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A Study Pursuant to Senate Resolution 96: 911 Communication Services

September 2022



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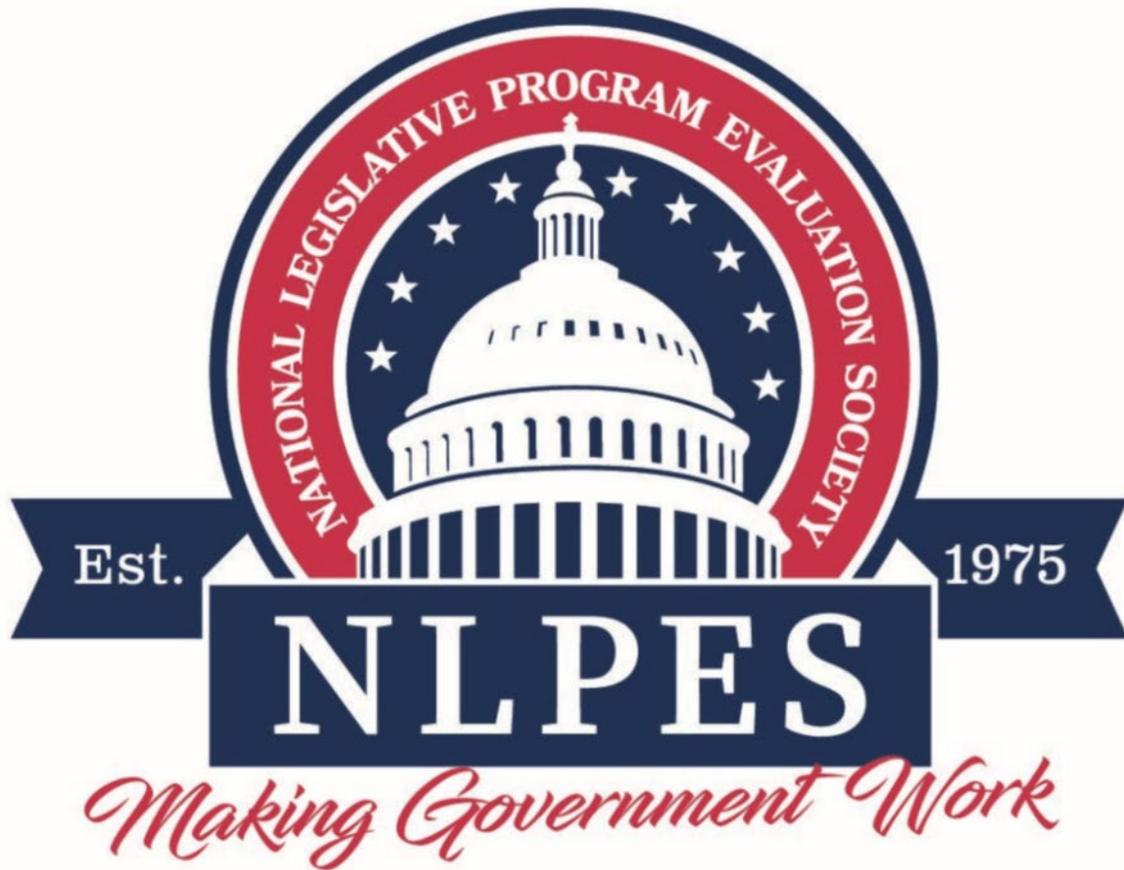
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REPORT SUMMARY



Objectives and Scope

Our objectives for this study were the following:

- 1. Determine the condition of the Commonwealth's 911 program, including but not limited to, administration, fee collection and distribution, and the capacity for next generation development.*
- 2. Review county public safety answering point operations (PSAP), including but not limited to, cost, hours of operation, staffing, infrastructure, and call volume. Similarly, review the county PSAPs to comparative operations in other states.*
- 3. Identify any possible recommendations for the Commonwealth's 911 program related to revenues, fees, funding formulas, consolidation of services, and/or other statewide notification systems.*

Report Overview

Three easily remembered digits, 9-1-1, have become the gateway for citizens to access emergency services, such as fire, police, and medical services. A key aspect of 911 is its national acceptance, which provides the public with a standardized and efficient mechanism to request services throughout the country.

As communication technology has advanced in recent years, many 911 systems throughout the country have been operating on legacy technology originally developed in the 1970s. The 911 communication service in Pennsylvania has been more proactive, as lawmakers in 2015 set the foundation for what will become the Next Generation 911 (NG911) system.

With many of the provisions of the 911 Emergency Services Code set to expire in 2024, it is critical to examine the condition of the commonwealth's emergency communication system to ensure that citizens will continue to receive the level of service that is expected and required in emergency situations for years to come.

Consequently, on May 11, 2021, the Pennsylvania Senate adopted Senate Resolution (SR) 96 (see Appendix A), which required the Legislative Budget and Finance Committee (LBFC) to conduct a performance audit of the 911 system. SR 96 directs the LBFC to examine the administrative, operational, and financial performance of the 911 system at both the state and county levels, and to make recommendations on the reauthorization of the 911 communication service provisions under 35 Pa.C.S. Ch. 53. Our objectives are laid out in the text box to the left. Key sections of our report include the following:

- **Section I - Objectives, Scope, and Methodology**
- **Section II - Background Information of Pennsylvania's 911 System**
- **Section III - Statewide 911 Program Review**
- **Section IV - Review of County Public Safety Answering Points**
- **Section V - Opportunities and Challenges for the 911 System**

In the pages that follow (S-1 through S-9), we have summarized our results from Sections III, IV, and V. In addition, staff from the Pennsylvania Emergency Management Agency have reviewed a draft of our work.

Section III – Statewide Program Review

The 911 system has traditionally been a county function in Pennsylvania; however, program oversight at the state level has been provided since the passage of Act 78 in 1990. In 2015, Act 12 tasked the Pennsylvania Emergency Management Agency (PEMA) with increased authority over statewide 911 system governance, funding, planning, and oversight. Today, PEMA can best be described as the “steward” of the commonwealth’s 911 program – establishing the system guardrails for the counties to follow.

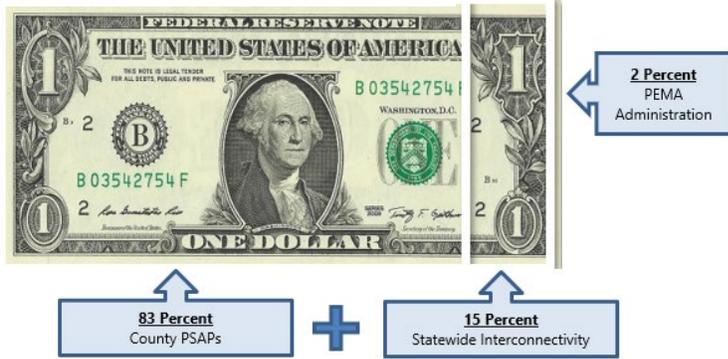
Act 12 of 2015 also brought significant changes to how 911 services are funded. Most notably, Act 12 implemented a uniform \$1.65 surcharge on wireline, postpaid wireless, and VoIP services. The Act also streamlined the collection process for these surcharges. Fees are still collected by communications providers, but fees are now all remitted to the state Treasury for deposit into the 911 Fund on a quarterly basis. Compared to other states, we found that Pennsylvania generated the most average annual 911 service fee revenue in the country between 2016 and 2020.

We reviewed revenue remitted by service type for the period 2016 through 2020. We also included funding data prior to Act 12 as a point of comparison. Our analysis found that, on average, \$317 million in surcharge revenue was generated for the 911 Fund annually between 2016 and 2020. Although the total revenue generated varied slightly year-over-year by category, overall, fund revenue has been consistent, which from a budgeting/funding distribution standpoint, is a strategic strength for Pennsylvania’s 911 program.

Regarding distributions to the counties, Act 12 requires that 83 percent of Fund revenue – which equates to approximately \$271 million per year – must be distributed to the counties via a distribution formula created by PEMA and the 911 Advisory Board. To date, there have been two distribution formulas – an interim formula created by the Act (used in 2015 – 2016) and the current formula created by PEMA and the Board (2017 – present).

The Act also requires PEMA to distribute 15 percent of the Funds revenue to the counties to create statewide interconnectivity of 911 systems. This aspect has been carried out via a competitive grant program overseen by PEMA and the Board. PEMA awarded over \$170 million in grants to the counties for the five-year observation period, in addition to supporting statewide interconnectivity through the NG911 project. In the coming years, the grant process will be phased out in favor of coordinated disbursements of interconnectivity funding, which will aid in the planning and payment of the statewide NG911 system.

Figure 1: How the 911 fee is distributed.



Act 12 allows PEMA to retain up to two percent of quarterly Fund revenue to cover its administrative costs. We found that PEMA retained an average of \$6.3 million in Fund revenue each year, but occasionally took less than its two percent allotment so that the revenue could be used to support the operation of the statewide 911 system. PEMA budgeted approximately \$3.5 million in expenditures each year, nearly all of which was dedicated to personnel and operating

costs. However, unlike most government agencies, operating costs make up the largest share of PEMA’s yearly spending. This is primarily because PEMA has needed to contract with many professional services to carry out the more specialized system requirements of the Act.

SR 96 asked us to determine the capacity for NG911 development in the commonwealth. We found that PEMA has identified priorities needed for NG911, including the creation of a statewide Emergency Services Internet-Protocol Network (ESInet) and related Next Generation Core Services (NGCS). These priorities will be used to migrate Pennsylvania into the first phase of NG911 implementation, which pertains to call delivery. The first steps towards ESInet development began in earnest in 2021, and the first phase of NG911 implementation is scheduled to be completed in 2023. Although we found there is no universal method to achieve NG911 capable systems, we assessed the progress of Pennsylvania’s NG911 project to be similar to that of other initiatives across the country.

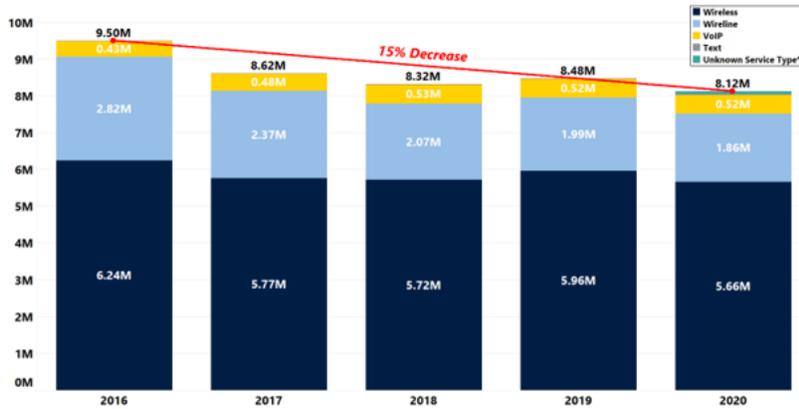
Section IV – Review of County Public Safety Answering Points

The heart of the commonwealth’s 911 system lies with the respective county Public Safety Answering Points (PSAP), which serve as a de facto dispatch point for police, fire, and emergency services. County responsibilities were codified with the passage of Act 78 in 1990 and reauthorized with the passage of Act 12 of 2015, albeit with more oversight from PEMA. Today, each county is still responsible for provisioning the 911 system within their jurisdiction – either directly or as part of a regional partnership.

We reviewed the areas of call volume, staffing, expenditures, and regional partnerships. Our review covers the period 2016 to 2020, and the data used in this analysis comes directly from the counties via PEMA’s annual

report; however, we also supplemented our analysis with data that we obtained from a questionnaire of county 911 (PSAP) coordinators.

Figure 2: Total 911 call volume decreasing.



We found that 911 call volume across the state decreased by 15 percent, including declines in wireline and wireless calls by 34 percent and nine percent, respectively. While counterbalanced slightly by increases to text-to-911 and VoIP calls, it is likely that the largest increase in workload came from alarm and other notification systems, which currently bypass the traditional 911 phone system. Additionally, 69 percent of counties

reported receiving more non-emergency calls than 911 calls for the period, a trend that many county 911 coordinators believed is becoming increasingly burdensome for their PSAPs. We were unable to provide more granularity on this issue though because the data is either lacking or not uniform.

The counties' total expenses grew by 22 percent over the observation period. The 911 Fund covered the majority of expenditures for all but two counties¹, and overall Fund-reimbursable spending increased by 18 percent. Spending in areas not covered by the Fund was mixed for the period. Although some counties expressed that they would like to see more expenses qualify for Fund reimbursement, we concur with PEMA's assessment that areas not fully covered (e.g., radio equipment, facilities) should remain that way to keep Pennsylvania eligible for federal 911 grant funding.

Personnel and operating expenses accounted for nearly 90 percent of all spending by the counties. While personnel spending is the main driver in many counties, operating expenses increased by 66 percent over the five years, primarily because of the need to update equipment after the findings of the 2016 PSAP Inventory Report, which was required by Act 12. We did find it concerning that 84 percent of counties in classes 6, 7, and 8 spent at least half their budgets over the period on operating costs. With the migration to NG911 underway, there is opportunity for these lesser populated counties to leverage technology and explore cost-sharing options.

¹ Huntingdon County (49 percent) and Adams County (44 percent) were the only two counties for which 911-funded expenses did not account for at least half of all expenditures for the observation period.

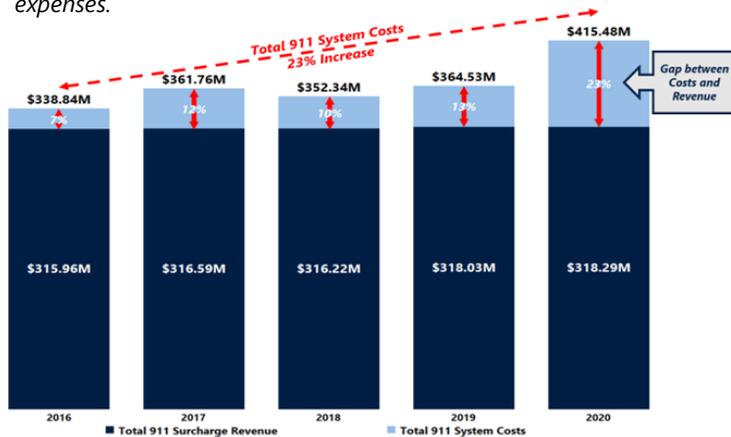
Staffing is perhaps the most significant issue currently facing the county PSAPs. Although a statewide database on staffing does not currently exist, responses to our survey as well as a PEMA survey indicate that many PSAPs are struggling to fill open telecommunicator positions. Staffing ranked as the most important issue in our survey of 911 coordinators, and PEMA reports that at least 23 counties have telecommunicator vacancy rates above 20 percent.

Many factors have caused a staffing issue, including challenges with hiring, retention, and compensation. Although a one-size-fits-all solution does not exist, we have identified opportunities for the General Assembly to further professionalize the 911 industry and bring light to this issue including: consider adding a requirement for PEMA to report on PSAP staffing and call processing metrics; and amending the definition of an emergency responder in Act 87 of 2021 to include 911 personnel and including 911 personnel in any future legislation pertaining to first responders and related occupations.

Section V – Opportunities and Challenges for the 911 System

Within the next decade, the 911 system will look vastly different than it has in decades prior. As a result of this transition, PEMA and the county PSAPs will be faced with many opportunities and challenges that will need to be addressed to help promote the efficient and effective operation of the 911 program.

Figure 3: State 911 funding not meeting all county expenses.



We found that the gap between 911 system costs and the revenue generated by the uniform surcharge accelerated during the observation period (2016 to 2020). While program expenses have increased each year, funding has remained constant. One potential cause PEMA has identified is the unexpected lack of growth in VoIP revenue over time. We believe this is because the rapid growth of IP-based technology and “Internet of Things” (IoT) devices has made it difficult for

the 911 industry to properly define the category of VoIP services. As a result, PEMA has reported difficulty in determining if the VoIP surcharge is being assessed appropriately. Further, this lack of standardization also impacts the ability of PSAPs to properly measure telecommunicator workload, as we believe a portion of these devices are currently outside

the commonwealth's call data tracking system. Technological advancements of NG911 should allow for more comprehensive data tracking to be accomplished if a uniform definition of VoIP devices is identified.

The funding gap is perhaps exacerbated by another issue: adoption of a new funding formula. Most of Pennsylvania's 911 stakeholders agree that the current 911 Fund distribution formula does not adequately address the needs of the commonwealth's 911 system. Many of the considerations that are used in the formula are now over a decade old and do not reflect the changing technological landscape or the transition to NG911. A fund formula revision was proposed in 2020, but the Board lacked a majority to move the formula forward. As a result, the funding formula continues to use outdated metrics and does not reflect the newer technological landscape of NG911. We recommend the implementation of a formula with population as its main consideration, as this is the most equitable way to distribute 911 Fund revenue. This conclusion is supported by the correlation between population and key 911 metrics such as call volume, PSAP staff size, and county system spending, as well as the perspective that the 911 system is most accurately demonstrated as a public good when funding is tied to the citizens the program serves.

In a related issue, one of the major challenges of the NG911 transition has been determining the demarcation – or splitting – of costs between originating service providers and 911 entities. Although cost recovery mechanisms have been developed for the legacy 911 system over time, these demarcation points are not relevant precedents for the IP-based environment of NG911. PEMA has reported working with the state's providers to determine points of interconnection, but the lack of a universally accepted demarcation point could lead to confusion, strain on the 911 Fund, and delays in implementing NG911 across Pennsylvania. Currently the FCC is deliberating rulemaking on this issue, but we recommend that the General Assembly consider establishing a demarcation point and cost recovery mechanism for NG911, if no federal standards are implemented.

Moving beyond challenges in funding and distribution issues, another area for opportunity is regionalization and consolidation. Act 12 encourages the counties to consider the efficiencies of regionalization and consolidation. We found that most regional partnerships to date have been based on existing equipment sharing agreements (primarily phone systems), as well as previous working relationships. Eight PSAPs have consolidated since the Act's passage, bringing the number of primary PSAPs down to 61 from 69. Although we believe these efforts will result in cost savings for the counties without sacrificing 911 services for the commonwealth's citizens, due to the current transitory state of the 911 program, this issue warrants further review following the migration to NG911. Additionally, a national comparison found that Pennsylvania is near the

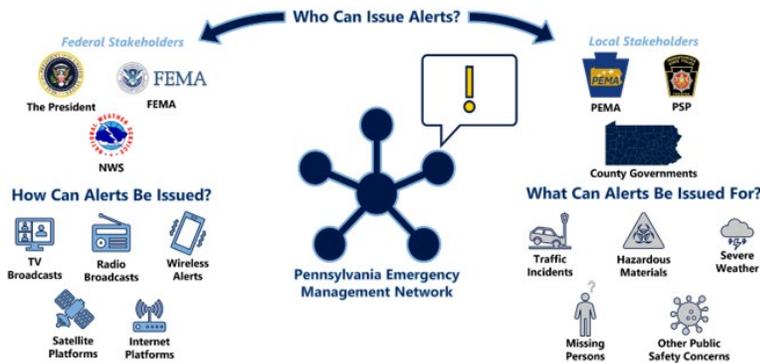
forefront of this movement compared to other states of similar size and 911 governance structure, but we do think that opportunities exist to further incentivize the streamlining of operations while still maintaining the same quality of service that citizens have come to expect of the commonwealth’s 911 system.

Staffing is one of the most complicated issues facing the 911 system. Despite many anticipated efficiencies for PSAP staffs from NG911, challenges for telecommunicators in the areas of training, call complexity, and mental health and well-being will be present. However, the transition also presents the opportunity for PSAPs to leverage technology to overcome staffing deficiencies. As the commonwealth’s PSAPs continue to become more connected in terms of equipment and systems, opportunities to pool resources in efforts to find regional – or even statewide – solutions to staffing issues will become more viable.

Finally, at the direction of SR 96, we also reviewed Pennsylvania’s AMBER alert system, as well as several other emergency notification systems used throughout the commonwealth. Specifically, we focused on alert systems and programs that utilize the federally coordinated wireless emergency alerts (WEA) and emergency alert systems (EAS). Although managed in part by the FCC, state and local public safety officials have

been permitted to use these systems for a variety of purposes, including missing children, severe weather, and even important notifications during the COVID-19 pandemic. These alert systems are outside the purview of the 911 system, so we offer no recommendations, but we do offer additional insight about the variety and type of alerts and how the systems are used in Pennsylvania.

Figure 4: PA Emergency Management Network



Report Recommendations

The following recommendations are directed to the General Assembly:

1. Barring additional action from the FCC, we recommend the General Assembly consider exploring requiring service providers to block incoming autodialed calls to the commonwealth’s PSAPs.
2. We recommend that, in the next authorization of 35 Pa.C.S. Ch. 53, the General Assembly consider adding a requirement

for PEMA to report on PSAP staffing and call processing metrics as part of its annual report, in order to better understand trends in telecommunicator staffing and workload.

3. The General Assembly should consider expanding the recognition of 911 personnel and their importance in the field of public safety, including: amending the definition of an emergency responder in Act 87 of 2021 to include 911 personnel and including 911 personnel in any future legislation pertaining to first responders and related occupations.
4. In the next reauthorization of 35 Pa.C.S. Ch. 53, we recommend the General Assembly consider directing PEMA and the 911 Advisory Board to develop standardized data collection procedures for alarms, alert notifications, and other applicable Internet of Things (IoT) devices as part of the statewide MIS solution, with the goal of analyzing the impact these devices have on telecommunicator workload, while also determining the viability for adjustment to the VoIP surcharge base.
5. In absence of action from the FCC, we recommend the General Assembly explore the establishment of a demarcation point between the commonwealth's 911 authorities and OSPs within the NG911 call delivery environment, including the delineation of costs that are expected from each, as part of the next reauthorization of 35 Pa.C.S. Ch. 53. In addition, such considerations could also take into account future technologies that may not require to be physically connected to other portions of the NG911 system.
6. We recommend that the General Assembly consider directing the Legislative Budget and Finance Committee to perform another review of the commonwealth's 911 system within five years of the reauthorization of 35 Pa.C.S. Ch. 53, with one of the primary objectives being to determine the impact of regionalization and consolidation efforts on the commonwealth's PSAPs within the NG911 environment.
7. The General Assembly should consider strengthening language in 35 Pa.C.S. Ch. 53 §5305 to explicitly require counties to explore efficiencies to be achieved from regionalization and consolidation as part of their 911 plans.
8. The General Assembly should consider whether remote dispatch centers should be required to connect to the statewide ESInet as part of the reauthorization of 35 Pa.C.S. Ch. 53.

The following recommendations are directed to PEMA, the 911 Advisory Board, or the county PSAPs:

1. PEMA and the county PSAPs should continue to monitor the demand for telecommunicators especially as telecommunicators leave the workforce.
2. PEMA should continue to be a leader in workforce development for PSAPs and should foster discussions on best practices in hiring and retaining telecommunicator staff.
3. PEMA should advise the PSAPs on the critical skills that will be required of new telecommunicator hires across the state. This guidance can be carried out primarily through establishing annual training and certification standards for PSAPs and telecommunicators. PSAPs should ensure that their job descriptions adhere to these standards.
4. PEMA and the counties should build upon the framework set by the Act and continue to incentivize cost sharing opportunities, especially in the areas of personnel and equipment.
5. We recommend that PEMA, the 911 Advisory Board, and the counties continue to work towards the adoption of a new 911 Fund distribution formula, using statewide interconnectivity payments to counties as temporary offsets of revenue losses if necessary.
6. With the funding cycles that remain, we recommend that PEMA prioritize grants for consolidation feasibility studies among statewide interconnectivity awards.
7. PEMA should continue to develop and maintain training requirements that will maximize situational preparedness in NG911, while also remaining mindful of the staffing constraints experienced by many PSAPs across the commonwealth.
8. We recommend that PEMA and the 911 Advisory Board use their statutory roles as the curators of the 911 system and training requirements to further promote the dissemination of mental health and well-being best practices to the PSAPs leading up to and following the transition to NG911, including the formation of a 911 personnel wellness subcommittee within the Advisory Board.
9. County PSAPs should continue to explore options to leverage NG911 technology to address common issues in the 911 system, especially regarding staffing.

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SECTION I OBJECTIVES, SCOPE, AND METHODOLOGY



Why we conducted this study...

- ❖ *Senate Resolution (SR) 96 was adopted on May 11, 2021, by the Senate. SR 96 directed the LBFC to conduct a performance audit of the 911 system.*
- ❖ *In addition to examining the state's administrative and regulatory duties over the 911 system, SR 96 requires an operational review of the county public safety answering points (PSAPs).*
- ❖ *SR 96 directs the LBFC to make recommendations on the reauthorization of the 911 communication service provisions under 35 Pa.C.S. Ch. 53, which are set to expire in 2024.*

Introduction

The American public has come to rely on “9-1-1” as the gateway to emergency services for fire, police, and medical services. Accordingly, it is estimated that over 240 million emergency service calls are placed in the United States each year.² In many life-threatening scenarios, the difference between success and peril can be the timeliness of response by the telecommunicators on the other end of the call. However, as communication technology has advanced rapidly in recent years, many 911 systems throughout the country have been operating on legacy technology originally developed in the 1970s. The 911 communication service in Pennsylvania has been more proactive, as lawmakers in 2015 set the foundation for what will become the Next Generation 911 (NG911) system.³ With many of the provisions of the 911 Emergency Services Code set to expire in 2024, it is critical to examine the condition of the commonwealth’s emergency communication system to ensure that citizens will continue to receive the level of service that is expected and required in emergency situations for years to come.

Consequently, on May 11, 2021, the Pennsylvania Senate adopted Senate Resolution (SR) 96, which required the Legislative Budget and Finance Committee (LBFC) to conduct a performance audit of the 911 system. SR 96 (see Appendix A) directs the LBFC to examine the administrative, operational, and financial performance of the 911 system at both the state and county level, and to make recommendations on the reauthorization of the 911 communication service provisions under 35 Pa.C.S. Ch. 53.

Objectives

After a House or Senate resolution is adopted, as a matter of practice the LBFC’s officers also adopt objectives for the proposed study. Study objectives allow us to answer the requirements of the resolution more precisely, while also providing an outline from which to guide and plan the project.

² FCC, *Task Force on Optimal PSAP Architecture*, 2016.

³ PEMA, *Pennsylvania NG9-1-1 Project Overview*, 2021.

As directed by the officers of the LBFC, on June 23, 2021, the following objectives were approved:

1. Determine the condition of the commonwealth's 911 program, including but not limited to, administration, fee collection and distribution, and the capacity for next generation development.
2. Review county public safety answering point operations (PSAP), including but not limited to, cost, hours of operation, staffing, infrastructure, and call volume. Similarly, review the county PSAP's to comparative operations in other states.
3. Identify any possible recommendations for the commonwealth's 911 program related to revenues, fees, funding formulas, consolidation of services, and/or other statewide notification systems.

Scope

According to Government Auditing Standards, issued by the Comptroller General of the United States through the Government Accountability Office (GAO), scope refers to the boundary of a study and is directly tied to the audit objectives. Scope defines the subject matter that will be reported on, such as a particular program or aspect of a program, the necessary documents or records, the period of time reviewed, and the locations that will be included.⁴

As approved by the LBFC Officers on June 23, 2021, the scope of this study covers the period from 2014 through 2020. This period will cover the full year before Act 12 of 2015 was passed, which dramatically changed the 911 fee and distribution structure in the commonwealth, as well as established Pennsylvania's framework for NG911. In addition to allowing us to measure the current program's performance against its prior condition, the interim funding distributions outlined in Act 12 are based, in part, on the revenue received during a period ending in 2014.⁵ The end date of 2020 was selected since that was the last full years' worth of data that was available at the study's inception, but updates to information occurred through the end of the audit procedures, as applicable.

⁴ See Comptroller General of the United States, Government Accountability Office, Government Auditing Standards, 2018 revision, paragraph 8.10.

⁵ See Pa.C.S. Ch. 53 §5306.1.

Methodology

The primary source of data used for the analysis in this study came from the annual reports produced by the Pennsylvania Emergency Management Agency (PEMA) as required by Act 12.⁶ These reports are the most comprehensive source of data on the commonwealth's 911 system, especially regarding service fee collection, 911 Fund distributions, program spending, and 911 call volume. For related information not included in the annual report, such as system statistics for years prior to the statutory report requirement or additional detail on administrative expenses, we were able to obtain data directly from PEMA. While we tested the reliability of the material presented to us, we did not independently audit this information, as much of the data is reported to PEMA from the county public safety answering points (PSAPs). Although this data is unaudited, PEMA does work with the counties to review and reconcile the information included in the agency's annual reports. Therefore, we believe the information to be reliable for the purposes of this study. Much of this information has been summarized in the appendices at the end of this report.

For information pulled from the annual reports, we started by reviewing aggregated statewide data by year in order to identify trends over time. Where applicable, we also applied additional levels of granularity, such as surcharge type, 911 call communication method, or expenditure category. In analysis relative to local 911 systems, including 911 Fund distributions and program spending, we also reviewed annual report data at the county level.

In much of our analysis, we attempted to control for 911 program size by considering county population. Although we primarily used the pre-determined county classifications, in areas such as 911 call volume, we used population data from the United States Census Bureau and developed ratios to examine trends on a per capita basis. Additionally, when comparing Pennsylvania's 911 program to that of other states, we commonly referred to population data as a benchmark, which resembles analysis performed by the Federal Communications Commission (FCC) when it reviews national system spending and revenue creation in congressional reporting.

We also conducted a survey of the commonwealth's county 911 coordinators in the Fall of 2021. In addition to gaining their perspective on issues relevant to the 911 community, we also obtained data on PSAP staffing, which was not tracked at the state level during our review period. It is important to note that, while we did review responses to assure that the information documented was reasonable, the data in our survey

⁶ 35 P.S. §5303 (a).

was entirely self-reported, and there was no other source that we could use to confirm the accuracy of the material we collected. However, we did compare our survey results to wage, and other occupational data produced by the United States Bureau of Labor Statistics. We also reviewed relevant laws pertaining to the professional classification of emergency responders in the commonwealth.

We reviewed a variety of program documentation produced by PEMA, including the 2016 PSAP Inventory Report, the 2017 Legislative Report, the statewide 911 plan, the Next Generation 911 (NG911) project overview, and the agency’s technical, telecommunicator training, and planning minimum requirements. We also interviewed PEMA staff and county 911 coordinators on issues such as staffing, system funding, program costs, regional cooperation, and NG911 development, among others. In addition, we attended several 911 Advisory Board meetings during our work on this study, and reviewed meeting minutes from Board meetings for the entirety of our observation period.

Over the course of our study, we reviewed numerous national reports produced by the FCC, the National 911 Office, and stakeholder groups, such as the National Emergency Number Association, Association of Public-Safety Communications Officials-International, and National Association of State 911 Administrators. Additionally, we also researched program documentation and applicable laws from other states across the country. All these resources were useful for gaining perspective on the achievements and limitations of Pennsylvania’s 911 system compared to its national counterparts.

Finally, we interviewed staff at both PEMA and the Pennsylvania State Police (PSP) to gain an understanding of the background, policies, and processes of statewide emergency notification systems used in the commonwealth, including the Emergency Management Network, Missing or Endangered Persons Advisory alerts, and AMBER alerts.

Frequently Used Abbreviations and Definitions

Throughout this report, we use several abbreviations for government-related agencies, industry terms, and functions. These abbreviations are defined as follows:

Abbreviation	Name	Definition
NENA	National Emergency Number Association	A non-profit organization focused on promoting the 911 industry through the development of standards, education and training programs, and informational materials for policymakers.
IP	Internet Protocol	Standards which address the routing of data via the Internet.

ILEC	Incumbent Local Exchange Carrier	A wireline telephone company which held a regional monopoly on service prior to the opening of the market following the Telecommunications Act of 1996.
E911	Enhanced 911	Technology that automatically identifies a 911 caller's location, name, and callback number for telecommunicators prior to processing a 911 call.
VoIP	Voice over Internet Protocol	Technology that delivers voice communications via the Internet.
EAS	Emergency Alert System	A national public warning system which is commonly used by state and local officials to delivery important emergency information over radio, television, cable, satellite, and wireline networks.
WEA	Wireless Emergency Alerts	A national public warning system that delivers emergency messages directly to mobile devices.
AMBER Alerts	America's Missing: Broadcast Emergency Response Alerts	The child abduction alerts system implemented by all 50 states of the United States. Alerts are distributed via radio, television, Internet, satellite, cable, and wireless communications.
NG911	Next Generation 911	An initiative aimed at building an all IP-based emergency communications infrastructure across the United States.
PSAP	Public Safety Answering Point	An entity responsible for receiving and processing emergency service calls for a defined geographic area. Synonymous with "911 call center."
Telecommunicator	[Industry Term]	Individuals employed by PSAPs, whose primary responsibility is to receive, process, transmit, and/or dispatch emergency and non-emergency calls for service for emergency medical, fire/rescue, law enforcement and other public safety services, via telephone, radio, and other communication devices.
CAD	Computer-Aided Dispatch	Systems used by telecommunicators to record 911 incident calls, locate emergency personnel in the field, and dispatch responders to the scene of an incident.
PSTN	Public Switched Telephone Network	The circuit-switched telephone networks operated by wireline providers.
ANI	Automatic Number Identification	Databases created by ILECs to identify the originating telephone numbers on calls. This technology was later implemented in the 911 system.
ALI	Automatic Location Identification	Databases created by ILECs for the 911 system that associate phone numbers to the addresses of the subscribers for which those numbers are assigned.
MSAG	Master Street Address Guide	Databases created by ILECs for the 911 system which associate street addresses to the corresponding emergency service number for its closest PSAP.
SRDB	Selective Routing Database	Databases created by ILECs for the 911 system that determine to which PSAP a 911 call should be routed.
CPE/CHE	Customer Premise Equipment/Call Handling Equipment	Equipment used by telecommunicators to answer 911 calls.
ESInet	Emergency Services IP Network	Internet-based communications networks that are intended to be separate from public networks and used to exclusively transport emergency service requests and other communications to public safety agencies.

GIS	Geographic Information Systems	Computer systems that capture topographical data, including landscape, soil, vegetation, bodies of water, manmade structures, highways, and electrical power lines.
NGCS	Next Generation Core Services	System and software elements needed to properly identify and route 911 calls and associated data (pictures, videos, etc.) across an IP network.
OSP	Originating Service Provider	Communications providers that allow their users to originate 911 calls to PSAPs.
POI	Point of Interconnection	The point at which private communications providers connect to the public 911 system.
MIS	Management Information System	Databases used for organizational analysis, coordination, and decision-making.
ASAP to PSAP Notifications	Automated Secure Alarm Protocol to Public Safety Answering Point Notifications	Technology that allows alarm monitoring services to bypass the traditional 911 phone system and direct notify PSAPs when an incident occurs.
APCO	Association of Public-Safety Communications Officials-International	The world’s largest and oldest public safety communications professionals’ organization, which offers technical assistance, professional development, and advocacy for its members.
NASNA	National Association of State 911 Administrators	Professional organization which represents 49 state 911 administrators, including Pennsylvania.
MEPA Alerts	Missing or Endangered Persons Advisory Alerts	Program utilized by the PSP to assist in the recovery of missing individuals who are at special risk of harm or injury through prompt notification to the general public, law enforcement authorities, and other agencies.

In addition, for many discussions in this report, we group counties by population according to their county classification – the criteria for which was set forth by Act 130 of 1955. A list of county classes, population thresholds, and the counties which fall into each category is provided in Appendix B. Please note, the classes listed represent those used during our observation period as outlined above, and do not take into consideration changes which occurred in 2022.⁷

Acknowledgements

We thank the staff of the Pennsylvania Emergency Management Agency, including Jeffery Boyle, Deputy Director for 911. The insights and assistance brought forth by the agency were instrumental in allowing us to obtain the necessary information needed to complete the report. We also thank the 911 coordinators from the county public service answering points for their time and cooperation throughout our study. Finally, we would like to acknowledge the commonwealth’s telecommunicators and 911 staff for the tremendous service they provide to Pennsylvania.

⁷ See https://lancasteronline.com/news/politics/lancaster-county-is-now-a-second-class-a-county-heres-what-that-means/article_74e6c12e-9428-11ec-b6ae-c7e06da40d4a.html, accessed June 17, 2022.

Important Note

This report was developed by the staff of the Legislative Budget and Finance Committee, including project manager Stephen Fickes and staff analyst Matthew Thomas. The release of this report should not be construed as an indication that the Committee as a whole, or its individual members, necessarily concur with the report's findings, conclusions, or recommendations.

Any questions or comments regarding the contents of this report should be directed to the following:

Patricia A. Berger, Executive Director
Legislative Budget and Finance Committee
P.O. Box 8737
Harrisburg, Pennsylvania 17105-8737
717-783-1600
email: lbfinfo@palbfc.us

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SECTION II BACKGROUND INFORMATION ON PENNSYLVANIA'S 911 SYSTEM



Fast Facts...

- ❖ *The first 911 call in the United States was placed in Haleyville, Alabama in 1968.*
- ❖ *Act 78 of 1990 created the first statewide 911 system in Pennsylvania. Act 12 of 2015 enacted the system's current requirements for governance across the commonwealth.*
- ❖ *There are currently 61 primary Public Safety Answering Points serving Pennsylvania's 67 counties.*
- ❖ *911 systems are typically funded by fees billed to wireline, wireless, and Voice over Internet Protocol services users.*

Introduction

In an emergency situation, life and death can be decided by response timeliness. Before the advent of modern communication devices, the emergency events relied upon friends, neighbors, or others in one's nearby vicinity to notify appropriate authorities. As communication and technology has improved, so too has the ability to provide emergency services to the community. From this evolution, the first emergency communications systems were created. However, in the 21st century – where communications are sent instantly around the world – 911 programs have struggled to break out of their localized silos into larger communities of systems. Across the country, many states, including Pennsylvania, are striving to create the next generation of 911 systems. This section of the report provides context and information about 911 systems, which will help to inform later discussions.

History of 911 in the United States and Key Federal Agencies

The 911 system was first conceptualized in the mid-20th century and has grown steadily in localities across the United States over the last 50 years. Despite being primarily a state and local government function, the federal government has established acceptable standards and guidelines for 911 administrators and staff over the last two decades. Through its role in communications oversight and its interest in maintaining transportation safety, the federal government has been a key player in promoting the 911 system's step into the 21st century.

Origins of 911

Despite its prevalence in American public life, the development of the emergency service communications system only occurred in the decades following World War II. According to the National Emergency Number Association (NENA), the first call for a nationwide emergency telephone

number came when the National Association of Fire Chiefs recommended a single number to report fires in 1957.⁸ By 1967, the President's Commission on Law Enforcement and Administration of Justice had recommended that a single number for reporting emergencies be established and tasked the Federal Communications Commission (FCC) with engaging stakeholders. That same year, the FCC met with the American Telephone and Telegraph Company (AT&T), the largest telephone provider in the United States, to establish such a number. AT&T announced shortly thereafter that it would use the code "9-1-1" as its emergency service number. These three digits could be easily remembered and dialed, and they were not planned to be used in the long-range numbering plans of the telephone industry. The Bell System of telecommunications companies agreed to make the necessary accommodations to the public telephone system to support 911, and subsequently absorbed the related costs as part of their general rate bases. The first "official" 911 call was made in Haleyville, Alabama by United States Senator Rankin Fite in February 1968.⁹

At its inception, the logical choice to provide 911 services was the wire-line telephone company, as other types of communications such as wireless phones or Internet Protocol (IP) networks were not yet in existence. States soon established arrangements with incumbent local exchange carriers (ILECs)¹⁰ to provide services.¹¹ ILECs were able to fund these services through surcharges approved by state regulatory bodies and payment requests made to the appropriate 911 entities. These agreements set forth the precedent of locally delivered service with state oversight that is still experienced in many 911 systems today.¹²

In the decades that followed, the use of 911 as the emergency service code steadily grew throughout the United States. In 1973, the White House began to aid local governments in the planning and implementation of 911 systems. Throughout the 1970s, the deployment of 911 occurred at the local level with an adoption rate of approximately 70 new systems per year.¹³ Nearly half of all Americans could use 911 to contact emergency services by 1987. At the turn of the 20th century, almost 93 percent of the population was covered by 911 service in some fashion.¹⁴

⁸ See <https://www.nena.org/page/911overviewfacts>, accessed July 29, 2021.

⁹ Ibid.

¹⁰ ILECs were the legacy telephone service companies that typically had a regional monopoly over providing communications services (e.g., Verizon, AT&T, etc.). After the Telecommunications Act of 1996 allowed any communications company to compete in all markets, Competitive Local Exchange Carriers (CLECs) began to increase in size across the country. While CLECs can compete in any market, it is typically more common to see these companies lead in internet-based phone services. In this report, we will commonly refer to these groups as "originating service providers (OSPs)" or simply "providers." See <https://www.atlantech.net/blog/market-confusion-understanding-the-options-for-telco-services>, accessed August 31, 2021.

¹¹ See The 911 Education Foundation, *History of 911*, 2015.

¹² Ibid.

¹³ See <https://www.nena.org/page/911overviewfacts>, accessed July 29, 2021.

¹⁴ Ibid.

It was at this time that the federal government took a more active role in advancing the use of 911 across the country.

Key Federal Stakeholders

On top of the historical factors described above, there has been significant value in the customization of service delivery that comes with the knowledge of geography, weather patterns, and populations held at the local level.¹⁵ However, interest in efficient 911 systems exist among many entities at the federal level, but the most relevant to this report are the Federal Communications Commission (FCC) and the United States Department of Transportation (USDOT).

Federal Communications Commission. Established by the Communications Act of 1934, the FCC is an independent agency that regulates interstate radio, television, wire, satellite, and cable communications.¹⁶ Despite being mostly localized programs, the FCC has been the primary federal oversight agency throughout 911's history due to the system's heavy reliance on wireline communications.

The codification of the FCC's role in the 911 system began in earnest with the Wireless Communications and Public Safety Act of 1999,¹⁷ as it was tasked with reviewing state emergency communications infrastructure plans and recommending best practices for 911 programs across the country.

Arguably the largest footprint the FCC has left on the 911 system is its requirements for Enhanced 911 (E911)¹⁸ technology. For the last two decades, the FCC has been instrumental in establishing standards for wireless communications within the 911 system, especially regarding requirements for location technology.^{19,20} In recent years, the FCC has started to emphasize similar requirements for Voice over Internet Proto-

¹⁵ See The 911 Education Foundation, *History of 911*, 2015.

¹⁶ See <https://www.ntia.doc.gov/book-page/federal-communications-commission-fcc>, accessed August 11, 2021.

¹⁷ The Wireless Communications and Public Safety Act of 1999 is credited with establishing 911 as the universal emergency service phone number in the United States, since prior to its passage no such statement had been made in a piece of federal legislation. In addition, the Act required that wireless communications providers connect into the 911 system. See NHTSA, *Model State 911 Plan*, 2013.

¹⁸ E911 uses tools that automatically identify a 911 caller's location, name, and callback number for telecommunications prior to processing a 911 call.

¹⁹ See <https://www.nena.org/page/911Cellphones>, accessed August 3, 2021.

²⁰ A current area of focus for the FCC is increasing standards for "dispatchable locations," such as addresses, floor levels, and room numbers. These details are critical for PSAPs and emergency personnel that operate in areas with multi-floor buildings. See 80 FR 45897 and 86 FR 8714.

col (VoIP) devices, which stands in contrast to the relatively little regulation the commission placed on the industry immediately following its inception (see discussion below).²¹

Outside of its regulatory capacity, the FCC submits yearly reports to Congress on the collection and distribution of 911 and E911 fees and charges made by states.²² Additionally, the FCC is tasked with maintaining portions of the nation's public warning system, including the Emergency Alert System (EAS) and Wireless Emergency Alerts (WEA). The EAS is used to deliver important emergency information via radio and television.²³ WEAs are short emergency messages that are broadcast from cell towers to mobile devices in a targeted area. Messages in both systems can be sent by public safety officials, such as the National Weather Service, the National Center for Missing and Exploited Children, or the President of the United States.²⁴ However, the agency allows states and local governments to use the EAS and WEAs to deliver emergency notifications, such as AMBER Alerts for missing children.²⁵

United States Department of Transportation. The USDOT has been interested in a nationwide emergency service number for many years, as it could be used to summon efficient and effective emergency responses during traffic incidents. Specifically, the ENHANCE 911 Act of 2004²⁶ created what would become the National 911 Office (also known as the National 911 Program) within the National Highway Traffic Safety Administration (NHTSA). A joint program with the Department of Commerce's National Telecommunications and Information Administration (NTIA), the National 911 Program seeks to establish "a seamless, reliable and cost-effective transition to a 911 system that takes advantage of new communications technologies to enhance public safety nationwide."²⁷

Since 2004, the National 911 Office has been at the forefront of Next Generation 911 (NG911) planning and implementation. With the creation of the NG911 Initiative in 2004, the 911 Office and USDOT have focused on the requirements to design a 911 system that could support

²¹ FCC, Consumer Guide: VoIP and 911 Service, 2019.

²² This requirement was included as part of the New and Emerging Technologies 911 Improvement Act of 2008. These reports were used to help inform our national 911 system comparisons throughout this report. See <https://www.fcc.gov/general/9-1-1-and-e9-1-1-services>, accessed August 2, 2021.

²³ See <https://www.fcc.gov/consumers/guides/emergency-alert-system-eas>, accessed August 11, 2021.

²⁴ See <https://www.ready.gov/alerts#wea>, accessed August 27, 2021.

²⁵ See <https://www.fcc.gov/consumers/guides/emergency-alert-system-eas>, accessed August 11, 2021.

²⁶ The Ensuring Needed Help Arrives Near Callers Employing 911 (ENHANCE 911) Act of 2004's focus was that of Enhanced 911 (E911) technologies, which greatly increased in importance with the rapid development of wireless communications. E911 technology will be discussed in the next issue area.

²⁷ Ibid.

voice, video, and data transmission as well as addressing issues pertaining to the deployment of such a plan.²⁸ The program conducted the first NG911 proof of concept in 2008, developed an implementation plan for NG911 infrastructure in 2009, and has maintained standards for NG911-related activities since 2011. Finally, the office reported to Congress on the costs to implement and sustain NG911 nationwide in 2018, and in 2020 created the NG911 Roadmap and Progress Report to track the status of obtaining national interconnectivity with NG911.²⁹

While promotion of NG911 has been a major focus, it has not been the only priority of the National 911 Program or USDOT. Over the last two decades, the department has helped to define compliance with the FCC's E911 requirements, created or assisted to fund the creation of numerous 911-related databases,³⁰ and has outlined a strategic plan for developing a nationally unified 911 data system.³¹

Overview of 911 System

The core concepts of the 911 system are relatively simple to understand, but the supporting systems, technology, and delivery are complex. The next generation of 911 systems is being developed and is expected to be a vast improvement from what is currently in place. However, counties, states, and the federal government will need to address outstanding challenges to create a system that is financially and operationally sustainable for the long term.

General 911 Process

At a high level, emergency service call-taking and response is a straightforward process. When an emergency occurs and an individual dials 911, a communications provider directs the call to an emergency call response center, known as a public safety answering point (PSAP).³² After the call

²⁸ See <https://www.911.gov/historyof911.html>, accessed August 11, 2021.

²⁹ Ibid.

³⁰ These databases include NENA's Wireless Deployment Profile database (2003), the National 911 Resource Center (2010), the National 911 Profile Database (2011), and the National Conference of State Legislators' Legislative Tracking Database (2012).

³¹ See <https://www.911.gov/historyof911.html>, accessed August 11, 2021.

³² A PSAP is an entity responsible for receiving and processing emergency service calls for a defined geographic area. This report will use PSAP interchangeably with the term "911 call center." See PEMA, *Commonwealth of Pennsylvania 911 Training, Certification, and Quality Assurance/Quality Improvement Requirements*, 2019.

is received by the PSAP, the telecommunicator³³ determines the precise location of the emergency.

Next, the telecommunicator asks a series of questions, usually pertaining to an event description (type of emergency, time, identities involved, etc.), existence of any impediments to first responders arriving at the scene, and contact information for the individual placing the 911 call.³⁴ Based on the description of the emergency provided, the telecommunicator determines the type of services that need to be dispatched to the scene (fire, medical, police, or a combination of the three). While many PSAPs telecommunicators are equipped with Computer-Aided Dispatch (CAD) systems and will also serve as the dispatchers, some jurisdictions maintain specialized dispatchers based on the service type – fire, police, or emergency medical services (EMS).³⁵ The individual performing dispatch duties will then notify the appropriate first responders based on location and event type, and relay all relevant information documented by the telecommunicator in the CAD system during the call.³⁶

While the concepts of this process have remained the same since the 911 system's inception, advancements in technology have at times aided and hindered the duties performed by telecommunicators and dispatchers at PSAPs. This technology is most evident for determining the *location* of 911 calls, which is perhaps the most critical component of the emergency call process, as it determines to which PSAP a 911 call will be routed and impacts how quickly first responders can arrive on site. The ensuing discussion will highlight the advancements – and challenges – imposed by developments in communications technology over the last 50 years.

Basic 911 Technology

Basic 911 began when the first official 911 call was placed in 1968. By reconfiguring the wireline circuit-switched technology used by public switched telephone networks (PSTNs), ILECs were able to create analog switches that could process dialing the three digits "9-1-1" to place a call, as opposed to the standard seven-digit telephone numbering system. This created a direct link between an ILEC's central office and a single corresponding PSAP.³⁷ Exhibit 1 below presents a high-level overview of the basic 911 process.

³³ PEMA defines a telecommunicator as "an individual employed by a PSAP whose primary responsibility is to receive, process, transmit, and/or dispatch emergency and non-emergency calls for service for emergency medical, fire/rescue, law enforcement and other public safety services, via telephone, radio, and other communication devices." Inclusive in this term is 911 call-takers, dispatchers, and supervisors. Unless referring to a specific function, this report will generally refer to PSAP staff as "telecommunicators". See PEMA, *Commonwealth of Pennsylvania 911 Training, Certification, and Quality Assurance/Quality Improvement Requirements*, 2019.

³⁴ Vera Institute of Justice, *The 911 Call Processing System: A Review of the Literature as it Relates to Policing*, 2019.

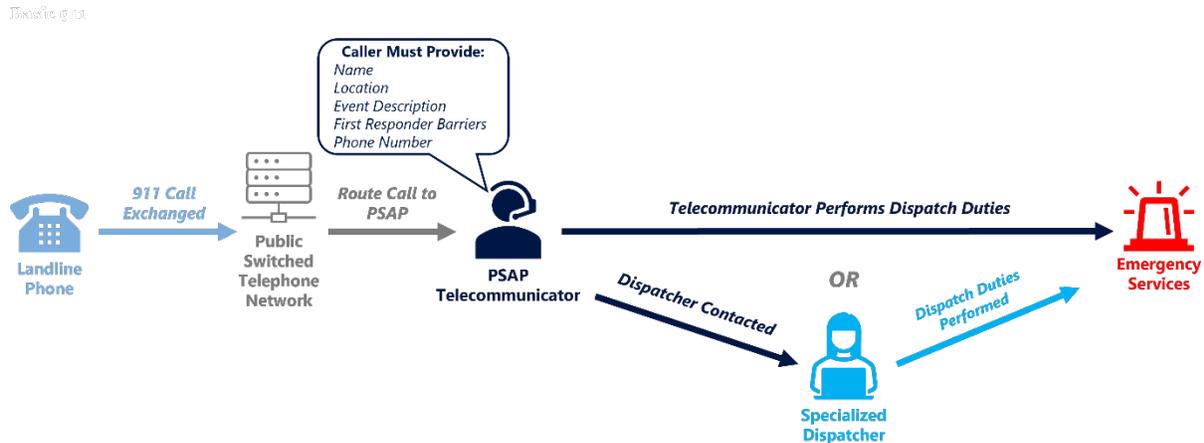
³⁵ Ibid.

³⁶ Ibid.

³⁷ See The 911 Education Foundation, *History of 911*, 2015.

Exhibit 1

Basic 911 Process Overview*



Note:

*/This graphic has been simplified for illustrative purposes.

Source: Developed by LBFC staff from information provided by the 911 Education Foundation and Vera Institute of Justice.

As shown in Exhibit 1, a key limitation to this structure is that the caller must relay information to the telecommunicator for which they may not be aware (e.g., location and callback number). Additionally, as more PSAPs were established in the 1970s, it became crucial that 911 calls be routed to the nearest PSAP from the caller’s location, rather than having the telecommunicators contact the appropriate PSAP or redirecting the caller to a telephone operator.³⁸

Enhanced 911 Technology

Shortly after the implementation of basic 911, the initial infrastructure for E911 technology was being developed. The framework of all E911 technologies is location-based functionality.³⁹ Using tools that automatically identify a 911 caller’s location, name, and callback number, telecommunicators have been able to gather key details about an event before initiating a call, which can save valuable time in life threatening situations. However, over the last several decades, E911 technology has had to keep pace with communications technology to stay relevant and to provide reliable information to PSAPs. Although the intricacies of each are rather complex, a simplified overview of the E911 processes discussed is presented in Exhibit 2 at the end of this section.

³⁸ Ibid.

³⁹ Ibid.

Traditional E911. The original E911 technology was developed in the mid-1970s. Using technology created for billing purposes, ILECs were able to create databases of subscriber phone numbers, known as Automatic Number Identification (ANI), as well as the addresses associated with each landline, known as Automatic Location Identification (ALI). When a 911 call is placed, a 911 selective router queries a selective routing database (SRDB) using the ANI to determine the originating telephone number's corresponding address location on a master street address guide (MSAG).⁴⁰ Each record within the MSAG has a predetermined PSAP to which the call should be routed. As the call is being delivered to the appropriate PSAP, the call center's equipment again uses the ANI to search the ALI database. After the ALI record is returned, the PSAP's customer premise equipment (CPE) displays the originating telephone number, along with the name and address associated with that number, on the telecommunicator's screen prior to answering the call.⁴¹

Although beneficial, traditional E911 systems started to become outdated with the advancement of wireless cell phone services in the 1990s. Since E911 systems identified caller location based on the fixed-installation address of the telephone number, mobile phones proved to be a challenge since their users can call from anywhere. Further, a 911 call from a wireless phone will go to the nearest PSAP from the *cell tower* at which the call is transmitted, regardless of where the user has purchased cellular service.⁴² For example, providing a telecommunicator with the subscriber address for a cell phone customer from Philadelphia would provide no benefit if they were calling 911 while visiting Pittsburgh. This assumes that address and caller information could even be provided at all, which was another prevalent issue given that ANI and ALI databases were built using customer information from ILEC landline systems.

Wireless E911. To address many of the issues described above, the FCC released rules pertaining to wireless E911 in 1996. Given that wireless service carriers were not previously required to integrate within the 911 system, the FCC introduced a phased implementation approach to allow providers time to meet the new federal standards. Phase I implementation required wireless providers to deliver 911 calls and originating cell site location to the most appropriate PSAP by no later than April 1998.^{43,44} Phase II implementation required providers to use global positioning systems (GPS) or cell tower triangulation to provide caller latitude

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² Vera Institute of Justice, *The 911 Call Processing System: A Review of the Literature as it Relates to Policing*, 2019.

⁴³ See <https://www.nena.org/page/911Cellphones>, accessed August 3, 2021.

⁴⁴ The first Phase I 911 call in the United States was made in Allentown, Pennsylvania during a trial project with CellularOne and XYPoint. See <https://web.archive.org/web/20190827200923/https://www.allentownpa.gov/Manage/Disabled-Pages/911-Communications-Center/History-of-9-1-1>, accessed August 3, 2021.

and longitude to PSAPs within specified location accuracy standards⁴⁵ by October 2001.⁴⁶

However, wireless E911 was not without its challenges. For example, many carriers could not meet the deadline for Phase II implementation, which forced the FCC to grant extensions for several years.^{47,48} Further, even as wireless E911 technology has improved, there are still limitations. One significant limitation involves call routing to the appropriate PSAP. For example, since wireless 911 calls are transmitted to the nearest PSAP from the cell tower used, it is not uncommon to have calls routed to the incorrect PSAP when the tower is located outside of the correct PSAP's jurisdiction (e.g., if a caller is located near a county border).⁴⁹ In times of high call volume, or when weather or other obstructions block access to the closest cell tower, wireless phones will often search for the next available tower, which can be further away from the caller's location.⁵⁰ These issues are further complicated if the cell tower used is located across a state border, as often interstate PSAP connections do not exist.

While wireless E911 has come a long way since 1996, with roughly 70 percent of nationwide 911 calls occurring by cell phone in 2019, the effectiveness of this system is imperative for the long-term reliability of the 911 system overall.⁵¹

Voice Over Internet Protocol E911. In recent years, perhaps the biggest change in the 911 system has been the use of Voice over Internet Protocol (VoIP) technology. VoIP allows users to make calls anywhere an internet connection is available. While some VoIP phones are connected to the traditional PSTN via broadband, others can be mobile, which leads to similar issues with location detection as described with cell phones above.⁵² Adding to this issue is the fact that the FCC chose not to heavily regulate VoIP during the inception of the industry, in attempts to boost innovation and competitive market pressure. However, many

⁴⁵ Providers using GPS were required to have locational accuracy within 50 meters for 67% of all 911 calls and within 150 meters for 90% of calls. Carriers using cell tower triangulation were required to be accurate within 100 meters for 67% of calls and within 300 meters for 90% of calls. See The 911 Education Foundation, *History of 911*, 2015.

⁴⁶ See <https://www.nena.org/page/911Cellphones>, accessed August 3, 2021.

⁴⁷ See <https://www.fcc.gov/document/fcc-clarifies-geographic-area-over-which-wireless-carriers-must-meet>, accessed August 3, 2021.

⁴⁸ Furthermore, while having latitude and longitude coordinates may be beneficial in less populated areas, it is not nearly as useful in urban locations, where populations are densely packed into office buildings, multi-family homes, and apartment complexes. Following the Ray Baum Act of 2018, a major focus for FCC is the provisioning of "dispatchable locations," such as address, floor level, and room number. See 86 FR 8714.

⁴⁹ Vera Institute of Justice, *The 911 Call Processing System: A Review of the Literature as it Relates to Policing*, 2019.

⁵⁰ See <https://www.fcc.gov/consumers/guides/understanding-wireless-telephone-coverage-areas>, accessed August 4, 2021.

⁵¹ FCC, *Twelfth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges*, 2020.

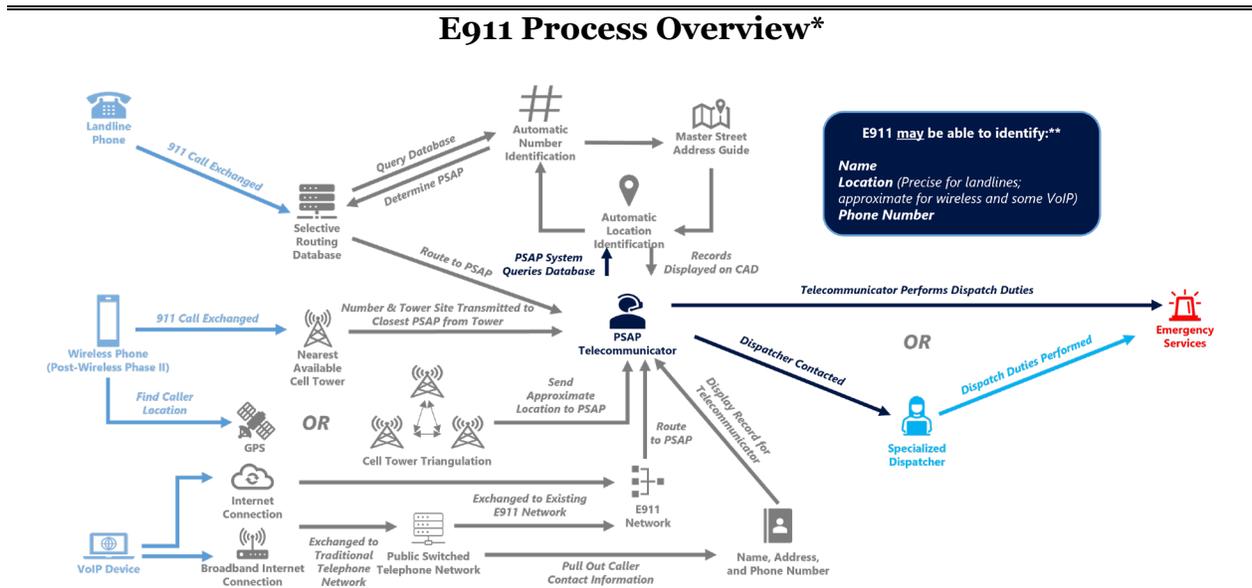
⁵² See The 911 Education Foundation, *History of 911*, 2015.

VoIP providers avoided problems with integrating into the E911 system by not servicing their customers with 911 capabilities.⁵³

Eventually, the New and Emerging Technologies 911 Improvement Act of 2008 required VoIP providers to connect to the E911 system, and the FCC began to regulate the 911 capabilities of these emerging services.⁵⁴ The FCC required VoIP systems connected to the PSTN to adhere to existing E911 requirements, while VoIP systems not connected to the PSTN were directed to inform customers of their 911 limitations, including that they may need to identify their name, location, and callback number to telecommunicators.⁵⁵

Exhibit 2 below shows a high-level overview of the traditional, wireless (post-phase II), and VoIP E911 processes.

Exhibit 2



Notes:

*/This graphic has been simplified for illustrative purposes.

**/PSAPs will typically have a standard list of questions that telecommunicators will use for each call, including a confirmation of location and contact information.

Source: Developed by LBFC staff from information provided by the 911 Education Foundation, Vera Institute of Justice, and the FCC.

⁵³ Ibid.

⁵⁴ See The 911 Education Foundation, *History of 911*, 2015.

⁵⁵ FCC, *Consumer Guide: VoIP and 911 Service*, 2019.

VoIP presents several hurdles for the 911 system that are still unresolved. As described above, VoIP callers using mobile devices often do not have their names, locations, or numbers shared with PSAPs, further delaying assistance from first responders. Additionally, the technological capability of VoIP has increased the ability for users to share photos and videos quickly and easily across networks. While having this information in real time could prove valuable to telecommunicators and other first responders, most PSAPs still operate using infrastructure from the B911 system, albeit with certain modifications and upgrades (also called “legacy 911”).

PSAPs operating on legacy 911 systems are incapable of receiving photos or videos – and in some cases, text messages – from 911 users, leading to a major gap in the current 911 system’s functionality.⁵⁶ However, this gap has led to a push over the last decade for the “next generation” of 911 systems.

Next Generation 911

By the 21st century, it was evident that the 911 system needed modernization. Legacy systems initially designed in the 1970s were unable to reach the full potential of contemporary technology, such as text messaging, video calling, and image sharing. The advancements available to the public in their everyday communications were not present in the emergency service communications system. Similarly, wireless and VoIP communications were creating a challenge for call routing and location identification. PSAPs still largely operated on localized systems, leading to disjointed communication that only enhanced routing issues.

However, these challenges guide the vision for Next Generation 911 (NG911). USDOT launched the NG911 Initiative in 2004, with a stated vision for the public to be able to contact 911 from “any wired, wireless, or IP device,” using a system of interworking technology that would allow PSAPs to share “location and other critical data, such as text messages, images, video, with the call” with other PSAPs along with first responders.⁵⁷

The NG911 infrastructure will accomplish these goals by creating what is often described as a “system of systems.” Legacy tools such as the SRDB, MSAG, ANI, and ALI will be retired in favor of an Emergency Services IP Network (ESInet). The ESInet is planned to be a nationwide network that is parallel to, but separate from, the public internet, and will only be used to support emergency communications among public safety agencies.⁵⁸ The system is intended to be interconnected, allowing PSAPs to communicate with their counterparts across the country. These connections

⁵⁶ FCC, *Consumer Guide: VoIP and 911 Service*, 2019.

⁵⁷ United States Department of Transportation, *Next Generation 9-1-1 System Initiative Concept of Operations*, 2007.

⁵⁸ See The 911 Education Foundation, *History of 911*, 2015.

are described as being seamless, secure, and redundant, meaning that a failure at one PSAP will not bring down the entire system, and that calls can easily be rerouted during an outage.⁵⁹

The most profound change from legacy 911 to NG911 will be in location detection and call routing technology. Rather than using traditional databases centered on the subscriber information of communication providers, NG911 will employ geographic information systems (GIS). A GIS database can comprise numerous layers of topographical information, including landscape, soil, vegetation, bodies of water, manmade structures, highways, and electrical power lines, among others.⁶⁰

For NG911, GIS databases will not only maintain municipal delineations such as addresses and county lines; they will also include the jurisdictional borders between PSAPs. Further, GIS can use address information as well as latitude and longitude to identify caller location (known as Location Validation Function) and route calls more accurately to the appropriate PSAP. This technology can even show telecommunicators event histories for the location, as well as events that have occurred in similar areas. As opposed to the disparate databases of the legacy 911 system, a NG911 GIS database will wholistically maintain this information, which will allow for easy sharing among telecommunicators and first responders.⁶¹ A high-level overview of the NG911 process can be seen in Exhibit 3. Please note that the process illustrated below has been simplified for summary purposes.

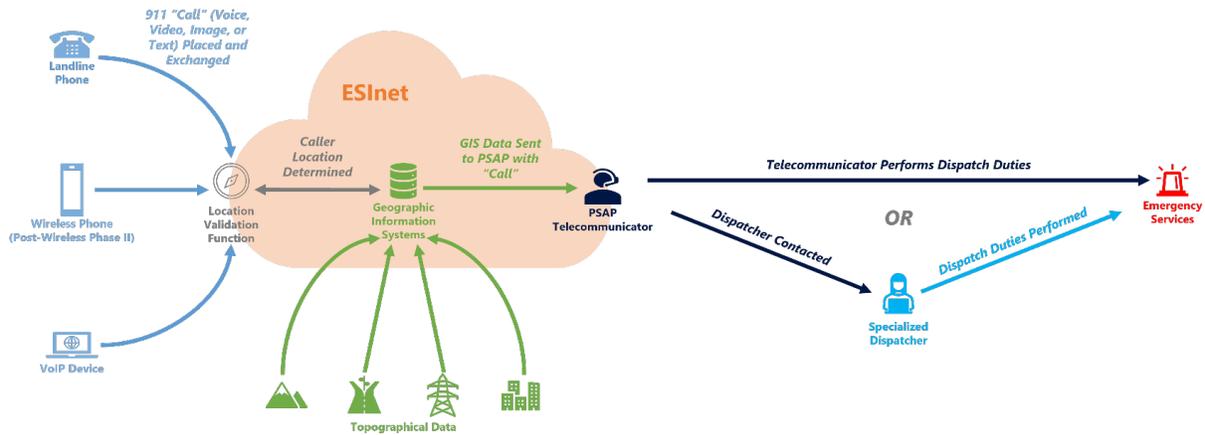
⁵⁹ Ibid.

⁶⁰ See <https://www.nationalgeographic.org/encyclopedia/geographic-information-system-gis/12th-grade/>.

⁶¹ See The 911 Education Foundation, *History of 911*, 2015.

Exhibit 3

Next Generation 911 Process Overview*



Notes:

*/This graphic has been simplified for illustrative purposes.

Source: Developed by LBFC staff from information provided by the FCC.

The advantages of NG911 are readily apparent. For example, NG911's ESInets will better accommodate dynamic locational data from modern communication devices and will be more resilient to acts of nature. Integration of video, images, personal health and safety devices, and topographical data will vastly increase the situational awareness of emergency personnel. Interconnected network systems will allow for geographically separated PSAPs to consolidate infrastructure and will enhance the ability of PSAP staff to work remotely. Finally, the modular change capacity built into the NG911 system will allow for the faster deployment of updates, which will keep the 911 system on pace with the advancement of communications technology.⁶²

However, states implementing NG911 systems do face several challenges. Most immediate among these issues is that of funding. The costs associated with building a new modernized system alone are quite high,⁶³ but states and local governments must also continue to maintain their current systems until the migration to NG911 is complete. This financial burden is only enhanced by the fact that many states fund their

⁶² Ibid.

