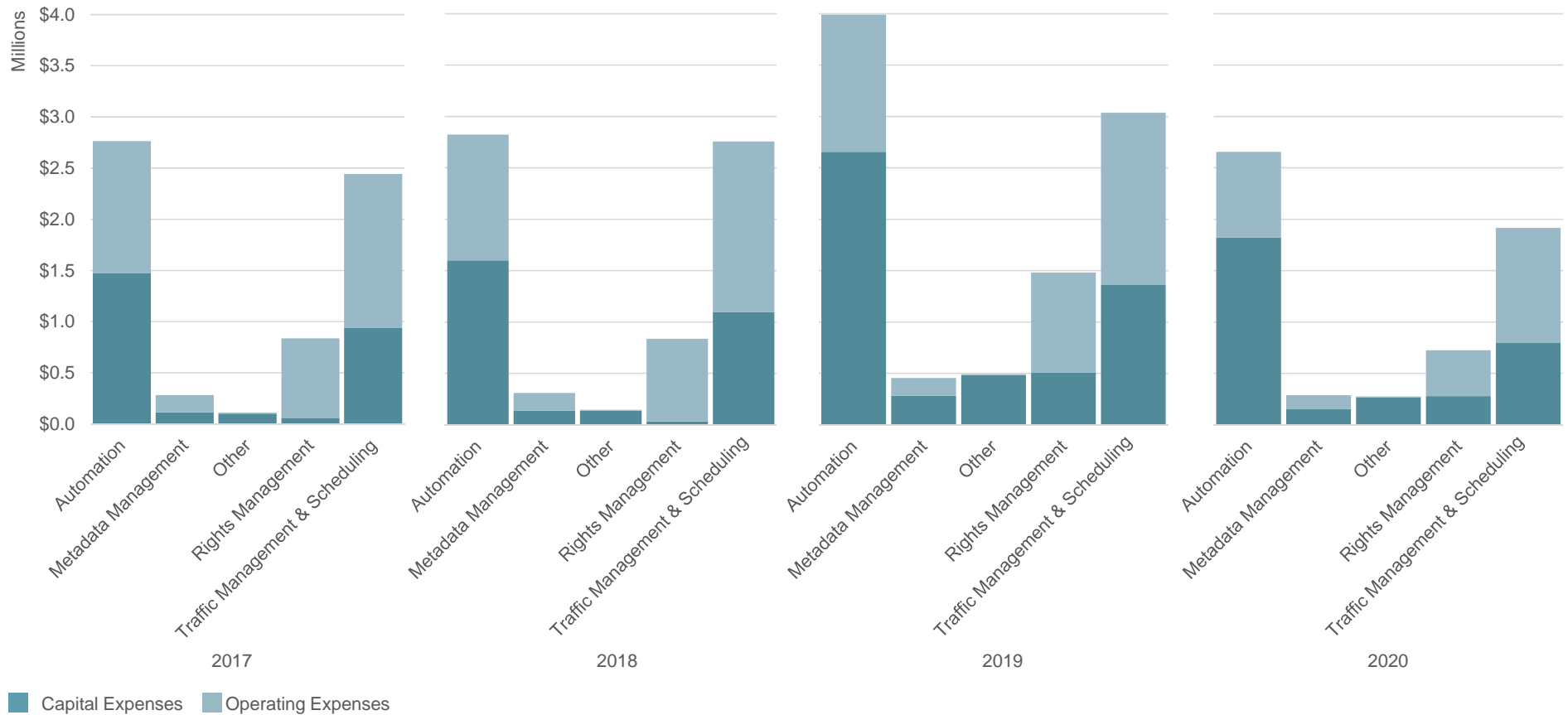
Radio Production and Master Control: Average Age at Expected Replacement by Licensee Type

Radio Traffic and Automation: Estimated Capital and Operating Expense Needs 2017-2020

Millions

$4.0
$3.5
$3.0
$2.5
$2.0
$1.5
$1.0
$0.5
$0.0

2017
Automation
Metadata Management
Other
Rights Management
Traffic Management & Scheduling

2018
Automation
Metadata Management
Other
Rights Management
Traffic Management & Scheduling

2019
Automation
Metadata Management
Other
Rights Management
Traffic Management & Scheduling

2020
Automation
Metadata Management
Other
Rights Management
Traffic Management & Scheduling

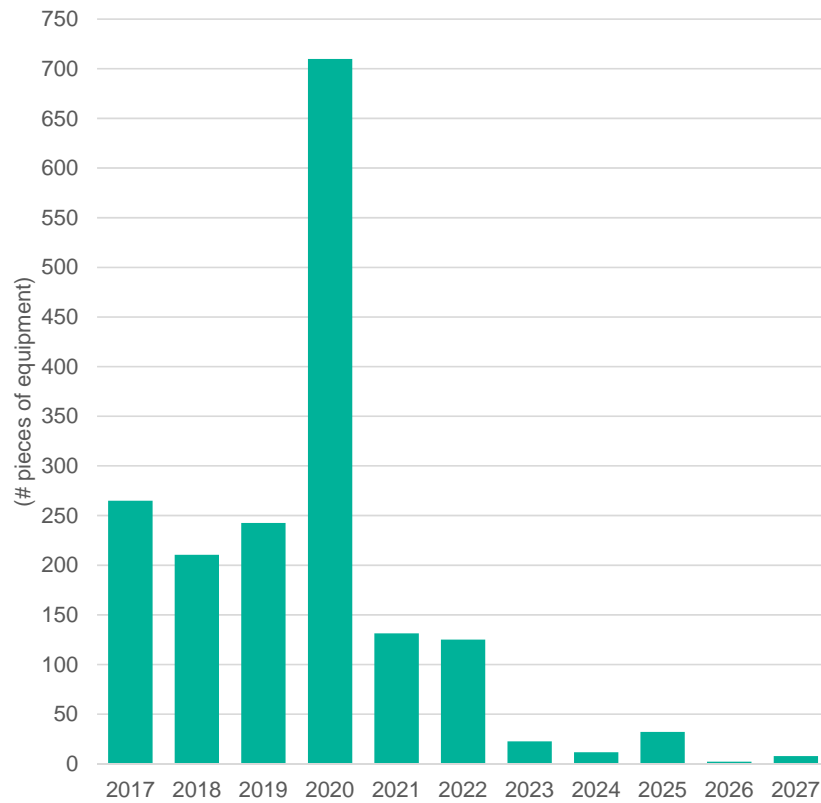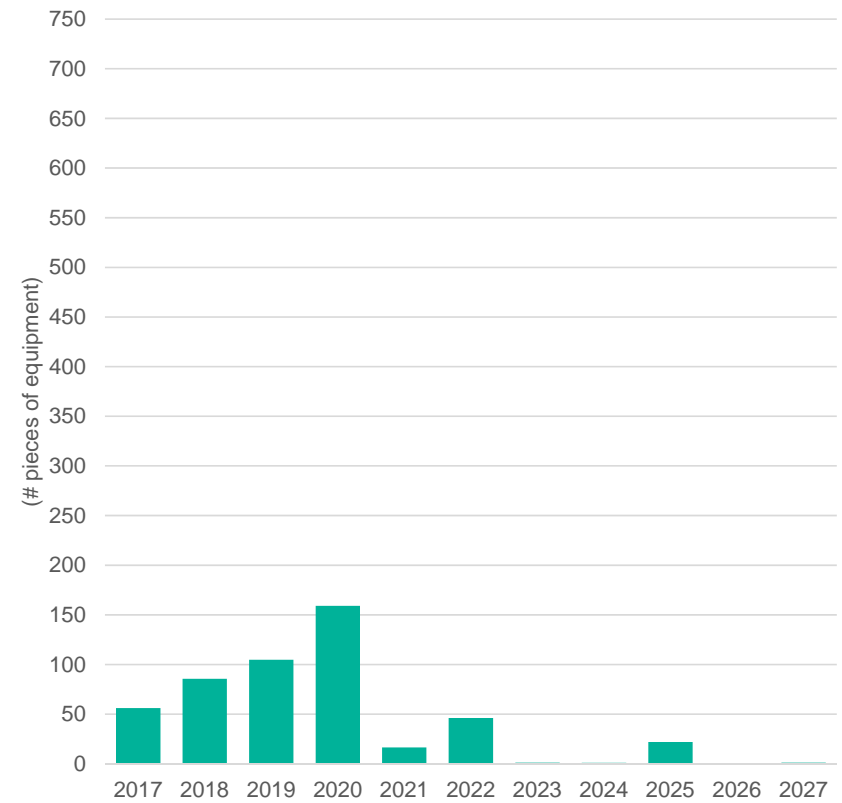Capital Expenses   Operating Expenses

