



pennsylvania
EMERGENCY MANAGEMENT AGENCY

Commonwealth of Pennsylvania

Statewide 9-1-1 Plan

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MissionCriticalPartners

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EXECUTIVE SUMMARY

The Commonwealth's 9-1-1 community is at a technological crossroads. The solutions implemented in the 1990s, while still capable, have been eclipsed by newer, more efficient public safety solutions that must be adopted in Pennsylvania. The Pennsylvania Emergency Management Agency (PEMA) stands ready to usher Pennsylvania into a new emergency communications era and, in collaboration with our public safety answering point (PSAP) partners, ensure that the future of 9-1-1 in the Commonwealth is strong for our generation and those to come. A significant step in that direction is the creation of this Statewide 9-1-1 Strategic Plan.

In 2015, the State of Pennsylvania legislature passed Act 12, which amended PA Title 35, Chapter 53, 9-1-1 Emergency Communications Services. The legislation allows for substantial measures to be taken regarding:

- Technology
- Governance
- Instituting Efficiencies and Reforms
- Funding and Distribution of Funds
- PSAP Inventorying and Assessment of Current Capabilities

Act 12 makes it possible to enhance emergency communications throughout the Commonwealth, which will result in the implementation of advanced technology to emergency services statewide, and to enable public safety professionals to perform their critical role more effectively and efficiently. At the core of the technology evolution will be a Commonwealth-wide migration from legacy 9-1-1 systems to Next Generation 9-1-1 (NG9-1-1) technology, which will make it possible for citizens to communicate with PSAPs via text, video and images, in addition to traditional voice. The anticipated end result will be a 9-1-1 system that provides citizens with unparalleled capabilities to contact emergency services through a variety of communications devices, at any time and from any place within the Commonwealth.

Work to enhance 9-1-1 already has begun, with PEMA conducting a comprehensive inventory of the Commonwealth's PSAPs. The inventory revealed that, in general, our PSAPs are using outdated equipment or systems that cannot be transitioned to the NG9-1-1 platform without potentially costly software upgrades or complete replacement of some core systems, including customer premises equipment (CPE), computer-aided dispatch (CAD) systems and network infrastructure.

There is much work still to do. PEMA developed this statewide plan to express its vision for revitalizing Pennsylvania's emergency communications system and to provide direction. This document identifies both near- and long-term objectives that will be achieved through collaboration with our PSAP partners.

Specifically, the Strategic Plan establishes a vision with a supporting framework of actionable objectives to advance 9-1-1 technological capabilities and associated services. This framework includes processes to:

- develop and implement uniform policies

- incentivize regionalization and shared services
- promote education and consistent training
- foster collaboration and stakeholder feedback
- establish achievable milestones
- create a statewide NG9-1-1 enterprise among all stakeholder agencies that is sustainable well into the future

While it serves as a charter for the future, this Strategic Plan must remain flexible as circumstances and technology change. It cannot be a static document. In establishing future milestones and an approach to successfully realizing those milestones, the Plan is not intended to be a step-by-step roadmap that must be rigidly followed. In providing the overall context of what PEMA is seeking to achieve, the document is intended to foster collaboration and obtain insight from the collective experience within Pennsylvania's PSAPs.

In order to attain the goals and objectives identified in this Plan, it is imperative that existing and emerging technology initiatives be leveraged and expanded; that lessons learned are shared and successes in one region be replicated, if appropriate, in other regions; and, in the end, the Commonwealth progresses toward a more holistic system and operational model that meets the needs of PSAPs and the people they serve.

1. INTRODUCTION

1.1. HISTORICAL PERSPECTIVE

In August 1990, the *Philadelphia Inquirer* reported that suburban residents outside Philadelphia mistakenly dialed 9-1-1 seeking emergency services, having seen the 9-1-1 emergency number posted in buses and touted on the popular television show *Rescue 911*. Unfortunately, those calls were routed to a Bell of Pennsylvania operator who then searched a paper file to route the call to the proper emergency dispatcher. At the time, a Bell spokesman stated, “It’s understandable, but regrettable that those people make the mistake of dialing it.” He added, “You can’t imagine how many hundreds of calls we handle a day from people dialing 9-1-1 or 0 who shouldn’t be.”¹ Fortunately, for Pennsylvania, 9-1-1 communications were about to change dramatically.

It took the enactment of legislation, Act 78, which became law in September 1990, to propel the entire Commonwealth into a new age of emergency communications. One must consider that, at the time, only 36 of Pennsylvania’s 67 counties used 9-1-1, and only a third of those counties were equipped with Enhanced 9-1-1 (E-911), which enabled the address of the caller to be displayed automatically.

Just as legislative mandates were enacted to enhance public safety 26 years ago, emergency communications officials and the Pennsylvania legislature once again have taken proactive measures to ensure that Pennsylvania remains at the forefront of emergency communications services. The rise and ubiquity of wireless cell phones, tablet devices, and telematics have rapidly changed our society and the way we communicate. The Pew Research Institute reported in April 2015 that 64 percent of American adults now own a smartphone, a 35-percent increase from 2011, with current smartphone ownership among young adults at the 85-percent mark.²

Although it is often difficult for our public safety systems to keep pace with consumer technology, it is our duty to see that it does. The continued safety of our families, our neighbors, and the nearly 193 million visitors traveling to or within Pennsylvania³ is dependent on a robust, technologically advanced 9-1-1 system. That system needs to be tightly integrated across public safety answering points (PSAPs) throughout Pennsylvania, while offering advanced call-routing features and enhanced backup and resiliency. 9-1-1 must ensure that those in need of emergency services are quickly routed to the most appropriate PSAP, are precisely located, and emergency services are dispatched to their location.

Today, our 9-1-1 community is at a technological crossroads. Solutions implemented in the 1990s, while still capable, have been eclipsed by newer, more efficient public safety solutions that must be adopted in Pennsylvania. The Pennsylvania Emergency Management Agency (PEMA) stands ready to usher Pennsylvania into a new emergency communications era and, in collaboration with our PSAP partners, ensure that the future of 9-1-1 in the Commonwealth is strong for our generation and those to come.

¹ [Philadelphia Inquirer Aug 10 1990](#)

² [Pew Research Institute April 1 2015](#)

³ [PA Tourism Office 2014 Report](#)

1.2. CURRENT LEGISLATION

The passage of [Act 12](#) by the Pennsylvania legislature in 2015, and the accompanying rewrite of [Chapter 53, 911 Emergency Communication Services](#), of Title 35, were groundbreaking measures for the Commonwealth's citizens and the public safety professionals who serve them. The increase in funding and changes instituted by the legislation made it possible for emergency communications throughout Pennsylvania to improve so that public safety entities could enhance their 9-1-1 service delivery. PEMA's vision for the future is to bring advanced technology to emergency services statewide, and to enable public safety professionals to perform their critical role more effectively and efficiently. As a result, our families, our citizens, and visitors to our state will have access to a 9-1-1 system that provides them with unparalleled capabilities to contact emergency services through a variety of communications devices, at any time and from any place within the Commonwealth.