⁶³ A 2018 cost study from the National 911 Program estimated that the cost to deploy NG911 nationally could range between \$9.5 and \$12.7 billion, with lifecycle costs (equipment refreshes, ongoing operational costs, etc.) to range between \$13.5 and \$16 billion. See 911 Implementation Coordination Office, *Next Generation 911 Cost Estimate: A Report to Congress*, 2018.

911 programs through tariff-based structures, which until recently depended heavily upon fees from wireline telephone use, despite its decreased market share.⁶⁴

Other issues states will have to overcome result from increased dependence on IP technology. Cyber threats will become a greater concern; therefore, states will have to maintain vigilant cybersecurity measures. The equipment and software that these systems use can become outdated with remarkable speed, leading to an increased frequency at which updates will be required. Further, whereas updates in the legacy 911 system could happen in isolation, the interconnected nature of NG911 means that updates to a single component could have downstream impacts to other elements in the system. Finally, the resources needed to be dedicated to training staff on these new systems is expected to increase as the technology involved becomes more complex.⁶⁵

911 Service Fee Structures

Many of the PSTN modifications that were needed to create the original 911 systems were completed by ILECs, who adopted policies that would absorb the associated costs into the companies' rate bases.⁶⁶ As 911 expanded throughout the country, many state legislatures and utility regulators established arrangements with the ILECs in their jurisdictions to tariff customers via monthly service fees at rates set by the state. The ILECs would remit these fees to the state, localities, or both, and then request payment for services from the appropriate 911 entity – in essence creating state regulated monopolies over the emergency communications systems.⁶⁷

The service fee model is still used today, although the process varies widely from state to state (see Section III). While adequate in the era of basic 911 services, this funding model has faced increasing scrutiny in the push for NG911. By far the biggest challenge that the current 911 service fee model has faced is its reliance on wireline communications. Although the number of subscribers to wireline telecommunications services has been steadily declining since the 1990s, many states were ill-equipped to immediately handle this shift because wireless and VoIP communications were not included in the original service agreements for 911 funding. States were therefore required to make legislative updates, which took time and led to a period of lost revenue.⁶⁸ Furthermore, typically sur-

⁶⁴ See The 911 Education Foundation, *History of 911*, 2015.

⁶⁵ *Ibid.*

⁶⁶ See <https://www.nena.org/page/911overviewfacts>, accessed July 29, 2021.

⁶⁷ See The 911 Education Foundation, *History of 911*, 2015.

⁶⁸ National 911 Program, *Current State of 911 Funding and Oversight*, 2013.

charges for wireless and VoIP services were not equivalent to the rate assessed to wireline customers,⁶⁹ and it was only recently that the three service fee rates began to even out.⁷⁰

Regardless of fee structure used, it is evident that the amount of revenue produced by 911 service fee collection is not enough to sustain the 911 system nationally. While in 2016 fees were expected to cover 79 percent of 911 costs across the country,⁷¹ that ratio had shrunk to 56 percent coverage four years later.⁷² Even though the national average for service fee rates increased over the period, the estimated costs to provide 911 services grew exponentially from \$3.5 billion in 2016⁷³ to \$5.7 billion in 2020.⁷⁴ The rise in expenditures is likely due to a variety of factors, including increases in personnel costs, dispatch expenses, and NG911 implementation balanced with maintaining legacy 911 systems.⁷⁵ Additionally, many states have eligibility requirements for their 911 service fee funds, meaning counties have to pay for ineligible expenses (e.g., brick and mortar updates) out of their general funds. All these topics will be explored throughout this report, as they impact the operation of the 911 system in Pennsylvania.

Act 12 of 2015 and the Current State of the 911 System in Pennsylvania

Act 12 of 2015 is the current legislation governing the 911 system in Pennsylvania. A major milestone in the progression of the 911 system in the commonwealth, the legislation rewrote many of the 911 statutes and looked to address many of the areas of concern for the 911 community prior to 2015, as well as prepare the state for the integration of 21st century technology into the 911 system. This discussion will briefly highlight some of Act 12's key changes in the areas of next generation development, 911 system governance, and 911 system funding. A full summary

⁶⁹ In 2016, the FCC reported that the national average 911 fees were \$1 for wireline, \$0.92 for wireless, and \$0.96 for VoIP. See FCC, Ninth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges, 2017.

⁷⁰ In 2019, the FCC reported that the national average 911 fees were \$1.04 for wireline, \$1.03 for wireless, and \$1.05 for VoIP. See FCC, Twelfth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges, 2020.

⁷¹ FCC, Ninth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges, 2017

⁷² FCC, Thirteenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges, 2021.

⁷³ FCC, Ninth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges, 2017.

⁷⁴ FCC, Thirteenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges, 2021.

⁷⁵ Ross, Closing the 911 Funding Gap: Increasing Revenues for 911 Emergency Dispatch Centers, 2020.

of the history and legislative milestones for the 911 system in Pennsylvania can be found in Appendix C.

911 Fund Fee Collection and Distribution

One of the main areas of focus for Act 12 was 911 system funding. To address revenue concerns amid the evolving communications environment, the commonwealth implemented a uniform monthly surcharge of \$1.65⁷⁶ for wireline, monthly post-paid wireless, and VoIP services effective on August 1, 2015. These surcharges are collected by communications providers and remitted to the Pennsylvania Treasury for deposit into the 911 Fund on a quarterly basis.⁷⁷

Additionally, prepaid wireless customers are assessed a \$1.65 point-of-sale transaction fee (also called the “E-911 Surcharge”), which is remitted by retailers to the Department of Revenue (DOR) in accordance with their sales/use tax return deadlines (typically monthly or quarterly).⁷⁸ DOR then transfers these fees to the State Treasury for deposit into the fund.

Once the service fees have been remitted, Act 12 tasks the Pennsylvania Emergency Management Agency (PEMA) with the quarterly distribution of 911 Fund revenue. The legislation puts several stipulations on how this funding can be allocated. At a high level, Act 12 requires that 83 percent of quarterly funding is distributed to the county PSAPs, 15 percent must be used to support statewide interconnectivity efforts, and two percent can be retained by PEMA for administrative purposes.⁷⁹ However, within those parameters, PEMA and the 911 Advisory Board have some discretion in how that funding is distributed. A full review of the current distribution methods is provided in Section III of this report. Proposals for future changes to the distribution methodology are discussed in Section V.

Next Generation 911 Development

Act 12 directed PEMA and the 911 Advisory Board to develop and adopt a plan for the transition to NG911.⁸⁰ PEMA has subsequently released a NG911 Strategic Plan, as well as annual NG911 technology requirements. The focus of this plan is the development and adoption of a statewide

⁷⁶ For businesses or other locations employing multi-line telephone systems (MLTS), there is a reduction in fee rates based on the number of lines in use. See 35 Pa.C.S. Ch. 53. §5306.2.

⁷⁷ 35 Pa.C.S. Ch. 53. §5306.2.

⁷⁸ 35 Pa.C.S. Ch. 53. §5306.2 and §5307.1.

⁷⁹ 35 Pa.C.S. Ch. 53. §5306.1 (d).

⁸⁰ See 35 Pa.C.S. Ch. 53. §5303.

ESInet, Next Generation Core Services (NGCS) system,⁸¹ and GIS software. While the plan promotes regionalization as a mechanism for achieving the development of such systems, the end goal is a larger “system of systems” at the statewide level. An overview of the state’s NG911 project and review of the project’s status is provided in Section III.

System Governance and Oversight

The provisions of Act 12 enhance PEMA’s ability to oversee the commonwealth’s 911 system while still maintaining elements of local involvement that had been established two decades prior. At the statewide level, standards are set by PEMA in consultation with the 911 Advisory Board, which has representation from 911 directors, county commissioners, the General Assembly, and statewide emergency services organizations.

Counties still maintain accountability in developing their own 911 plans, but they must adhere to PEMA’s statewide standards.^{82,83} PEMA, in turn, has more responsibility when creating statewide regulations, NG911 policies and plans, and standardized accounting and reporting procedures. This authority also comes with improved enforcement capabilities, which were lacking previously.

Simplified spending eligibility rules and reporting guidelines have reduced the administrative burden experienced by the PSAPs and has helped to give PEMA actionable information that can be used in statewide planning, budgeting, and policy development. PEMA also uses its administrative role to incentivize regionalization, voluntary consolidation, and other cost-sharing measures for county PSAPs where suitable.⁸⁴ Although Section III is primarily devoted to the statewide 911 system, PEMA’s role in program governance and oversight is referenced at various times throughout this report.

Key Stakeholders in Pennsylvania

A key theme in the development of the 911 system in Pennsylvania has been cooperation among private industry, state officials, and local governments. Although the primary regulatory capacity for 911 sits with PEMA, Act 12 has retained the input of various stakeholders through the 911 Advisory Board.

⁸¹ A NGCS system would include elements integral for 911 call routing via an IP network, such as an emergency call routing function (ECRF), emergency services routing proxy, location validation function, and policy routing function. See PEMA, *Commonwealth of Pennsylvania Statewide 911 Plan*, 2019.

⁸² PEMA, *Next Generation 9-1-1 Report and Recommendations*, 2017.

⁸³ 35 Pa.C.S. Ch. 53. §5303.

⁸⁴ PEMA, *Next Generation 9-1-1 Report and Recommendations*, 2017.

The State Treasury and DOR also play key roles in the collection and transmission of 911 service fees via the 911 Fund. At the local level, counties still have relative autonomy in the creation of 911 plans and maintenance of systems, and the 61 primary PSAPs that serve Pennsylvania are beginning to experience more regional collaboration as a part of the NG911 model. The following section will highlight the key duties charged to the entities of Pennsylvania's 911 system.

Pennsylvania Emergency Management Agency

Created by Act 323 of 1978, the PEMA is tasked with "prompt, proper, and effective discharge of basic commonwealth responsibilities relating to civil defense and disaster preparedness, operations and recovery."⁸⁵ To meet this goal, PEMA relies on coordination with local, state, and federal government entities, volunteer organizations, private industry, and citizens across the commonwealth.

PEMA was originally charged with providing technical oversight for the emergency communications system but had become the primary state oversight entity for 911 by 1996. Act 12 increased the agency's responsibilities for statewide 911 planning, budgeting, and enforcement.⁸⁶ As such, PEMA has outlined strategic priorities for Pennsylvania's 911 system, including the adoption of service standards and system requirements, advancement of fiscally sound policies, creation of GIS and call record datasets, and development of statewide interconnectivity of systems within NG911, among others.⁸⁷

The agency sets spending eligibility requirements for 911 system funding, apportions, and distributes revenue from the 911 Fund to the counties on a quarterly basis, and reviews PSAP expenditures for guideline compliance. Following the migration to NG911, PEMA will take over the traditionally county-held role of procuring call delivery services, which is expected to help to advance its goal of statewide interconnectivity.⁸⁸ As the primary steward of the state's 911 system, PEMA's responsibilities and perspective on the 911 program will be integrated throughout this report.

Within PEMA, the 911 Office is the main bureau for emergency communications oversight. Currently, the 911 Office consists of ten staff and two administrators, all led by a Deputy Director for 911. The office is

⁸⁵ 35 Pa.C.S.A. §7311 *et seq.*

⁸⁶ PEMA, Next Generation 9-1-1 Report and Recommendations, 2017.

⁸⁷ PEMA, *Commonwealth of Pennsylvania Statewide 911 Plan*, 2019.

⁸⁸ PEMA, Next Generation 9-1-1 Report and Recommendations, 2017.

grouped into two divisions: operations and administrative. The Operations Division focuses on the functioning capabilities of the 911 system, such as technology, GIS, program analysis, quality assurance, and training. The Administrative Division handles the organizational capacity of the system, including accounting, public education, program management, and support.⁸⁹ The office places an emphasis on collaboration, working heavily with the 911 Advisory Board, county PSAPs, communications providers, and others to administer 911 services throughout the commonwealth.

911 Advisory Board

The 911 Advisory Board was created by Act 12 to advise PEMA on the administration and operation of the commonwealth's 911 system.⁹⁰ Specifically, the Board assists PEMA in developing planning guidelines, performance standards, training policies, and NG911 deployment strategies. In addition, the Board reviews PSAP performance to ensure compliance with federal regulations and industry standards. It also helps PEMA to promote regionalization, information sharing, and joint purchasing opportunities for PSAPs. Finally, the Board provides recommendations to PEMA during the development of 911 Fund distribution formulas.⁹¹ Similar to PEMA, since the Advisory Board is involved in many areas of 911 oversight across the system, its roles and duties will be referenced at various times throughout this report.

The current 911 Advisory Board consists of 42 members with a wide array of experiences, backgrounds, and skillsets from across Pennsylvania. By statute, the Board contains a core group of voting members from the state and local levels. Statewide voting members include the following:

- The director of PEMA, who serves as the Board's chair.
- The state 911 coordinator (PEMA Deputy Director for 911).
- The commissioner of the Pennsylvania State Police.
- The state Fire Commissioner.
- The chair and vice chair of the Senate Veterans Affairs and Emergency Preparedness Committee.
- The chair and vice chair of the House Veterans Affairs and Emergency Preparedness Committee.
- The chair of the state Geospatial Coordinating Board.⁹²

The Board also contains six local officials and six 911 coordinators who serve as voting members and represent groupings of the city/county classes within the commonwealth. Except for Philadelphia, which is the

⁸⁹ PEMA, 911 Office Organization Chart, 2021.

⁹⁰ See <https://www.pema.pa.gov/911-Program/911-Advisory-Board/Pages/default.aspx>, accessed August 26, 2021.

⁹¹ See 35 Pa.C.S. Ch. 53. §5303.

⁹² Ibid.

only first class city/county in Pennsylvania, all these members are appointed to the Board by the Governor to serve two-year terms.⁹³ Finally, the 911 Advisory Board includes a large contingent of non-voting members from a variety of organizations across the state, such as the Pennsylvania Public Utility Commission, the Governor's Office of Administration, the Pennsylvania Chapter of NENA, and the Association of Public Safety Communications Officials, to name a few.⁹⁴

County Public Safety Answering Points

PSAPs are the primary contacts for the public to receive emergency services in Pennsylvania. Like most of the United States, PSAPs developed locally, which for Pennsylvania was at the county level. Act 78 codified this county responsibility, with only two city-run PSAPs in Allentown and Bethlehem being grandfathered into the system.⁹⁵ As mentioned previously, the responsibility for emergency communications service delivery sat primarily with the counties for the first 25 years of the statewide 911 system in Pennsylvania. Counties oversaw wireline and VoIP fee rate setting and collection. With limited exceptions, counties purchased and maintained their equipment and systems independently. While some of this responsibility has shifted away from the PSAPs since 2015,⁹⁶ the counties are still accountable for provisioning their own 911 systems under Act 12.⁹⁷ However, options to consolidate and regionalize have always been available to the counties and have only increased since the passing of Act 12 (discussed further in Section V).

Currently 61 primary PSAPs serve Pennsylvania's 67 counties. These 911 centers field approximately 14.5 million calls annually.⁹⁸ These PSAPs can be quite unique, each differing in size, call volume, staffing levels and duties, and infrastructure. However, each center provides a valuable service for the safety of citizens across the commonwealth. Section IV is devoted to a review of PSAP operations, with additional opportunity and challenge areas for the counties presented in Section V. Nevertheless, given the role that the counties have in the operational aspects of the 911 system, certain topic areas – such as 911 Fund distributions and NG911 – would be impossible to discuss without also mentioning the counties.

⁹³ The breakdown of local officials on the 911 Advisory Board is as follows: one mayor and one 911 coordinator from a first-class city; one county executive and one 911 coordinator from a second-class county; one county commissioner and one 911 coordinator from a second-class A county; one county commissioner and one 911 coordinator from a third or fourth-class county; two county commissioners and two 911 coordinators from fifth, sixth, seventh, or eighth-class counties. See 35 Pa.C.S. Ch. 53. §5303.

⁹⁴ Ibid.

⁹⁵ These two PSAPs were consolidated with their respective counties in 2019. Please see Section V for further discussion. See PEMA, *Next Generation 9-1-1 Report and Recommendations*, 2017.

⁹⁶ Berks County still collects a municipal 911 surcharge, and invoices entities directly for 911 services. See PEMA, *Commonwealth of Pennsylvania Public Safety Answering Point Inventory Report*, 2016.

⁹⁷ 35 P.S. §5304 (a).

⁹⁸ See <https://www.pema.pa.gov/911-Program/Pages/default.aspx>, accessed August 26, 2021.

Pennsylvania Treasury

The Pennsylvania Office of the State Treasurer has been the primary guardian of commonwealth funds since its creation in 1777. The Treasurer is accountable for activities involving state monies including investments and oversight of deposits and withdrawals from state agencies.⁹⁹ The Treasury's involvement in 911 began in 2003 with the passage of Act 56. By 2015, the Treasury was collecting remittances directly from wireless service providers, receiving prepaid wireless fees from DOR, and had the option of receiving remittances for VoIP surcharges – all of which were placed in the Wireless E911 Fund. Under Act 12, the state Treasurer now oversees all service fees as the custodian of the 911 Fund. Wireline, post-paid wireless, and VoIP fees are received directly from service providers, while prepaid wireless fees are collected via DOR. Each quarter, the Treasury appropriates the revenue from the 911 Fund to PEMA for distribution to the county PSAPs using an allocation formula developed by the 911 Advisory Board.

Pennsylvania Department of Revenue

DOR was founded in 1927 and is responsible for collecting most tax levies, fees, fines, and other monies due to the commonwealth.¹⁰⁰ DOR's involvement in the 911 program centers on the collection of prepaid wireless 911 fees, which was first enacted under Act 18 of 2010. Act 12 directs DOR to collect the \$1.65 transaction fee from retailers as part of sales/use tax collection, which can occur on either a monthly or quarterly basis. Within a month of collecting these surcharges, DOR is to pay all fees to the state Treasurer for placement in the 911 Fund.¹⁰¹ Additionally, as will be discussed in Section III, DOR also works with PEMA to audit providers remitting service fee revenue into the 911 Fund.

⁹⁹ See <https://www.patreasury.gov/>, accessed August 26, 2021.

¹⁰⁰ Pennsylvania Department of Revenue, *Strategic Plan 2016-2020*, 2017.

¹⁰¹ See 35 Pa.C.S. Ch. 53. §5307.1.

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SECTION III STATEWIDE 911 PROGRAM REVIEW



Fast Facts...

- ❖ *At approximately \$317 million per year, the current uniform surcharge brought Pennsylvania the most average annual 911 service fee revenue in the country between 2016 and 2020.*
- ❖ *The 911 Fund Distribution Formula has disbursed an average of \$271 million in service fee revenue to the counties each year.*
- ❖ *The statewide interconnectivity grant program is a successful initiative that has awarded over \$170 million to the counties since 2016*
- ❖ *The first phase of NG911 implementation, call delivery, is scheduled to be completed next year.*

Overview

Although the 911 system has traditionally been a county function in Pennsylvania, oversight at the state level has been provided since the passing of Act 78 in 1990. In 2015, Act 12 empowered PEMA with increased authority over statewide 911 system governance, funding, planning, and oversight. Today, PEMA can best be described as the “steward” of the commonwealth’s 911 program – establishing the system guardrails for the counties to follow. In this section, we cover two main themes. First, funding, which is reviewed across three issue areas – remittance collection, funding distribution, and PEMA’s administrative spending (analysis of county expenses is provided in Section IV). Second, we cover the commonwealth’s 911 system planning and specifically the development of the NG911 project. Throughout, we will highlight areas where PEMA has provided statewide governance and oversight of the counties’ activities.

Prior to 2015, the commonwealth’s service fee remittance model was complex and disparate. Act 12 revised this model and implemented a uniform \$1.65 surcharge, which became effective on August 1, 2015. As a result, when reviewing the average total yearly revenue for the period between 2016 – 2020, to the final year of revenue generated under the old (2014) model, we found the Fund generated 66 percent more revenue. Although we can attribute this increase to the higher (and more uniform) surcharge rate, operational efficiency in remittance collection has also improved. Compared to other states, we found that Pennsylvania generated the most average annual 911 service fee revenue in the country between 2016 and 2020. However, as will be discussed below and further in Section V, several potential challenges loom, particularly in the proper determination of VoIP devices for service fee assessment.

As a result of Act 12, PEMA and the 911 Advisory Board also have more control over the distribution of 911 service fee revenue. However, the Act does establish certain requirements. Specifically, 83 percent of Fund revenue – which equates to approximately \$271 million per year – must be distributed to the counties via a distribution formula created by PEMA and the Board. To date, there have been two distribution formulas – an interim formula created by the Act (used in 2015 – 2016) and the current formula created by PEMA and the Board (2017 – present).

The Act also requires PEMA to distribute 15 percent of Fund revenue to the counties to create statewide interconnectivity of 911 systems. This aspect has been carried out via a competitive grant program overseen by PEMA and the Board. PEMA awarded over \$170 million in grants to the counties for the five-year period, in addition to supporting statewide interconnectivity through the NG911 project. In the coming years, the grant process will be phased out in favor of coordinated disbursements of interconnectivity funding, which will aid in the planning and payment of the statewide NG911 system. The grant initiative has been successful in achieving the intent of the statute's requirements.

Act 12 allows PEMA to retain up to two percent of quarterly Fund revenue to cover its administrative costs. We found that PEMA retained an average of \$6.3 million in Fund revenue each year but took less than its two percent allotment so that the revenue could be used to support the operation of the statewide 911 system. PEMA budgeted approximately \$3.5 million in expenditures each year, nearly all of which was dedicated to personnel and operating costs. However, unlike most government agencies, operating costs make up the largest share of PEMA's yearly spending. This is primarily because PEMA has needed to contract with many professional services in order to carry out the more specialized system requirements of the Act. While overall 911 system costs are expected to rise in the upcoming years, neither we nor PEMA hold concerns regarding the adequacy of the agency's funding allowance or spending practices.

Finally, SR 96 asks us to determine the capacity for NG911 development in the commonwealth. We found that PEMA has identified priorities needed for NG911, including the creation of a statewide ESInet and related Next Generation Core Services (NGCS). These priorities will be used to migrate Pennsylvania into the first phase of NG911 implementation, which pertains to call delivery. The first steps towards ESInet development began in earnest in 2021, and the first phase of NG911 implementation is scheduled to be completed in 2023. Although we found there is no universal method to achieve NG911 capable systems, we assessed the progress of Pennsylvania's NG911 project to be similar to that of other initiatives across the country.

Issue Areas

A. 911 Service Fee Review

Prior to Act 12, the 911 service fee remittance process was multi-layered and complex. The process involved the counties and multiple state agencies performing similar tasks. Fees differed by service type and, as

was the case with wireline fees, could even vary by county size. Overall, the process was inefficient, and as a result, reduced the level of revenue received by the state's 911 system.

Due to the issues previously described, one of the main goals for Act 12 was improved 911 system funding. In this issue area, we will provide an overview of the current surcharge remittance process, review the levels of funding received, and compare Pennsylvania's service fee and 911 revenue to that of other states.

911 Surcharge Remittance Overview

To address revenue concerns amid the evolving communications landscape, Act 12 revised the commonwealth's 911 funding model from a fee that varied by service type to a uniform surcharge. Starting on August 1, 2015, a monthly surcharge of \$1.65 per subscriber was implemented for wireline, postpaid wireless, and VoIP services.¹⁰² The Act also streamlined the collection process for these surcharges. Fees are still collected by communications providers but are now all remitted to the state Treasury for deposit into the 911 Fund on a quarterly basis. The Act allows both providers and the Treasury to retain one percent of revenue collected for administrative processing costs.¹⁰³

Additionally, prepaid wireless customers are assessed a \$1.65 point-of-sale transaction fee, which is also known as the "E-911 surcharge." The E-911 surcharge is remitted by retailers to the Department of Revenue (DOR) in accordance with their sales/use tax return deadlines (typically monthly or quarterly).¹⁰⁴ DOR then transfers these fees to the Treasury for deposit into the Fund. Retailers may retain up to 1.5 percent for administrative purposes, while DOR can withhold 1 percent before transmission to the Treasury.¹⁰⁵

Exhibit 4 shows a summary representation of this process. Please note that this visual aid shows the remittance process from the consumer's initial service fee through final transmission to the county PSAPs. A review of PEMA's distribution of Fund revenue to the counties is provided in the next issue area.

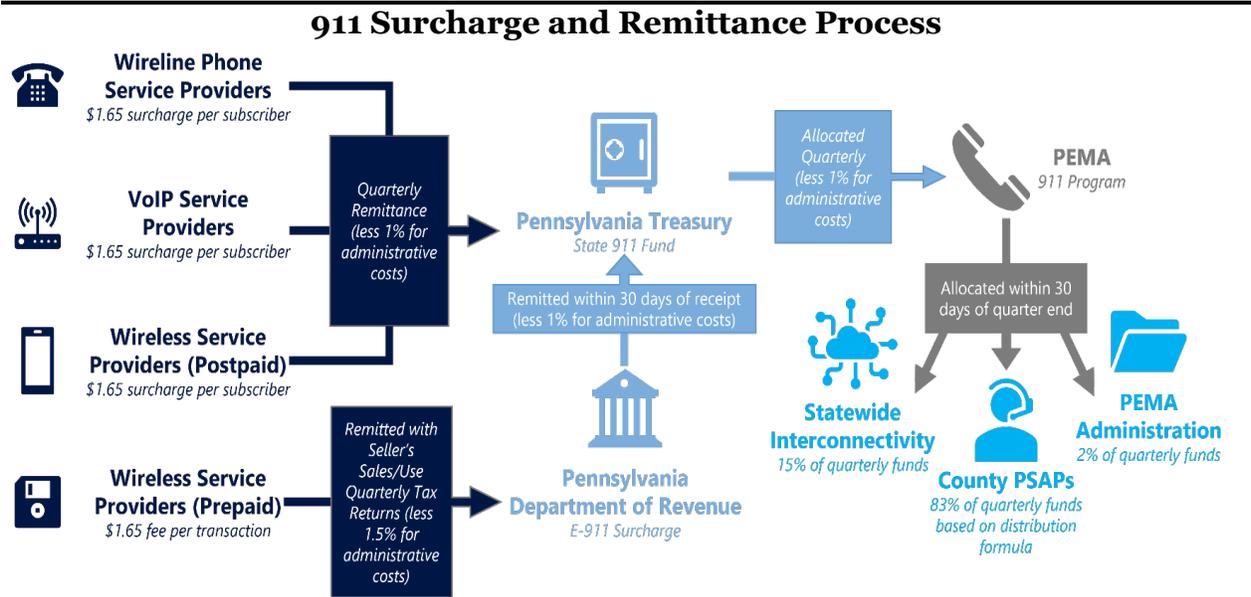
¹⁰² For businesses or other locations employing multi-line telephone systems (MLTS), there is a reduction in fee rates based on the number of lines in use. See 35 Pa.C.S. Ch. 53. §5306.2.

¹⁰³ See 35 Pa.C.S. Ch. 53. §5306.2.

¹⁰⁴ See 35 Pa.C.S. Ch. 53. §5306.2 and §5307.1.

¹⁰⁵ See 35 Pa.C.S. Ch. 53. §5307.1.

Exhibit 4



Source: Developed by LBFC staff from information provided by PEMA and 35 Pa.C.S. Ch. 53.

911 System Funding Review

Consistent with the intent of SR 96, we reviewed the 911 system’s funding under the new service fee model (i.e., post Act 12). In a previous study of the commonwealth’s 911 system, we had attempted to verify if all required entities were remitting surcharges in the proper amount. Unfortunately, we encountered difficulties in obtaining authoritative lists of providers and customer bases which hampered our efforts.¹⁰⁶ Knowing these difficulties, to avoid similar project delays, we did not pursue a review of provider compliance. Instead, we analyzed funding levels under the new surcharge, using data from PEMA’s annual reports, and interviewed PEMA staff that are familiar with the remittance process.¹⁰⁷

911 System Funding Levels. Using data provided by PEMA in its annual reports, we reviewed the revenue remitted by service type for the period 2016 through 2020. We also included funding data from prior to Act 12 as a point of comparison. Consistent with the scope outlined at the start of this project, we included 911 service fee data from PEMA’s 2014 annual report. However, we did not include data from 2015 because Act 12’s implementation occurred in August of that year. As a result, because 2015 was a “hybrid” year (i.e., using two different revenue

¹⁰⁶ LBFC, Pennsylvania’s 911 Emergency Telephone System: Funding, Expenditures, and Future Challenges and Opportunities, 2012.

¹⁰⁷ Consistent with the intent of Senate Resolution 96, we used records from PEMA’s annual reports in place of a financial audit. However, we believe the information presented in these reports to be reliable for our purposes.

streams), there was too much variability to make a meaningful comparison, therefore we omitted that year. Our analysis has been aggregated and is presented in Exhibit 5.

Exhibit 5

Average Total 911 Fund Revenue Increased by 66 Percent Following Act 12 Implementation*



Year	Wireline	Prepaid Wireless	Postpaid Wireless	VoIP	Interest Accrued ^{a/}	911 Fund Total
Percentage Increase or (Decrease)						
2016	-	-	-	-	-	-
2017	(6)	6	(1)	4	NA	-
2018	(15)	0	3	4	44	-
2019	(16)	7	3	1	53	1
2020	(10)	6	2	(2)	(64)	-
Five-Year Trend	(39)	21	8	7	NA	1
Act 12 Average (2016-2020) vs Pre-Act 12 (2014)	3	107	80	90	7,180	66

Notes:

^{*/}Average Act 12 funding encompasses 2016 (first full year of implementation) through 2020). Funding from 2014 is included as a reference to pre-Act 12 levels. Funding from 2015 has been excluded since both the old service fees and the uniform surcharge were in effect for portions of that year.

^{a/}According to PEMA, the interest in the 911 Fund in 2014 only refers to interest accrued from wireless revenue.

Source: Developed by LBFC staff from information provided by PEMA.

Our analysis found that, on average, \$317 million in surcharge revenue was generated annually for the 911 Fund between 2016 and 2020. Although the total revenue generated varied slightly year-over-year by category, overall, fund revenue has been consistent.

Wireless surcharges collected were by far the most revenue for the period. Combined, prepaid and postpaid wireless generated an average of \$217 million – or 69 percent – of total Fund revenue per year. This makes sense given the significant growth in wireless phones in the United States and aligns with the distribution in call volume metrics that will be discussed later in Section IV.

However, we found that postpaid wireless was a much larger revenue generator for the Fund, bringing in an average of nearly \$186 million (59 percent) each year. This is compared to the \$31 million (10 percent) per year that was collected from the E-911 surcharge on prepaid wireless phones. Prepaid wireless did outpace postpaid in terms of growth, but both categories increased, by 21 percent and 8 percent, respectively, between 2016 and 2020.

Service fees from VoIP devices was the next largest revenue source for the Fund, accounting for approximately \$52 million (17 percent) of the yearly funding share. Funding from VoIP surcharges increased by 7 percent between 2016 and 2020. These patterns are logical given the expansion of VoIP services in the last decade, and once again these results are mirrored by our findings related to call volume trends in the commonwealth.

Wireline surcharge revenue was one of the smallest contributors among the service types, bringing in an average of \$46 million per year. This equated to roughly 15 percent of the annual Fund revenue. Matching declines in wireline communications use across the country, the revenue generated from this surcharge decreased in every year, including a 39 percent decrease for the period.

When compared to pre-Act 12 service fee revenue data, the new uniform surcharge has brought in vastly more revenue than what had existed pre-Act 12. Overall, the average total 911 Fund annual revenue for the period (\$317 million) was approximately 66 percent larger than the total revenue generated by all service fees in 2014 (\$191 million), which was the last full year prior to the Act's implementation. Obviously much of the growth was attributed to the fact that the surcharge increased between \$0.15 and \$0.65 per subscriber, depending on the service type and location.

Prepaid wireless (107 percent), postpaid wireless (80 percent), and VoIP (90 percent) each experienced drastic increases in the amount of revenue generated, which correlates with rises in use rates across the commonwealth, in addition to service fee increases. Even despite a decline in use

of wireline communications, the increased surcharge grew wireline revenue by 3 percent compared to pre-Act 12 levels.

It is also important to note the increased interest that accrued by having all service fee revenue in a single fund. PEMA explained that prior to Act 12, the 911 Fund was gaining interest only on the revenue generated by wireline surcharges, which were the only fees collected entirely at the state level. The Fund accumulated almost \$24,000 in interest in 2014. Although it is only a tiny fraction of the total revenue, the interest that is generated with all service fees now placed in the Fund is much higher. The average annual revenue produced by interest on the Fund was \$1.7 million between 2016 and 2020, which represents an increase of over 7,000 percent compared to the previous funding model.

Adequacy of Remittance Process. In our discussions with agency staff, PEMA expressed that the new remittance process is an improvement from what had been in place prior to the passing of Act 12. The model has been efficient from PEMA's perspective, and the result has been funding levels that have been predictable and consistent each year.¹⁰⁸

However, one potential pitfall that was raised to us by PEMA was in the assessment of the VoIP surcharge. Specifically, concern exists in the 911 community that some providers of VoIP services may be able to employ loopholes within the VoIP surcharge remittance structure. For example, a residential alarm company located in another state can provide services to clients in Pennsylvania. In accordance with the federal requirements outlined in Section II, these devices and companies must connect to the 911 system and be routed to the appropriate PSAP for the location of their clients. However, if all billing for a company is directed to an out-of-state address, then customers may be remitting 911 service fees to the state in which the *company* is located, not Pennsylvania. A major hurdle in resolving issues such as this is the lack of a standardized method to collect data on emergency service requests coming from alarm systems, and more broadly, the rapid evolution of technology means that the category of "VoIP devices" is still actively being defined. Beyond the remittance of 911 service fees, this issue also impacts the proper assessment of 911 call volume and telecommunicator workload (see Section IV). This topic will be revisited in Section V, as it presents both a major opportunity and a challenge for the commonwealth's 911 system.

Additionally, under the provisions of the Act, PEMA has the authority to audit entities remitting surcharges to the 911 Fund.¹⁰⁹ Since PEMA does

¹⁰⁸ The agency did report that one area they are currently trying to streamline the remittance process further is in the manner of payment used by providers. PEMA stated that they are encouraging all providers to use Automated Clearing House (ACH) electronic payments, as money in this method is transferred quicker than the typical check. This change will improve the speed by which PEMA can determine quarterly Fund revenue and county distributions.

¹⁰⁹ See 35 Pa.C.S. Ch. 53. §5303 (a).

not have the institutional expertise to perform such audits, the agency has worked to establish policies for these reviews to be conducted by the DOR. The selection of DOR makes sense, given the department also performs audits of retailers collecting prepaid wireless transaction fees under its power to review sales/use tax returns.¹¹⁰ Although it adds an additional administrative layer to the remittance process, PEMA informed us that it believes the agreement was still cost effective.¹¹¹

However, according to PEMA, much of the audit process was paused due to the COVID-19 pandemic and was only beginning to be reinitiated during our work on this report. PEMA reported that prior to the pandemic, DOR did find instances where surcharges were not being remitted properly, but the financial impact of the findings to date have been negligible.

911 Service Fee Collection in Other States

We also compared Pennsylvania's revenue model to other states. To accomplish this task, we utilized annual reports pertaining to the collection and distribution of 911 and E911 fees that are compiled by the FCC and submitted to Congress.¹¹² Similar to the methodology used previously, we reviewed reports filed by the FCC for the period 2016 to 2020.

First, we analyzed the average total service fee revenue generated by each state for the period, the results of which are presented in Exhibit 6. In addition, we also provided a list of the authorities in charge of fee collection for each state – state government, local government, hybrid, or other – as this nuance can impact the level of revenue generated. Finally, it is important to note that variations in reporting for each state can influence the data compiled by the FCC.

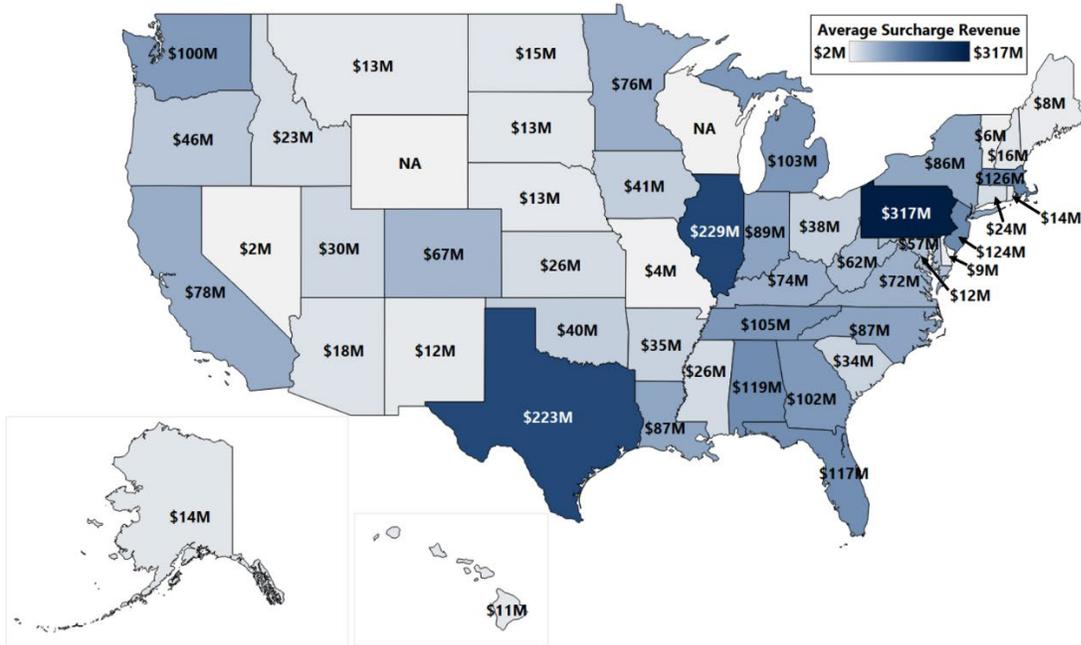
¹¹⁰ See 35 Pa.C.S. Ch. 53. §5307.1 (a).

¹¹¹ PEMA pays DOR \$104.90 per hour to audit communications providers remitting the uniform surcharge. Further, the agreement between the two entities states that no audit shall exceed a cost of \$11,250.

¹¹² See <https://www.fcc.gov/general/911-fee-reports>, accessed April 21, 2022.

Exhibit 6

Pennsylvania Generated the Most 911 Service Fee Revenue Per Year between 2016 – 2020*



Fee Collection Authority	States
State	AL, AZ, CA, CT, DE, DC, FL, GA, HI, IN, KS, ME, MD, MA, MN, MT, NH, NJ, NM, NC, PA , RI, SD, TN, UT, VT, VA
Local	AK, NV, NY
Hybrid	AR, CO, ID, IL, IA, KY, LA, MI, MS, MO, NE, ND, OH, OK, OR, SC, TX, WA, WV, WY
Other	WI

Service Type	U.S. Average 911 Service Fee Rate (2020)
Wireline	\$1.05
Prepaid Wireless	\$0.88
Postpaid Wireless	\$1.03
VoIP	\$1.05

Notes:

*/Our analysis included data for all 50 states and the District of Columbia.

Source: Developed by LBFC staff from information provided by the FCC.

On average, Pennsylvania generated the most 911 service fee revenue in the country for the period.¹¹³ The margin of difference was quite considerable as the next closest state – Illinois – lagged Pennsylvania by almost \$90 million per year.

We believe that several factors could have contributed to this trend. First, we found that states which collected service fees at the state level were more likely to generate higher annual levels of revenue, as this was the case for seven of the top 10 states for the period. Second, service fee rates play a significant role in determining the level of revenue generated by each state. Although not the highest rate for any service type, Pennsylvania's \$1.65 uniform surcharge was, depending on the category, \$0.60 to \$0.77 higher than the national average calculated by the FCC for 2020.¹¹⁴

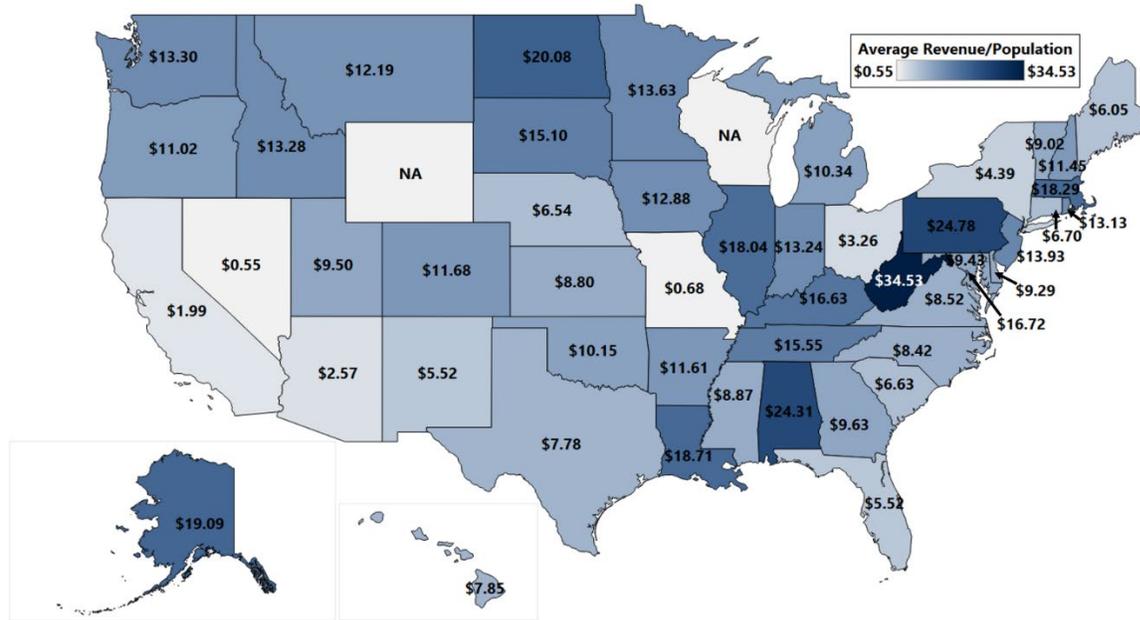
With this context in mind, we felt it was also necessary to benchmark service fee revenue based on the size of the state. We compared the average yearly surcharge revenue discussed above to the average state population data for the period, obtained from the U. S. Census Bureau. While we note that not everyone pays the service fee, the 911 system can be viewed as a public good and as such it is relevant to view the revenue generated for the system on a per-citizen basis. The results of our analysis can be found in Exhibit 7.

¹¹³ Our analysis included data for all 50 states and the District of Columbia.

¹¹⁴ According to the FCC, West Virginia had the highest monthly surcharge rates for wireline (\$3.22), postpaid wireless (\$3.67), and VoIP (\$3.22) services out of any of the states that reported data for 2020. Alabama had the highest prepaid wireless retail fee at \$1.86 per transaction. Arizona had the lowest rates for wireline, postpaid wireless, and VoIP services at \$0.20 per month, and California had the lowest prepaid wireless transaction fee at \$0.30. See FCC, Thirteenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges, 2021.

Exhibit 7

Pennsylvania Generated the Second Most 911 Service Fee Revenue Per Person between 2016 – 2020*



Notes:

*/Our analysis included data for all 50 states and the District of Columbia.

Source: Developed by LBFC staff from information provided by the FCC and the U. S. Census Bureau.

We found that Pennsylvania generated the second most annual 911 service fee revenue per person for the period.¹¹⁵ Again, we believe this is due to the relatively high surcharge rate in Pennsylvania compared to the respective national averages. Pennsylvania was the fifth most populated state on average for the period, but, not surprisingly, its 911 system funding significantly outpaced larger states on a per capita basis.¹¹⁶ Further, Illinois – a state that is nearly identical to Pennsylvania in terms of average population and generated the second highest yearly revenue for the period – fell behind Pennsylvania in terms of per capita funding by \$6.74 per person.

Overall, the analysis presented in this issue area shows that the uniform \$1.65 monthly surcharge implemented by Act 12 has considerably elevated the funding levels of the commonwealth’s 911 system compared to

¹¹⁵ Our analysis included data for all 50 states and the District of Columbia.

¹¹⁶ Based on our analysis, California (population: 39.3 million; revenue per capita: \$1.99), Texas (28.6 million; \$7.78), Florida (21.2 million; \$5.52), and New York (19.5 million; \$4.39) all exceeded Pennsylvania (12.8 million; \$24.78) in average population for the period.

what had existed previously. As a result, in terms of total revenue, Pennsylvania has one of the most well-funded 911 systems in the country.

B. 911 Fund Distributions

As a result of Act 12, PEMA has taken over the management and distribution of all 911 service fee revenue. While the Act does establish criteria for PEMA to follow, the agency has the liberty to work with its partners to decide the most appropriate distribution method. In this issue area, we will detail the current distribution formula, the payments that have been made to the counties from the Fund, and the revenue retained by PEMA to carry out administrative duties. Data used in this analysis is from PEMA's annual reports.

911 Funding Distribution Overview

The Act tasks PEMA, in consultation with the 911 Advisory Board, to determine and oversee the appropriate quarterly distribution of 911 Fund revenue. When determining a suitable distribution method, the Act encourages PEMA to consider various 911 system needs, including:

- Common base level 911 system costs.
- Population and population density.
- Call volume as defined by the agency.
- Topography, concentration of transit or industrial facilities, frequency of high-attendance public events, or other extenuating factors.¹¹⁷

Although the formula can be adjusted from year to year, the Board must review it every two years. The current formula (discussed below) was adopted in 2017 and was reviewed with no recommended changes in 2019. A proposed revised formula was brought to the Board in 2020 but was not formally accepted. Detailed discussion on this revision process and the decision not to accept the proposed formula is included in Section V.¹¹⁸

While PEMA and the Board have the authority to set the final distribution formula, the Act puts several stipulations on how this funding can be allocated. In accordance with §5306.1 (d), at least three percent must be distributed equally to all county PSAPs, regardless of their operational

¹¹⁷ 35 Pa.C.S. Ch. 53. §5306.1 (e).

¹¹⁸ PEMA, *911 Advisory Board Funding Subcommittee Funding Formula Recommendation Calendar Year 2021, 2020*.

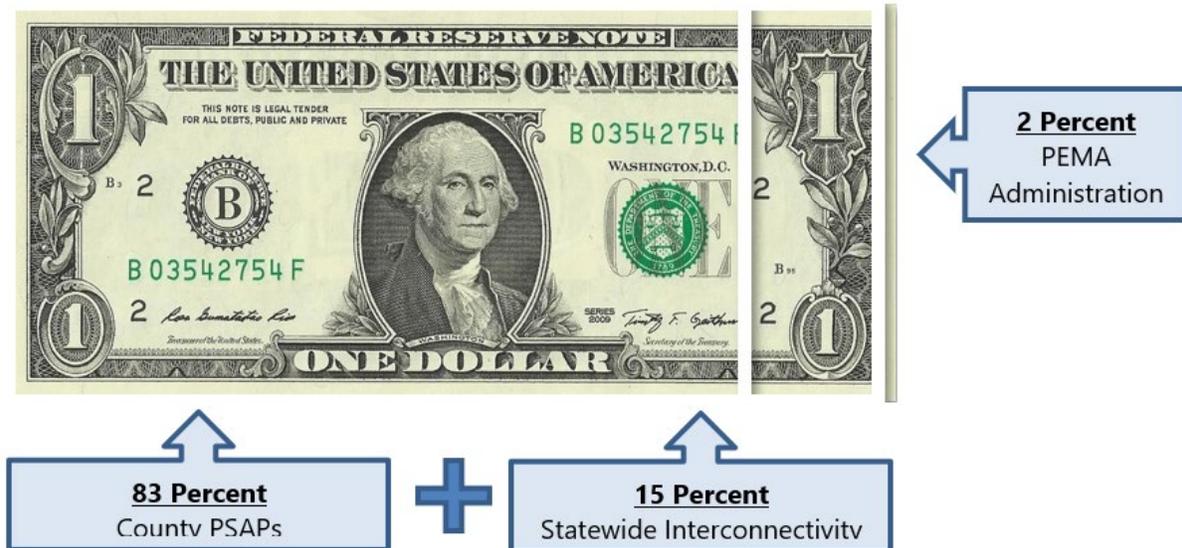
status.¹¹⁹ Additionally, at least 80 percent must be distributed to the counties using a mathematic formula, with population accounting for at least 30 percent of the funding share. As a result of these requirements, PEMA has determined that 83 percent of quarterly Fund revenue is distributed to the counties for discretionary use.¹²⁰ These funds are commonly referred to as “83 percent” funds (see below).

Next, the Act dictates that 15 percent of quarterly Fund revenue must be used to promote the “statewide interconnectivity of 911 systems.” While statewide interconnectivity – or “15 percent” – funds have primarily been awarded as grants to the counties to promulgate portions of the NG911 project, they have also been used to incentivize consolidation and regionalization activities (see more discussion below and in Section V).

Finally, Act 12 allows PEMA to retain up to 2 percent of quarterly Fund revenue for administrative purposes. A depiction of this distribution breakdown is shown in Exhibit 8.

Exhibit 8

98 Cents of Every Dollar Collected in 911 Fees Supports County 911 Operations and Development



Source: Developed by LBFC staff from information provided by PEMA.

¹¹⁹ County PSAPs that have consolidated following the passage of Act 12 still receive their 3 percent distribution. See further discussion in Section IV.

¹²⁰ Counties can use funding on any 911 system costs if the expense has been deemed eligible by PEMA. See further discussion in Section IV.

According to statute, PEMA is required to determine the available revenue for distribution and make disbursements of that revenue to the counties within 30 days of the end of each quarter.¹²¹ In our review, PEMA has been proficient in meeting this timeline, reporting an average time of slightly under 24 days to collect and distribute surcharge revenue over the course of the period.

Due to the requirements of Act 12, the overall structure and use of the Fund revenue will remain intact. However, since the formulas and uses of revenue within these categories are subject to change, we will review the distributions of Fund revenue in the sections to follow.

County Distributions (“83 Percent” Funds)

Although the counties ultimately receive nearly all the Fund revenue each quarter, they get this funding through a variety of distribution methods. The primary method that is used to determine the appropriate funding for each county is via the distribution formula, which is used to allocate the “83 percent” funds. The current distribution formula has a complex history and requires an understanding of the concepts used to determine the proportional split of revenue in this category.

Distribution Formula Overview. To understand the current distribution formula, one must first be familiar with the interim distribution formula. Codified in Act 12, this interim formula was to be used as a stopgap until PEMA and the Board determined a new formula. It was used for the payments made to the counties at the end of 2015 and for all of 2016. The interim formula is comprised of the following:

- A share 106 percent times the respective 911 system's average of local exchange telephone carriers' (wireline) surcharge between 2010 and 2014.
- A share 106 percent times the respective 911 system's average of VoIP providers' surcharge collections for between 2010 and 2014.
- The remaining funding is distributed to each 911 system based on the ratio of its average reported allowable 911 system costs between 2010 and 2014 to the average reported allowable 911 system costs for all 911 systems in the state between 2010 and 2014.¹²² According to PEMA, statewide 911 system costs for 2010 to 2014 were determined to be \$314 million.

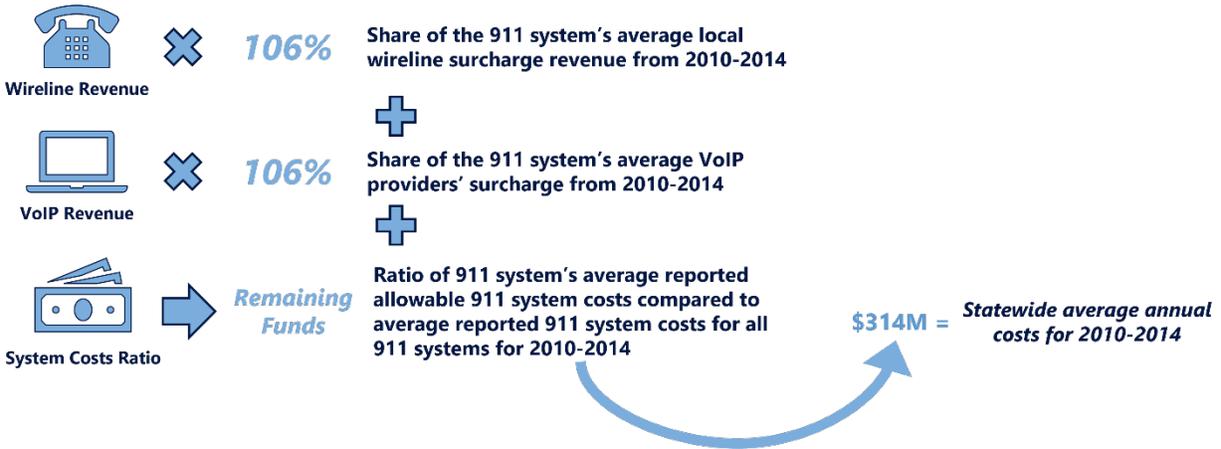
¹²¹ 35 Pa.C.S. Ch. 53. §5306.1 (d).

¹²² 35 Pa.C.S. Ch. 53. §5306.1 (f).

The interim formula is graphically depicted in Exhibit 9.

Exhibit 9

Interim Distribution Formula Overview



Source: Developed by LBFC staff from information provided by PEMA.

Although the interim formula was designed to help bolster county budgets during the Act’s transitional period, ultimately it was not well received. Many counties were concerned that the formula did not adequately capture the impact that the changing technological landscape had on service fees, mainly the shift away from wireline communications towards that of wireless and VoIP. However, by far the most common concern was that there were no standardized accounting procedures prior to Act 12, meaning that the counties were likely reporting their system costs inconsistently, and there was no existing audit trail for PEMA to perform verification of PSAP expenses. Further, many counties felt that they were not receiving their proportional share of money from the Fund.¹²³

As noted, the interim formula was replaced by the current distribution formula in 2017, fulfilling the requirement that a new formula be implemented within 18 months following the effective date of Act 12.¹²⁴ For the most part, the current distribution formula is more straightforward than its predecessor.

To meet the statutory requirements, PEMA starts by determining the three percent equal distribution that will go to each county. The remain-

¹²³ PEMA, *911 Advisory Board Funding Subcommittee Funding Formula Recommendation Calendar Year 2021, 2020*.

¹²⁴ 35 Pa.C.S. Ch. 53. §5306.1 (e).

der of the distribution share of county funding is determined by mathematical formulas. Thirty percent of the remaining funding is distributed according to a ratio of each county's population to the total population of Pennsylvania. The other 70 percent of the remaining funding is distributed based on each county's revenue difference calculation compared to the calculation for the entire state.¹²⁵

While the proportion based on population is relatively simple to comprehend, the revenue difference ratio is much more complex. This ratio is dependent on the revenue difference formula, which PEMA has described to us in the following way:

- First, PEMA determines a county's revenue share using the interim formula with \$314 million in funding,¹²⁶ which was the statewide average of funding between 2010 and 2014.
- Second, PEMA subtracts 3 percent of \$314 million that would be distributed to the counties equally.
- Third, PEMA subtracts 30 percent of \$314 million that would be distributed to the counties based on population.¹²⁷

The current formula for "83 percent" funding, along with descriptions of the formula's components, is displayed in Exhibit 10.

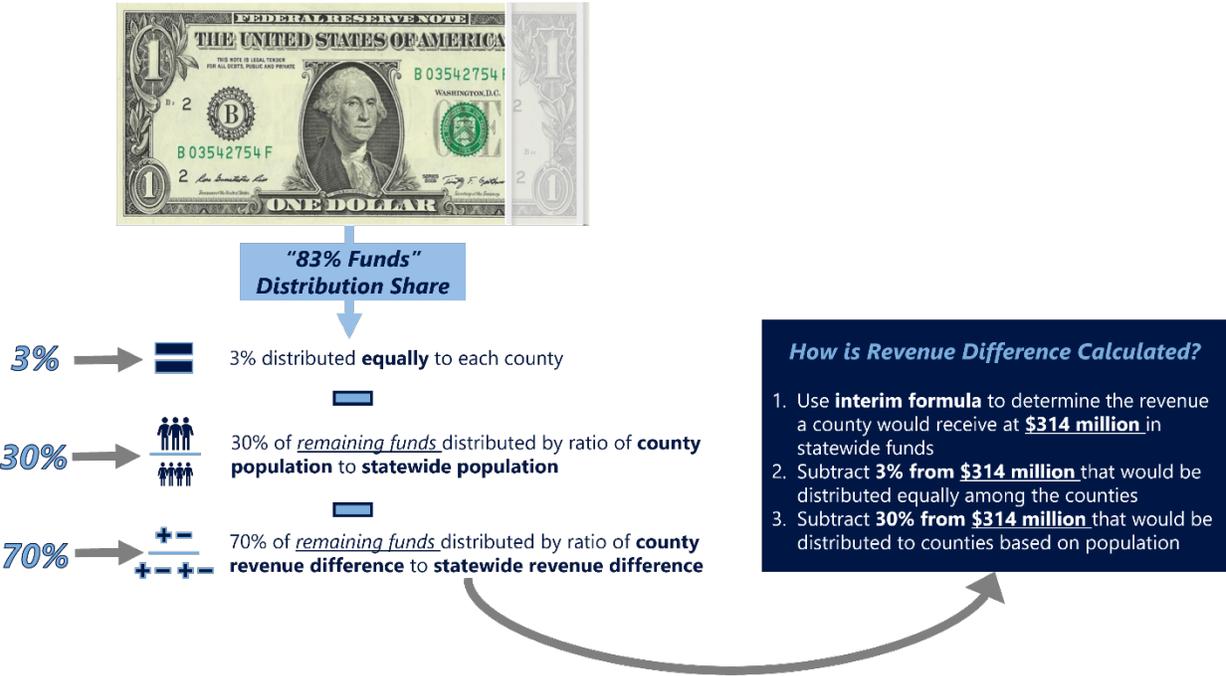
¹²⁵ PEMA, *911 Annual Report Calendar Year 2020, 2021*.

¹²⁶ Since the revenue difference calculation uses the interim formula, PEMA chose to use of \$314 million as its funding estimate. In the interim formula, \$314 million was found to be the average annual system costs between 2010 and 2014.

¹²⁷ PEMA uses the entire average annual system costs for all steps in the revenue difference calculation. Still, this remains a conservative estimated calculation by PEMA, since actual costs have now grown substantially above \$314 million (see Section IV). This is different from the distribution formula, which bases its ratios on the remaining funds available. PEMA, *911 Advisory Board Funding Subcommittee Funding Formula Recommendation Calendar Year 2021, 2020*.

Exhibit 10

County Distribution Formula, 2017 – Present



Source: Developed by LBFC staff from information provided by PEMA.

Though viewed as an improvement from the interim formula, the current distribution formula is not without some controversy. For example, it is widely accepted, even by PEMA, that both the interim and the current formula have carried over known issues of the 911 system prior to Act 12, particularly in areas of expenditure reporting, accounting standards, and oversight. It is believed that basing large portions of distributions on pre-Act 12 activities will not only put counties at a disadvantage in the funding of their current 911 systems but will also not be sustainable for the NG911 environment. This aspect is discussed further in Section V, when we discuss the revision process that occurred in 2020, as well as next steps for future iterations of the formula.

Review of Formula Distributions. Distributions from the "83 percent" funds have been the primary source of revenue for the counties since the passage of the Act. As such, we felt it would be appropriate to review the distributions made by PEMA to the counties over the course of the observation period. The data used in this section comes from the counties' financial records that are submitted to PEMA as part

of the annual report.¹²⁸ It should be noted that both the interim formula (2016) and the current formula (2017 to 2020) were used for the distributions made during this period.

We found that PEMA distributed an average of slightly less than \$271 million annually to the counties using the distribution formulas between 2016 and 2020. It is important to note that it is possible for the counties to receive more than 83 percent of Fund revenue from distributions each year. As required by the Act, excess funds are to be distributed to the counties using the distribution formula.¹²⁹ According to PEMA, this occurred with surplus funding in 2017, as well as in 2020 when there was an excess in interconnectivity grants from the prior year combined with a reduction of funding retained by PEMA as part of their two percent allocation. The counties received 87 and 91 percent of Fund revenue in these years, respectively. Exhibit 11 shows these disbursements by year.

Exhibit 11

Counties Received Approximately \$271 Million in 911 Fund Revenue from 2016 – 2020 (Numbers in 000,000)

Year	Total 911 Fund Revenue	"83 Percent" Formula Distributions
2016	\$315.96	\$262.25
2017	\$316.59	\$276.45
2018	\$316.22	\$262.46
2019	\$318.03	\$264.12
2020	\$318.29	\$288.66
Average	\$317.02	\$270.79

Source: Developed by LBFC staff from information provided by PEMA.

As part of our analysis, we also reviewed the formula payments that were made to each county. These findings are shown in Exhibit 12. Although it is a significant part of their available revenue, formula payments consist of only a portion of the funding that counties can spend on 911-eligible expenses. Counties can also use interconnectivity grants for approved projects (see below), gain interest on funding, or roll-over unused balances from the previous year. Please refer to Appendix D for a breakdown of these categories as part of the counties' average budgets. More

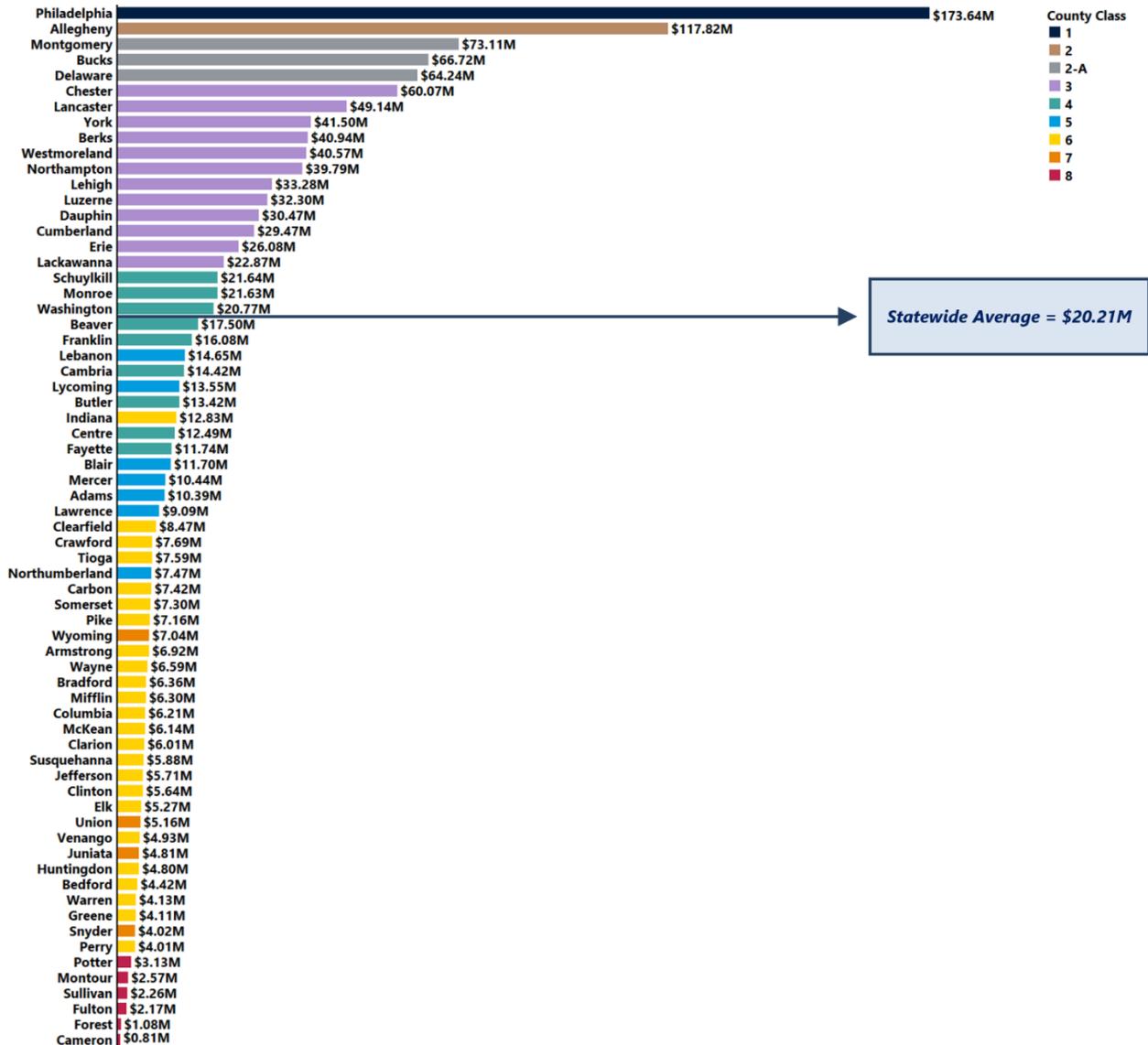
¹²⁸ Consistent with the intent of Senate Resolution 96, we used records from PEMA's annual reports in place of a financial audit. However, we believe the information presented in the reports to be reliable for our purposes. It should be noted that any discrepancies between yearly data presented in this study and the annual reports is due to a reconciliation process of the previous year's records that occurs between PEMA and the counties on an annual basis. This process is discussed regarding our review of county expenses in Section IV.

¹²⁹ See 35 Pa.C.S. Ch. 53. §5306.1 (g).

information on the counties' use of Fund revenue can be found in Section IV.

Exhibit 12

Counties Received an Average of \$20.21 Million in Formula Distributions between 2016 – 2020



Source: Developed by LBFC staff from information provided by PEMA and the Pennsylvania county PSAPs.

On average, counties received \$20 million in formula distributions between 2016 and 2020, which would equate to approximately \$4 million for each county per year. However, the disbursements are clearly skewed

towards more populated counties, as denoted by a county class designation that is closer to one. The 20 counties that received more than the statewide average of formula distributions were all from county classes 1 through 4. Further, no counties in classes 6, 7, or 8 received more than \$10 million in total formula distributions for the five years.

The trends that emerge in our analysis are logical for two reasons. First, counties with higher populations should receive more weighting in portions of the formula calculations based on population. Indeed, nine of the 10 counties that received the most funding for the period are also among the top 10 most populated counties by average for the period.¹³⁰ From this standpoint, the formula's goal of spreading 911 revenue based on population density appears to be meeting that goal.

Second, as discussed later in Section IV, more populated counties tend to have larger PSAPs and, as a result, *higher* yearly expenses. This factor should be considered in the weighting of the revenue difference formula, which carries over the interim formula's consideration of 911 system costs. Consistent with this goal, eight of the top 10 funded counties were also among the 10 largest spenders of 911-funded expenses for the period. Although the interim formula's consideration of 911 system costs considers expenses between 2010 and 2014 – data which was outside the scope of this report – it is likely that the variation of spending among the counties did not change drastically.

As noted above, there is disagreement among the counties whether the current distribution formula allocates Fund revenue in the most equitable fashion. We will explore this notion in Section V when we look at potential recommendations for 911 program funding formulas.

Statewide Interconnectivity Grants (“15 Percent” Funds)

Counties can also receive revenue for select purposes from allocations of “15 percent” funds, which are distributed via a competitive statewide interconnectivity grant award program. According to the Act, “15 percent” funding is to be used to “establish, enhance, operate, or maintain statewide interconnectivity of 911 systems.”¹³¹

¹³⁰ Westmoreland County is the only county in the top 10 of formula distributions for the period that was not also in the top 10 of average population among Pennsylvania counties. With an average of nearly 351,000 residents, the county ranks number 11 in average population.

¹³¹ See 35 Pa.C.S. Ch. 53. §5306.1.