Radio Traffic and Automation: Anticipated Replacements 2017-2027

Automation

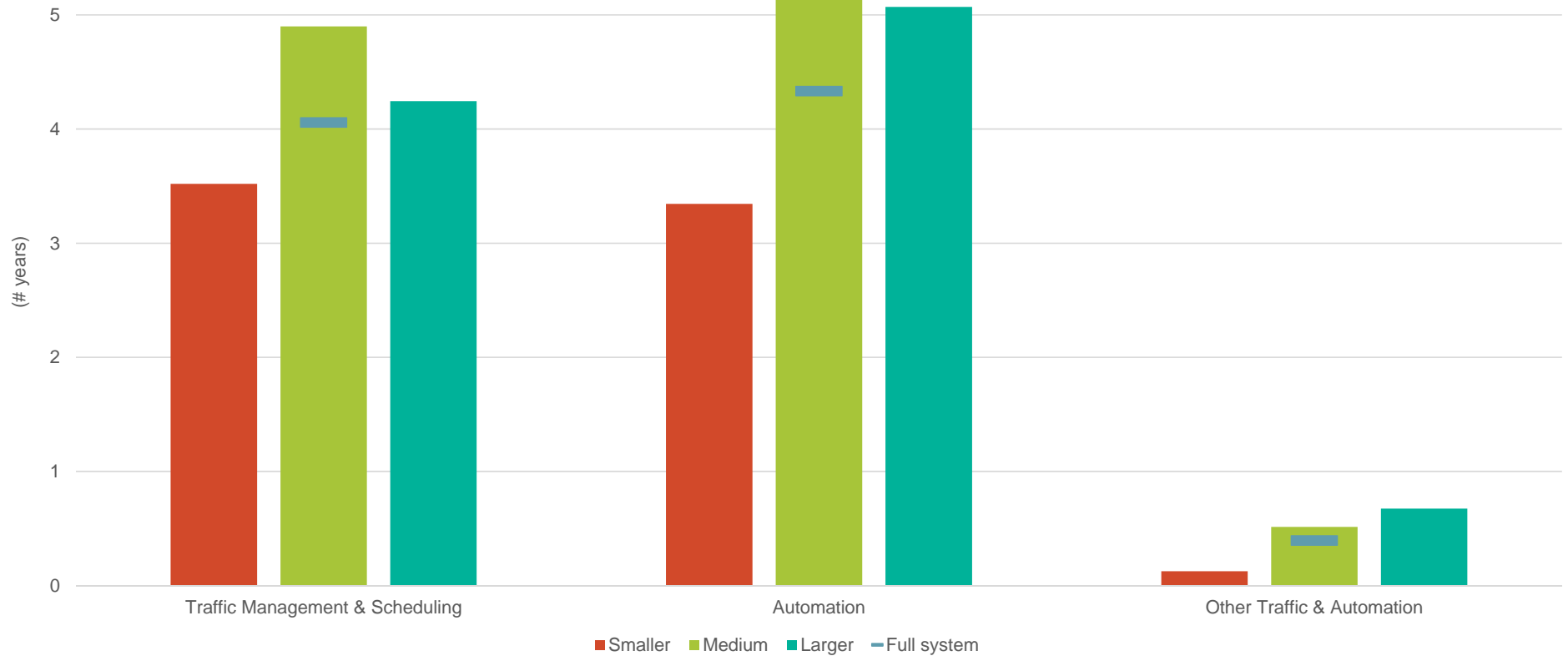**Traffic Management & Scheduling**

Radio Traffic and Automation: Average Age at Expected Replacement by Grantee Size

(# years)

Traffic Management & Scheduling | Automation | Other Traffic & Automation

■ Smaller   ■ Medium   ■ Larger   ▬ Full system

Radio Traffic and Automation: Average Age at Expected Replacement by Licensee Type
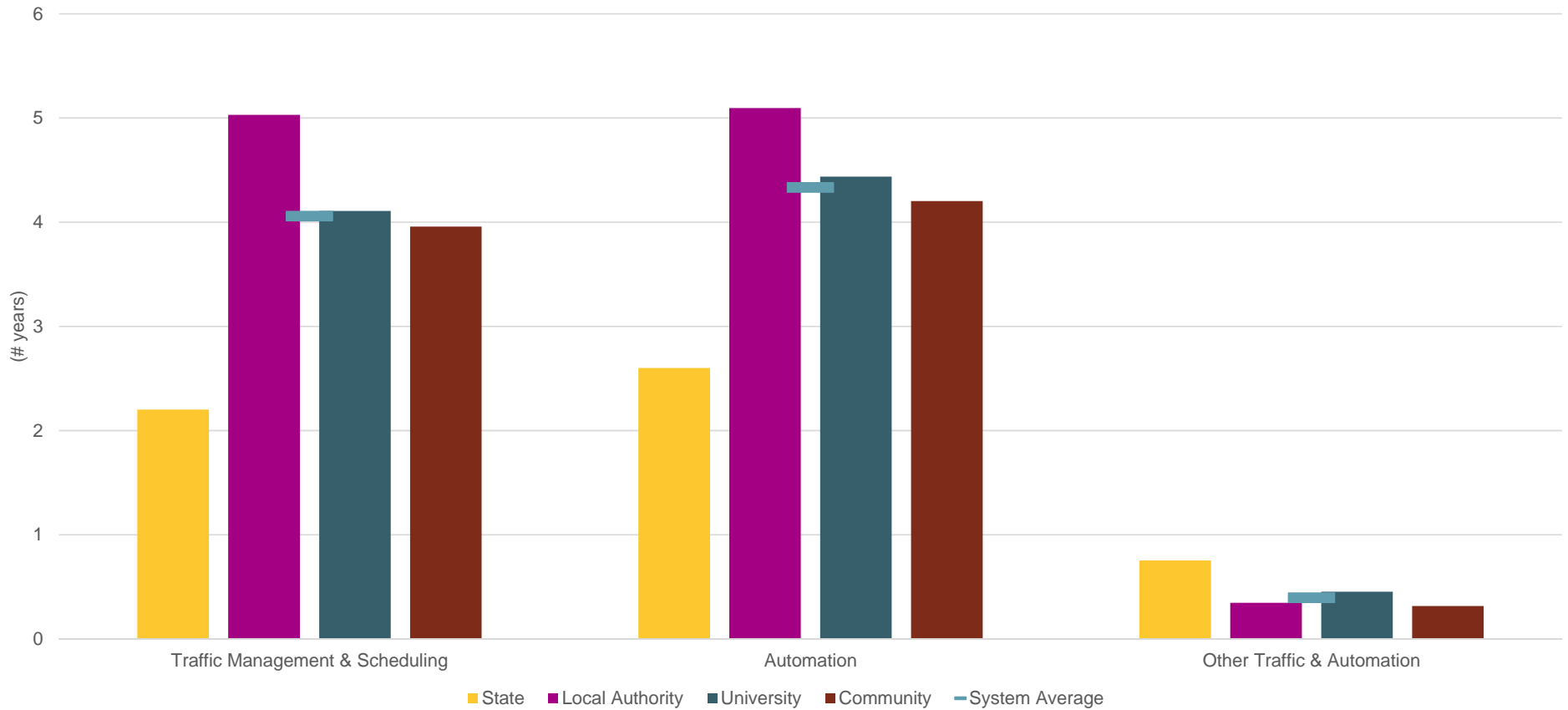
Automation Vendors	
11 Software	Paravel
360 Systems	PowerGold
Apple	RadioDJ
Arrakis	RCS
AudioVault	SeaLevel
BEI	Simian
Broadcast Electronics	Sundance
BSI	Supermicro
Crispin	Telos/Axia
Dalet	WideOrbit
DAVID Systems	Wire Ready
Dell	
Digital Jukebox	
Drobo	
Enco Systems	
IMediaTouch	
Legitek	
MacroMedia, Inc.	
Mediatouch	
Microfirst	
Miller CAS	
MusicMaster	
Natural Broadcast Systems	