With valuable insight and guidance supplied by the emergency services community, the Pennsylvania legislature enacted revisions to the existing statute that allow for substantial measures to be taken regarding:

- Technology
- Governance
- Instituting Efficiencies and Reforms
- Funding and Distribution of Funds
- PSAP Inventorying and Assessment of Current Capabilities

Act 12 also directed PEMA to complete a comprehensive inventory of each PSAP across the State. The inventory revealed that, in general, many PSAPs in Pennsylvania are using outdated or end-of-life (EOL) equipment or systems that cannot be transitioned to the NG9-1-1 platform, including customer premises equipment (CPE), computer-aided dispatch (CAD) systems, and network infrastructure. A majority of PSAPs indicate a need to replace CPE and/or CAD systems by 2018, representing a very large financial investment, one that is currently beyond available 9-1-1 funding capabilities.

This Strategic Plan describes PEMA's goals, objectives, and initiatives in fulfilling our agency's vision for revitalizing Pennsylvania's 9-1-1 emergency communications system. Both near- and long-term goals and objectives are included to focus our efforts on attainable outcomes that will be achieved through collaboration with our PSAP partners.

1.3. BACKGROUND ON NG9-1-1 AND EMERGING TECHNOLOGY

Today's 9-1-1 system is a patchwork implementation of legacy technologies, with some PSAPs in the Commonwealth working toward NG9-1-1. We recognize that our PSAPs are hampered by outdated and proprietary systems, and many systems have reached EOL. The ways in which people contact 9-1-1 have changed over the years as well, with the vast majority of emergency callers now using wireless devices. There is a limited ability to transfer 9-1-1 calls between PSAPs, and we know that carriers are transitioning their networks to all-Internet Protocol (IP)-based technologies.

With that in mind, the 9-1-1 community is looking forward to a transition to NG9-1-1. The National Emergency Number Association (NENA) defines NG9-1-1 as:⁴

“...an Internet Protocol (IP) based system comprised of managed Emergency Services IP networks (ESInets), functional elements (applications), and databases that replicate traditional E9-1-1 features and functions and provides additional capabilities. NG9-1-1 is designed to provide access to emergency services from all connected communications sources, and provide multimedia data capabilities for Public Safety Answering Points (PSAPs) and other emergency service organizations.”

PEMA and 9-1-1 professionals from across the state recognize the many benefits of a statewide NG9-1-1 solution. Such a solution would:

- Promote interagency cooperation between PSAPs, PEMA, the Pennsylvania Department of Transportation (PennDOT), Pennsylvania State Police (PSP), and Pennsylvania’s first responder agencies
- Allow for cost and operational efficiencies through statewide solutions and retirement of expensive legacy technologies
- Provide additional capabilities (such as multimedia call handling) not available in today’s 9-1-1 system
- Enable enhanced redundancy and backup flexibility for PSAPs
- Improve interoperability and data sharing among PSAPs, especially for PSAP-to-PSAP call transfers

To fulfil the Pennsylvania General Assembly’s intent for Pennsylvania to implement statewide PSAP interconnectivity and transition to NG9-1-1, both an Emergency Services IP Network (ESInet) and Next Generation Core Services (NGCS) are required. As part of the NG9-1-1 transition, PEMA will become responsible for 9-1-1 call delivery services.

1.3.1. PSAP Interconnectivity (ESInet)

The backbone of any NG9-1-1 system is known as an ESInet. This type of system provides interconnectivity between one or more networks, while supplying a high level of service and redundancy to public safety operations. One of the many benefits of an ESInet is the ability for PSAPs to share infrastructure and, in some instances, consolidate back-end technology services. Presently, Pennsylvania has a few regions implementing varying phases of ESInets, from full implementations to the start of system design. ESInets are gaining traction in many regions of the Commonwealth. Eventually, this will allow the state to be interconnected via a single statewide system, by integrating multiple regional ESInets. PEMA is working to ensure that this statewide interconnectivity is accomplished in a coordinated, standardized, and timely fashion. The ESInet infrastructure that already is implemented could be used as a springboard for additional regions to develop and plan for

⁴ [NENA Master Glossary](#)

connectivity to the state-level ESInet. PEMA also will play a key role in the monitoring, security, and reliability of this overarching network.

1.3.2. Next Generation Core Services (NGCS)

NGCS are the functions that are required to deliver calls across the ESInet in a manner that corresponds to standard legacy 9-1-1 call delivery. Core services are necessary to enable the NG9-1-1 applications and database access to manage and control call delivery in an IP-based network. Some functions of core services include the Emergency Call Routing Function (ECRF), Border Control Function (BCF), Policy Routing Function (PRF), logging services, and typical IP services such as Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP). Once the ESInet is in place providing PSAP interconnectivity, NGCS can be deployed to provide NG9-1-1 call routing.

1.4. ROLE OF THE STRATEGIC PLAN

This Strategic Plan is intended to establish a vision with a supporting framework of actionable objectives to advance 9-1-1 technological capabilities and associated services. This framework includes processes to:

- Develop and implement uniform policies
- Incentivize regionalization and shared services
- Promote education and consistent training
- Foster collaboration and stakeholder feedback
- Establish achievable milestones
- Create a statewide NG9-1-1 enterprise among all stakeholder agencies that is sustainable well into the future

Serving as a charter for the future, this Strategic Plan must remain flexible as circumstances and technology change. It cannot be a static document. In establishing future milestones and an approach to successfully realizing those milestones, the Strategic Plan is not intended to be an operational or tactical plan. In providing the overall context of what PEMA is seeking to achieve, the document is intended to foster collaboration and obtain insight from the collective experience within Pennsylvania's PSAPs. To attain our goals and objectives, it is imperative that existing and emerging technology initiatives be leveraged and expanded, lessons learned are shared, and successes in one region be replicated (as appropriate) in other regions. In the end, the Commonwealth seeks to progress toward a more holistic 9-1-1 system and an operational model that meets the needs of PSAPs and the people they serve.

2. THE FUTURE OF PENNSYLVANIA'S 9-1-1 SYSTEM

The Commonwealth's 9-1-1 vision, goals, and initiatives describe a path to NG9-1-1, based on technical, operational, and policy requirements needed to make the transition a reality. This Strategic Plan will guide PEMA actions and priorities, in particular around areas of funding. It will help inform the

9-1-1 Advisory Board and 9-1-1 stakeholders from throughout Pennsylvania. PEMA invites all 9-1-1 professionals to take an active role in helping Pennsylvania achieve its vision for the future of 9-1-1, by actively participating in implementing these goals and initiatives.

2.1. VISION

PEMA’s vision is to develop, in collaboration with its PSAP partners, a fully integrated, robust NG911 system that provides a foundation for PSAPs to leverage technology, enhance interoperability and provide the public with unparalleled statewide access to emergency services at any time, from any device. Collectively, we are entrusted to ensure that public safety, security and the preservation of lives and property are maintained at the highest level throughout Pennsylvania. PEMA is committed to providing the leadership necessary to realize this vision and propel the Commonwealth into a new age of emergency communications for generations to come.

2.2. GOALS/OBJECTIVES

In order to set the stage for success in this multipronged, multiyear initiative, PEMA has identified strategic building blocks that, when achieved, will form the keystone of our NG9-1-1 framework. The four building blocks—Interconnectivity, 9-1-1 Call Routing, Shared Systems and Operational Support—must be reinforced with a governance model, security structure and standards that support NG9-1-1 in the Commonwealth and ensure that it is a viable system for years to come. Figure 1 below depicts PEMA’s strategic vision for Pennsylvania’s NG9-1-1 system.



