Intelligent Transportation Systems
U.S. Department of Transportation

Next Generation 9-1-1 (NG9-1-1) System Initiative

Transition Plan

Washington, DC

Version 1.0
February 2, 2009

DOCUMENT CHANGE HISTORY

Version	Publication Date	Description of Change
1.0	February 2, 2009	Final Version

TABLE OF CONTENTS

Executive Summary

Although the 9-1-1 system has been a success for nearly 40 years, changes in the public's use of technology, the saturation of the mobile market, and the spread of Voice over Internet Protocol (VoIP) telephony over broadband are contributing to greater expectations that the current system needs to address. Because text, data, images, and video are increasingly common in personal communications and are critical to future transportation safety, users expect the 9-1-1 system to accommodate highly mobile, dynamic communications modes. The architecture of these communications modes is inconsistent with the fundamental structure of the current 9-1-1 system. To guide and foster a nationwide vision of a 9-1-1 system for the 21st century, the U.S. Department of Transportation (USDOT) is taking a lead role in the research and development needed to bring about a more capable Next Generation 9-1-1 (NG9-1-1) system that supports emergency call delivery and a response-based system that maximizes impact across a diverse stakeholder community.

There are, however, a large number of operational, economic, political, and institutional issues that must be addressed and reconciled to successfully implement the NG9-1-1 system across the Nation. Implementing NG9-1-1 will likely be a complicated process, requiring the effective, timely, and willing cooperation of an array of stakeholders. To address these issues, the NG9-1-1 Initiative has researched and analyzed the transition issues along with the strategic elements and options that could be followed to further the progress and implementation of NG9-1-1. The intent of this Transition Plan is to frame the view of NG9-1-1 deployment issues held by stakeholders and provide options for addressing key issues with the goal of making implementation a reality.

Benefits of Transitioning to NG9-1-1

USDOT and the 9-1-1 community believe that a technological and operational transition to NG9-1-1 is essential for the Nation's public safety emergency service networks to adapt to the general public's increasing use of wireless communications and digital and IP-based devices that can transmit text, images, and video. USDOT's core vision for NG9-1-1 is that the new internetwork will provide the foundation for public emergency services in an increasingly mobile and technologically diverse society and ultimately enable 9-1-1 calls from most types of communications devices. Envisioned as an emergency call[1] delivery and response system (or "system of systems"), the NG9-1-1 system will capitalize on advances in information and communications technologies and will enable—

- Quicker receipt of more robust information delivered to both responders and the general public as the result of making a 9-1-1 call
- Better and more useful forms of information (text, images, and video) from any networked communications device
- Transfer of 9-1-1 calls between geographically dispersed public safety answering points (PSAP) (and from PSAPs to remote public safety dispatchers), if necessary
- Transfer of 9-1-1 calls and data between PSAPs and other geographically dispersed emergency entities if connected to the underlying IP internetwork[2]
- Increased aggregation and sharing of data, resources, procedures, and standards to improve emergency response
- Maximized use of available public capital and operating costs for emergency communications services

[1] The term "call" is used in this document to indicate any real-time communication—voice, text, or video—between a person needing assistance and a PSAP telecommunicator. This term also includes non-human-initiated automatic event alerts, such as alarms, telematics, or sensor data, which may also include real-time communications.

[2] "Emergency Services Internetwork" is an element of the NG9-1-1 Community Model that illustrates the 9-1-1 systems, applications, and information repositories that seamlessly share emergency data to improve response. FCC NRIC VII Focus Group 1D, *Communications Issues for Emergency Communications Beyond 9-1-1, Report #1,* December 6, 2004, available at http://www.nric.org/meetings/docs/meeting_20041206/FG1D%20Final%20Report.pdf (last accessed February 2, 2009).

- Promotion of increased coordination and partnerships within the emergency response community.

While NG9-1-1 is expected to result in these benefits for nationwide emergency services, it will also provide the flexibility necessary to allow adoption and implementation of operational standards, protocols, and best practices to meet unique local circumstances and needs. Furthermore, as noted in the *Preliminary Cost Value Risk Analysis*,[3] additional benefits of NG9-1-1 compared with the existing 9-1-1 environment include—

- **Accessibility**. The NG9-1-1 system will be capable of accepting 9-1-1 calls from a larger variety of IP-based devices compared with the existing 9-1-1 system, and there will be an increased number of PSAPs that can receive, process, and transfer 9-1-1 calls beyond their local systems as the Nation moves toward full adoption of NG9-1-1.

- **Reliability of Service**. The NG9-1-1 system will promote increased linkages among PSAPs, which will allow complete redundancy in the event of natural disasters or individual PSAP failure.

- **Public Safety and Awareness**. The NG9-1-1 system will help improve the ability of emergency response services to more effectively share information and coordinate the response to everyday and large scale emergencies.

Implementation Environments and Potential Deployment Approaches

Transition to NG9-1-1 is expected to be an evolutionary process, involving technological, economic, and institutional change. In some cases, the path to NG9-1-1 implementation will depend on the underlying infrastructure involved and the characteristics of the PSAP and 9-1-1 Authorities in a defined geographic area. In other cases, the transition to NG9-1-1 may depend more on the ability of originating service networks to deliver NG9-1-1 calls via native IP-based infrastructure to jurisdictions that are prepared to receive those calls. Regardless of the specific evolutionary steps, it is expected that NG9-1-1 system implementation will stem from a combination of the two general deployment environments described below, which reflect two extremes in existing institutional and service delivery arrangements around the country:

- **Coordinated, Intergovernmental Implementation.** System services generally reflect planned and coordinated deployments of 9-1-1 capabilities, facilitated by statewide 9-1-1 authorities, regional authorities, or informal mechanisms that enable a collaborative environment.

- **Independent, Unilateral Implementation.** System services generally reflect a starting point that features decentralized deployments of 9-1-1 capabilities by local jurisdictions through an environment featuring piloting independent initiatives.

Through an extensive series of stakeholder workshops and individual interviews, the NG9-1-1 Initiative identified a broad range of perspectives on the role of the emergency response community, industry, decision-makers, and the general public, as well as some important constraints on NG9-1-1. While there is no single best approach to coordinating NG9-1-1 implementation at the local, state, or national level, stakeholders within each 9-1-1 community will need to weigh options to meet that jurisdiction's specific needs and unique circumstances.

[3] USDOT ITS JPO, *Next Generation 9-1-1 (NG9-1-1) System Initiative: Preliminary Cost Value Risk Analysis*, available at: http://www.its.dot.gov/ng911/pdf/NG911_FINAL_PreliminaryCostValueRiskAnalysis_v2.0_021208.pdf (last accessed February 2, 2009). A final version of this document will be available at: http://www.its.dot.gov/ng911/ng911_pubs.htm.

Strategies and Options for NG9-1-1 Going Forward

Although there are specific challenges and decisions for states, 9-1-1 Authorities, and PSAPs when choosing an implementation path, there are also overarching issues to be resolved, regardless of the transition approach. Consequently, the broader strategic elements for progressing toward NG9-1-1 are identified in this document to help the emergency communications community and local, state, and federal policymakers address critical elements for success. Within this document, the NG9-1-1 agenda for transition is defined by the following strategic elements: **Funding, Operations, Standards and Technology, Governance and Policy,** and **Education**. Making progress with all of these strategic elements is essential because they are largely interdependent. Therefore, to gain a true picture of a community's transition to NG9-1-1, progress along all of the elements should be considered together. Within this Plan, each strategic element for the transition to NG9-1-1 is described in terms of what the strategic issues are, what has already been accomplished to address them, and what could still be done.

The matrix below defines the shared responsibilities for NG9-1-1 implementation and identifies partners with primary and supporting responsibility for each of the initiatives and actions specified.[4]

Table ES-1: Strategies and Options Facing Various NG9-1-1 Stakeholder Groups

Issue Area	Strategies and Options	NG9-1-1 Stakeholder						
		9-1-1 Authorities	State Government	Federal Government	Non Governmental Organizations	Service/Equipment Providers	Responder Agencies	General Public
	FUNDING							
1	Ensure NG9-1-1 upgrades are considered a fiscal priority for states and local jurisdictions and the Federal Government through outreach and education	X	X	X				
2	Transform the current funding mechanisms to address the diminishing revenue base, population-based and geographical funding disparities, funding allocation and governance models for shared resources, and service provider cost recovery	X	X	X				
3	Ensure 9-1-1 funds are preserved for 9-1-1 and emergency communications systems	X	X	X				
	OPERATIONS							
1	Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call	X	X	X	X	X		
2	Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and standard operating procedures (SOP)	X	X	X	X	X	X	
3	Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of "virtual PSAPs"	X	X	X	X	X		
	STANDARDS AND TECHNOLOGY							
1	Complete and accept NG9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing		X	X	X	X		
2	Establish system access and security controls to protect and manage access to the NG9-1-1 system of systems		X	X	X	X	X	
3	Determine the responsible entity and mechanisms for location acquisition and determination		X	X	X	X		
4	Determine routing and prioritization protocols and business rules	X	X		X		X	

[4] Table 1 ("9-1-1 Stakeholder Types") of this *Transition Plan* provides a high level description of each stakeholder type.