* Denotes major vendor

Radio RF Broadcast: Estimated Capital and Operating Expense Needs 2017-2020
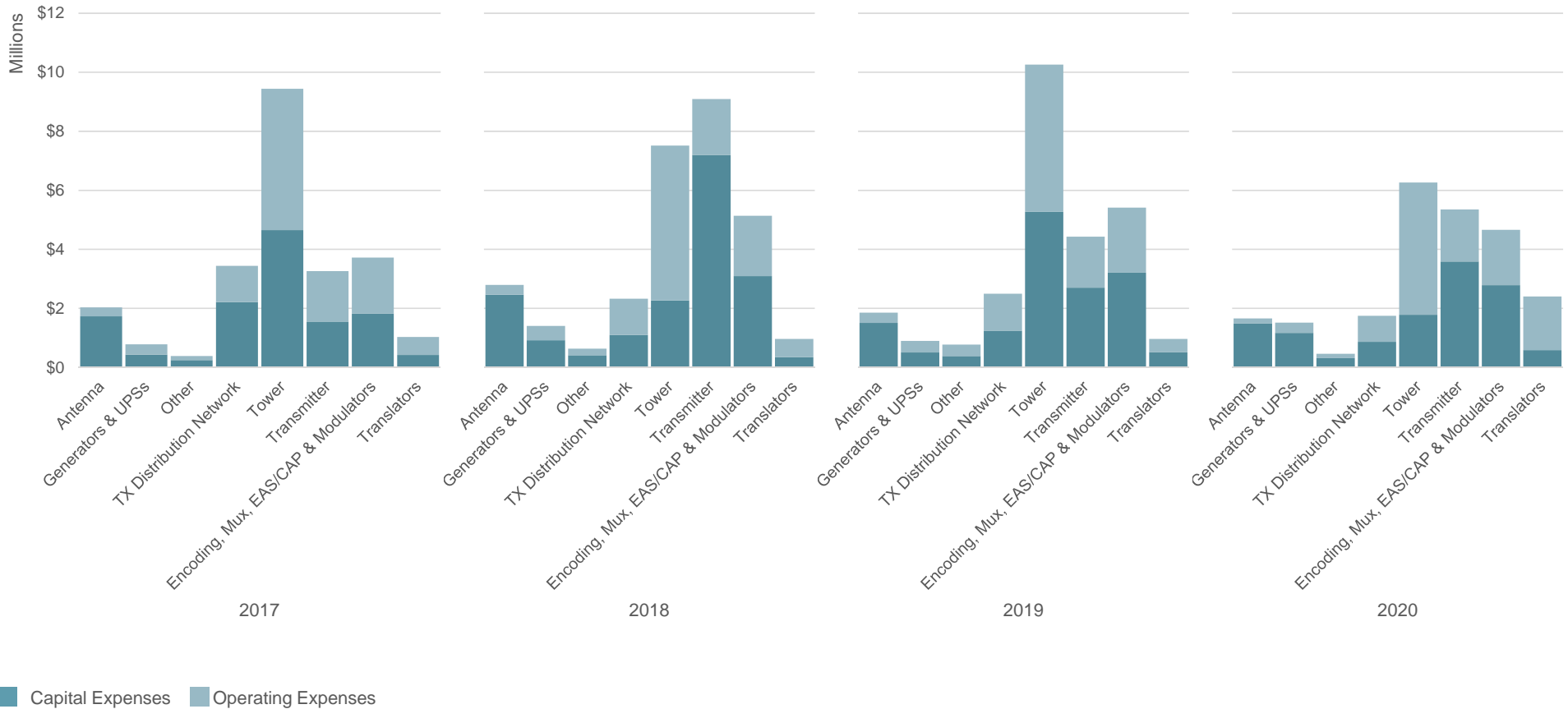
Radio RF Broadcast: Anticipated Replacements 2017-2027