Figure 1: NG9-1-1 Initiative

Just as any large project or strategic initiative must be broken into component pieces and implemented over time, so too will Pennsylvania’s implementation of its interconnectivity and associated core services. PEMA recognizes that there have been great strides already taken in various regions across the Commonwealth, particularly in establishing fiber or microwave connectivity between counties. Leveraging those deployed networks provides immediate efficiencies and speeds us toward interconnecting the other regions moving forward. However, we also must strive to bring balance across all regions, ensuring that all PSAPs provide a minimum level of service when interconnecting to the statewide ESInet. This necessitates the need to work in a unified way to achieve the goal of establishing a statewide NG9-1-1 system in Pennsylvania.

To achieve our strategic objectives, PEMA has identified subcomponents that are required so that each objective can be integrated into the larger whole. These objectives require strong, overarching governance, security and standards that are jointly adopted and implemented. The subcomponents of the overall Strategic Plan are comprehensively described in Sections 3 through 6 of this document. Each section begins with a guiding strategy that communicates the desired end-stage goal within that specific component of the overall plan. The initiatives that follow provide steps in the process to achieve that guiding strategy. The initiatives for all four sections are then organized chronologically in Section 7. Table 1 below provides an overview of the relationship between each objective and its subcomponents.

Table 1: Subcomponent Building Blocks of NG9-1-1 Objectives

PA NG911 BUILDING BLOCKS	
OBJECTIVE	SUBCOMPONENTS
Interconnectivity	<ul style="list-style-type: none"> • ESInet • Network Monitoring • Network Management
9-1-1 Call Routing	<ul style="list-style-type: none"> • GIS • Transitional Components • Call-Delivery Functions
Shared Systems	<ul style="list-style-type: none"> • Call Accounting • Call Processing • Computer-Aided Dispatching
Operational Support	<ul style="list-style-type: none"> • Training/Certification • Quality Assurance/Quality Improvement (QA/QI) • Standard Operating Procedures (SOPs)

3. INTERCONNECTIVITY

Guiding Strategy: PSAP interconnectivity will be accomplished Commonwealth-wide, and provide sufficient network structure to support the information-sharing process between the call-delivery and call-handling functions. PEMA will be accountable for monitoring, management, and security of the Commonwealth's ESInet.

The current legacy infrastructure that supports PSAP operations has little to no networking capability outside of the 9-1-1 facility. In fact, some legacy systems have no connectivity to other internal systems even within the same PSAP. This design, often referred to as the “siloes,” is the product of functional restrictions and intentional security measures associated with legacy technology that, in some cases, have been in place for more than 40 years. Many components are at, or rapidly approaching, EOL, with no viable opportunities to effectively use them in an updated infrastructure design.

Migrating to an NG9-1-1 platform requires a transition from the legacy network design to a more common, open-network design, capable of supporting IP traffic outside of the PSAP facility. Unlike a typical commercial network that is openly public to all individuals and entities, connectivity in a PSAP network will be restricted to public safety agencies and critical infrastructure facilities with appropriate levels of security.

3.1. ESINET

Establishing an ESInet is considered a preliminary, but vital, step in a migration toward NG9-1-1. It provides the network transport medium that enables call and information delivery between PSAPs, improving the functionality and interoperability of PSAP operations. Barriers that restrict capabilities—such as call transfers, information sharing, and backup procedures—are lessened or, in some cases, removed. Connectivity that supports an ESInet should follow established uniform technical standards and best practices that guide a public safety-grade design, and focus on security, resiliency, and redundancy.

A uniform and integrated Commonwealth design is at the foundation of ESInet development and deployment. Currently, regional initiatives throughout Pennsylvania can be evaluated as a model to achieve a unified and functional design. Three regions—the Northern Tier, Southeast, and Southwest—have deployed fiber- and microwave-based networks with connectivity points accessing each PSAP within the region. The majority of PSAPs have a bandwidth capability between 1 gigabyte (GB) and 10 GB. In the absence of fiber, some PSAPs maintain regional ESInet access via microwave links with bandwidth up to 150 megabytes (MB). These regional networks will be assessed to determine how best to integrate into the statewide ESInet solution.

As PSAP core services migrate from legacy to NG9-1-1-ready technology, the ESInet needs to be capable of supporting projected IP traffic associated with real-time data and media streams. Additional applications and services that would use the ESInet include CAD systems, CPE, data loggers, and

management information systems (MIS). A fully compliant NG9-1-1 architecture must have the ability to support NGCS and provide transport for other 9-1-1 applications.

Interconnecting the regional networks can be accomplished through a second level of the ESInet procured and managed at the Commonwealth level. This “super highway” design will maintain redundant connectivity to each regional ESInet and become the primary transport medium for any traffic that would need to be moved between any regions within the Commonwealth. Additionally, the PSAP community can benefit from leveraging infrastructure developed and maintained by other public safety, higher education, and/or public utilities—such as PennDOT, PSP, the Keystone Initiative for Network Based Education and Research (KINBER), etc. Creating the ability to maintain diverse paths of communication and information sharing among support agencies improves the ability to efficiently and effectively respond to, and recover from, critical incidents and disasters.

3.1.1. Initiatives

- Adopt technical standards governing network design capable of regional and Commonwealth-wide ESInet connectivity
- Support regional connectivity initiatives that promote regional ESInet connectivity to a Commonwealth-wide network
- Conduct an interconnectivity assessment to identify underserved PSAPs and regions
- Implement Commonwealth-managed sections of the network, including interconnectivity to regional networks
- Evaluate interconnectivity solutions between the PSAP and critical infrastructure facilities (e.g., acute-care medical facilities, traffic operations and public works) in ESInet connectivity

3.1.2. Outcomes

- Regional network solutions are designed and implemented to adhere to technical and operational standards that provide for uniform connectivity throughout the PSAP community
- All primary PSAPs in the Commonwealth have ESInet connectivity capable of operating shared resources and deploying NGCS at a public safety-grade level
- Improved PSAP resiliency
- Key critical infrastructure facilities will be incorporated in public safety network connectivity and communications plans
- PEMA maintains management of all network and connectivity components deployed by the Commonwealth, and assumes management of any established regional networks at the desire of the appointed regional authority

3.2. NETWORK SECURITY

An established ESInet, although isolated from commercial or public use, is still vulnerable to the threat of a security breach at any network ingress or egress point. A Commonwealth-wide security policy will be developed based on nationally accepted standards and best practices established by organizations such as the National Emergency Number Association (NENA) and the National Institute of Standards

and Technology (NIST). Other relevant standards will be considered as recommended by the 9-1-1 Advisory Board and approved by PEMA.

Intrusion protection will be established utilizing a two-layer approach. A BCF will be deployed at the outermost edges of the ESInet. Each BCF independently conducts security interrogations on all incoming calls and data, preventing deliberate and malicious attacks on PSAPs. Subsequently, data and calls traversing an ESInet also will pass through a secondary firewall that will be deployed at each individual PSAP. The design of intrusion-protection components should be based on nationally accepted cybersecurity framework standards, such as NIST's [Framework for Improving Critical Infrastructure Cybersecurity](#).

The BCF will be monitored by a Commonwealth-wide security operations center (SOC) that is capable of continuous surveillance of the network and all associated endpoints. The SOC will be responsible for threat intelligence, security alerts, and network ingress control. Additionally, the SOC will ensure that all Commonwealth and regional network administrators adhere to functional policies, including acceptable use, passwords and authentication, data protection, physical security, and remote access.