Issue Area	Strategies and Options	NG9-1-1 Stakeholder						
		9-1-1 Authorities	State Government	Federal Government	Non Governmental Organizations	Service/Equipment Providers	Responder Agencies	General Public
	GOVERNANCE AND POLICY							
1	Clarify jurisdictional frameworks and responsibilities and identify the coordination required at each level of government to enable NG9-1-1	X	X	X	X		X	
2	Update regulations, legislation, and other policies to reflect modern communications and NG9-1-1 system capabilities	X	X	X				
3	Ensure continued access to the 9-1-1 system from devices and services with which users would reasonably expect to have access to 9-1-1	X	X	X		X		X
	EDUCATION							
1	Encourage stakeholders to embrace change through effective education programs	X	X	X	X	X	X	X
2	Reduce barriers for NG9-1-1 through education programs	X	X	X	X	X	X	
3	Educate PSAP and 9-1-1 Authority personnel regarding their role in NG9-1-1	X	X	X	X	X		
4	Develop effective public education programs	X	X	X	X		X	X

Conclusion

The completion of the USDOT NG9-1-1 Initiative marks an important transition point for all of the public and private stakeholders. The NG9-1-1 Initiative has established a substantial body of knowledge on the vital transition issues and associated strategic options that can be implemented to address potential NG9-1-1 transition issues. This NG9-1-1 Final Transition Plan is designed to serve as an agenda for action and a foundation for the 9-1-1 community in planning and deploying NG9-1-1.

Introduction—About This Report

NG9-1-1 Initiative Project Background

The Next Generation 9-1-1 Initiative (NG9-1-1) is a U.S. Department of Transportation (USDOT) research and development project to help define the system architecture and develop a transition plan that considers responsibilities, costs, schedule, and benefits for deploying Internet Protocol (IP)-based emergency technologies within the 9-1-1 network across the Nation.[5] As detailed in the *USDOT NG9-1-1 System Initiative: Concept of Operations (CONOPS)*, USDOT understands that access to emergency services provided by public safety answering points (PSAP) in today's world of evolving technology will ultimately occur within a broader array of interconnected networks comprehensively supporting emergency services—creating a seamless communications network from public access to those services, to the facilitation of those services, to the delivery of the emergency information to dispatchers and first responders.[6]

The USDOT's NG9-1-1 Initiative has two main areas of focus: Technical/Engineering and Institutional/ Transitional. The technical aspect of the NG9-1-1 Initiative mainly centers on documenting NG9-1-1 system requirements, developing a system architecture, and demonstrating a proof-of-concept system. The institutional aspect primarily focuses on developing an assessment of cost, value, and risk of the NG9-1-1 system and developing a transition plan to evaluate all non-technical factors (e.g., cost, stakeholders, impacts, benefits) that will affect the successful transition to NG9-1-1.

Purpose and Scope of the Transition Plan

To facilitate the migration to the NG9-1-1 system, it is critical to understand and assess transition issues and identify potential options to resolve or address these issues. Without a clear understanding of the potential challenges and options to overcome the obstacles, the deployment of NG9-1-1 may extend over an inordinate length of time. This NG9-1-1 Transition Plan summarizes key funding, standards and technology, operations, governance and policy, and education and awareness issues identified in the *NG9-1-1 Transition Issues Report* (see Appendix A), that will affect the transition from today's 9-1-1 to a nationwide NG9-1-1 system. The Plan identifies potential, high-level strategic options for a variety of stakeholders. The NG9-1-1 Transition Plan also informs public policy officials about considerations for leadership, legislative, or regulatory activities essential to successful transition to NG9-1-1.

Methodology

USDOT used a phased approach to ensure that the Transition Plan captured critical issues and associated potential strategic options. USDOT found a significant and growing body of work addressing NG9-1-1 transition issues, including testimony before legislative and regulatory bodies; standards development organization (SDO) documents; professional association and academic research, white papers, and issue papers; and lessons learned from statewide IP-based 9-1-1 system implementations (e.g., Indiana's IN9-1-1).

In addition to existing reference research, USDOT has reached out to 9-1-1 stakeholders—including users such as 9-1-1 Authorities, call takers, and the general public; associations; local, state, and federal government agencies; and vendors, including service providers and equipment providers—to verify the

[5] It is assumed that emergency service networks will be IP-based and shared with other emergency and government services. NG9-1-1 service must be a priority service on the shared IP networks.

[6] USDOT ITS JPO, *Next Generation 9-1-1 (NG9-1-1) System Initiative: Concept of Operations*, April 2007, available at http://www.its.dot.gov/ng911/pdf/NG911ConOps_April07.pdf (last accessed February 2, 2009).

issues and options, and provide feedback on effective methods, in order to present transition plan information that is useful to the 9-1-1 community.

How to Use This Transition Plan

The intended audience for this document includes 9-1-1 stakeholders who have interest in or are directly affected by the transition to NG9-1-1. This plan provides a high-level description of issues that may arise and their potential solutions.

❶ To learn more about the potential implementation paths that states and jurisdictions can follow to transition to NG9-1-1…

Turn to the section *How NG9-1-1 Could Be Implemented Across the Nation: Implementation Environments and Potential Deployment Approaches.*

❷ To learn more about the strategic options and transition elements that will enable these NG9-1-1 implementation paths…

Turn to the section *Strategies and Options for NG9-1-1 Going Forward*. This section explains the key NG9-1-1 transition elements and how potential strategies and options have been analyzed. The sections addressing Funding, Operations, Standards and Technology, Governance and Policy, and Education describe, in more detail, what actions could be taken in the future to progress toward achieving NG9-1-1.

❸ To find out how your organization or stakeholder group is affected and how it can help resolve key NG9-1-1 transition issues…

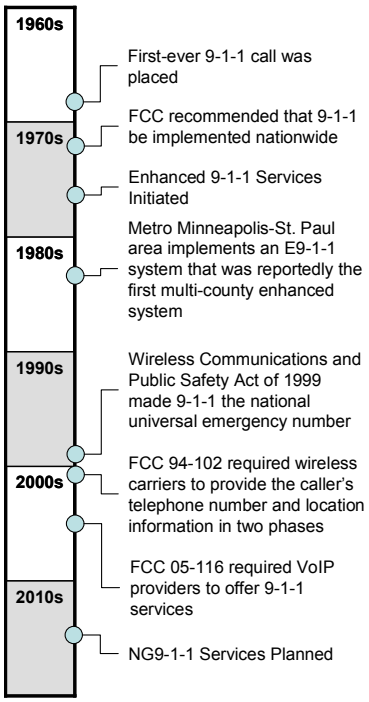
Identify your role as a 9-1-1 stakeholder and the corresponding symbol from the section beginning on the next page. For example, if you are a 9-1-1 Authority, your symbol is shown at right. For each major transition element and strategy, you can look for your symbol within the *Strategies and Options* section or *Appendix D* to learn how your community may be able to impact or contribute to the resolution of financial, operational, technology, governance issues or education.

9-1-1 Authority Symbol

Taken together, both the transition paths and strategies for addressing transition elements can help stakeholders better understand what options are available and who else may be involved in addressing issues resulting from the transition to NG9-1-1. Once all stakeholders understand what options are available and who else is affected, they can design or contribute to a tailored path that is appropriate for their jurisdiction.

Background: From 9-1-1 and E9-1-1 to NG9-1-1

The Nation's 9-1-1 system architecture, designed in the 1970s, is based on a decades-old, analog, circuit-switched network technology. In the beginning, 9-1-1 call processing was basic, using three-digit dialing and circuit-based transmission to PSAPs, and neither Automatic Number Identification (ANI) nor Automatic Location Identification (ALI) functions were available. The calls were received and processed through wireline infrastructure to the PSAP. As new technologies were introduced, modifications were made to establish connection to this basic 9-1-1 infrastructure. "Enhanced" 9-1-1 (E9-1-1) enabled the functionality to route calls to appropriate PSAPs, based on the location of the caller, using selective routing equipment, as well as to provide PSAPs with the number (ANI) and address information associated (ALI) with the caller.