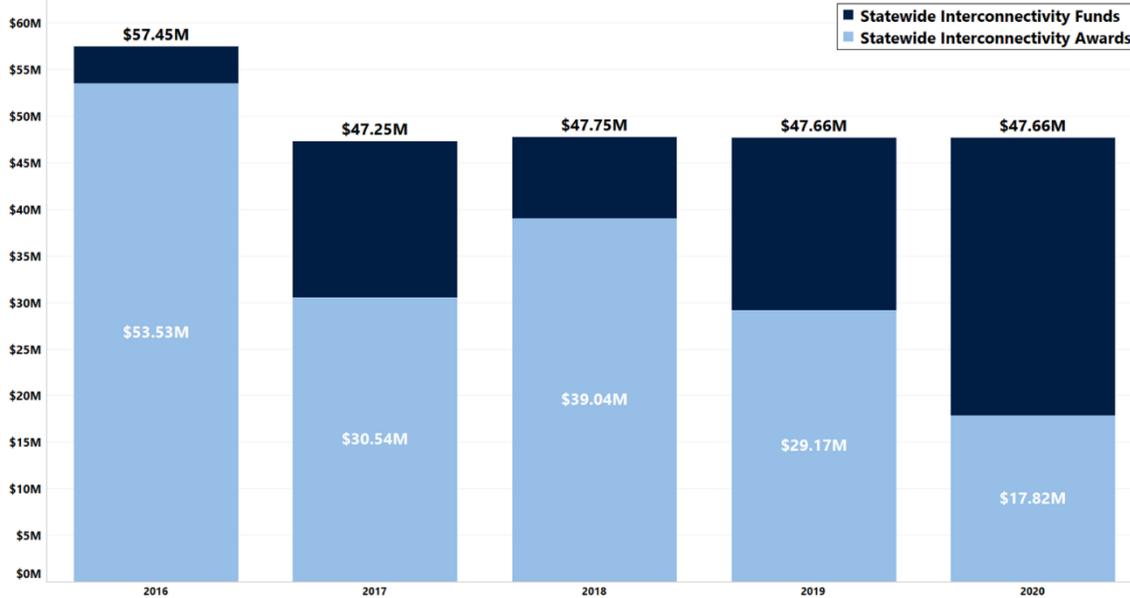
To date, these funds have primarily been used to help bankroll the migration to NG911. In a review of the most recent year's interconnectivity grants (2021), we found that 68 of the 94 grants awarded (72 percent) were related to the NG911 transition (ESInet, GIS, facility accommodations, network installation, service migration, etc.). This funding has also been used to promote regionalization efforts, as the remaining 26 grants were awarded to help fund the maintenance of existing regional equipment (CAD, call handling equipment (CHE), and radio) and consolidation studies (see further discussion in Section V).

There is a nuance within the interconnectivity grant program that should be clarified before discussing the process further. When PEMA refers to "statewide interconnectivity grant awards," the agency is discussing the grants that have been *allocated* during the award cycle. On the other hand, "statewide interconnectivity payments" denotes the amount of funding that has been *distributed* to the counties via the grant award process. Grants that are awarded to the counties in any given year are paid out over several years. In other words, a grant award represents the funding that is expected to be paid to the county or counties, whereas a grant payment is the funding that has been paid out from the award. In the discussion that follows, we will highlight the awards that have been made by PEMA as well as the payments that have been distributed to the counties between 2016 and 2020.

Statewide Interconnectivity Grant Awards. Similar to "83 percent" funds, revenue from the "15 percent" reserves are awarded to the counties on a quarterly basis. However, unlike formula distributions, counties are not guaranteed funding from this portion of service fee revenue. Counties are required to submit grant requests to PEMA. Awards are then reviewed and allocated by the agency and the Advisory Board. Exhibit 13 shows the levels of "15 percent" funding and statewide interconnectivity grants awarded by PEMA between 2016 and 2020.

Exhibit 13

PEMA Awarded over \$170 Million in Statewide Interconnectivity Grants between 2016-2020



Source: Developed by LBFC staff from information provided by PEMA.

PEMA awarded slightly over \$170 million in statewide interconnectivity grants between 2016 and 2020. Upon review, we found that not all the “15 percent” fund revenue is awarded as grants to the counties. On average, there was approximately \$49.6 million in “15 percent” funds available each year. However, only an average of \$34 million per year was awarded to the counties. These averages are slightly skewed by the elevated level of funding seen in 2016. Since Act 12 was only in place for the latter half of 2015, PEMA did not distribute “15 percent” fund revenue from 2015’s last two quarters until the following year.

There are several factors at play which determine the amount of revenue allocated each year. First, the grant award process is competitive, and PEMA has instructed the counties to only submit requests that align with the strategic priorities of the grant program. Once received, PEMA then works with the Board to review and authorize awards. Not every application that is submitted to PEMA receives grant funding.¹³² When funds remain after all grants have been awarded, PEMA and the Board either distributed it to the counties via formula payments (e.g., 2020), devoted it to the statewide NG911 project (e.g., 2018), or both (e.g., 2017).

¹³² According to the annual reports, we found that PEMA allocated significantly less than the overall grant requests in 2016, 2017, and 2018. Figures on total county requests were not included as part of the 2019 and 2020 annual reports.

Second, PEMA has determined that portions of the available funds will be used outside the grant process to help support interconnectivity, such as building out the statewide ESInet. In fact, one of the challenges related to funding that will be highlighted in Section V is that as the NG911 project becomes more mature, most of "15 percent" funds will be needed to support interconnectivity within the statewide program, particularly regarding call delivery. While PEMA estimates that a reduction in call delivery costs will result in net savings for the counties, this means that there will be less grant funding available. This can already be seen in the steep decline in awards made in 2020, as over \$16 million was allocated towards the statewide NG911 system.¹³³

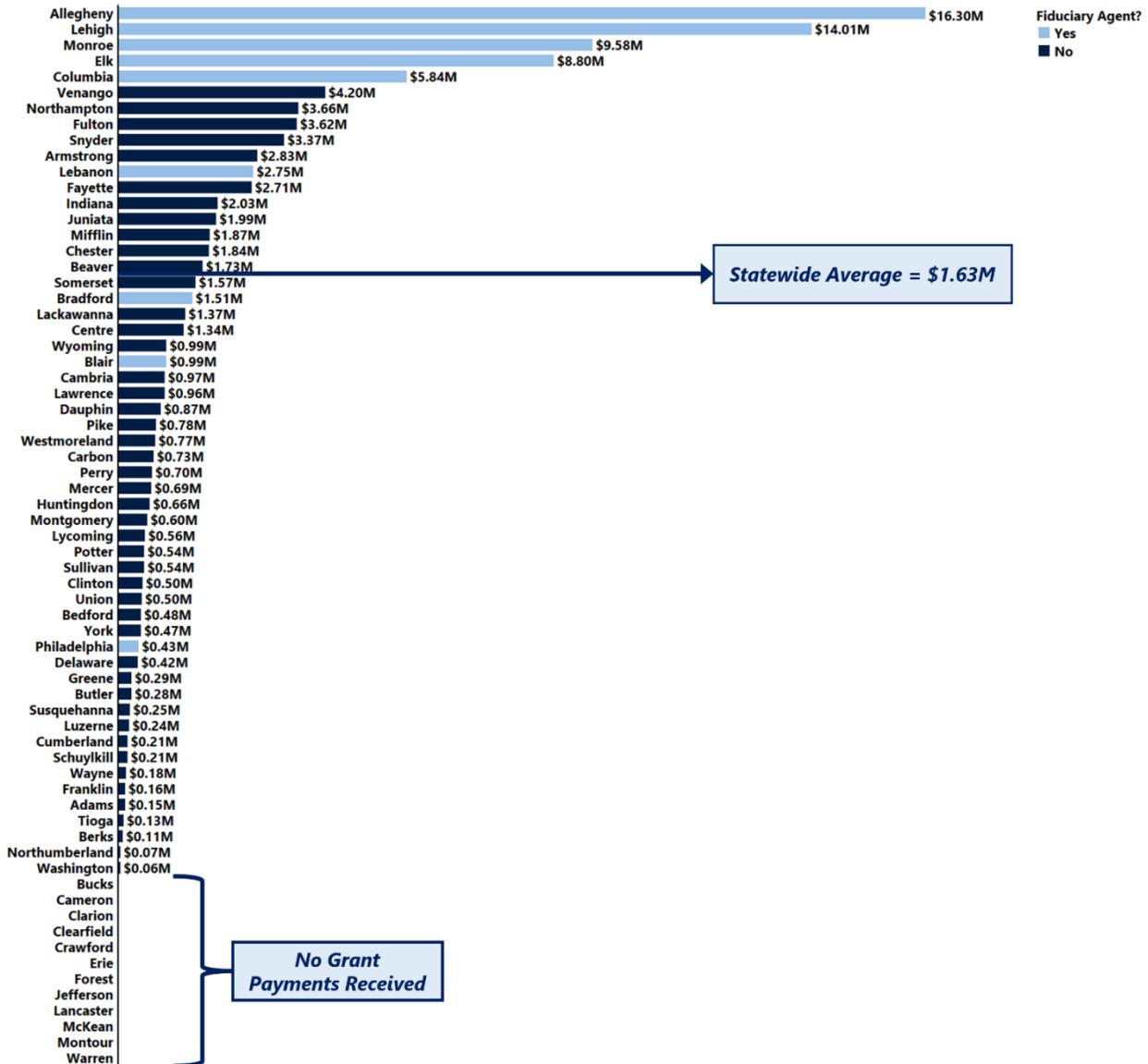
Due to the decline in available grant funding, PEMA has expressed that the grant application process in its current form will be phased out. Instead, PEMA will transition to coordinated disbursements of interconnectivity funding, which will help to better manage the funds needed for the NG911 project. While this will mean a reduction in overall revenue for the counties, PEMA has been forthcoming in expressing this reality for several years, which has given the PSAPs ample time to structure their budgetary needs.

Statewide Interconnectivity Grant Payments. The next step in our analysis was to review the payments that have been distributed to the counties by PEMA through the statewide interconnectivity grant program. As noted, these payments are reflective of awards that have been allocated by PEMA over the course of several funding cycles. As such, we reviewed the total payments made to each county over the entire period. These results can be found in Exhibit 14.

¹³³ PEMA also noted that \$13 million was distributed to counties that were anticipating increased revenue as part of the proposed formula change that would have gone into effect for 2021. This topic will be discussed further in Section V. See PEMA, *911 Annual Report Calendar Year 2020, 2021*.

Exhibit 14

PEMA Paid \$109 Million to Counties via the Statewide Interconnectivity Grant Program between 2016-2020



Source: Developed by LBFC staff from information provided by PEMA and the Pennsylvania county PSAPs.

Of the \$170 million that was allocated in statewide interconnectivity grant awards, PEMA paid \$109 million from those awards to the counties between 2016 and 2020. On average, counties received \$1.63 million in grant payments over the period, which would equate to approximately \$327,000 each year.

We found that the level of payments received by each county was not dependent on county size, but rather the fiduciary agreements that exist among the counties. Fiduciary agreements will be discussed fully in Section V, but generally these agreements involve one regional county – called the fiduciary agent – receiving most or all the interconnectivity payments for multi-county project(s) in return for administering duties relating to those project(s) (e.g., procurement, vendor payments, accounting, etc.).

As shown above, the five counties with the highest levels of interconnectivity payments received for the period are all listed as primary fiduciary agents according to PEMA. Further, of the counties that reported receiving no interconnectivity grant payments, only one – Lancaster County – was not listed as part of a fiduciary agreement for the period. However, it is important to note that fiduciary agreements are fluid in nature and can vary by project and year. The most common fiduciary agents are marked as such in Exhibit 14, but the list is not exhaustive.

Additionally, some regions utilize these agreements more than others. For example, nine of the counties that received no interconnectivity payments – Cameron, Clarion, Clearfield, Crawford, Erie, Forest, Jefferson, McKean, and Warren – are all part of the Northern Tier fiduciary agreement. The fiduciary agent for this agreement is Elk County, which can help to explain why a relatively smaller county in terms of population (county class 6) was among the highest paid counties in the grant program for the period. This can be juxtaposed with the counties of the Southeast fiduciary agreement – Berks, Bucks, Chester, Delaware, Montgomery, and Philadelphia (fiduciary agent) – which use these agreements less, and as a result the payments among these counties are more evenly distributed. Overall, we found that over 60 percent of the counties that received less than \$1 million in statewide interconnectivity payments for the period were involved in a fiduciary agreement with an agent that was among the top five compensated counties within the grant program. For a full list of fiduciary agreements and details on these partnerships, please refer to our discussion on regionalization and consolidation in Section V.

While there is still allocated funding to be distributed, as noted, the statewide interconnectivity grant program will be ending in exchange for more coordinated payments of “15 percent” funds to the counties. PEMA has indicated that the majority of “15 percent” funds in 2021 and 2022 will be used for interconnectivity projects such as the statewide ESInet and the NG911 system. We believe the grant program to be a successful initiative for both PEMA and the counties. We found PEMA to be a wise steward of the funding, allocating the revenue to both the full intent of the statute and in the best interests of the state’s 911 system. The counties used this money to strengthen their regional relationships, which was

one of the primary goals of Act 12 overall (see further discussion in Section V). Even though the “15 percent” funding will still be used to support statewide interconnectivity, we think the progress made because of the grant program was significant.

PEMA’s Administrative Allocation

Finally, Act 12 states that PEMA may retain up to two percent of Fund revenue for administrative purposes.¹³⁴ While PEMA has discretion with the amount of the revenue it takes up to that threshold, the funding can only be used to carry out the provisions of the legislation. In addition, in any given year, PEMA can supplement its allotment with unspent money from previous cycles. As discussed below, this practice benefits PEMA during periods of transition, because it allows the agency to have a larger operating budget than it would have if relying solely on Fund allocations from the current year.

Levels of Funding. Exhibit 15 shows PEMA’s two percent allocations and total funding between 2016 and 2020.

Exhibit 15

PEMA Administrative Funding is Approximately \$6 Million per Year (Amounts in \$000)

Year	Annual 911 Fund Revenue	Annual PEMA Allocation Retained (Percentage of 911 Fund Revenue)	Funding Balance from Prior Year	Total Funds Available
2016	\$315,964	\$6,319 (2.0%)	\$1,888	\$8,207
2017	\$316,587	\$6,332 (2.0%)	\$4,358	\$10,689
2018	\$316,217	\$6,324 (2.0%)		\$6,324
2019	\$318,031	\$6,361 (2.0%)		\$6,361
2020	\$318,291	\$4,388 (1.4%)	Remaining balance from prior year placed in reserve fund	\$4,388

PEMA can retain 911 Fund revenue on a quarterly basis

Source: Developed by LBFC staff from information provided by PEMA.

As shown above, PEMA consistently retained approximately \$6.3 million in Fund revenue. The exception to this trend was 2020, where PEMA retained \$4.3 million – or 1.4 percent – of Fund revenue. According to PEMA, little to no funds were retained for administrative purposes in the

¹³⁴ See 35 Pa.C.S. Ch. 53. §5306.1.

2nd and 4th quarters of 2020. These funds were instead used to help advance delayed projects across the state.¹³⁵

As shown in Exhibit 15, in 2016 and 2017, PEMA supplemented its total 911 funding with available funds from prior years. As discussed in the next issue area, this occurrence is largely due to the uncertainty that was present in implementing the Act.

In 2017, with the immediate Act 12 procedural costs defined and a longer transition to NG911 on the horizon, PEMA was able to shift its budgetary focus to the long-term. In that year, the agency made the strategic decision that unspent revenue would be used to maintain a reserve balance of \$5 million to cover costs of NG911 call delivery, as well as any future costs that arise from the system migration that are yet to be defined. PEMA's role in the NG911 transition and implementation will be covered in greater detail later in this section.

Adequacy of Funding. During our meetings with PEMA staff, there was no concern expressed about the adequacy of the funding model for its immediate needs. The Fund has consistently achieved at least \$315 million in revenue each year. Given that PEMA has elected to not retain its full portion of Fund revenue in recent years, we do not believe there is reason to increase the agency's allocated share above the current two percent allowance.

C. PEMA's Administrative Expenses

Act 12 increased PEMA's responsibility for 911 system administration and oversight. As a result, the agency has taken on new duties related to statewide planning, budgeting, and enforcement. As discussed, to accomplish these tasks, the Act permits PEMA to retain up to two percent of the quarterly revenue paid into the Fund.

Following its passage, the full scope and the related costs to implement the Act were largely undefined. Over the last five years, PEMA has put significant effort into developing accounting and governance procedures for the statewide 911 system. This effort includes tools to annually report on the agency's administrative expenses, the data from which has been used to produce the analysis in this section.

In this issue area, we will analyze PEMA's expenditures over the last five years, identifying trends of interest. Where applicable, we have also included relevant comments and observations from PEMA officials.

¹³⁵ PEMA, 911 Annual Report Calendar Year 2020, 2021.

Administrative Expenses

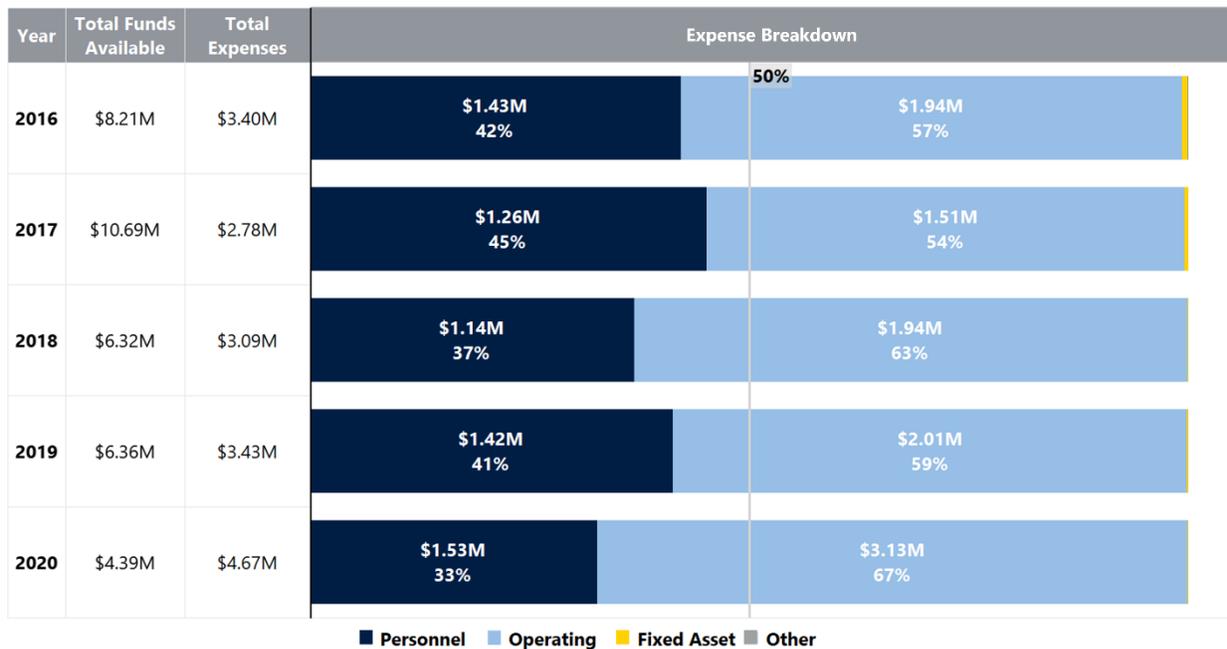
A consistent funding model has provided PEMA with needed stability in budgeting the two percent administrative allocation. This stability is crucial because the Act vested PEMA with new responsibilities within the current 911 system. Perhaps more importantly, however, consistent administrative funding has allowed PEMA to lead the commonwealth's efforts in NG911 development.

As part of our analysis, we conducted a limited review of PEMA's expenses.¹³⁶ Although expenses increased by 37 percent over the last five years, we found that PEMA has been able to keep spending in check relative to its funding sources.

Exhibit 16 shows a breakdown of PEMA's administrative expenses by category (Personnel, Operating, Fixed Asset, and Other) for the period 2016 to 2020.

Exhibit 16

PEMA Operating Costs Constitute Greater Than 50 Percent of Total Administrative Expenses



Source: Developed by LBFC staff from information provided by PEMA.

¹³⁶ We did not conduct a financial audit of PEMA's use of 911 administrative funding. Instead, consistent with the intent of Senate Resolution 96, we reviewed spending reported by PEMA within its annual reports. The information in these reports is unaudited; however, we believe the information to be reliable for the purposes used in this report.

On average, PEMA budgeted approximately \$3.5 million in expenses each year. The agency was able to keep total expenses within its available funds in every year except for 2020. According to PEMA, this occurred because of several factors. First, as mentioned previously, PEMA did not retain its full allocation of Fund revenue for 2020, and as such, available funding was reduced. This coincided with a roughly 36 percent increase in expenses from the year prior, which resulted from the implementation of several NG911 projects (discussed further below). However, PEMA was able to pull nearly \$280,000 from its reserves to pay for the remainder of the expense balance and avoided a deficit.

Personnel and operating expenses account for practically all PEMA's 911 administrative spending each year. This is not an uncommon occurrence for most state agencies, as personnel expenses are a significant portion of an agency's overall expenditures. Personnel expenses constitute about \$1.4 million, or 39.6 percent, of PEMA's yearly spending. Despite seeing overall growth of seven percent during the period, this category did experience considerable declines between 2016 and 2018 before a turnaround in 2019.

Related to personnel expenses, staffing issues in the 911 industry have been well documented, and unfortunately PEMA has not been immune to this phenomenon. The agency has stated both publicly¹³⁷ and to us during our interviews that it experienced turnover in the years immediately following the passage of Act 12. Reportedly, the specialized knowledge and skills needed to carry out the requirements of the Act has made it challenging for PEMA to find qualified candidates to fill open positions. On a positive note, PEMA expressed that recently it has been able to build up its staff to a level that is adequate to carry out the Act's requirements and to support NG911 implementation. Agency staff noted that it will continue to assess and address personnel needs throughout the shift to an NG911 operating environment.

Averaging \$2.1 million a year, PEMA's operating expenses outpaced the spending of all other categories at a ratio of approximately 3:2. Over 95 percent of the expenses in this category come from professional or specialized services, mostly pertaining to NG911 development, performance audits, and tools needed to support 911 system oversight. It is logical that PEMA would need to externally contract many of these specialized services given the previously mentioned staffing issues. Spending in this category increased by 62 percent between 2016 and 2020. This growth was driven by a 56 percent increase in expenses in 2020, which was caused by the initiation of several NG911 contracts pertaining to GIS. PEMA expects operational costs to continue to rise over the next several years, as many more applications and regional systems will continue to be integrated into the statewide NG911 system.

¹³⁷ PEMA, *Next Generation 9-1-1 Report and Recommendations*, 2017.

Combined, fixed assets and other expenses constitute less than 0.5 percent of PEMA's average yearly spending. The "other" spending category consisted of a one-time grant expense of \$3,000 in 2016. Fixed assets included primarily office supplies and equipment, and only consumed approximately \$10,000 from PEMA's yearly budget. The category did experience a substantial decrease of 74 percent over the period, which has been attributed to a decline in equipment upgrades and a reduction in supply costs due to a lack of office activity during the COVID-19 pandemic. However, due to its size relative to the rest of PEMA's expenses, the category's influence was inconsequential.

PEMA has not expressed concern regarding its future administrative budgeting needs. Although trends in increased spending are expected to continue, it appears that PEMA's two percent share of Fund revenue will be adequate to handle these costs for the next several years. Further, PEMA has been successful in keeping most of its administrative funding available for tasks related to NG911 implementation, which is currently the major driver of costs. It is still too early to fully define the administrative costs within the NG911 operational environment, so it is possible that a review of this area could be warranted in the future.¹³⁸ However, in the short term, and specifically regarding its use of 911 funding for administrative expenses, PEMA has stayed within the provisions of Act 12.

D. Capacity for NG911 Development

As noted in Section II, over the last two decades communication technology has rapidly outpaced that of 911 systems in the United States. Pennsylvania is not immune to this trend. Although the commonwealth has made great strides since 2015, there are still portions of the 911 system that are disparate and inefficient.¹³⁹

Pennsylvania's 911 program is amid a significant transition as it migrates to NG911. Act 12 provided the legislative framework to help prepare the commonwealth for this transition. In the issue area that follows, we provide an overview of the NG911 project in Pennsylvania, provide a status of the project milestones developed by PEMA, and compare the outlook of the commonwealth's NG911 system to that of other states.

¹³⁸ Additionally, the current inflationary pressures that are present in the economy as of July 2022 may be a concern for PEMA as well.

¹³⁹ In support of this conclusion, we note that according to PEMA, there are currently 37 different phone companies providing service to the 911 community across five networks. Data accompanying a 911 call (caller name, location, etc.) is typically unable to be transferred across networks along with a call. See PEMA, *Pennsylvania NG911 Project Overview*, 2021.

NG911 Project Development

Act 12 requires PEMA and the 911 Advisory Board to create a plan for the development of an NG911 technology-based system in Pennsylvania. This plan encompasses the framework for the NG911 project that is currently underway. It is important to note that the technology and processes involved with NG911 can be quite complex. As such, it is important to have a basic understanding of NG911 and its significance to future development (for additional detail on NG911 refer to Section II – Background).

NG911 in Pennsylvania – How will it work? According to PEMA, its ideal “end state” NG911 system consists of a multi-phased approach. Getting to this end state involves three phases, with each mirroring the steps involved with a 911 call:

1. **Call Delivery,**
2. **Call Processing, and**
3. **Call Dispatch.**

Within each of these stages, there will be several supporting NG911 projects that when completed will compromise NG911 in Pennsylvania. Each of the above areas involves complex design and implementation projects that will take years to be fully implemented. Currently, the NG911 project is primarily focused on the first phase, call delivery. As such, when we discuss the “NG911 project” in this report, we are referring to this phase of the NG911 project specifically.

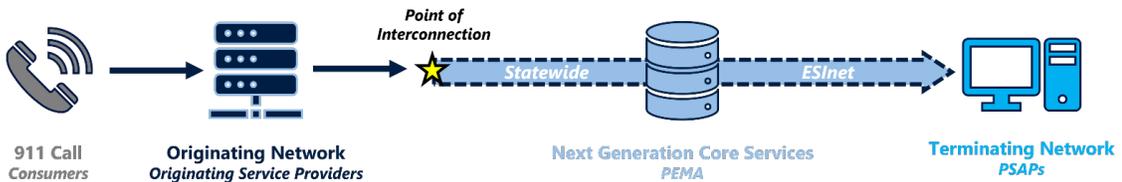
PEMA has segmented NG911 call delivery into three components, which are discussed below and shown graphically in Exhibit 17.

- **Originating Network.** Operated by the originating service providers (OSPs), the originating network will deliver the 911 call from the consumer to a point of interconnection (POI) for the statewide network.
- **ESInet/Next Generation Core Services (NGCS).** Operated by PEMA, the ESInet will transport calls between the OSP and the county PSAPs. According to PEMA, the ESInet will be the first in the United States to be constructed fully out of fiber optic cables and will provide public safety grade resiliency to the system. The system will not be built from scratch, however, as PEMA will leverage existing regional ESInets where possible. As such, PEMA has described the ESInet as a “system of systems.” NGCS refers to the set of tools needed to properly validate a caller’s location and correctly route a 911 call on an IP-based network. A primary component of the NGCS is GIS technology, which will be highlighted below.

- **Terminating Network.** The terminating network refers to PSAPs that receive a 911 call and advanced call data from the NGCS via the ESInet.¹⁴⁰

Exhibit 17

Pennsylvania's NG911 Call Delivery Process Flow*



Notes:

*/This process has been simplified for illustrative purposes.

Source: Developed by LBFC staff from information provided by PEMA.

According to PEMA, OSPs will connect to the ESInet much like they connect to the current 911 system. Rather than routing a 911 call via a selective router, OSPs will instead route the call to a POI for the ESInet. PEMA states that POIs will be purposefully placed across the commonwealth to aid OSPs in the connection process.¹⁴¹ As discussed further in Section V, there is no precedent for the use of this technology within the 911 system, and as such, there are lingering questions over the responsibility for the associated costs for developing this capacity.

Another important aspect of the new system is that it has been designed to minimize the initial change for PSAPs in their daily operations. For example, calls will be delivered to telecommunicator CHE in the same way that it is today. Further, the ESInet will support call routing to legacy equipment until all PSAPs have transitioned to NG911-supported systems. Finally, PSAPs will still have autonomy in the selection of their call handling systems. As a result, PEMA predicts that significant staff retraining will not be required immediately following the initial transition to NG911. However, as more complex technology is integrated into the NG911 system over time, it is likely that training needs may increase. However, given the technical aspects of 911 call handling, it is not unexpected that ongoing training would be necessary.

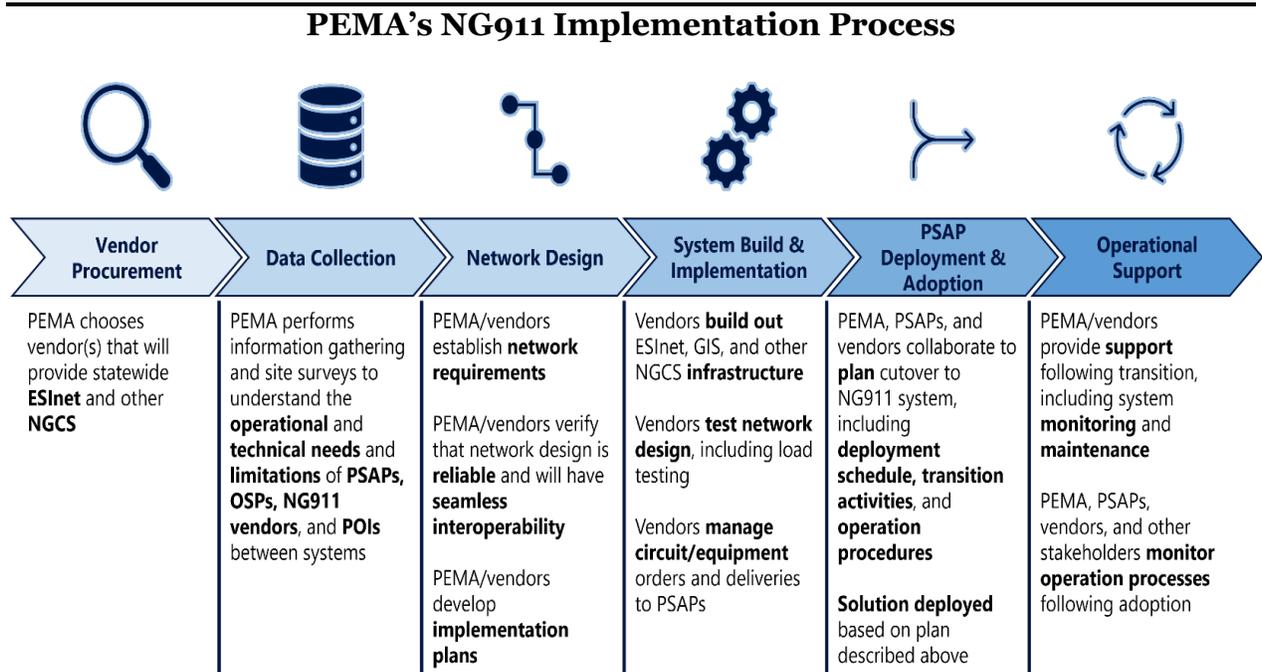
As part of the planning required by Act 12, PEMA has outlined a step-by-step process for the development and transition to the NG911 system. Based upon the traditional system development life cycle, the implemen-

¹⁴⁰ Ibid.

¹⁴¹ Ibid.

tation process highlights the key tasks associated with vendor procurement, data collection, network design, system implementation, PSAP adoption, and ongoing support. An overview of this process is provided in Exhibit 18.

Exhibit 18



Source: Developed by LBFC staff from information provided by PEMA.

NG911 Development Status

The current 911 plan (updated in 2019) identifies nine priorities for NG911. These priorities serve as the collective guidance for NG911 in Pennsylvania. The priorities are comprehensive, spanning areas such as technology requirements, data collection, staffing support, and public education.

Each of the nine priorities target specific needs within the future NG911 system. However, because the NG911 system is still in its infancy, for the purposes of this review, we focused on two areas: (1) the creation of the statewide ESInet; and (2) related NCGS tools, such as GIS. These areas will determine the capacity for NG911 in the commonwealth. Information used to develop our NG911 project status was pulled from the 2019 statewide plan update,¹⁴² PEMA's annual reports, and interviews

¹⁴² PEMA, *Commonwealth of Pennsylvania Statewide 911 Plan*, 2019.

with agency staff. Additional information regarding the background, key milestones, and next steps for each of PEMA's nine NG911 priorities can be found in Appendix E.

Key Accomplishments in ESInet and GIS Development. Interconnectivity of 911 systems, which is a primary goal of NG911, is being met through the development of the ESInet. This secure, fiber optic network will support upgraded 911 call delivery and text-to-911 for all counties – key aspects of any NG911 system. Additionally, as the ESInet is established, vital NCGS tools will be integrated, including a statewide information system as well as performance, operations, and security monitoring.

In 2020, PEMA executed a contract for statewide NG911 services for seven years, with the option for three annual renewals. The selected contractor will be primarily responsible for supporting the build out of the ESInet. A phased implementation of the ESInet was initiated in 2021 (see below).

For upgraded call delivery to be achieved on the ESInet, the NG911 system will rely on NGCS. Primary among these services is GIS, as this technology will be used to identify the location of 911 callers and route their information to the correct PSAP in the NG911 environment.

Since 2016, PEMA has worked with stakeholders to create a Statewide NG911 GIS Strategic Plan and minimum system requirements. PEMA has also funded a statewide GIS gap analysis and has provided the counties with new orthoimagery (satellite imagery) to help with the development of GIS datasets. Counties are responsible for maintaining their own GIS datasets currently, but this satellite imagery has become cost prohibitive to many PSAPs. As a result, many counties were using GIS data from 2008 prior to the start of this initiative. Additionally, PEMA has deployed spatial interface technology to aggregate and check county GIS data and has also awarded \$11.3 million in statewide interconnectivity funds to the counties for use in GIS related projects.

Although aspects of the NG911 system, such as the ESInet, are being funded and executed at the state level, the 911 system will remain primarily a county function following the NG911 transition. PSAPs will have autonomy over the equipment that will be used to connect to the ESInet, and counties will still be responsible for maintaining their own data and

information, such as is the case with GIS. As such, it is important to look at the NG911 project status by measuring county progress. To this end, PEMA posts a considerable amount of detail about county NG911 progress to its website and the NG911 Progress Dashboard.¹⁴³ We reviewed this information and found that users can find county-by-county breakouts that reveal the status of GIS development, ESInet build out and transition information, and text-to-911 capability, to name a few. In Exhibit 19 below, we provide a screenshot of the dashboard, as well as several examples of county status updates.

Exhibit 19

PEMA's NG911 Progress Dashboard*



¹⁴³ See <https://www.pema.pa.gov/911-Program/NG911/Pages/NG911-Progress-Dashboard.aspx>, accessed May 6, 2022.

Exhibit 19 continued.

Centre County	Lycoming County	Schuylkill County
South Central Mountain NG911 Service Region <i>last updated on 03/01/2022</i>	North Central NG911 Service Region <i>last updated on 03/01/2022</i>	NECORE NG911 Service Region <i>last updated on 03/01/2022</i>
NG911 PROGRESS INDICATORS	NG911 PROGRESS INDICATORS	NG911 PROGRESS INDICATORS
Implementation Phase:	Implementation Phase:	Implementation Phase:
System Build	Network Design	Data Collection
Cut-over to NG911 Service?	Cut-over to NG911 Service?	Cut-over to NG911 Service?
No	No	No
Geospatial Call Routing Enabled?	Geospatial Call Routing Enabled?	Geospatial Call Routing Enabled?
No	No	No
TEXT-TO-911 STATUS	TEXT-TO-911 STATUS	TEXT-TO-911 STATUS
Available	Available	Not Available
STATUS OF REQUIRED GIS LAYERS	STATUS OF REQUIRED GIS LAYERS	STATUS OF REQUIRED GIS LAYERS
Emergency Service Boundaries	Emergency Service Boundaries	Emergency Service Boundaries
NG911 Ready	In Development	In Development
Provisioning Boundary	Provisioning Boundary	Provisioning Boundary
NG911 Ready	In Development	In Development
Public Safety Answering Point Boundary	Public Safety Answering Point Boundary	Public Safety Answering Point Boundary
NG911 Ready	In Development	In Development
Road Centerlines	Road Centerlines	Road Centerlines
NG911 Ready	In Development	In Development
Site/Structure Address Points	Site/Structure Address Points	Site/Structure Address Points
NG911 Ready	In Development	In Development
<i>To be NG911 ready, GIS layers must not contain any critical errors and the Automatic Location Identification (ALI) to Road Centerline match rate must reach or exceed 98%.</i>	<i>To be NG911 ready, GIS layers must not contain any critical errors and the Automatic Location Identification (ALI) to Road Centerline match rate must reach or exceed 98%.</i>	<i>To be NG911 ready, GIS layers must not contain any critical errors and the Automatic Location Identification (ALI) to Road Centerline match rate must reach or exceed 98%.</i>
DEMOGRAPHIC DATA	DEMOGRAPHIC DATA	DEMOGRAPHIC DATA
Population*: 164,029	Population*: 116,794	Population*: 146,871
Percent of Statewide Population: 1.26%	Percent of Statewide Population: 0.90%	Percent of Statewide Population: 1.13%
<i>*population estimate based on data from the US Census Bureau's American Community Survey (2017)</i>	<i>*population estimate based on data from the US Census Bureau's American Community Survey (2017)</i>	<i>*population estimate based on data from the US Census Bureau's American Community Survey (2017)</i>

Notes:

*/The final phase of the system development life cycle, operational support, is not included as part of PEMA's progress dashboard, as maintenance is an ongoing support item.

Source: PEMA, accessed May 6, 2022.

According to PEMA's data, as of spring 2022, 29 counties – or 43 percent of the state – were in the process of having the ESInet constructed for their PSAP. An additional 13 counties (19 percent) were designing their networks prior to system development. The remaining 25 counties (37 percent) were still in the initial stages of data collection.

Given that NG911 will remain a county-centric process, PEMA has chosen to implement the ESInet in stages across Pennsylvania, starting in the western half of the state. As such, the most progress towards NG911 has been made in the western counties. This approach was practical because many of these counties were already interconnected, due to their history of equipment sharing partnerships that existed before the passing of Act 12 (discussed further in Section V).

Additionally, 59 counties were reported as having text-to-911 capabilities, which marks an increase of 26 percent from 2016 (see Section IV for additional discussion). However, relatively less progress has been made in GIS development. Only 11 counties – Cameron, Centre, Clarion, Clearfield, Crawford, Fayette, Indiana, Jefferson, Lawrence, Mercer, and Venango – reported their GIS status as "NG911 Ready."¹⁴⁴

Next Steps in ESInet and GIS Development. Although PEMA has been able to highlight several major accomplishments in the development of NG911, several key milestones remain. For example, over half the counties in the commonwealth have not had ESInet construction initiated. Additionally, over 80 percent of the counties do not currently have their GIS data in a state of NG911 readiness.

According to PEMA representatives, now that NG911 implementation has begun, progress for the remainder of the state will be made quickly. According to the agency, NG911 phase one (call delivery) implementation, including completion of the ESInet, development of GIS and other NGCS for all counties, migration off all call traffic, and PSAP training is expected to be finalized in 2023. Based on our review of the project to date, barring unforeseen circumstances, we see no reason for that target to be missed.

Additionally, going forward, PEMA plans to work with stakeholders to establish GIS change management procedures, which will be used to help update call routing on the ESInet. This aspect is important to ensure that if a boundary line changes (e.g., boundaries between PSAPs) calls can be appropriately and quickly routed to the correct PSAP. PEMA has also identified the need for future investment in GIS technology, especially tools for Z-axis (vertical) location and three-dimensional modeling. These advancements are especially critical for identifying caller location

¹⁴⁴ In a recent update of the 911 Advisory Board at its Quarter 2 2022 meeting, PEMA indicated that five regions of the state – Southwest, Northern Tier, South Central Mountains, North Central, and South Central – along with Susquehanna, Lackawanna, and Luzerne Counties have successfully uploaded their GIS data to the NGCS data hub.

in densely populated areas, where many individuals live and work in multi-storied structures. Finally, PEMA is anticipating the integration of new tools and technologies into the NG911 system, and as a result is planning to annually review its technology and training requirements, governance structures, data collection, and funding models to compensate.

NG911 in Other States

We compared the status of Pennsylvania’s NG911 project to that of other states. In making our comparison, we relied upon data collected by the National 911 Program from its 2020 annual report.¹⁴⁵ The National 911 Office tracks a wide range of self-reported state data on NG911 planning, vendor procurement, network transitions, operations, and system maturity levels. In our review of the national data, we found that there is no uniform method or process to achieve NG911 capable systems, and many states are at various points in their transitions depending on the priorities set by their respective 911 governing bodies. As such, the discussion points in this section were selected to give perspective on Pennsylvania’s NG911 project compared to similar activities in other states.

NG911 Planning. Before a NG911 system can be developed, a plan must be in place to guide its development. We looked at which states have also produced statewide plans for the development of NG911 systems. According to the National 911 Program, an adequate plan included aspects related to governance, funding, system apparatuses, and operations, which is similar to the plan components produced by PEMA and the Board as part of Act 12. Exhibit 20 shows a breakdown of which states have and have not produced a statewide NG911 plan to date.

Exhibit 20

Pennsylvania is One of 35 States That Has Created a Statewide NG911 Plan*

Statewide NG911 Plan Developed?	Total Number Responded	States
Yes	35	AL, AZ, AR, CA, CO, CT, DC, FL, ID, IL, IN, IA, KS, KY, LA, ME, MD, MA, MN, MT, NE, NC, ND, OH, PA, SC, SD, TN, TX, UT, VT, VA, WA, WI, WY
No	12	AK, GA, HI, MI, MO, NH, NJ, NM, NY, OK, OR, RI
No Response	4	DE, MS, NV, WV

Notes:

*/Our analysis included data for all 50 states and the District of Columbia.

Source: Developed by LBFC staff from information provided by the National 911 Office.

¹⁴⁵ National 911 Program, *National 911 Progress Report: 2020 Data*, 2022.

The National 911 Office reported that 35 states¹⁴⁶ have created a statewide NG911 plan as of 2020. This is compared to 12 states that did not have a statewide plan in place, including several states in the Northeast portion of the country.¹⁴⁷ Although nearly three-quarters of the country have statewide NG911 plans, it is worth noting that Pennsylvania adopted one earlier than many other states. When the first iteration of PEMA's NG911 plan was created in 2016, Pennsylvania was one of only 20 states that had such a plan in place.¹⁴⁸ While having a statewide plan is not a prerequisite to NG911, we did find that states with plans were more likely to have taken additional steps towards NG911 implementation than those without plans.

Call Routing Maturity. Next, we examined the maturity of call location and routing technology among states. We used this data point as a benchmark for Pennsylvania's phase one of NG911 implementation, which is focused on call delivery. The National 911 Program interprets this measure as how caller location is used to route calls and associated data to the correct PSAP. Additionally, this metric shows a state's advancement in using NGCS geospatial tools, such as GIS, to identify caller location. We used the same maturity levels as defined by the 911 Office, which are as follows:

- **Legacy.** There has been no change in the technology used to locate and route 911 calls.
- **Foundational.** The transition to NG911 call location and routing has started. However, the technology needed to support full implementation (e.g., GIS) has not been completed for all 911 call types within any jurisdiction. As a result, states in this category are deemed as not using IP technology – an ESInet – to transfer calls to their PSAPs.
- **Transitional.** NG911 call location and routing technology has been implemented for some PSAPs or some specific 911 call types. Although the ESInet is being used to transfer calls to some PSAPs, the 911 system is still reliant on legacy location technology.
- **Intermediate.** NG911 geospatial technology is in use for the routing of all 911 call types, but PSAPs still need to use legacy location technology to verify caller location.

¹⁴⁶ Our analysis included data for all 50 states and the District of Columbia.

¹⁴⁷ There is also the possibility of regional implementation of NG911 plans. Of the 12 states that reported not having statewide NG911 plans, five (Alaska, Georgia, Michigan, New York, and Oklahoma) reported having at least one regional entity with a NG911 plan in place.

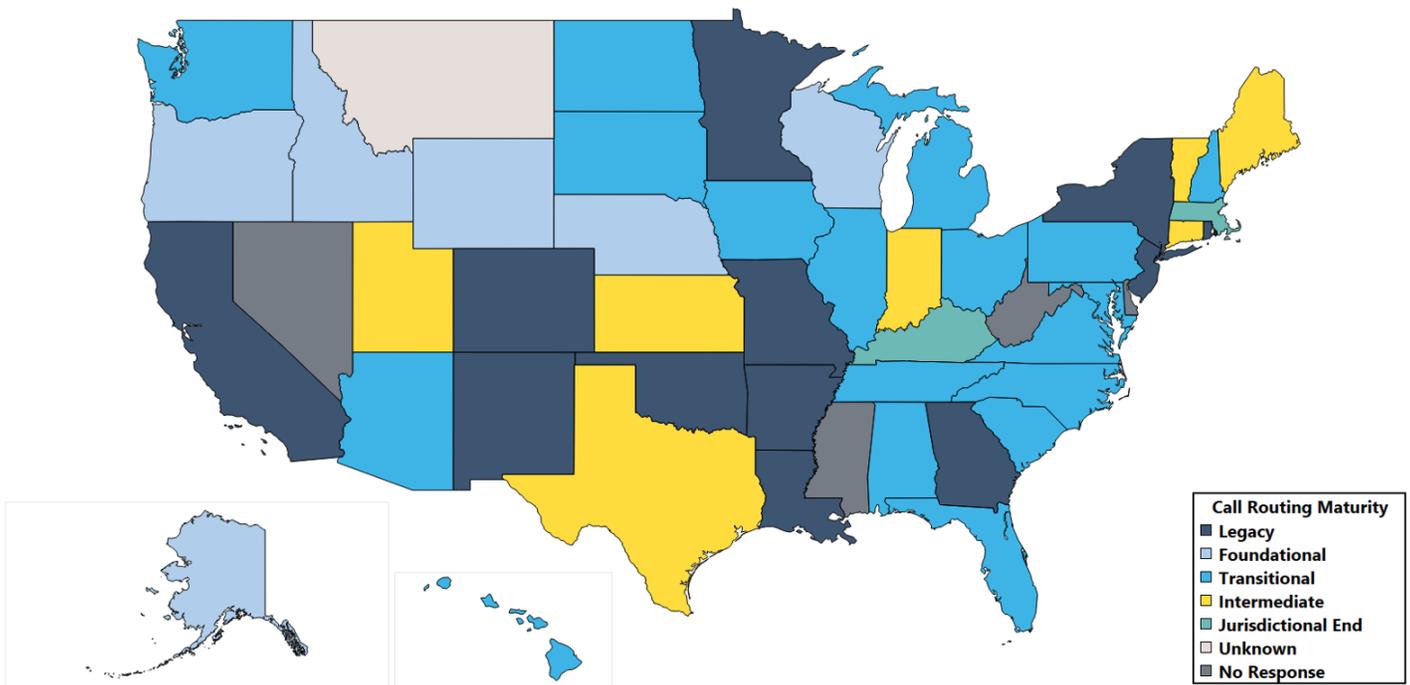
¹⁴⁸ National 911 Program, *National 911 Progress Report: 2016 Data*, 2017.

- **Jurisdictional End State.** There has been full implementation of NG911 call location and routing technology that meets or exceeds the industry standard.¹⁴⁹

Exhibit 21 shows the maturity level of the call routing technology in each state as of 2020.

Exhibit 21

Pennsylvania is One of 28 States That Has Implemented an ESInet for at Least Some 911 Calls*



Notes:

*/Our analysis included data for all 50 states and the District of Columbia.

Source: Developed by LBFC staff from information provided by the National 911 Office.

¹⁴⁹ National 911 Program, *National 911 Progress Report: 2020 Data*, 2022.

Only two states – Massachusetts and Kentucky – reported that NG911 call location and routing technology had been fully implemented. Pennsylvania is one of 28 states¹⁵⁰ that has implemented an ESInet for at least some portion of its 911 calls. The commonwealth has been categorized as a “transitional” state, meaning that it has an ESInet that is in limited use. This aligns with PEMA’s own assessment of the NG911 project – regional ESInets are being leveraged where possible, but other portions of the state still need to have networks developed before the system can be fully operational.

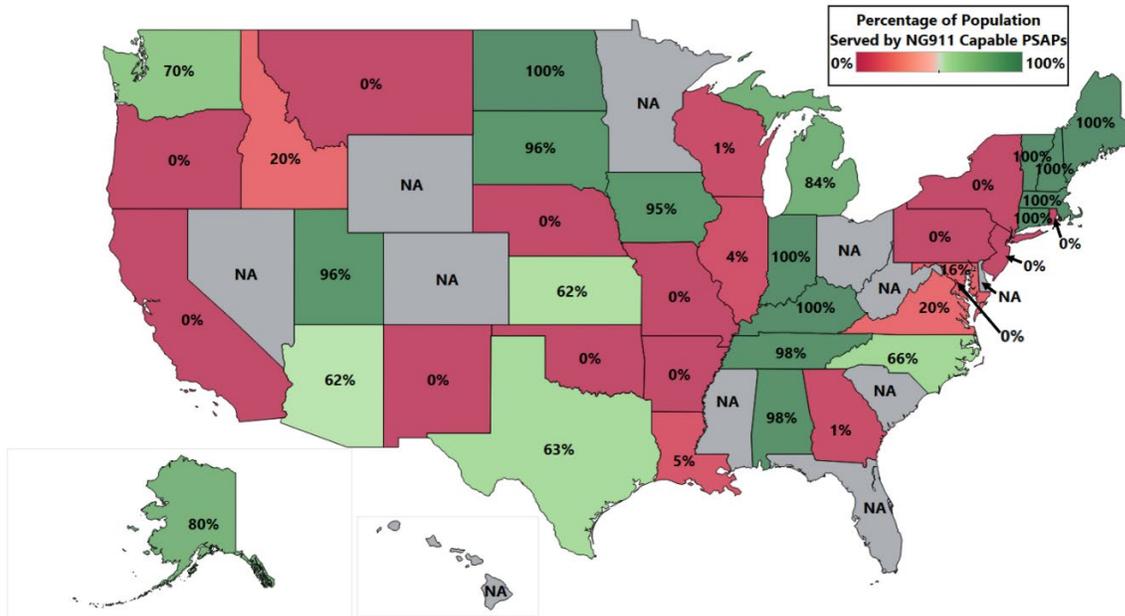
While Pennsylvania may not be leading the nation in ESInet development, it also does not seem to be falling behind. Many states are also in the “transitional” category for this metric, and there are more states considered behind Pennsylvania than ahead in terms of call routing maturity (e.g., 19 labeled as either “legacy” or “foundational” versus 9 labeled as “intermediate” or “jurisdictional end”). Overall, we assess Pennsylvania to be on par with the rest of the country in terms of ESInet development.

NG911 Capable PSAPs. Finally, we explored the status of NG911 development at the PSAP level. The National 911 Program asked states to report the percentage of their population that is served by an NG911 capable PSAP. To be clear, the 911 Office does not describe this metric as a measurement of the population that is currently covered by NG911 systems. Instead, it is a measurement of the technological capabilities of PSAPs to support NG911 services, including networks, equipment, and interfaces, which meet the industry standard. Exhibit 22 shows a geographical representation of this data.

¹⁵⁰ Our analysis included data for all 50 states and the District of Columbia.

Exhibit 22

Pennsylvania is One of 20 States* with Less than 25 Percent of its Population Served by NG911 Capable PSAPs**



Notes:

*/Our analysis included all 50 states and the District of Columbia.

**/In addition, Pennsylvania is one of 13 states that currently has none of its population that is served by NG911 capable PSAPs. During trend analysis, we found several other states that had made minor progress, but still reported less than a quarter of their respective populations covered by NG911 capable PSAPs.

Source: Developed by LBFC staff from information provided by the National 911 Office.

Pennsylvania is one of 20 states¹⁵¹ which reported that less than a quarter of its population is served by NG911 capable PSAPs. An additional 11 states were unable to provide data for this question. The remaining 20 states reported that at least 50 percent of their populations were covered by PSAPs that are NG911 capable.

Despite Pennsylvania's lower ranking, we do not think this is a negative reflection on the NG911-preparedness of the commonwealth's PSAPs. NG911 upgrades are costly, and especially so when considering that the current 911 system must be funded concurrently. Therefore, it will likely take many PSAPs time to get their systems to a full state of NG911 readiness.

¹⁵¹ Our analysis included data for all 50 states and the District of Columbia.

Additionally, PEMA has noted that NG911 call delivery will be operational in the commonwealth before PSAPs are able to upgrade all their systems to NG911 compatible levels. As a result, the ESInet will support connections to legacy systems for several years once it has been fully implemented. However, since they will no longer be responsible for costs related to call delivery, PSAPs will be able to use this funding to help prepare their systems for NG911.

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SECTION IV REVIEW OF COUNTY PUBLIC SAFETY ANSWERING POINTS



Fast Facts...

- ❖ *Statewide 911 call volume decreased by 15 percent between 2016-2020. Newer technologies currently outside of the PSAPs' data collection process have likely compensated for this workload dip.*
- ❖ *Staffing is a pressing issue facing the 911 system. According to PEMA, 23 surveyed PSAPs have a telecommunicator vacancy rate above 20 percent.*
- ❖ *Total county spending grew by 22 percent for the period, including an 18 percent increase in expenses covered by the 911 Fund.*
- ❖ *As the 911 system becomes more interconnected, counties are exploring opportunities to streamline operations. Eight PSAPs have consolidated services with regional partners.*

Overview

County PSAPs are the primary entities responsible for the operation of Pennsylvania's 911 system. PSAP responsibilities were codified with the passing of Act 78 in 1990 and reauthorized with the passing of Act 12 of 2015, albeit with more oversight from PEMA. Today, each county is still responsible for provisioning the 911 system within their jurisdiction – either directly or as part of a regional partnership.¹⁵²

Although PSAPs are focused on local needs and demands, similar trends and challenges are present when reviewing PSAPs from a macro perspective. To that end, we reviewed the areas of call volume, staffing, expenditures, and regional partnerships. Our review covers the period 2016 to 2020. Data used in this analysis comes directly from the counties via PEMA's annual report; however, we also supplemented our analysis with data that we obtained from a questionnaire of county 911 (PSAP) coordinators.

We found that 911 call volume across the state decreased by 15 percent, including declines in wireline and wireless calls by 34 percent and nine percent, respectively. While counterbalanced slightly by increases to text-to-911 and VoIP calls, it is likely that the largest increase in workload came from alarm and other notification systems, which currently bypass the traditional 911 phone system. Additionally, 69 percent of counties reported receiving more non-emergency calls than 911 calls for the period, a trend that many county 911 coordinators believed is becoming increasingly burdensome for their PSAPs. We were unable to provide clearer granularity to this issue though because the data is either lacking or not uniform. Future developments in NG911, and specifically a management information system solution, should provide more clarity in the coming years.

Staffing is perhaps the most significant issue currently facing the county PSAPs. Although a statewide database on staffing does not currently exist, responses to an LBFC survey as well as a PEMA survey indicate that many PSAPs are struggling to fill open telecommunicator positions. Staffing ranked as the most important issue in our survey of 911 coordinators, and PEMA reports that at least 23 counties have telecommunicator vacancy rates above 20 percent. Many factors have caused this issue,

¹⁵² 35 P.S. §5304 (a).

including challenges with hiring, retention, and compensation. Although a one-size-fits all solution does not exist, we have identified opportunities for the General Assembly to further professionalize the 911 industry and bring light to this issue.

The counties' total expenses grew by 22 percent over the observation period.¹⁵³ The 911 Fund covered the majority of expenditures for all but two counties, and overall Fund-reimbursable spending increased by 18 percent. Spending in areas not covered by the Fund was mixed for the period. Although some counties expressed that they would like to see more expenses qualify for Fund reimbursement, we concur with PEMA's assessment that areas not fully covered (e.g., radio equipment, facilities) should remain that way to keep Pennsylvania eligible for federal 911 grant funding.

Personnel and operating expenses accounted for nearly 90 percent of all spending by the counties. While personnel spending is the main driver in many counties, operating expenses increased by 66 percent over the five years, primarily because of the need to update equipment after the findings of the 2016 PSAP Inventory Report. We did find it concerning that 84 percent of counties in classes 6, 7, and 8 spent at least half their budgets over the period on operating costs. With the migration to NG911 underway, we feel there is opportunity for these lesser populated counties to leverage technology and explore cost-sharing options.

Issue Areas

A. Call Volume

The most basic unit of measurement for the 911 system is that which initiates an emergency service request – a call to 911 from a telecommunication device. However, because of the decentralized nature of the 911 system in the United States, there is no nationally accepted call data collection and reporting mechanism.

The lack of standardization at the national level is also apparent in Pennsylvania's call data collection. Although this lack of standardization is problematic for statewide analysis today, prior to Act 12 there was no need for call volume data standardization. After the passage of the Act, however, it became evident that a crucial component for achieving statewide interconnectivity in NG911 would be data standardization. As

¹⁵³ Huntingdon County (49 percent) and Adams County (44 percent) were the only two counties for which 911-funded expenses did not account for at least half of all expenditures for the observation period.

noted, PEMA has been in the process of developing standardized call volume collection and reporting guidelines, which will be implemented within a statewide management information system (MIS) as part of the NG911 project. According to PEMA, this MIS tool will provide comprehensive reporting of both contemporary and historical 911 data, including call volume.¹⁵⁴

According to PEMA, the first deployments of the MIS solution occurred in April 2022, and 24 counties in the Northern Tier and WestCORE regions currently have access to the tool. Unfortunately, for purposes of this report, the statewide MIS solution was not in use during the scope of this study, and as a result there are three significant challenges presented when analyzing historical call volume data. First, according to PEMA and the 911 Advisory Board, counties currently collect, and report call volume data in a variety of ways. Counties across the state currently employ several different MIS systems, and there are several instances where counties counted call volume manually due to an outage of or transition between MIS tools.¹⁵⁵

Second, differences in the network components and configurations within a PSAP can also impact how a 911 call is recorded. For example, a wireless call that is delivered to a PSAP via a wireline circuit will be registered as a wireline call.¹⁵⁶ As a result, in this example the number of wireline calls is overrepresented in the county's data.

Third, while PEMA works with the counties to reconcile data discrepancies and correct supporting documentation, there are some cases where distinct county records could not be provided. Examples include select instances of consolidation of operations^{157,158} and shared service agreements¹⁵⁹ between counties. These cases are noted in the relevant exhibits that follow.

¹⁵⁴ According to information presented by PEMA and the agency's partners during 911 Advisory Board meetings, dashboards within the statewide data monitoring tool will allow PSAPs to monitor their daily call volume in real time.

¹⁵⁵ 911 Advisory Board, *Funding Formula Recommendation: Calendar Year 2021, 2020*.

¹⁵⁶ *Ibid.*

¹⁵⁷ Union County has consolidated its 911 operations with Snyder County, and Montour County has consolidated its operations with Columbia County. As a result, separate county call data could not be provided for Union and Montour starting in 2018. These counties have been excluded from relevant calculations for 2018 through 2020.

¹⁵⁸ LBFC staff combined historical data for the city PSAPs in Allentown and Bethlehem with Lehigh County and Northampton County, respectively, to reflect the consolidations that occurred in 2019.

¹⁵⁹ Due to their shared service agreement, in 2017, calls for Potter County and Tioga County were counted manually and submitted in a combined report. As a result, data for Potter cannot be separated from that of Tioga for this year. Potter has been excluded from relevant calculations for 2017.

While we believe that it is necessary to analyze and understand the patterns in 911 call volume at both the state and county level, due to the challenges highlighted, we stress that the trends discussed should be viewed with caution. In areas where empirical explanations may have been scarce, we were able to rely upon PEMA and the county PSAPs for insight into observed trends in 911 call statistics. However, going forward, as PEMA develops and standardizes its MIS 911 call solution, more investigation should be conducted to ensure that these observations are consistent in an NG911 environment.

Statewide Call Volume Trends

Using the data submitted in PEMA’s annual report, we analyzed state level trends in call volume for the five-year period covering 2016 through 2020. In addition to analyzing the total 911 calls across the state, we also reviewed the data by service type and change over time. The results are presented in Exhibit 23 below.

Exhibit 23

Statewide Call Volume Decreased by 15 Percent between 2016 and 2020*

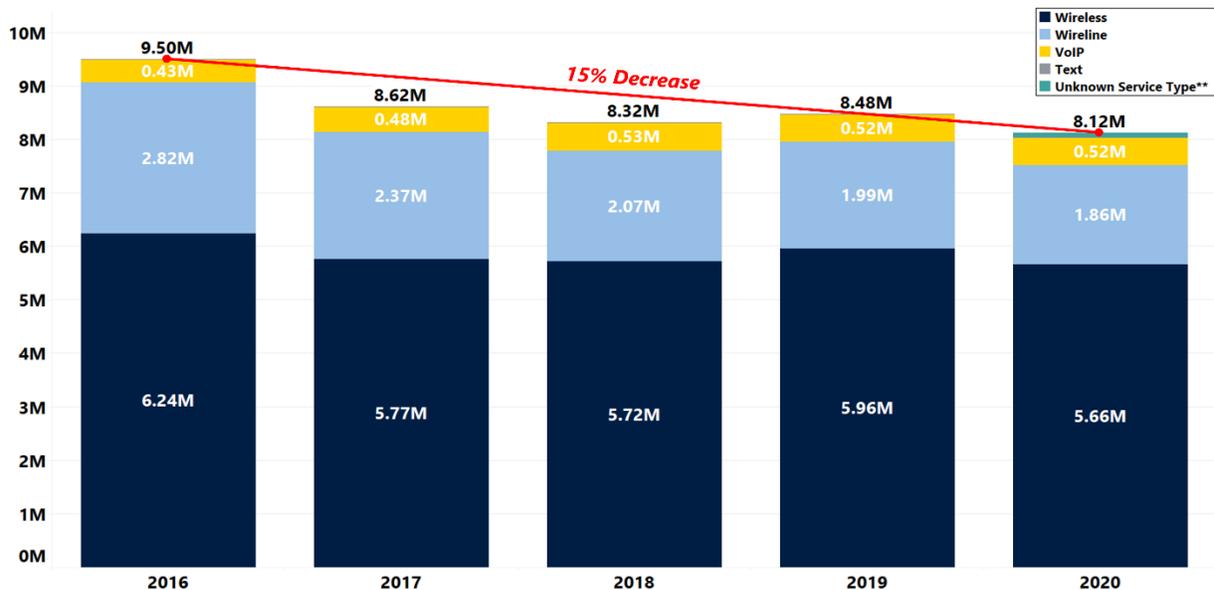


Exhibit 23 Continued

Year	Wireless	Wireline	Text	VoIP	Total 911 Calls
	Percentage Increase or (Decrease)				
2016	-	-	-	-	-
2017	(8)	(16)	(17)	11	(9)
2018	(1)	(13)	(21)	10	(3)
2019	4	(4)	7	(1)	2
2020	(5)	(7)	54	(1)	(4)
Five-Year Trend	(9)	(34)	8	19	(15)

Notes:

*/Please refer to footnotes 157 – 159 located on Page 77 regarding data discrepancies which could have influenced our analysis.

**/PEMA only began to count calls with an unknown service type in 2020.

Source: Developed by LBFC staff from information provided by PEMA.

As shown above, total call volume experienced consistent declines in three of the five years, and decreased by 15 percent over the period. It is important to note that there are many factors that can influence 911 call statistics, and a decrease in call volume does not necessarily mean a reduction in workload for PSAPs.¹⁶⁰ PEMA noted that advancements in technology have created alarm monitoring services that can bypass the traditional 911 telephone system and send alerts directly to a PSAP’s CAD system, in a process referred to as Automated Secure Alarm Protocol (ASAP) to PSAP notifications. While they do remove the time it takes to answer a 911 call, ASAP to PSAP notifications contribute additional workload for telecommunicators, as they must review and dispatch these notifications as they would with other emergency services requests. Further, not all PSAPs – or alarm companies – currently have the technology to send or receive ASAP to PSAP notifications. In those scenarios, telecommunicators must take the additional step of processing calls from alarm companies into their CAD, which can be a time-consuming process.¹⁶¹

To date, there is no standardized way for the 911 industry to track the volume of events initiated by these alert systems. However, we did work with PEMA to obtain data from a select set of class 2-A and 3 counties that track emergency response incidents generated by alarm systems. These counties reported receiving approximately 12,000 alarm notifications per year, which would equate to between five and nine percent of

¹⁶⁰ However, there is a belief that the number of incoming 911 calls to PSAPs dipped in 2020 because of the COVID-19 pandemic. According to PEMA, county PSAPs have indicated a return to normal call volume in 2021. Final call volume metrics for 2021 will be released in PEMA’s annual report, which is due on December 1, 2022.

¹⁶¹ One PSAP we contacted on the matter reported that it requires 100 seconds per call for its telecommunicators to process alarm calls into their CAD system.

the respective counties' current total 911 call volume. For perspective, the average combined share of text and VoIP service requests received by Pennsylvania counties for the observation period was roughly seven percent (county-level analysis provided below). As will be discussed further in Section V, although this is a relatively small share of 911 service requests compared to wireless and wireline calls, this is still a significant addition to telecommunicator workload that is widely outside the oversight of the statewide 911 system. To help manage telecommunicator workload and better understand potential funding alternatives, we feel that viable options to track these alert notifications should be explored.

With respect to wireless and wireline communications, both categories experienced declines in call volume over the five-year span. Wireline calls decreased by 34 percent between 2016 and 2020, which is consistent with national usage trends for the communication method over the same time. Although usage declined steadily, wireline calls still constituted over a quarter of all 911 calls for the period. However, we again urge caution that this statistic could be influenced by nuances in PSAP configurations.

Wireless call volume also decreased at a rate of 9 percent over the same time. Given that wireless makes up nearly 70 percent of the incoming service calls to PSAPs, it is logical that the number of calls would decline given the trends in total call volume discussed above. However, it is important to mention that the classification of 911 calls can be impacted by the call's originating network, as is the case with advancements in cell phone technology that support the placement of calls via Wi-Fi instead of cellular networks. For example, if an individual places a 911 call via their wireless phone and the call hits a cell tower, this call would be classified as a wireless call. However, if the same person places a 911 call, but the phone was connected to a Wi-Fi network, the call would be delivered to the PSAP via an internet router. According to PEMA, "Wi-Fi calls" are counted as VoIP calls and not wireless, skewing the analysis. As will be discussed below, trends in VoIP calling over the same time make it reasonable to assume that Wi-Fi calling has at least marginally impacted the number of wireless calls experienced by the 911 system.¹⁶²

Conversely, the number of service requests (i.e., 9-1-1 contact to the PSAP) initiated via text messaging and VoIP calls increased over the period, although combined both categories were less than six percent of total 911 calls. While use of text messaging to contact PSAPs grew by eight percent over the period, there are several factors that cause it to be

¹⁶² There is also anecdotal evidence that the number of wireless calls could have decreased due to market saturation of cellular phones. With the current prevalence of wireless phone service, it is not unfair to assume that a passersby would not call 911 to report an incident if they presumed another individual had already done so.

an underutilized method for requesting emergency services. First, while text-to-911 is extremely valuable in situations where a call is not possible (e.g., the individual requesting help is hard of hearing or needs to remain silent), the quickest way to contact 911 is still a voice call. Second, although the 911 community across Pennsylvania and the country have been active in raising public awareness about the benefits of text-to-911, not every PSAP currently has the technology required to receive text messages.