Antenna
(# pieces of equipment) by year 2017–2027
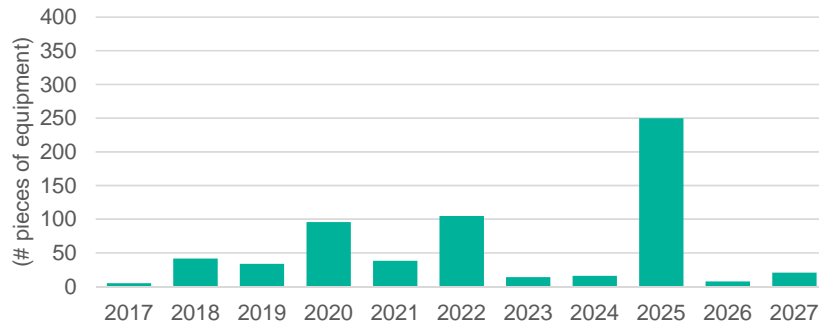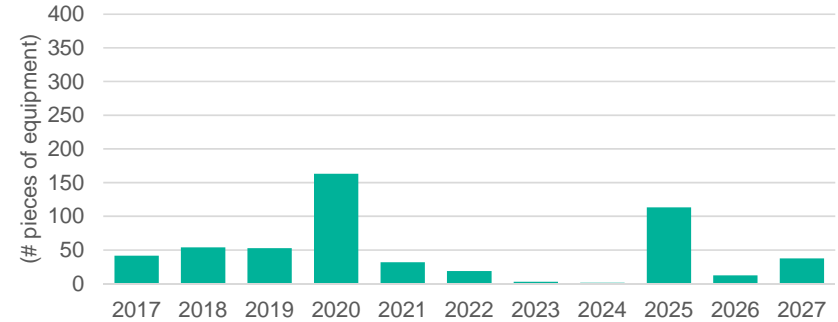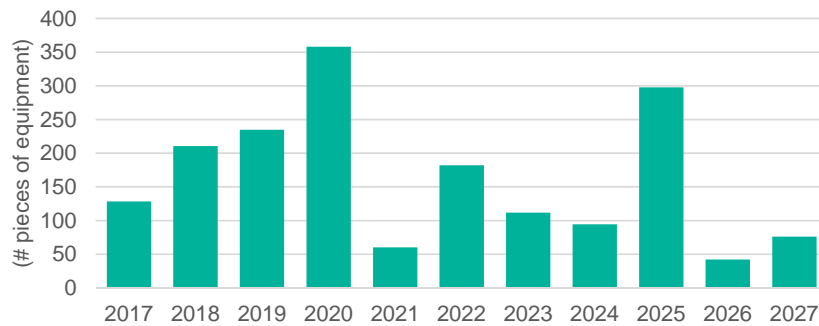
Generators & UPSs
(# pieces of equipment) by year 2017–2027

Encoding, Mux, EAS/CAP, & Modulators
(# pieces of equipment) by year 2017–2027

Transmitters
(# pieces of equipment) by year 2017–2027
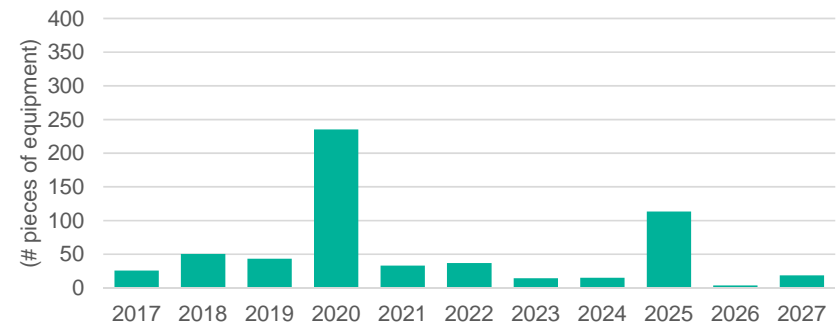
Radio RF Broadcast: Average Age at Expected Replacement by Grantee Size
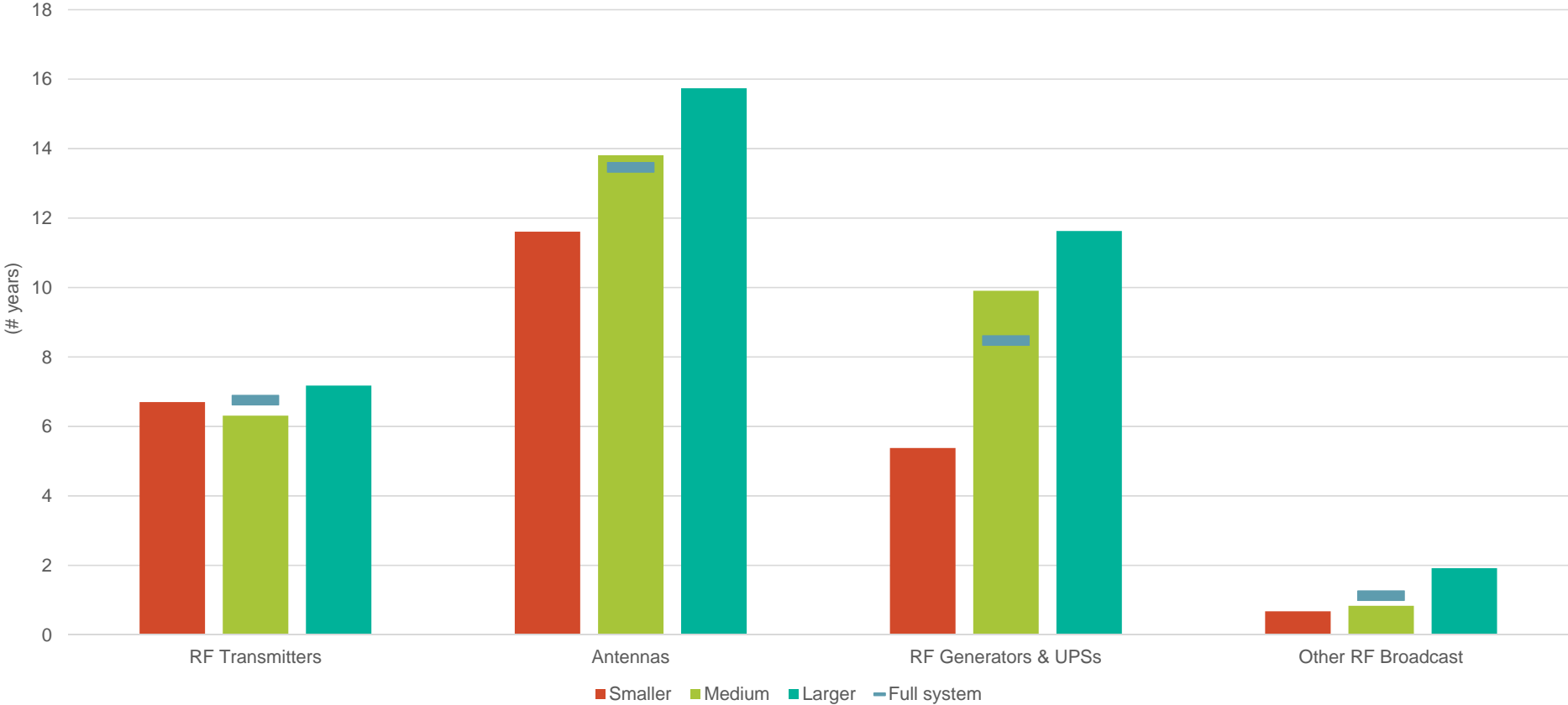
Radio RF Broadcast: Average Age at Expected Replacement by Licensee Type
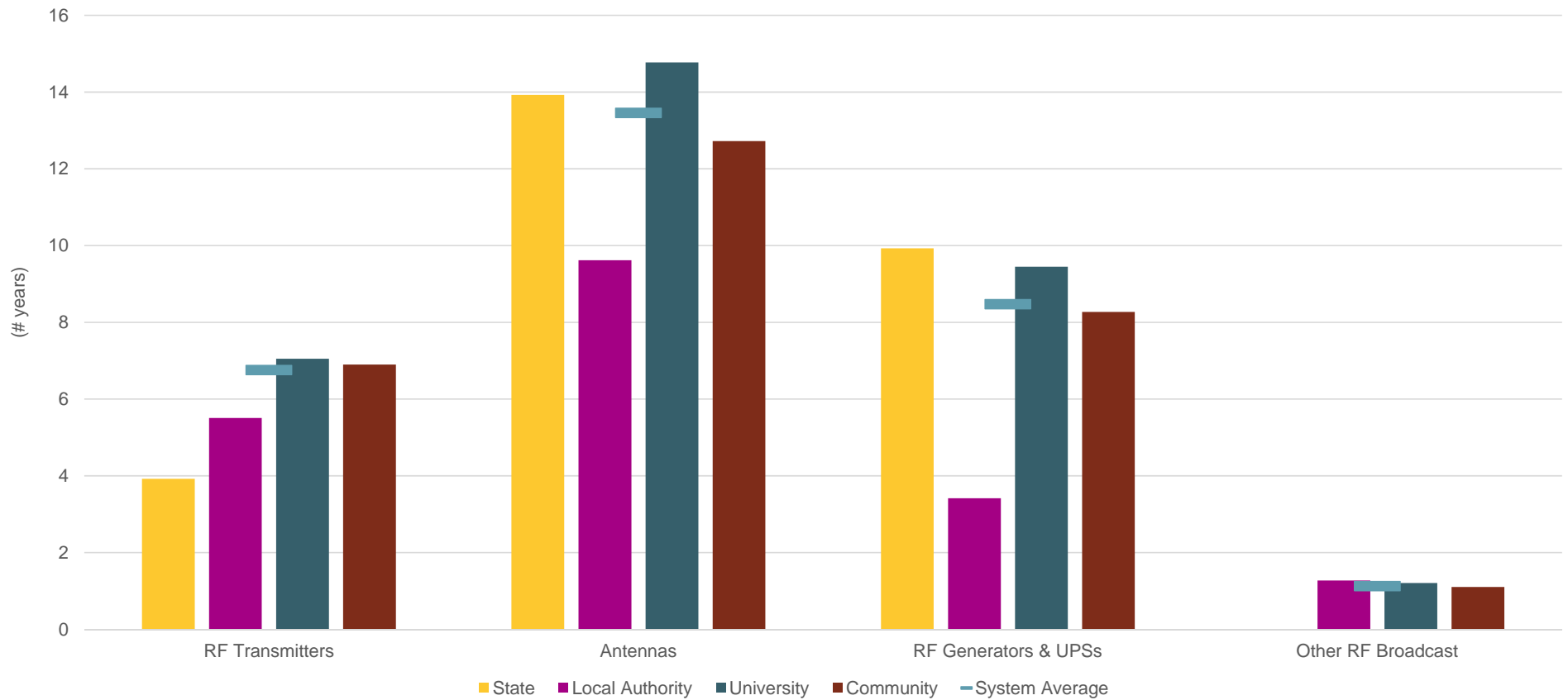
Radio RF Broadcast: Antenna Vendors