In the mid-1990s, with the proliferation of wireless technologies, the 9-1-1 system faced new challenges—receiving wireless 9-1-1 calls and identifying the location of the caller. The Federal Communication Commission's (FCC) Order 94-102[7] proceeding established requirements and deadlines in two phases, requiring that all wireless carriers provide the caller's telephone number and location information to the PSAPs. In 2005, with the growth of Voice over Internet Protocol (VoIP) telephony, the FCC issued Order 05-116[8] requiring VoIP providers to offer 9-1-1 services to all subscribers. These new technologies required further modifications to the existing 9-1-1 infrastructure to enable the connection of wireless and VoIP 9-1-1 calls.

The growing consumer market penetration of both wireless and VoIP telephony, and the increasing use of the advanced technologies they represent, has underscored the limitations of the current 9-1-1 infrastructure. The Nation's 9-1-1 system, based on decades-old technology, cannot handle the video, text, images, and other data that are increasingly common in personal communications. The pace of change in technology will not slow. If government wants to ensure that the general public has access to 9-1-1 from multiple communications devices, it will need to ensure that the 9-1-1 infrastructure can accommodate new technologies. If left unchanged, the current 9-1-1 system will face increasing challenges in providing 9-1-1 service as society and technology continue to advance. For example—

- At least 8 million customers currently rely solely on wireless communications as their primary telephone service (having discontinued wireline service or chosen not to use it),[9] representing nearly 16 percent of U.S. households.[10]
- Of those, an estimated 12 percent are prepaid customers.[11]

[7] Federal Communications Commission, Report and Order and Further Notice of Proposed Rulemaking, Adopted June 12, 1996, http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-04-524A1.pdf (last accessed February 2, 2009).

[8] Federal Communications Commission, Report and Order and Further Notice of Proposed Rulemaking, Adopted May 19, 2005. http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-116A1.pdf (last accessed February 2, 2009).

[9] National Emergency Number Association, *9-1-1 Fast Facts, January 7, 2009*, http://www.nena.org/pages/Content.asp?CID=144&CTID=22 (last accessed February 2, 2009).

[10] CTIA Wireless Quick Facts (June 2008), http://www.ctia.org/media/industry_info/index.cfm/AID/10323 (last accessed February 2, 2009).

[11] According to a 2007 TracFone presentation to the National Association of State 9-1-1 Administrators (NASNA).

- 48 billion SMS messages were sent in December 2007 alone, or roughly six per day per cellular subscriber.[12]

- Estimates are that 12–15 million households will be using a VoIP service as either a primary or secondary telephone line by the end of 2008.[13]

Current 9-1-1 System Deficiencies

For a member of the public making an emergency call from a traditional wireline telephone, the 9-1-1 system works as designed. However, in many communities, nearly half of 9-1-1 calls are placed from wireless telephones.[14] In addition, a small, but growing, number of telephone users have acquired VoIP service. Wireless and VoIP service users often do not have traditional wireline telephone service in their homes or offices. As a result, the 9-1-1 system is functionally deficient for this growing segment of the public. In addition, the current system cannot incorporate the multiple types of data transmitted by new communications devices, and therefore, cannot unlock the potential for better emergency service delivery that these data types (e.g., texting, video) represent.

The communications and computing technology available to the public has advanced and continues to advance faster than the 9-1-1 system can change to meet the consumer's needs.[15] In particular, technology has allowed 9-1-1 callers and their communications devices to be mobile—a major challenge for the current 9-1-1 service delivery model, which relies on accurate callback and location data for every 9-1-1 call. It has now been more than a decade since the FCC required that all wireless carriers provide the caller's telephone number and location information to the PSAPs, yet not all PSAPs can receive this information with wireless 9-1-1 calls.[16] With the advancement of technology, the emergency communications networks are becoming increasingly less efficient, less technologically advanced, and, as a result, less able to provide the public with 9-1-1 services for newer technologies and devices.

In addition, the deaf, hearing, and speech-impaired segment of the population has been historically underserved by 9-1-1. Current regulations require PSAPs to provide direct and equal access to their services for all citizens, regardless of disability.[17] As a result, PSAP operators employ Telecommunication Device for the Deaf/Teletypewriter (TDD/TTY) equipment to communicate with the deaf and hearing-impaired, and assistive technologies to aid speech-impaired individuals. However, although the technology used by individuals with a disability has improved dramatically through the use of consumer devices (e.g., text messaging), access to 9-1-1 for these devices has not significantly improved.

[12] CTIA Wireless Quick Facts (June 2008), http://www.ctia.org/media/industry_info/index.cfm/AID/10323 (last accessed February 2, 2009).

[13] National Emergency Number Association, *9-1-1 Fast Facts, January 7, 2009*, http://www.nena.org/pages/Content.asp?CID=144&CTID=22 (last accessed February 2, 2009).

[14] Ibid.

[15] As a *New York Times* article observed, the 9-1-1 "system has not kept pace with the nation's rapidly changing communications habits. As it ages, it is cracking, with problems like system overload, understaffing, misrouted calls, and bug-ridden databases leading to unanswered calls and dangerous errors." Shaila Dewan, "An SOS for 911 Systems in Age of High-Tech." (*New York Times*, April 6, 2007) http://www.nytimes.com/2007/04/06/us/06phone.html (last accessed February 2, 2009).

[16] FCC, *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 9-1-1 Emergency Calling Systems, FCC Docket No. 94-102, RM-8143, Report and Order and Further Notice of Proposed Rulemaking*, June 1996, available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-96-264A1.pdf (last accessed February 2, 2009).

[17] For more information, please consult the U.S. Department of Justice, Civil Rights Division, *Americans with Disabilities Act: Access for 9-1-1 and Telephone Emergency Services,* available at: http://www.usdoj.gov/crt/ada/911ta.pdf (last accessed February 2, 2009).

NG9-1-1: Where We Are Going…

USDOT and the 9-1-1 community believe that a technological evolution to NG9-1-1 is essential for the Nation's 9-1-1 systems to adapt to the public's increasing use of wireless communications and digital and IP-based devices. Many of these devices also transmit video, text, images, and other data. These technologies enable major advances in the ability of callers and public safety responders to send and receive useful information to, from, and beyond the emergency services internetwork. Two examples that illustrate this point are emergency calls in American Sign Language (ASL) via video, and medically relevant telematics data transmitted from a car after a vehicle crash. With the trends in telecommunication and information technology (IT) convergence,[18] the current 9-1-1 systems should transition to a state-of-the-art infrastructure that will enable transmission of voice, text, images, and other data from all types of communications devices to PSAPs, and on to emergency responder networks.

NG9-1-1 will be part of a comprehensive emergency communications system (or "system of systems") that will capitalize on advances in information and communications technologies and will enable—

- Quicker receipt of more robust information delivered to both responders and the general public as the result of making a 9-1-1 call
- The receipt of better and more useful forms of information (text, images, and video) from any networked communications device by PSAPs and other emergency response agencies
- Transfer of 9-1-1 calls between geographically dispersed PSAPs (and from PSAPs to remote public safety dispatch centers and other emergency entities), if necessary
- Increased aggregation and sharing of data, resources, procedures, and standards to improve emergency response
- Maximized use of available public capital and operating cost savings for emergency communications services
- Promotion of increased coordination and partnerships within the emergency response community.

The NG9-1-1 system will enhance 9-1-1 service to the public, allowing callers to request emergency assistance by sending text, images, and video (in addition to voice) from several different kinds of access networks and communications devices. The USDOT NG9-1-1 CONOPS defines the NG9-1-1 system as—

> ". . . an evolutionary transition to enable the general public to make a 9-1-1 "call" from any wired, wireless, or IP-based device, and allow the emergency services community to take advantage of E9-1-1 call delivery and other functions through new internetworking technologies based on open standards."[19]

9-1-1 Authorities will need to deploy NG9-1-1 solutions that accommodate legacy components (e.g. existing telephony switching and routing technologies to non-IP-enabled PSAPs) until those services have been completely transitioned to NG9-1-1 or become statistically insignificant.

[18] "Convergence" is the integration of traditional telecommunications and newer IT services.

[19] USDOT ITS JPO, *Next Generation 9-1-1 (NG9-1-1) System Initiative: Concept of Operations*, April 2007, available at http://www.its.dot.gov/ng911/pdf/NG911ConOps_April07.pdf (last accessed February 2, 2009).