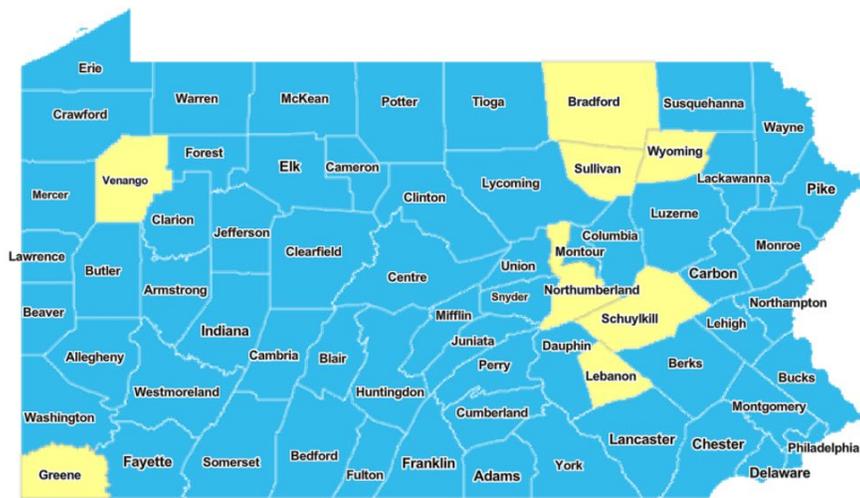
As show in Exhibit 24, 59 of the Commonwealth’s 67 counties currently have the capability to receive emergency service requests via text. At the start of the observation period, only 47 counties were text-to-911 capable.^{163,164} However, as access to text-to-911 expands following the implementation of NG911, PEMA expects its use to become more common.

Exhibit 24

Most Counties Have Text-to-911 Capabilities - But Eight Counties Do Not

Text-to-911 Status

- Text To 9-1-1
- Available
- Not Yet Available



Source: PEMA.

¹⁶³ PEMA, Commonwealth of Pennsylvania Public Safety Answering Point Inventory Report, 2016.

¹⁶⁴ According to PEMA, only seven counties had text-to-911 capabilities prior to the passage of Act 12 (June 2015). See PEMA, *Next Generation 9-1-1 Report and Recommendations*, 2017.

Finally, VoIP calls increased by nearly 20 percent between 2016 and 2020. This increase corresponds with the increased use of VoIP services discussed in previous sections of the report, as well as the prominence of Wi-Fi calling mentioned above. It is expected that VoIP 911 calls will continue to grow as the use of internet calling continues to expand nationwide.

County Call Volume Trends

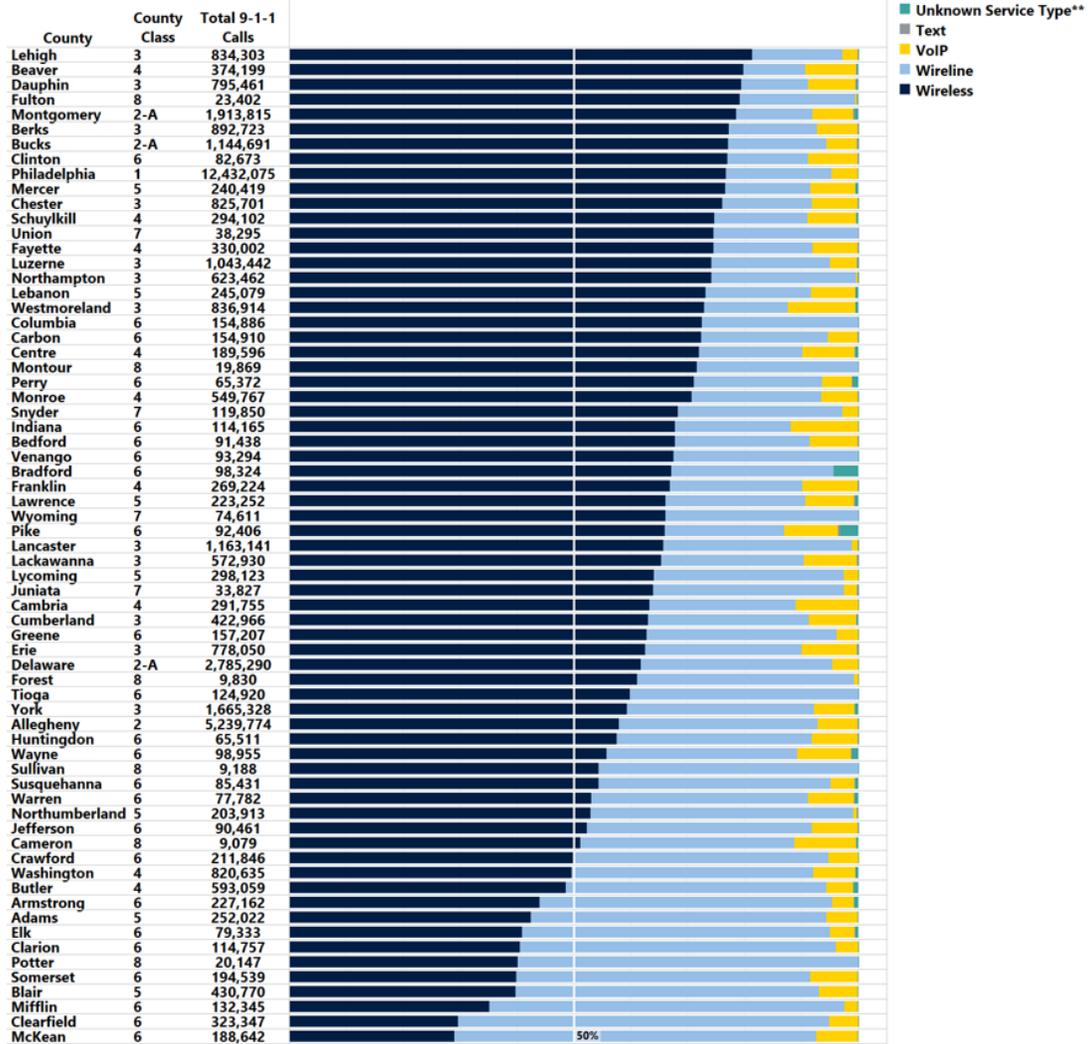
In addition to analyzing statewide statistics and trends, a review of county level trends is also important. Counties vary widely in terms of demographic and geographic characteristics and as a result it is not uncommon to see county call data trends either lead or lag that of the state.

As mentioned previously, given that data collection and reporting standards were still in development during this period, it is important to view this analysis with caution. The county data presented in this discussion is aggregated for the five-year observation window (2016-2020). Yearly presentations of the data used below can be found in Appendix F.

As shown in Exhibit 25, while most counties receive the majority of their 911 service requests via wireless, there are several more rural counties that rely heavily on wireline communications.

Exhibit 25

55 Counties Received Over Half of all 911 Calls via Wireless Phones between 2016 and 2020*



Notes:

*/ Please refer to footnotes 157 – 159 located on Page 77 regarding data discrepancies which could have influenced our analysis.

**/PEMA only began to count calls with an unknown service type in 2020.

Source: Developed by LBFC staff from information provided by PEMA.

For almost every county, wireless phones are the primary method to contact 911 services. Over the five-year period, 55 of Pennsylvania's 67 counties (82 percent) received over half of their 911 service requests via wireless communications. In every county, wireless communications accounted for at least a quarter of all 911 calls.

Wireline calls were the next most common method of communication, with 10 counties (15 percent) receiving over half of their service requests from wireline phones. However, like the patterns experienced for the entire state, both wireless and wireline communications saw a net decline in prominence over the observation period. The total number of wireless calls decreased over the period for 37 counties (55 percent), while wireline use declined in 61 counties (91 percent).

Similar to statewide trends, VoIP and text-to-911 consisted of only a small portion of the counties' 911 service requests. On average, counties received approximately six percent of their total 911 service requests from VoIP communications over the period. No counties saw this service type account for over 12 percent of their total call volume. Further, text-to-911 did not account for a full percent of total call volume in any county from 2016 to 2020.¹⁶⁵ Although the total number of service requests via VoIP and text-to-911 increased over the period, this trend is not necessarily the case on the county level. Only eight and six counties, respectively, saw an increase in VoIP and text-to-911 usage between 2016 and 2020. All other counties either experienced a decline in use or did not have enough data to form a complete dataset for the period.

Consistent with the statewide trends, most counties experienced a decline in total 911 calls between 2016 and 2020. Almost three quarters of the counties saw a decline in 911 calls over the period. On the statewide level, this trend is amplified by the large concentration of 911 calls that come from a small selection of counties. Of the 43 million 911 calls received across the state between 2016 and 2020, over 27 million (64 percent) of those calls came from eight counties (ranked in order): Philadelphia, Allegheny, Delaware, Montgomery, York, Lancaster, Bucks, and Luzerne. Of these eight, only two – Luzerne (5 percent) and York (4 percent) – saw increases in 911 calls over the period.

¹⁶⁵ Similarly, the Association of Public-Safety Communications Officials-International (APCO) found that 92 percent of text-to-911 capable PSAPs reported that service requests via text messages constituted between zero and two percent of their total call volume. See APCO, *Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study*, 2018.

County 911 Call Volume by Population

Our initial analysis showed that two-thirds of Pennsylvania's 911 calls over the five-year period came from only eight counties. However, those eight counties combined for nearly 50 percent of the state's average population. While population is a major driver of 911 call volume, comparing all counties together using call volume alone also does not fully depict the spectrum of the commonwealth's 911 system. For example, receiving 20 calls in an hour may seem relatively routine for a county that averages 200,000 calls a year. Conversely, for a county that averages 2,000 calls a year, the same number of calls in a single hour could be viewed quite differently. Therefore, we wanted to provide additional perspective about each county's call volume relative to the size of the community it serves.

To accomplish this task, we developed a proportional relationship between county call volume and population. Stated differently, we averaged each county's reported 911 call volume over the review period, and then similarly measured it against the average population (as reported by the United States Census Bureau) for the same period. The result of this calculation provides a ratio of 911 calls per person for each county. Using this analysis, we were then able to determine counties where 911 call volume may be particularly high or low for the size of the community. The results of this analysis are presented in Exhibit 26.

Exhibit 26

Philadelphia is the Only County Where Total 911 Calls Outpaces Population*

County	County Class	Average 911 Calls per Year	Average Population per Year	Average 911 Calls per Person
Philadelphia	1	2,486,415	1,581,530	1.57
Delaware	2-A	557,058	565,328	0.99
McKean	6	37,728	41,021	0.92
Allegheny	2	1,047,955	1,218,380	0.86
Greene	6	31,441	36,484	0.86
Clearfield	6	64,669	79,466	0.81
Washington	4	164,127	207,081	0.79
York	3	333,066	447,628	0.74
Blair	5	86,154	122,494	0.70
Armstrong	6	45,432	65,356	0.69
Luzerne	3	208,688	317,547	0.66
Monroe	4	109,953	168,824	0.65
Butler	4	118,612	187,798	0.63
Tioga	6	24,984	40,759	0.61
Clarion	6	22,951	38,633	0.59
Snyder	7	23,970	40,452	0.59
Dauphin	3	159,092	277,071	0.57
Mifflin	6	26,469	46,179	0.57
Erie	3	155,610	272,046	0.57
Wyoming	7	14,922	27,077	0.55
Lackawanna	3	114,586	210,162	0.55
Montour	8	9,935	18,178	0.54
Elk	6	15,867	30,077	0.53
Somerset	6	38,908	73,894	0.52
Lycoming	5	59,625	114,014	0.52
Lawrence	5	44,650	86,148	0.52
Fayette	4	66,000	130,342	0.51
Crawford	6	42,369	85,074	0.50
Adams	5	50,404	102,627	0.49
Carbon	6	30,982	63,964	0.48
Westmoreland	3	167,383	350,709	0.48
Columbia	6	30,977	65,390	0.47
Montgomery	2-A	382,763	827,180	0.46
Lehigh	3	166,861	367,338	0.45
Beaver	4	74,840	164,781	0.45
Northumberland	5	40,783	91,234	0.45
Cambria	4	58,351	131,562	0.44
Mercer	5	48,084	110,519	0.43
Lancaster	3	232,628	543,050	0.43
Clinton	6	16,535	38,549	0.43
Berks	3	178,545	419,062	0.43
Union	7	19,148	44,831	0.42
Susquehanna	6	17,086	40,604	0.42
Jefferson	6	18,092	43,570	0.42
Schuylkill	4	58,820	141,935	0.41
Northampton	3	124,692	304,233	0.41
Cameron	8	1,816	4,512	0.40
Warren	6	15,556	39,466	0.39
Wayne	6	19,791	51,268	0.39
Bedford	6	18,288	48,154	0.38
Bucks	2-A	228,938	627,668	0.36
Venango	6	18,659	51,355	0.36
Lebanon	5	49,016	140,410	0.35
Franklin	4	53,845	154,954	0.35
Cumberland	3	84,593	251,487	0.34
Pike	6	18,481	55,660	0.33
Bradford	6	19,665	60,721	0.32
Fulton	8	4,680	14,492	0.32
Chester	3	165,140	521,980	0.32
Sullivan	8	1,838	6,038	0.31
Potter	8	5,037	16,683	0.30
Huntingdon	6	13,102	45,145	0.29
Perry	6	13,074	46,133	0.28
Juniata	7	6,765	24,657	0.27
Forest	8	1,966	7,190	0.27
Indiana	6	22,833	84,463	0.27
Centre	4	37,919	162,264	0.23

Statewide
Average = 0.67

Notes:

*/ Please refer to footnotes 157 – 159 located on Page 77 regarding data discrepancies which could have influenced our analysis.

Source: Developed by LBFC staff from information provided by PEMA.

Between 2016 and 2020, the average ratio of total 911 call volume to population for Pennsylvania was 0.67. This means that, on average, there were fewer 911 calls placed across Pennsylvania than there are citizens in the commonwealth. For the observation period, only 10 counties (15 percent) had an average ratio that exceeded the statewide average. Of those counties, only Philadelphia (1.57) exceeded an average ratio of one 911 call per person. However, given the large number of non-residents that work and/or travel to the City of Philadelphia, it is not unusual to expect that the annual number of 911 calls received by its PSAP would outpace its population base.¹⁶⁶

What was somewhat unusual to see was that certain other “high call ratio” counties were less urbanized or smaller counties. For example, McKean, Greene, Clearfield, and Armstrong counties are class 6 counties, meaning they are smaller population centers. As a result, there are other causal factors that are likely driving the higher call to population ratio. These factors include, but are not limited to, large manufacturing and industrial centers, interstate travel, and vibrant tourism and recreational industries. Our analysis is also consistent with PEMA’s annual reporting of county activity.¹⁶⁷

Non-Emergency (10 digit) Phone Calls

As previously discussed, individuals dial the three digits “9-1-1” on their communications devices to contact their nearest PSAP and request emergency services. However, these are not the only calls that PSAPs receive. PSAP telecommunicators also receive non-emergency calls via the centers’ “traditional” 10-digit phone lines.

Non-emergency calls are significant to the discussion of county call trends, because when telecommunicators are required to answer non-emergency calls, it reduces availability to field emergency service requests; thus, slowing overall response times.

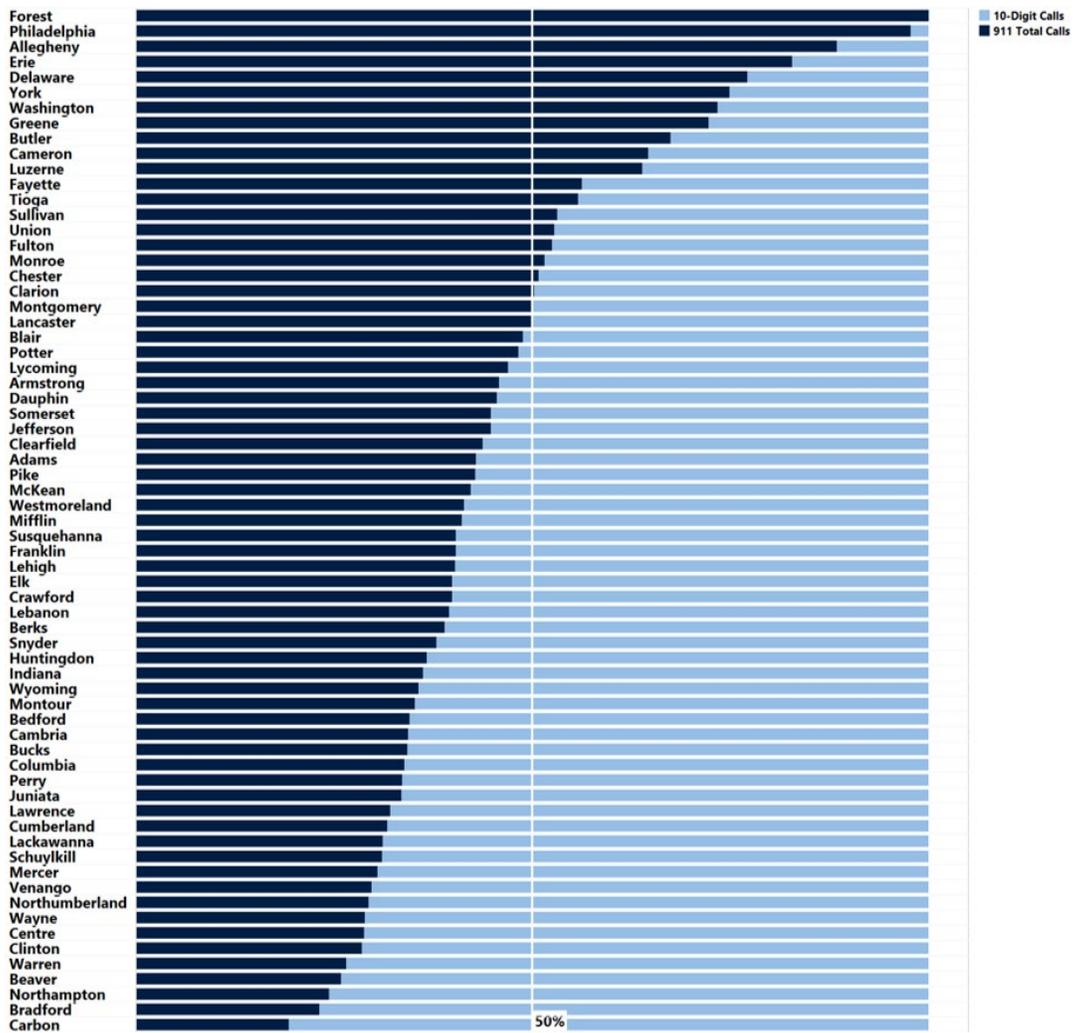
To understand the scope of this situation, we compared number of annual 911 calls to 10-digit calls reported for each county, the results of which are presented in Exhibit 27.

¹⁶⁶ The 2016 PSAP Inventory Report also cited crime rates as a key consideration in several urbanized areas. The report listed Philadelphia as having a violent crime rate that was three times the national average. Additionally, the City of Chester in Delaware County, which had the second highest ratio of 911 calls per person in our analysis, was cited as having the second highest murder rate per capita in the United States. See PEMA, *Commonwealth of Pennsylvania Public Safety Answering Point Inventory Report*, 2016.

¹⁶⁷ PEMA, *Commonwealth of Pennsylvania Public Safety Answering Point Inventory Report*, 2016.

Exhibit 27

46 Counties Received More 10-Digit Calls than 911 Calls*



Notes:

*/Please refer to footnotes 157 – 159 located on Page 77 regarding data discrepancies which could have influenced our analysis.

Source: Developed by LBFC staff from information provided by PEMA.

From 2016 to 2020, 46 counties (69 percent) reported receiving more 10-digit calls than 911 calls. Only two counties – Forest and Philadelphia – reported that 10-digit calls consist of less than 10 percent of their total call volume.

Given the large number of 10-digit calls received by most counties, we wanted to analyze how these calls impact the total call volume for each county relative to its size. As such, we updated our population ratio to

reflect the number of total calls (911 and 10-digit) compared to the number of residents for each county. The results are presented in Exhibit 28.

Exhibit 28

Two-Thirds of Counties Had Average Total Calls Exceed County Population*

County	County Class	Average Total Calls per Year	Average Population per Year	Average Total Call Volume Per Person
Carbon	6	160,949	63,964	2.52
McKean	6	89,234	41,021	2.17
Clearfield	6	147,657	79,466	1.86
Beaver	4	288,842	164,781	1.75
Lackawanna	3	367,961	210,162	1.75
Northampton	3	512,385	304,233	1.69
Lawrence	5	139,184	86,148	1.62
Philadelphia	1	2,542,824	1,581,530	1.61
Snyder	7	63,206	40,452	1.56
Montour	8	28,263	18,178	1.55
Wyoming	7	41,813	27,077	1.54
Northumberland	5	138,789	91,234	1.52
Armstrong	6	99,200	65,356	1.52
Clinton	6	58,077	38,549	1.51
Warren	6	58,676	39,466	1.49
Blair	5	176,333	122,494	1.43
Mercer	5	157,926	110,519	1.43
Columbia	6	91,489	65,390	1.40
Bradford	6	84,825	60,721	1.40
Mifflin	6	64,447	46,179	1.40
Schuylkill	4	189,609	141,935	1.34
Wayne	6	68,453	51,268	1.33
Elk	6	39,744	30,077	1.32
Cambria	4	170,000	131,562	1.29
Delaware	2-A	722,363	565,328	1.28
Monroe	4	213,351	168,824	1.26
Dauphin	3	349,658	277,071	1.26
Crawford	6	106,187	85,074	1.25
Venango	6	62,715	51,355	1.22
Greene	6	43,537	36,484	1.19
Clarion	6	45,709	38,633	1.18
Somerset	6	86,916	73,894	1.17
Westmoreland	3	404,227	350,709	1.15
Adams	5	117,481	102,627	1.15
Lehigh	3	414,308	367,338	1.13
Lycoming	5	126,946	114,014	1.11
Bedford	6	52,902	48,154	1.10
Tioga	6	44,816	40,759	1.10
Berks	3	457,958	419,062	1.09
Washington	4	223,701	207,081	1.08
Bucks	2-A	668,894	627,668	1.07
Cumberland	3	266,945	251,487	1.06
Susquehanna	6	42,353	40,604	1.05
Luzerne	3	326,668	317,547	1.03
York	3	444,624	447,628	0.99
Allegheny	2	1,184,496	1,218,380	0.97
Butler	4	175,940	187,798	0.94
Jefferson	6	40,422	43,570	0.93
Montgomery	2-A	762,696	827,180	0.92
Fayette	4	117,369	130,342	0.90
Lebanon	5	124,132	140,410	0.89
Franklin	4	133,544	154,954	0.86
Lancaster	3	463,568	543,050	0.85
Perry	6	38,950	46,133	0.84
Junata	7	20,180	24,657	0.82
Centre	4	131,728	162,264	0.81
Union	7	36,292	44,831	0.80
Huntingdon	6	35,697	45,145	0.79
Pike	6	43,145	55,660	0.78
Indiana	6	62,953	84,463	0.75
Erie	3	187,847	272,046	0.69
Potter	8	10,427	16,683	0.63
Cameron	8	2,810	4,512	0.63
Chester	3	325,268	521,980	0.62
Fulton	8	8,917	14,492	0.62
Sullivan	8	3,455	6,038	0.57
Forest	8	1,966	7,190	0.27

Statewide
Average = 1.16

Notes:

*/ Please refer to footnotes 157 – 159 located on Page 77 regarding data discrepancies which could have influenced our analysis.

Source: Developed by LBFC staff from information provided by PEMA.

When integrating 10-digit calls into the calculation, the average ratio of total calls compared to population for Pennsylvania between 2016 and 2020 was 1.16, meaning that on average, PSAPs fielded more calls per year than there are citizens in the commonwealth. Forty-four counties – nearly two-thirds of the state – had the average total number of calls to their 911 centers exceed the average population in their communities. It also appears that 10-digit calls disproportionately impacted less populated counties more so than densely populated counties. Of the 44 counties that have a ratio that exceeded one call per person, 28 were county class 5 or lower.

It became clear during our discussions with PEMA and county PSAP coordinators that the influx of 10-digit calls can be the result of a variety of factors. In our survey of county 911 directors, 34 counties self-reported that their PSAPs perform ancillary duties outside of 911 call-taking and dispatching. Many of these duties involve answering additional non-emergency calls, including serving as after-hours points of contact for municipal governments, local police departments, county judicial offices, and public works agencies.¹⁶⁸ Some coordinators suggested that it may be possible for these duties to be handled as “3-1-1” non-emergency information systems run by municipalities. However, because we cannot distinguish the number of 10-digit calls that pertain to these duties, it is impossible for us to say if it would be cost effective to create these additional municipal services or to extend the hours of operation in localities where they already exist. If more granular data on incoming 10-digit calls to county PSAPs could be collected, this would aid any further discussion on possible remedies at the state or local level.

Another area of concern that was raised to us by county 911 directors was the possibility of 10-digit calls coming from telemarketers. Again, due to the granularity of the data available to us, we cannot determine the proportion of 10-digit calls that come from this source. While counties did mention that “spam calls” is a relatively loose term that can make tracking such data difficult, PEMA did help us to obtain information from several counties that do attempt to quantify these calls. One class 7

¹⁶⁸ Many PSAPs across the country perform similar ancillary duties. In a national survey, APCO found that 64 percent of responding PSAPs served as afterhours points of contacts, 47 percent fielded calls for public utilities, and 94.5 percent answered other administrative calls. See APCO, *Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study*, 2018.

county reported that it was able to classify approximately five percent of its total non-emergency calls as “spam” in 2021. Additionally, although a broader tangential category, one class 3 county informed us that accidental and false 911 calls constitute nearly 17 percent of its PSAP’s total 911 call volume. We caution, however, that these are anecdotal reports and we do not have access to data to verify these claims.

Nevertheless, this issue is prevalent enough to warrant the FCC to explore preventative measures. In 2012, the FCC was directed to create a “Do-Not-Call” registry for PSAPs that would inhibit unwanted or illegal robocalls from dialing phone lines designated for 911 centers. This system was never fully implemented, due to the security concerns that would arise from having contact information for the entire country’s emergency communications services on a single registry.¹⁶⁹ However, in 2021, the commission requested comment on additional rule changes that could address this issue, specifically on the proposal that voice service providers be required to block autodialed calls made to PSAP phone lines.¹⁷⁰ Formal rule changes have yet to be adopted.

Barring additional action from the FCC, we recommend the General Assembly explore the possibility of requiring service providers to block incoming autodialed calls to the commonwealth’s PSAPs. While many of these calls are designed to imitate legitimate telephone numbers, counties have explained to us that developing a database of numbers that have been flagged as “spam” should be a relatively simple process using the technology that is already present in many CHE systems. Considering such action can be one way to help lessen an unnecessary burden on the commonwealth’s PSAPs.

B. Staffing

One of the most prevalent issues facing the 911 community today is staffing. In our poll of 911 county coordinators, 33 counties ranked “hiring and retention of staff” as the most concerning issue facing their PSAP. When averaging the rankings of all responding counties, staffing scored as the most predominant issue throughout the state’s 911 system. However, there are many layers to what makes staffing a difficult issue

¹⁶⁹ See FCC-21-108, 2021.

¹⁷⁰ Ibid.

for Pennsylvania's PSAPs. In this issue area, we will detail the condition of staffing at PSAPs during the observation period, explore the effects of staffing on PSAP effectiveness, discuss some of the common staffing issues faced across the commonwealth and offer potential strategies we have heard from our conversations with PEMA and the PSAPs.

PSAP Staffing Levels

While it is evident that staffing is critical for understanding the state of the commonwealth's 911 system, it unfortunately, is not the most straightforward issue to analyze. Unlike county call volume or expenditure information, no statewide database or other data collection on staffing exists.

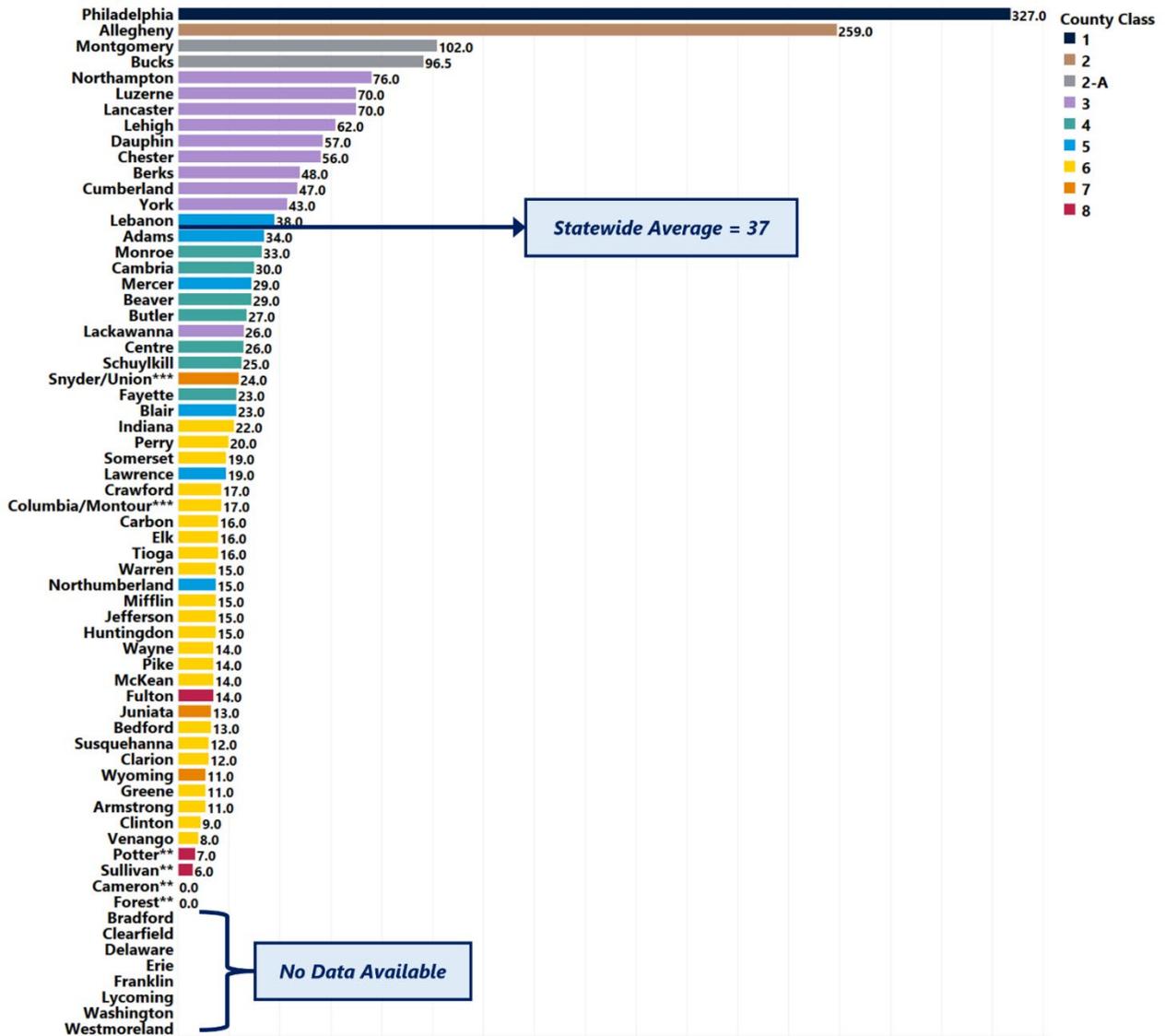
Because we lacked a comprehensive dataset to analyze, we surveyed 911 county coordinators to obtain data on staffing within their respective PSAPs.¹⁷¹ The information collected from this survey is used as the primary basis for much of the analysis. Because this information is self-reported, we attempted to perform tests to see if the data was reasonable but could not always do so because there was no corroborating data readily available. As a result, while we discuss high level trends – as opposed to individual county metrics – we advise caution in extrapolating the results to form hard conclusions for every county, as the conditions that may exist in one county PSAP may not be true of other PSAPs, even within the same county class.

Current Telecommunicator Staffing Levels. In Exhibit 29 we present the number of telecommunicators employed at the county PSAPs, including part-time operators listed as full-time equivalents (FTEs).

¹⁷¹ Our survey received responses from 58 of Pennsylvania's 67 counties.

Exhibit 29

Telecommunicator Staff Size is Highly Dependent on Size of County*



Notes:

*/ These totals do not reflect the number of administrators or support staff employed by the PSAPs. These numbers are reflective of the results reported in our 911 county coordinator survey during the Fall of 2021.

**/ Due to shared service agreements, Cameron, Forest, Potter, and Sullivan Counties do not maintain primary PSAPs. Please refer to Section V for more information.

***/ Due to physical consolidations, regional PSAPs are now operated for Snyder and Union Counties and Columbia and Montour Counties. Please refer to Section V for more information.

Source: Developed by LBFC staff from information provided by the Pennsylvania county PSAPs.

As expected, the number of telecommunicators employed at a PSAP is closely connected to county size. Philadelphia and Allegheny, the two most populated counties in the state, each outpace the next closest county by at least 150 operators. Additionally, of the 14 counties that employed more than the statewide average of 37 operators per PSAP, 13 (93 percent) were grouped as a county class 3 or higher. This trend is logical when considering that population is one of the major drivers on 911 call volume across Pennsylvania. More populous counties tend to receive more 911 calls than lesser populated counties; therefore, these larger counties can justify having PSAPs with more staff.

Changes in Staffing Levels Over Time. Although we did not have annual employment data, we wanted to provide perspective on changes in PSAP staffing levels over time. To complete this perspective, we compared the staffing data provided to us by the county 911 coordinators to similar metrics collected as part of the 2016 PSAP Inventory Report required by the Act.¹⁷² We then took the additional step of reviewing the change in staff size to the variation in total 911 call volume for the same time span (2016 and 2020). Although this is only a point in time comparison, it does allow us to approximate the development of PSAP staffs over the first five years of the Act. The results of this comparison are presented in Exhibit 30.

Exhibit 30

Over Half of County PSAPs Reported an Increase in Total Staff Size between 2016 and 2020

	Staff Size Increase	Staff Size Decrease	No Change in Staff Size	No Staffing Data*
Call Volume Increase	8	3	3	3
Call Volume Decrease	27	10	6	7
Total	35	13	9	10

Notes:

*/While call volume data exists for all of Pennsylvania’s 67 counties via PEMA’s annual report, we did not have enough staffing data from 10 counties to help inform this comparison.

Source: Developed by LBFC staff from information provided by PEMA and the Pennsylvania county PSAPs.

Our comparison indicates that 35 counties self-reported an increase in the size of their PSAP staff since the 2016 Inventory Report. Further, 27 of those counties reported an increase in staff size and experienced a decline in call volume between 2016 and 2020. An additional 13 counties

¹⁷² 35 Pa. C.S. §5314.

reported a decrease in overall staff size, and nine reported no change in staffing levels.

While these results must be viewed with a degree of caution due to their self-reported nature, we did not expect to see most counties report increases in staffing levels given the more dire views about hiring and retention that were expressed to us throughout our study (see below). However, in our discussions with PEMA, we came away with several reasonable explanations as to why PSAPs might increase their staff size despite net declines in 911 call volume.

First, funding increases resulting from the Act likely allowed PSAPs to increase their staffing levels since 2018. Prior to the Act, the last addition to the revenue base for the 911 program was in 2011, when a \$1.00 fee for prepaid wireless phone service was added.¹⁷³ The first 911 Fund payments to counties under the new \$1.65 uniform surcharge came in early 2016; however, as indicated by the PSAP Inventory Report that occurred in the same year, the initial focus for many PSAPs was to replace outdated equipment.¹⁷⁴ This could explain why the staffing numbers reported by the Inventory were still reflective of the levels maintained prior to the Act. As equipment upgrades were finalized by 2018, it is likely that PSAPs shifted their resources toward staffing.

Second, as previously discussed, it must be noted that call volume can be influenced by a variety of factors. Declines in call volume do not necessarily indicate reductions in workload for PSAPs, due to alarm and other notification systems that negate the need for a 911 call.¹⁷⁵ Additionally, it is believed that the COVID-19 pandemic reduced the number of 911 calls made to PSAPs, and call volume will return to more normal levels in 2021 and beyond.¹⁷⁶ Consequently, a longer period of analysis may reverse the trend we observed.

Third, not only are emergency service requests coming from sources other than phone calls, but the calls that are occurring are becoming increasingly more complex to process. As more technology and modes of communication get interconnected into the 911 system, there is an increasing amount of data and information that needs to be integrated and processed before a telecommunicator even answers a call. However, because the technology is not completely precise, operators are required to ask a standardized series of questions to verify the information pre-

¹⁷³ Although surcharges for wireline (1990; \$1.00-\$1.50), postpaid wireless (2003; \$1.00), VoIP (2008; \$1.00), and prepaid wireless (2011; \$1.00) were added over time, the allowable fee rates were never raised statewide prior to Act 12 of 2015.

¹⁷⁴ PEMA, Commonwealth of Pennsylvania Public Safety Answering Point Inventory Report, 2016.

¹⁷⁵ We are recommending the study of these notification systems be a priority for PEMA following the deployment of the statewide MIS solution.

¹⁷⁶ Final metrics on 2021 call volume will be released in PEMA's annual report, which is due by December 1, 2022.

sented to them. As a result, there are early indications that telecommunicators are spending more time on 911 calls, which reduces the number of calls that they can process. In turn, this increased call-handling time creates the need to increase staff sizes to compensate. This topic will be highlighted again later in this issue area, and addressed fully in Section V, as its impacts within NG911 are significant.

Finally, as will be discussed later in this issue area, personnel management practices that are unique to PSAPs can impact the trends we observed. PSAPs are primarily 24/7 operations,¹⁷⁷ and as such, the nature of the work oftentimes leads to employees earning considerable amounts of leave through overtime or other employee incentives.¹⁷⁸ It is therefore necessary for PSAPs to attempt to hire at rates that will help maintain adequate staffing levels while allowing employees to take earned leave and mitigate against employee turnover.

Current Telecommunicator Vacancies. Although the majority of PSAPs have increased their telecommunicator staffing levels since 2016, PSAPs are having problems filling open positions. In late 2021/early 2022, PEMA conducted a PSAP staffing survey to assess the vacancy rate of telecommunicator positions in the commonwealth.

PEMA found that, among the 43 counties that responded, 1,804 telecommunicator positions exist at full complement (no vacancies). In total, these PSAPs reported 363 vacancies, indicating a vacancy rate of 20 percent. The county-level results were even more troubling. Twenty-three of the responding counties reported vacancy levels above 20 percent, including three counties above 40 percent and one county that had a vacancy rate of over 50 percent. Only eight PSAPs reported that their center did not have any vacant telecommunicator positions. Unfortunately, these results seem to align with national trends. A nationwide PSAP staffing study conducted by the Association of Public-Safety Communications Officials-International (APCO) found that 71 percent of PSAPs surveyed nationally reported that their staffing levels were lower than their authorized complement for some of or all of 2017.¹⁷⁹

The vacancy rate among telecommunicator positions is one of the most significant issues facing the commonwealth's 911 system. Throughout the remainder of this issue area, we will look at the impact this issue can have on PSAP operations, as well as potential causes and solutions that

¹⁷⁷ Several counties have voluntarily reduced their hours of operation by consolidating operations or entering shared service agreements with other counties. See Section V for more discussion on this topic.

¹⁷⁸ APCO reported that across the United States, nearly 68 percent of PSAP staff surveyed received at least 80 hours of vacation leave annually. Additionally, approximately 79 percent of surveyed employees reported receiving between 41 and 120 hours of sick leave per year. See APCO, *Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study*, 2018.

¹⁷⁹ Ibid.

have been presented. Staffing was one of the most frequently reoccurring themes throughout our survey of county 911 coordinators, and the input we received will be highlighted throughout the discussion that follows.

PSAP Staffing Impacts on Response Time

As mentioned previously, staffing was ranked as the top concern among 911 county coordinators across the commonwealth. To assess the impact of this concern, we asked the coordinators if they felt that the number of telecommunicators that are employed at their PSAPs is sufficient to handle their center's call volume. Thirty-five counties answered that they felt their current staffing level was not sufficient to handle their PSAP's call volume. Conversely, 21 counties said their staffing level was sufficient relative to the call volume experienced by their PSAP.¹⁸⁰

However, we recognize that the definition of "sufficient" requires a subjective response from each county coordinator. To normalize this subjectivity, we also compared each coordinator's response to this question with the respective PSAP's performance against call processing¹⁸¹ standards set by PEMA.

PEMA indicated that the call center processing goal during the scope of our study was to answer at least 90 percent of 911 calls in 10 seconds (3 telephone rings) or less.¹⁸² County PSAP's report compliance with this goal to PEMA; however, like with other reported call center data, the information is self-reported from each PSAP's call center system. While this fact also provides some limitation on the analysis, we believe a comparison of the two yields valuable perspective on staffing and its everyday impacts on Pennsylvania's PSAPs. The results of this comparison are presented in Exhibit 31.

¹⁸⁰ The remaining 11 counties either declined to answer this question or did not respond to our survey.

¹⁸¹ In their documentation, NENA uses the term "call processing" to describe the length of time needed for a telecommunicator to answer an emergency service call. For the purposes of this report, we will use the terms "call answering" and "call processing" interchangeably. See NENA, *NENA Standard for 9-1-1 Call Processing*, 2020.

¹⁸² In April of 2020, NENA revised their recommended standard to be that 90 percent of all 911 calls are answered in 15 seconds or less. According to PEMA, the Technical Subcommittee of the 911 Advisory Board adopted this standard in September 2021. A regulatory review process was in its initial phases at the time of this writing. For more discussion, see Section V of this report.

Exhibit 31

**Most Counties Reported Meeting PEMA’s Call Answering Standard
 Despite Reporting Insufficient Staff to Handle Call Volume**

Average Time to Answer 911 Calls (Reported to PEMA)	In your opinion, is the number of telecommunicators currently employed at your PSAP sufficient to handle the center’s call volume?			
	Yes	No	NA	Total
1-10 Seconds	20	28	1	49
11-21 Seconds	0	4	0	4
21-30 Seconds	1	1	0	2
31-60 Seconds	0	0	0	0
61-90 Seconds	0	1	0	1
Over 90 Seconds	0	1	0	1
Data Not Available	0	0	10	10
Total	21	35	11	67

State and
National
Standard

Source: Developed by LBFC staff from information provided by the Pennsylvania county PSAPs.

Our review showed that 49 counties reported meeting (and in many cases, exceeding) the call processing standard that was in place during the period.¹⁸³ Surprisingly, more counties said they felt their PSAP’s staffing levels were not sufficient to handle their call volume and still reported meeting the call processing standard than those that said their staffing levels were sufficient. Twenty-eight counties reported meeting the call processing standard despite expressing that their staffing levels were not sufficient. Conversely, 20 counties reported both sufficient staffing levels and that their PSAP had met the state’s call processing standard.

Once again, these findings were perplexing given the reported staffing issues currently facing PSAPs. However, we believe that it could be the result of the growing complexity of technology that was previously discussed. While many telecommunicators may be able to now meet the industry standard for call *processing* (answering), we believe many coordinators feel there is strain on their staffs in terms of *handling* 911 calls – meaning the time it takes to see a call through to its completion. As the number of devices and pieces of information that are integrated into the 911 system increases, the length of time needed to handle 911 calls will likely also grow. When the time needed to handle 911 calls increases, this can impact the ability of staffs to answer calls in a timely manner.

¹⁸³ In 2018, APCO found that the average length of time for PSAPs in the United States to answer 911 calls was 10.5 seconds. See APCO, *Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study*, 2018.

NENA's recent decision to extend the standard call processing time from 10 to 15 seconds supports this conclusion (see Section V).¹⁸⁴

Nevertheless, without a statewide dataset, we are unable to review the development of this condition over time. According to PEMA, individual PSAP and telecommunicator performance metrics, including call length, are not currently accessible at the state level. Following the transition to NG911, the MIS solution that will be used by PEMA will have the ability to track this data.

Potential Legislative Action Related to the Collection and Reporting of Staffing Data

It became evident throughout our conversations with members of the 911 community across the state that staffing is an extremely important issue. However, as we have noted, tracking data pertaining to staffing and telecommunicator workload – outside of traditional 911 metrics such as call volume – is currently not possible at the statewide level. However, the examination of such metrics is expected to become more plausible following the implementation of the MIS solution.

Like many of the potential remedies for staffing issues (see below), it is difficult for us to recommend targeted actions for PEMA to address the shortcomings in staffing data, as the provisioning of 911 systems – which includes staffing matters – is primarily a county function under Act 12.¹⁸⁵ However, we believe that, as the steward of the commonwealth's 911 program, it would be beneficial for PEMA in their statewide planning capacity to have access to accurate data on staffing and telecommunicator workload. Further, as will be demonstrated in the discussion that follows, we feel that PSAP staffing is a significant issue of which the legislature should be apprised.

Over the course of this study, we found that the most accurate source of data on the commonwealth's 911 program was PEMA's annual report. Currently, Act 12 requires PEMA to report on 911 Fund revenue and distributions, county compliance with the state's 911 priorities, and the consolidation of 911 systems.¹⁸⁶ Moving forward, we think that it would be beneficial for both PEMA and the General Assembly to have access to annual data on PSAP staffing and telecommunicator workload. We recommend that, in the next authorization of 35 Pa.C.S. Ch. 53, the General Assembly consider adding a requirement for PEMA to report on PSAP staffing and call processing metrics as part of its annual report. Since the next authorization of the statute is expected to coincide with the

¹⁸⁴ NENA, NENA Standard for 9-1-1 Call Processing, 2020.

¹⁸⁵ 35 P.S. §5304 (a).

¹⁸⁶ 35 P.S. §5303 (a).

statewide deployment of MIS solution, the annual collection and reporting of this staffing data will help PEMA, the legislature, and Pennsylvania's 911 stakeholders better understand trends in telecommunicator staffing and workload.

Causes of Staffing Issues Facing PSAPs

Factors that cause staffing issues at the commonwealth's PSAPs are complex. In fact, many distinct, yet related, issues work in congruence to create the current situation facing the 911 community. In this section, we will highlight some of the primary areas of concern based on our discussions with PEMA and the county PSAPs.

Telecommunicator Pay. Throughout our conversations, it was evident that there is a widespread view among the 911 community that compensation is related to staffing shortages. Many in the industry believe that the pay scale for telecommunicators does not align with the job demands, including long hours, graphic depictions of traumatic events, and need for time sensitive responses. One class 7 county succinctly expressed the matter to us in this way:

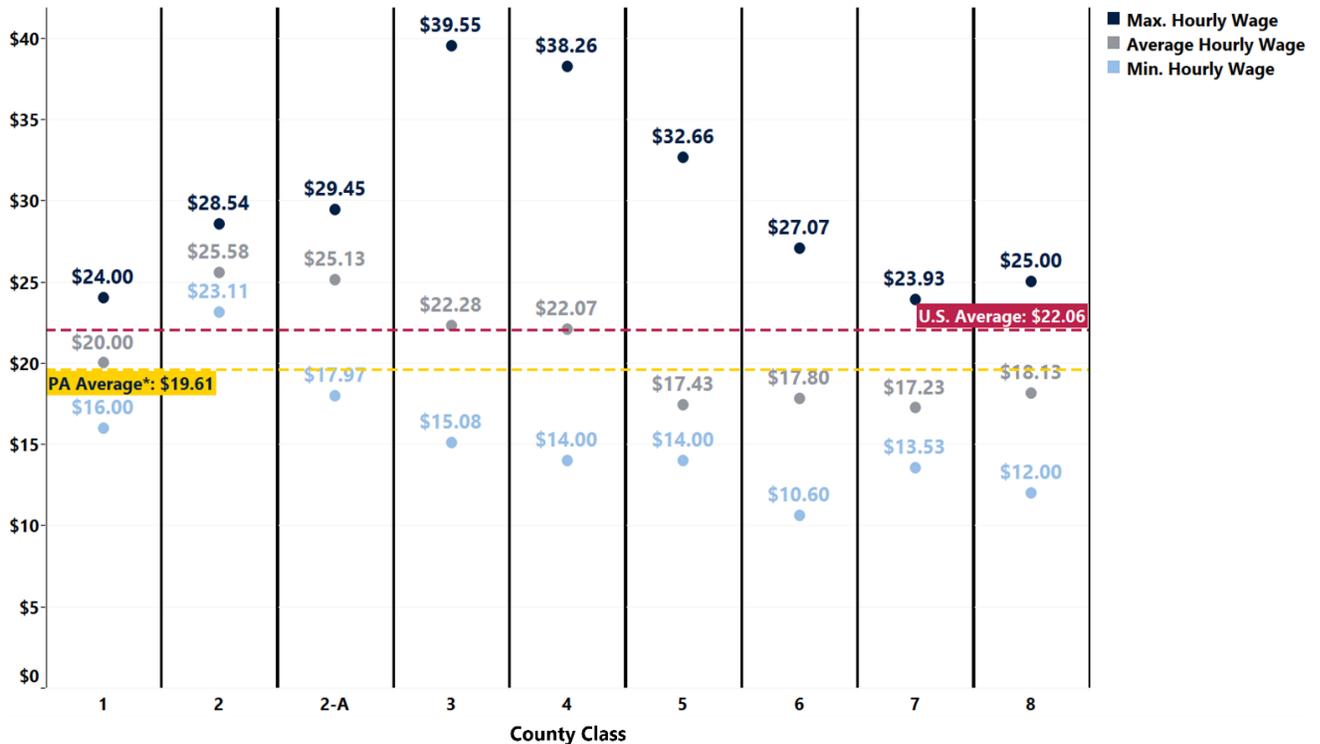
Staffing is a major issue for many PSAPs across the commonwealth. The pay that most dispatchers receive is not high enough to be competitive in the job market. Most pay what you can make at a fast-food or convenience store to start. The consequence for a mistake at the fast-food chain is remaking an order, and ours is life and death.

To quantify this issue, we asked 911 county coordinators to report their average hourly wage for full-time telecommunicators, as well as the highest and lowest hourly rates among their operators. We then compared this self-reported information to occupational data collected by the United States Bureau of Labor Statistics (BLS) for public safety telecommunicators.¹⁸⁷ Exhibit 32 presents a summary of this analysis.

¹⁸⁷ See <https://www.bls.gov/ooh/office-and-administrative-support/police-fire-and-ambulance-dispatchers.htm#tab-1>, accessed March 9, 2022.

Exhibit 32

Hourly Full-Time Telecommunicator Wages are Higher Among More Populated Counties than Lesser Populated Counties



Notes:

*/ Average calculated based on data submitted by counties that participated in the 911 coordinators survey. As of May 2020, BLS estimated that the hourly mean wage for public safety telecommunicators in Pennsylvania was \$21.37.

Source: Developed by LBFC staff from information provided by the Pennsylvania county PSAPs and US BLS.

Based on our calculations from self-reported full-time operator wage data, the average hourly rate for a telecommunicator in Pennsylvania is \$19.61. When grouped and averaged by county class, more densely populated counties (classes 1 - 4) all exceed the statewide average, whereas less populated counties (classes 5 - 8) all fall short of this mark.¹⁸⁸ Further, 85 percent of counties that reported an average hourly wage lower than the statewide average were a county class 5 or lower (23 out of 27 counties reporting).¹⁸⁹ Conversely, 66 percent of counties that

¹⁸⁸ Average calculated based on data submitted by counties that participated in the 911 coordinators survey. As of May 2020, BLS estimated that the hourly mean wage for public safety telecommunicators in Pennsylvania was \$21.37. When considering this benchmark, class 1 counties now fall below the statewide average along with county classes 5 through 8.

¹⁸⁹ When using the BLS estimated average for Pennsylvania, 81 percent of counties that fell below the statewide average were from county classes 5 through 8 (26 out of 32 counties reporting).

reported a wage higher than the statewide average were from county class 4 or higher (16 out of 24 counties reporting).¹⁹⁰

One intriguing observation from Exhibit 32 above is the bell-shaped peak that appears among county classes 2 through 5 – especially with maximum reported hourly wages. Upon further review, these classes were among the highest compensated from the 911 Fund for the period.¹⁹¹ With the exception of one, all the counties in these classes reported fewer than 100 full-time telecommunicators on staff. One possible explanation for the spike in wages is that, although these counties are among the highest paid by the 911 Fund, most have far fewer staff relative to the most densely populated counties in the state. In turn, this could help lead to higher wages for the counties' telecommunicators. This claim is further corroborated by the statistic that 91 percent of counties (29 out of 32) in classes 2 through 5 used over half of their 911-funded expenditures on personnel from 2016 to 2020. Interestingly, APCO has found that PSAPs of similar size to those discussed here were also among the highest compensators of their employees across the nation.¹⁹²

However, in many areas Pennsylvania's telecommunicators are being compensated below the national average for their field. According to BLS, the mean hourly wage for public safety telecommunicators in the United States was \$22.06 as of May 2020.¹⁹³ Only 13 Pennsylvania counties reported an average hourly wage that exceeded the national average.¹⁹⁴

While it is important to again caution that our survey data is entirely self-reported, even by BLS's calculations for the period, Pennsylvania's mean hourly wage of \$21.37 falls short of the national average. From a comparison of state data produced by BLS's Occupational Employment and Wage Statistics Query System,¹⁹⁵ Pennsylvania ranks 25th in the nation for average hourly wages for public safety telecommunicators.¹⁹⁶

Hiring Process. Another recurring theme we heard in our discussions with county coordinators pertained to recruitment of employees.

¹⁹⁰ When using the BLS estimated average for Pennsylvania, 74 percent of counties above the statewide average were from county classes 1 through 4 (14 out of 19 counties reporting).

¹⁹¹ From 2016 to 2020, 59 percent of counties (19 of 32) in classes 2 through 5 received more than the statewide average for Fund formula revenue distributions for the period.

¹⁹² APCO classifies a "medium-sized PSAP" as employing 16 to 75 staff members. Twenty-seven of the 32 counties in classes 2 through 5 would fit this criterion. In their study, APCO found that medium-sized PSAPs were the most likely to have employees earning over \$70,000 per year. See APCO, *Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study*, 2018.

¹⁹³ See <https://www.bls.gov/ooh/office-and-administrative-support/police-fire-and-ambulance-dispatchers.htm#tab-1>, accessed March 9, 2022.

¹⁹⁴ Except for one, all the counties exceeding the national average were from county classes 2 through 4.

¹⁹⁵ See <https://data.bls.gov/oes/#/occGeo/One%20occupation%20for%20multiple%20geographical%20areas>, accessed March 10, 2022.

¹⁹⁶ When using the average calculated with our survey data, Pennsylvania would rank 31st in the nation.

Like the issues that were expressed by PEMA following the passage the Act, many PSAPs are grappling to find qualified candidates that understand the 911 system and have the skillset needed to navigate the NG911 environment. Further, even when candidates exist, it is hard for PSAPs to garner interest for open roles. For example, a 911 coordinator from a class 3 county told us that in a recent job opening that was of posted online and on social media, 900 interactions led to only two potential candidates. Additionally, as previously mentioned, PEMA found that 35 of 43 PSAPs surveyed had open telecommunicator positions, including 23 that reported vacancy rates above 20 percent.

There are several reasons why we believe county PSAPs are struggling to find qualified candidates for open positions. First, as outlined above, the average hourly pay rate for telecommunicators in many counties is lower than the national average. Further, typically incoming candidates at many PSAPs are hired at a trainee's wage, which is often several dollars per hour lower than that of a trained telecommunicator. Using the same data from Exhibit 32, our analysis showed that the average *minimum* hourly pay rate for full-time telecommunicators in Pennsylvania was \$16.62; however, slightly over half of counties reported that their lowest hourly wage was below that mark. For comparison, BLS estimates that the mean hourly wage for a retail sales worker in the United States was \$13.95 as of May 2020.¹⁹⁷

Second, the training process for incoming telecommunicators is long and arduous. A typical training program for a new hire at a PSAP in Pennsylvania was reported to us as lasting approximately six months. Several 911 coordinators estimated that it takes up to a full year for a new telecommunicator to become fully acclimated to the position. Additionally, it is not uncommon for telecommunicators to be trained as a call-taker first before becoming cross-trained as a dispatcher. One 911 coordinator told us that it can take roughly two years for telecommunicators at their PSAP to fully cross-train.

Finally, many potential candidates are often discouraged by the demands of the position. PSAPs largely operate 24/7, meaning that telecommunicators must work nights, weekends, and holidays. Additionally, PSAPs with staffing shortages often must mandate overtime to cover shifts, which equates to more hours on the job and time away from friends and family. This often creates a vicious cycle – dissuading candidates that could help to alleviate the staffing problem from even joining the PSAP in the first place.

¹⁹⁷ See <https://data.bls.gov/oes/#/occGeo/One%20occupation%20for%20multiple%20geographical%20areas>, accessed March 10, 2022.

If that was not enough, the responsibility that comes with being a telecommunicator makes the position extremely stressful. Every day, telecommunicators deal with individuals that may be having the worst day of their life. It is routine for telecommunicators to not just hear about traumatic events occurring; they speak to those directly involved in the events and they are relayed graphic descriptions in real time. It is the primary duty of telecommunicators to process this information and respond as quickly as possible while remaining composed.

The difficulties of hiring telecommunicators puts 911 coordinators and PSAP staffs in a remarkably challenging position. A coordinator from a class 6 county summarized the realities described above in the following:

Being able to find someone who is willing to work for the wage we offer, the hours the job requires, and is actually able to do the job adequately is difficult. The job of a 911 dispatcher is not something that just anyone off the street can do. Not everyone can handle the shifts or the stress of the job. The job has a lot of information to learn. Currently it takes at least six months to certify as a dispatcher for our PSAP. We are already low staffed. Six months is a long time...It is a difficult position to be in.

Staff Retention. Once a telecommunicator is hired, the next challenge faced by PSAPs is retaining them in that position. In 2018, APCO found that the average turnover rate for telecommunicators in the United States was 29 percent.¹⁹⁸ To evaluate the situation among Pennsylvania's PSAPs, we asked 911 coordinators to estimate the average length of employment for their respective telecommunicators. The results are shown in Exhibit 33.

Exhibit 33

**Three-Quarters of Full-Time PSAP Staffs
 Have 14 or Fewer Years of Experience**

Average Length of Employment	Full Time Staff	Part Time Staff
Under 5 Years	9	17
5-14 Years	41	30
15-24 Years	5	2
Over 25 Years	0	0
NA	12	18

Source: Developed by LBFC staff from information provided by the Pennsylvania county PSAPs.

¹⁹⁸ APCO, Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study, 2018.

Fifty counties reported the average length of employment for their telecommunicators is 14 years or less,¹⁹⁹ including nine that reported it as being less than five years. While this seems to indicate that most PSAP staffs are experienced, the fact that only five counties reported an average staff length of employment that was longer than 14 years likely shows the impact of turnover within the 911 community.²⁰⁰

Unfortunately, the national outlook for PSAPs and employment is rather bleak. Although BLS projects that the demand for public safety telecommunicators will grow by 8 percent from 2020 to 2030, it is expected that most openings will be the result of the need to replace workers who change occupations or exit the labor force.²⁰¹ This will be a figure that PEMA and the counties should watch closely, as telecommunicators in several of the more veteran PSAPs will likely approach retirement over the next decade.

Additionally, it is important to note that our analysis only captures information about the telecommunicators that have *stayed* at their PSAPs, not those who have left. While anecdotal, some of the retention figures communicated to us are alarming. For example, a 911 coordinator expressed to us that their PSAP had lost 19 telecommunicators – roughly 30 percent of their total complement – in the last year. Another captured the impact this can have on remaining staff when they stated, “We are currently operating at 56 percent of our staffing capacity, which translates to each telecommunicator doing twice the work.”

A growing concern we repeatedly heard during our study was that PSAPs are becoming a “training ground” for other positions in the public safety industry. A common scenario we heard from PSAPs was that, after a telecommunicator becomes fully trained and gains several years of experience, they will leave to become a Police Communications Operator (PCO) with the Pennsylvania State Police (PSP). According to PSP, the *starting* salary for a PCO is \$39,537.²⁰² For comparison, assuming a 40-hour work week at the statewide average hourly wage reported to us (\$19.61), a telecommunicator would earn approximately \$40,700 in a year.²⁰³

¹⁹⁹ This number seems to be comparable to national trends. APCO found the average length of employment by PSAP staff at their current 911 center was nine years, with an average of 11.5 years in the public safety industry. Ibid.

²⁰⁰ As will be discussed later in this section, several PSAPs reported a wave of retirements during the COVID-19 pandemic.

²⁰¹ See <https://www.bls.gov/ooh/office-and-administrative-support/police-fire-and-ambulance-dispatchers.htm#tab-6>, accessed November 8, 2021.

²⁰² See [https://www.psp.pa.gov/employment/Pages/Police-Communications-Operators-\(PCO\).aspx#:~:text=%E2%80%8BPolice%20Communications%20Operator&text=Work%20is%20characterized%20by%20fast,salary%20of%20%2439%2C537.00%20before%20deductions.](https://www.psp.pa.gov/employment/Pages/Police-Communications-Operators-(PCO).aspx#:~:text=%E2%80%8BPolice%20Communications%20Operator&text=Work%20is%20characterized%20by%20fast,salary%20of%20%2439%2C537.00%20before%20deductions.), accessed March 10, 2022.

²⁰³ The same calculation using BLS’s statewide average hourly rate (\$21.37) for Pennsylvania would have a telecommunicator earning roughly \$44,400 a year. At the average statewide minimum hourly wage reported to us (\$16.62), a telecommunicator would earn \$34,500.

While the monetary situation will vary for every telecommunicator, there are other external factors that could lead operators to make this change. Several coordinators informed us that the PSP can offer more extensive benefits than are available at the county level. Additionally, there is a belief among some coordinators that working as a PCO is less demanding than being a PSAP telecommunicator, in the sense that PCOs are tasked with responding to 911 calls for one entity – the PSP – as opposed to the numerous fire, police, and EMS agencies that exist within a county.

Outside of the PSP, 911 coordinators have also detailed this same scenario unfolding for telecommunicators who leave for other public safety agencies that operate their own remote dispatch centers, such as municipal police or EMS units. Training a telecommunicator is time-consuming and expensive for county PSAPs – one estimate was that it costs approximately \$3,000 to train an operator to the call-taker level. Given that replacing a telecommunicator creates the need to start the training anew, this training can become quite a costly situation for the counties.

Finally, it is important to highlight that the demands and stress that accompany working as a telecommunicator were only exacerbated by the COVID-19 pandemic. On top of the stressors discussed above, many telecommunicators found themselves working in more restrictive office environments to help reduce viral exposure. While not uniform across counties, in several instances, coordinators reported to us that staff were required to use their own sick leave if quarantining was necessary. These and many other factors from the pandemic have had a negative impact on PSAP staffs and have likely contributed to turnover rates. One coordinator from a class 2-A county described the situation to us as the following:

...overall morale of the operational staff has been very low on the last 18 months. Restrictive working conditions coupled with an inability to enjoy recreational time off (travel restrictions, restaurant closures) increased stress inside and outside of the communications center. Retirements increased as those close to retirement age made decisions to leave early. This required an increase in our hiring efforts, which have become challenging to conduct in a pandemic environment.

County PSAP to Address Staffing Issues.

Given the myriad of complex challenges described above, it is hard to find a “one-size fits all” solution that could be applied by PSAPs across the commonwealth. While ideas may be common, the combination of practices makes the range of solutions about as unique as the county

PSAPs themselves. However, we have tried to encompass some of the more common trends we encountered in the discussion that follows.

Scheduling Adjustments. As a short-term fix, 16 counties reported that their PSAP has been required to mandate overtime and/or implement scheduling adjustments, including staggering telecommunicator shifts or having qualified administrative staff respond to emergency service requests.²⁰⁴ While necessary to address gaps in coverage, these strategies also create operational and personal inefficiencies for PSAPs. First, overtime can become quite costly for counties. One coordinator from a class 3 county estimated that their PSAP spends between \$600,000 and \$800,000 on overtime annually.²⁰⁵

Second, pulling staff from other operational areas of the PSAP to help with staffing deficiencies in the short-term can act as an obstacle to addressing the issue over time. In the words of one coordinator:

The shortages in the communications center have effects in all aspects of our communications division, not just in the 911 center. QA [Quality Assurance], Training, and Management [staff] all supplement the staffing shortages, which then creates a backlog of training of new hires, current employees, and QA/QI [Quality Improvement]. It is a vicious cycle which repeats itself.

Not only can this strategy delay the onboarding of new hires that would be used to address staffing shortages, it also postpones the training and development of current staff. Over time, this strategy can lead to performance issues within PSAPs.

Third, these practices can negatively impact the well-being of PSAP staff. The duties of a telecommunicator are already stressful and extending the hours per day an operator must endure this stress will not be beneficial for their long-term health.²⁰⁶ Over time, this can lead to increased levels of burnout, which will drive individuals out of the industry. As previously discussed, the time commitment required in this position already serves as a deterrent for new candidates, so extended use of these strategies will likely only worsen the current staffing issues experienced at PSAPs.

²⁰⁴ This number reflects the 911 coordinators that provided this information during an open response question. Based on our conversations with PEMA and others in the 911 community, we believe that the number of counties that are using these strategies is much higher. This is corroborated by previous national surveys, which found that anywhere between 73 to 100 percent of PSAPs – depending on the size of the 911 center – use overtime frequently. See APCO, *Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study*, 2018.

²⁰⁵ For reference, this would equate to approximately 11 percent of this county's average 911-funded expenditures for the period 2016-2020.

²⁰⁶ Similar issues have been explored in other states as well. In a 2019 survey of Virginia public safety personnel, 14.5 percent of public safety communicators reported having suicidal thoughts within the previous year. See Fairfax Coalition of Police, *2019 Virginia Public Safety Mental Health Pilot Survey*, 2019.

Updating Hiring Strategies. Many counties have started to focus on hiring strategies that could help improve their ranks long-term. Many counties mentioned that whereas previously their PSAP relied on word of mouth among public safety agencies (e.g., volunteer EMS units) to garner interest in open positions, they now have become more proactive in finding candidates. Strategies include posting job listings online and on social media, as well as outreach to local high schools, technical schools, colleges, career service organizations, and recruitment fairs.

Additionally, nearly a third of counties reported that they now require additional screenings or certifications before a candidate can be hired. While at first it might seem like this would have an adverse effect on the candidate pool, the logic behind the strategy is sound. PSAPs are attempting to ensure that candidates are prepared for the work environment before making a commitment and starting the rigorous (and expensive) training process. Another similar strategy we encountered frequently was for PSAPs to include a sit-in with telecommunicators as part of the interview process, so that candidates can experience the position first-hand. To reduce hiring time, often the sit-in and additional interviews are all conducted on the same day.

Based on our discussions, these strategies appear to have produced mixed results to date. While some counties have reported success, others say that they are still struggling to find candidates.²⁰⁷ While staffing is mainly a responsibility for the counties under the provisions of Act 12, we recommend that PEMA use its position as the central figure of the state's 911 program to foster discussion and help to share hiring best practices among the counties.

Increasing Pay and Benefits. Many counties have expressed to us that they believe increasing telecommunicator pay and benefits is essential for improving the overall staffing situation at PSAPs. Twenty-six counties stated they have increased or are trying to increase operator pay and benefits as part of their hiring and retention strategies. It goes without saying that raising wages would make the telecommunicator position more competitive in the current employment market. However, many PSAPs are struggling to find the additional funding needed to make these changes. As expressed by one coordinator:

The department is currently hovering at around 65 percent of our budgeted staff. We have difficulty recruiting qualified candidates that are able to complete the training program. With stagnant funding, incentives to attract more candidates, such as higher wages, would create a larger structural deficit for the County. These shortages

²⁰⁷ Prior to the pandemic, staffing difficulties were apparent at county PSAPs. Post pandemic, these issues are likely to increase an already stressed system due to reported labor shortages.

have required reductions in minimum staffing levels that impact our service on a day-to-day basis. Our budgeted staffing level would allow the PSAP to meet its daily needs, but still does not provide an adequate surge capacity. [emphasis added]

Given the downstream effects it could have on county budgeting, it seems unlikely to expect that each PSAP would be able to address this need. An expansion of the 911 surcharge base to include alarm and other notification systems would increase the amount of revenue in the Fund; however, due to the lack of available data on these systems, it is unknown to what degree this would improve the formula distributions to the PSAPs.