Antenna Vendors	
Aldena	Pirod
Alford	Progressive Concepts
Andrew	PSI
Audemat	RF Specialties
Backup Antenna Segment	Rohn
Bext	S.W.R.
Broadcast Depot	Scala
Broadcast Electronics	SCMS
Celwave	SHI
Crown	**Shively**
DB Products	Stainless
Dielectric	Sun Coast Towers
Electronics Research, Inc (ERI)	Union Metals
Harris	Windcharger
Jampro	World
Kathrein	Yagi
Kinetronics	
NA	
Nautel	
Nicom	
OMB	
Phelps Dodge	

* Denotes major vendor

Radio RF Broadcast: Encoding, Mux, EAS/CAP and Modulators Vendors

Encoding, Mux, EAS/CAP and Modulators Vendors			
Altronic Research	Cummins	Nielsen	Telos/Axia
Aphex	DASDEC	NPR/PRSS	TFT
Arbitron	Davicom	Omnia	Tieline
Armstrong	DaySequerra	Opticomm	Tiernan
Audemat	Electro Impulse	Opto22	Trilithic
Axxess	Endec	Orban	TTC translator / PTEK amplifier
Barix	Energy Onyx	Potomac Instruments	Urban
BEi	ERI	PTEK	Valmont/Microflect
Belar	Ericsson	P-Tek	Valvcon
Bext	Eventide	QEI	Wheatstone
Bird	Flexiva	Radyne	WorldCast Systems
Broadcast Depot	GatesAir	RCA	
Broadcast Electronics	Gentner	Re	
Broadcast Tools	Gorman Redlich	Rexburg Translator	
BSW	**Harris**	RF Specialties	
Burk	Henry	RF Systems	
BW Broadcast	Innovonics	Rohn	
Cambium	Intraplex	RVR	
CCA	Kohler	**Sage**	
CircuitWerks	Larcan	SAGE Alerting Systems	
Cisco	McMartin	SCMS	
Collins	MDO UK	SICON	
Comex	Modulation Sciences	Silicon Valley	
Comlabs	Monroe	SINE	
Comrex	Moseley	Sine System	
Continental Electronics	Nautel	Sparta	
Crown Broadcast	NiCom	Team	

* Denotes major vendor

Radio Common Infrastructure: Estimated Capital and Operating Expense Needs 2017-2020
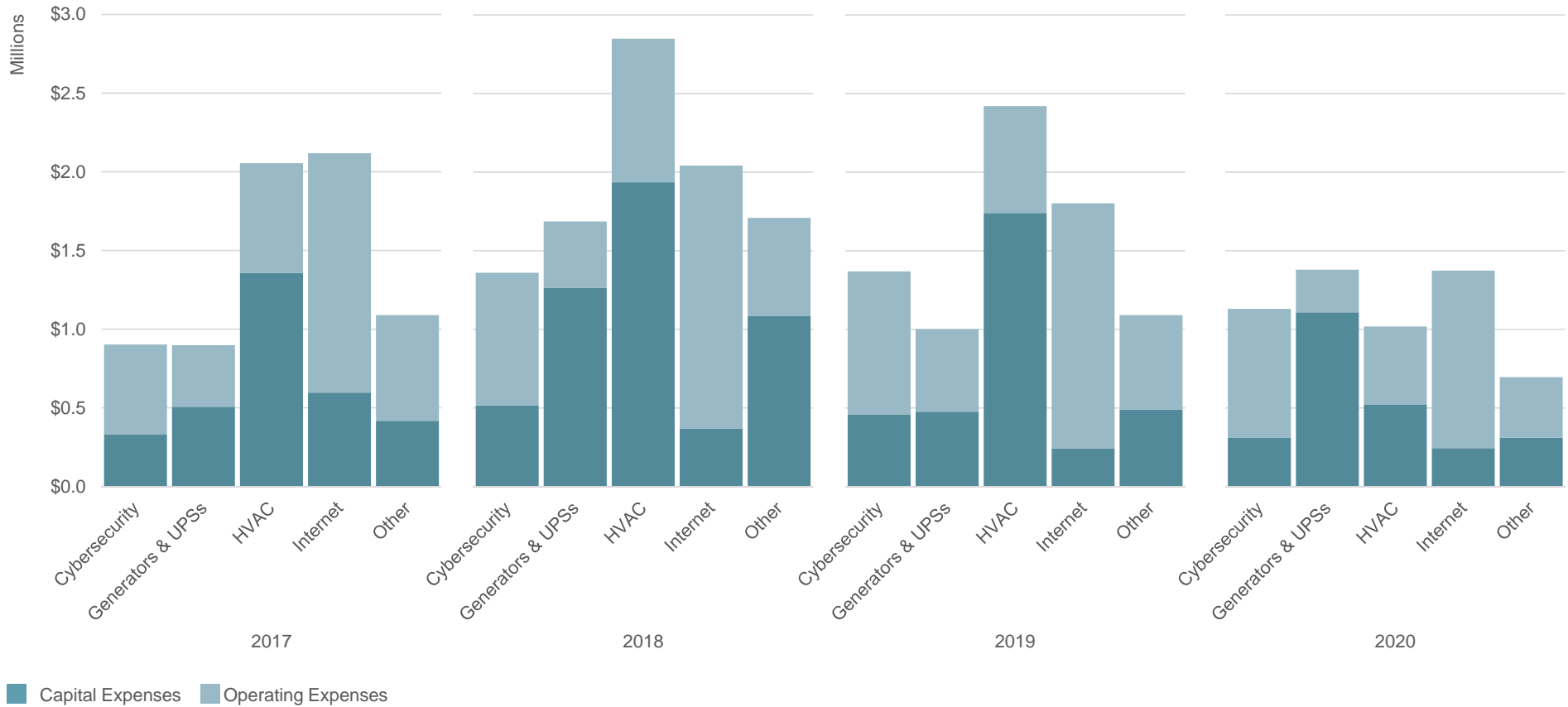
Radio Common Infrastructure: Anticipated Replacements 2017-2027