A security plan is the standard playbook for planning a security threat response, recovery, and mitigation. Nationally accepted cybersecurity standards and best practices—such as NENA's [NG-SEC](#) (Ref. STA 75-001) and products from the Federal Communications Commission (FCC) [Communications, Security, Reliability, and Interoperability Council \(CSRIC\)](#)—will be the foundation of the security plan. In addition, requirements from PEMA and the Pennsylvania Office of Administration (OA) also will be incorporated into the security plan; however, local additions to the security plan cannot be allowed to impact the public safety-grade requirements of the network.

3.2.1. Initiatives

- Conduct an assessment of firewall hardware deployed inside the PSAPs and associated with ESInet routers
- Deploy redundant BCFs at the outermost edges of each regional and Commonwealth ESInet
- Establish a Commonwealth-wide SOC
- Identify and adopt standards and best practices governing network security
- Develop and implement a comprehensive security plan

3.2.2. Outcomes

- Security and network reliability
- Oversight and control as the Commonwealth manages ESInet security and the risk-management process from a centralized SOC, maintaining close communication with regional network administrators
- Increased maintenance efficiency; the SOC will maintain responsibility for all necessary network security updates, upgrades, and preventative maintenance

- Effective communications planning that provides regional and PSAP network administrators with critical information and instructions regarding the identification of, response to, and recovery from a security threat

3.3. MONITORING AND MANAGEMENT

The critical nature of 9-1-1 calls and data traversing the ESInet requires uninterrupted service availability. The resiliency that is inherent to an IP-based platform provides the ability to view the entire network holistically, rather than on a component-by-component basis. Further, while it is not necessary to deploy all components in redundant pairs, an analysis focusing on identifying all possible single points of failure will be conducted at the regional and Commonwealth ESInet levels. This analysis will be dynamic and ongoing as PSAPs and regions deploy interconnectivity solutions that will interface with the Commonwealth's ESInet.

Monitoring the Commonwealth's ESInet and all associated components will be conducted at a central network operations center (NOC) that is managed and directed by PEMA. The state, or status, of all network components will be reported to the NOC, and relevant notifications distributed to appropriate network administrator levels, including PSAP, regional, neighboring state, and federal. PSAP and regional network administrators will reciprocate in this process and notify the NOC of any network interruptions they identify.

From the NOC, the Commonwealth will manage a comprehensive MIS that will be capable of capturing and reporting statistical data to each PSAP. The functions and benefits of centralized MIS reporting will be described in detail later in this document in Section 5.1, Shared Systems.

3.3.1. Initiatives

- Establish a Commonwealth-managed NOC
- Conduct a Commonwealth-wide assessment to identify any network single points of failure, or other weaknesses that may impact network availability for any PSAP or facility connected to the ESInet
- Develop a network monitoring and management policy that includes identification, notification, and response procedures for all network interruptions, and identifies levels of responsibility

3.3.2. Outcomes

- Commonwealth and regional networks retain levels of availability, redundancy, and resiliency necessary for public safety-grade operations
- A communication plan governs the process used by regional network administrators and NOC personnel to make network interruption notifications
- All call-delivery data collection will be centralized in the NOC. PSAP and regional authorities will have unrestricted access to report production for their local jurisdiction

4. 9-1-1 CALL ROUTING

Guiding Strategy: PEMA will design, deploy, and take ownership of the call-delivery function in the Commonwealth. Additionally, PEMA will coordinate GIS collaboration necessary to establish a public safety-grade GIS database capable of location-based routing for 9-1-1 calls.

The systems and components currently utilized to route 9-1-1 calls to PSAPs are based on technology originally designed in the 1970s. Original selective-routing deployments were a significant improvement to call-delivery accuracy in an era when every call was initiated from a wireline telephone with a static address. The functional data associated with these systems was basic, but provided the information necessary to route the call to the appropriate PSAP and to locate the caller. Within the last ten years, wireless phone usage has become the standard and IP-based technologies have emerged, and now dominate, the 9-1-1 landscape. Traditional wireline handsets have been exchanged for mobile devices no longer associated with a single and unique (static) address. The conventional process of call routing is a suitable standard for approximately 30 percent of all 9-1-1 calls placed in the U.S. today—and that percentage continues to decrease annually. Additionally, the technology that supports this type of legacy call-routing process is at or near EOL, with some communications service providers announcing their intention to vacate this service area.

Providing an appropriate transition toward an NG9-1-1 platform is necessary to support mainstream communications technology and expectations. Established commercial systems are designed to take full advantage of the location and routing capabilities provided by IP-based technology. Establishing a Commonwealth-wide ESInet provides the IP-based transport mechanism necessary to support the functions available for 9-1-1 call routing. The static database design is being replaced with a location-verification process intended to pinpoint the exact location of a caller, from a city high-rise to a remote corner of a state forest—and everywhere in between, regardless of the device being used to call.

4.1. GIS

As the communications landscape continues to develop, enhance and advance mobile technology, the importance of geospatial information increases exponentially. No longer is a unique street address sufficient for locating a single device that is capable of placing a 9-1-1 call from anywhere. The location-verification process now must evolve into one that utilizes dynamic information based on current coordinates and related geospatial data.

Outside of the 9-1-1 community, GIS has been developed to serve in a variety of commercial markets. With the flexible capabilities that a fully integrated GIS database possesses, the geospatial information can be collected, displayed, and consumed in many different formats. Although this may be a benefit to commercial markets, this creates a loss of consistency necessary for use in 9-1-1 call routing. One of the primary initiatives of this Strategic Plan will be to establish a standard GIS database that maintains the appropriate point file, line, and polygon layers necessary for public safety-grade call routing. There is a substantial amount of work associated with this initiative. Therefore, commencing a coordinated effort toward this goal should be included in the first year of this Strategic Plan, and be permitted to

stretch into second- and third-year objectives. It will be necessary to not only continue this work into future years, but an ongoing process for maintaining the accuracy and currency of the data will be imperative.

For 9-1-1 call-routing functions, the GIS database must obtain an accuracy level as determined by NENA GIS standards. This will require a plan that establishes a baseline for GIS data accuracy, and details an ongoing maintenance process that will sustain a sufficient accuracy level for call routing and other core systems in an NG9-1-1 architecture. A separate GIS-specific plan is being created in conjunction with this master Strategic Plan. It provides an in-depth strategy that includes personnel and training needs, working group formation, work flow, database evaluation, and integration.

4.1.1. Initiatives

- Establish GIS support within PEMA to implement and oversee geospatial programs
- Establish a PEMA 9-1-1 GIS Working Group
- Establish a foundational GIS database for the Commonwealth through collaborative work with county, regional, and Commonwealth GIS partners
- Reconcile borders, centerlines, and other basic data fields that are required to maintain accuracy levels as documented in current NENA standards (Ref. [NENA 02-014, GIS Data Collection and Maintenance](#))
- Manage development and integration of address point information
- Deploy and manage a public safety-grade GIS database accessible to local and regional public safety spatial analysts for real-time update and reporting functions
- Contract with a solutions service to maintain a GIS database at public safety-grade availability for use in NG9-1-1 location-verification functions
- Complete a GIS data accuracy plan
- Adopt and develop GIS data standards and best practices to be followed in the Commonwealth
- Collaborate with the Pennsylvania State Geospatial Coordinating Board on public safety and 9-1-1 GIS priorities

4.1.2. Outcomes

- PSAPs will have the ability to submit and edit GIS data from their jurisdictions, adhering to standardized symbology and data-field configurations
- 9-1-1 calls in the Commonwealth will be routed to the appropriate PSAP using highly accurate geospatial information
- Standardized GIS data sets for core services in a PSAP will enable the ability to interface and operate using a centralized and standard set of GIS data

4.2. TRANSITIONAL COMPONENTS – INTERNET PROTOCOL SELECTIVE ROUTER (IPSR)

Legacy selective-routing technology is based on static tabular data that assumes a telephone number is associated with one point of origin. Wireless calls and other emerging technology, such as Voice over

IP (VoIP), locate users differently than wireline devices, and as a result are unable to take full advantage of the dynamic location-verification capabilities available in communication services of their genre. An IP-based selective router (IPSR) is a transitional step toward a fully compliant NG9-1-1 solution, allowing PEMA to begin the process of building a Commonwealth-wide call-routing solution that provides the same degree of resiliency and availability, without the current duplication of hardware and services.