Further, while increased pay can improve the attractiveness of the position, it cannot always serve as a remedy to telecommunicator burnout. Several counties reported that a key piece of their retention strategy was increasing telecommunicator training opportunities and/or improving well-being benefits to focus more on post-traumatic stress disorder (PTSD) and other areas of mental health. Given the increased levels of trauma exposure that will likely be placed on telecommunicators in the NG911 environment (see Section V), we encourage PEMA and the counties to prioritize this area following the NG911 transition.²⁰⁸

Leveraging Technology. A potential area of opportunity in the NG911 environment could be the use of technology to overcome staffing deficiencies. A handful of counties reported already using strategies in this area. For example, counties that share CHE and CAD equipment set up “queues” with collaborating counties. If a 911 call goes unanswered after a set number of seconds at the primary PSAP for the caller’s location, the call goes into the queue of the next closest PSAP. If the call still goes unanswered, it will go into the queue for the next county, and this process will continue until the call is answered. Following the statewide interconnectivity that will come with NG911, solutions such as this may be a viable option for counties to overcome staffing shortages and surges in call volume. This area will be discussed further in Section V.

PEMA Support of County Efforts. Given that staffing is primarily a county responsibility, PEMA is somewhat constrained in their efforts to support county hiring strategies. However, the agency has made the support of telecommunicator recruitment and retention efforts one of its nine 911 system priorities as part of the statewide NG911 plan. PEMA has also been involved in spreading awareness about career op-

²⁰⁸ On the national level, APCO found that, of PSAPs that offer mental health resources, over 66 percent of employees either have personally used or know of a coworker that has used these services. See APCO, *Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study*, 2018.

portunities in the 911 industry. Recently, the agency launched an education campaign on its social media accounts to inform the public about the career paths that exist within the field of 911. According to PEMA, the initial launch of this campaign on social media was estimated to have reached over 210,000 users over a 19-day period in April 2020, making it one of the most successful social media postings ever across the entire agency. PEMA soon plans to expand this campaign with short videos of telecommunicators that will highlight their lives and experiences working at PSAPs. PEMA also has dedicated space on its website that details the requirements to work in the 911 field and links the necessary contact information for county employment opportunities.²⁰⁹

Classification of 911 Telecommunicators as First Responders

Throughout the course of this review, it became apparent that 911 personnel perform a tremendous service to the commonwealth and its citizens. In an emergency, telecommunicators serve as the “gateway” to the public safety agencies within their jurisdiction. As the communications industry has advanced, so too have the responsibilities for those in the 911 profession. The public expectation for operators is extremely high and failure can have severe real-life consequences.

However, unlike other professions within the public safety industry, in many parts of the country 911 telecommunicators are not classified as “first responders.” Many in the 911 community feel that this is more than a label; to them, a first responder classification could have significant impacts on professional prestige, compensation, and the general public’s understanding of the occupation. In recent years, reclassification efforts have taken root at both the federal and state level, each with its own degree of success.

Federal Reclassification Efforts. The push to reclassify telecommunicators as first responders at the federal level began to take shape in 2014, when the United States Office of Management and Budget (OMB) announced a review period for the Standard Occupational Classification (SOC) system. Maintained by a joint effort between OMB and BLS, the SOC was created to aid with occupational statistical activities on the federal level. Following this announcement, numerous 911 stakeholder groups – including NENA and APCO – petitioned OMB to have telecommunicators reclassified from an office and administrative support occupation to a protective services occupation. With this change, telecommunicators would be moved from a category that consists primarily of clerical professions to that of police officers, firefighters,

²⁰⁹ For more information, please refer to Appendix E, which details the status of PEMA’s NG911 system priorities.

lifeguards, crossing guards, and Transportation Security Administration screeners.^{210,211}

However, OMB ruled not to reclassify telecommunicators as a protective service organization in 2018 for several reasons.²¹² First, the SOC categorization process is based on objective data collection, and OMB found that in many instances, descriptions of telecommunicator positions contained duties that aligned with that of administrative support staff (e.g., collecting, processing, and entering information). Second, OMB stated that reclassification would create confusion by removing telecommunicators from the same category as other forms of dispatchers. Finally, the duties of other first responders differ from the tasks performed by many telecommunicators, which OMB argued often excludes physical activities, as well as administering care or advising an individual through the process of administering care.

Many in the 911 community feel that the decision not to reclassify telecommunicators prevents the profession from being properly understood by the public. Stakeholders argue that, since the SOC is considered as part of BLS's statistical data on wages, unemployment, inflation indicators, and working conditions, an inappropriate classification does not allow the position to be accurately defined in the broader economic context. As a result, supporters of reclassification believe this prevents individuals from making educated career decisions regarding the occupation, as well as inhibiting employers of telecommunicators from determining fair compensation packages based on other professions in their field.²¹³ Stakeholders also contend that the reclassification would help to professionalize the field. Beyond granting telecommunicators a title they feel is deserving, these groups believe that an increase in occupational status could aid in hiring and retention efforts nationwide.²¹⁴

Additionally, supporters believe that reclassification could have positive effects on the morale and overall health of 911 personnel. For example, APCO has found a positive correlation between public recognition of 911 personnel and the commitment felt by those employees to their PSAP. Further, the same study found that public recognition was a predictor of telecommunicator psychological distress, and that efforts to improve acknowledgement of 911 personnel will likely improve the wellbeing among PSAP staffs.²¹⁵

²¹⁰ National 911 Program, Public Safety Telecommunicator Reclassification Toolkit: Developing a Public Safety Telecommunicator Job Description, 2021.

²¹¹ See <https://www.apcointl.org/advocacy/soc-revision/>, accessed March 15, 2022.

²¹² 82 FR 56271.

²¹³ National 911 Program, Public Safety Telecommunicator Reclassification Toolkit: Developing a Public Safety Telecommunicator Job Description, 2021.

²¹⁴ National 911 Program, Public Safety Telecommunicator Reclassification Toolkit: Developing a Legislative Strategy for Reclassification, 2021.

²¹⁵ APCO, Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study, 2018.

In the years since OMB's ruling, 911 stakeholder groups have taken a proactive approach to improving their outcomes during the next SOC review cycle, which is scheduled for 2028. Reviews of job postings (which are used as part of OMB's data collection process) from many states found that the language used in describing the duties of a telecommunicator were years, and in some cases decades, old. Outdated descriptions, it is believed, do not allow the public to recognize the development of the 911 industry, and prevents prospective telecommunicator candidates from understanding the skills that will be needed in the NG911 environment.

To address these concerns, groups such as NENA, APCO, and the National Association of State 911 Administrators (NASNA) have worked with the National 911 Office to educate the 911 community on the importance of maintaining up to date telecommunicator job descriptions. Additionally, these groups have produced reclassification "toolkits," which can be used by PSAPs to create job descriptions that are reflective of the work performed by their telecommunicators. Beyond suggestions for "rebranding" of the position (e.g., use of the term "telecommunicator" rather than "dispatcher"), these toolkits provide concrete ideas for improving the candidate application process and identifying skills that telecommunicators will need in the fast-paced, data driven world of NG911. By improving the professional competence at the local level, it is the hope of many in the 911 community that these efforts will result in SOC reclassification following the next review.²¹⁶

There have also been congressional efforts to get OMB to change its decision. Introduced in both the House of Representatives²¹⁷ and the Senate,²¹⁸ the Supporting Accurate Views of Emergency Services Act of 2021 (911 SAVES Act) would require OMB to reclassify public safety telecommunicators as a protective service occupation within the SOC. To date, neither bill has received a vote in its respective chamber.²¹⁹

State Reclassification Efforts. Since the unsuccessful SOC reclassification in 2018, several states have taken steps to recognize telecommunicators as first responders within their jurisdictions. These efforts have taken on a variety of methods. While some states have amended their emergency services statutes or passed resolutions recognizing telecommunicators as first responders, others have extended additional

²¹⁶ National 911 Program, Public Safety Telecommunicator Reclassification Toolkit: Developing a Public Safety Telecommunicator Job Description, 2021.

²¹⁷ The version of the 911 SAVES Act in the House of Representatives includes several members from Pennsylvania's congressional delegation as cosponsors, including Representatives Brian Fitzpatrick (original cosponsor), Dwight Evans, Susan Wild, Mary Gay Scanlon, Conor Lamb, Chrissy Houlahan, Madeleine Dean, and Lloyd Smucker. See H.R. 2351 – 117th Congress.

²¹⁸ See S.1175 – 117th Congress.

²¹⁹ Versions of the 911 SAVES Act were previously introduced in 2019. The legislation did not pass in either the US House or Senate before the end of the 116th Congress. See H.R. 1629 – 116th Congress and S. 1015 – 116th Congress.

responders tasked with gathering information pertaining to medical emergencies, dispatching the support of EMS, and providing assistance by voice prior to the arrival of EMS.²²¹

New York. Passed in 2021, New York's legislation designated public safety dispatchers, emergency service dispatchers, emergency operators, emergency responders, and emergency complaint operators as "first responders in communications." Further, the legislation encouraged employers of telecommunicators to provide training to promote their "knowledge, skills, and proficiency."²²²

New Jersey. Passed in January 2022, New Jersey's legislation recognizes the work performed by telecommunicators, and designates them as "911 first responder dispatchers."²²³

The examples highlighted demonstrate the range of approaches taken by state legislatures across the United States. These actions have high support among 911 stakeholder groups. Beyond the benefits of reclassification discussed above, stakeholders believe the efforts that have occurred to date will help to encourage other states to enact similar measures. Over time, it is their hope that support across the nation will lead to reclassification at the federal level.²²⁴

As can be seen in Exhibit 34, Pennsylvania has passed legislation which meets NENA's threshold to be considered a state that categorizes its telecommunicators as first responders. However, while we agree with this assessment, we feel that it is important to view this action as a strong first step to more widespread recognition in the future. Please see below for further discussion.

Next Steps for Pennsylvania's PSAPs in Reclassification Efforts. From our discussions with members of the 911 industry, we believe there is merit to recognizing Pennsylvania's 911 telecommunicators in the first responder community. This action can become a useful tool in the hiring and retention strategies of many PSAPs across the state. The enhanced status that can be derived from the further professionalization of the field can help to attract candidates to the occupation, as well as help to retain those already in the field. Additionally, previous studies have shown at least preliminary evidence that increased awareness and support for the 911 community can lead to the improved health and wellbeing of its personnel.

²²¹ See http://www.wvlegislature.gov/Bill_Status/Bills_history.cfm?input=4123&year=2020&session-type=RS&btype=bill, accessed March 15, 2022.

²²² See <https://www.nysenate.gov/legislation/bills/2021/S7121>, accessed March 15, 2022.

²²³ See <https://www.njleg.state.nj.us/bill-search/2020/A3804>, accessed March 15, 2022.

²²⁴ National 911 Program, Public Safety Telecommunicator Reclassification Toolkit: Developing a Legislative Strategy for Reclassification, 2021.

There is intrinsic value to the recognition as well. It has become evident to us that telecommunicators hold a critical role in public safety, and that the emergency response process would be at a severe detriment without them.

At the county level, it is critical for PSAPs to keep job descriptions for their open positions as up to date as possible. Especially with the transition to NG911, it is essential for job descriptions to not just reflect the duties of the current 911 environment, but to also outline the skills that will be required in an industry that is rapidly becoming data centric.

Given that national 911 stakeholder groups have previously discovered that PSAPs across the country were maintaining decades old task descriptions for telecommunicators, we felt that a review of job listings for Pennsylvania's operators would be beneficial. As such, we found job descriptions for 25 PSAPs that were posted online in March of 2022, and compared the language used to a list of telecommunicator responsibilities, skills, and key tasks produced by the National 911 Office.²²⁵ Our intent was not to "grade" these counties on their adherence to a national standard, but rather to explore how a sample of telecommunicator job descriptions align to the recommendations of 911 stakeholder groups.

Exhibit 35 below shows a visual representation of the 911 Program's suggested telecommunicator responsibility categories that appeared in the county PSAP job listings. In this depiction, larger circles indicate a higher frequency of occurrence among the counties.

²²⁵ National 911 Program, Public Safety Telecommunicator Reclassification Toolkit: Developing a Public Safety Telecommunicator Job Description, 2021.

Exhibit 35

Fourteen of the National 911 Office's 17 Key Telecommunicator Responsibilities Appear in County PSAP Job Descriptions



Source: Developed by LBFC staff from information provided by the National 911 Office and the county PSAPs.

Overall, we assessed that the 25 counties reviewed adequately highlight the skills and tasks promoted by the National 911 Office, as all but three of the 17 recommended responsibility areas were identified.²²⁶ Areas that we found most commonly referenced related to “enhancing professional competence” (i.e., continuing education/career development), “taking appropriate action” (i.e., determining the appropriate public safety agencies for dispatch), “operating agency equipment” (e.g., CAD, GIS, radio, etc.), and “processing requests for emergency services personnel” (i.e., identify active arrest warrants). It is important to note, however, that an omission of any of these responsibilities does not mean that they

²²⁶ Those not identified were “identify and mitigate caller safety” (e.g., recognizing indicators of psychological distress), “caller management” (e.g., assisting foreign language callers), and “participate in post-incident activities” (e.g., testify in necessary court proceedings).

are not required of telecommunicators at these PSAPs, but rather that we did not identify a reference to any related skills as part of our review.

Although the job listings reviewed appear to be properly updated, that does not mean that PSAP efforts to refine their telecommunicator job descriptions further should cease. As noted above, the 911 industry is in a period of rapid transition. In the coming years, the daily tasks of a telecommunicator will diverge more from its past than at any point since the inception of the 911 system. While the core responsibilities of the role will conceptually remain, telecommunicators will be required to adopt a host of new skills, including data management, visual observation analysis, and social media literacy, to name a few.

The PSAPs should not continue these efforts in a vacuum. While each PSAP is unique, we encourage counties to collaborate on telecommunicator skills and job requirements wherever possible. Doing so will only help to enhance county associations and cooperation, which will become increasingly pertinent following the transition to NG911. Further, we think that PEMA and the 911 Advisory Board are uniquely positioned to offer support to the counties in these efforts. Although we agree with PEMA's assessment that staffing is primarily a county function under Act 12, given its role as steward of the statewide program and NG911 implementation, it would be beneficial for the agency to provide advice to PSAPs on the critical skills that will be required of new telecommunicator hires across the state. This guidance can be carried out within PEMA and the Board's roles of establishing annual training and certification standards for PSAPs and telecommunicators, which is related to the Act 12 requirement to incentivize regionalization and collaboration efforts across the commonwealth.

However, even as these efforts will aid the federal reclassification push, this recategorization will likely not happen for several years, if at all. As discussed, the next review of the SOC will not take place until 2028. While the 911 SAVES Act could address the issue sooner, the history of similar legislation in previous sessions and the lack of movement for the current bills would indicate that the legislation will likely not pass before the end of the 117th Congress in January 2023.

Legislative Opportunities for Reclassification. In the absence of federal action, Pennsylvania has acted, and can continue to act, to improve the status of the 911 telecommunicator profession in the state. However, the definition of a "first responder" in statute is somewhat complex and warrants further explanation. In short, there does not appear to be a universal definition of the term first responder across Pennsylvania's statutes. When it does appear, there is typically reference to performing medical assistance (e.g., first aid) or the requirement of

certification by the Pennsylvania Department of Health (DOH).^{227,228} Additionally, it seems that Act 37 of 2009 absorbed the term first responder into that of Emergency Medical Responders (EMR), which are likewise certified by DOH.²²⁹ To become certified as an EMR, DOH requires candidates to complete at least 48 hours of relevant coursework from an accredited organization,²³⁰ as well as pass a practical and written examination.²³¹

Given the information presented above, we do not think that legislative changes to explicitly include telecommunicators in the definition of first responders (or EMR) would be the most beneficial action for the 911 community. As stated, the DOH certification has educational and testing components, which would not be expected to cease with this statutory change. Currently, telecommunicators in Pennsylvania are not required to undergo any medical aid training outside of maintaining a cardiopulmonary resuscitation (CPR) certification.²³² It is our view that the cost to conduct the training and testing required for all telecommunicators to be certified as first responders/EMRs by DOH would put unnecessary additional strain on the 911 Fund. Further, as discussed above, PSAPs have reported falling behind on existing training requirements due to staffing shortages. The addition of more training for the first responder/EMR certification purposes alone would likely only exacerbate the staffing issues currently facing many of the state's PSAPs.

We do believe, however, that steps should be taken to further recognize the work of 911 personnel without the first responder certification. As indicated previously, NENA does currently consider Pennsylvania to be a state that recognizes its telecommunicators as first responders. Passed in 2020, Act 69 amended Title 35 to create mental wellness and stress management programs for emergency responders, **including** 911 dispatchers. Specifically, Act 69 requires DOH to create mental health and stress management protocols, a peer-to-peer support system, a toll-free help line, and a Critical Incident Stress Management Program, which are all designed to prevent and alleviate situations that may impact the mental wellbeing of emergency responders.²³³ We commend this legislation, not only as a step towards the proper recognition of 911 personnel, but for its efforts to address many of the detrimental side effects of working as a telecommunicator that were described previously.

²²⁷ 35 P.S. §7603.

²²⁸ 42 Pa. C.S. §5951.

²²⁹ Act 2009-37, 35 Pa C.S. §8114.

²³⁰ See <https://www.health.pa.gov/topics/EMS/Pages/FAQ.aspx>, accessed March 29, 2022.

²³¹ See DOH EMS Information Bulletin 2018-12.

²³² PEMA, Commonwealth of Pennsylvania 911 Training, Certification, and Quality Assurance/Quality Improvement Requirements, 2022.

²³³ Act 2020-69, 35 Pa C.S. §§75A01 – 75A06.

Despite Act 69 being a positive development for the 911 community, there is still ample opportunity for the General Assembly to enhance the professional recognition of telecommunicators. To start, we recommend that the General Assembly consider expanding the recognition of 911 personnel and their importance in the field of public safety. Until recently, there was uncertainty if the definition of emergency responders in Act 69 met NENA's threshold to classify Pennsylvania as a state which recognizes its telecommunicators as first responders. In fact, at the start of this study, Pennsylvania was not considered to be a state that met this threshold. After research and collaboration with PEMA, we presented our findings to NENA. The organization agreed with our assessment and began to recognize Pennsylvania as a state which classifies its telecommunicators as first responders in the Spring of 2022.

A logical next step in this effort would be to amend Act 87 of 2021, which established September 27 as First Responders Day in Pennsylvania. Section 1502 of this legislation describes first responders as "police, fire, emergency medical services (EMS), and public health personnel."²³⁴ Since the commonwealth's statutes do not explicitly include or exclude occupations from first responder status,²³⁵ we suggest the language be amended to align with the definition of an emergency responder from Act 69 of 2020.²³⁶

Similarly, we recommend that the General Assembly consider including 911 personnel in any future legislation pertaining to first responders and related occupations.²³⁷ Although small, these actions will help to solidify the professional recognition of 911 telecommunicators in the commonwealth. Professionals in the 911 industry are often the "unseen" link in public safety. Increasing the visibility of this field can help to improve the morale of those in it, as well as highlight another opportunity for individuals looking to help their fellow Pennsylvanians through their work.

²³⁴ Act 2021-87, 38 Pa C. S. §1502.

²³⁵ In our research, we only found one statute where professions were specifically named in the definition of a first responder. In §7603 of Title 35 (Confidentiality of HIV-Related Information Act of 1990), a first responder is described as "police, firefighters, rescue personnel or any other person who provides emergency response, first aid or other medically related assistance either in the course of their occupational duties or as a volunteer, which may expose them to contact with a person's bodily fluids." However, this definition is narrower in scope, as it specifically deals with situations where bodily contact is likely. See Act 1990-148, 35 PS §7603.

²³⁶ The insertion of similar language in this definition could also add corrections officers and coroners or medical examiners who respond to an emergency in an official capacity to the definition of recognized occupations as part of First Responders Day. See Act 2020-69, 35 Pa C.S. §75A01.

²³⁷ During our research, we came across two pieces of legislation that are currently proposing to include 911 telecommunicators in the definition of emergency personnel. House Bill (H.B.) 2108 of 2021 and H.B. 2262 of 2022 each would add telecommunicators to the list of emergency personnel whose families can be eligible for additional benefits if it is deemed that the professional died as a result of responding to an emergency.

C. County 911 Fund Spending

Under the Act, counties have the duty to provide for the 911 system within its jurisdiction. The distribution of 911 Fund revenue is the primary means by which counties pay for 911 systems and operations, although county specific funding is also used to support 911 operations.

Given the shift to NG911, it is important for counties to monitor spending closely as legacy 911 county costs will differ from that of a NG911 environment. Although PEMA has taken on the brunt of costs for the statewide transition, counties are still responsible for maintaining their current systems, as well as ensuring that their equipment will be NG911-compatible. The transition to NG911 was not underway for the entirety of the observation period, but many counties did undergo equipment upgrades and other capital investments between 2016 and 2020.²³⁸ Reviewing these expenses gives us a reasonable starting point by which to identify trends in costs within the 911 program.

Overview of County 911 Program Costs

The Act permits counties to spend Fund distributions (i.e., revenue) only on “reasonably necessary costs that enhance, operate, or maintain a 911 system.”²³⁹ PEMA, in consultation with the 911 Advisory Board, determines what these eligible costs will be.²⁴⁰ When determining these eligibility requirements, PEMA and the Board consider a variety of factors throughout the year including equipment costs, future investment needs, and, most notably, FCC eligibility rules.²⁴¹ Understanding the process and timeline by which PEMA and the Board determine eligibility for the counties sets an important precursor to understanding how counties use 911 funding.

²³⁸ PEMA, Commonwealth of Pennsylvania Public Safety Answering Point Inventory Report, 2016.

²³⁹ 35 Pa. C.S. §5306.1.

²⁴⁰ 35 Pa. C.S. §5303.

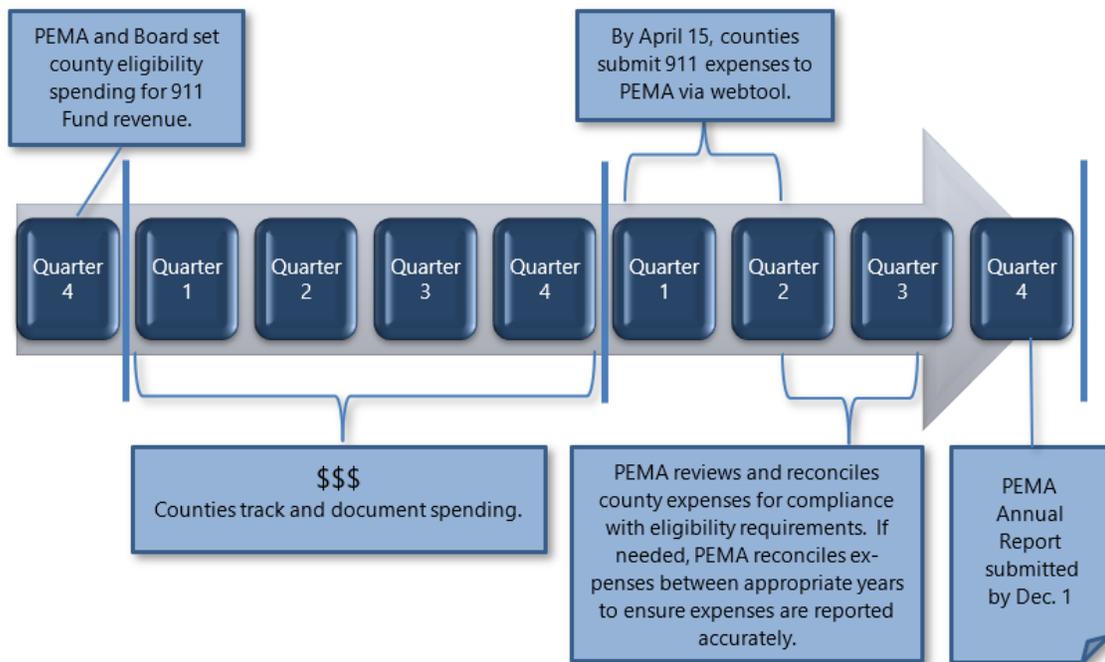
²⁴¹ Although the FCC cannot dictate the acceptable use of a state’s 911 service fee revenue, misalignment with federal standards will render a state ineligible for federal 911 funding. According to PEMA, Pennsylvania has never been deemed a “diverter” of 911 fees, as spending has always aligned with FCC eligibility standards. Currently, Pennsylvania has received \$4.8 million in federal grant support for the NG911 project.

Determining 911 County Cost Eligibility. The process used by PEMA and the Board is quite complex and involves key milestones that take place over a multi-year process. The process begins when the Board adopts eligibility requirements for the upcoming year. The Board typically adopts these requirements during the fourth quarter of the calendar year. For example, 2021 eligibility requirements were set in the fourth quarter of 2020.

Once eligibility spending is established, the counties then document their spending throughout the year and use an online reporting tool to submit annual expenses to PEMA by mid-April of the following year (e.g., April 2021 submission for 2020 expenses). PEMA and the counties then work to review, correct, and reconcile expenses in accordance with the eligibility requirements for the collection year. These expenses are then documented in the annual report due from PEMA at the end of the year.²⁴² The entire process, with key aspects from eligibility setting to the publication of county spending in the annual report, is graphically depicted in Exhibit 36 below.

Exhibit 36

County Spending and Reporting of State 911 Fund Revenue Occurs Over Several Quarters



Source: Developed by LBFC staff from information provided by PEMA.

²⁴² The annual report is statutorily due to the General Assembly by December 1, but traditionally PEMA has submitted the report in early November.

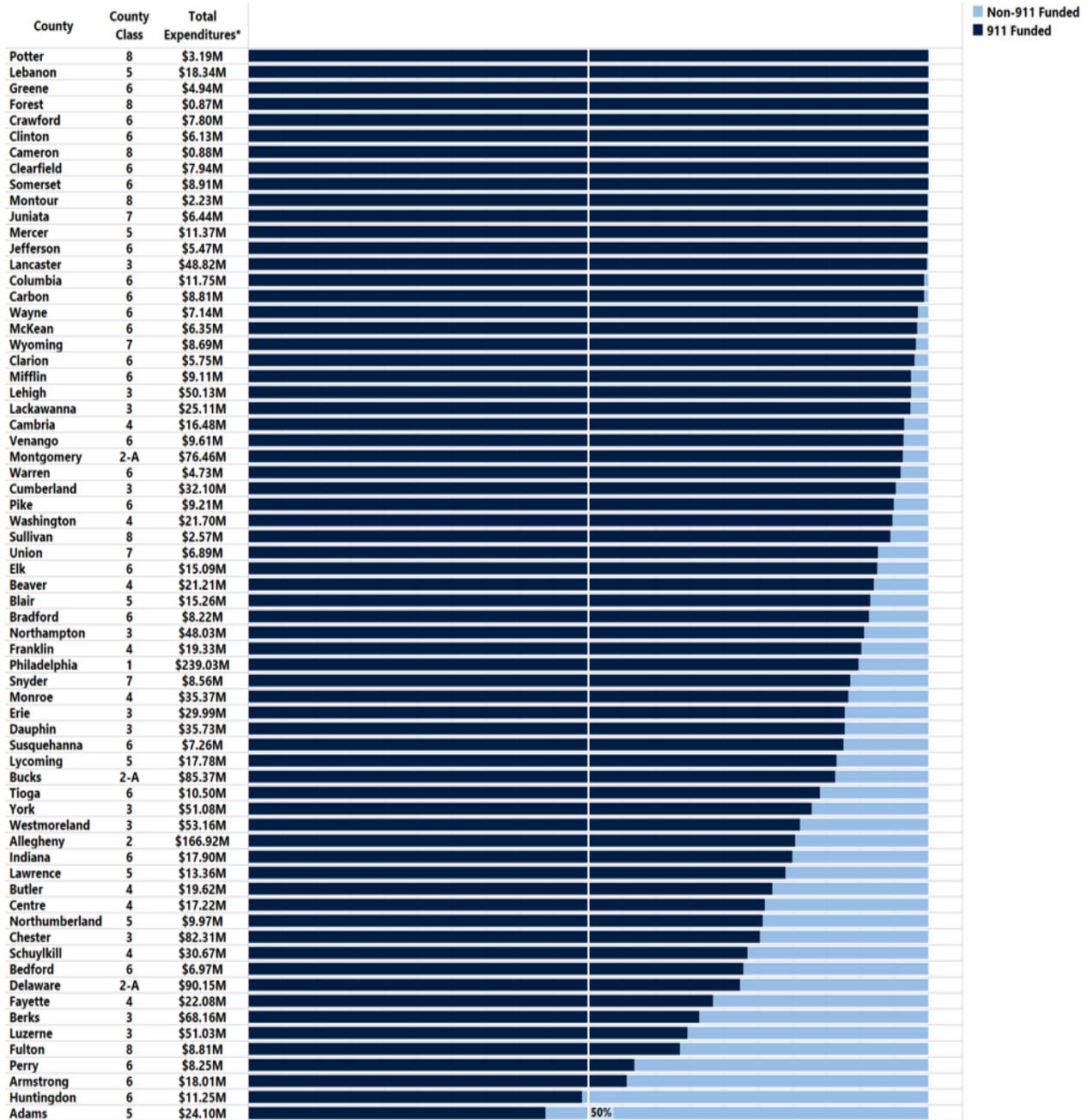
As mentioned previously, the Fund provides for eligible spending within the program, but counties also spend additional money on their 911 systems. Additional revenue can come from ancillary duties performed by PSAPs (e.g., alarm monitoring, serving as the after-hours call center for municipal governments, etc.), as well as from county general funds. Given the impacts that tapping into general funds could have on county budgeting, it is important to understand the split between 911 and non-911 spending at the county level. We will briefly cover these spending splits in the next subject area.

Non-reimbursed County 911 Spending. To get a better understanding of how much counties contribute to their 911 operations, we reviewed PEMA's annual reports and analyzed each county's respective 911 reported expenses against the expenses that were ultimately reimbursed by state 911 funding. PEMA astutely lists the distinction between these two variables in the annual reports published at year's end.²⁴³ Exhibit 37 below shows the distribution of program spending for each county from 2016 to 2020. Annual results for the counties are included in Appendix G.

²⁴³ As discussed in the previous section, PEMA reviews and reconciles the data in the annual reports with the counties. We did not audit this information because we believe it to be accurately reported and thus suitable for use in our analysis.

Exhibit 37

Most Counties use State Fund Revenue to Cover 911 Expenses



Notes:

*/Total expenditures represent county 911 spending from all sources, including those not reimbursed by the 911 Fund.

Source: Developed by LBFC staff from information provided by PEMA.

In terms of total spending, we found that expenditures for the period were highest among counties with larger populations, as denoted by a county classification closer to one. Of the 20 counties with the most total expenditures from all sources for the period, 19 of them were in county classes 1 through 4. We found the inverse to be true as well – all 20 of the counties with the fewest total expenses from all sources for the period were in county classes 6, 7, or 8. This is a logical trend given that counties with larger populations tend to have larger PSAPs with more staff and equipment, and as a result, higher annual expenses. This trend will be highlighted again in future sections of the report.

Over the five years, Fund-eligible expenses accounted for at least three quarters of total spending for 56 counties (84 percent). Interestingly, state 911 spending was the primary source of expenses for all but two counties. Upon further review, over 60 percent of expenses not reimbursed by the Fund were related to radio systems, facilities, or “other” miscellaneous expenses. However, according to PEMA, expenses in several of these categories can never be eligible for full reimbursement by the 911 service fee, because the fee is designed to support a PSAP’s ability to receive and dispatch 911 calls.

Although upgrades to facilities and equipment (e.g., radio systems), may be valuable to achieving the 911 fee’s stated purpose, the use is defined more broadly than the 911 system itself. For example, many counties share facilities and/or radio equipment with public safety agencies beyond the 911 call center. As a result, if these expenditures were fully reimbursed by the 911 service fee, then the Fund could quickly become depleted by entities that are not directly considered part of the PSAP. While this interpretation is not unanimously accepted across the 911 community,²⁴⁴ it is the eligibility criteria that is set by the FCC; thus, PEMA must also follow it if the agency wants Pennsylvania to continue to receive federal 911 grant funding.²⁴⁵ We agree that PEMA should maintain these eligibility requirements to keep the commonwealth eligible for this funding.

Additional analysis showed that total county expenses increased by 22 percent between 2016 and 2020, which was driven by 52 counties (78 percent) that experienced an increase in spending for the period. Fund reimbursed expenditures increased for 56 counties (84 percent) and by 18 percent for the entire state. While expenses not reimbursed by the Fund increased by 41 percent statewide, only 18 counties (27 percent) saw an increase in this type of spending for the period. An additional 20 counties saw a decline in non-Fund reimbursable spending, while the remaining counties did not use this additional form of spending for enough years for us to complete the dataset.

²⁴⁴ In our survey of 911 coordinators, eight counties expressed the opinion that eligibility of Fund revenue should expand to cover more expenses.

²⁴⁵ See FCC-21-08, 2021.

Increased program costs align with national trends that have been previously discussed for the same period, and it is likely due to increased personnel and equipment costs (see below).²⁴⁶ While we noted large increases in non-Fund reimbursable expenses, the trend does not currently appear to be widespread among the counties. Additionally, according to PEMA, spending increases in this area are likely due to significant radio and/or facility upgrades that occurred in a small selection of counties, including a \$17 million project conducted by the City of Philadelphia in 2020.²⁴⁷

911 Fund Eligible Expenses by Category

Our analysis showed that Fund reimbursable expenses increased by 18 percent statewide between 2016 and 2020. This trend was also noted throughout our survey of 911 county coordinators – 20 counties expressed concern with increasing system costs or the ability to use Fund revenue to only cover the status quo and not being able to invest in the 911 system’s future. The situation was summarized to us by a 911 coordinator from a class 7 county in the following way:

In the current political, social, medical, and economic environment, personnel costs and staffing have the potential to outpace the available means of support. Factoring in the increased costs of traditional upgrades, training, and maintenance of equipment, counties are becoming increasingly hesitant to invest in the necessary equipment and infrastructure advancements needed to ensure interoperability of services across regional boundaries. Without substantial investment in rural infrastructure projects, growing rural communities adjacent to populous or affluent counties will not be able to provide the level of resources needed to ensure public safety.

To better understand the drivers of these cost increases and the distinction of each, we also reviewed and grouped county expenditure categories outlined in PEMA’s eligibility requirements²⁴⁸ over the same period (2016-2020). Our groupings are defined as follows:

- **Personnel.** Includes costs related to PSAP employee salaries, benefits, and memberships in 911 professional associations. This category also includes employee recruitment costs and hiring screenings.

²⁴⁶ The FCC estimated that costs for 911 systems across the country rose from \$3.5 billion in 2016 to \$5.2 billion in 2019.

²⁴⁷ PEMA, 911 Annual Report: Calendar Year 2020, 2021.

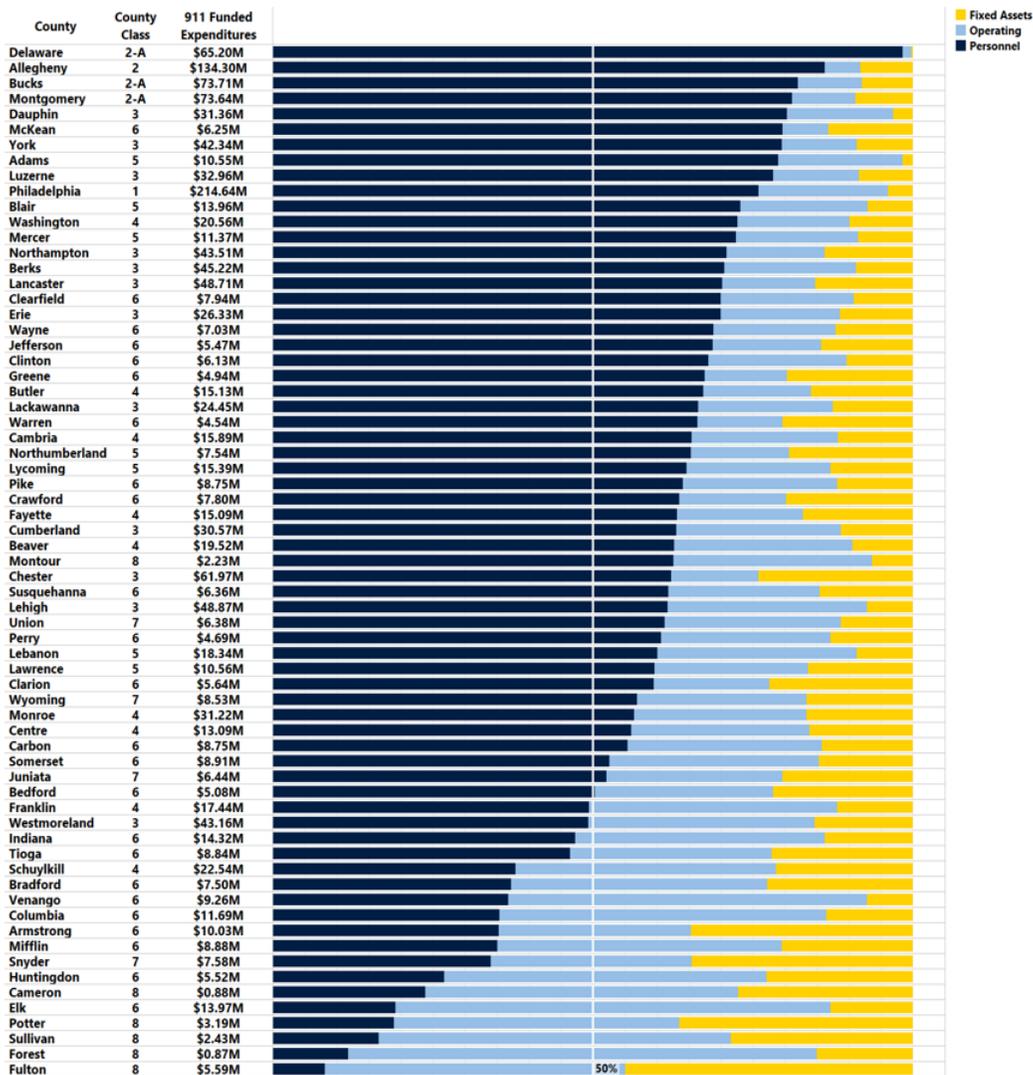
²⁴⁸ PEMA, 911 Program: Program Guidance Calendar Year 2021, 2020.

- **Operating Expenses.** Includes a variety of costs for equipment such as CPE, CAD, GIS/mapping tools, mass notification systems, eligible radio system costs, and voice/data recorders. This category also includes fees for contracted services, the cost of office operations, and spending on public education materials.
- **Fixed Assets.** Includes spending on facilities as well as county infrastructure for statewide interconnectivity.

The results of our analysis are presented in Exhibit 38. Annual results for the counties are included in Appendix H.

Exhibit 38

Personnel and Operating Expenses Account for 90 Percent of Fund-related Costs Among the Counties between 2016 – 2020



Source: Developed by LBFC staff from information provided by PEMA.

As might be expected, personnel and operating costs combined make up most of the Fund reimbursable spending among the counties, accounting for nearly 90 percent of total expenditures for the period. Statewide, almost 70 percent of total Fund costs are spent on personnel. In 49 counties (73 percent), this category constituted at least half of all expenses for the period. Spending on personnel rose by a modest seven percent between 2016 and 2020, including 46 counties (69 percent) that experienced an increase for this category.

Recent analysis from the United States Government Accountability Office has shown that employee compensation is the largest expense for state and local governments; therefore, it is logical to see the same trend within Pennsylvania's 911 system.²⁴⁹ Further, of the 10 counties that spent at least 75 percent of their total Fund expenses on personnel, eight were at least county class 3 or higher.²⁵⁰ As discussed in the staffing issue area, more populous counties tend to have larger PSAPs with more staff; so, it makes sense for these counties to spend a larger portion of their budgets on personnel. However, as also discussed above, many counties feel that their PSAPs are currently staffed at sufficient levels. Since spending on personnel increased despite reported worker shortages, it is expected that this trend of growth would only accelerate if counties can staff at sufficient levels.

Operating costs accounted for 20 percent of spending for counties across the state during the period. The growth in spending for operating costs was by far the largest of the three categories, increasing by 66 percent between 2016 and 2020. Additionally, nearly three-quarters of all counties (50 in total) experienced an increase in operating costs for the period.

Fixed assets contributed the smallest portion of spending for the period, making up slightly over 10 percent of all county costs. Despite being a relatively small part of the counties' expenses, spending in this area grew by a substantial 21 percent over the period. This includes 37 counties (55 percent) that saw an increase in fixed asset expenses over the five years.

More than anything, it seems that increased spending on operating expenses and fixed assets reflects the growing cost of the 911 system. According to PEMA, a key action item from the 2016 PSAP Inventory Report was that over half of counties needed to replace at least one piece of aging infrastructure, such as phone systems, CAD systems, generators, or uninterruptible power supply. These updates were to be completed by 2018; therefore, this capital investment is likely a main factor for the large increase of expenses in these areas for the period.

²⁴⁹ GAO, *State and Local Governments: Fiscal Conditions During the COVID-19 Pandemic in Selected States*, 2021.

²⁵⁰ A class 3 county is one with a population between 210,000 and 500,000 inhabitants.

Although in terms of dollars, more funding is spent on operating costs and fixed assets in counties with larger populations, an area of concern is the high concentration of expenses in these areas among lesser populated counties. In Exhibit 38, 16 of 19 counties (84 percent) that spent at least half of their budgets on operating costs and fixed assets were in county classes 6, 7, or 8. While these PSAPs are smaller and have fewer staff to fund, several of these counties expressed to us that at times the size and scope for equipment upgrades can be more than the PSAP may need or can afford. As a result, many counties have used the legislative framework of Act 12 as an opportunity to explore cost-sharing options (see Section V). Looking forward, 29 counties reported to us that they believed IP-based technologies would present opportunities to overcome cost inefficiencies by either sharing equipment or fully consolidating operations with other counties.²⁵¹

However, as will be highlighted in Section V of this report, there is some concern about the speculative nature of future costs related to NG911. There is apprehension among some in the 911 community that the frequency, complexity, and scale of equipment upgrades and maintenance in the NG911 environment will far outpace legacy 911.²⁵² Further, the possibility of additional costs associated with training and certifying PSAP staff on NG911 equipment will likely only increase the counties' growth in personnel spending.

Based on the analysis presented in this issue area, an obvious conclusion is that 911 system costs will only continue to increase in coming years. However, the rate at which costs will increase under NG911 is yet to be defined. While PEMA has indicated to us that some expenses will shift from the counties (see Section V), these costs will still need to be paid with Fund revenue. Given that costs are continuing to rise, yet Fund revenue is stagnant, eventually a "tipping point" may be reached. According to PEMA, one of the primary goals of the 911 Advisory Board Subcommittee on Funding for 2022 is to work with the agency and the counties to develop potential cost control efforts for the 911 system.

We also believe that PEMA and the counties should build upon the framework set by the Act and continue to incentivize cost sharing opportunities. Increased revenue in the Fund would allow PEMA to further incentivize the use of consolidation and shared service agreements. Many counties have been receptive to these options to date, but we encourage them to continue to work with their regional partners to share the burden of equipment and personnel costs in the NG911 environment.

²⁵¹ A similar situation led to the foundation of the WestCORE region in the western half of the state. The original alliance was formed, in part, to reduce the excess equipment and cost that the counties would incur from upgrading their CPE and other equipment independently. More discussion is included in Section V. See NASNA, *Case Study: Western Pennsylvania County Regional ESInet*, 2016.

²⁵² See The 911 Education Foundation, *History of 911*, 2015.

911 Spending in Other States

Finally, we used data from the FCC's congressional reports to compare Pennsylvania's 911 program spending to that of other states for the period. As with other national comparisons in this report, there are several caveats that should be understood when interpreting the analysis. First, some states reported that they lack the jurisdictional authority to collect 911 data from local entities. As a result, these states were only able to provide approximate or partial system costs, if any estimate at all. Second, although the FCC's reports review data for the calendar year, there are a handful of states that reported operating on other budgetary cycles. As a result, the estimated costs provided to the FCC may not be based off finalized reporting for a given year. In the analysis that follows, we highlight any of these discrepancies that may have influenced our findings.

Additionally, it is important to note that the data for Pennsylvania in this analysis consists of total 911 system costs. These figures include PSAP reported expenses that are reimbursed by the 911 Fund, as well as those that are not. PEMA administrative expenses and other statewide 911 costs are also included as part of these values. However, given that PSAP expenses constitute over 98 percent of total 911 system spending in Pennsylvania each year, it is appropriate to include this comparative analysis as part of our review of county operations.

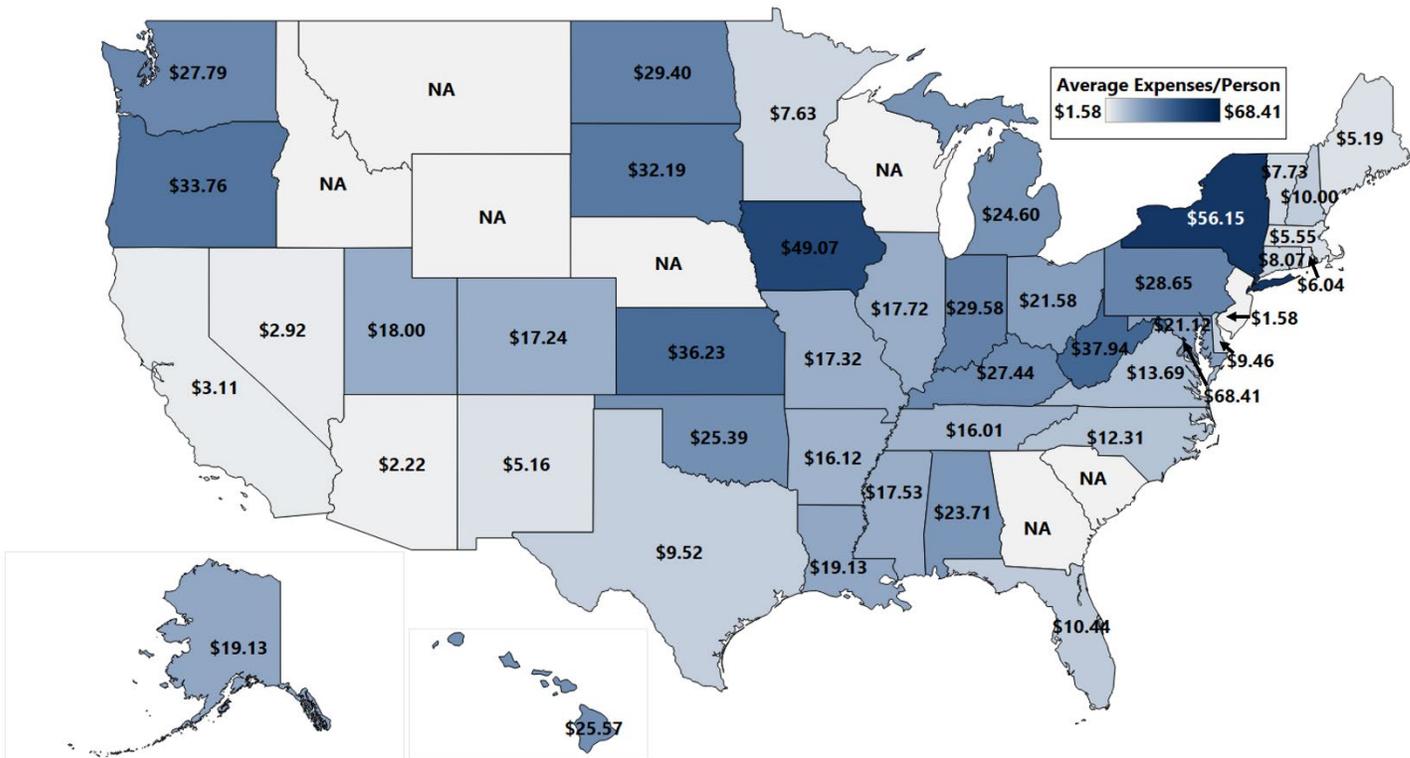
Annual 911 System Costs. First, we reviewed the annual estimated 911 system costs that were reported by the states to the FCC. Although not every state can generate comprehensive cost estimates, the records produced by each state still provide meaningful comparative analysis. For example, we found that as of 2020, 13 states reported that they were unable to provide full 911 cost estimates because the appropriate state entities lacked the authority to collect such data.²⁵³ An average of the annual system costs reported by state between 2016 and 2020 is displayed graphically in Exhibit 39 below.

²⁵³ These states were Georgia, Hawaii, Idaho, Kansas, Maine, Missouri, Montana, Nebraska, New Jersey, South Carolina, Virginia, Wisconsin, and Wyoming. Additionally, Connecticut and Maryland indicated that budgetary cycles could impact their cost projections, and Massachusetts reported excluding statewide administrative costs as part of its estimate. See FCC, *Thirteenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges*, 2021.

911 System Costs per Capita. As with previous discussions on revenue collection, we felt it was important to view system spending in context to the population of the state. As such, we compared average annual system costs to state population data from the United States Census Bureau, the results of which are shown in Exhibit 40.

Exhibit 40

Pennsylvania Had the 10th Highest Average Annual 911 System Costs per Capita between 2016 – 2020*



Notes:

*/Our analysis included data for all 50 states and the District of Columbia.

Source: Developed by LBFC staff from information provided by the FCC and the United States Census Bureau.

At \$28.65 per person, our analysis found that Pennsylvania had the 10th highest average reported 911 system costs when compared to the state’s population.²⁵⁵ While Pennsylvania had higher per capita system costs compared to states of similar size, such as Ohio, Illinois, and North Carolina, most of the states that outpaced Pennsylvania in spending had

²⁵⁵ Our analysis included data for all 50 states and the District of Columbia.

smaller populations.²⁵⁶ Significantly, New York was the only state with a higher per capita cost than Pennsylvania that also had a larger average population for the period; the other states were all, at most, half the size of the commonwealth.²⁵⁷

Comparison of 911 Spending Related to Funding. For reasons already specified, state-to-state comparisons of 911 spending vis-à-vis state funding are complicated by the fact that these data sets lack uniformity. However, we did leverage other data from the FCC congressional reports to help us review 911 revenue and costs in a comparative context.

For example, first, we looked at the states' use of service fee revenue for 911 designated purposes. As previously discussed, the FCC sets standards for the appropriate use of 911 service fee revenue. While states have no obligation to adhere to these guidelines, misalignment would render states ineligible for federal 911 grant funding. As such, the FCC makes note of states that have been deemed to be "diverting" their service fee revenue to non-911 purposes in its annual reports. Although most states fall within the federal standards, there are a handful each year that do not. Exhibit 41 provides a list of states that the FCC has identified as diverters of 911 funds by year for the report period.

Exhibit 41

At Least Five States Have been Identified by the FCC as 911 Service Fee Diverters Each Year between 2016 – 2020. Pennsylvania is NOT One of Them

Year	States
2016	Illinois, New Jersey, New Mexico, New York, Rhode Island, West Virginia
2017	Montana, Nevada, New Jersey, New York, Rhode Island, West Virginia
2018	Nevada, New Jersey, New York, Rhode Island, West Virginia
2019	Nevada, New Jersey, New York, Rhode Island, West Virginia
2020	Nevada, New Jersey, New Mexico, New York, West Virginia

Source: Developed by LBFC staff from information provided by FCC, *Thirteenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges*, 2021.

²⁵⁶ Pennsylvania's (population: 12.8 million; spending per capita: \$28.65) per capita spending for the period was considerably higher than that of Ohio (11.7 million; \$21.58), Illinois (12.7 million; \$17.72), and North Carolina (10.4 million; \$12.31).

²⁵⁷ States with smaller average populations but higher per capita 911 spending compared to Pennsylvania were the District of Columbia (population 701,974; spending per capita: \$68.41), Iowa (3.1 million; \$49.07), West Virginia (1.9 million; \$37.94), Kansas (2.9 million; \$36.23), Oregon (4.1 million; \$33.76), South Dakota (879,000; \$32.19), Indiana (6.7 million; \$29.58), and North Dakota (760,000; \$29.40).

The FCC has labeled at least five states as 911 service fee diverters each year since 2016. In our review of the FCC reports, we found that diverted service fee revenue was most commonly used for purposes that are tangentially related to 911 programs, such as expanding wireless cellular service or other public safety needs (e.g., state police, police body cameras, national guard services, search and rescue, etc.). However, several states did report placing fee revenue in their general funds for other purposes.²⁵⁸

We also found that Pennsylvania's use of 911 service fee revenue is comparable to that of other states. As of 2020, Pennsylvania, like most states, reporting funding operating costs (e.g., CPE, CAD, facilities maintenance, etc.), personnel costs, and administrative costs with service fee revenue. Additionally, Pennsylvania reported that it does not use fee revenue to reimburse dispatch costs for other law enforcement agencies, which makes the commonwealth one of 33 states that does not fully reimburse dispatch-related costs.²⁵⁹ Overall, we have no reason to believe that the commonwealth's service fee eligibility use is either more liberal or more restrictive than the practices employed by other states.

Second, we reviewed the ability of service fee revenue to fully cover 911 system costs. We found that Pennsylvania was like many states in that system costs were not fully funded by service fee revenue. For the period, 49 percent of states reported that fee revenue could not cover 100 percent of 911 system costs, compared to only 24 percent that reported in the affirmative.²⁶⁰ This result reflects the widening national gap between increasing 911 system costs and stagnant service fee rate structures.

In sum, while we acknowledge that Pennsylvania currently has one of the highest 911 system costs in the country, this cost must be viewed within the context of the population served, as well as the fact that counties have ultimate control over 911 spending in their respective jurisdictions.

Additionally, Pennsylvania generates the most service fee revenue in the country, all of which goes directly into the 911 program. While ideally, service fee revenue would cover a larger share of system costs, we recognize that this is uncommon across the country, and is due in large part to extenuating circumstances such as growing equipment and personnel costs and spending eligibility criteria.

²⁵⁸ We should also note that in most cases, the states labeled as 911 service fee revenue diverters did not agree with the FCC's assessment. However, according to the FCC, these states did not provide documentation to prove that the revenue in question was being used for 911-related purposes.

²⁵⁹ See FCC, *Thirteenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges*, 2021.

²⁶⁰ Additionally, an average of 27 percent of states were unable to produce enough data to answer this question.

Recommendations

1. Barring additional action from the FCC, we recommend the General Assembly consider exploring requiring service providers to block incoming autodialed calls to the commonwealth's PSAPs.
2. We recommend that, in the next authorization of 35 Pa.C.S. Ch. 53, the General Assembly consider adding a requirement for PEMA to report on PSAP staffing and call processing metrics as part of its annual report, in order to better understand trends in telecommunicator staffing and workload.
3. PEMA and the county PSAPs should continue to monitor the demand for telecommunicators especially as telecommunicators leave the workforce.
4. PEMA should continue to be a leader in workforce development for PSAPs and should foster discussions on best practices in hiring and retaining telecommunicator staff.
5. PEMA should advise the PSAPs on the critical skills that will be required of new telecommunicator hires across the state. This guidance can be carried out primarily through establishing annual training and certification standards for PSAPs and telecommunicators. PSAPs should ensure that their job descriptions adhere to these standards.
6. The General Assembly should consider expanding the recognition of 911 personnel and their importance in the field of public safety, including: amending the definition of an emergency responder in Act 87 of 2021 to include 911 personnel and including 911 personnel in any future legislation pertaining to first responders and related occupations.
7. PEMA and the counties should build upon the framework set by the Act and continue to incentivize cost sharing opportunities, especially in the areas of personnel and equipment.

SECTION V OPPORTUNITIES AND CHALLENGES FOR THE 911 SYSTEM



Fast Facts...

- ❖ *The gap between total 911 system costs and revenue from the Fund to pay for those costs, grew from 7 percent in 2016 to 23 percent in 2020.*
- ❖ *The proposal to change the Fund distribution formula to an allocation based primarily on population failed in 2020, due to concerns of revenue losses for some counties. This proposal should be revisited.*
- ❖ *Since enacting Act 12, the number of primary PSAPs in the commonwealth has been reduced from 69 to 61. Pennsylvania's county-based 911 system model has already put the state near the forefront of consolidation and regionalization efforts nationally. NG911 may present further opportunity, but more data is needed to inform these decisions.*

Overview

As discussed earlier, the commonwealth's 911 program is in the midst of a major transition. Within the next decade, the 911 system will look vastly different than it has in decades prior. As a result of this transition, PEMA and the county PSAPs will be faced with many opportunities and challenges that will need to be addressed to help promote the efficient and effective operation of the 911 program. In this section, we will discuss what we found as some of the most critical issues for the program to overcome, as well as the areas we have identified as presenting the most opportunity for improvement. While many of these topics have been covered, in part, in other sections of this report, most of the discussion points have provided a retrospective look at the 911 system since the passing of Act 12. By contrast, in this section, we attempt to anticipate the needs of the system in NG911, and provide recommendations for the General Assembly, PEMA, the 911 Advisory Board, and the PSAPs.

We found that the gap between 911 system costs and the revenue generated by the uniform surcharge accelerated during the observation period (2016 to 2020). While program expenses have increased, year-over-year, funding has remained constant. One potential cause PEMA has identified is the unexpected lack of growth in VoIP revenue over time. We believe this is because the rapid growth of IP-based technology and "Internet of Things" (IoT) devices²⁶¹ has made it difficult for the 911 industry to properly define the category of VoIP services. As a result, PEMA has reported difficulty in determining if the VoIP surcharge is being assessed appropriately. Further, this lack of standardization also impacts the ability of PSAPs to properly measure telecommunicator workload, as we believe a portion of these devices are currently outside the commonwealth's call data tracking system. However, the technological advancements of NG911 should allow for more comprehensive data tracking to be accomplished if a uniform definition of VoIP devices is identified. As such, we recommend that in the next reauthorization of 35 Pa.C.S. Ch. 53, the General Assembly consider directing PEMA and the 911 Advisory Board to develop standardized data collection procedures for alarms, alert notifications, and other applicable IoT devices as part of the

²⁶¹ Internet of Things devices can be classified as everyday objects that have the capacity to connect to the internet, e.g., refrigerators, smart watches, etc.

statewide MIS solution, with the goal of analyzing the impact these devices have on telecommunicator workload, while also determining the viability for adjustment to the VoIP surcharge base.

Most of Pennsylvania's 911 stakeholders agree that the current 911 Fund distribution formula does not adequately address the needs of the commonwealth's 911 system. Many of the considerations that are used in the formula are now over a decade old and do not reflect the changing technological landscape or the transition to NG911. In 2020, the 911 Advisory Board proposed a new formula based primarily on population, but it did not receive the votes required for adoption, due in large part to the concern that some counties would experience declines in revenue. After discussions with PEMA and review of other potential options, we recommend the implementation of a formula with population as its main consideration, as this is most equitable way to distribute 911 Fund revenue. This conclusion is supported by the correlation between population and key 911 metrics such as call volume, PSAP staff size, and county system spending, as well as the perspective that the 911 system is most accurately demonstrated as a public good when funding is tied to the citizens the program serves.

In a related issue, one of the major challenges of the NG911 transition has been determining the demarcation – or splitting – of costs between originating service providers and 911 entities. Although cost recovery mechanisms have been developed for the legacy 911 system over time, these demarcation points are not relevant precedents for the IP-based environment of NG911. PEMA has reported working with the state's providers to determine points of interconnection, but the lack of a universally accepted demarcation point could lead to confusion, strain on the 911 Fund, and delays in implementing NG911 across Pennsylvania. Currently the FCC is deliberating rulemaking on this issue, but we recommend that the General Assembly consider establishing a demarcation point and cost recovery mechanism for NG911, if no federal standards are implemented.

Act 12 encourages the counties to consider the efficiencies of regionalization and consolidation.²⁶² We found that most regional partnerships to date have been based on existing equipment sharing agreements (primarily phone systems), as well as previous working relationships. Eight PSAPs have consolidated since the Act's passage, bringing the number of primary PSAPs down to 61 from 69. Although we believe these efforts will result in cost savings for the counties without sacrificing 911 services for the commonwealth's citizens, due to the current transitory state of the 911 program, this issue warrants further review following the migration to NG911. Additionally, a national comparison found that Pennsylvania is near the forefront of this movement compared to other states of

²⁶² 35 Pa. C.S. 53 §5305.

similar size and 911 governance structure. However, we do think that opportunities exist to further incentivize the streamlining of operations while still maintaining the same quality of service that citizens have come to expect of the commonwealth's 911 system.

Staffing is one of the most complicated issues facing the 911 system. Despite many anticipated efficiencies for PSAP staffs from NG911, challenges for telecommunicators in the areas of training, call complexity, and mental health and well-being will be present. However, the transition also presents the opportunity for PSAPs to leverage technology to overcome staffing deficiencies. As the commonwealth's PSAPs continue to become more connected in terms of equipment and systems, opportunities to pool resources in efforts to find regional – or even statewide – solutions to staffing issues will become more viable.

Finally, at the direction of SR 96, we also reviewed Pennsylvania's AMBER alert system, as well as several other emergency notification systems used throughout the commonwealth. Specifically, we focused on alert systems and programs that utilize the federally coordinated wireless emergency alerts (WEA) and emergency alert systems (EAS). Although managed in part by the FCC, state and local public safety officials have been permitted to use these systems for a variety of purposes, including missing children, severe weather, and even important notifications during the COVID-19 pandemic.²⁶³ We reviewed AMBER alerts and Missing or Endangered Persons Advisory (MEPA) alerts, which are both functions of the Pennsylvania State Police (PSP). AMBER alerts are intended exclusively for cases of abducted children. We found the system is employed strategically by the PSP, with approximately five to 15 alerts launched per year. MEPA alerts are more broadly used for missing individuals of all ages, including children whose cases do not meet the criteria for an AMBER alert. These alerts occur much more frequently, with approximately 100 MEPA alerts issued each year.

In addition, we also reviewed the Pennsylvania Emergency Management Network (EMnet), which is a component of the national EAS, but maintained by PEMA. The EMnet disseminates emergency messages across broadcast television and radio, and can be used for a variety of purposes, including severe weather, traffic incidents, 911 telephone system outages, and AMBER alerts. According to PEMA, the EMnet is primarily used by governmental entities at the county level, including PSAPs. We found that over 75 percent of the alerts issued on the EMnet between 2020 and 2021 were test messages. Outages of PSAP telephone equipment and cancelations of previously issued alerts were the only valid (meaning non-test) alerts used over 10 total times during the observation window.

²⁶³ FCC, *Enhanced Wireless Emergency Alerts Available for Coronavirus Pandemic*, DA 20-367, 2021.

Issue Areas

A. Additional Revenue Potential

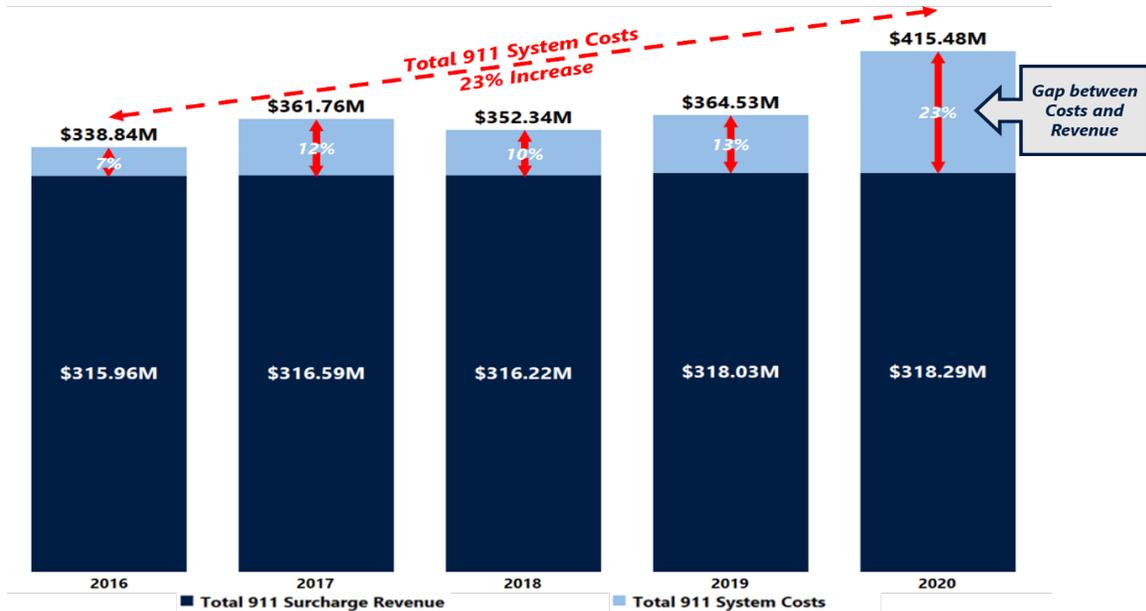
In Section III, we report on two factors: (1) the uniform \$1.65 surcharge, which significantly increased 911 Fund revenue compared to pre-Act 12 levels; and (2), the new remittance model created by the Act, which has also enhanced the overall efficiency in collecting 911 service fees. However, further opportunities to improve the service fee remittance process may exist. Over the course of our review, we identified several potential areas that may need to be considered in future reauthorizations of 35 Pa.C.S. Ch. 53. In this issue area, we will examine the current state of the VoIP surcharge in greater detail and provide our recommendations.

VoIP Surcharge and Remittance

Revenue generated by the uniform 911 surcharge did not fully cover all 911 system costs during any year of our observation period. This occurrence is due, in part, to spending stipulations set by PEMA to keep the commonwealth eligible for federal 911 grant funding. However, it is also worth noting that while the Fund has been a stable source of revenue for the 911 program, its growth has not kept pace with that of system costs. Exhibit 42 shows the ability of the 911 surcharge to cover system costs by year between 2016 and 2020.

Exhibit 42

911 System Costs Increased by 23 Percent between 2016 – 2020, while 911 Fund Revenue Remained Constant



Source: Developed by LBFC staff from information provided by PEMA.

In 2016, Fund revenue was able to cover 93 percent of total county 911 system spending, leaving approximately seven percent of costs to be covered by other sources from the counties (e.g., general funds, ancillary duties, etc.). Over the course of the observation period, 911 system costs grew by 23 percent, while surcharge revenue increased by one percent. As a result, the proportion of system costs covered by the 911 Fund in 2020 had shrunk to 77 percent, meaning that counties were required to finance nearly a quarter of spending by other means.

There are many reasons driving the growth in system spending throughout this report, including increased personnel and equipment costs, along with the simultaneous funding of the current 911 program and NG911 migration. We have not discussed factors that led to the relative lack of growth in 911 Fund revenue to date.

However, it is first important to note that the stability of the Fund is a strength for the 911 program. Surcharge revenue was between \$315 million to \$318 million each year during the review period, which has afforded PEMA and the counties the ability to conduct long-term planning within the context of predictable funding streams. In many ways, this speaks to the sound funding framework created by Act 12. During our

comparison of national 911 service fee collection, we found that this stability was not a luxury experienced by every state in the country.²⁶⁴

Additionally, PEMA has planned for less revenue to be generated by the 911 Fund each year. The agency informed us that they use \$314 million in revenue²⁶⁵ for its yearly projections, which has helped those involved in 911 program planning to not overextend on spending commitments. As shown in the previous exhibit, Fund revenue has consistently exceeded this basis.

Despite the planning conducted by PEMA and the counties, some system costs arise organically and cannot always be fully predicted (e.g., equipment malfunctions, mandated overtime, etc.). Additionally, the NG911 migration has put increasing strain on Fund revenue in recent years.²⁶⁶ Although PEMA anticipates cost savings to be experienced within the NG911 environment, it is possible that these savings may not be seen for several years. Further, while PEMA has worked to establish initial baseline costs for NG911,²⁶⁷ there are costs that will have to be defined as more applications become integrated into the NG911 system. For example, some in the 911 industry have expressed concern over the speed in which IP-based technology can become outdated, which could lead to more frequent updates that have downstream impacts on other areas of a completely interconnected 911 system.²⁶⁸

As a result of increasing 911 system costs, PEMA has looked for “red flags” within the current service fee funding model. An area that is a primary concern is VoIP revenue. A decline in revenue within the wireline surcharge was anticipated due to decreased use of the service type, and has been offset by increases among both wireless surcharge funding streams.²⁶⁹ However, PEMA expressed that the current stagnation in VoIP revenue, including the final two years of our observation period and similar projected levels in 2021, were not expected.²⁷⁰ PEMA indicated that it found this trend particularly perplexing, given the rise in internet device use during the COVID-19 pandemic.