Cybersecurity
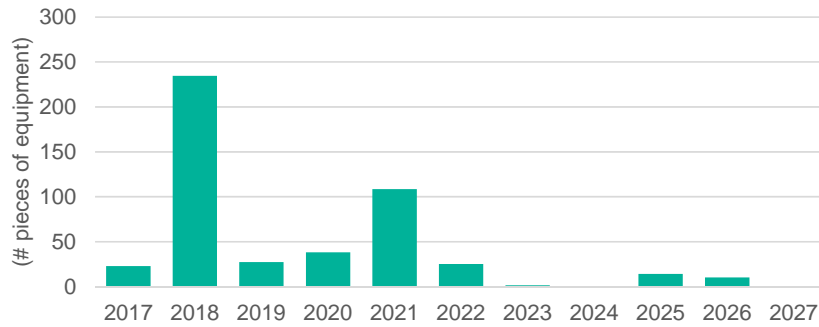
Generators
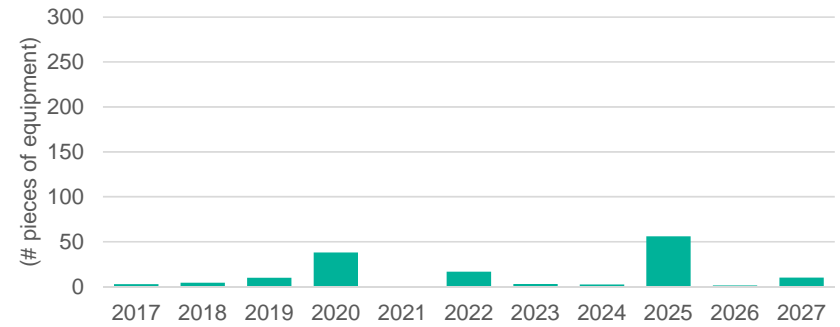
UPSs
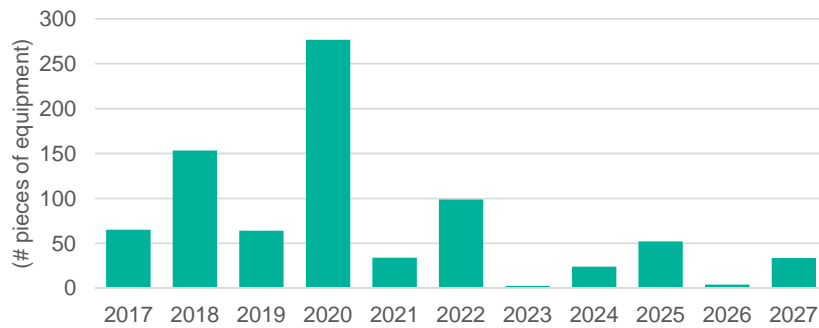
Radio Common Infrastructure: Average Age at Expected Replacement by Grantee Size
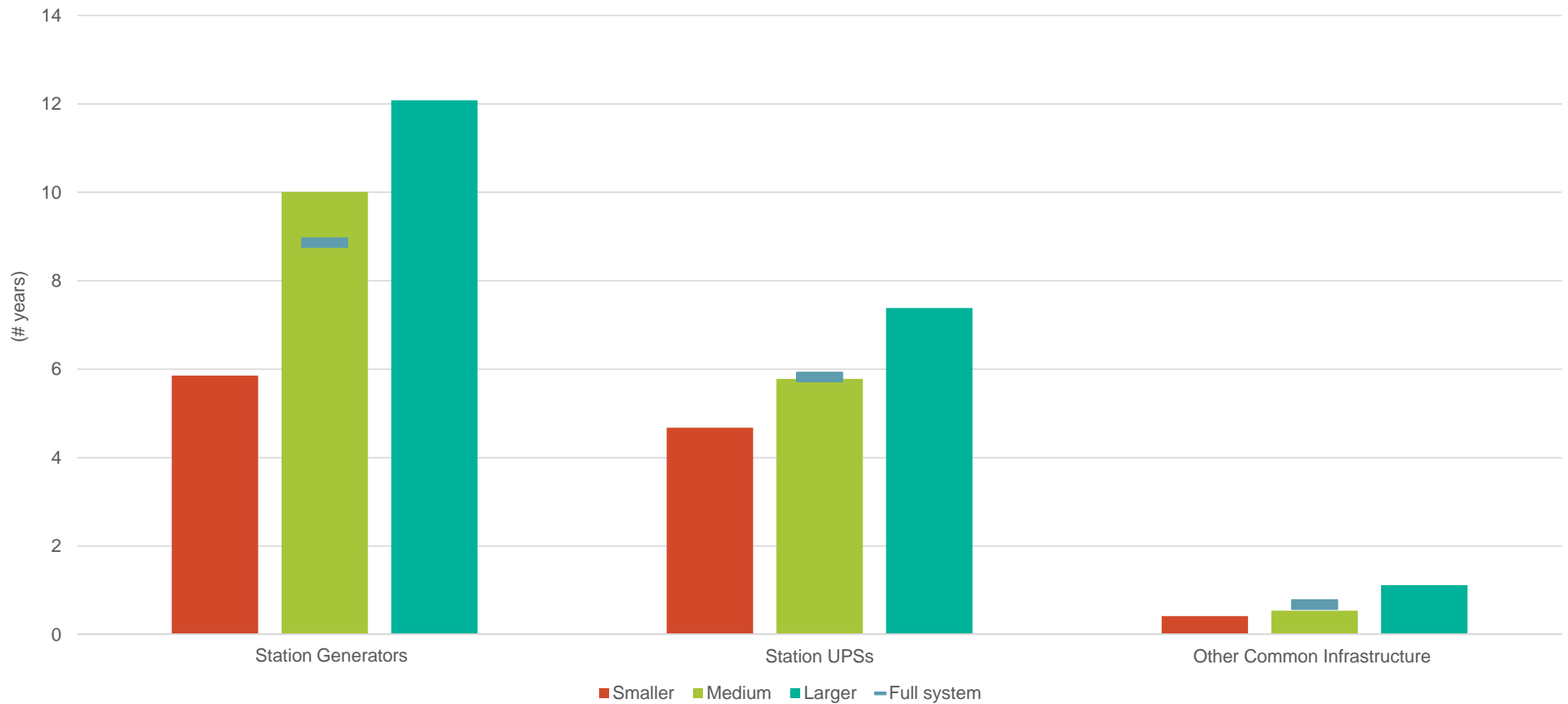
Radio Common Infrastructure: Average Age at Expected Replacement by Licensee Type