4.2.1. Initiatives

- Design and implement regional IPSR solutions, where appropriate, as an initial transition to expandable, full IP-based technology
- Decommission legacy selective routers and associated call-delivery equipment and services

4.2.2. Outcomes

- Allows migration progress toward NG9-1-1 by implementing a transitional IPSR solution; provides an immediate opportunity to retire expensive legacy call-delivery equipment
- Enables PEMA to scale IPSR expansion across the Commonwealth as needed to support individual PSAPs and regions as they are prepared to migrate
- Improves call location and routing by using dynamic spatial information when a fully compliant NG9-1-1 selective router is deployed
- Achieves cost savings by eliminating legacy technology faster

4.3. CALL DELIVERY

Today, 9-1-1 call delivery is expansive and soon will include receiving data and information from media streams other than voice. Text already has been implemented in many PSAPs across the Commonwealth and other agencies are beginning to research the deployment implementation process. The FCC recently announced initial considerations that will remove support mandates regarding legacy telecommunications device for the deaf/teletypewriter (TDD/TTY) technology, which historically has been utilized by the deaf and hard-of-hearing community, in favor of real-time text (RTT) technology regulations.

This move is signaling a national shift away from the established public switched telephone network (PSTN) and toward an IP-based platform. Members of the deaf and hard-of-hearing community should have the same access to emergency services as they embrace mobile technology. It is vital that every PSAP in the Commonwealth complete text-to-911 deployment expeditiously, using one of the three currently available delivery methods.

An IP-based communications network will provide the necessary architecture to support several critical NG9-1-1 call-routing components. A high level of redundancy and resilient functionality are intrinsic to an IP-network, and provide the PSAP community with improved interoperability. Rather than a limited number of communications paths to a few neighboring PSAPs, which restricts operational and backup

options, an IP-based network offers the ability to build multiple communications paths with any PSAP in the Commonwealth, and beyond if needed. It also provides the potential to deliver calls based on dynamic location rather than static and restrictive tabular data-routing rules, and establishes redundant routing policies that would allow a PSAP to balance call-volume workload among any number of PSAPs should they have an interruption of service. Four NGCS components are briefly described below.

Emergency Call Routing Function (ECRF)

In NG9-1-1, the ECRF is the process of selecting the correct route for a call to travel based upon the location of the calling device. The database used by the ECRF is a GIS map-based dataset. The ECRF gives 9-1-1 entities the flexibility to input their data into the system. The ECRF relies upon a standard data structure, with no local adjustments, to ensure that call routing is consistent within all NG9-1-1 configurations.

PEMA may elect to establish more than one ECRF to cover the entire Commonwealth. ECRFs will be connected via the Commonwealth-level ESInet, resulting in the ability to facilitate multiple queries across each of the regions. Mapping queries can be forwarded multiple times. A “forest guide” will be interconnected to the ECRF to serve as a regional knowledge base for each individual ECRF in the Commonwealth.

Emergency Services Routing Proxy (ESRP)

The Commonwealth-level ESInet will act as the primary input point for all calls across the state. An ESRP is the first element to make routing decisions across the state. The ESRP determines routing based on several factors, including location and policy. Once the routing decision is made, the ESRP forwards the call to the next point, which may be another ESRP (i.e., an ESRP for a regional ESInet) or a terminating ESRP (i.e., an ESRP for a PSAP).

Location Validation Function (LVF)

Given a request for location validation, the LVF queries its database and returns the correct and complete civic address to the requestor. The PSAP remains responsible for all data utilized by the LVF for call routing. The LVF database is based upon GIS-mapping capabilities that include layers for parcels, municipal boundaries, ZIP codes and/or GIS points that represent civic addresses. The LVF database is the authoritative address database that uses exactly one point to determine the corresponding address in the LVF database.

To cover the entire Commonwealth, there will be more than one LVF database and operator. ECRF validation requests to the originating LVF will be forwarded to the appropriate LVF for those locations not served by the originating LVF, and the responses returned to the originating LVF.

Policy Routing Function (PRF)

Determination of the next destination for a call is based largely upon the policy of the entity that normally receives the call. Policies can be defined by an entity such as a PSAP, a regional ESInet or some level of governance. The Policy rules are the common variables that can be applied to the available resource, security rules, access rules or other potential operational guidelines. In addition, the Policy may be affected by overflow characteristics such as time of day, origin of the call and, potentially, call-specific information. Policy rule sets must have priorities to facilitate the application of the rules.

4.3.1. Initiatives

- Ensure that all PSAPs are capable of receiving text-to-911 calls by December 2018
- Deploy Commonwealth call-routing functions—ECRF, ESRP, LVF, and PRF—in geographically diverse, public safety-grade data centers
- Integrate the Commonwealth’s public safety-grade GIS database with data center call-routing functions
- Develop and implement alternate call-routing policies, in conjunction with PSAP leadership, that will allow for seamless rerouting of 9-1-1 calls should any PSAP be rendered unavailable on the network

4.3.2. Outcomes

- Achieve NENA’s strategic vision for public access to emergency services “anytime, anywhere, from any device”
- More accurate 9-1-1 call routing based on dynamic caller location information
- More robust call-routing practices that can be temporarily modified at a regional Policy Store level by PSAP or regional authorities
- PEMA will act as the primary input point for all calls for the Commonwealth and manage all call-delivery functions and components
- A fully compliant NG9-1-1 call-delivery system will be established for the entire Commonwealth PSAP community
- More effective and cohesive migration toward NG9-1-1 call delivery initiated by IPSR deployment
- Decommissioning of legacy call-delivery components and services can be expedited, and the funding toward their recurring costs can be reinvested in NG9-1-1-compliant technology

5. SHARED SYSTEMS

Guiding Strategy: PEMA will design, deploy, and manage diverse and redundant data centers throughout the Commonwealth that will be capable of housing a centralized MIS application and other call-processing applications.

5.1. CALL-ACCOUNTING SOFTWARE

PSAP leaders must make critical decisions on a regular basis to sustain and improve operations and service provided to the community, while reporting performance to stakeholders. MIS provide many options to extract and analyze a single or configured set of data fields. This data displays a summary of specific PSAP activity and allows leaders to make sound decisions based on objective evidence. A call-accounting system is an MIS software application that documents activity in the PSAP. Reports can be configured based on timeframe, type of activity—outgoing, incoming, abandoned, or transferred calls, for example—specific individuals or locations, or a combination of desired parameters.

Historically, each PSAP has maintained its own MIS and call-accounting process. However, the NG9-1-1 environment provides opportunities for centralized systems with standardized information aggregation and distribution procedures. Scheduled reports can be provided en masse or based on individual requests from a PSAP or region. PEMA must play a role with the Commonwealth-wide call-accounting system to ensure that call volume counts are accurate and based on a standard set of parameters.