²⁶⁴ An example which stood out to us was Illinois, which ranked second behind Pennsylvania in terms of average service fee revenue generated per year for the period. However, Illinois experienced large swings in the total service fee revenue collected each year, including a yearly increase of 111 percent (2018), and annual decreases of 28 (2017) and 48 (2019) percent.

²⁶⁵ This projection comes from the calculated average annual system costs between 2010 and 2014, which is still used in 911 Fund distribution formula.

²⁶⁶ As noted in Section III, PEMA’s administrative expenses increased by 56 percent in 2020, due in large part to the execution of several major NG911 projects and contracts.

²⁶⁷ PEMA’s NGCS contract executed in 2020 outlined base costs at \$137 million for the first seven years of the contract, with additional estimated for reoccurring costs of \$12.5 million per year.

²⁶⁸ See The 911 Education Foundation, *History of 911*, 2015.

²⁶⁹ In Section III, we reported that wireline surcharge revenue decreased by 39 percent between 2016 and 2020. Conversely, prepaid and postpaid wireless revenue increased by 21 and eight percent, respectively.

²⁷⁰ We found that VoIP revenue increased by one percent in 2019 and decreased by two percent in 2020.

As noted in Section III, PEMA has expressed concern that some providers may be able to leverage current loopholes in the VoIP surcharge, as was evidenced in the hypothetical example of out-of-state alarm companies providing services in Pennsylvania but avoiding the remittance of service fee revenue. Additionally, a major issue in determining the impact of IP-based devices on the 911 system has been the lack of standardized data collection and tracking procedures due to the rapid technological advancements in this industry over the last decade. For example, an entire sector of “Internet of Things” (IoT) devices has emerged, which now allows everyday objects – such as watches, household appliances, and cars – to connect to the internet.²⁷¹ As these devices have changed the way individuals communicate, officials have also become aware of the role they can play in public safety, including by connecting to the 911 system. Given this rapidly changing environment, it has become increasingly difficult for PEMA to determine if this surcharge is being assessed correctly, since the category of VoIP devices is still being defined.

This lack of standardization not only impacts budgets, but it also effects the ability of county PSAPs to project staffing levels appropriately. As discussed in Section IV, it is believed that alarm notifications which fall outside of the current call data tracking process have made a considerable impact on telecommunicator workload. Since these alarms are not universally tracked at the statewide level, it is difficult for us to fully quantify this impact. However, based on the information provided to us by several counties which do have the ability to track these notifications, we found that alarms may consist of approximately five to nine percent of the respective county’s current total 911 call volume. For perspective, calls from VoIP devices currently tracked in the statewide call volume data accounted for roughly six percent of all 911 service requests for the observation period.

While the technological ability to aggregate these data points across the state currently does not exist, the potential to do so will be available in the NG911 environment. As mentioned, the call accounting system within the statewide MIS tool is being deployed in the western half of the state, with the remainder of the commonwealth expected to receive the solution throughout 2022 and 2023. Further, the ability to track alarm notifications should be easier in coming years, as the technology to receive ASAP-to-PSAP notifications directly on PSAP computer-aided dispatch (CAD) equipment will become more widespread.

However, for this tracking to be done, a uniform definition of VoIP services and other internet-based devices must be developed. As such, we recommend that in the next reauthorization of 35 Pa.C.S. Ch. 53, the General Assembly consider directing PEMA and the 911 Advisory Board to develop standardized data collection procedures for alarms, alert notifi-

²⁷¹ See <https://www.ibm.com/blogs/internet-of-things/what-is-the-iot/>, accessed May 20, 2022.

cations, and other applicable IoT devices as part of the statewide MIS solution, with the goal of analyzing the impact these devices have on telecommunicator workload, while also determining the viability for adjustment to the VoIP surcharge base. The development of such standards could have significant impact on the operational planning of the commonwealth's 911 program and may also provide the 911 Fund with additional revenue to further NG911 development.

B. Proposed Distribution Formula Changes

During our review of the 911 program, a recurring discussion from PSAPs was the adequacy of funding. In our survey of county 911 coordinators, 24 respondents indicated that funding was the biggest challenge currently facing the 911 system in Pennsylvania.²⁷² Somewhat conversely, however, revenue generated by the uniform surcharge (and passed to the counties) has been stable and has made the commonwealth's 911 system one of the most well-funded in the country.

Although system costs are expected to continue to rise in the short-term, PEMA believes that both cost-saving and cost-sharing opportunities will be present for the counties in the NG911 environment. In the last issue area, we identified opportunities for the strengthening of the surcharge remittance process, which as a result, may offer opportunities to increase revenue to the Fund. While we acknowledge that funding is a major concern for the counties, any changes to the service fee model may be premature considering the results of the NG911 transition have yet to be seen. Therefore, in this issue area, we will discuss the fairness of the distribution formula used to distribute 911 funds to the counties.

Challenges with the Current Distribution Formula

In Section III, we noted that since its implementation in 2017, the current distribution formula has received criticism from the counties. This sentiment was expressed to us as well during our survey of county coordinators. Thirty-three PSAPs stated that they do not believe the current funding distribution formula is adequate to meet the needs of their 911 pro-

²⁷² As mentioned in Section IV, our survey received responses from 58 of Pennsylvania's 67 counties. However, this question allowed for multiple selections to be made, and 60 total responses were received. Please note that, although funding was a frequent response when asked about major system challenges, when we asked coordinators to rank issues in order of most to least important, staffing was rated as the highest concern on aggregate, while funding ranked as the second most pressing concern.

gram. This is juxtaposed with 18 counties that felt the formula is sufficient.²⁷³ In many ways, the issues with the current distribution formula are the same as those that existed with the interim distribution formula. First, the formula relies heavily on the revenue generated by wireline and VoIP fees between 2010 and 2014. Besides the fact that service fees were significantly lower during that time, the formula does not account for the changing technological landscape. Critics note that the shift away from wireline communications towards wireless services is not considered.²⁷⁴ Additionally, using VoIP revenue from the early-to-mid 2010s ignores the expansion of that service which occurred in the latter half of the decade.²⁷⁵

However, larger concerns arise from the formula's use of average PSAP expenditures between 2010 and 2014. As discussed in Section III, standardized accounting and financial reporting procedures did not exist prior to Act 12, meaning that counties were likely not documenting the expenses used for formula calculations in the same way, and PEMA had no mechanism to verify the information reported. Additionally, counties which underwent large-scale projects or renovations between 2010 and 2014 are more likely to have average expenditures that are artificially elevated compared to their counterparts. Further, the consideration of expenses during this period overlooks the equipment upgrades required of many PSAPs following the 2016 Inventory Report and does not account for the updates that will be needed to support NG911. Overall, it is widely accepted by the Pennsylvania 911 community that the current distribution formula has carried over known funding deficiencies that existed in the 911 system prior to Act 12.

Proposed Changes to the Distribution Formula

As a result of the concerns cited above, PEMA and the 911 Advisory Board (Board) looked to revise the distribution formula in order to create a replacement that was simplified and could be based on objective data. The Board's Subcommittee on Funding began work in 2018, and ultimately reviewed over 30 different funding models before proposing a new formula in 2020 with the goal of implementation for the 2021 cycle.

²⁷³ Three counties also expressed no opinion on the matter.

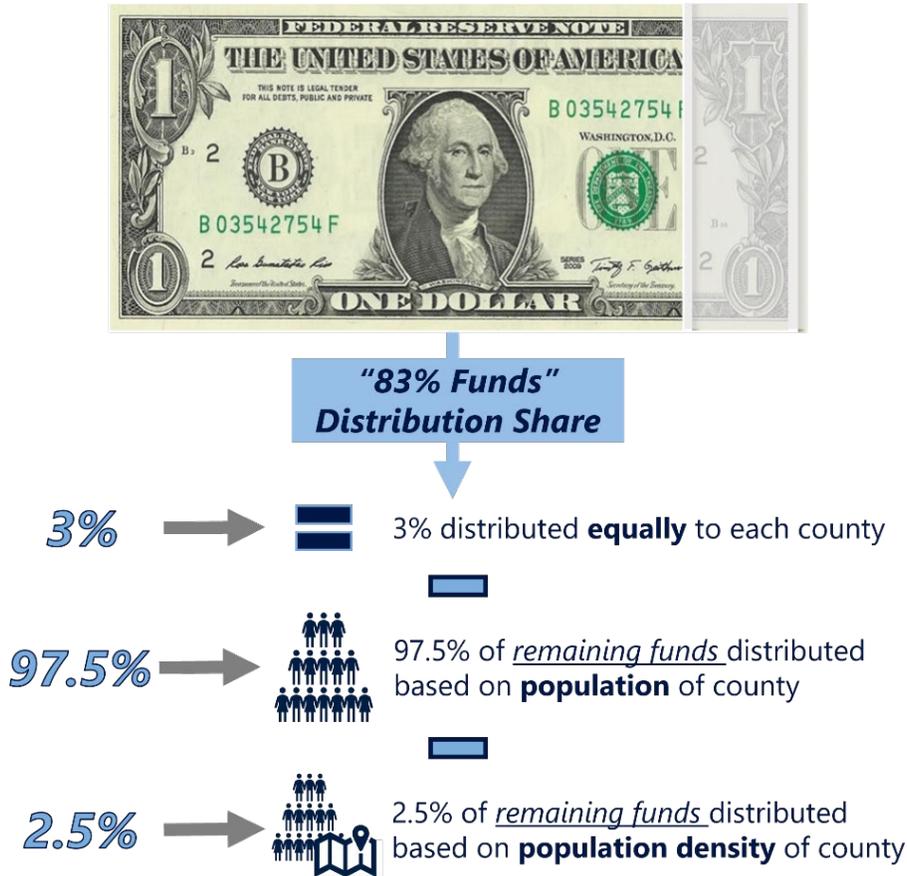
²⁷⁴ In Section III, we found that average wireline revenue between 2016 and 2020 was only a three percent increase from the revenue generated prior to Act 12. We concluded this increase was primarily due to the increased surcharge. Conversely, prepaid, and postpaid wireless increased by 107 and 80 percent, respectively, compared to pre-Act 12 levels.

²⁷⁵ Our analysis found that average VoIP revenue between 2016 and 2020 was an increase of 90 percent compared to pre-Act 12 levels. This is due to the growth of IP-based services and the increase of the VoIP surcharge.

According to the subcommittee, the proposed formula met both the intent of the current statute and could not be subject to manipulation.²⁷⁶ Exhibit 43 shows a graphical representation of the proposed formula.

Exhibit 43

Proposed County Distribution Formula (2020)



Source: Developed by LBFC staff from information provided by PEMA.

Following the statutorily required three percent equal distribution, funding under the proposed formula would be distributed by population. Nearly all the remaining funding – 97.5 percent – would be distributed based on county population. The last 2.5 percent of funding would be allocated based on the population density of the county.

The subcommittee provided several rationales for the selection of the proposed formula. Primary among the rationales is that population met-

²⁷⁶ PEMA, 911 Advisory Board Funding Subcommittee Funding Formula Recommendation Calendar Year 2021.

rics are readily available and easily understood by the public. These datasets are at low risk to manipulation, making them an objective source in which to determine funding. Distribution of funding based on county population, will also most likely reflect the location where an individual paid the uniform surcharge, meaning the funding would go directly back into citizens' local 911 systems. According to PEMA, the proposed formula would distribute approximately \$1.64 per person of the \$1.65 monthly surcharge back to the counties.²⁷⁷

Additionally, the subcommittee attempted to balance the concerns of both large and small counties. Opinions have been expressed that the required three percent equal distribution disproportionately benefits less populated counties. It is suggested that many of these counties do not have a population base that is substantial enough to generate three percent of the total 911 service fees, whereas densely populated counties are contributing more than three percent of the total Fund revenue. Therefore, rather than simply base the entire distribution on population, the subcommittee recommended two and a half percent be allocated based on population density, which is viewed as benefitting counties with higher population levels. Further, the subcommittee also noted that "15 percent" funds are distributed to the counties in a manner that is not based on size.

Moreover, the subcommittee also documented why it did not include several common 911 considerations as part of its formula, such as base-level system costs, call volume, public road mileage, and other extenuating circumstances. It was determined that standardized statewide datasets in many of these areas did not exist. Therefore, PEMA would not be able to fairly determine appropriate levels of funding, and opportunities for manipulation in reporting would be created. Further, in many of the example formulas reviewed with these factors included, the subcommittee found large swings in the levels of funding distributed to the counties. Ultimately, the subcommittee felt that such drastic changes to funding would impact the long-term planning of the counties, which could make the 911 system financially unstable.

Perhaps one of the most frequent suggestions was to revise the formula to consider updated PSAP expenditures from 2016 to 2018 as opposed to reported expenses from 2010 to 2014. While it is believed that 911-funded expenditures from the post-Act 12 period have been reported with a high degree of consistency, there is less uniformity in the documenting of expenses not reimbursed by the Fund. Further, the subcommittee felt that distribution considerations based on expenses would have an adverse effect on 911 system costs by encouraging counties to spend more so that they would receive more revenue in future cycles. The subcommittee believed that similar practices occurred within the

²⁷⁷ PEMA, 911 Annual Report: Calendar Year 2020, 2021.

wireless funding request process that existed prior to Act 12. The result, it is argued, was a gap in wages and system capabilities between counties that requested more funding and those that did not.

Finally, the subcommittee felt that this type of distribution philosophy would not encourage PSAPs to explore cost-saving measures, which would only amplify the disparity between Fund revenue and system costs.²⁷⁸

Proposed Formula Impact, Reception, and Decision Not to Adopt

In order to show how proposed distribution formula changes would impact the budgeting of the counties, the subcommittee created a hypothetical distribution example as part of its recommendation report.²⁷⁹ In this example, the subcommittee used estimated total Fund revenue of \$316 million, which was slightly less than the average annual surcharge revenue that we found for the period 2016 to 2020.²⁸⁰ In addition, the subcommittee also showed how the current formula would distribute the same level of funding, and then documented the difference between the two for each county. We have taken this information and displayed it graphically in Exhibit 44 below.

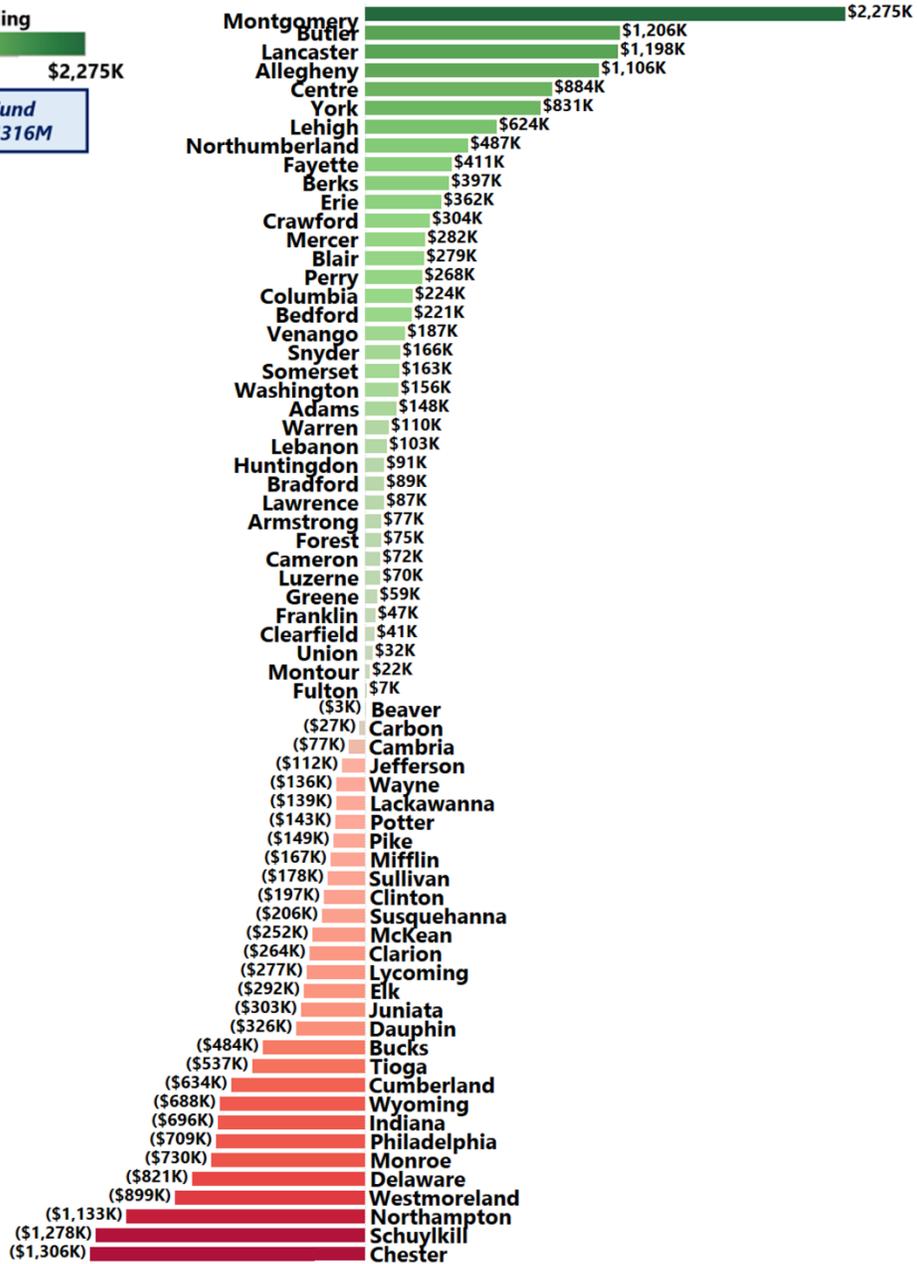
²⁷⁸ PEMA, *911 Advisory Board Funding Subcommittee Funding Formula Recommendation Calendar Year 2021, 2020*.

²⁷⁹ *Ibid.*

²⁸⁰ In Section III, we found that the average annual 911 service fee revenue for our observation period was \$317 million. However, it should be noted that yearly revenue was higher - \$318 million - in the last two years of our study. Additionally, PEMA anticipates that total revenue for 2021 will be significantly higher, with current estimates approaching \$325 million. Final revenue totals for 2021 will be included in PEMA's annual report, which is due to the General Assembly by December 1, 2022.

Exhibit 44

Under the Proposed Distribution Formula Example*, 37 Counties would Experience an Increase in Funding, while 30 would See a Decrease (\$000)



Note: */The 911 Advisory Board Subcommittee on Funding developed this example using \$316 million in 911 Fund revenue. Actual changes in funding would vary based on the level of service fee revenue generated.

Source: Developed by LBFC staff from information provided by PEMA.

We found that the proposed distribution formula would increase Fund revenue for 37 counties, whereas 30 counties would experience a decrease from the funding they are currently allocated. When reviewing net changes in funding – excluding whether the difference was positive or negative – we found that, on average, the counties experienced a change in funding of approximately \$393,000 each.

Before we started this analysis, we hypothesized that since funding was proposed to be based on population, we would find that highly populated counties would be more likely to experience an increase in funding, and less populated counties would be more likely to experience a decrease. However, we ultimately discovered that this was not the case. Less populated counties were more likely to see increases in funding than decreases. Of the 41 counties in classes 5 through 8, 24 would receive an increase in funding under this new formula, whereas 17 would see a decrease in their revenue share. More densely populated counties – which we considered to be county classes 1 through 4 – were equally as likely to experience an increase or a decrease in funding, with 13 falling into each category. However, it should be noted that this analysis is based on projections made with estimated surcharge revenue. Actual dollar amounts, as well as funding differences, would be subject to change based on the level of service fee revenue generated each year.

Upon further review, we believe that the trends cited above could be the result of the simplicity of the proposed formula compared to the current method of funding distribution. The proposed formula was to be based primarily on population, a metric which by its nature would provide more populated counties with higher levels of funding than less populated counties. However, in addition to also weighting funding distribution based on population, the other considerations in the current formula – service fee revenue generation and system costs – can also be influenced by population.²⁸¹ Therefore, on top of all the other concerns with the current formula raised in this report, it is possible that the proposed formula would have been able to increase funding to many less populated counties because it reduced the number of formula considerations that are inherently skewed towards larger counties.

As with most scenarios where changes in funding are involved, the proposal to increase revenue shares for some, but not all, counties were controversial. To ease the concern of many 911 stakeholders and to aid county planning activities, PEMA and the Board proposed using statewide interconnectivity funding to cover all revenue losses that would be experienced by counties in 2021, followed by an offset of half of all losses in 2022. With this plan, the counties that would experience losses in revenue would have over two years to adjust their budgeting.²⁸²

²⁸¹ These considerations are part of the interim formula outlined by Act 12, which is still used as part of the revenue difference calculation.

²⁸² PEMA, *911 Advisory Board Funding Subcommittee Funding Formula Recommendation Calendar Year 2021, 2020*.

However, PEMA informed us that the primary concern with the proposed formula remained. When the full Advisory Board voted on the formula in September 2020, 70 percent of the voting members voted in favor, which was short of the 75 percent consent margin required for the recommended action to be adopted.²⁸³ As a result, the proposal for a revised funding formula failed, and the distribution formula created in 2017 remains in use today.

Next Steps

A solution is needed to address the funding formula problems. Not only does the existing formula not consider the largest revenue producers for the Fund, but the service fee revenue it does include is now a decade old. Likewise, determining allocations based on the PSAPs' spending needs from 8 to 12 years ago does not accurately reflect today's 911 system. Moreover, the accuracy of these expenses has never been verified, growing system costs are not considered, and the needs of NG911 are neglected. Ultimately, the current formula is neither fair nor equitable for the current 911 system, but that is primarily because it was never intended to still be in use today.

At the same time, we recognize that adopting a new formula is an extreme challenge for all those involved. Stated simply, with a limited amount to funds to distribute, there will need to be hard decisions for several counties. Given the previous failure to adopt a new funding formula, one potential solution might be to further codify a distribution formula beyond the current requirements in 35 Pa.C.S. Ch. 53. While this action might force a solution, we think there are at least two reasons not to pursue it at this time.

First, PEMA and the Board are the experts on the commonwealth's 911 system, and they are most in tune with the needs and concerns of the stakeholders invested in the program. Second, the 911 program in Pennsylvania is in a period of transition, and the funding formula should be adaptive and responsive to the changing needs of the system. Despite the present challenges in adopting a new formula, PEMA and the Board still can review it and make changes each year. We view this flexibility as an asset for the commonwealth as it enters the NG911 environment.

Going forward, the biggest roadblock to changing the funding formula is the concern that some PSAPs will lose revenue. Another possible alternative might be to increase the 911 fee to increase available revenue. However, it is difficult to believe that raising the revenue in the Fund will be a permanent solution, as it will simply supply more money to the

²⁸³ PEMA, 911 Annual Report: Calendar Year 2020, 2021.

problem without addressing the underlying issues involved in the gap between funding and costs.

We considered several forms of funding distribution. Metrics related to call volume appeared to be a logical inclusion at first, but concerns over the reliability of the current datasets were too strong to make this information a viable option for future formulas. While the use of public road mileage seemed like it would be more concrete, we accepted PEMA's determination that the use of this data would be disadvantageous due to the large fluctuations in funding that would be experienced by the counties following the change. Further, in both situations, the use of such datasets has not been recommended in funding models produced at the federal level.

Additionally, we feel that the use of expenditure data in the current formula shows why it should not be included in future formula iterations. First, such data is always retrospective. While in some cases previous spending patterns may be good indicators for the future, we think that, with the pace of change currently being experienced by the 911 system, expense data from the years following Act 12 will not adequately display the needs of the PSAPs under NG911. Second, we agree with the subcommittee's assessment that the use of expenditure data could promote a system in which counties are encouraged "to spend more to receive more" revenue. Such a scenario is not conducive to cost containment.

Ultimately, it seems the most equitable method for funding distribution is that of population. There are several reasons for this conclusion. First, as we have mentioned throughout this report, population is closely correlated with trends in call volume,²⁸⁴ PSAP staff size,²⁸⁵ and overall spending.²⁸⁶ Second, we believe that population is the most logical way to distribute funding when viewing the 911 system as a public good. In the end, the 911 program is intended to serve the citizens of Pennsylvania. From this perspective, distribution by population helps to promote equal distribution of 911 funding for all Pennsylvanians, as opposed to methods that may eventually place more emphasis on some parts of the commonwealth rather than others.

We recommend that PEMA, the 911 Advisory Board, and the counties continue to work towards the adoption of a new 911 Fund distribution formula based primarily on population. If necessary, PEMA should explore the use of statewide interconnectivity payments to counties as a

²⁸⁴ In Section IV, we found that two-thirds of total 911 calls between 2016 to 2020 were made in eight counties.

²⁸⁵ In our review of staffing, we reported that 93 percent of PSAPs with staff sizes larger than the statewide average were from county classes 1 through 3.

²⁸⁶ Our review of county spending patterns found that 19 of the top 20 counties with the highest expenses for the period were grouped in county classes one through four.

temporary offset of revenue losses.²⁸⁷ We understand that, like the outcome of the most recent formula proposal, any recommended change that involves the reduction in funding for some counties will likely be controversial.

C. NG911 Call Delivery Demarcation and Cost Recovery

As we referenced in Section III, NG911 will introduce new technologies and platforms into the 911 system. While this technology is anticipated to bring numerous benefits, one main challenge has been determining the responsibility for costs in building this new capability. For Pennsylvania, like many other states across the country, developing appropriate demarcation and cost recovery procedures has been a potential problem in the transformation from the legacy 911 environment to the NG911 platform.

In theory, this subject is simple – it is a discussion of where in the physical process of call delivery does the responsibility to finance and maintain the 911 system shift from the originating service provider (OSP) to the appropriate governmental entity (PSAP, state, etc.). However, as with most topics within NG911, demarcation and cost recovery become an area that is technically complex. As such, in this issue area, we will first briefly outline the history of demarcation and cost recovery in the 911 system before summarizing the key discussion points of the matter within the context of NG911. We will conclude with recommendations for potential action that could be taken by the General Assembly to help resolve this issue in Pennsylvania. Please note that many of the concepts discussed in this issue area have been simplified for summary purposes.

Historical Context of 911 Demarcation and Cost Recovery

The discussion on demarcation and cost recovery originates with the start of the 911 system in the 1960s and 1970s. As noted in Section II, most of the early modifications to the public switched telephone network (PSTN) needed to support 911 calls were carried out by the telecommunications companies – known as incumbent local exchange carriers (ILECs) – that operated the phone service within a jurisdiction. Many of these initial upgrades were financed by the ILECs through rates passed

²⁸⁷ PEMA has demonstrated that such a program can be implemented successfully. Following the decision to not adopt the proposed funding formula, PEMA distributed \$13 million in statewide interconnectivity funding to counties that were budgeting yearly expenses based on increases in funding from the proposed formula change. See PEMA, *911 Annual Report: Calendar Year 2020, 2021*.

along to their customers. As the 911 system became more technically complex, the ILECs were also asked to build additional tools to support call delivery, such as selective routers, automatic number identification and automatic location identification databases, and master street address guides.

Over time, however, costs were more frequently “recovered” through tariffs approved by state regulatory bodies and via payment requests made directly to PSAPs.^{288,289} Eventually, it became accepted practice that the selective router within the ILECs’ central offices – which was tasked with determining the location of a 911 call and routing it to the PSAP – was an appropriate demarcation point to split costs between providers and PSAPs.²⁹⁰ This would set the stage for much of the future discussion on demarcation and cost recovery (see below).

As the telecommunications industry became more open to competition, it became obvious that newer competitive local exchange carriers (CLECs) would also need to connect to the 911 system. In many areas of the country, CLECs were allowed to use the tools and technology already created by the ILECs, if the CLECs accepted the costs to route their calls to the existing demarcation points. In addition to billing CLECs for use of their services, many ILECs have been allowed to maintain their existing cost recovery mechanisms for the technology they built to support the 911 system.

The first major challenge to this cost recovery structure came with the advent of wireless communications. These services likewise needed to connect to the 911 system, but as discussed in Section II, the technology needed to do so is different from that of landline telephones. Whereas the responsibilities and associated costs of call delivery within the PSTN had been well demarcated between providers and PSAPs over decades, the technology needed to route wireless calls to the appropriate PSAP was much less defined. Across the country, disagreements arose between 911 entities and wireless providers as to where in the process connections to the 911 system should occur, how the connections should physically be made, and – most importantly – which entities should be responsible for covering the costs of the connections. The result of these differences delayed E911 implementation in many parts of the United States.

As a result, the FCC was asked to make a ruling to settle the disputes between providers and PSAPs. In its *King County* decision, the FCC ruled

²⁸⁸ See The 911 Education Foundation, *History of 911*, 2015.

²⁸⁹ In our conversations with PEMA staff that had experience in both the telecommunications and 911 industries, they informed us that without the ability of ILECs to recover costs through tariffs, some counties in Pennsylvania would not have been able to build their initial 911 systems.

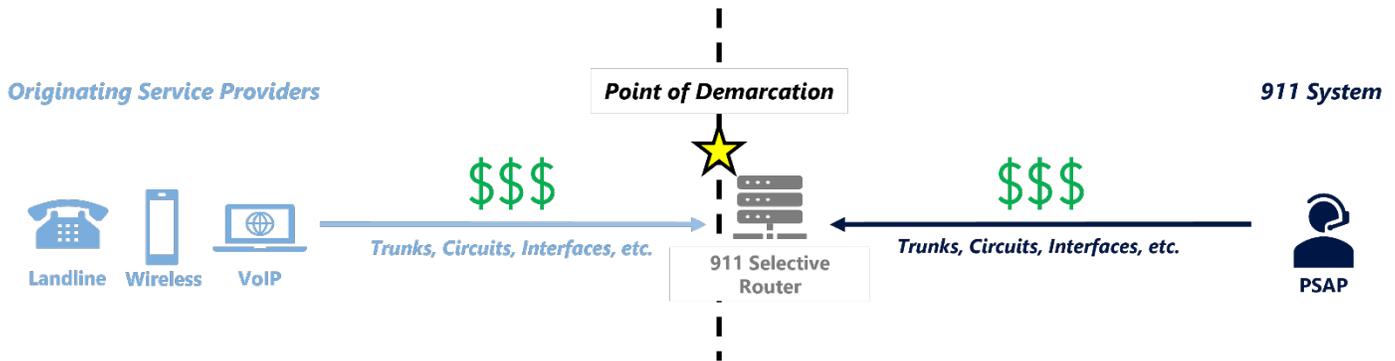
²⁹⁰ See NENA, *Potential Points of Demarcation in NG911 Networks Information Document*, 2013.

that the 911 selective router is the point of demarcation for E911 implementation costs when the parties involved could not otherwise agree on an appropriate point.²⁹¹ The FCC explained that the selective router was the most sensible location to split costs, because it is at this point in the 911 system where the appropriate PSAP is identified for call transmission. In addition, this would closely align with the typical point of interconnection (POI) that existed within call routing for wireline communications that was noted above. With this ruling, providers were required to finance the hardware and software components to deliver the call up to the selective router, whereas PSAPs were then responsible for all costs to route the call to the PSAP – including the maintenance costs on the selective router itself.²⁹²

Exhibit 45 shows a highly simplified summary of the typical demarcation and cost recovery process for OSPs following the FCC's *King County* ruling.

Exhibit 45

Typical 911 Demarcation and Cost Recovery Process following the FCC's *King County* Ruling



Source: Developed by LBFC staff from information provided by the FCC and NENA.

NG911 Demarcation and Cost Recovery

With the transition to NG911 underway, a similar dispute to that of E911 cost recovery is emerging. However, NG911 cost recovery disputes differ from previous disagreements in several key areas. First, whereas previous discussions were centered around connecting new providers or services to the existing call delivery system, the switch to NG911 applies to all

²⁹¹ The FCC has been asked to reconsider its decision in the years following its ruling, but the Commission has continued to uphold *King County*. See FCC 02-146.

²⁹² See FCC 02-146.

OSPs. This means that there is no precedent for where a reasonable demarcation point should be within the NG911 environment. It also makes the entire process more expensive, given the sheer number of providers that will all need to switch to the new NG911 system at approximately the same time.

Second, as we have continually noted, NG911 marks a shift in the operation of the 911 system. Cost recovery mechanisms in legacy 911 were built on metrics related to analog communication systems, such as the mileage of copper wire run in trunks to reach a POI. However, these systems of measurement are no longer as relevant in the NG911 environment, moving instead to the components of an IP-based system, such as fiber optic cables and bandwidth capacity.

In Pennsylvania, PEMA informed us that the agency has communicated with providers throughout the NG911 project to discuss the components needed to connect to the ESInet and transition call delivery services.²⁹³ However, disagreements over how connections will be made and who will pay for the migration still exist. While the agency has reported progress towards agreements with some companies, this is not the case with all the OSPs in the commonwealth. Without a standardized model in place, PEMA anticipates there may be differences among OSPs in how they try to recover the costs of connecting to the ESInet, which could lead to confusion and additional strain on the 911 Fund.²⁹⁴

However, there is the possibility that federal action may soon resolve the issue. In October 2021, the National Association of State 911 Administrators (NASNA)²⁹⁵ filed a petition for rulemaking with the FCC to address, among other issue areas, the point of demarcation for NG911 cost recovery. Specifically, NASNA requested the FCC act in a manner similar to that of *King County* and make a determination for the appropriate NG911 demarcation point(s) in cases where such cost recovery mechanisms are not provided by state law and the parties involved cannot come to an agreement.²⁹⁶ To date, no determination on this request has been made.²⁹⁷

²⁹³ PEMA has stated that it has furnished two POIs within every local access and transport area (LATA) in Pennsylvania. A LATA is a geographical area that was traditionally assigned to wireline telephone companies to provide services. There are six LATAs in Pennsylvania. See PEMA, *Pennsylvania NG911 Project Overview*, 2021.

²⁹⁴ PEMA expects that most cost recovery requests would come to the agency due to its role in supplying the statewide ESInet. In this instance, statewide interconnectivity funding for the NG911 project could be used to offset costs. However, if OSPs do request cost recovery from a PSAP, then the county's "83 percent" funding would be used.

²⁹⁵ NASNA represents state 911 administrators from 49 states, including Pennsylvania.

²⁹⁶ See Petition for Rulemaking; Alternatively, Petition for Notice of Inquiry, CC Docket No. 94-102 and PS Docket Nos. 18-64, 18-261, 11-153, and 10-255, 2021.

²⁹⁷ The FCC requested public comment on this issue to be filed by February 3, 2022. See FCC, *PSHSB Seeks Comment on NASNA Petition for Rulemaking*, DA 21-1607, 2021.

Future Legislative Considerations

Establishing appropriate demarcation points and cost recovery mechanisms is a critical component for the NG911 transition. As was seen across the United States with the implementation of E911 services in the early 2000s, the inability to determine the responsibility for associated transition costs could eventually lead to delays in OSPs migrating to the NG911 environment. Currently the FCC is considering rules which could be beneficial to settling the disputes experienced between Pennsylvania's 911 authorities and OSPs. However, regardless of federal action, it appears that the matter will need to be resolved to further a smooth and cost-effective transition to NG911 call delivery. Therefore, in absence of action from the FCC, we recommend the General Assembly explore the establishment of a demarcation point between the commonwealth's 911 authorities and OSPs within the NG911 call delivery environment, including the delineation of costs that are expected from each, as part of the next reauthorization of 35 Pa.C.S. Ch. 53.

Additionally, it is important to note that any action from the FCC will likely be similar to the Commission's *King County* decision, in that the ruling will only establish the minimum standard for cost recovery mechanisms, if no other existing laws or agreements are in place. As Pennsylvania's NG911 system becomes advanced and more applications, platforms, and services are integrated into the environment, it is possible that additional demarcation points beyond that of call delivery may need to be created. Further, as the technology of the NG911 system becomes more complex, there is potential for demarcation points to expand beyond the *physical* equipment connections discussed throughout this issue area, instead shifting to more *logical* demarcations where elements of a network interact with each other without a physical connection.²⁹⁸ Although full system requirements may not fully be realized until the completion of the first phase of the NG911 transition, it could also be advantageous for the General Assembly to consider adding a framework in which logical demarcation points can be established as part of any cost recovery-related amendments in the next reauthorization of 35 Pa.C.S. Ch. 53.

D. Regionalization and Consolidation

As Pennsylvania's NG911 system is further developed, a key item for future discussion will be regionalization and consolidation. Neither concept is new to Pennsylvania, and as we found, since Act 12's enactment there have been examples of each. Although these terms are sometimes used interchangeably (or collectively), we found they refer to differing

²⁹⁸ NG911 stakeholders refer to this logical interaction as an "interface." In NG911, an interface could occur when a PSAP's CPE interacts with NGCS or other related systems for which it is not connected by a physical router.

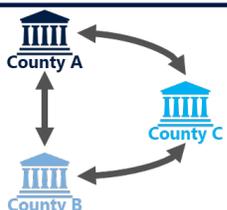
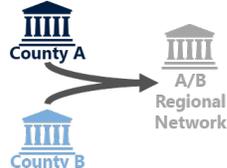
concepts. Within this Issue Area, we discuss the significance of regionalization and consolidation, and present some options for further consideration.

Regionalization and Consolidation Overview

Within the 911 community, PSAP consolidation and regionalization are recurring topics, but what these terms mean can be confusing to the reader. At the highest level, regionalization refers to the creation of a formal working relationship aimed at optimizing the level of 911 service provided to the service area. While regionalization may involve consolidation, it is not a requirement for it to occur.²⁹⁹ In essence then, through regionalization the whole is more than just the sum of its members.

Similar to regionalization, consolidation seeks to combine PSAPs into larger entities and similarly leverage existing resources. How this goal is achieved, however, usually takes one of two forms—physical consolidation or technological (shared services) consolidation. Exhibit 46 presents a high-level overview of these concepts.

Exhibit 46

Partnership Type	Description	Examples
Regionalization 	PSAPs remain separate entities but maintain a working relationship to achieve common goals or to reduce operational/administrative burdens, often through the use of shared systems (phone, CAD, financial, etc.).	<ul style="list-style-type: none"> * NG911 Regions * Fiduciary County Agreements
Consolidation 	PSAPs physically merge 911 operations (facilities, equipment, systems, etc.) to form, in essence, a new organizational unit. <i>Also known as physical consolidation.</i>	<ul style="list-style-type: none"> > Montour and Columbia Counties > Union and Snyder Counties
Technological Consolidation 	PSAP(s) agree to take on specific 911 duties of another county in exchange for payment . <i>Also known as shared service agreement.</i>	<ul style="list-style-type: none"> \$ Forest and Clarion/Warren Counties \$ Potter and Tioga Counties

Source: Developed by LBFC staff from information provided by PEMA.

²⁹⁹ See <https://www.nasna911.org/911-regionalization>, accessed April 7, 2022.

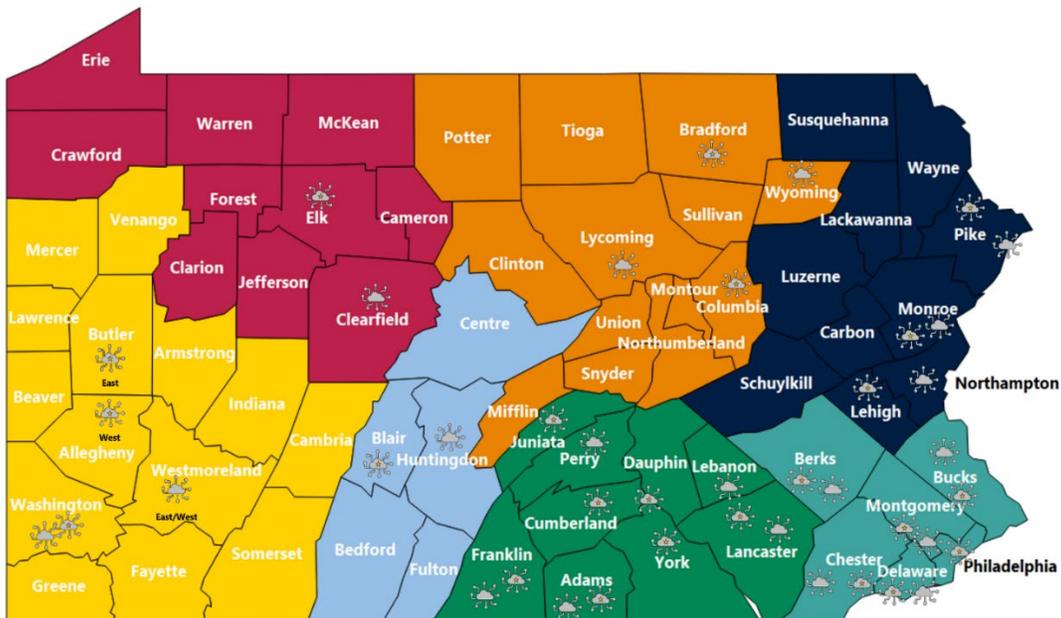
Regionalization Efforts. Two of the best examples of regionalization occurred with the creation of WestCORE and the Northern Tier projects, both of which took form before the passing of Act 12. WestCORE was designed in 2009 as a partnership of counties in the western portion of the state that were looking to alleviate redundant equipment purchases when replacing telephone systems.³⁰⁰ Similarly, the Northern Tier project started prior to 2015 as an opportunity to explore network and information sharing opportunities.³⁰¹

As the commonwealth continues its development of NG911, regionalization will be an especially important aspect. To date, the commonwealth has been further “regionalized” into seven different areas, loosely based on preexisting phone sharing agreements among the counties. PEMA’s national partners have expressed that the regional approach to NG911 is a concept that is unique to Pennsylvania compared to other initiatives in the United States.

The NG911 regions are graphically represented along with the regional ESInet host sites and the phone equipment sharing agreements that currently exist in the commonwealth in Exhibit 47.

Exhibit 47

NG911 Service Regions and Phone System Sharing Agreements



³⁰⁰ NASNA, *Case Study: Western Pennsylvania County Regional ESInet*, 2016.

³⁰¹ PEMA, *Next Generation 9-1-1 Report and Recommendations*, 2017.

Exhibit 47 Continued

Phone System Sharing Agreement	Participating Counties
Juniata/Perry	Juniata and Perry
Lehigh/Northampton	Lehigh and Northampton
NECORE	Carbon, Lackawanna, Luzerne, Monroe, Schuylkill, and Susquehanna
North Central	Clinton, Columbia, Lycoming, Mifflin, Montour, Northumberland, Snyder, Sullivan, Tioga, and Union
North COM	Bradford, Potter, and Wyoming counties
Northern Tier	Cameron, Clarion, Clearfield, Crawford, Elk, Erie, Forest, Jefferson, McKean, and Warren
Pike/Wayne	Pike and Wayne
South Central Mountain	Bedford, Blair, Centre, Fulton, and Huntingdon
Standalone (No Agreement)	Adams, Berks, Bucks, Chester, Cumberland, Delaware, Dauphin, Franklin, Lancaster, Montgomery, Philadelphia, and Washington
WestCORE	Allegheny, Armstrong, Beaver, Butler, Cambria, Fayette, Greene, Indiana, Lawrence, Mercer, Somerset, Venango, and Westmoreland
York/Lebanon	Lebanon and York

Source: Developed by LBFC staff from information provided by PEMA.

PEMA has established seven NG911 service regions, but the state currently has 10 phone system sharing agreements in place. While only two align directly with NG911 service regions (the Northern Tier and the South-Central Mountain regions) all the phone system sharing agreements consist of counties within the same NG911 region. Additionally, there are currently 12 counties that maintain their own phone system equipment. Some additional observations from our conversations with PEMA are as follows:

- While most of the WestCORE region shares a phone system, Washington County – which was not part of the original WestCORE agreement – does not. However, the entire region does share a radio system.
- The South-Central region, with the exceptions of Juniata and Perry and Lebanon and York counties, do not currently share any equipment systems. PEMA did inform us that they are currently working to build the region a shared fiber ESInet for NG911.
- Although none of the counties in the SEPA region currently share a phone system, the NG911 partnership was based on previous working relationships among the counties, including the South-east Pennsylvania Regional Task Force, which was founded in 1998.³⁰²

The connections formed because of phone system sharing agreements are significant for two reasons. First, it helps to expedite NG911's first

³⁰² PEMA, Commonwealth of Pennsylvania Public Safety Answering Point Inventory Report, 2016.

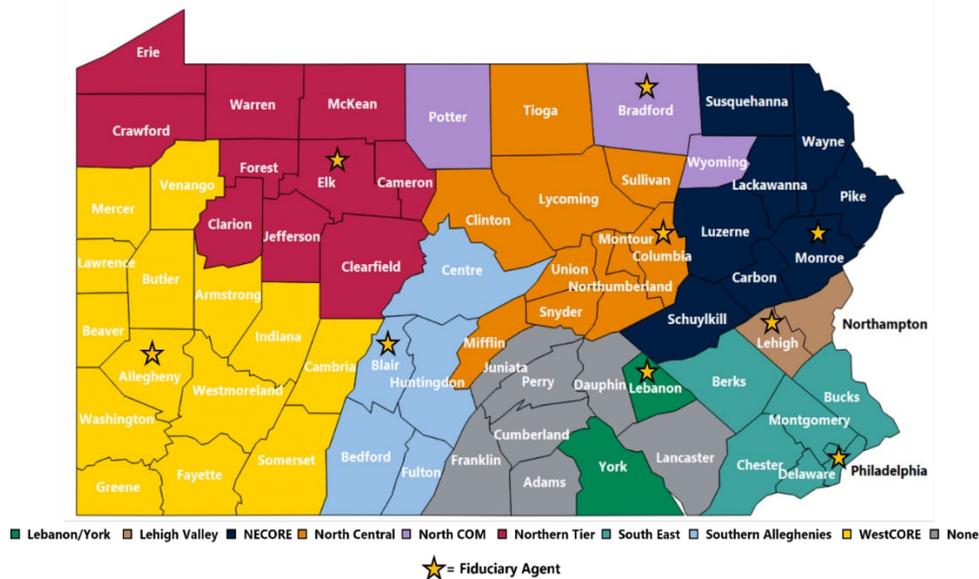
phase of call delivery. It was for this reason that these agreements were a primary consideration when PEMA was determining the NG911 service regions. Given that two of the primary goals of NG911 are interconnectivity and increased collaboration, it was a logical decision to group counties into regions where previous working relationships exist.

Regionalization efforts can also be seen in fiduciary agreements. When statewide interconnectivity funds for multi-county projects are distributed by PEMA, the counties involved have discretion in how those funds are received. One common method to handle these funds is through fiduciary agreements, where one county will serve as a “fiduciary agent” and receive most, if not all, of the funding for a regionally based project. In return, this county will typically handle the procurement, vendor payments, and accounting activities for the related project(s). Overall, these agreements can reduce the number of redundant tasks that are required of the counties included in the project.

Since fiduciary agreements are centered on shared interconnectivity projects (which are often multi-year ventures), the groupings of counties are fairly consistent from year to year. However, the counties do have the liberty to change the primary fiduciary agent in the agreement for each funding cycle.³⁰³ Exhibit 48 shows the fiduciary county agreement regions and current primary fiduciary agents.

Exhibit 48

Nine Fiduciary County Agreements are Currently Active in Pennsylvania



Source: Developed by LBFC staff from information provided by PEMA.

³⁰³ In our review of 2021 statewide interconnectivity grant funding, we found several examples where the primary fiduciary agents varied by project.

As shown, there are currently nine fiduciary county agreements in place across the commonwealth. With a few exceptions, the regional alignment of these agreements is identical to the phone system arrangements previously discussed.³⁰⁴ Since most statewide interconnectivity grants are currently related to NG911 phase I (call delivery), it makes sense that the counties would align in this manner. Only seven counties do not currently have a fiduciary agreement in place, but these counties (apart from the shared phone system between Juniata and Perry counties) do not share any infrastructure with their neighbors.³⁰⁵

Of the 94 statewide interconnectivity grants awarded in 2021, 25 (27 percent) used a fiduciary agent for at least part of the funding distribution. A total of \$8.7 million was distributed among these projects, equaling 42 percent of the \$20.9 million in awarded grants. The most common types of projects funded via fiduciary agreements were related to NG911 (ESInet, GIS, networks, service migrations), call handling equipment (CHE), and CAD. These trends make sense given that most fiduciary agreements are centered around shared phone systems, as well as the fact that the transition to NG911 is underway across the state.

Overall, although the fiduciary agreement process may seem complex, PEMA has informed us that they can support either method of county funding (fiduciary or split cost) with relative ease and little administrative burden. For this reason, while we recognize that fiduciary agreements can be used to streamline funding distributions and administrative duties among the counties, we also respect the counties' autonomy to determine the most appropriate funding method for their program's needs. Consequently, because there is no further administrative burden to PEMA, we believe the current working arrangements should continue.

Physical Consolidation. Prior to Act 12, Pennsylvania's 911 system supported 69 PSAPs. However, with the passage of the Act, counties were required to "consider efficiencies to be achieved from regionalization and consolidation" as part of their 911 system plans.³⁰⁶ As a result, the number of primary PSAPs in the commonwealth has been reduced to 61. This process typically takes one of two forms. A "physical consolidation" refers to the process when one PSAP voluntarily merges or decommissions its services into a neighboring PSAP's operations to form a new organizational unit.

³⁰⁴ Exceptions include the addition of a Southeast zone and the lack of a fiduciary system for Juniata and Perry counties.

³⁰⁵ Our review of 2021 statewide interconnectivity funding indicated that cooperation among the counties in the South Central NG911 region is becoming more common, as several of these counties entered into fiduciary agreements for grant award funding.

³⁰⁶ 35 Pa. C.S. §5305.

While a county still theoretically maintains a 911 system in this situation (e.g., the county is still required to produce a 911 plan), all the duties required to operate this system are completed by a joint agreement with another county. Physical consolidations that have occurred to date include the following:

- Montour County consolidated its operations with Columbia County, which was completed in 2018.
- Union County consolidated its operations with Snyder County, which was completed in 2016.
- In addition, Allentown and Bethlehem, the two city PSAPs grandfathered into the 911 system by Act 78 of 1990, were consolidated with Lehigh County and Northampton County, respectively. These consolidations were completed in 2019.

Technological Consolidation (Shared Service Agreements). A “technological consolidation” occurs when a county directs its call-taking and dispatch duties to another county using shared equipment systems. Since the PSAP taking on the additional duties are “sharing” its 911 service with another county, these consolidations are also called shared service agreements. Counties that have entered shared service agreements include the following:

- Cameron County entered a shared service agreement with Elk County beginning in 1995.
- Forest County entered a shared service agreement with Clarion County for calls originating from the eastern half of the county beginning in 2008. It has also entered an agreement with Warren County for calls originating from the western half of the county beginning in 2018.³⁰⁷
- Potter County entered a shared service agreement with Tioga County beginning in 1990.
- Sullivan County entered a shared service agreement with Lycoming County beginning in 2010.

³⁰⁷ Prior to contracting with Warren County, Forest County previously maintained a similar shared service agreement with Venango County.

Impact of Regionalization and Consolidation

One of the primary goals of Act 12 was to help promote the transformation of the commonwealth's 911 program from a collection of associated, but separated, entities to a connected statewide system that is focused on intercounty cooperation and collaboration. As we have discussed above, great strides have been made in these areas since the passage of the Act. With this progress in mind, we still felt it necessary to explore the impact that regionalization and consolidation efforts have made on the counties. As such, we attempted to perform a review in two areas – hours of operation and county finances.

However, at times, such analysis proved to be a challenge for several reasons. First, much of the data we were able to obtain for this report was retrospective. Given the migration to NG911 that the commonwealth currently finds itself, we found it difficult to project findings from a system that was in a legacy state or in mid-transition to a new environment that is completely unprecedented for the 911 industry. Second, as will be highlighted below, other studies around the country have found that the full impact of consolidation and regionalization efforts could take at least five years to a decade to be realized. As can be seen from the timelines discussed above, we are currently in the middle of this transition period for many of the efforts that took place around or after the passing of Act 12. Further, many of the other older efforts – mainly technical consolidations – occurred several decades before the implementation of the Act. Given the rapid changes experienced by 911 system in the last 20 to 30 years, we ultimately felt that a comparison of operations before and after these efforts would not be reflective of the needs of today's 911 program.

While we felt that future reviews of the 911 program would be warranted in many areas, this topic is perhaps where that need is most evident. Over the next decade, the impacts of regionalization and consolidation efforts will be more solidified, and the results of the NG911 transition will become more defined. As such, we recommend that the General Assembly consider directing the Legislative Budget and Finance Committee to perform another review of the commonwealth's 911 system within five years of the reauthorization of 35 Pa.C.S. Ch. 53. One of the primary objectives of this study should be to determine the impact of regionalization and consolidation efforts on the commonwealth's PSAPs within the NG911 environment.

Impact of Consolidation on Hours of Operation. SR 96 specifically directed us to review "hours of operation" within county PSAP operations. With this directive in mind, we determined this review was best conducted within the context of consolidation. This distinction is important because while statewide, 911 calls are answered 24 hours a day, seven days a week, 365 days a year, consolidation results in counties

that do not operate PSAPs 24/7. Specifically, we focused on the four counties that have reduced their 911 operations due to technical consolidations, since physical consolidations can be viewed as the joint operation of a PSAP.

Based on information reported in our PSAP survey, documented online, or obtained directly from the counties, we found that all the counties maintain some semblance of a 911 program within their jurisdiction. Three of the four counties serve as backup PSAPs for the county to which they contracted their 911 duties, and two reported maintaining telecommunicators and other 911 staff (outside of 911 coordinators, which all counties are statutorily required to appoint).³⁰⁸ We found it was common practice for 911 personnel in these counties to work as part of an emergency services office with standard business hours – eight-hour work weeks running Monday through Friday. Additionally, two counties reported maintaining on-call staff to assist with 911 services when needed. Exhibit 49 shows the relevant information we were able to obtain from each county.

Exhibit 49

Counties That Have Voluntarily Reduced PSAP Hours of Operation Still Maintain a 911 Presence

				
County Class	8	8	8	8
Backup PSAP?	Yes	No	Yes	Yes
Number of Reported Telecommunicators (Full-time and Part-time)	0	0	6*	8**
Emergency Service Office Hours of Operation	Monday – Friday, 8:30 AM – 4 PM	Monday – Friday, 8 AM – 4 PM	Monday – Friday, 8:30 AM – 4 PM	Monday – Friday, 7:30 AM – 3:30 PM

Notes:

*/According to Sullivan County, this number includes three full-time employees, as well as three that remain on call.

**/According to Potter County, this number includes one Master Street Address Guide Coordinator and seven on call employees.

Source: Developed by LBFC staff from information provided by PEMA.

³⁰⁸ 35 P.S. §5304 (a).

Additionally, we also looked at potential impacts reduced hours of operation could have on the ability to respond to emergency service requests. We found that each county received less than 40,000 total 911 calls for the period 2016 to 2020. Even 10-digit non-emergency calls, which some counties have reported as being problematic, do not appear to be an issue in these circumstances. According to PEMA, because each county still maintains a non-emergency 10-digit number for their 911 system, most of these calls do not get directed to other PSAPs. Therefore, we can conclude that there does not appear to be a decline in performance of 911 services for the residents of the four counties that have voluntarily reduced their hours of operation since the passage of Act 12.

Financial Impacts of Regionalization and Consolidation. One of the major drivers towards regionalization and consolidation efforts has been the potential positive impacts on county finances. Proponents of these efforts argue that they can reduce costs and expand collective purchasing power for the counties. This aspect is especially pertinent in the move to NG911, where maintaining updated technology will become critical to 911 operations. This has perhaps been best demonstrated with the regional efforts towards NG911 development, as these enhancements are costly and likely could not be accomplished in the current timespan if not for the joint purchasing power that has been achieved through regional cooperation (e.g., statewide interconnectivity funding distributed via fiduciary agreements)

Furthermore, given the current staffing and funding issues facing the commonwealth's 911 system, regionalization and consolidation efforts could present opportunities for counties to better align services within existing staffing/funding constraints (see Issue Area E). However, previous studies have indicated that it may take between five to 10 years for cost savings from these efforts to be realized.³⁰⁹ Therefore, while we were able to obtain some cost figures from these counties related to consolidation, we found it difficult to discern the true impact of these efforts to date. Additionally, as noted above, we found that much of the other data we were able to obtain would not take into account the rise in 911 system costs over the last several decades, as well as the needs of the PSAPs within NG911. As a result, we feel that it would be beneficial to review these topics again once the NG911 environment has had time to mature and the full cost savings of these regionalization and consolidation efforts can be realized.

³⁰⁹ Michigan State 911 Committee, *Report on Efficiencies in 911*, 2012.

Specifically related to consolidation efforts, as noted in Section III, counties that have consolidated their operations with another county still receive 911 Fund distributions, as the formula that is currently in place was established before these consolidations occurred.³¹⁰ However, since these counties no longer operate a PSAP, these funds are used, in part, to help support the PSAP that has taken their duties, as well as to offset expenses related to consolidation. We discussed at length in Issue Area B that the current funding distribution formula no longer accurately reflects the needs of the commonwealth's 911 program. Several counties have expressed frustration that PSAPs that no longer maintain daily 911 operations are still allocated funding using expenses from when they did operate PSAPs. However, we do not feel that consolidation should be considered in future versions of the funding distribution formula, as this could be viewed as a disincentive for counties to explore cost savings measures. Further, it is important to note that even if the distribution formula was to change, the Act still requires that all counties continue to receive their share of three percent equal distribution funds.³¹¹ Since the counties still maintain responsibility over their 911 systems under Act 12, we believe that future distribution formulas should fund all counties equitably. It would then be the determination of each county to furnish its program how it sees fit, including the exploration of cost saving measures such as consolidation.

Regionalization/Consolidation Efforts in Other States

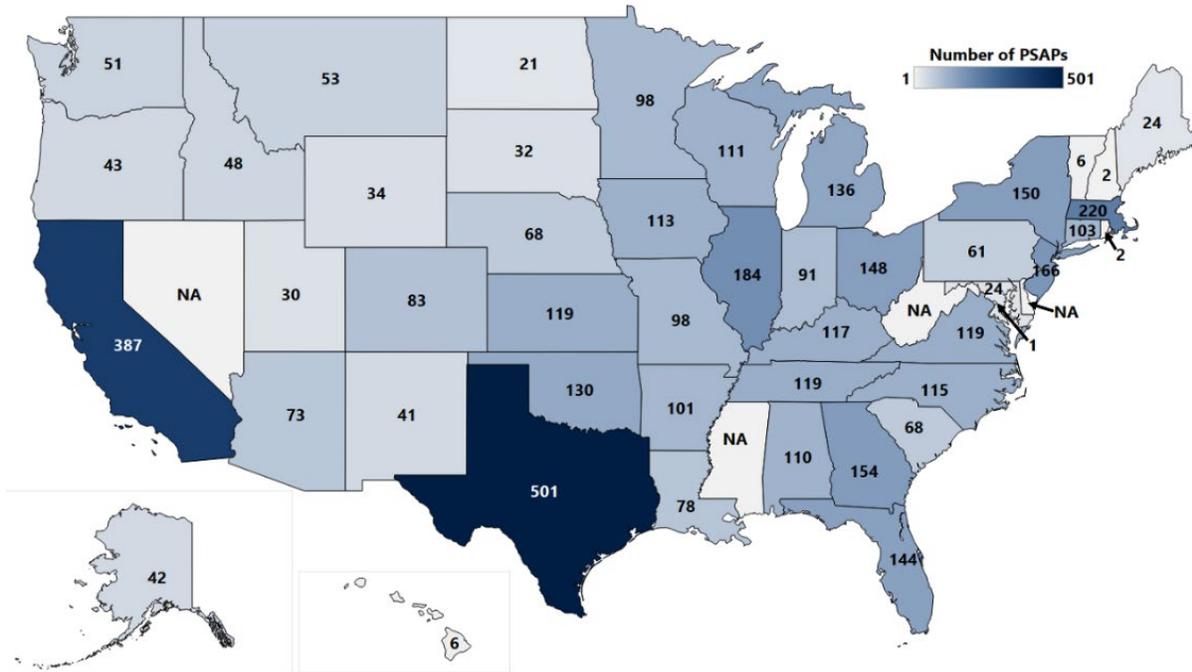
Given the localized nature of America's 911 system, many states find themselves considering consolidation as a viable option for their 911 systems. As part of our review, we used data collected by the National 911 Office to analyze the number of primary PSAPs operated by state. Exhibit 50 shows this evaluation in greater detail.

³¹⁰ The exceptions are Allentown and Bethlehem, which stopped receiving Fund distributions after 2019.

³¹¹ 35 Pa. C.S. §5306.1 (d).

Exhibit 50

Number of Primary PSAPs by State, 2020*



Notes:

*/Our analysis included data for all 50 states and the District of Columbia.

Source: Developed by LBFC staff from information provided by the National 911 Office.

In 2021, NENA reported that there were 5,748 primary and secondary PSAPs across 3,135 counties and county equivalents in the United States.³¹² This is corroborated by our own review of the 2020 National 911 Annual Report data. Upon further review, we found that Pennsylvania is one of only 13 states that reported³¹³ the operation of fewer primary PSAPs than there were county/county equivalents in their respective states.^{314,315} Indeed, in our attempts to research consolidation efforts conducted by other states, while we did discover several examples of regional consolidation,³¹⁶ most discussions we found over the last 15 years

³¹² County equivalents include parishes, independent cities, boroughs, and Census areas. See <https://www.nena.org/page/911Statistics>, accessed April 7, 2022.

³¹³ Delaware, Mississippi, Nevada, and West Virginia did not report primary PSAP statistics to the National 911 Office in 2020.

³¹⁴ County information was obtained from the U.S. Census Bureau.

³¹⁵ Our analysis included data for all 50 states and the District of Columbia.

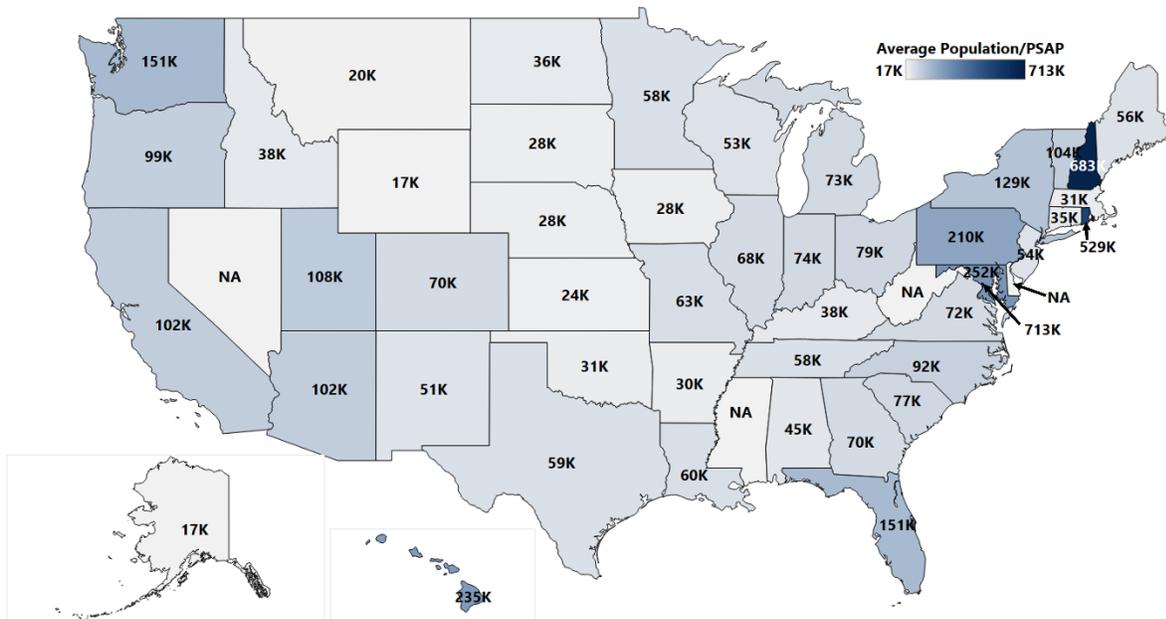
³¹⁶ Examples include the CCE (Charlevoix, Cheboygan, and Emmet Counties), Chippewa, Iron, Mason Oceana, Meceola, and Negaunee regional PSAPs in Michigan. See Michigan State 911 Committee, *Report on Efficiencies in 9-1-1 Presented to the Michigan Legislature*, 2012.

pertained to municipal PSAP consolidations within counties. The challenges faced in other states were not a major concern in Pennsylvania, as Act 78 of 1990 established the state's 911 system primarily as a county, not a city, responsibility.³¹⁷

While we recognize that there is no national requirement prohibiting states to administer 911 at localized levels beyond the counties, we felt that this would serve as a good starting point for a discussion on consolidation. However, in order to try and provide a point of comparison, we also used state population data from the U.S. Census Bureau to calculate the average number of residents that would be covered by each primary PSAP in the state. These results are presented in Exhibit 51.

Exhibit 51

Thirty-eight States Average Fewer than 100,000 Residents per PSAP*



Notes:

*/Our analysis included data for all 47 states, including the District of Columbia.

Source: Developed by LBFC staff from information provided by the National 911 Office and the U.S. Census Bureau.

Overall, we found that 38 of 47 reporting states, including the District of Columbia, would average fewer than 100,000 residents per PSAP if the state populations were evenly distributed. At 210,000 residents per PSAP, only five states have PSAPs that serve higher population bases on

³¹⁷ Act 1990-78, as amended, P.L. 340, No. 78, §4 (c).

average than Pennsylvania. While we note that many PSAPs serve population bases that are higher or lower than what is shown here – and that larger averages do not necessarily correlate to more consolidation efforts – Exhibit 51 is useful in representing the size of each state’s 911 system relative to its population.

Finally, we identified New Hampshire, Rhode Island, and Vermont as states that have successfully implemented “regional” 911 systems with PSAPs that serve similar or larger average population bases to that of Pennsylvania.³¹⁸ However, there are several key differences between Pennsylvania’s 911 system and the systems operated in these states. First, the structures used to govern the 911 systems in these states are quite different. Whereas Pennsylvania is classified as having a statewide authority (PEMA) that works to plan and coordinate its 911 system with localities, New Hampshire, Rhode Island, and Vermont all have statewide 911 authorities that either directly own or fund its PSAPs.³¹⁹

Furthermore, the call volume experienced in these three states is drastically different from that of Pennsylvania. All three states reported between 200,000 and 465,000 911 calls in 2020.³²⁰ These levels are comparable to counties in classes 2-A and 3 in Pennsylvania. In sum, it is our view that relatively lighter PSAP workloads and 911 organizational structures that can dictate consolidation from the statewide level make it more plausible for these three states to implement regionalization efforts compared to Pennsylvania. However, given the state’s size and emphasis on local control over 911 governance, Pennsylvania has made measured progress towards consolidation and regionalization efforts since the passage of Act 12 compared to other states.³²¹

Next Steps

Given the efforts that have taken place to date, there may be opportunities for counties to experience cost and operational efficiencies through consolidation and regional collaboration. While not every county would be a candidate for these measures, we think that the counties that have been impacted most by staffing shortages and rising system costs could benefit from the combining of resources and streamlining of operations that can result from these efforts (see Issue Area E).

Since the data for the commonwealth’s 911 system is in a period of transition, it is difficult to establish criteria to determine which counties

³¹⁸ New Hampshire has two PSAPs serving 10 counties, Rhode Island has two PSAPs serving five counties, and Vermont has six PSAPs serving 14 counties.