(# years)

Legend: State, Local Authority, University, Community, System Average

Categories: Station Generators, Station UPSs, Other Common Infrastructure
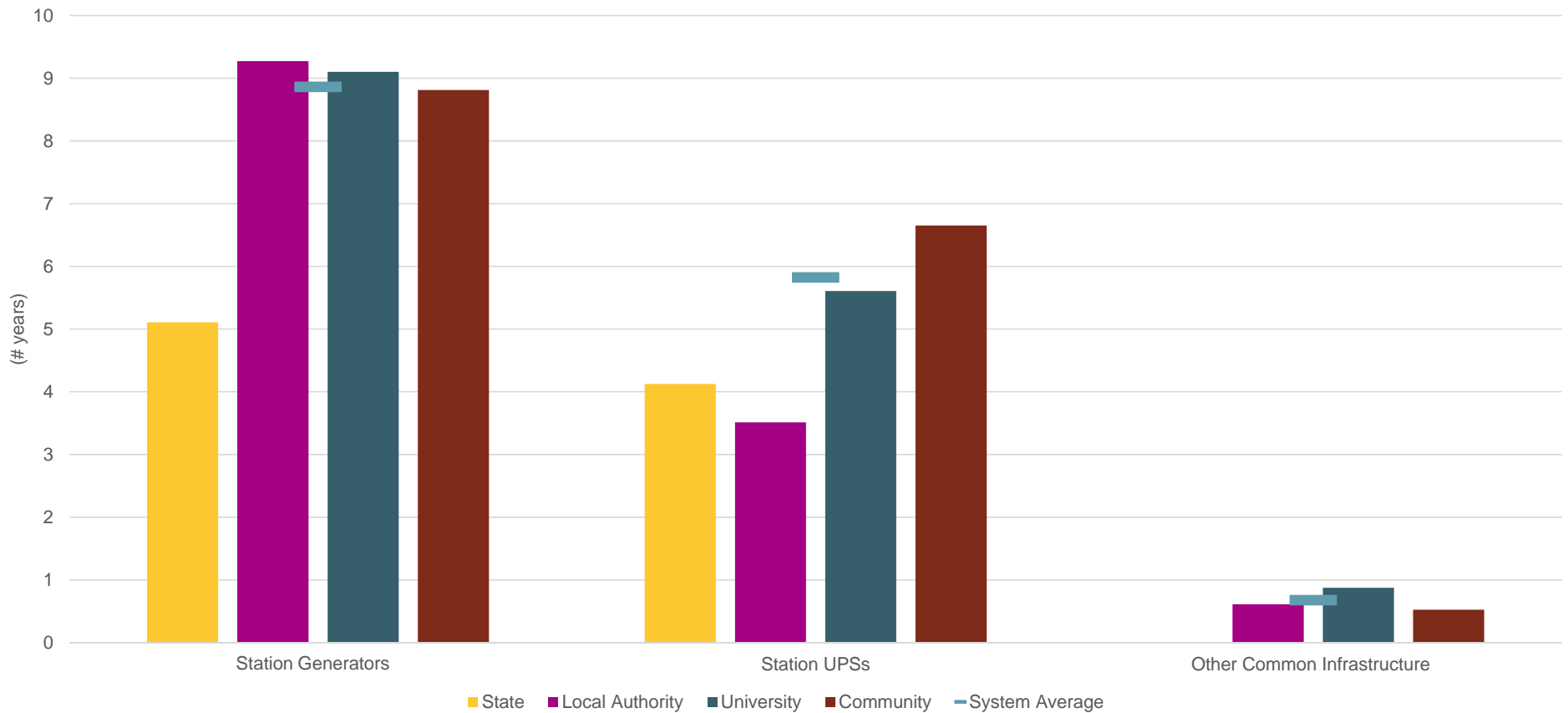
Radio Common Infrastructure: Cybersecurity Solutions by Licensee Type
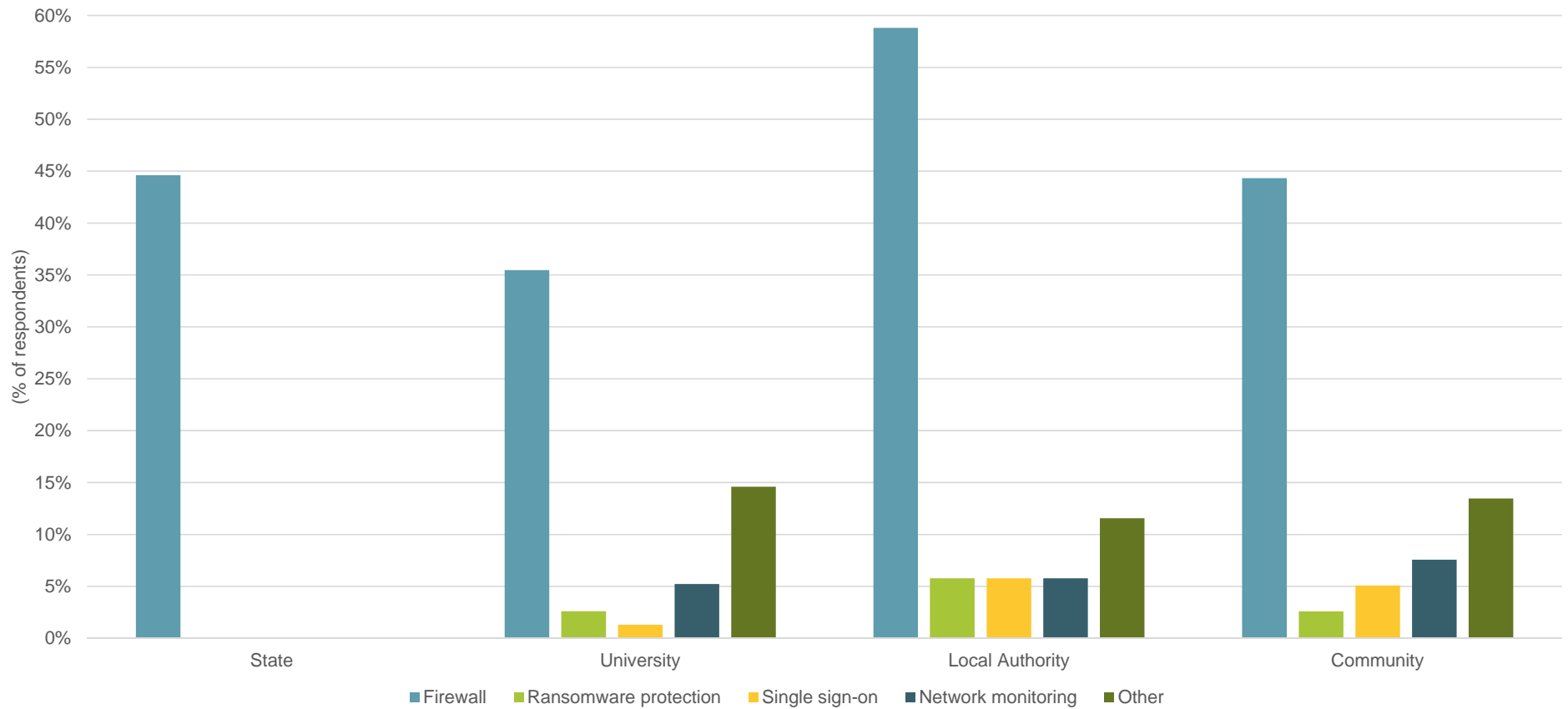
KEY LEARNINGS FROM INTERVIEWS AND PILOT