5.1.1. Initiatives

- Complete a gap analysis on local, regional, and Commonwealth call-accounting analytics to determine the current state of available data and identify the outstanding needs that would provide critical value for future management decisions
- Deploy a Commonwealth-wide MIS reporting system by June 2017
- Develop a monthly, quarterly, and annual statistical report template for PSAP community distribution

5.1.2. Outcomes

- Effective call-delivery data for the Commonwealth will be centrally collected, maintained, and distributed to local PSAP authorities
- Accurate network and NGCS needs assessments can be based on uniform call-delivery data and associated system usage information

5.2. CALL PROCESSING

The CAD system and CPE are two platforms that can be shared regionally or Commonwealth-wide. Presently across the country there are several examples of CAD data sharing, allowing for real-time data exchange, from call sharing to unit recommendation.

The CPE is the call-handling telephone equipment at the PSAP. Today, some regions in Pennsylvania leverage regional PSAP interconnectivity to deploy a shared approach that saves money, both in terms of capital expenditures and monthly maintenance fees. Existing legacy phone systems and networks cannot be interconnected, are not redundant, and will not allow critical 9-1-1 information, such as

automatic number identification/automatic location identification (ANI/ALI) information, to be passed from one PSAP to another. With regional shared CPE, 9-1-1 caller data is automatically and electronically shared, reducing the call-processing time and risk of making a transcribing error during a 9-1-1 call-taker hand-off. For both CAD and CPE sharing, PEMA is committed to supporting these initiatives and making them a high priority for funding.

5.2.1. Initiatives

- Prioritize interconnectivity funding to support regional projects that utilize a shared service/resource concept, increasing interoperability
- Deploy call-processing applications in the Commonwealth data centers as an available shared system for PSAP use
- Identify and adopt standards that ensure all core services implemented at the PSAP, regional, or Commonwealth level are NG9-1-1 capable

5.2.2. Outcomes

- Increase interoperable functionality by sharing system infrastructure and hardware necessary for call processing, increasing interoperable functionality and decreasing unnecessary system duplication
- Decrease or eliminate unnecessary system duplication
- Reduce implementation and recurring costs for PSAP call-processing systems
- Ensure that all deployed core services are capable of successfully interfacing with the Commonwealth ESInet

5.3. ADDITIONAL APPLICATIONS

Traditionally, hardware, such as a logging recorder, and software, such as a records management system (RMS), resided in every PSAP. While it is true that 9-1-1 telephony and radio traffic must be recorded, core recording equipment does not have to be a physical resident at every PSAP. Today technology allows remote access to recordings and the recorders themselves have a massive amount of storage capacity. Thus, recording systems can handle multiple PSAPs. The same is also true for RMS and video-teleconferencing systems. Because all of these platforms come at a considerable cost, system sharing is the most effective way to implement cost efficiencies.

5.3.1. Initiatives

- Prioritize interconnectivity funding to support regional projects that utilize a shared service/resource concept, increasing interoperability
- Identify and adopt standards for design and deployment of NG9-1-1-capable core services and applications at the PSAP, regional, and Commonwealth levels

5.3.2. Outcomes

- Improved levels of information sharing and interoperability are introduced in the PSAP network and the day-to-day operation
- Opportunities for the PSAP community to directly interface and interoperate with other emergency and critical infrastructure entities are realized
- Improved interoperability as deployed core services and other applications will be capable of successfully interfacing with the Commonwealth-level ESInet.

6. OPERATIONAL SUPPORT

Guiding Strategy: PEMA will provide all necessary operational support to the PSAP community to ensure a stable transition to an NG9-1-1 environment. This will include training and technical standards, governance models and tools, message crafting for stakeholder groups, and quality assurance programs focused on quality improvement.

6.1. TRAINING/CERTIFICATION

Presently, training and certification of telecommunicators in the State of Pennsylvania is mandated by Chapter 120c of the Title 35 code. All telecommunicators must have a prescribed amount of training and must certify by taking a written test administered by PEMA. In addition, supervisory personnel have a different written test that requires a more robust amount of hours. The program has a continuing-education element and recertification parameters. The program has not been revised or reviewed for several years.

6.1.1. Initiatives

- Develop a minimum training standard and certification exam for the call-taker, dispatcher, and supervisor roles in the PSAP
- Develop training programs for 9-1-1 coordinator and QA/QI personnel
- Establish an annual evaluation process for training and exam standards
- Develop a centralized repository of training and educational resources available to help individual PSAPs and regions achieve minimum training standard requirements

6.1.2. Outcomes

- Uniform training and education is available to all primary PSAP operations personnel across the Commonwealth that will equip them to operate in an NG9-1-1 environment
- Training and exam material will be dynamic and relevant to the knowledge base required

6.2. COMMUNICATIONS/PUBLIC EDUCATION

In order to effectively and successfully carry out the Strategic Plan, engaging the public safety communications community and educating them on the Plan's goals will be critically important. A communications strategy for this effort will be two-fold. First, the strategic vision must be developed with input from key stakeholders, including the 9-1-1 Advisory Board, and then communicated to local public safety practitioners, educating them concerning their contributory role as it relates to achieving the vision. Second, a public education component of the communications strategy will provide the general public with information on the Commonwealth's plans to improve our emergency communications system.

6.2.1. Initiatives

- Develop a series of "NG9-1-1 Informational Briefings" for PSAP leadership to: increase understanding of planning processes; make available tools and resources for migrating legacy equipment to NG9-1-1 technology; and develop progress status reports on statewide implementation
- Develop the PEMA website's NG9-1-1 page as an informational repository to house tools and reference materials, such as: statewide planning documents, standards and requirements, timeline/status information, and other resources for increased NG9-1-1 understanding
- Develop public education materials such as informational pages on a website and/or in a downloadable format for ease of printing by local PSAPs for use in their community
- Produce public service announcements (PSAs) to promote understanding of multi-line telephone system (MLTS) regulations, wireless calling limitations, text-to-911 useful tips, the importance of understanding where you are (location), NG9-1-1, and the statewide implementation of advanced technologies
- Develop social media materials, YouTube videos, and other tools and links to capture the attention of younger-generation callers and to educate them in ways that are familiar and used by this demographic group. It may be possible to leverage online materials developed for general public consumption and refresh for this particular audience
- Engage the deaf and hard-of-hearing community as advocates and informers of the benefits of NG9-1-1 to their particular community of interest, and as co-developers of educational tools for others in their group

6.2.2. Outcomes

- Establishment of a consistent and controlled message to the public and public safety professionals, to ensure comprehensive planning and implementation strategies to efficiently carry out the strategic initiatives of the Commonwealth
- An increase in awareness and education is realized regarding the benefits of NG9-1-1 and the plans to implement advanced technologies at a Commonwealth level
- Effective planning tools and resources for PSAPs are developed to support local initiatives that will complement NG9-1-1 implementation throughout the Commonwealth

- A comprehensive, population-specific, public education program is developed that communicates the advantages and limitations of technology designed to assist the local 9-1-1 agency, and the public at large, in the effective response to emergency requests

6.3. STANDARDS

Standards and best-practice concepts are well established in public safety operations and legacy technology. Emerging technology has changed the landscape of the PSAP community, greatly improving interoperable and functional capabilities between the callers and first responders. There are public safety organizations focused on adapting current standards or developing new standards to address these new technology areas. Fortunately, the technology that is emerging in public safety has been successfully implemented in other industries, and has associated standards and best practices governing design, deployment, and use.