Stakeholders That Will Be Key to the NG9-1-1 Transition

Transition to the NG9-1-1 system will be affected by a large and varied group of stakeholders ranging from the general public and local emergency responder agencies to federal health, security, and emergency management agencies. Early and continued participation in NG9-1-1 planning by all 9-1-1 stakeholder groups is critical to successfully deploying the NG9-1-1 system. Although the boundaries of the USDOT NG9-1-1 Initiative are limited to the delivery and processing of the 9-1-1 call, this document addresses all stakeholders, including service providers, responder agencies, legislative and regulatory bodies, SDOs, and non-governmental organizations (e.g., professional and industry associations, and citizen and special interest advocacy organizations) that can directly or indirectly influence the transition to NG9-1-1. To better understand the fundamental roles and functions of each 9-1-1 stakeholder, Table 1 below provides a high-level description of each stakeholder type. In this context, "type of stakeholder" refers to an entire stakeholder category rather than individual entities within that category (e.g., responder agencies versus individual first responders).

Table 1: 9-1-1 Stakeholder Types

Type of Stakeholder	Symbol	Description
9-1-1 Authorities and PSAP Administrators		A 9-1-1 Authority has jurisdiction over and/or supports a particular 9-1-1 system. The 9-1-1 Authority could be a county/parish or city government, a special 9-1-1 or emergency communications district, a council of governments, an individual PSAP, a state agency, or other similar body. The 9-1-1 Authority generally manages human resource requirements and activities, oversees service delivery, performs high-level database management and support functions, oversees funding and procurement of supporting infrastructure and services, establishes standard operating procedures (SOP) and operational policies, contracts with vendors and 9-1-1 service providers, and is responsible for security at the PSAPs. Along with the 9-1-1 Authority, the PSAP Administrator directs the overall operation of a PSAP and is responsible for the direct supervision, training, and administration of the PSAP's staff. The PSAP Administrator may be responsible for the maintenance of PSAP call-taking equipment and supporting peripherals. The PSAP Administrator may be responsible for the PSAP's budget and staff support.
State Government (Legislative and Regulatory Bodies)		Legislative bodies within each state draft and pass legislation for the welfare and benefit of the public. To ensure that the provisions of the legislation are implemented and enforced, regulatory bodies (e.g., public utility commissions) may write draft regulations that are open to public comment but binding once promulgated in final form. The regulatory body itself or a court with the appropriate jurisdiction may impose sanctions for regulatory infractions.

Type of Stakeholder	Symbol	Description
Federal Government Agencies and Regulatory Bodies		The U.S. Congress and Federal Government agencies are responsible for establishing national policies and funding, providing leadership, and promoting coordination and communications among agencies and organizations involved with 9-1-1 services. Agencies involved in 9-1-1 include the USDOT—Intelligent Transportation Systems (ITS) Joint Program Office (JPO), National Highway Traffic Safety Administration (NHTSA); Department of Homeland Security (DHS)—Federal Emergency Management Administration (FEMA), Office of Infrastructure Protection, Office of Emergency Communications, Office of Interoperability and Compatibility, Office of Science and Technology; Department of Commerce (DOC)—National Telecommunications and Information Administration (NTIA); Department of Justice (DOJ)—National Institute of Justice; FCC—Public Safety and Homeland Security Bureau; and Department of Health and Human Services (HHS)—Office of the Assistant Secretary for Preparedness and Response.
Non-Governmental Organizations		Non-governmental organizations (e.g., agencies and organizations that are considered part of the private sector) will play a critical role in the implementation of the NG9-1-1 system because of their involvement in identifying the needs of their membership, thereby shaping the products and services used by consumers and PSAPs who will use the NG9-1-1 system. Examples of non-governmental organizations include SDOs, public safety communications organizations and associations, professional and industry associations, citizen and special interest advocacy organizations, private emergency response and recovery organizations, and research and academia.
Service and Equipment Providers & Third-Party Call Centers		Service and equipment providers are responsible for developing, supplying, and sometimes maintaining the hardware, software, and other equipment used by PSAPs in transferring 9-1-1 calls; providing public access to 9-1-1 services, physical and network access, and telecommunications and IT infrastructure equipment; and helping to maintain the data and information necessary to route and deliver emergency calls. Types of service and equipment providers include 9-1-1 service providers, service access providers, service application providers, and equipment suppliers. Third-party call centers receive voice, video, text, images, and other data originating from the public via various services, such as automobile telematics, relay services, medical alert, poison control hotlines, alarm monitoring, and satellite telecommunications services.

Type of Stakeholder	Symbol	Description
Responder Agencies		Responder agencies—dispatch entities, law enforcement, fire and rescue, emergency medical services (EMS), supplemental responders, and beneficiary entities—have a legal or consensual obligation to respond to or obtain information from emergency calls to support comprehensive incident management.
General Public		The general public relies heavily on the ability to access 9-1-1 service with full functionality through any communications device during an emergency. The public expects a timely response from the emergency responder agencies once a call is made to 9-1-1 and determines the success of the 9-1-1 service based on the response time. To date, the general public can make 9-1-1 calls through wireline telephone, wireless telephone, TDD/TTY over wireline, and VoIP, and indirectly through third-party call centers associated with telematics and relay services.

How NG9-1-1 Could Be Implemented Across the Nation: Implementation Environments and Potential Deployment Approaches

Potential Paths to NG9-1-1 Deployment

As described by the NG9-1-1 Initiative, the NG9-1-1 system is expected to be an interconnected system of local and regional emergency services networks (system of systems).[20] However, the boundaries of emergency service systems and related networks may vary, depending on local requirements and organizational frameworks. Consequently, although the architecture and underlying requirements of NG9-1-1 will be relatively consistent, it is expected that there will be several implementation paths to NG9-1-1—all with merit.

Transition to NG9-1-1 is also expected to be an evolutionary process involving technological, economic, and institutional change. In some cases, the path to NG9-1-1 implementation will depend on the underlying infrastructure involved and the nature of 9-1-1 systems in a defined geographic area. In other cases, the transition to NG9-1-1 may depend more on the ability of originating service networks to deliver NG9-1-1 calls via native IP-based networks to jurisdictions that are prepared to receive those calls.

Regardless of the specific evolutionary steps, it is expected that NG9-1-1 system implementation within the public sector will stem from one of the two general deployment environments described below, which largely reflect existing institutional and service delivery arrangements around the country:

- **Coordinated, Intergovernmental Implementation.** System services generally reflect planned and coordinated deployments of 9-1-1 capabilities, facilitated by statewide 9-1-1 authorities, regional authorities, or informal mechanisms that enable a cooperative environment.

- **Independent, Unilateral Implementation.** System services generally reflect a starting point that features decentralized deployments of 9-1-1 capabilities by local jurisdictions through an environment featuring piloting independent initiatives.

The following sections describe the key elements of these environments and their underlying assumptions, as well as provide an analysis of the transition issues specific to the implementation approaches that derive from each. It is expected that several transition issues will need to be resolved, regardless of the specific deployment approach. Transition issues that are independent of a jurisdiction's implementation approach are addressed in the section entitled *Strategies and Options for NG9-1-1 Going Forward*.

Implementation in a Coordinated, Intergovernmental Environment

The Nature of This Environment

In a coordinated, intergovernmental 9-1-1 service environment, planned deployments of NG9-1-1 capabilities most likely will be governed by statewide 9-1-1 Authorities, regional authorities, or informal mechanisms that enable a collaborative deployment. Over time, many states have already developed intergovernmental or interjurisdictional mechanisms to coordinate, plan, and help guide the delivery of 9-1-1 services across jurisdictions. These mechanisms range from regional and metropolitan institutional frameworks to statewide programs vested in state government. The goals of these efforts are largely

[20] USDOT ITS JPO, *Next Generation 9-1-1 (NG9-1-1) System Initiative: Concept of Operations*, April 2007, available at http://www.its.dot.gov/ng911/pdf/NG911ConOps_April07.pdf (last accessed February 2, 2009).

designed to help address consistent and coordinated 9-1-1 service delivery throughout regions and states, along with the need to address increasingly more mobile and complicated telecommunication services. Although enabling legislation supports most of these efforts, in some cases, local 9-1-1 Authorities have worked out other, less formal ways to address the need for coordination and joint planning.

Within a coordinated, intergovernmental approach, an NG9-1-1 system could be implemented in several ways. While all, to some degree, involve intergovernmental coordination and planning, they vary in institutional arrangements, support, and authority based on a variety of factors related to the historical relationship of state and local government and the evolution of 9-1-1 services within the community involved. Generally, this approach can take one of three forms: 1) single statewide 9-1-1 authority, 2) regional authority (often county government), and/or 3) informal mechanisms that enable a cooperative NG9-1-1 deployment. These are illustrated in Figure 2 and defined below.