³¹⁹ See https://www.911.gov/issue_911statsanddata.html, accessed April 7, 2022.

³²⁰ National 911 Program, National 911 Progress Report: 2020 Data, 2022.

³²¹ These findings are consistent with previous assessments of Pennsylvania’s 911 system. See LBFC, *Pennsylvania’s 911 Emergency Telephone System: Funding, Expenditures, and Future Challenges and Opportunities*, 2012.

should consider consolidation versus those that should not. Further, Act 12 gives the counties the power to ensure the provision of the 911 system in their jurisdiction, and we feel that the counties are best suited to determine what is most financially and operationally viable for their citizenry.

However, the General Assembly can consider further emphasizing this point in future authorizations of 35 Pa.C.S. Ch. 53. For example, §5305 (a), regarding county 911 system plans, currently states, “the plan *shall* consider efficiencies to be achieved from regionalization and consolidation and *may* include consideration of next generation 911 technology,” [emphasis added].³²² This language could be strengthened further to state, “the plan *must* consider efficiencies to be achieved from regionalization and consolidation, *including* consideration of next generation 911 technology.” These changes will accentuate the importance that counties should place on leveraging technology in the NG911 environment to overcome operational inefficiencies. Furthermore, and perhaps most significant toward these cost saving undertakings, as more robust data becomes available through the 911 MIS solution, these types of plans and considerations will be further informed.

Additionally, finding other opportunities to incentivize consolidation and regionalization from the statewide perspective has proven to be challenging. The most realistic form of incentive would be monetary, but without any additional revenue coming into the 911 Fund, increased spending on consolidation incentives will mean decreased spending on other parts of the program, which are equally important to overall effectiveness.

Currently, PEMA incentivizes consolidation and regionalization efforts through the use of statewide interconnectivity grant awards. These awards address a variety of areas pertaining to interconnectivity, including the funding of consolidation feasibility studies.³²³ As noted, the lifespan of these awards is waning, as “15 percent” funds will eventually be needed to cover NG911 at the statewide level. With the funding cycles that remain, we recommend that PEMA prioritize grants for consolidation feasibility studies among statewide interconnectivity awards. While this may initially reduce some of the funding available for other awards, ultimately the cost savings that come from consolidation can be distributed back to the counties via the Fund.

Finally, as discussed in Section III, the current Fund Distribution formula is now outdated by several years. Whether counties are relatively overfunded or underfunded, the current formula is not equitably meeting the

³²² 35 Pa. C.S. §5305 (a).

³²³ PEMA has funded three consolidation feasibility studies since 2016. In one instance – a study on merging Armstrong County’s PSAP into that of Allegheny County – the consolidation was not pursued, and the funding was returned to the agency.

needs of the 911 program. Ultimately, this can have influence on counties when they are determining what is best for their 911 program. Again, we recommend that PEMA and the 911 Advisory Board continue efforts to revise the 911 Fund distribution formula, as we believe this will have downstream effects on the counties' ability to plan and to determine the potential financial benefits of consolidation and regionalization agreements.

Role of Remote Dispatch Centers in Statewide Interconnectivity

As we have discussed, one of the primary goals of Act 12 was to promote the statewide interconnectivity of 911 systems. While this is currently in progress at the county PSAP level, one potential gap exists among remote dispatch centers that are under the authority of municipalities, not the counties or PEMA.³²⁴ Act 17 of 2019 solidified that 911 calls must first be directed to county PSAPs before they are relayed to a dispatch center, if one exists.³²⁵ Although these centers are largely outside the purview of this report, we felt it necessary to mention their role in the emergency response process. Given the emphasis that has been placed on such matters as a result of Act 12, the General Assembly should consider whether remote dispatch centers should be required to connect to the statewide ESInet as part of the reauthorization of 35 Pa.C.S. Ch. 53.

E. Staffing in NG911 Environment

PSAP telecommunicator staffing is one of the most challenging and complex issues facing the commonwealth's 911 system. In Section IV, we made several targeted recommendations to the General Assembly, PEMA, and the PSAPs to help further professionalize the 911 industry and to aid in hiring efforts at the county level. However, in this section – which is devoted to opportunities and challenges for the 911 system – we turn our focus to staffing in the NG911 environment. In this issue area, we will discuss several of the largest looming issues facing PSAP staffs following the transition, but also highlight the benefits of NG911 that may be used to counteract staffing concerns in the future.

³²⁴ In addition, the Pennsylvania State Police is also not required to participate in statewide interconnectivity efforts, as it is exempted from the management of PEMA and the 911 Advisory Board. See 35 Pa.C.S. Ch. 53. §5303 (d).

³²⁵ PEMA and the counties also expressed concern that these centers represent a duplication of service, and as a result, "double tax" the residents of these localities for the same level of 911 coverage.

Staffing Challenges in NG911

Telecommunicators already perform a tremendous service for the commonwealth's citizens. Throughout Pennsylvania, telecommunicators aid those in dire situations, often enduring long hours and odd shifts across nights, weekends, and holidays. Unfortunately, while the technology of NG911 has potential benefits for PSAP staffs (discussed below), in some ways, it will also make the jobs of telecommunicators more difficult. In the discussion that follows, we will highlight the challenges presented to PSAP staffs by NG911 technology in the areas of training, call complexity, and telecommunicator well-being.

Telecommunicator Training. The training process for telecommunicators is lengthy and expensive.³²⁶ As noted in Section IV, a handful of PSAPs expressed to us that they already struggle to meet the current training requirements set by PEMA due to staffing shortages. Although the transition to NG911 will not immediately affect the training that is required of telecommunicators, PEMA has acknowledged that training will likely increase and become more complex as additional advanced technologies and platforms are integrated into the system.³²⁷ On aggregate, 911 coordinators ranked "training staff with NG911 technology" as the one of the most pressing issues facing the 911 system, only trailing issues related to staff retention and system funding.

Further, the speed in which IP-based technology changes will also have a negative effect on telecommunicator training requirements. Not only will the physical hardware and equipment used by PSAPs become obsolete faster than what is currently experienced in the legacy 911 system, but the software, applications, and network requirements used to support NG911 technology will also require updates more frequently.³²⁸

Developing strategies to help preemptively mitigate these scenarios will be a challenge. It is unrealistic to suggest that telecommunicators should have *less* training in NG911 than they have now. PEMA has been a leader in providing updated training requirements, which the agency says are viewed as some of the most comprehensive in the country. To ensure consistent, quality 911 service for all Pennsylvanians, many of these standards should continue to be carried over to the NG911 environment. If PSAPs can leverage NG911 technology to help alleviate staffing shortages (see below), then it is quite possible that the additional technological training will be less of a burden.

³²⁶ In Section IV, we reported that some counties informed us that it could cost \$3,000 and take approximately one year or longer to train new telecommunicators.

³²⁷ PEMA, *Pennsylvania NG911 Project Overview*, 2021.

³²⁸ See The 911 Education Foundation, *History of 911*, 2015.

PEMA reviews training requirements on an annual basis. We believe this is a prudent strategic decision given the transition in which the 911 system currently finds itself. Going forward, PEMA must continue to develop and maintain training requirements that will maximize situational preparedness in NG911, while also remaining mindful of the staffing constraints experienced by many PSAPs across the commonwealth.

NG911 Call Complexity. In Section IV, we noted that many PSAPs were able to meet or exceed current call processing (answering) standards despite expressing that they felt their current staffing levels were not sufficient to handle their center's call volume.³²⁹ We theorized that this contradiction could be the result of many 911 coordinators anticipating the increased levels of call complexity that will likely come in NG911.

One interesting dichotomy that seems to be emerging in NG911 is the complexity of handling 911 calls through completion. While certain technological advancements will make aspects of this process easier (see discussion on ASAP-to-PSAP notifications below), the overall scale of new devices and information that is expected to flood telecommunicators in the NG911 is high. As such, 911 stakeholders have needed to look for ways to streamline the information presented to telecommunicators while verifying its accuracy.

Recently, PEMA required PSAPs to use standardized fire, police, and medical dispatch protocols. These protocols provide telecommunicators with a list of questions (based on incident type) that are to be asked and documented when handling a 911 call. According to PEMA, the use of these protocols promotes a consistent level of service across the commonwealth using procedures that have been tested and validated. In addition, the agency states that the protocols aid in random auditing of PSAPs, since every county will be handling incidents in the same manner, which will help to improve quality assurance and quality improvement processes.

While many counties have expressed appreciation for the standardization of 911 procedures,³³⁰ the protocols have also received criticism.³³¹ The most prevalent concern is the impact these protocols have on the time it takes to handle 911 calls. One 911 coordinator from a class 5 county stated:

³²⁹ In our survey of 911 coordinators, 28 counties reported insufficient staffing levels, while still maintaining the call processing standard of answering calls in 10 seconds or less. Conversely, 20 counties reported both sufficient staffing levels and meeting the call processing standard.

³³⁰ In our survey, 12 county coordinators said that standardization of policies and training was the biggest success of the 911 system under Act 12. This response was tied with funding as the second most selected response to this poll.

³³¹ See <https://www.wtae.com/article/911-dispatchers-say-system-puts-police-public-at-risk/29656745>, accessed May 26, 2022.

The protocols are a benefit for agencies as they provide a standardized and scripted form of questioning. However, as staffing issues rise across the state, the protocols increase dedicated call time making it difficult to function adequately without adding staff or incurring additional budgetary costs such as overtime.

In sum, the growing complexity of handling 911 calls is beginning to have a negative impact on the ability of PSAPs to answer incoming service requests. As a result, the 911 Advisory Board voted to adopt new call processing standards, which were recommended by NENA, in September 2021. Whereas previously the requirement was to answer 90 percent of calls in 10 seconds or less, PSAPs will soon be required to meet the same threshold in 15 seconds or less.³³²

Overall, we think that PEMA's decision to require the use of standardized dispatch protocols is beneficial in that it promotes a uniform level of service regardless of location. However, it is also clear that many PSAPs are starting to feel the strain of increased call-handling times. The changes to call processing standards made by NENA and PEMA are the reflection of the growing complexity of the 911 system under NG911. Although we believe that consistent service in the 911 system is important, we must also recognize that a component of service is timeliness. To that end, as NG911 is further developed this metric needs to be closely monitored by PEMA and the PSAPs.

Telecommunicator Well-being. As with most occupations in public safety, working as a telecommunicator can be extremely stressful. A 2019 survey of Virginia public safety personnel found that 14.5 percent of contacted telecommunicators reported having suicidal thoughts within the year.³³³ APCO's study of PSAPs across the country found that over two-thirds of PSAP staff either personally used or referred a coworker to mental health resources.³³⁴ Although it is too soon to quantify the issue, anecdotally we have heard from several 911 coordinators across the commonwealth that the COVID-19 pandemic has only increased the stress levels of PSAP staffs. These factors all contribute to the burn out of telecommunicators, which in turn leads to staffing shortages and higher demands being placed on the employees who remain. As we have heard from many in the 911 community, this is a vicious cycle which has been repeating itself for years.

Given these conditions, NG911 technology may introduce additional stressors on telecommunicators. For example, in NG911, telecommunicators will be exposed to new media sources, including graphic images

³³² At the time of this report, the adopted change was still undergoing regulatory review.

³³³ Fairfax Coalition of Police, 2019 Virginia Public Safety Mental Health Pilot Survey, 2019.

³³⁴ APCO, Staffing and Retention in Public Safety Answering Points (PSAPs): A Supplemental Study, 2018.

and videos. As the technology in the system becomes more advanced, it is likely that telecommunicators will not just listen to the voices of individuals experiencing traumatic events – they will watch as these events unfold in real-time. Unfortunately, because most of the country is still in the process of transitioning to NG911, many long-term effects of this new work environment on telecommunicators are still unknown.

On a more positive note, PEMA, the 911 Advisory Board, and the PSAPs all recognize that this is an issue that will need to be addressed moving forward. PEMA reported that protocols to help address increased levels of post-traumatic stress disorder among telecommunicators have started to be included as part of the uniform system and training requirements that must be established annually by the agency and the Board in accordance with Act 12.³³⁵

More recently, Act 2020-69 amended Title 35 of Pennsylvania statutes by adding Chapter 75A regarding Emergency Responder Mental Wellness and Stress Management. This chapter imposes additional responsibilities on the Department of Health and covers mental wellness and stress management guidelines, peer-to-peer support programs, trained peer support providers, a toll-free helpline, establishment of the Statewide Critical Incident Stress Management Program, and the requirement of trauma and suicide awareness and impact training for emergency responders. Chapter 75A's definition of an "emergency responder" includes a 911 dispatcher.

Given the significance of mental health well-being on public safety, we recommend that PEMA and the 911 Advisory Board use their statutory roles as the curators of 911 system and training requirements to further promote the dissemination of mental health and well-being best practices to the PSAPs leading up to and following the transition to NG911. The formation of a wellness subcommittee within the Advisory Board would be an important first step.

Staffing Opportunities in NG911

Although at times it may seem as if navigating the NG911 environment will prove to be daunting for PSAPs and their staffs, the transition also presents great opportunity for the 911 system. Currently, the commonwealth's PSAPs are on the cusp of a new operating environment – one where old challenges may be faced in ways that were inconceivable previously. With NG911 there will be ample opportunities for PSAPs to – individually and collectively – leverage technology and use resources to address these challenges.

³³⁵ See 35 Pa.C.S. Ch. 53. §5303 (a) and (c).

ASAP-to-PSAP Notifications. First, proponents of NG911 argue that advancements in technology will help to reduce the workload on telecommunicators. An area where there is the most opportunity for immediate impact is in the receipt of alarm notifications at PSAPs. We discussed in Section IV that, despite finding a reduction in total 911 calls for the observation period (2016 to 2020), many PSAPs are not reporting a decrease in telecommunicator workload. It is believed that alarm notifications currently outside the call tracking system have been a major contributor to this phenomenon.³³⁶

The frequency of alarms and other notifications will only increase in coming years, especially as the popularity of IoT devices expands the number of everyday objects that can connect to the internet (see Issue Area A). However, how PSAPs can handle this increased workload is rapidly changing, specifically in the form of ASAP-to-PSAP notification systems.

As noted in Section IV, ASAP-to-PSAP technology allows alarm monitoring services to bypass the traditional 911 system and send alerts directly to the PSAP CAD equipment. For ASAP-to-PSAP notifications to be used, both the alarm company and the PSAP must have this technology in place, otherwise the alarm must be sent as a traditional 911 call. Although this has been a major inhibitor to date, PEMA expressed to us that it believes the use of this technology will continue to become more widespread for both private and public entities in the IP-based environment of NG911.

Although PEMA informed us that only a few PSAPs currently have this technology in place, these counties have already reported time-savings for ASAP-to-PSAP notifications as opposed to alarms coming through the traditional 911 system. This is because alarms received as a traditional 911 call still need to be entered into a PSAP's CAD system, whereas ASAP-to-PSAP notifications go directly to the telecommunicator's CAD equipment. As an example, one class 3 county shared that the additional time it takes telecommunicators to process 911 calls from alarm companies – approximately 100 seconds each – equated to nearly 300 hours of additional workload compared to the PSAP's ASAP-to-PSAP notifications in 2021. For perspective, assuming a single telecommunicator processed all these calls as part of a 40-hour work week, this would equate to almost two months a year of workload.

In an industry where timeliness is one of the most important factors, any reduction in the length of time to complete a task – even less than two minutes – can be critical. PEMA anticipates that over the next several years, the cost savings realized by counties because of the statewide im-

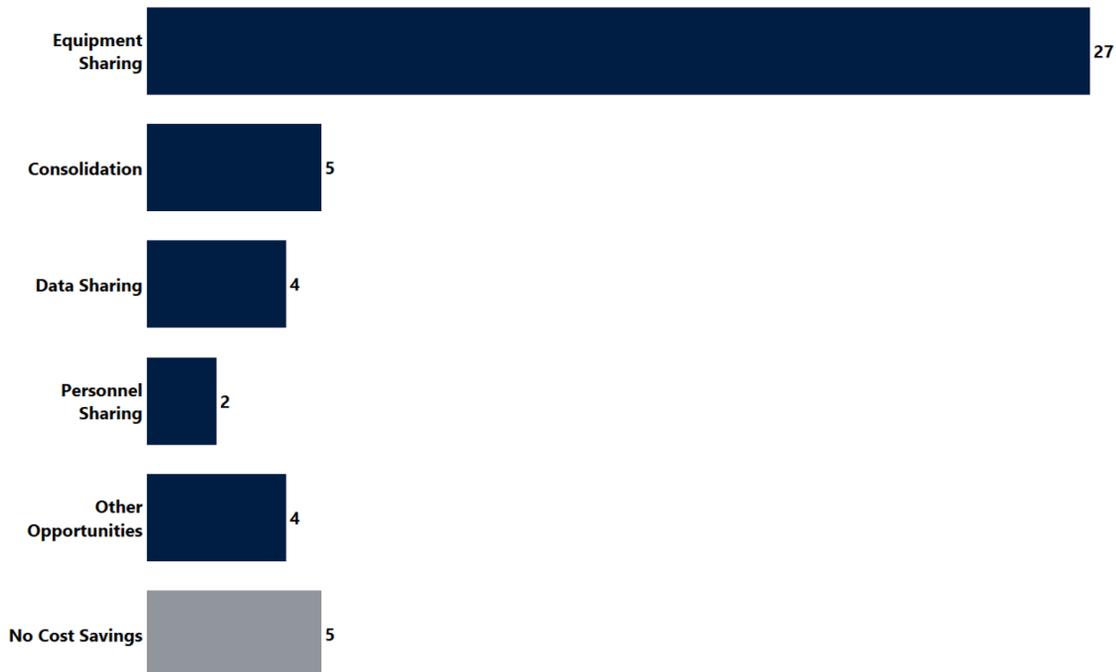
³³⁶ From data we received from several class 2-A and 3 counties, we approximated that these counties received roughly 12,000 alarm notifications per year. This would equate to anywhere between five and nine percent of their respective annual 911 call volume for the period.

plementation of call delivery services will allow counties to invest in technological upgrades. Although there are several areas where we see the potential for long-term benefit, in the short-term, we believe ASAP-to-PSAP technology would be a strategic investment for counties that could help to reduce telecommunicator workload. In addition, as the use of NG911 and IP-based technology becomes more widespread, it is likely that the use of direct notifications to PSAP CAD equipment will expand beyond alarm monitoring services. Early adoption of this technology can allow PSAP staffs to become familiar with these notifications before they become a larger portion of telecommunicator workload.

Technology Sharing. As referenced in Section IV, it is possible that technology sharing could help to mitigate staffing deficiencies. In our survey of PSAPs, 40 911 coordinators said they felt NG911 technology would present opportunities for cost-savings or other operational efficiencies among counties. As shown in Exhibit 52, most coordinators felt equipment sharing is currently the most attainable opportunity, with 27 counties suggesting the option as part of an open-ended response. Equipment sharing seems to be a logical proposal, given the history of shared phone systems among the counties that was highlighted in Issue Area D.

Exhibit 52

Most PSAPs Noted that Equipment Sharing is the Most Likely Way to Leverage Technology among Counties in NG911



Source: Developed by LBFC staff from information provided by the Pennsylvania county PSAPs.

However, as the practice of regional equipment sharing increases, so too does the opportunity to utilize these shared resources to overcome staffing shortages. According to PEMA, several counties already share the necessary equipment (phone, CAD, etc.) to answer the calls of another PSAP, if needed. Further, some counties reported to us that they currently leverage shared CHE and CAD equipment to create “queues” at neighboring PSAPs in scenarios when all telecommunicator lines are busy at the primary PSAP for the caller’s location.

In the short-term, where technically possible, equipment sharing agreements may be a viable emerging alternative to address staffing shortages. For example, rather than mandating overtime, PSAPs could arrange agreements with other counties to handle excess calls during odd hours (e.g., night shifts), thus reducing the number of telecommunicators needed on duty. Additionally, equipment sharing agreements could be useful to PSAPs during times of unexpected call surges, as opposed to pulling administrators from their supervisory positions to answer calls.³³⁷ Over time, this effort could reduce some of the demands placed on telecommunicators, which can help to alleviate burn out and may lead to higher retention rates for PSAPs.

Regionalization of 911 Operations. If PSAPs continue to move towards regional integration in terms of resources, there is an opportunity for the 911 system to look for regional solutions to staffing issues. Specifically, counties could create “virtual PSAPs.” With shared equipment across an interconnected ESInet, telecommunicators would have the ability to remotely handle calls from locations other than the physical PSAP building which received the call based on the caller’s location.

This concept was also presented in our 2012 report on the 911 system.³³⁸ However, according to PEMA, this practice has been delayed because counties do not uniformly share all the equipment needed to handle a call through to completion. For example, across the commonwealth, significant investment would be necessary for many counties to have shared radio systems, among other types of equipment.

However, as previously noted, once cost savings from the NG911 call delivery transition are realized, counties may be better positioned to make these investments. Further, if counties approach these purchases using regional agreements – similar to joint purchases currently utilizing fiduciary agreements for ESInet-related upgrades – then it is possible for the connected infrastructure required to operate virtual PSAPs to be realized.

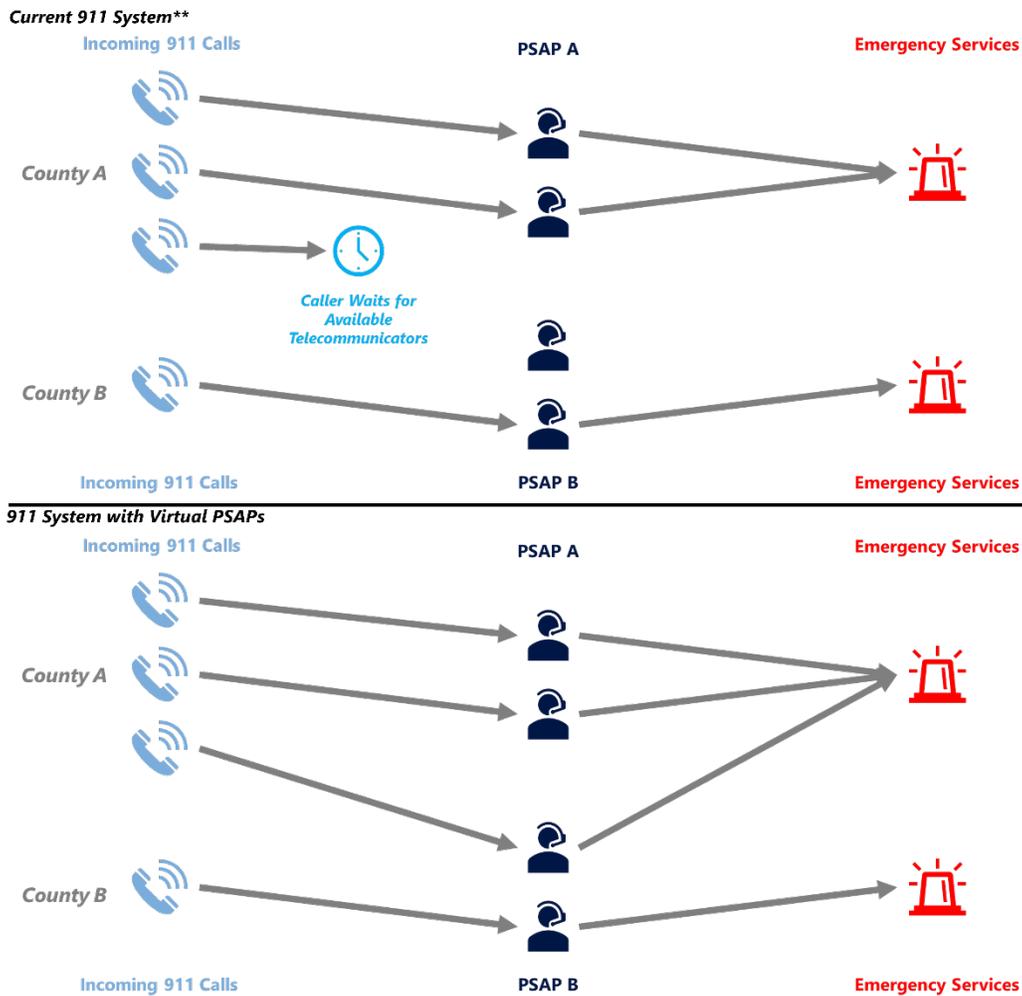
³³⁷ According to information presented by PEMA and the agency’s partners at 911 Advisory Board meetings, through the statewide MIS tool, PSAPs will be able to reroute their call traffic in real time.

³³⁸ LBFC, *Pennsylvania’s 911 Emergency Telephone System: Funding, Expenditures, and Future Challenges and Opportunities*, 2012.

Exhibit 53 presents a hypothetical example of the current 911 system, as well as the 911 system with the potential utilization of virtual PSAPs.

Exhibit 53

NG911 Technology Could Allow PSAPs to Support Each Other in Periods of Staffing Shortages*



Notes:

*/This exhibit has been simplified for illustrative purposes.

**/This graphic illustrates the current capabilities of the majority of the 911 system. However, there are some PSAPs that have the ability to transfer calls to neighboring counties.

Source: Developed by LBFC staff from information provided by PEMA.

Additionally, PEMA expressed to us that it is possible to help facilitate regional partnerships like virtual PSAPs statewide. Currently, the commonwealth's ESInet is set to be supported by two "data center cores" located in Philadelphia and Boyers. According to the agency, since this infrastructure will already be in place, it would be possible to integrate cores for other 911 equipment, such as phone or CAD systems. If this scenario were to be realized, then it would allow telecommunicators to assist with 911 calls anywhere in the state.

In either case, we do not envision the loss of autonomy for the counties in the 911 system. While standardized training and dispatch protocols help to ensure that all calls across the state are handled in the same way, we acknowledge that it would take time for telecommunicators to become familiar with the intricacies of other counties. For this reason, we believe that a regionally based approach would be the most beneficial starting point for any leveraging of staffing resources. In this way, PSAPs would be able to collaborate with other counties in their general local vicinity.

In conclusion, even with the expected efficiencies from NG911, staffing will continue to be an ongoing issue for PSAPs. Turnover is already high and will likely continue to increase due to a concoction of factors, such as less competitive pay scales, growing occupational demands, and an aging workforce. Hiring will also likely continue to be an issue, given the challenges of attracting qualified candidates. Ultimately, one of the most viable options for PSAPs would be to leverage emerging NG911 technologies and pool resources to address staffing concerns; however, more time is needed to see these systems come online. With this in mind, we recommend that the county PSAPs continue to explore options to leverage NG911 technology to address common issues in the 911 system, especially regarding staffing.

F. Statewide Notification Systems

SR 96 also directs the LBFC to review the use of the Pennsylvania AMBER alert system. As a result of this directive, a review of statewide notification systems was included as part of the scope for this report. In this Issue Area, we explore three emergency notification systems used in the commonwealth. First, we explore the Pennsylvania Emergency Management Network (EMnet), which is a platform maintained by PEMA and used by stakeholders across the state to issue a variety of emergency messages, including AMBER alerts. Next, we discuss AMBER alerts and Missing or Endangered Persons Advisory (MEPA) alerts, which are both used by the Pennsylvania State Police (PSP) to help locate missing individuals.

All these systems utilize the larger, federally coordinated wireless emergency alerts (WEA) and emergency alert systems (EAS). As noted in Section II, these tools are components of the national public warning system maintained in part by the FCC and are used to deliver emergency messages over broadcast television and radio (EAS) as well as cellular devices (WEA). These systems can be used by a myriad of federal stakeholders to issue public safety messages, including the President (Presidential Alerts), the Federal Emergency Management Agency (FEMA), the National Center for Missing and Exploited Children (NCMEC), and the National Weather Service (NWS), to name a few. However, the primary use of EAS and WEA are by local and state public safety officials such as PEMA or the PSP.³³⁹ As will be discussed below, the FCC allows states to use these tools for a variety of purposes, including missing persons, traffic incidents, severe weather alerts, or – as has been the case recently – public safety messages related to the COVID-19 pandemic.³⁴⁰

Pennsylvania Emergency Management Network

The Pennsylvania EMnet is a software platform maintained by PEMA to issue alerts as part of the EAS. EMnet alerts are typically issued via broadcast television, although it is becoming more common to have these messages spread on internet or satellite platforms. Additionally, PEMA can send alerts to cell phones via WEAs. Alerts are issued for a wide array of matters, including for severe weather (issued primarily by NWS), traffic incidents, hazardous materials situations, and missing persons – although AMBER and MEPA alerts are issued through the EMnet by the PSP.

Although it is maintained at the state level, the EMnet is required to interface with FEMA’s Integrated Public Alert and Warning System (IPAWS), which is another component of the national public warning system.³⁴¹ This integration means that federal agencies can use the EMnet. However, outside of weather alerts from the NWS, PEMA informed us that

³³⁹ See <https://www.fcc.gov/consumers/guides/emergency-alert-system-eas>, accessed August 11, 2021.

³⁴⁰ See <https://www.fcc.gov/document/enhanced-wireless-emergency-alerts-available-coronavirus-pandemic>, accessed August 11, 2021.

³⁴¹ See <https://www.fema.gov/emergency-managers/practitioners/integrated-public-alert-warning-system/broadcasters-wireless/emergency-alert-system-participants>, accessed June 29, 2022.

most alerts on the EMnet come from state or county government entities. Counties usually issue these alerts themselves, although PEMA does assist when necessary (e.g., assistance crafting an emergency message). However, PEMA will issue the alert directly if the message needs to go out to multiple counties at the same time.

According to agency staff, alerts are generated when there is an immediate or imminent threat to life or property. The issuing entity (whether it be PEMA or the counties) will craft the emergency message for transmission. If the message is being transmitted via traditional broadcast television, the issuing entity will inform the providers of the severity of the alert, which will determine if the message must be immediately broadcasted. Alerts that are of lower urgency can be broadcasted at the providers discretion, but usually must occur within an hour of receiving the message from the issuing entity.

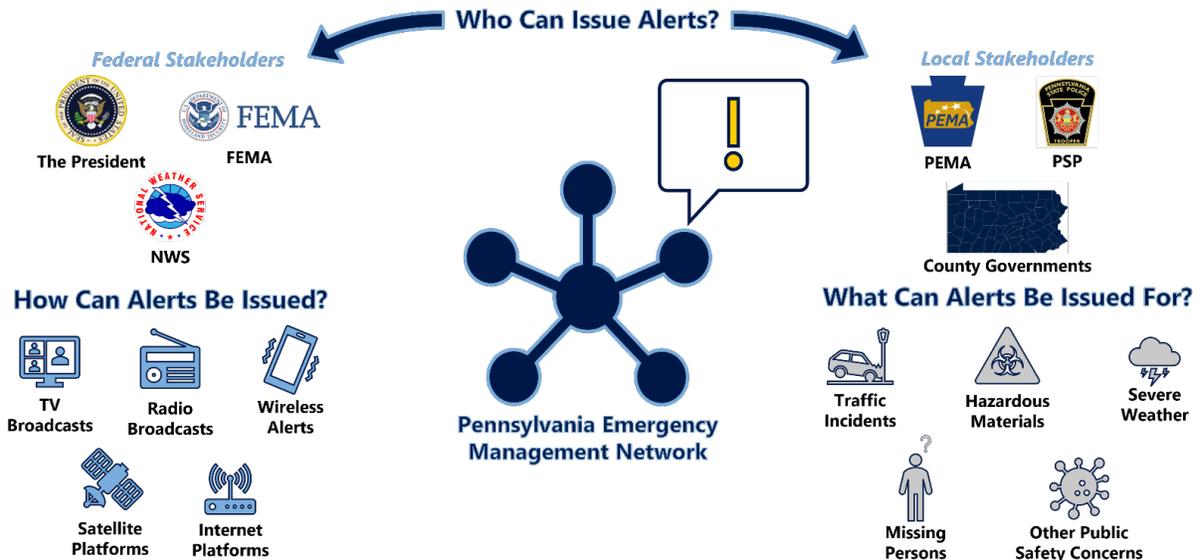
Although most messages are issued at the county level, PEMA expressed those messages can be isolated to municipalities if needed. Additionally, when PEMA issues a WEA, the agency can use cell towers to geolocate a specific region to receive an alert, which is especially useful in situations such as traffic incidents or severe weather. Alerts are not often issued at the state level, with the rare exception of the alert warning Pennsylvanians of bar and restaurant closures due to the COVID-19 pandemic in November 2020. According to PEMA, this alert was issued by the agency at the behest of the Governor's Office.³⁴²

It is also common for PSAPs to use the EMnet as well. According to PEMA, the system is a useful tool for PSAPs to notify residents and emergency responders when there is an outage of the 911 center's phone system or other equipment. Additionally, PSAPs may use the system to put out a notice to first responders about a missing person (e.g., conveying MEPA alerts issued by the PSP). Exhibit 54 shows a high-level overview of the EMnet. It is important to note that this representation is an illustrative example of the various stakeholders, incident types, and technologies used within the EMnet, and therefore is not an exhaustive list of the platform's components.

³⁴² In a Public Notice issued in April 2020, the FCC reminded state and local governments that WEAs could be used to convey recommended actions for saving life or property related to the pandemic, such as remaining at home due to surges in COVID-19 case numbers. See <https://www.fcc.gov/document/enhanced-wireless-emergency-alerts-available-coronavirus-pandemic>, accessed June 28, 2022.

Exhibit 54

Pennsylvania Emergency Management Network at a Glance*



Notes:

*/ This exhibit is an illustrative example of the various stakeholders, incident types, and technologies used within the EMnet, and therefore is not an exhaustive list of the platform's components.

Source: Developed by LBFC staff from information provided by PEMA.

According to PEMA, 184 EMnet messages were registered on FEMA's IPAWS system between 2020 and 2021.³⁴³ As shown in Exhibit 55 below, the vast majority of these alerts – 144 or 78 percent – were system test messages. PEMA indicated that these messages included the required monthly testing that is carried by broadcasters, as well as tests conducted by the agency but not disseminated to the public.

In terms of valid alerts (meaning non-test messages), the most commonly occurring messages pertained to outages of PSAP telephone equipment, with 13 such notifications taking place during the observation period. The second most common messages were cancelations of previous alerts (e.g., resolution of a 911 telephone outage), constituting five percent of the total EMnet traffic. Law enforcement warnings³⁴⁴ consisted of four percent of the total alerts on the EMnet, and all other types of alerts – including AMBER alerts – made up slightly less than six percent of the total messages for the period.

³⁴³ Data from 2019 was excluded from this review, due to PEMA's concern over the quality of the data maintained by IPAWs for that year.

³⁴⁴ Law enforcement warnings are used to inform the public of criminal activity that could pose a risk to public safety, such as jailbreaks, riots, or bomb threats.

Exhibit 55

Seventy-Eight Percent of All Alerts on the Pennsylvania EMnet were Test Messages between 2020 and 2021

Alert Type	Number of Alerts	Percent of Total
Shelter in Place	1	1
Civil Emergency Alerts	2	1
Evacuation Immediate	2	1
AMBER Alerts	5	3
Law Enforcement Warning	7	4
911 Telephone Outage	13	7
Cancellations of Previously Issued Messages	10	5
Test Messages	144	78
Total	184	100

Source: Developed by LBFC staff from information provided by PEMA.

AMBER Alert System and Missing or Endangered Persons Advisory Alerts

AMBER stands for America's Missing: Broadcast Emergency Response. The first AMBER alert system was established in Texas in 1996 in response to the abduction and murder of nine-year old Amber Hagerman. Other systems soon sprouted throughout the nation, and the National AMBER Alert Coordinator was created within the Department of Justice in 2003.³⁴⁵ Coordinated by the PSP, Pennsylvania's AMBER alert system was launched in February 2002, with the first AMBER alert being issued in July of that year.

While the details can vary by case, the general process of issuing an AMBER alert remains the same in every scenario. After the investigating agency - either the PSP or a local municipal police department - is informed of an incident, it will notify the on-call AMBER alert designee at PSP.³⁴⁶ The designee will work with the investigating agency to deter

³⁴⁵ See <https://amberalert.ojp.gov/about>, accessed August 11, 2021.

³⁴⁶ PSP informed us that it currently has eight AMBER alert designees, who share on-call duties on a rotating basis. All these designees are trained state troopers. As opposed to states that use civilian call takers, PSP believes that the use of trained officers allows for quick and decisive interpretations of potential AMBER alert incidents.

mine if the criteria for an AMBER alert have been met. Although there are many other pieces of information that can factor into the decision, PSP states that an AMBER alert can only be issued if the designee can:

- 1) Determine that the child is a minor,
- 2) Verify that an abduction has occurred, and
- 3) Has reasonable belief that the threat of bodily injury or death of the child is imminent.

If all three criteria have been met, the investigating agency and the PSP designee will work simultaneously to gather photos of the child, register the child as a missing person, create the AMBER alert message and fliers, and notify stakeholders³⁴⁷ that an AMBER alert is forthcoming. Once all this information has been collected and confirmed, the PSP will launch an AMBER alert, which will be sent out as a WEA³⁴⁸ and an emergency alert via the EMnet that will interrupt regularly scheduled broadcasting on television and radio. PSP informed us that its goal is to have this entire process - from initial notification of the AMBER alert designee to the launching of the alert - completed in less than an hour.

If all the initial criteria for an AMBER alert are not met, it is common for a MEPA alert to be issued in its place. In addition to children not currently eligible for an AMBER alert, MEPA notifications can also be especially useful for missing individuals who are elderly or may be at special risk of personal injury or harm to the public.

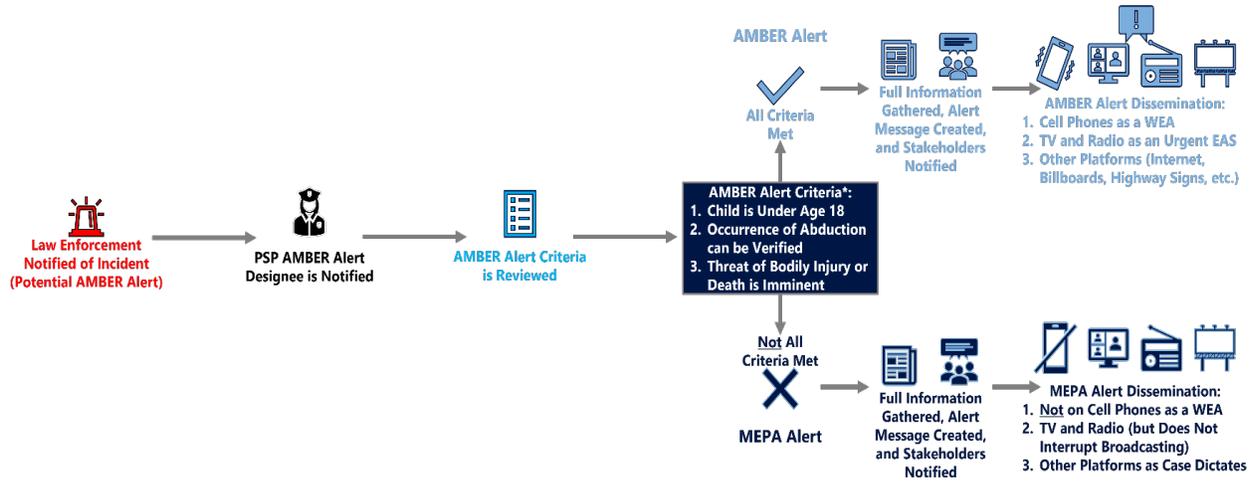
The process for issuing a MEPA alert mirrors that of an AMBER alert, except the emergency message will not be issued as a WEA or immediately interrupt broadcasting on television or radio. In addition, PSP expressed that it is possible for a MEPA alert for a missing child to be elevated to an AMBER alert if more information on the situation becomes known. Exhibit 56 illustrates a process flow for the issuing of AMBER and MEPA alerts.

³⁴⁷ PSP works with various state agencies to disseminate an AMBER alert once it has been issued, including PEMA, PennDOT, the Turnpike Commission, and the Lottery Commission, among others. AMBER alert messages can be displayed on various platforms, such as PennDOT highway signs, digital billboards, and internet advertisements. Similarly, MEPA alerts also leverage stakeholders from other state entities on a case-by-case basis.

³⁴⁸ As part of an agreement reached by the FCC and other stakeholders in 2013, AMBER alerts in the United States are sent as WEAs to all compatible cellular phones within the targeted area for the alert. See <https://www.psp.pa.gov/amber-alert/Pages/amber-alert.aspx>, accessed August 27, 2021.

Exhibit 56

AMBER and MEPA Alerts Activation Process



Notes:

*/All three criteria must be met for PSP to launch an AMBER alert. Additional information may be considered on a case-by-case basis.

Source: Developed by LBFC staff from information provided by the PSP.

According to PSP, the commonwealth is divided into WEA regions that are used as the locational basis for issuing AMBER alerts. The PSP uses the details of the case (e.g., suspect has access to a vehicle, public transportation, etc.) to determine the regions in which an AMBER alert will be issued. Similarly, if PSP deems that it is possible that the suspect and child could cross state lines, the AMBER alert designee will work with the corresponding agencies of surrounding states to issue an AMBER alert in their jurisdictions.

PSP uses the commonwealth's AMBER alert system strategically. According to officials, the total number of AMBER alerts issued in Pennsylvania typically ranges between five to 15 alerts per year. For our observation period, alerts fell near the lower end of that spectrum, with PSP reporting six alerts in 2019, five in 2020, and seven in 2021. Additionally, since most AMBER alerts are issued regionally, the number of alerts seen by Pennsylvanians in a given year is likely lower than the statewide total. MEPA alerts occur much more frequently, with PSP estimating that approximately 100 of these alerts are issued across Pennsylvania each year.

There are several points of clarification that must be understood when interpreting the statistics on the AMBER alert system. First - and most importantly - the lack of an AMBER alert does not mean that PSP is not actively working to recover the missing child. PSP officials estimated over three quarters of AMBER alert requests per year do not result in the

issuing of an AMBER alert, but a MEPA alert will be issued in almost every circumstance. In these cases, the distinction between AMBER alerts and MEPA alerts is often that clear evidence of a child abduction cannot be established. For example, PSP used the illustrative scenario of a parent that has gone missing with their child. Although a MEPA alert for both individuals can, and likely will, be issued in this case, PSP cannot issue an AMBER alert without evidence that the parent has physically abducted the child (e.g., the parent lost custody of the child, was served notice, and then took the child).

Second, limiting the use of AMBER alerts provides significant value to law enforcement personnel. AMBER alerts are intended for use in the most serious cases pertaining to missing children. If these alerts were issued more frequently, as PSP indicated they can be in other states, then law enforcement runs the risk of the population becoming desensitized to the alerts. However, because AMBER alerts are rare in Pennsylvania, when the public does see an alert, they are more likely to take the notification seriously and spread the relevant information in their communities, which ultimately can assist in locating the child. It is for this reason that PSP strictly adheres to the criteria established for AMBER alerts, rather than issuing alerts for many of the requests received. Additionally, PSP uses this same logic for their regional approach for the issuing of alerts. Instead of issuing all AMBER alerts statewide, PSP restricts alerts to regions where the missing child is most likely to be located.

It does appear that both AMBER and MEPA alerts assist law enforcement in locating missing individuals. PSP expressed that nearly all the missing children from AMBER alerts are located within 24 hours. MEPA alerts have a slightly lower recovery rate, but officials still estimated missing individuals are located in over 90 percent of cases.³⁴⁹ Additionally, PSP expressed that there is no timeline for the closing of AMBER or MEPA alerts, and officials expressed that they believe there is benefit for law enforcement personnel to keep these alerts open until the individual has been recovered.

Recommendations

1. In the next reauthorization of 35 Pa.C.S. Ch. 53, we recommend the General Assembly consider directing PEMA and the 911 Advisory Board to develop standardized data collection procedures for alarms, alert notifications, and other applicable Internet of Things (IoT) devices as part of the statewide MIS solution, with the goal of analyzing the impact these devices have on telecommunicator workload, while

³⁴⁹ It is important to note that recovery rates do not denote the condition of the individual when they are found, although PSP believes that the timeliness in which these recoveries occur increases the odds of law enforcement safely locating these individuals for both MEPA and AMBER alerts.

also determining the viability for adjustment to the VoIP surcharge base.

2. We recommend that PEMA, the 911 Advisory Board, and the counties continue to work towards the adoption of a new 911 Fund distribution formula, using statewide interconnectivity payments to counties as temporary offsets of revenue losses if necessary.
3. In absence of action from the FCC, we recommend the General Assembly explore the establishment of a demarcation point between the commonwealth's 911 authorities and OSPs within the NG911 call delivery environment, including the delineation of costs that are expected from each, as part of the next reauthorization of 35 Pa.C.S. Ch. 53. In addition, such considerations could also take into account future technologies that may not require to be physically connected to other portions of the NG911 system.
4. We recommend that the General Assembly consider directing the Legislative Budget and Finance Committee to perform another review of the commonwealth's 911 system within five years of the reauthorization of 35 Pa.C.S. Ch. 53, with one of the primary objectives being to determine the impact of regionalization and consolidation efforts on the commonwealth's PSAPs within the NG911 environment.
5. The General Assembly should consider strengthening language in 35 Pa.C.S. Ch. 53 §5305 to explicitly require counties to explore efficiencies to be achieved from regionalization and consolidation as part of their 911 plans.
6. With the funding cycles that remain, we recommend that PEMA prioritize grants for consolidation feasibility studies among statewide interconnectivity awards.
7. The General Assembly should consider whether remote dispatch centers should be required to connect to the statewide ESInet as part of the reauthorization of 35 Pa.C.S. Ch. 53.
8. PEMA should continue to develop and maintain training requirements that will maximize situational preparedness in NG911, while also remaining mindful of the staffing constraints experienced by many PSAPs across the commonwealth.
9. We recommend that PEMA and the 911 Advisory Board use their statutory roles as the curators of 911 system and training requirements to further promote the dissemination of mental health and well-being best practices to the PSAPs leading up to and following

the transition to NG911, including the formation of a 911 personnel wellness subcommittee within the Advisory Board.

10. County PSAPs should continue to explore options to leverage NG911 technology to address common issues in the 911 system, especially regarding staffing.

Appendix A – Senate Resolution 96 of 2021

PRINTER'S NO. 680

THE GENERAL ASSEMBLY OF PENNSYLVANIA

SENATE RESOLUTION

No. **96** Session of
2021

INTRODUCED BY STEFANO, MENSCH, BAKER, BROOKS, FONTANA, GORDNER
AND MARTIN, APRIL 27, 2021

REFERRED TO VETERANS AFFAIRS AND EMERGENCY PREPAREDNESS,
APRIL 27, 2021

A RESOLUTION

Directing the Legislative Budget and Finance Committee to
conduct a performance audit on the provision of 911
communications service under 35 Pa.C.S. Ch. 53.

WHEREAS, It is critical to the health and safety of the
residents of this Commonwealth to have a highly functional 911
communications service; and

WHEREAS, A performance audit of 911 communications service in
this Commonwealth is necessary to understand which remedial and
regulatory changes will improve 911 communications service;
therefore be it

RESOLVED, That the Senate direct the Legislative Budget and
Finance Committee to conduct a performance audit on the
provision of 911 communications service under 35 Pa.C.S. Ch. 53;
and be it further

RESOLVED, That the Legislative Budget and Finance Committee,

in conducting the performance audit, have the following duties:

(1) Address the performance of 911 communications service regarding administrative and regulatory activities.

(2) Make recommendations for remedial and regulatory changes to implement 911 communications service for the purposes specified under 35 Pa.C.S. Ch. 53.

(3) Review the annual reports required under this chapter, 35 Pa.C.S. Ch. 53, the legislative report under 35 Pa.C.S. § 5313 and the inventory report under 35 Pa.C.S. § 5314.

(4) Review county public safety answering point operations, including costs, hours of operation, staffing, technologies and equipment, and similar operations in other states.

(5) Make recommendations on the reauthorization of the provisions of 35 Pa.C.S. Ch. 53 regarding revenues, fees, surcharges, funding formulas, incentives for regional cooperation and consolidation, having all 911 calls dispatched from county public safety answering points, the use of the Pennsylvania Amber Alert System and alternative approaches to the collection of fees and surcharges;

and be it further

RESOLVED, That the Pennsylvania Emergency Management Agency make available all records, documents and any other information to the Legislative Budget and Finance Committee that reasonably relates to the conduct of the performance audit; and be it further

RESOLVED, That the Legislative Budget and Finance Committee submit a report on the performance audit to all of the following no later than November 30, 2022:

- (1) The Governor.
- (2) The director of the agency.
- (3) The chair and minority chair of the Veterans Affairs and Emergency Preparedness Committee of the Senate.
- (4) The chair and minority chair of the Veterans Affairs and Emergency Preparedness Committee of the House of Representatives.

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Appendix B – County Classes in Pennsylvania

The following is the list of county class criteria which was set forth by Act 130 of 1955. Please note, the classes listed represent those used during our observation period as outlined in Section I, and do not take into consideration changes which occurred in 2022.

Class	Population	Counties
First Class	1,500,000 or more	Philadelphia
Second Class	800,000 to 1,499,999	Allegheny
Second Class A	500,000 to 799,999	Bucks, Delaware, and Montgomery
Third Class	210,000 to 499,999	Berks, Chester, Cumberland, Dauphin, Erie, Lackawanna, Lancaster, Lehigh, Luzerne, Northampton, Westmoreland, and York
Fourth Class	145,000 to 209,999	Beaver, Butler, Cambria, Centre, Fayette, Franklin, Monroe, Schuylkill, and Washington
Fifth Class	90,000 to 144,999	Adams, Blair, Lawrence, Lebanon, Lycoming, Mercer, and Northumberland
Sixth Class	45,000 to 89,999	Armstrong, Bedford, Bradford, Carbon, Clarion, Clearfield, Clinton, Columbia, Crawford, Elk, Greene, Huntingdon, Indiana, Jefferson, McKean, Mifflin, Perry, Pike, Somerset, Susquehanna, Tioga, Venango, Warren, and Wayne
Seventh Class	20,000 to 44,999	Juniata, Snyder, Union, and Wyoming
Eighth Class	Less than 20,000	Cameron, Forest, Fulton, Montour, Potter, and Sullivan

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Appendix C – History of 911 System in Pennsylvania

Although Pennsylvania did not have a codified statewide 911 system for over two decades, the elements of the system have evolved considerably since its first iteration. The follow sections will detail a legislative history of 911 in Pennsylvania, provide an introduction to the current statutes governing the system, and outline the key players in the present 911 environment.

Legislative History of 911 in Pennsylvania

Prior to 1990, Pennsylvania did not have a statewide emergency services communications system.³⁵⁰ However, since then, there has been a great deal of collaboration among the executive and legislative branches, local governments, private businesses, and stakeholder groups to develop the commonwealth's 911 system. The following section will discuss the progression of Pennsylvania's 911 system from 1990 to 2015, using the key legislative changes as milestones.

Act 78 of 1990. Act 78 of 1990 established "9-1-1" as the emergency services telephone number throughout the commonwealth. Administration at the state level was the responsibility of the Department of Community Affairs (DCA) and technical oversight was provided by the Pennsylvania Emergency Management Agency (PEMA). Although it was now "statewide," Act 78 gave most of the responsibilities in creating the comprehensive 911 system to the counties, establishing a trend of localization that has continued.³⁵¹ Under this system, counties were allowed to collect a monthly fee for 911 services, which could range between \$1 and \$1.50 depending on the class of the county.³⁵² While Act 78 did require several subsequent updates to adapt to the evolving communications environment, the legislation provided a framework for the initial iteration of a statewide 911 system.

Act 58 of 1996. DCA was dissolved by Act 58 in favor of the creation of the Department of Community and Economic Development. Full administrative responsibility for the 911 system in Pennsylvania was transferred from DCA to PEMA.³⁵³

Act 17 of 1998. This act extended the administrative powers and responsibility of PEMA over the 911 system. The legislation also gave additional duties to the Pennsylvania Public Utility Commission, which oversaw the counties' wireline fee rate setting. Finally, this act improved the

³⁵⁰ PEMA, Commonwealth of Pennsylvania Statewide 911 Plan, 2019.

³⁵¹ PEMA, Next Generation 9-1-1 Report and Recommendations, 2017.

³⁵² Act 1990-78, as amended, P.L. 340, No. 78, §2.

³⁵³ PEMA, Next Generation 9-1-1 Report and Recommendations, 2017.

regulation of county 911 plans, training, telephone record access, and quality assurance.³⁵⁴

Act 56 of 2003. Act 56 amended Act 78 of 1990 to allow for the collection of a \$1 per month surcharge on wireless phones. This remittance was to be paid directly to the state Treasury and placed in the Wireless E-911 Emergency Services Fund. Counties, in turn, would apply for this funding through grant projects to enhance their wireless 911 call taking abilities.³⁵⁵

Act 72 of 2008. Act 72 amended Act 78 of 1990 to allow for the creation of a \$1 per month surcharge on VoIP telephones. Unlike the wireless surcharge, the VoIP surcharge could be remitted to either the Treasury or directly to the counties, and it could be paid on either a monthly or a quarterly basis.³⁵⁶

Act 118 of 2010. Act 118 amended Act 78 of 1990 to create a 911 fee for prepaid wireless cell phone services. Different from the other surcharges, which were collected from customers on a monthly billing basis, prepaid wireless phone customers were charged a \$1 fee per transaction. These fees were collected by the Department of Revenue and paid to the Treasury, where it was placed in the Wireless E-911 Fund. The Act also directed our study on the 911 system and fee structures, which was released in 2012.³⁵⁷

State of the 911 in Pennsylvania Prior to 2015

Prior to the passage of Act 12, the 911 system in Pennsylvania was becoming disparate and stagnant. Although the 911 statutes had been updated several times since 1990, the siloed approach that existed for program design, administration, and funding led to many inefficiencies throughout the system.

Over time, Pennsylvania's PSAPs, like the rest of the country, were faced with the challenge of integrating new technologies such as wireless and VoIP calling into legacy systems based on analog wireline architecture (copper lines, selective routers, etc.). While most PSAPs recognized that updates were required, many counties were attempting to pay for such projects independently, which often led to funding-related delays. Interconnectivity with other counties was not often a priority, and as a result each PSAP installed equipment that aligned with their local policies and

³⁵⁴ PEMA, *Commonwealth of Pennsylvania Statewide 911 Plan*, 2019.

³⁵⁵ PEMA, *Next Generation 9-1-1 Report and Recommendations*, 2017.

³⁵⁶ *Ibid.*

³⁵⁷ See <http://lbfc.legis.state.pa.us/Resources/Documents/Reports/430.pdf>, accessed September 2, 2021.

preferences. Even when connectivity may have seemed possible, the preference for locality was often selected.³⁵⁸

While local customization may have been the most logical option at the 911 system's inception, this practice became increasingly unsustainable as hardware upgrades became more expensive and often included more equipment than was needed in rural PSAPs.³⁵⁹ Additionally, many structural expenditures ("brick and mortar" costs) were not eligible for 911 service fee funding, as inclusion would lead to the quick exhaustion of 911 funds. However, this resulted in many PSAPs collocating in local government or private buildings that were not designed to support the rapidly advancing technological needs of the 911 system, which created more difficulties when updates were implemented.³⁶⁰

Administratively, inefficient business processes created burdens for both PEMA and the PSAPs. According to PEMA, PSAPs were required to complete numerous reporting formats for compliance, but little of the information in those reports was used for oversight, planning, or budgeting purposes at the statewide level. Further, most of the data submitted to PEMA came from plans submitted by the PSAPs on a staggered, triennial basis, meaning that two-thirds of the statewide data was outdated in any given year.³⁶¹ Further, there was no way for PEMA to comprehensively assess the technological capabilities of each PSAP, and the agency had little capacity to enforce noncompliance with the county 911 plans or other statewide requirements. Finally, by the mid-2010s, the statewide standards for training of 911 personnel had not been updated in over a decade.³⁶²

Although Pennsylvania was not subject to the extreme revenue volatility and 911 service fee "raiding" for nonrelated purposes that was problematic in other states, the funding system in the commonwealth was in dire need of improvement. As described above, surcharge rates varied between service type and, as was the case with wireline fees, could even be different based on county class.³⁶³ PEMA could set eligibility requirements for the products and services to be used with wireless funding, but they had little oversight for wireline and VoIP revenue, which was submitted on the county level. In short, by 2015, the commonwealth's 911 system needed an overhaul.

³⁵⁸ PEMA, Next Generation 9-1-1 Report and Recommendations, 2017.

³⁵⁹ NASNA, Case Study: Western Pennsylvania County Regional ESInet, 2016.

³⁶⁰ PEMA, Next Generation 9-1-1 Report and Recommendations, 2017.

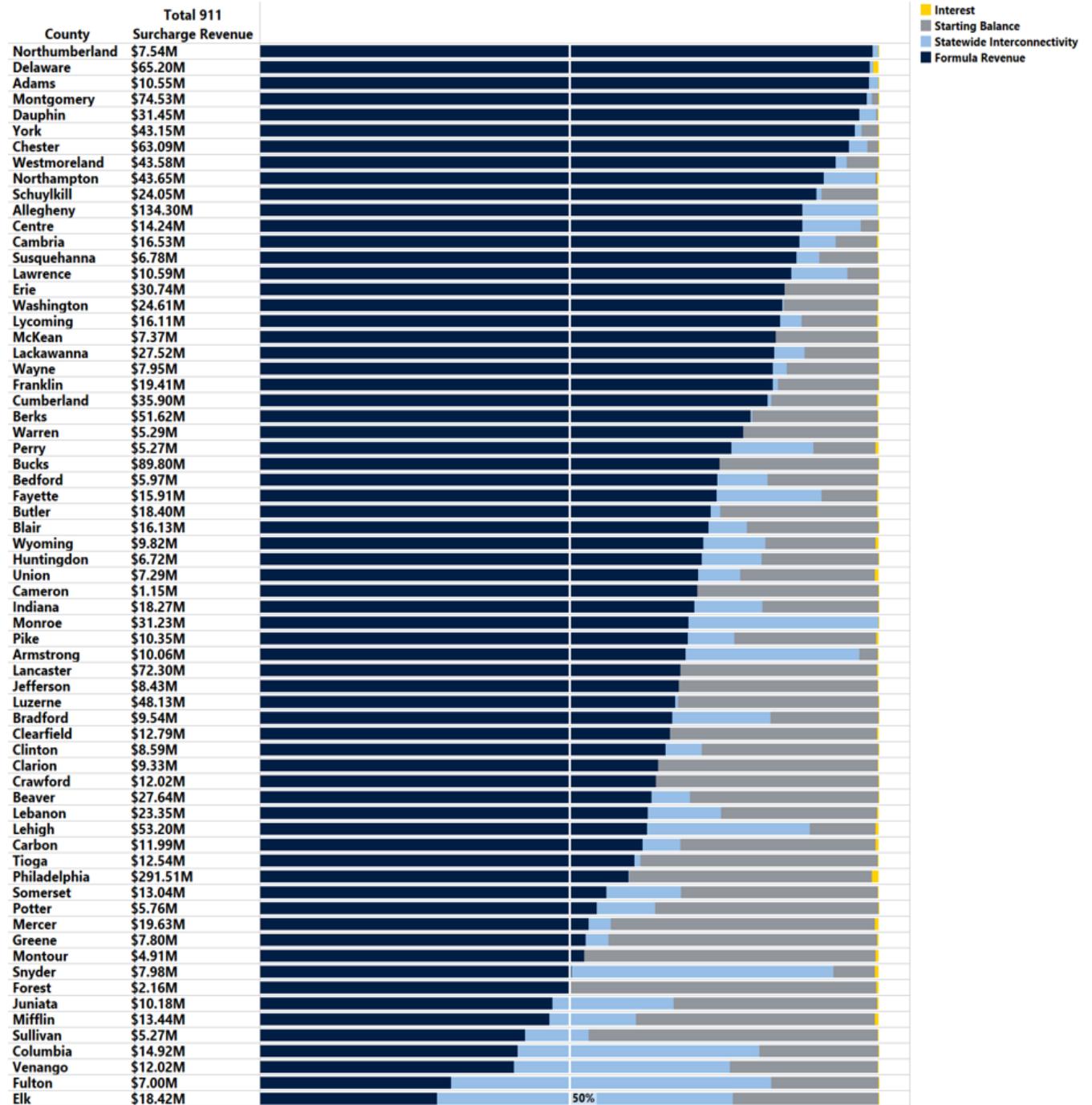
³⁶¹ *Ibid.*

³⁶² *Ibid.*

³⁶³ *Ibid.*

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Appendix D – Average Percentage of Counties’ Total 911 Surcharge Revenue by Category between 2016 and 2020



Source: Developed by LBFC staff from information provided by PEMA.

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Appendix E – NG911 Project Priorities, Milestones, and Next Steps

Priority	Background	Key Milestones	Next Steps
<p>1. Uniform 911 System Requirements</p>	<p>PEMA and the Board are required to create and update yearly uniform 911 system requirements for: administration, technology (legacy and NG911), operations, planning, and training.</p> <p>PEMA was able to develop a framework of requirements that will serve as the foundation for the funding, implementation, and operation of NG911. Costs and timelines were considered to minimize the impact to PSAPs of all sizes.</p>	<p>Administration: In the month between the passing of Act 12 and its implementation, PEMA worked with the Governor’s Office of Budget and State Treasury to establish the new 911 Fund, restricted accounts, remittance processes and financial documentation. PEMA also worked with service providers to educate them on the new Act requirements.</p> <p>In the years that have followed, PEMA has established standardized procedures for financial reporting, funding distribution, and system planning that operate on a calendar year, rather than the state fiscal year.</p> <p>Technology, Operations, and Planning: In September 2021, PEMA and the Board adopted a new framework of minimum requirements for technology, operations, and planning. Upon finalization of the regulatory review, this will be the first standards update since 1991. These requirements adhere to national standards for systems, facilities, call processing, and governance. Additionally, new requirements were made for emerging NG911 fields such as GIS and cybersecurity.</p> <p>Training: New minimum requirements for training, certification, quality assurance (QA)/quality improvement (QI) were adopted by PEMA and the Board in 2019. Upon finalization of the regulatory review, this will be the first standards update since 2000. This new framework is regarded as one of the most comprehensive set of requirements in the country, and will help to provide consistent, high-quality level of 911 service across the commonwealth.</p>	<p>Administration: Use the standardized accounting and reporting procedures to (1) sustain current legacy systems, (2) implement and fund NG911, and (3) invest in future system technologies that will improve operational efficiency.</p> <p>Technology, Operations, and Planning: Repeal and replace the current requirements, and then review the new regulations on an annual basis.</p> <p>Training: Repeal and replace the current requirements, and then review the new regulations on an annual basis.</p>

Priority	Background	Key Milestones	Next Steps
2. County 911 System Plan Process	Act 12 directs the counties to create annual 911 plans that adhere to the requirements developed by PEMA.	PEMA deployed the new 911 System Plan process and reporting tool in February 2022. Once county plans are submitted, this information will support PEMA in the development of yearly planning, budgeting, and statewide coordination.	<p>Initial county system plans are due to PEMA via the new application by September 30, 2022. Counties can then use this information for planning purposes.</p> <p>PEMA will use the information in these plans to assist in (1) allocating statewide interconnectivity funds, (2) maintaining minimum system requirements, and (3) creating benchmarks for NG911 system improvement progress.</p>
3. Statewide GIS Processes for NG911	Replacing legacy call routing datasets, GIS is a foundational requirement of NG911, and is needed to ensure calls are routed to the appropriate PSAP. Counties are required to maintain their own GIS data, including road center lines, address points, PSAP boundaries, provisioning boundaries, and emergency service boundaries, which will all then be integrated into a statewide GIS dataset.	Since 2016, GIS has been a priority for PEMA in the transition to NG911. The agency has worked with stakeholders to create a Statewide NG911 GIS Strategic Plan and minimum system requirements. PEMA has also funded a statewide GIS gap analysis, and has provided the counties with new orthoimagery to help with the development of GIS datasets. This satellite imagery is cost prohibitive, and many counties have been using data from 2008 prior to the start of the project. Additionally, PEMA has deployed spatial interface technology, which will be used to aggregate and check county GIS data. Since 2017, PEMA has also awarded \$11.3 million of statewide interconnectivity funds to the counties for use in GIS related projects.	PEMA plans to work with stakeholders to establish change management procedures, which will be used to help update call routing if a boundary line changes (e.g., boundaries between PSAPs). PEMA has also identified the need for future investment in GIS technology, especially tools for Z-axis (vertical) location (e.g., high rise buildings) and three-dimensional modeling.

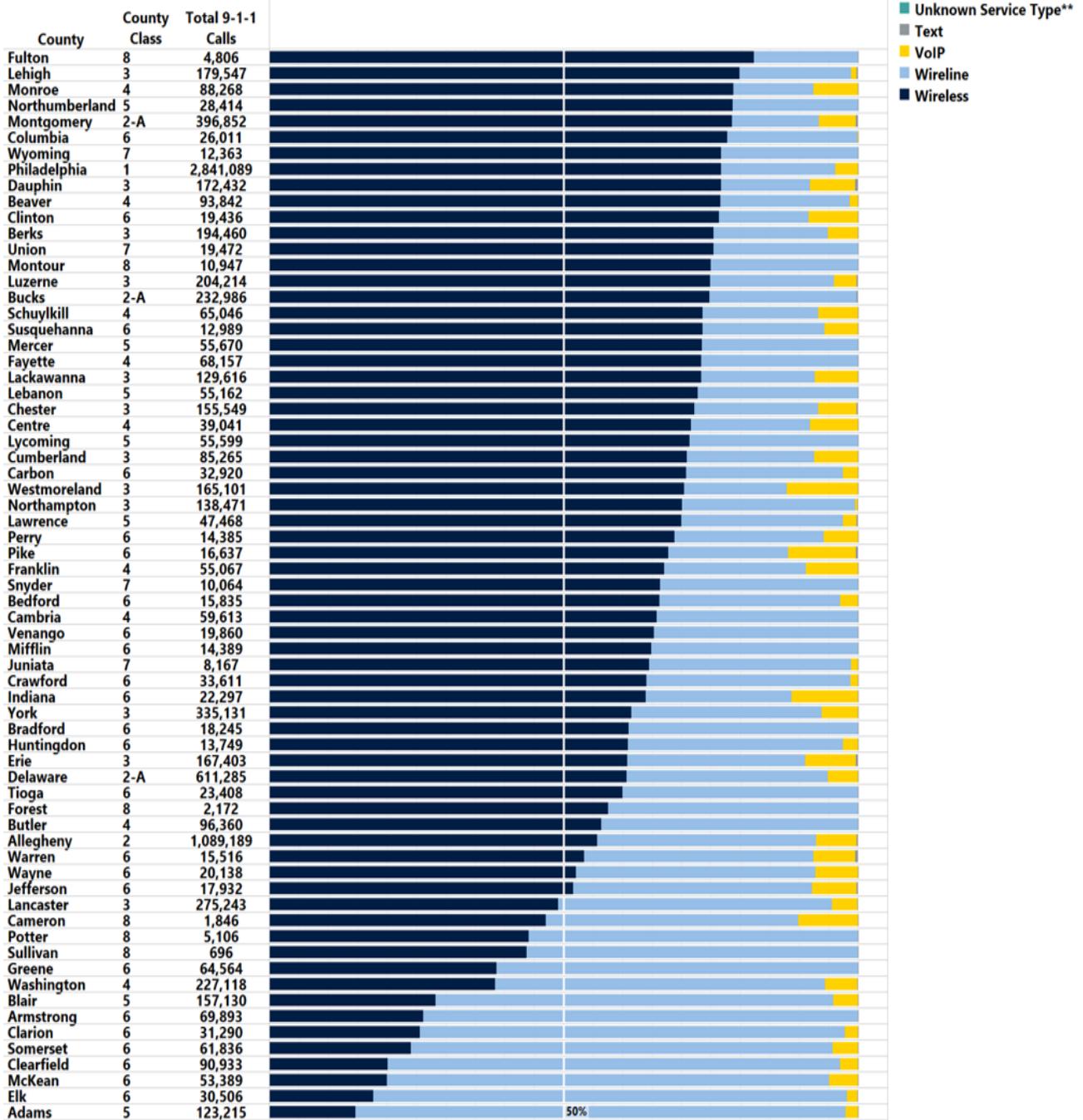
Priority	Background	Key Milestones	Next Steps
4. NG911 Governance	To support the seamless implementation and operation of NG911, governance roles must be established, so that all stakeholders understand their responsibilities in the new system.	PEMA has sent a Letter of Engagement to all PSAPs to confirm their plans to use NG911 services, as well as to set expectations and identify the roles needed to successfully transition to NG911. The letter also formalizes policies and procedures for the NG911 operational environment, including network management, change management, and reporting.	Following the implementation of NG911 phase one (call delivery) PEMA will need to update the governance model to support the addition of new applications, services, functionality, and stakeholders into the system.
5. Sustainable Funding Policies and Procedures for NG911	Although the uniform surcharge has provided a stable revenue source, the 911 Fund has not had sufficient funding to support all 911 system costs in recent years. Further, in this period of transition, funding must be used to simultaneously support the current system and NG911 migration costs as they are defined.	PEMA has taken several steps to date that aim to address 911 system costs. Standardized financial reporting and the new 911 System Planning process will give the agency the insight needed to proactively plan and allocate funding. In 2020, PEMA executed a contract for statewide NG911 services for seven years, with the option for three one-year renewals. This contract has helped to solidify base costs at \$137 million for the first seven years of the NG911 contract, with additional estimated reoccurring costs of \$12.5 million for the full 10 years. Additionally, PEMA has supported county efforts to integrate systems and networks, including four physical PSAP consolidations since 2016 (see Section V).	Following the end of statewide interconnectivity grant process, PEMA plans to budget “15 percent” fund allocations multiple years in advance. Once the ESInet is fully implemented, PEMA plans to explore new cost and operational efficiencies for PSAPs that can be gained in the NG911 environment. The agency has also indicated an interest in pursuing feasible cost control measures for statewide contracts, as well as the continuation of regionalization incentives for PSAPs.
6. Statewide ESInet and NGCS Solution	Under Act 12, PEMA is required to work its county and regional partners to establish statewide interconnectivity of 911 systems, using an IP network and NG911 technology that can coordinate with local, state, and federal services.	The NG911 services contract executed by PEMA in 2020 is the mechanism through which the statewide ESInet and NG911 system will be built. The system will support upgraded 911 call delivery through the ESInet, text-to-911 for all counties, statewide information system, and performance, operations, and security monitoring. A phased implementation of these services began in 2021 (see below).	The phased implementation, including completion of the ESInet, development of GIS and other NGCS, migration off all call traffic, and PSAP training is expected to be finalized in 2023.