Collaborative Project Team Structure

Advisory Panel
Eric Wolf, Ling Ling Sun, Bill Hayes, Stacey Decker, Laura Hunter, Perry Metz, Becky Magura, Lonna Thompson, Victoria St. John, Mike Beach, Tom Thomas, Eric Hyyppa, Bruce Jacobs, Scott McPherson, Bill Sanford

- Provide overall project guidance and direction
- Review and approve major project issues, decisions, and plans
- Attend three in-depth review meetings

Project Executive
John McCoskey

- Update CPB Project Advisory Group on project status
- Act as a single point of contact for CPB
- Provide insight and industry perspectives on complex and challenging issues

Project Advisor
Sam Kassar

- Provide advice and counsel on key issues, best practices, and survey methodology and analysis

Project Team
Jennifer Keister, Anna Wiinberg-Freitas, Ron Clifton

- Facilitate executive reviews and Advisory Panel sessions
- Manage the project including timeline, schedule, and budget
- Conduct interviews; design, field, and analyze survey
- Develop deliverables aligning with project outcomes
- Assess and provide recommendations on solutions and implementation plan

CPB Project Sponsors
Ted Krichels, Deborah Carr, Lainie Tompkins

- Provide input into implementation planning
- Review survey format and content
- Provide input on risk mitigation strategies

Public Media Stakeholders
Round 1 Interviewees

- Validate survey approach and value-add
- Identify best outreach methods to ensure high response rates

Public Media Stakeholders
Round 2 Interviewees

- Validate translation of technical detail into survey architecture and logical flow
- Validate technical survey content

CPB   EHC

Advisory Panel Members

Eric Wolf

Victoria St. John

Ling Ling Sun

Mike Beach

Bill Hayes

Tom Thomas

Stacey Decker

Eric Hyyppa

Laura Hunter

Bruce Jacobs

Perry Metz

Scott McPherson

Becky Magura

Bill Sanford

Lonna Thompson

Public Media Stakeholders that Participated in Round One and Round Two Interviews

Public Media Stakeholders

Round One	Round Two
Sally Kane [NFCB]	Victoria St. John [Vermont Public Radio]
Greg Petrowich [WISU]	Don Mussell [Hawaii Public Radio]
Bill Sanford [Lakeland Public Television]	Lille Buck [Illinois Public Media]
Tom Thomas and Terry Clifford [SRG]	Perry Metz [WFIU/WTIU]
Ling Ling Sun [NET]	Bruce Jacobs [TPT]
Michael Beach [NPR]	Ralph Hogan [KJZZ]
Eric Wolf [PBS]	Alan Popkin [KLCS]
Loris Taylor and Melissa Begay [NPM]	Tim Eby [KWMU]
Bill Hayes [Iowa Public Television]	Eric Hyyppa [Montana PBS]
Steve Holmes [PBS]	Mike Starling [WHCP]
Lonna Thompson [APTS]	
Becky Magura [WCTE-TV]	
Laura Hunter [UEN]	

Interview Focus

- *Value*
- *Scope*
- *Financial Planning*
- *Communication & Engagement*
- *Operational & Technology Trends*
- *Capturing Survey Data*

Interview Focus

- *Survey Architecture*
- *Survey Mechanics*
- *Level of Detail*
- *Question Wording*
- *Use of Previously-Collected Data*

Key insights from Round One interviews

Data Sharing

Allowing station access to data will help them raise funds, and benchmark against their peers

Building a sense of mutual investment in the public media system

Trends

Questions on trends in broadcast media can measure station's digital maturity, including workforce maturity

Station connectivity (Broadband and between stations) shapes peer-to-peer sharing and their ability to leverage technology trends

Approach

Send surveys to GMs, but allow them to forward sections to other staff members

Tailor surveys for joint licensees to avoid duplicate work

Communications

Use nation-wide groups to emphasize system value

Use affinity and constituency groups to highlight more specific values to their members

Level of Detail

Given advances in technology, clearly articulating survey scope (broadcast and production equipment) must be deliberate

Weigh the level of detail asked on the equipment survey (and the time this takes for respondents to fill out) against these data's ultimate use case

Inclusive

Given the variety of radio and TV stations, questions should be addressable by a variety of station staff and volunteers

Make the approach scalable to small and large stations

Key insights from Round Two interviews

Clarity & Simplicity

Develop meaningful financial thresholds for equipment, software, and services to reduce the burden on respondents

Revise questions to be precise, clear, and concise

Representing Radio

Make the survey flexible enough to ensure small stations are not left out

Tailor the language to align with specific radio needs and terminology

Architecture

Group functional items together based on real-world scenarios in order to increase ease-of-use

Identify and address gaps

Use of Previous Data

Use drop-down lists to assist stations in filling out the survey, rather than pre-populate it for each station with previous data (like ETAC) that they would spend time deleting

Level of Detail

Ask about replacement costs for groups of equipment, not individual items, to encourage stations to think about the future, and not project expenses for equipment that will not be replaced

Financial & Workforce Questions

Identify the number of employees working in technology disciplines and their years of experience

Separate production and broadcast finances

These interviews were working meetings, with often-live changes to the survey architecture and wording, and a focus on vetting the content and logical structure of the survey instrument

Summary of survey improvements made in response to feedback from interviews and advisory panel interactions

Survey Improvements	Driving Factors
Introduction and Messaging	
• Shortened and reorganized introduction to improve readability • Reemphasized the assessment's value proposition to encourage engagement, and highlight the need for specific data collection • Added links to help documents: "What to Prepare," glossary, FAQs • Added tooltips	• Drive engagement and completion rates by continually emphasizing the value proposition • Leverage accumulated feedback and industry expertise to finalize help documents, and confirm definitions are accessible to the public media community • Online survey interface best practices regarding help documents and tooltips
Survey Architecture and Content	
• Simplified survey architecture and clarified technology categories • Eliminated vendor/product/model questions from the radio technology survey to reduce completion time and boost participation • Revised question language and organization to improve clarity, consistency of answers, and encourage participant engagement • Reorganized questions within the strategy and operations survey	• Feedback on equipment categorization • Feedback around question wording clarity and need for informative examples • Feedback around respondents' comfort and ability to forecast budget estimates
User Interface	
• Revised the architecture graphic to include a clickable, indented list that improves survey navigation • Removed the progress bar • Edited question fields to improve answer quality and options • Made each section scrollable instead of having "next" buttons to reduce the number of clicks and survey fatigue • Condensed formatting to ease completion and shorten survey	• Progress bar did not indicate true completion status • Navigation needs to be intuitive, clear, and readily accessible to guide respondents • Feedback on answer fields to better reflect the most likely answer types and/or provide additional answer options • User experience best practices