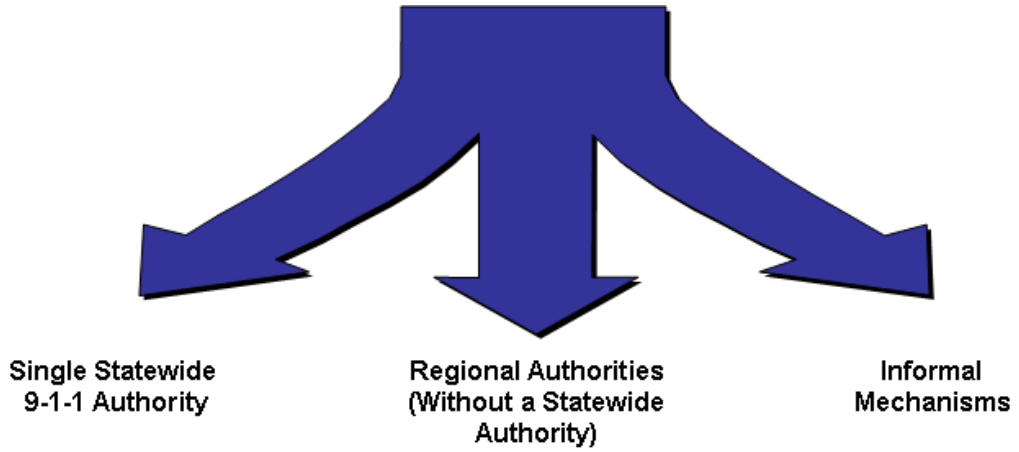


Figure 2: Types of Coordinated/Intergovernmental NG9-1-1 Deployments

- **Single Statewide 9-1-1 Authority**. Where such authorities exist, they are usually created by statute or executive order, or operate as a function of existing authority (such as a state utility commission, for example). Authority generally covers both funding and implementation, although the latter ranges from statewide systems and outright authority over PSAP service migration and enhancement, to limited powers of encouragement, coordination, and guidance of the same.

- **Regional Authorities Without a Statewide Authority**. Some states do not provide for state-level 9-1-1 Authorities; rather, they authorize local governments to join together in regional efforts to coordinate service delivery and share resources. That authorization may occur through specific enabling legislation (directed toward 9-1-1) or be a by-product of existing joint powers/inter-local cooperation legislation. In any case, such organizations have a legal basis of existence and may operate as political subdivisions of the state.

- **Informal Mechanism, Locally Initiated Coordination**. Generally, local initiatives coordinate 9-1-1 services and enhancement across traditional jurisdictional boundaries where more formal mechanisms do not exist. These efforts vary from endeavors focused on metropolitan regions, to statewide initiatives. Normally they are more informal (e.g., conducted through regional and state associations, and other cooperative endeavors) but can be quite effective, depending on the organizations involved.

Assumptions and Key Dependencies of Deployment in a Coordinated, Intergovernmental Environment

The common theme among all these forms of implementation is the desire to coordinate 9-1-1 service delivery among 9-1-1 Authorities, with the driving force being consistency in emergency response, and maximization of available resources. Such coordination may be as simple as working together in a structured, cooperative way, to employing a higher level coordinating body with the authority to ensure that coordination. The desire to coordinate does add another factor to NG9-1-1 migration. Authorities must balance local initiative and timing with that of the coordination goal. Consequently, decision authority, goals, and priorities are shared to some extent, and the process may take longer to implement. On the other hand, the process does provide the opportunity to share resources, deploy new and enhanced multijurisdictional service arrangements, and deal with emerging challenges in more effective ways (e.g., transferring 9-1-1 calls among jurisdictions, providing backup and mutual support, addressing larger scale emergency preparedness and homeland security needs). The box below presents an example of deployment in a coordinated, intergovernmental environment.

Example of Deployment in a Coordinated, Intergovernmental Environment—State of Springfield

The "State of Springfield" has a statutory 9-1-1 function assigned to the state's General Services Commission (GSC). Under its statute, the GSC cannot force local governments to implement 9-1-1 services, but it can help fund, guide, and encourage such activity. In this state, there is a large metropolitan region with one central city and numerous suburban municipalities. The statute allows these governmental entities to join together in a multijurisdictional emergency communications district. Although that district does not have the authority to directly operate PSAPs across the region, it can assess 9-1-1 fees and help fund such operation, along with providing connecting infrastructure, service, and support. Working together with the state, the district works out a plan for the region to collectively migrate to NG9-1-1 and to support state needs for public safety radio interoperability, emergency preparedness, and poison control.

In this scenario, the state provides statewide perspective and coordination, some additional funding to ensure that state needs are met, and state-procured backbone infrastructure and basic networking functions to facilitate the process. The district provides regional connecting infrastructure through an emergency services IP-based network, facilitates expanded and focused service arrangements among local 9-1-1 Authorities, and supports regional database and related functions. The local 9-1-1 Authorities operate the PSAPs involved and local authorities provide emergency response services.

Transition Issues in a Coordinated, Intergovernmental Environment

Because of the level of complexity and the opportunities that are available in, for example, the "State of Springfield" model, several transition issues must be addressed before deployment of NG9-1-1 can occur:

- **Governance and Policy**. Underlying this kind of implementation is the need for coordination among multiple 9-1-1 Authorities. With more entities involved, the roles and responsibilities and intergovernmental arrangements for the NG9-1-1 system will need to be defined across jurisdictional boundaries and within new partnerships. This is more complicated than the independent, unilateral style of deployment because of the potential need to determine which entity is responsible for what, how to share different components of NG9-1-1, and how to address liability and confidentiality protection across jurisdictional boundaries (assuming that liability and confidentiality protection might be different for each jurisdiction).

- **Standards and Technology**. With the connection among multiple PSAPs and 9-1-1 Authorities, the control of system access and security may be more difficult to manage because of the number of entities involved. Furthermore, new processes and procedures may need to be defined that include all the jurisdictions and entities involved. In addition, the protocols and business rules for call routing and prioritization will be different and/or potentially more complicated because of the number of PSAPs and jurisdictional coverage area involved and the number of potential options available to route calls (e.g., based on type of communications).

However, it also provides the opportunity to consolidate or streamline PSAP functions, including, for example, the use of "virtual PSAPs."[21]

- **Funding**. Coordinating the implementation of 9-1-1 service delivery enables many 9-1-1 Authorities and PSAP Administrators to share various components of the NG9-1-1 system. This may provide opportunities for cost sharing and shared services among the 9-1-1 Authorities or other entities involved (e.g., emergency responders), and indeed, this is what is envisioned in the National Emergency Number Association's (NENA) definition of NG9-1-1 as part of a larger IP-based emergency services communications system.[22] A more detailed definition of NG9-1-1 is available on the NENA website.[23]

- **Education**. The coordinated approach will require a more extensive education program than the independent, unilateral approach. It is inherently more complex, involving a greater number of organizations and agencies to implement. In turn, that requires that the 9-1-1 Authorities, legislative and policy officials, state organizations, and other entities involved receive targeted, consistent, and coordinated messages. The needs and impacts associated with shared services must be communicated, including funding and cost recovery options.

Implementation in an Independent, Unilateral Service Environment

The Nature of This Environment

In an independent, unilateral 9-1-1 service environment, migration to NG9-1-1 necessarily involves a decentralized deployment of system capabilities by local jurisdictions through unilateral or independent initiatives. The basis for this approach is that historically, 9-1-1 services have been largely a local or municipal governmental responsibility. Indeed, the first assumption cited in the USDOT NG9-1-1 CONOPS notes—

> ". . . the fundamental local institutional and operational frameworks for 9-1-1 services will remain in effect. That is, local government agencies will serve as answering points to receive, assess, and redirect 9-1-1 emergency calls from the general public to appropriate responders for help."[24]

In some states, that historical focus, coupled with a theme of strong local control of communications centers, has ensured that the responsibility for 9-1-1 service remains there as well. That may be difficult to change even with the growing need for larger scale geographical coordination and planning.

Consequently, this deployment framework will be used in a state with a 9-1-1 statutory environment that places 9-1-1 implementation responsibility solely on a local jurisdiction (e.g., at the township, city, or country/parish level). This type of situation can also be used where there is no state or regional governmental entity responsible for 9-1-1 services or where 9-1-1 statutes explicitly provide funding and implementation responsibility and authority to the local governments involved.