Priority	Background	Key Milestones	Next Steps
7. Statewide Call Accounting System	Counties currently collect and report call volume data using a variety of methods and systems. Following the passage of Act 12, PEMA identified the need for a standardize call reporting solution to support statewide analysis and trend identification for key call metrics.	Since 2015, PEMA has been in the process of creating uniform call volume collection and reporting guidelines that can be implemented as part of a statewide management information system (MIS) within the NG911 project. The implementation of the new MIS solution began in April 2022, and 24 counties in the Northern Tier and WestCORE regions currently have access to the tool.	PEMA anticipates the rollout of the MIS solution to occur for the remainder of the state throughout 2022 and 2023.
8. NG911 Public Education and Outreach	For NG911 to be successful, both 911 stakeholders and the public must understand the need for the transition, the benefits of the technology, and the potential challenges facing 911 systems moving forward. It is PEMA's role as the steward of the statewide 911 program to make sure all groups are informed on the NG911 project.	PEMA has hired a Public Safety Education and Outreach Specialist to develop NG911 educational materials. These materials can all be found on a special page on PEMA's website dedicated to NG911. PEMA's specialist also provides monthly status updates to 911 stakeholders.	PEMA has identified the need to continue education for the public on the progress of NG911 throughout its implementation.
9. Support County 911 Telecommunicator Recruitment and Retention Efforts	Staffing is a critical challenge facing 911 systems across Pennsylvania. While the demands placed on telecommunicators are expected to increase within NG911, the new system will present an opportunity for many PSAPs to redesign their organizational policies and structures, hiring practices, and training schedules.	Recently, PEMA launched an education campaign on its social media accounts to inform the public about career opportunities in the 911 industry. The agency also has dedicated space on its website that details the requirements to work in the 911 field and links the necessary contact information for county employment opportunities.	PEMA plans to expand their public awareness campaign with short videos of telecommunicators that will highlight their lives and experiences working the 911 industry.

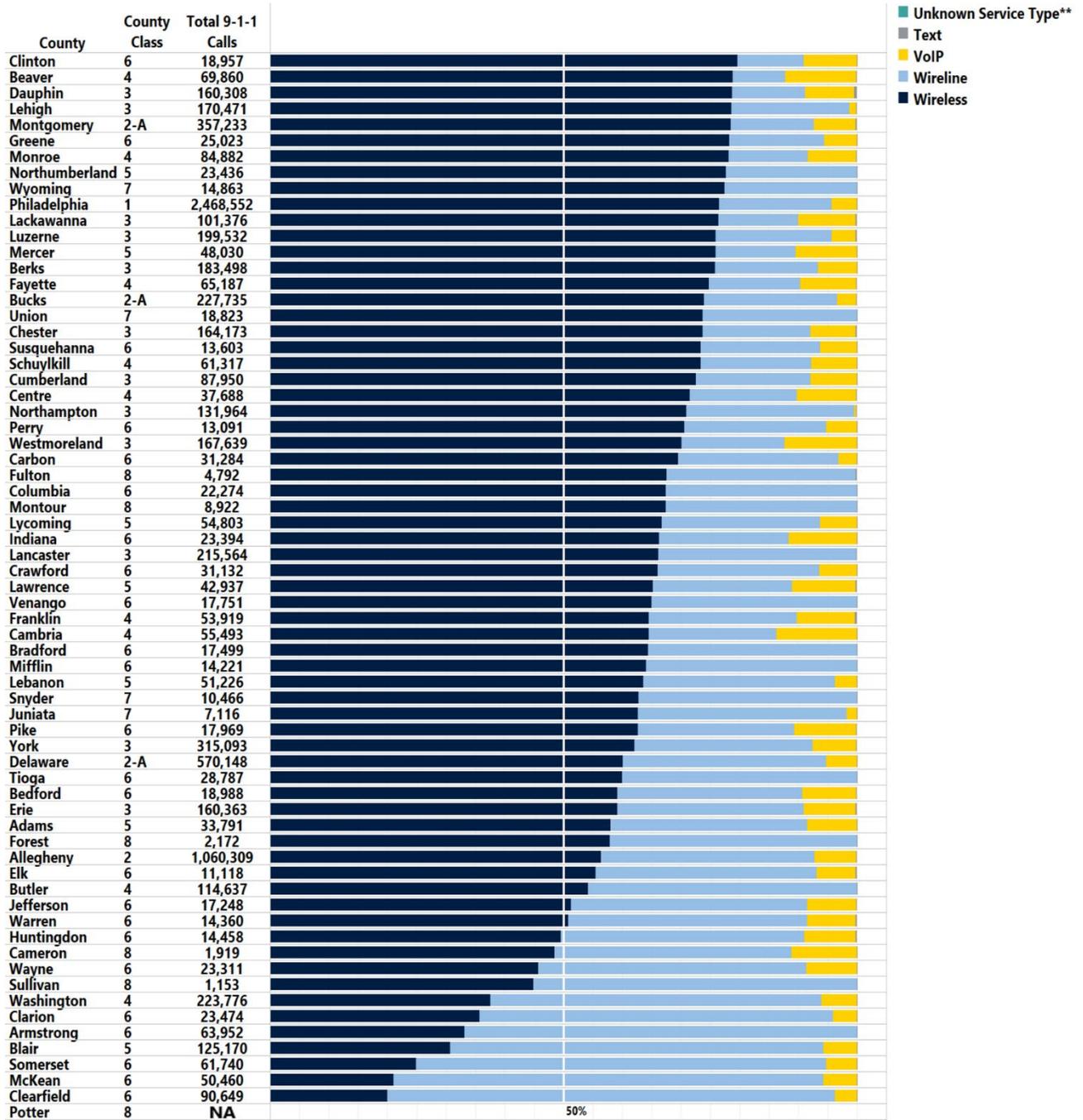
Source: Developed by LBFC staff from information provided by PEMA.

Appendix F – County 911 Calls by Year, 2016 – 2020*

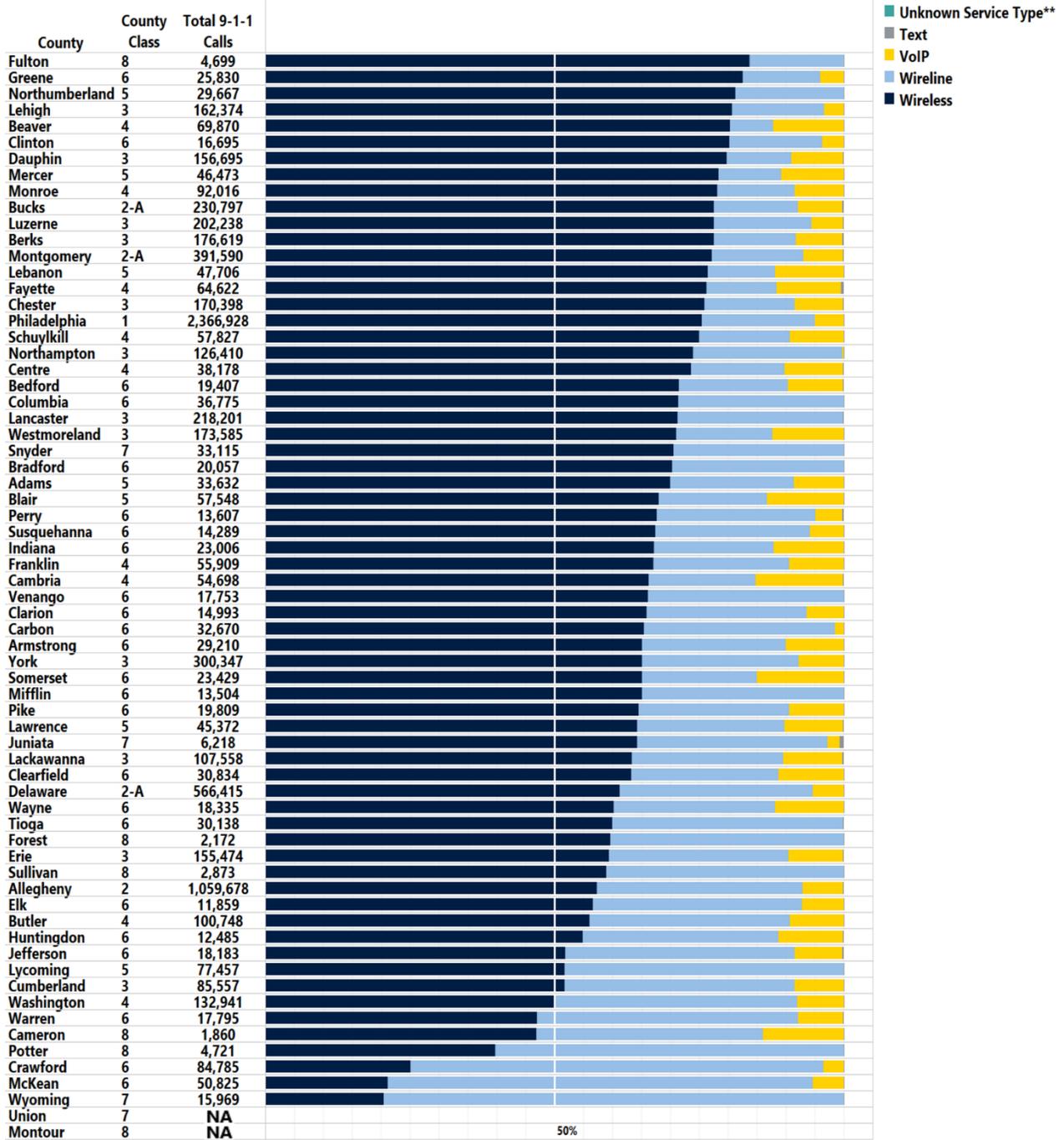
Total 911 Calls by County, 2016



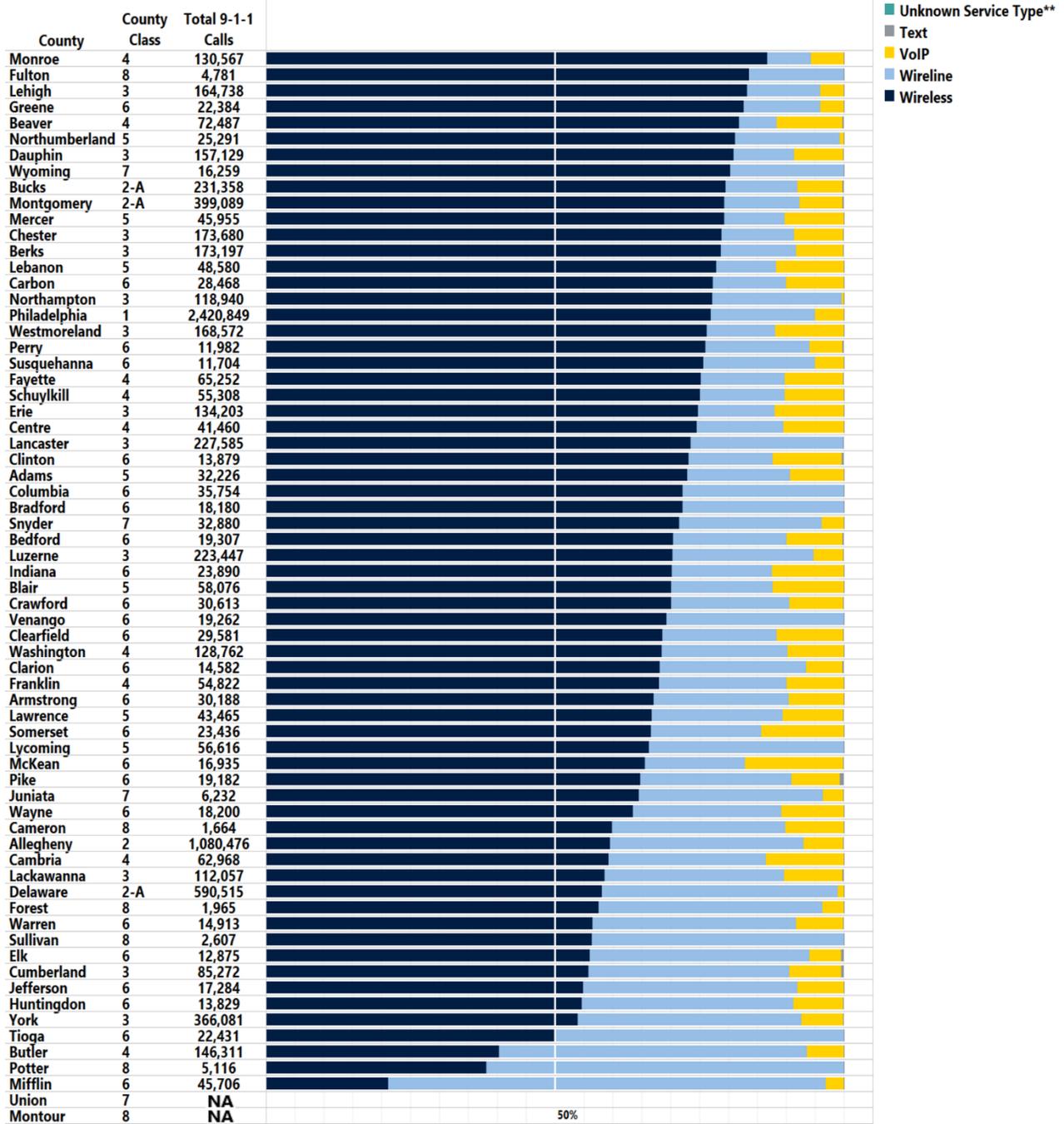
Total 911 Calls by County, 2017



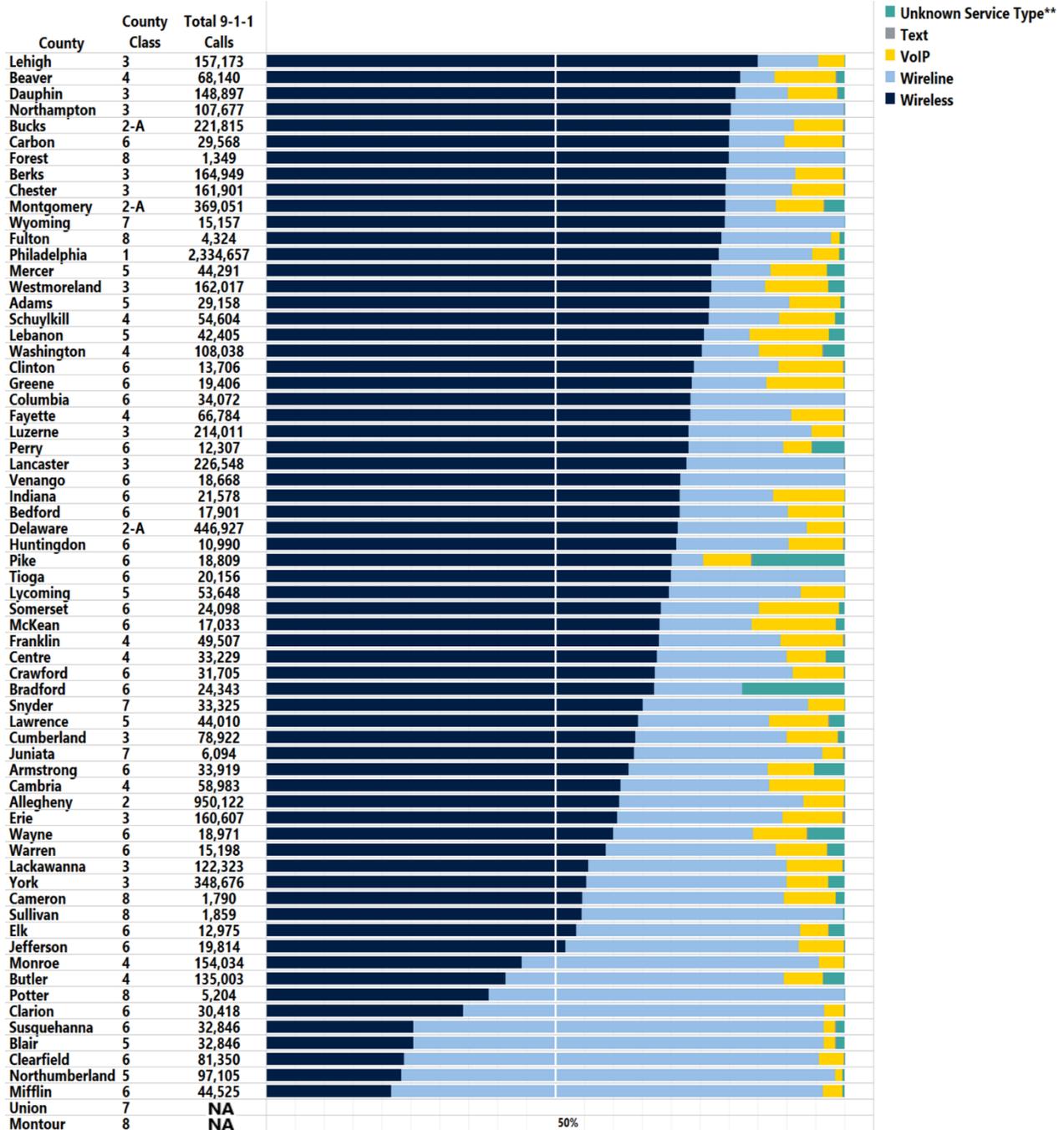
Total 911 Calls by County, 2018



Total 911 Calls by County, 2019



Total 911 Calls by County, 2020



Notes:

*/ Due to consolidations and shared service agreements, individual county data could not be provided in the following instances: Potter County (2017), Montour County (2018 – 2020), and Union County (2018-2020). In addition, LBFC staff combined historical data for the city PSAPs in Allentown and Bethlehem with Lehigh County and Northampton County, respectively, to reflect the consolidations that occurred in 2019.

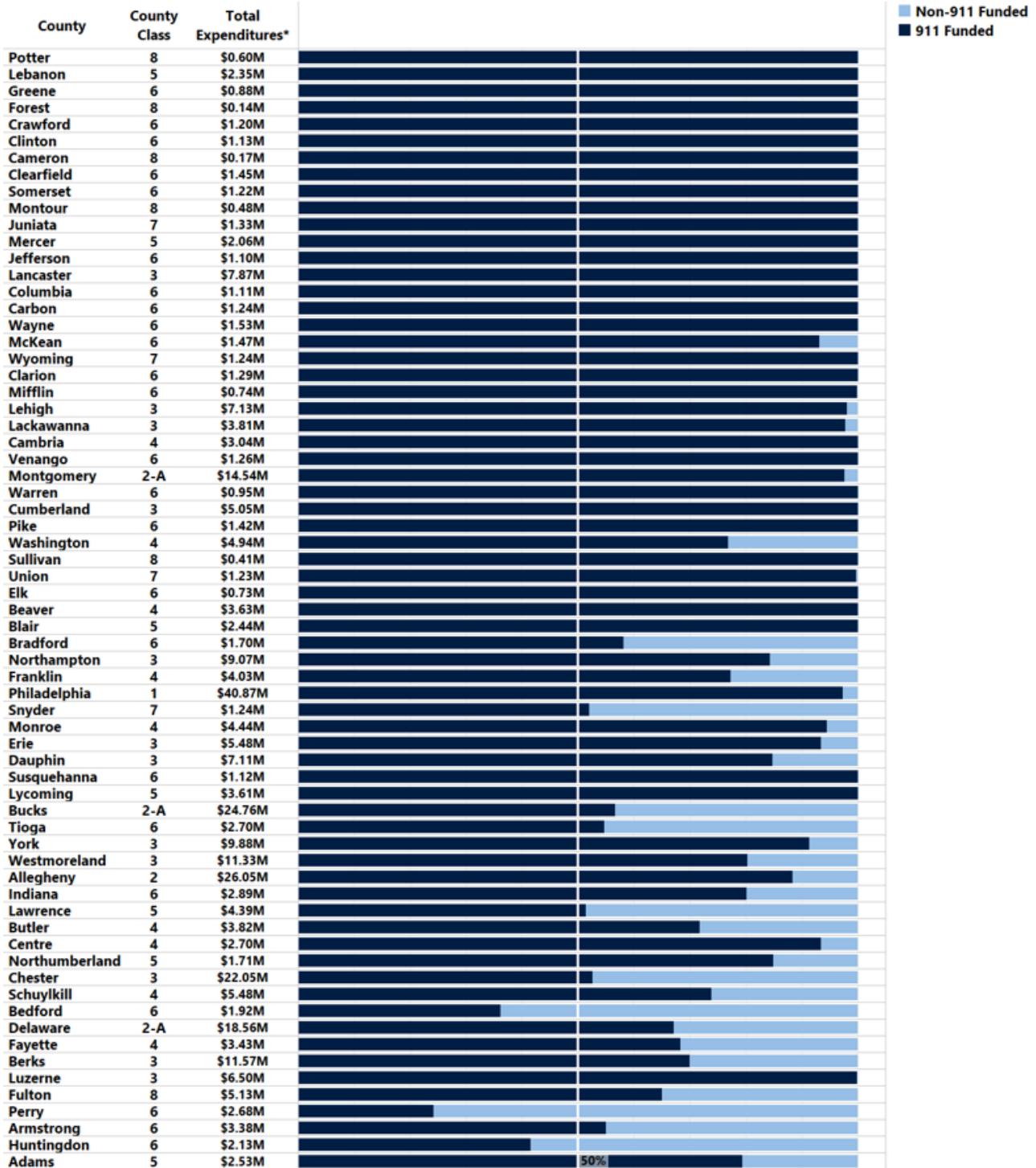
**/PEMA only began to count calls with an unknown service type in 2020.

Source: Developed by LBFC staff from information provided by PEMA.

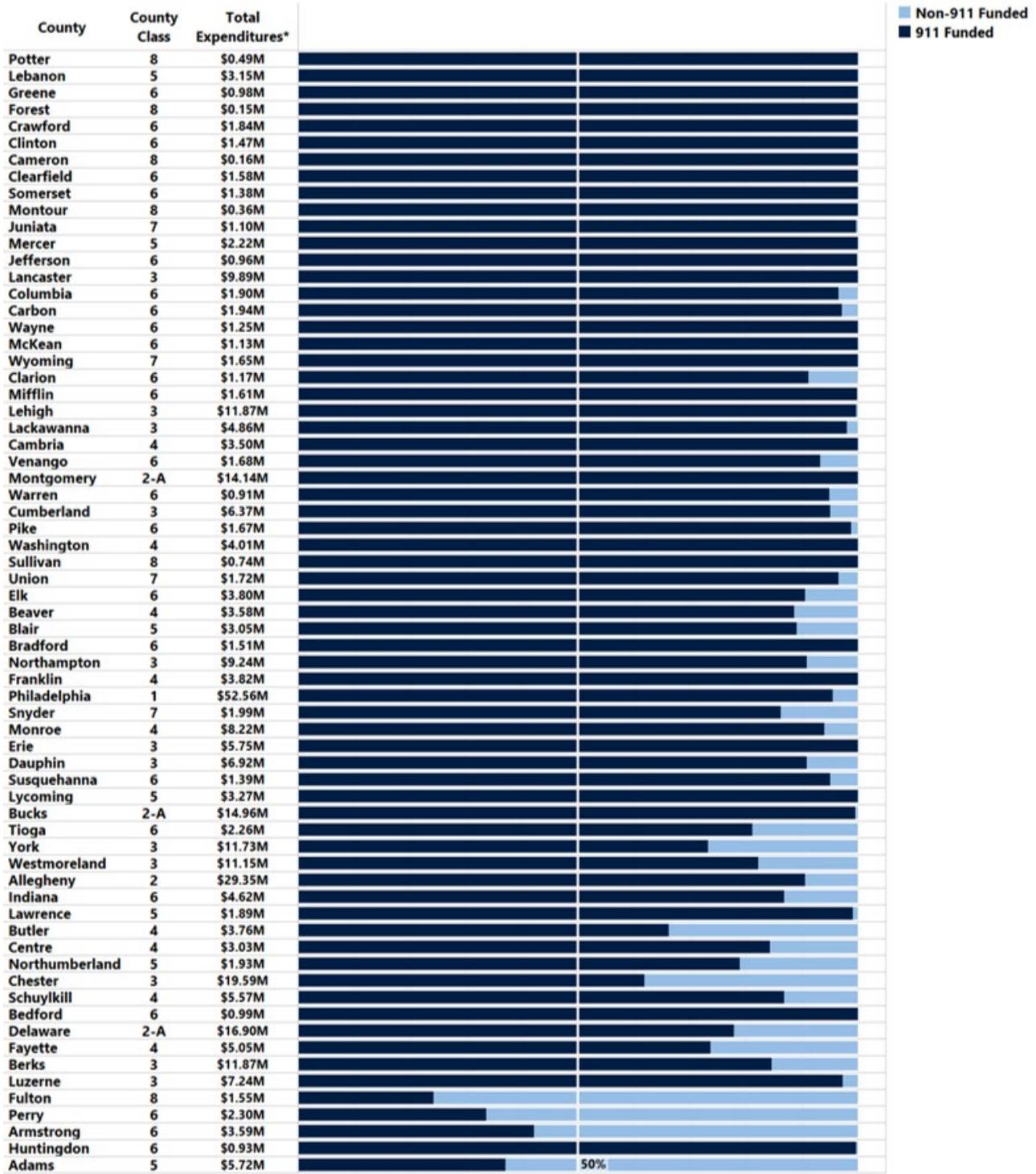
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Appendix G – County Distribution of Total Spending by Year, 2016 – 2020

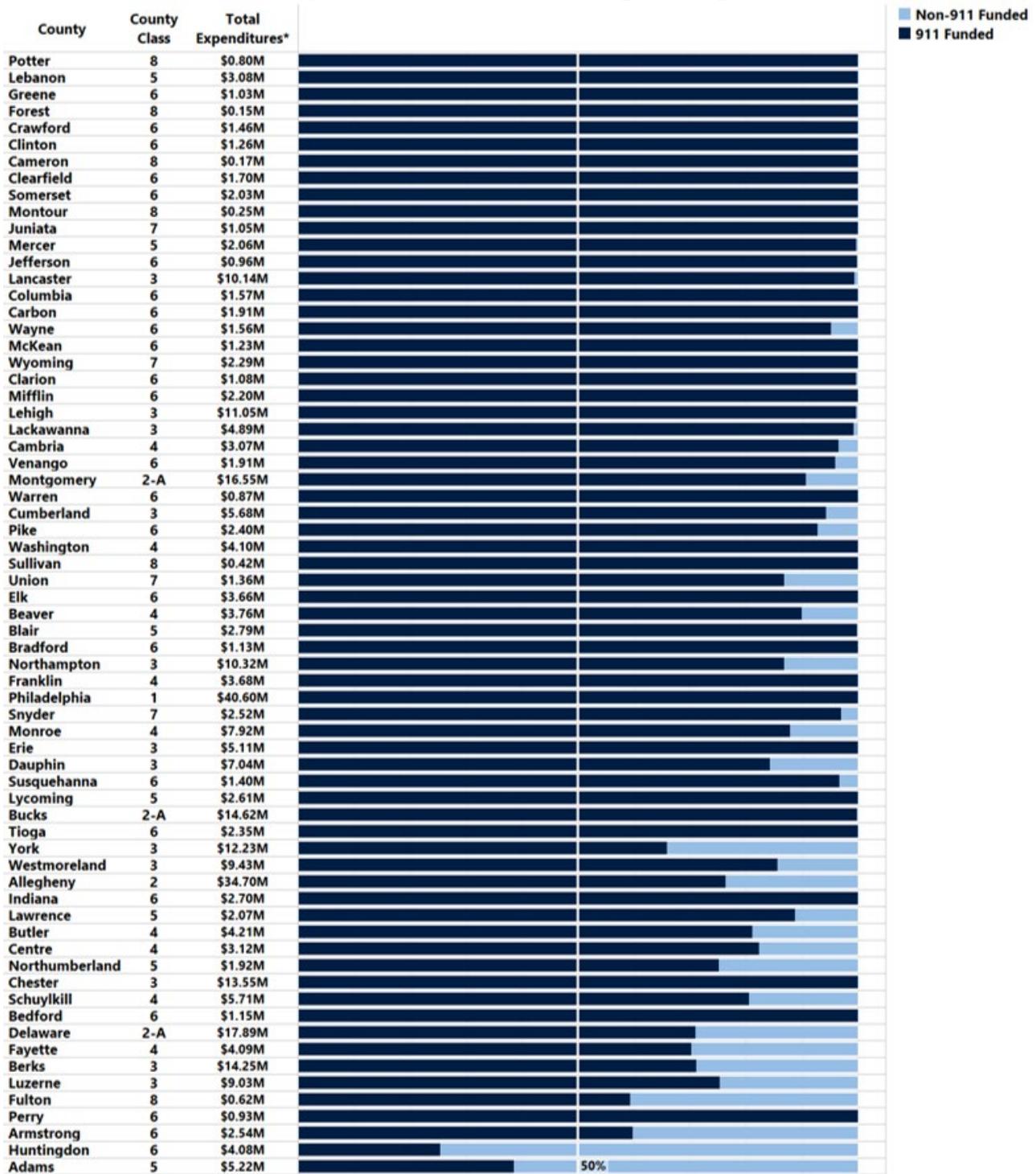
County Distribution of Total Spending, 2016



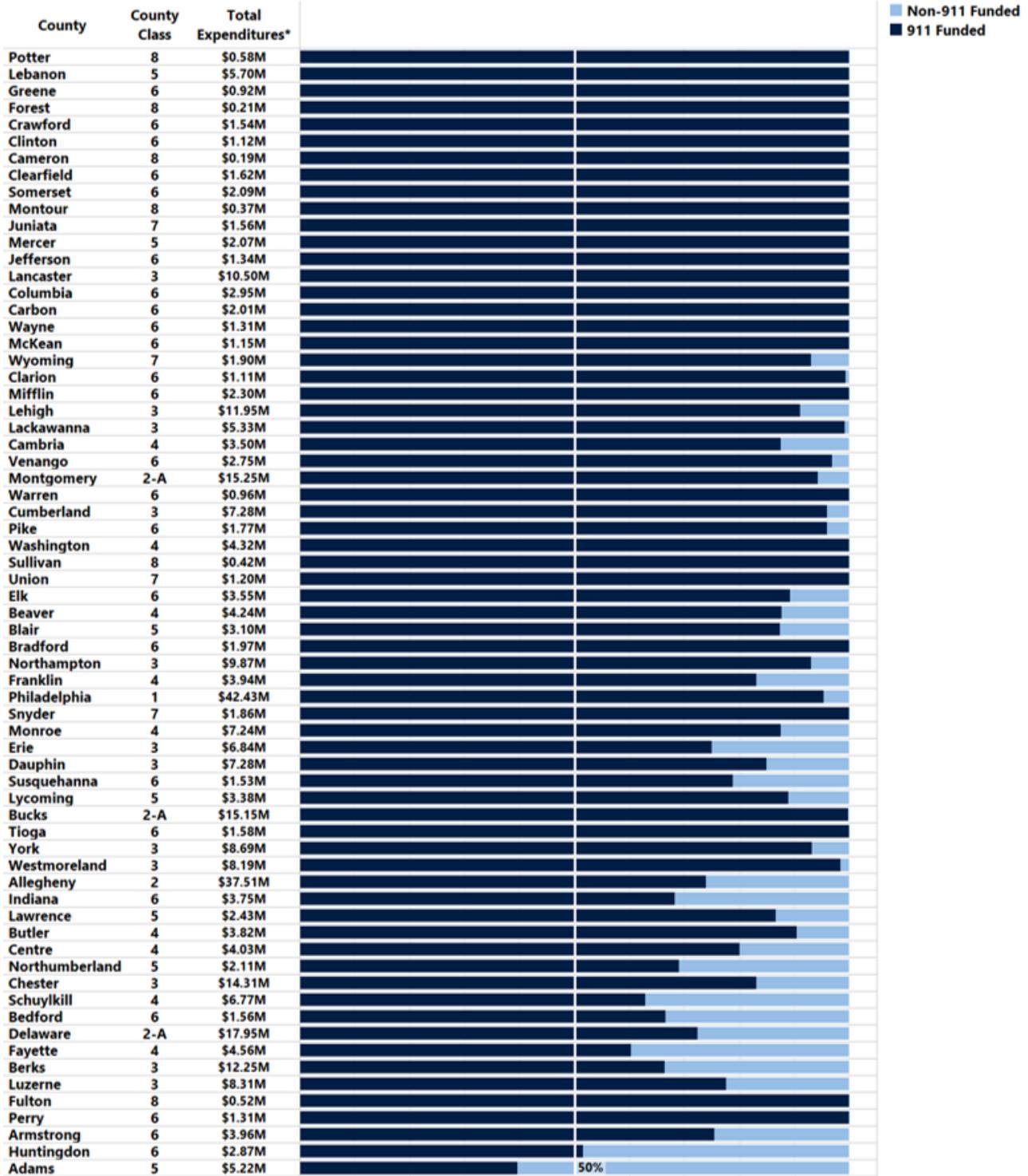
County Distribution of Total Spending, 2017



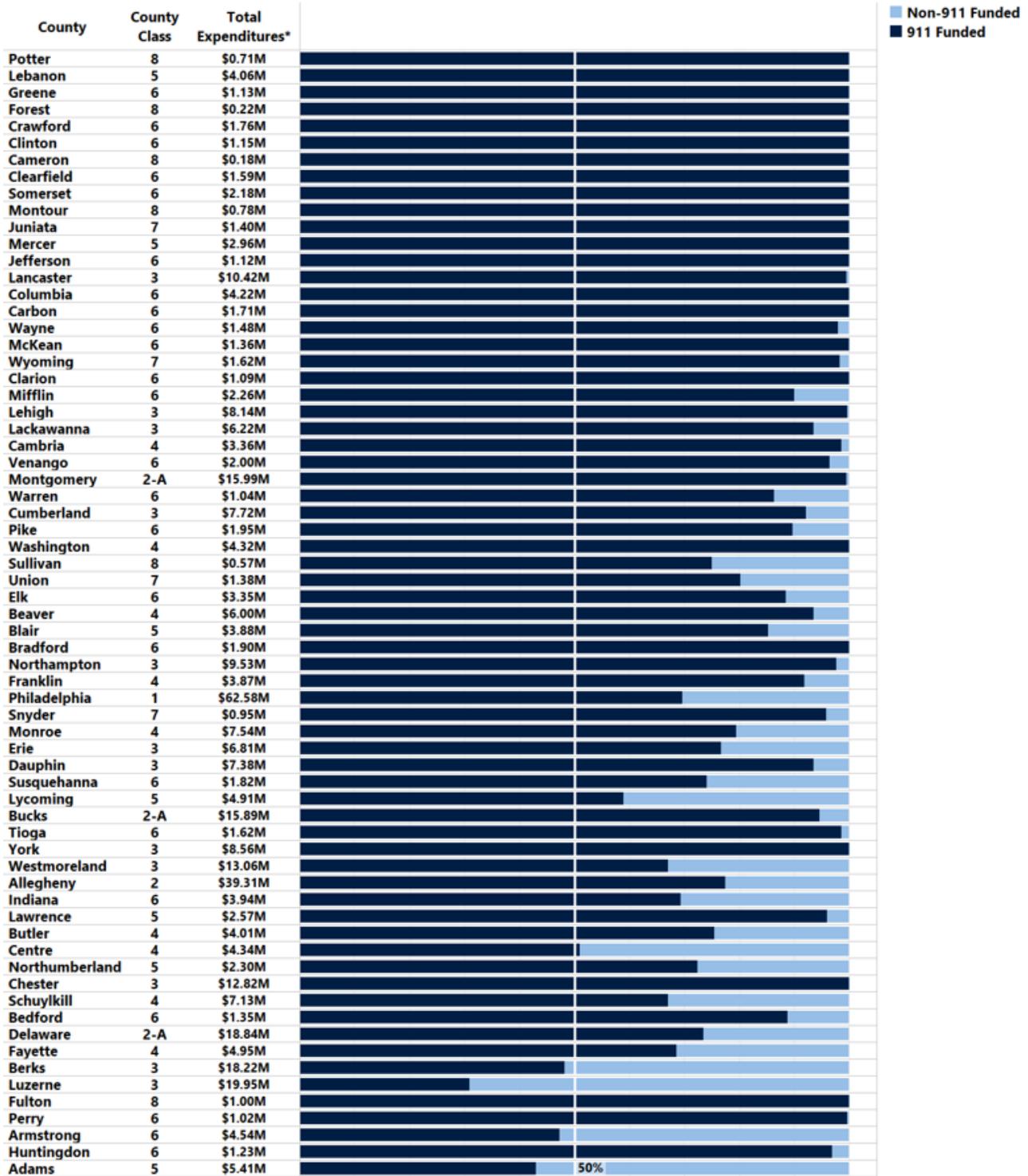
County Distribution of Total Spending, 2018



County Distribution of Total Spending, 2019



County Distribution of Total Spending, 2020



Notes:

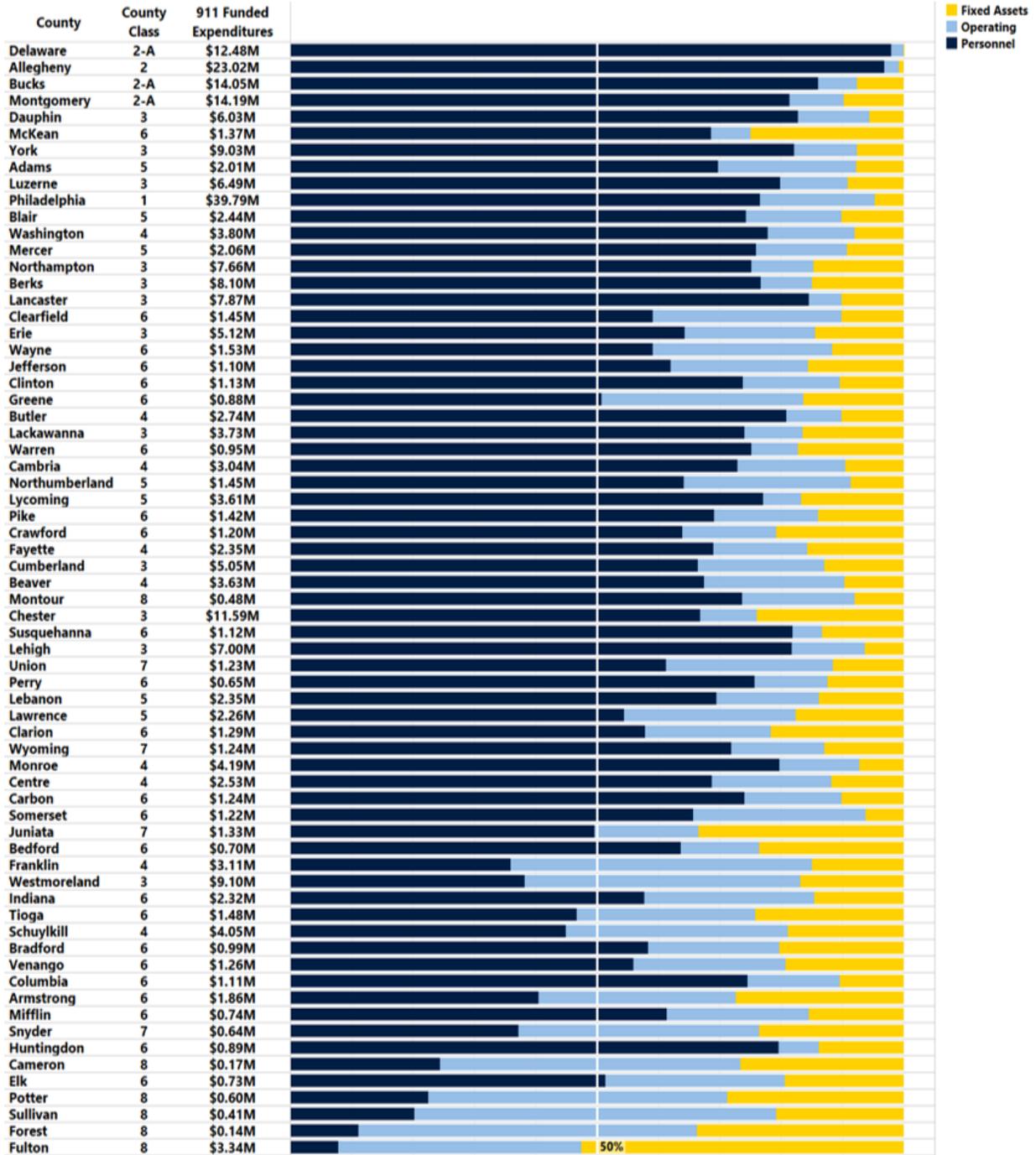
*/Total expenditures represent county 911 spending from all sources, including those not reimbursed by the 911 Fund.

Source: Developed by LBFC staff from information provided by PEMA.

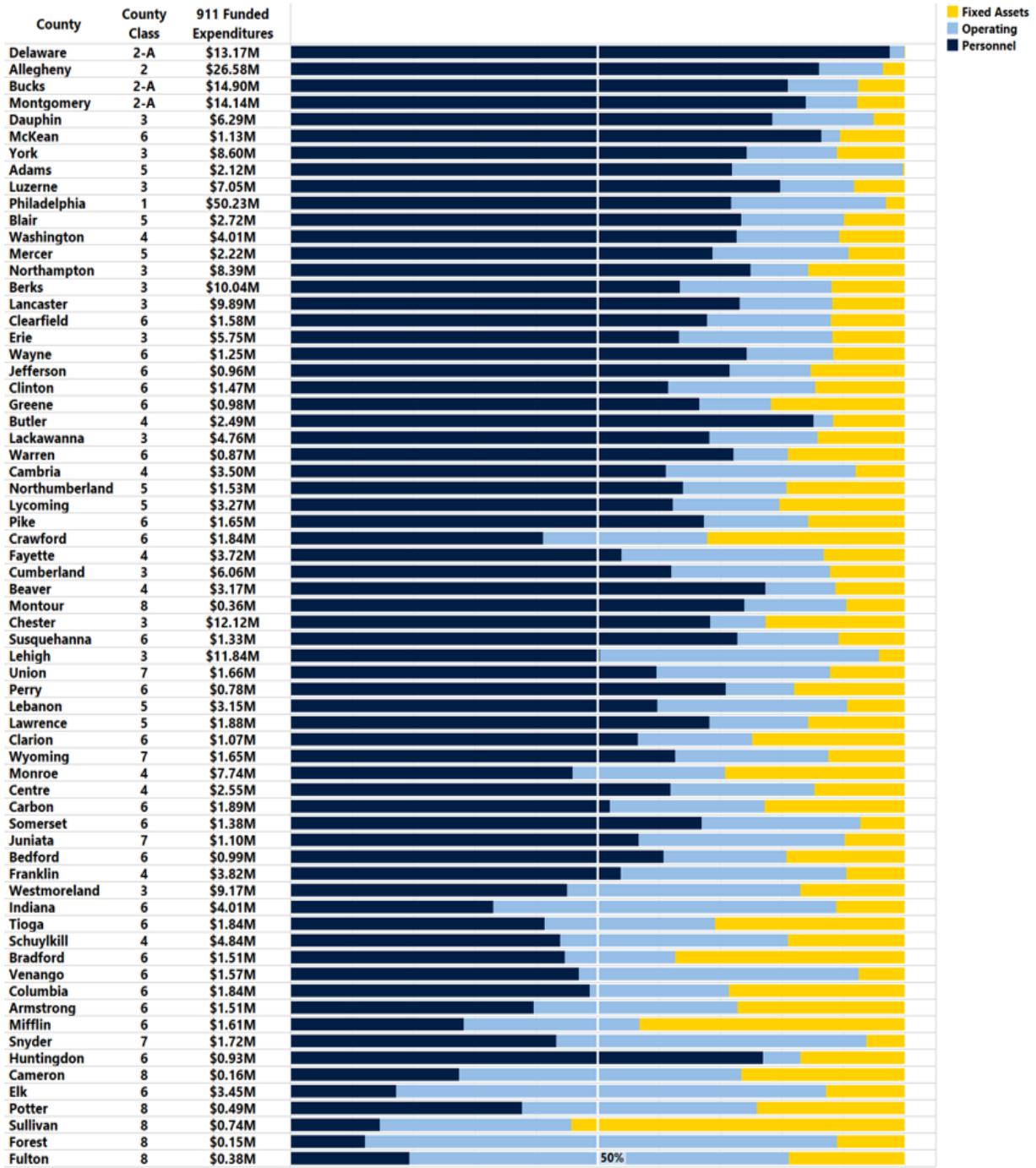
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Appendix H – Annual County 911 Spending by Category, 2016 – 2020

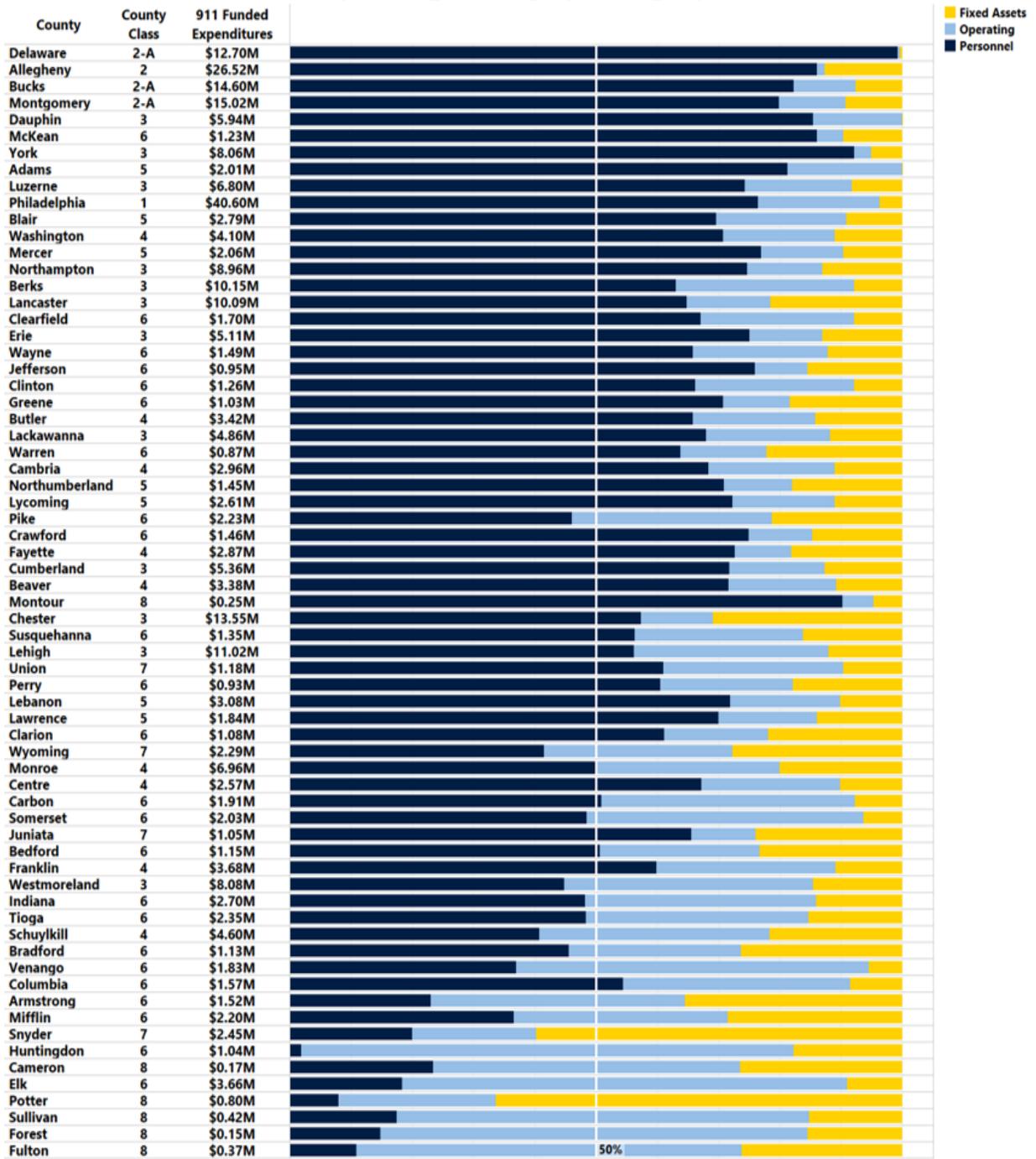
County 911 Spending by Category, 2016



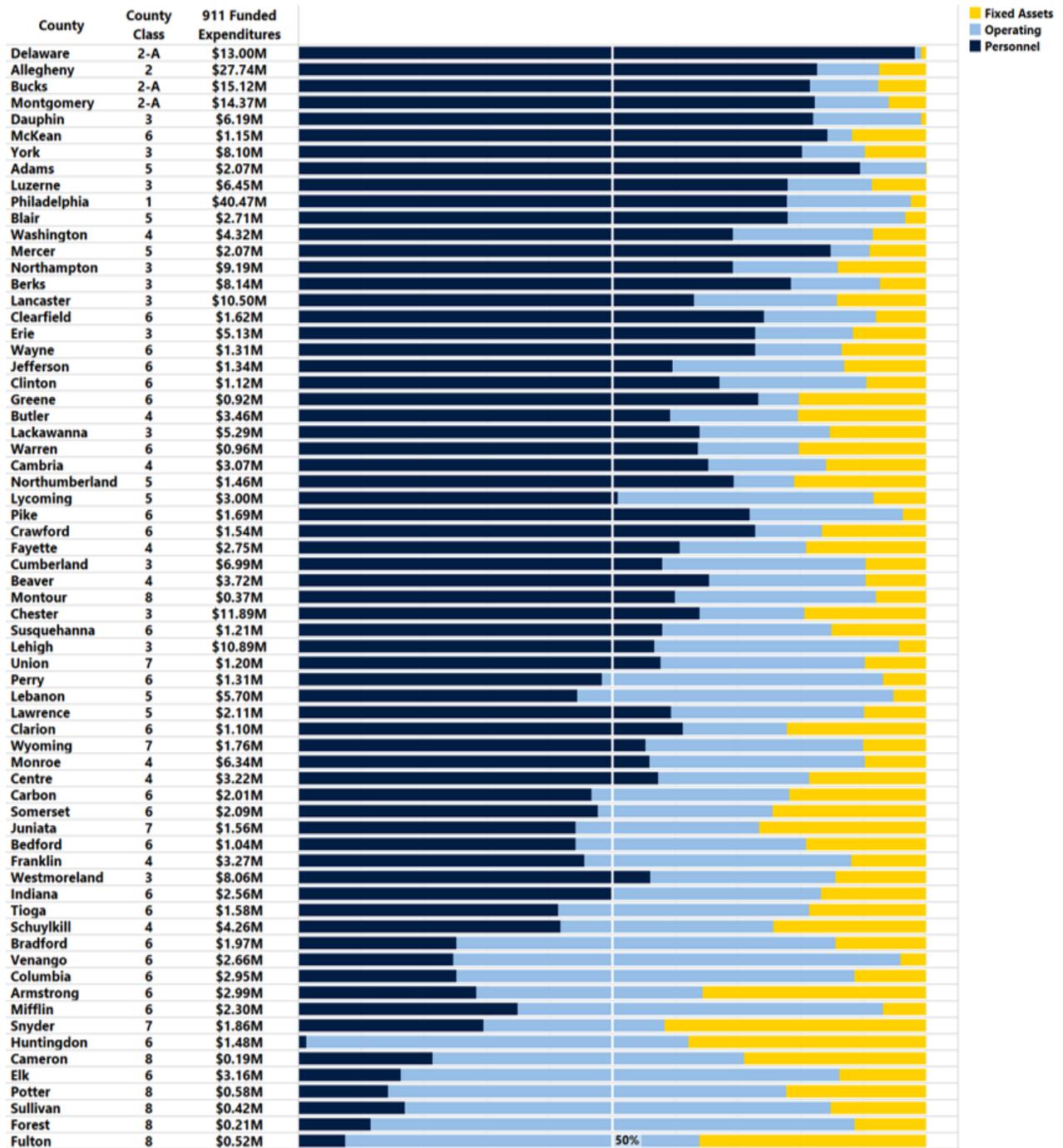
County 911 Spending by Category, 2017



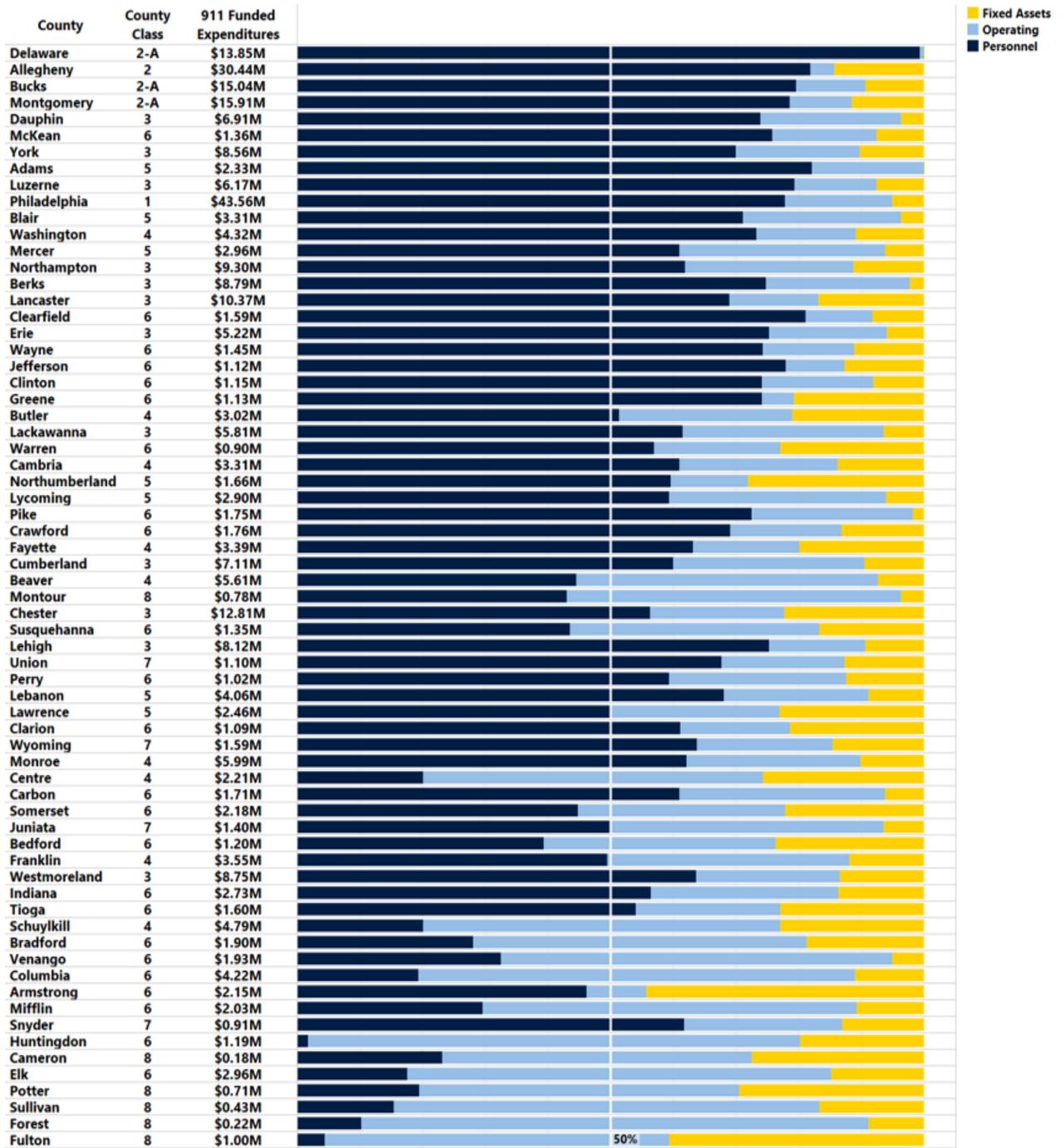
County 911 Spending by Category, 2018



County 911 Spending by Category, 2019



County 911 Spending by Category, 2020



Source: Developed by LBFC staff from information provided by PEMA.

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Appendix I – PEMA’s Response



August 15, 2022

Ms. Patricia A. Berger, J.D.
Executive Director
Legislative Budget and Finance Committee
Room 400, Finance Building
Harrisburg, Pennsylvania 17105-8737

Dear Ms. Berger:

On behalf of the Pennsylvania Emergency Management Agency (PEMA), I would like to thank the Legislative Budget and Finance Committee (LBFC) for their thorough and professional performance audit of Pennsylvania’s 911 system. PEMA appreciates the opportunity to review and provide comment on the resulting report which demonstrates a comprehensive review of Pennsylvania’s 911 system. The report recognizes many notable accomplishments of the Pennsylvania 911 community since the passage of Act 12 of 2015 (Act 12), identifies key challenges PEMA and the 911 community will face in a next generation 911 (NG911) environment, and offers recommendations on the reauthorization of the 911 Communications Service provisions under 35 Pa. C.S. Ch. 53. This letter addresses the LBFC’s recommendations directed to PEMA, the 911 Advisory Board, or the county PSAPs and provides PEMA’s comments regarding the report.

Overall, a critical point to emphasize is that 911 fee structures, eligibility rules, and financial reporting processes vary by state. These differences often make a standard comparison of 911 activity between states difficult to achieve. While 911 telecommunicators, 911 phone systems, public safety answering point (PSAP) facilities, computer aided dispatch systems, and radio systems are all critical parts of 911 service, the method for how each state funds and reports costs for these items will differ across the country. To provide one example, 911 telecommunicator salaries are an eligible use of 911 fees in Pennsylvania but are not in California, North Carolina, and many parts of Texas. Pennsylvania has implemented standardized financial reporting processes that require all costs for 911 service, regardless of funding source, be included in annual financial reports. Other states may have less inclusive financial reporting processes or more restrictive eligibility rules to meet their particular circumstances. As a result of these differences, 911 surcharge fee rates and reported costs may appear less in those states when compared to Pennsylvania even though states incur the same types of costs to provide 911 service. Pennsylvania has a consolidated 911 system in terms of the number of PSAPs when compared to other states. If financial reporting processes were standardized across the country, PEMA anticipates costs reported for states of comparable size would be similar to or exceed the cost of 911 service in Pennsylvania. For example, the cost of providing 911 service in New York State was over \$1 billion in 2020 compared to \$415 million in Pennsylvania.

Office of the Director
1310 Elmerton Avenue | Harrisburg, PA 17110 | 800-Hbg-PEMA | www.pema.pa.gov

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Recommendations directed to PEMA, the 911 Advisory Board, or the county PSAPs:

- 1. PEMA and the county PSAPs should continue to monitor the demand for telecommunicators especially as telecommunicators leave the workforce.**

PEMA agrees with this recommendation. 911 telecommunicator recruitment and retention is a critical issue facing 911 service in Pennsylvania and across the country. Key issues impacting recruitment and retention efforts are well documented within the report. Pennsylvania's 911 community expects it will take a variety of strategies in areas such as funding, technology, public recognition, and operations along with engagement from a variety of stakeholders including PEMA, county 911 professionals, elected officials, and other 911 system stakeholders to help address recruitment and retention concerns within Pennsylvania's 911 centers.

- 2. PEMA should continue to be a leader in workforce development for PSAPs and should foster discussions on best practices in hiring and retaining telecommunicator staff.**

PEMA agrees with this recommendation. PEMA looks forward to expanding the #IAM911 campaign to promote the 911 industry, tools for recruitment, and to support county staff retention efforts. Discussions to document best practices for recruitment and retention from within and outside of Pennsylvania are already underway.

- 3. PEMA should advise the PSAPs on the critical skills that will be required of new telecommunicator hires across the state. This guidance can be carried out primarily through establishing annual training and certification standards for PSAPs and telecommunicators. PSAPs should ensure that their job descriptions adhere to these standards.**

PEMA agrees with this recommendation. PEMA works closely with the 911 Advisory Board and Operations Subcommittee to maintain Pennsylvania's minimum training, certification, and quality assurance/quality improvements standards for 911 service. The advice and recommendations of the Board and subcommittee have been instrumental in these efforts. PEMA looks forward to continued collaboration with the Board to evaluate these standards annually to maintain a current set of critical skills required for 911 telecommunicators as NG911 service is implemented in Pennsylvania.

- 4. PEMA and the counties should build upon the framework set by the Act and continue to incentivize cost sharing opportunities, especially in the areas of personnel and equipment.**

PEMA agrees with this recommendation. PEMA, the 911 Advisory Board, and our county partners have successfully managed statewide interconnectivity funding to address 911 center needs, invest in 911 system improvements, and incentivize efficiencies while maintaining the

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ability to fund the largest technological upgrade in the history of Pennsylvania's 911 system with the implementation of NG911 for 911 call delivery. PEMA is dedicated to continued planning and coordination of statewide interconnectivity funds with the 911 Advisory Board and counties to support Pennsylvania's NG911 system, cost sharing opportunities, and 911 system improvements.

- 5. We recommend that PEMA, the 911 Advisory Board, and the counties continue to work towards the adoption of a new 911 Fund distribution formula, using statewide interconnectivity payments to counties as temporary offsets of revenue losses if necessary.**

PEMA generally agrees with this recommendation and emphasizes "temporary offsets". The concerns with the current distribution formula and efforts to address these concerns are well documented in the report. It is encouraging the LBFC developed the same recommendation as the 911 Advisory Board Funding Subcommittee which was to implement a formula with population as the main consideration. However, the use of statewide interconnectivity funds to offset revenue losses should be viewed as a temporary solution. The infrastructure upgrade to NG911 has added significant costs to the statewide interconnectivity funding stream beginning in 2021. Long-term use of statewide interconnectivity funds to offset revenue losses will impact PEMA's ability to use these funds to invest in NG911 system improvements, cost sharing opportunities, and future technologies.

- 6. With the funding cycles that remain, we recommend that PEMA prioritize grants for consolidation feasibility studies among statewide interconnectivity awards.**

PEMA agrees with this recommendation. PEMA has supported county consolidation efforts with statewide interconnectivity funding since the passage of Act 12. Statewide interconnectivity funds have been used to support the consolidation of four PSAPs into other existing PSAPs since 2016. Consolidation feasibility studies continue to be a priority of the annual statewide interconnectivity funding process. PEMA will continue to support counties with their consolidation efforts contingent upon available funding.

- 7. PEMA should continue to develop and maintain training requirements that will maximize situational preparedness in NG911, while also remaining mindful of the staffing constraints experienced by many PSAPs across the commonwealth.**

PEMA agrees with this recommendation. With numerous emerging applications and technologies entering the public safety community, careful consideration must be made when adopting them to determine the operational, technical, and financial implications of integrating these features into the Commonwealth's NG911 system. As NG911 is implemented across the country and additional forms of communication are introduced to the 911 system, Pennsylvania PSAPs will need to rethink their organizational structures, hiring practices, training regimens and

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policies. This is to ensure PSAPs can triage the significant increase in data generated by citizens and a plethora of communications systems to determine what data is actionable, and ultimately identify the appropriate response. PEMA is focused on continuing efforts to work with the 911 Advisory Board to plan, coordinate, and manage improvements to the NG911 system. The impact of NG911 system improvements on training requirements and PSAP staffing will be considered as part of these efforts.

- 8. We recommend that PEMA and the 911 Advisory Board use their statutory roles as the curators of the 911 system and training requirements to further promote the dissemination of mental health and well-being best practices to the PSAPs leading up to and following the transition to NG911, including the formation of a 911 personnel wellness subcommittee within the Advisory Board.**

PEMA agrees with this recommendation. The report effectively captures the significance of mental health in 911 service. PEMA currently works with the 911 Advisory Board and Operations Subcommittee to evaluate and publish training standards and best practices annually. PEMA is committed to ensuring mental health is considered in training standards and best practice efforts, and will work with the 911 Advisory Board to further promote the dissemination of mental health and well-being best practices to the PSAPs.

- 9. County PSAPs should continue to explore options to leverage NG911 technology to address common issues in the 911 system, especially regarding staffing.**

PEMA agrees with this recommendation. Implementing NG911 in Pennsylvania provides both an opportunity and a challenge. The opportunity is to greatly enhance the capabilities of the 911 system to meet the public's needs and expectations and provide equal access to emergency services for at-risk communities such as the deaf and hard of hearing. The challenge will be to ensure financial resources are available to sustain current 911 systems, operate and improve NG911 systems, and maintain our ability to invest in future technologies and efficiencies.

PEMA is focused on working with stakeholders to identify areas related to 911 within a maturing statewide approach that would be technically, operationally, financially, and programmatically beneficial to the citizens, visitors and first responders of Pennsylvania.

The passage of Act 12 was a significant legislative accomplishment for Governor Wolf and the Pennsylvania General Assembly. It increased the capabilities of the 911 system and facilitated the implementation of NG911 in Pennsylvania. PEMA, our county partners, the 911 Advisory Board, and 911 system stakeholders have built a collaborative relationship as a result of Act 12, and continue to implement many 911 system enhancements. Together, we are prepared to usher Pennsylvania into a new emergency communications era with the continued support of the General Assembly.

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Thank you for the opportunity to comment on the report. Should you have any further questions, please contact Jeffrey Boyle, Deputy Director for 911 at 717-651-2218 or jefboyle@pa.gov.

Sincerely,



David R. Padfield
Director, PA Emergency Management Agency