Act 12 directs PEMA, in consultation with the 9-1-1 Advisory Board, to establish and update annually, a comprehensive set of standards that provides guidance to the PSAP community throughout the NG9-1-1 migration. Relevant standards and best practices from other industries will be considered when necessary to offer foundational support to emerging technology implantation and use.

6.3.1. Initiatives

- Identify and distribute a comprehensive set of standards that supports design, deployment, maintenance, and use of public safety networks, core service components, and associated applications
- Maintain an annual review process of all established standards, and distribute all approved modifications to the PSAP community

6.3.2. Outcomes

- All PSAPs and regions will be provided a single resource that will guide them in their NG9-1-1 transitional efforts
- All current and future NG9-1-1-compliant systems and components will be established and operated in a uniform manner throughout the Commonwealth

6.4. GOVERNANCE AND POLICY

This Strategic Plan provides a migration path toward a Commonwealth-wide NG9-1-1 platform. Act 12 directs PEMA to assume a proactive role in planning, regulatory approval, funding disbursement and general oversight of 9-1-1 advancement in the Commonwealth. By assuming this leadership role, PEMA provides a centralized point to develop a standardized process of 9-1-1 system governance, removing the burden for each PSAP and region to manage individual governance models.

6.4.1. Initiatives

- Develop and execute a memorandum of understanding (MOU) with any PSAP, public safety agency, or critical infrastructure facility that is requesting connectivity to the statewide ESInet
- Establish a management model for all network and NGCS components deployed and integrated to the Commonwealth's NG9-1-1 environment
- Develop and publish a funding model and application procedures for the distribution of fees collected under Act 12 of 2015

6.4.2. Outcomes

- The management and governance of the ESInet and NGCS components become a collective effort, assigning PEMA primary authority and accountability regarding Commonwealth-wide network and NGCS components, while regional and PSAP authorities manage local network and NGCS operations in accordance with established MOUs
- A funding process is established that provides clear direction to PSAP leadership for all phases of connectivity projects, including proposal submission, project status requirements, and compliance audits

6.5. QUALITY ASSURANCE

A vital component of any PSAP operation is ensuring that PSAP employees are performing to a high level of efficiency that the public expects. Answering, processing and dispatching emergency services should be done in a timely fashion according to standards set forth by industry experts. To ensure that PSAPs are meeting these standards, PEMA must develop a review procedure and must perform the review annually.

6.5.1. Initiatives

- Identify and publish a set of standards providing performance metrics and minimum requirements for PSAPs based on nationally accepted standards and best practices
- Establish a process to collect and analyze quarterly performance standard reports from all PSAPs
- Establish an annual review schedule that ensures all performance standards are evaluated for relevancy and modified as needed to remain aligned with national standards and best practices

6.5.2. Outcomes

- The PSAP community maintains an equally efficient and effective 9-1-1 service across the Commonwealth that is meeting, or exceeding, the national standard of service
- PSAP and regional leadership possess practical and useful tools to evaluate performance and proactively identify and resolve minor issues before they develop into major issues

7. ROAD MAP – TASKS AND MILESTONES

Strategic Plan – Year 1 Goals July 2016 – June 2017		
Area of Focus	Initiative	Estimated Date of Completion
Interconnectivity – ESInet	Support regional interconnectivity initiatives that promote regional network connectivity to a Commonwealth-wide network.	Ongoing from 3 rd Quarter - 2016
Shared Systems – Call Processing	Prioritize interconnectivity funding to support regional projects that utilize a shared service/resource concept, in order to increase interoperability and decrease an unnecessary level of redundancy.	Ongoing from 3 rd Quarter - 2016
Operational Support – Communications / Public Education	Develop a series of NG9-1-1 informational briefings for PSAP leadership.	Ongoing from 3 rd Quarter - 2016
Interconnectivity – ESInet	Identify and adopt technical standards governing network design capable of regional and Commonwealth ESInet connectivity.	4 th Quarter – 2016
Interconnectivity – Security	Identify and adopt standards governing network security.	4 th Quarter - 2016
Operational Support – Governance & Policy	Develop and publish a funding model and application procedures for the distribution of fees collected under Act 12 of 2015.	4 th Quarter – 2016
Interconnectivity – ESInet	Conduct regional interconnectivity assessment based on PSAP inventory data to locate underserved PSAPs.	4 th Quarter – 2016
Shared Systems – Call-Accounting Software	Complete a gap analysis on local, regional, and Commonwealth call-accounting analytics	4 th Quarter - 2016
Operational Support – Communications / Public Education	Develop PEMA website to include a diverse and robust NG9-1-1 informational repository for public safety professionals and the general public.	4 th Quarter - 2016
Operational Support – Communications / Public Education	Engage the deaf and hard-of-hearing community as advocates and co-developers of NG9-1-1 educational tools for members of their community and the general public.	4 th Quarter - 2016
Call Routing – GIS	Establish GIS expertise within PEMA.	1 st Quarter – 2017
Operational Support – Training Certification	Identify and adopt minimum training and certification standards for the call-taker, dispatcher, and supervisor role in the PSAP.	1 st Quarter – 2017

Strategic Plan – Year 1 Goals July 2016 – June 2017		
Area of Focus	Initiative	Estimated Date of Completion
Operational Support – Quality Assurance	Identify and adopt standards providing performance-metric minimum requirements for PSAPs based on nationally accepted standards and best practices.	1 st Quarter – 2017
Call Routing – GIS	Establish a PEMA GIS Working Group	2 nd Quarter – 2017
Call Routing – GIS	Establish a foundational GIS database for the Commonwealth through collaborative work with county, regional, and Commonwealth GIS partners.	2 nd Quarter – 2017
Shared Systems – Call-Accounting Software	Deploy Commonwealth-wide MIS reporting.	2 nd Quarter – 2017
Shared Systems – Additional Applications	Identify and adopt standards for design and deployment of NG9-1-1-capable core services and applications at the PSAP, regional, and Commonwealth level.	2 nd Quarter 2017
Operational Support – Standards	Identify and adopt a comprehensive set of standards that supports design, deployment, maintenance, and operation of public safety networks, core services, and associated applications.	2 nd Quarter – 2017

Year 1 Goals Summary

Standards—Much of the initial work in the first year of the strategic plan is focused on standards development. PEMA will establish necessary collaborative relationships with local, county, and Commonwealth stakeholders to begin immediate work toward standards in the following areas:

- Public safety-grade network design
- Network security
- Core service and application design and deployment (NG9-1-1-capable)
- Minimum training/certification
- Performance metrics

All standards will be collected and published in a comprehensive standards manual, and distributed to the PSAP community.

GIS—The anticipated path toward a public safety-grade GIS database utilized for location-based routing of 9-1-1 calls is extensive. Therefore, PEMA will initiate the preliminary steps during the first year of the strategic plan. This will include establishing a PEMA GIS Working Group that will collaborate with GIS professionals at all levels of government, and assess the current state of GIS data in the Commonwealth.

Resources—As the work on standards development begins, PEMA will support resource projects initiated by PSAPs or regions that continue to align with the Commonwealth Strategic Plan outlined in this document. Assessments based on the PSAP inventory report will be conducted to determine areas of need and potential collaboration.