---

[21] An NG9-1-1 concept that makes the physical, geographic location of a PSAP immaterial. Through operational, technical, and networking planning, PSAPs may acquire and leverage resources outside of their normal environment. For example, a single PSAP could experience a dramatic and rapid increase in call volume as a result of a large-scale incident occurring in its locale. Using NG9-1-1, its pre-planned PSAP partners could provide additional technologic and staff support to handle the call volume, even though they are physically located hundreds (or thousands) of miles away.

[22] Cost sharing does not have to be limited to public safety functions (or entities). For example, it is anticipated that many states will have deployed statewide network infrastructure to support a variety of state functions, and that it represents a potential resource for NG9-1-1. In an IP world, lower layer network functions are common to all applications, and thus, associated costs can be shared across all those applications.

[23] NENA, *What is NG9-1-1?*, available at: http://www.nena.org/media/File/NG9-1-1DefinitionFinal1.1.pdf (last accessed February 2, 2009).

[24] USDOT ITS JPO, *Next Generation 9-1-1 (NG9-1-1) System Initiative: Concept of Operations*, April 2007, available at http://www.its.dot.gov/ng911/pdf/NG911ConOps_April07.pdf (last accessed February 2, 2009).

Assumptions and Key Dependencies of Deployment an Independent, Unilateral Service Environment

In an independent, unilateral deployment environment, it is assumed that no other interjurisdictional coordination mechanism or initiative exists, and that efforts to migrate to NG9-1-1 will be limited to separate initiatives by local jurisdictions.[25] While the authorities may migrate to the NG9-1-1 system independently or unilaterally, such improvements are limited to their jurisdiction and involve little if any service or infrastructure sharing or interconnection with neighboring entities (or, for that matter, with any other jurisdiction). Consequently, implementation in this scenario depends only on local initiative and resources and does not require time or effort to coordinate with a third party, nor the potential compromise that may require. Priorities can be set and migration managed as the jurisdiction best sees fit.

The general public will be able to make a 9-1-1 call from a wider range of devices, and call takers at the involved PSAPs will be able to take advantage of other NG9-1-1 system functionality, including expanded call treatment, access to additional information and data, and enhanced support of emergency response and incident management. Infrastructure and resource sharing is limited to the local public safety agency itself, as are the opportunities for innovative and expanded service arrangements with neighboring jurisdictions. While the authority may be able to implement new operational approaches like the so-called virtual PSAP,[26] arrangements involving other jurisdictions (e.g., coordinated incident management, support and backup, emergency response) are necessarily limited by the willingness of the jurisdictions to work together. Thus, the independent, unilateral approach to implementation does not enable full NG9-1-1 functionality—the PSAP or PSAPs involved are still an island, albeit an IP-enabled one. The box below presents an example of deployment in an independent, unilateral environment.

Example of Deployment in an Independent, Unilateral Service Environment—Central City

"Central City" in "Washington" County operates one PSAP and, under state statute, supports and funds it. Recently the City has made the decision to implement its vision of NG9-1-1. Working with a variety of infrastructure, equipment, and service providers, the City procured and deployed an IP-enabled system that offers many of the features described by nationally accepted next generation standards. They can accept 9-1-1 calls of all types (both in origination, and in format), process those calls in accordance with established business rules, and pass on enhanced data and information useful for emergency response and incident management.

However, based on long-standing precedent and history, the City does not coordinate much of what it does with the Sheriff's Office and the County. Inside the City, it is the City's business. Outside, it is the County's business. Nor does Central City work much with the "City of Fairfield" in the neighboring county. Over the years, Central City has always been more progressive and reluctant to impair that progress by trying to collaborate with a "less progressive" community like Fairfield. Consequently, the City does not consider an option provided by the local community college to share in the cost of multifunctional IP-access network serving both counties and both cities, and deploys its own one-purpose, dedicated network. Nor does the City attempt to work out enhanced mutual aid and service arrangements with either Washington County or the City of Fairfield. The City feels that such arrangements are generally more detrimental than beneficial because it is able to receive and successfully serve the majority of calls.

Transition Issues in an Independent, Unilateral Service Environment

Because of the level of complexity and the opportunities that are specific to the "Central City" model described above, several transition issues must be addressed before deployment of NG9-1-1 can occur:

- **Governance and Policy**. In this environment, it is expected that the 9-1-1 Authority responsible for a specific local jurisdictional area will remain the same, which means that governance and

[25] The definition of NG9-1-1 calls for interconnected systems. So, technically, the full nature of NG9-1-1 could not be implemented in this kind of environment. However, as described, some functions of NG9-1-1 could be deployed, and that ultimately might be a policy decision by the 9-1-1 and PSAP authorities involved.

[26] A "virtual facility" (e.g., emergency command vehicle, backup facility, or other ad hoc location) equipped and staffed to receive 9-1-1 calls that augments an existing municipal or county emergency communications center or 9-1-1 call center that directs 9-1-1 or other emergency calls to appropriate police, fire, and EMS agencies and personnel.

existing policies may either remain unchanged or only slightly change to accommodate its version of NG9-1-1. In addition, it may be difficult to coordinate large-scale emergency response events because of the limited coordination among PSAPs across jurisdictional boundaries.

- **Standards and Technology**. If individual 9-1-1 Authorities upgrade to NG9-1-1 without consideration for neighboring jurisdictions, it may be more complicated in the future to coordinate call treatment processes and response efforts that involve multiple jurisdictions if they do not implement common standards. Call routing process and other SOPs may not exist or take into account neighboring jurisdictions to support coordinated call and data handling efforts.

- **Funding**. As noted in the *NG9-1-1 Transition Issues Report*, funding may be limited because of the low priority of 9-1-1 upgrades and outdated funding models and allocation mechanisms. Consequently, implementing NG9-1-1 independently without the ability to share costs may make it difficult to identify sufficient funding to fully upgrade to NG9-1-1. Furthermore, the Federal Government is promoting coordination among public safety entities with neighboring jurisdictions for upgrading efforts to reduce cost through resource sharing, as well as to encourage interoperability.

- **Education**. Often, agencies are unable to identify sufficient funding to support education needs. Consequently, education may remain a low priority, making it difficult to achieve any significant level of coordination among neighboring agencies, and perhaps even within the area served by the agency itself. Moreover, without a coordinated education program, long-term benefits of the upgrade to NG9-1-1 may not be fully realized.

Final Observations About Implementation Environments and Deployment Approaches

Migration approaches to NG9-1-1 will likely grow out of one of the above two environments. However, only a handful of states consistently represent one or the other of the two implementation environments statewide. Pragmatically, many, if not most, states exhibit a hybrid or combination of the two, with some degree of coordination and planning in some locations.[27] Furthermore, in some states, the planning and coordination function is less than comprehensive, being limited to coordination of certain types of 9-1-1 calls such as those from wireless devices.[28] Consequently, it is likely that various versions of NG9-1-1 will be deployed from location to location. Part of the challenge of NG9-1-1 migration is the sheer diversity of communities and situations across the country, contrasted with the standards-based, interconnected nature of the next generation goal. Although there is no single best approach to achieving NG9-1-1, the nature of its vision calls for some degree of planning and coordination. How well that vision is achieved and how well the opportunity for shared and coordinated next generation services, cost efficiency, and all the other benefits of NG9-1-1 is maximized will depend a great deal on how well the country addresses this challenge.[29]

---

[27] For example, this could be a large metropolitan area in a relatively rural state. The complex institutional environment of the metropolitan area may foster (or even require) some degree of planning and coordination to maximize consistent service delivery across the region, while the balance of the state may not have the same factors or impetus.

[28] See "Model State Plan," National Association of State 9-1-1 Administrators, July 2008. It notes that "[w]hile many states across the country have established state-level 9-1-1 programs, there continues to be a great deal of diversity in the nature and organization of those programs. Some states have established programs by statute, and the programs involved are comprehensive in both geography and program scope; while other states have done the same in a less formal way, or program scope may be more limited. Beyond that, there are several states that have no state 9-1-1 focus or coordination mechanism at all."

[29] For example, see "Model State Plan," National Association of State 9-1-1 Administrators, July 2008. It states, "The institutional aspects of 9-1-1 are evolutionary in nature. As the service has evolved to address new challenges or service requirements, so have also the institutions put into place to support those needs. For example, while 9-1-1 is by nature a locally based public safety service, new forms of communications like wireless and VoIP have forced the community to develop new institutional mechanisms to coordinate and fund the service enhancements necessary to serve the calls involved. Some states with a history of strong local government-based 9-1-1 systems acknowledged the need to do something statewide, but limited the state focus to the challenge at hand, i.e., wireless. More recently, however, in response to the increasingly complex world of telecommunication, some states are beginning to explore more comprehensive institutional arrangements to support 9-1-1."

Coordination and Implementation at a National Level

The vision for NG9-1-1 calls for an interconnected, nationwide implementation. The USDOT NG9-1-1 Project CONOPS document, for example, speaks to ". . . a vision of a nationally interoperable emergency services internetwork." This vision implies some degree of national leadership for the deployment of NG9-1-1—especially when compared with the implementation of wireless E9-1-1 nationwide over the last decade. In the ENHANCE 911 Act of 2004, Congress states, "Enhanced 9-1-1 is a high national priority, and it requires Federal leadership, working in cooperation with state and local governments and with the numerous organizations dedicated to delivering emergency communications services."[30] Without focus and leadership at a national level, NG9-1-1 could face challenges in realizing its goal of a national interconnected system.

There is no single best national approach to coordinating NG9-1-1 implementation at a national level. Potential stakeholders range from invested federal agencies like USDOT, NTIA, and the FCC, to national associations like the National Association of State 9-1-1 Administrators (NASNA), NENA, Association of Public-Safety Communications Officials (APCO), and others. USDOT and DOC jointly support the federal Implementation and Coordination Office (ICO). Pursuant to existing legislation, the ICO defines its mission as ". . . [providing] leadership and coordination of comprehensive and technologically-enhanced [9-1-1] services." Specific responsibilities include improving coordination and communication among federal, state, and local emergency communications systems, emergency personnel, public safety organizations, telecommunications carriers, and telecommunications equipment manufacturers and vendors. Other responsibilities include development, collection, and dissemination of information concerning practices, procedures, and technology used in implementation of E9-1-1 services.

The New and Emerging Technologies (NET) 911 Improvement Act of 2008 formally charged the ICO with a task to "facilitate coordination and communication between…[those parties] involved in the implementation of E-911 services." The legislation has provisions requiring the ICO to develop and report to Congress on a "National Plan . . . for migrating to a national IP-enabled emergency network capable of receiving and responding to all citizen-activated emergency communications and improving information sharing among all emergency response entities." [31]

At a higher level, the Federal Government also has a stakeholder interest in the connection between 9-1-1 and federal programs and services, including subject areas such as public safety radio interoperability, transportation safety, and incident management. Beyond that, organizations such as NENA, APCO, and NASNA, have a national association member interest in improving 9-1-1 services and migrating to next generation systems. The same is true of a variety of SDOs. All of this activity would benefit from some degree of national coordination and oversight.

Finally, there is the potential for a national organization to foster migration of 9-1-1 authorities and PSAPs using a national-level IP backbone and/or national-level NG9-1-1 services., given the perceived disadvantages of implementing NG9-1-1 using a strictly national network on the part of local and state authorities, this involvement may not occur. Historically, public safety organizations have expected that the overall next generation national emergency communications structure would be through an interconnected set of state or sub-state governmental multi-use IP networks. Optionally, a national level IP network could provide the interconnection between these state or sub-state level networks. Initially, commercial service providers will likely provide the bulk of national- or regional-level IP networks for the NG9-1-1 system; however, the implementation of these networks could take several years to fully resolve the regulatory issues involving security, database, and access rights. National level coordination in resolving these issues must continue and expand in preparation for NG9-1-1 and other components of the larger next generation emergency communications system.

[30] PL 108-494, known as the ENHANCE 911 Act of 2004, available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_public_laws&docid=f:publ494.108.pdf (last accessed February 2, 2009).

[31] PL 110-283, known as the NET 911 Improvement Act of 2008, available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ283.110.pdf (last accessed February 2, 2009).

Other Transition Issues

The extent to which 9-1-1 Authorities or local jurisdictions move toward NG9-1-1 will be affected by existing institutional arrangements, underlying funding, operational structure, governance and policy, and the availability of appropriate standards and technology for IP access network infrastructure and next generation services and functions. This section described existing 9-1-1 service and implementation environments, and the approaches to NG9-1-1 migration that those environments imply. Although the complexity of the issues may differ between the two frameworks, there are overarching issues that 9-1-1 Authorities and other governing entities will face before and during NG9-1-1 implementation, regardless of which deployment framework is used. High-level discussions of transition issues and associated strategic options are identified in the following sections to assist 9-1-1 stakeholders in moving forward to implement NG9-1-1.

For Additional Information

Additional information regarding the impact of implementation environments and deployments on the migration to NG9-1-1 can be found at—

- 9-1-1 Industry Alliance: *2008 Study on the Health of the US9-1-1 System*: http://www.911alliance.org/9IA_Health_of_US_911%20_2_.pdf (last accessed February 2, 2009).
- NASNA: *Model State 9-1-1 Plan*, July 18, 2008. Contact NASNA through their website (http://www.nasna911.org) for information on how to obtain this document.
- Congressional Research Service Report for Congress: *Emergency Communications: The Future of 911:* http://opencrs.com/getfile.php?rid=65747 (last accessed February 2, 2009).

Strategies and Options for NG9-1-1 Going Forward

The Key NG9-1-1 Transition Elements

Although specific challenges and decisions face states, 9-1-1 Authorities, and PSAPs when choosing an implementation path, some overarching issues will need to be resolved, regardless of the transition approach. Consequently, broader strategic elements for progressing toward NG9-1-1 are identified in this document to help the emergency communications community and local, state, and federal policymakers address critical elements for success as they plan and implement NG9-1-1 nationwide. The *NG9-1-1 Transition Issues Report* identified many of the key challenges that the Nation—at all levels of government—needs to overcome to ensure the achievement of the NG9-1-1 vision. These challenges were used as the basis for potential strategies organized into high-level elements in this Transition Plan. These "Strategic Elements" represent the refinement of the broad sense of direction stemming from the transition planning process into a practical set of options that can move the Nation toward successfully implementing NG9-1-1. They describe a strategic agenda for the Nation derived from the analyses of key transition issues.

Within this document, the NG9-1-1 agenda for transition is defined by the following strategic elements: Funding, Operations, Standards and Technology, Governance and Policy, and Education and Awareness. Making progress in all aspects of these strategic elements is essential because the elements are largely interdependent. Therefore, to gain a true picture of a region's transition to NG9-1-1, progress for all of the elements should be considered together. For example, when a 9-1-1 Authority begins to procure new infrastructure, that jurisdiction should plan training and conduct testing to make the best use of that equipment. The five Strategic Elements are briefly described in Table 2.

Table 2: NG9-1-1 Strategic Elements

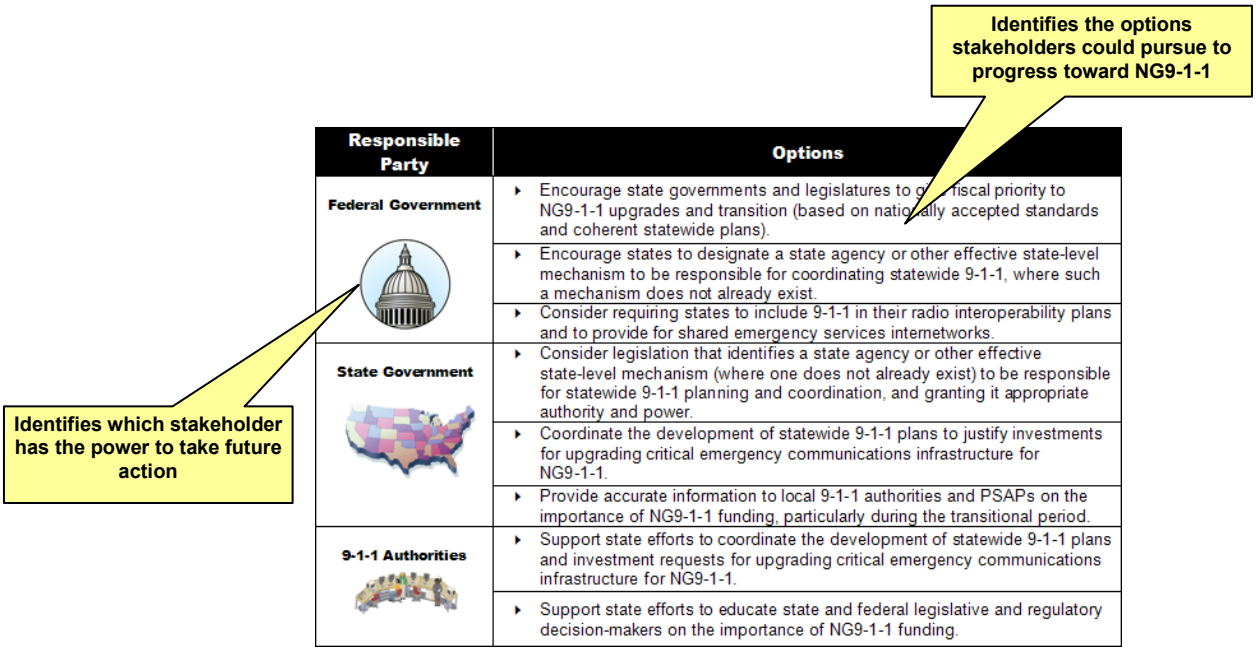
Strategic Elements	Description
	Most state and local Authorities obtain funding by assessing and collecting fees on telecommunications services such as landline, wireless, and IP-enabled voice services. Changes in legislation and regulation have not matched changes in consumer use of telecommunications services, resulting in a decline in revenue. Jurisdictions must be willing to commit the resources necessary to ensure the success of any next generation effort. For example, ongoing maintenance and support of the system must be planned for and incorporated into the budget. Additionally, the possibility of sharing services and costs with multiple emergency response and government agencies should be explored.
	Operations includes PSAP operations, as well as broader SOPs, formal written guidelines and/or instructions for calls and incidents (e.g., PSAP goes down), as well as training, exercises, operational optimization (e.g., business process reengineering, change management), and NG1-1-1 system operations.
	Progress in each of the other elements is essential to proper planning, use, and implementation of NG9-1-1 technology, and should drive technology procurement. Technology is highly dependent on existing infrastructure within a region and/or what is available to states and PSAPs from service providers. Multiple technology solutions may be required to support unique situations. Similarly, technical standards need to be completed to enable the full spectrum of NG9-1-1 capabilities.