Strategic Plan – Years 2-3 Goals July 2017 – June 2019		
Area of Focus	Initiative	Estimated Date of Completion
Interconnectivity – Security	Conduct an assessment of firewall hardware deployed inside the PSAPs and associated with ESInet routers.	3 rd Quarter – 2017
Interconnectivity – Monitoring & Management	Conduct an assessment to identify any network single points of failure or other weaknesses that may impact network availability.	3 rd Quarter – 2017
Operational Support – Training Certification	Establish an annual evaluation process for training and examination standards.	3 rd Quarter – 2017
Operational Support – Standards	Establish an annual evaluation process for technical standards, and distribute all approved modifications to the PSAP community.	3 rd Quarter – 2017
Share Systems – Call-Accounting Software	Develop a monthly, quarterly, and annual statistical report template for information distribution to the PSAP community	3 rd Quarter - 2017
Operational Support – Quality Assurance	Establish an annual evaluation process for performance metric standards and best practices	3 rd Quarter - 2017
Call Delivery – GIS	Develop GIS data standards and best practices	4 th Quarter - 2017
Operational Support – Governance & Policy	Establish a management model for all network and NGCS components deployed and integrated into the Commonwealth’s NG9-1-1 environment.	4 th Quarter – 2017
Operational Support – Governance & Policy	Develop and execute a memorandum of understanding (MOU) with any PSAP, public safety agency, or critical infrastructure facility that is requesting connectivity to the Commonwealth ESInet.	4 th Quarter - 2017
Operational Support – Communications / Public Education	Develop social media materials, YouTube videos, and other tools and links to capture the attention of younger generations.	4 th Quarter - 2017
Operational Support – Training Certification	Develop a centralized repository of training and educational resources available to help individual PSAPs and regions to achieve minimum training standard requirements.	1 st Quarter – 2018

Strategic Plan – Years 2-3 Goals July 2017 – June 2019		
Area of Focus	Initiative	Estimated Date of Completion
Operational Support – Quality Assurance	Establish a process to collect and analyze quarterly performance standard reports from all PSAPs.	1 st Quarter - 2018
Operational Support – Communications / Public Education	Produce PSAs to promote understanding of current issues (e.g., the importance of location and wireless calling limitations) and provide information on NG9-1-1 implementation.	2 nd Quarter - 2018
Call Routing – Transitional Components	Design and implement regional IPSR solutions as an initial transition to expandable, IP-based technology.	2 nd Quarter – 2018
Interconnectivity – Security	Deploy redundant BCFs at the outermost edges of each regional and Commonwealth ESInet.	3 rd Quarter - 2018
Interconnectivity – Monitoring & Management	Establish a Commonwealth-wide network operations center (NOC).	3 rd Quarter - 2018
Interconnectivity – Security	Establish a Commonwealth-wide security operations center (SOC)	4 th Quarter – 2018
Call Routing – Call Delivery	All PSAPs are capable of receiving text-to-911 calls.	4 th Quarter – 2018
Interconnectivity – Security	Develop and implement a security plan.	1 st Quarter – 2019
Interconnectivity – Monitoring & Management	Develop a network monitoring-and-management plan that includes identification, notification, and response procedures for all network interruptions.	1 st Quarter – 2019
Interconnectivity – ESInet	Implement Commonwealth-managed sections of the network, including intra-regional connectivity paths.	2 nd Quarter – 2019
Call Routing – GIS	Reconcile borders, centerlines, and other basic data fields that are required to maintain accuracy levels as documented in current NENA standards (REF. NENA 02-214).	2 nd Quarter – 2019

Years 2-3 Goals Summary

Network—With standards established, PEMA will focus on ESInet implementation. This will include a security plan managed by the security operations center (SOC), and network monitoring plan managed by the network operations center (NOC).

Requirements—As stated in Act 12, many of the established standards and procedures require an annual evaluation process to ensure that they are relevant and applicable to the current 9-1-1 landscape. PEMA will create a uniform evaluation process that will include distribution of modified standards to the PSAP community.

Call Delivery—PEMA will design and deploy a Commonwealth-wide, IP-based call-delivery function, and retain ownership and management of all network and component functions associated with call delivery. Initial phases will be deployed in regions with established public safety-grade networks. Final phases will provide the call-delivery function to every PSAP once ESInet connectivity has been established. Legacy selective router technology then will be decommissioned. However, legacy selective router gateways will be maintained in the design for short-term interoperability during the transition and long-term interoperability across state lines.

Strategic Plan – Years 4-5 Goals July 2019 – June 2021		
Area of Focus	Initiative	Estimated Date of Completion
Interconnectivity – ESInet	Implement interconnectivity solutions between the PSAP community and critical infrastructure facilities.	4 th Quarter – 2019
Call Routing – GIS	Manage development and integration of point-address information into the GIS database.	4 th Quarter – 2020
Call Routing – GIS	Deploy and manage a public safety-grade GIS database accessible to local and regional public safety spatial analysts for real-time update-and-reporting functions.	1 st Quarter – 2021
Call Routing – Transitional Components	Complete the Commonwealth-wide IPSR deployment, and decommission legacy selective routers and associated call-delivery equipment and services.	2 nd Quarter – 2021
Call Routing – Call Delivery	Develop and implement alternate call-routing policies, in conjunction with PSAP leadership, that will allow for seamless rerouting of 9-1-1 calls should any PSAP be rendered unavailable on the network.	2 nd Quarter - 2021

Years 4-5 Goals Summary

GIS—Collaboration continues since the Year 1 initiatives toward a public safety-grade GIS database. PEMA plans to have an established set of address points standardized and integrated into the GIS database. PEMA will coordinate data-integrity testing to ensure accuracy of the developed database. Local, regional, and Commonwealth GIS professionals will work to modify all anomalies identified through integrity testing.

Requirements—PEMA will leverage a Commonwealth-wide call-delivery system to create routing policies for all 9-1-1 calls. The alternate routing parameters will be based on input from PSAP leadership and utilize regionalization efforts where possible (e.g., PSAPs operating from a shared CAD platform).

Strategic Plan – Years 6-7 Goals July 2021 – June 2023		
Area of Focus	Initiative	Estimated Date of Completion
Call Routing – GIS	Complete GIS data integrity and accuracy testing	3rd Quarter – 2021
Call Routing – GIS	Contract with a solutions service to maintain a GIS database at public safety-grade availability for use in NG9-1-1 location-verification functions in the call-routing process.	1st Quarter - 2022
Call Routing – Call Delivery	Deploy Commonwealth call-routing functions – ECRF, ESRP, LVF, PRF – in geographically diverse data centers	2nd Quarter – 2022
Call Routing – Call Delivery	Integrate the Commonwealth’s public safety-grade GIS database with data center call-routing functions.	3rd Quarter - 2022
Call Routing – Call Processing	Deploy call processing applications in the Commonwealth data centers as an available shared system for PSAP use.	2nd Quarter - 2023

Years 6-7 Goals Summary

NG9-1-1 Platform—The remaining components of a fully compliant NG9-1-1 platform will be realized at the conclusion of this Strategic Plan. A public safety-grade GIS database will be deployed for location-based call routing. The LVF, ECRF, and ESRP components will be deployed in the data centers established by the Commonwealth during the initial IP selective router initiative. Additionally, the data centers will be expanded to include shared call-processing systems available to PSAPs. All components maintained in the data centers will be managed by PEMA, which also will have fiduciary responsibility.