Strategic Elements	Description
Governance and Coordination	Governance and policy includes leadership and planning—both key to entities transitioning to NG9-1-1. For example, many regions face difficulties related to political issues and the relationships within and across jurisdictions and disciplines. Leadership can help to work through these challenging internal and jurisdictional conflicts, as well as set the stage for a region's commitment to the NG9-1-1 effort. Success in this element is also based on public's understanding, use, and satisfaction with NG9-1-1 services.
Education and Awareness	The purposes of education related to NG9-1-1 are to frame a vision for what NG9-1-1 is and can do, to convey the need for change in the way 9-1-1 service is provided, to encourage all stakeholders to work together to accelerate the implementation of NG9-1-1, and to reduce the barriers to transition planning. Targets for education programs include those within the 9-1-1 community responsible for implementing NG9-1-1, those who fund NG9-1-1, those who form public policy and pass laws and regulations, those who develop technical standards and SOPs, and the public. Effective educational messages must be developed for each target audience in order to accelerate the implementation of NG9-1-1.

Understanding the NG9-1-1 Transition Elements and Options

As part of the transition planning process, the strategic elements described in this document will also identify which organizations have the ability to respond to them and thus guide future options, decisions, and strategy. In the following sections of this document, each strategic element for the transition to NG9-1-1 is described in terms of what the strategic issues are, what has already been accomplished to address them, and what could still be done to address those issues, as illustrated in Figure 3 below.

Figure 3: Example of NG9-1-1 Transition Options



Strategic Options for NG9-1-1 Funding

Background

Despite emerging requirements for the next generation of 9-1-1 services and capabilities, 9-1-1 Authorities and PSAPs throughout the Nation may struggle to finance new systems and capabilities while continuing to operate their current systems. Indeed, many areas of the country are experiencing a decline in 9-1-1 revenues because consumers have adopted new telecommunications services and technologies not covered under current 9-1-1 funding laws. As a result, a steadily decreasing number of consumers are subsidizing a steadily increasing number of other consumers who do not contribute to the cost of providing 9-1-1 service. This situation, if allowed to continue, will most certainly exacerbate the challenges of the transition to NG9-1-1. Where existing revenue streams fall short, elected officials and government budget experts may face difficult choices when setting public investment priorities. These and other considerations make the funding environment for NG9-1-1 complex—recognizing and addressing these factors will be key to the successful migration to NG9-1-1:

- **NG9-1-1 as a Fiscal and Strategic Priority.** Emergency communications networks and NG9-1-1 systems are costly. Yet, the events of September 11, 2001, and Hurricane Katrina underscore that 9-1-1 is a component of our Nation's critical emergency communications infrastructure that must be protected and adequately funded. If dedicated and sustainable funding mechanisms are not available, these projects will face competition for funding from other worthy public projects. Many states lack forward-looking strategic plans or roadmaps for planning and building out the foundations of NG9-1-1. Capital and strategic planning is critical if decision-makers are to be armed with the facts they need to justify high-priority emergency communications projects.

- **Adequacy of Funding Mechanisms for NG9-1-1.** The concept of a 9-1-1 subscriber fee on telephone services remains virtually unchanged today from its inception. There is little consistency among and within states on 9-1-1 surcharge rates, which often differ based on the service type (e.g., wireless, prepaid wireless, wireline, or VoIP) and the jurisdiction for which the fee is being collected.

- **Adequacy of Funding Mechanisms During the Transition Period.** It is generally accepted that the transition period will involve operating the legacy system and the NG9-1-1 system side-by-side for a period of time. The funding needs of the transition period will be unique and require careful planning to assure adequate funding throughout the transition.

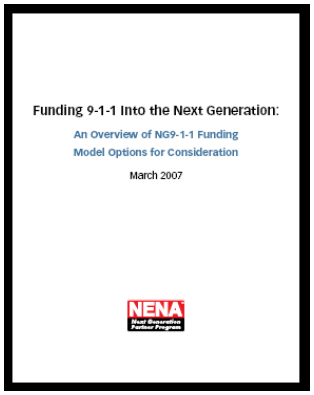
- **NG9-1-1 Cost Allocation and Cost-Reduction Strategies.** In an NG9-1-1 environment, allocating costs will be a challenge, especially for costs related to shared networks, interfaces between systems, and costs for shared facilities and resources. Determining the appropriate allocation of costs will depend on the unique circumstances of a particular NG9-1-1 implementation. Without adequate attention to appropriate governance in a shared environment, the benefits of next generation cost sharing will not be possible, and the overall funding, fund distribution, and cost allocation issues will remain unresolved.

- **Diversion of Dedicated 9-1-1 Funding Needed for NG9-1-1.** Although many states and local jurisdictions assess a surcharge or fee for 9-1-1 services, the funds collected are not always expended solely for 9-1-1 systems or PSAP maintenance and upgrades. There have been numerous, highly publicized instances of diversion of funds for non-9-1-1 uses such as for balancing state budgets and funding state police. If states and local jurisdictions continue to divert 9-1-1 funds for other purposes, it will be more challenging and take longer to transition to

NG9-1-1. As new funding mechanisms for NG9-1-1 are established, it is important that the eligible uses of funds include all components of the system as well as shared systems.

What Has Been Done?

Some progress has been made to partially resolve elements of the NG9-1-1 funding issue:



- **Identification of Alternative Funding Models for NG9-1-1**. As funding models become obsolete, it is essential to identify and adopt alternative models. One resource on alternative funding models for 9-1-1 is the NENA Next Generation Partner Program report, *Funding 9-1-1 into the Next Generation: An Overview of NG9-1-1 Funding Model Options for Consideration.* This report presents five alternative funding models for consideration while outlining the benefits and potential barriers associated with the proposed models. These five funding model options are fixed-amount surcharges on all calling services, a surcharge on access infrastructure providers, a universal statewide communications surcharge, a universal federal communications surcharge, and a user (incident) fee. As noted in this initial study, funding models may not be exclusive because the best funding model for a given deployment scenario may be a combination of several ideas. Although not included in the NENA Next Generation Partner Program report, traditional bonding for capital expenditures is another option open to state and local governments to fund public safety and other infrastructure projects.

- **Federal Legislation on 9-1-1 Fees**. Federal legislation[32] enacted in 2008 authorizes states and localities to impose fees on VoIP and commercial mobile services, but such funds must be expended in support of 9-1-1, E9-1-1, and "enhancements to such services," which would include NG9-1-1. This builds on legislation[33] that established a federal grant program for PSAPs in which eligible entities may receive funding only if the recipients certify that the state has not diverted funds for non-9-1-1 purposes.

- **Potential of Federal Grants and Loans for NG9-1-1**. Increased interest in existing and proposed federal grant programs on the part of state and 9-1-1 Authorities is one sign of increasing awareness regarding these alternatives. Grant programs administered by the National E9-1-1 ICO are now being considered as a source of NG9-1-1 funding because the 2008 legislation broadened the eligible use of federal PSAP grants to include "the migration to an IP-enabled emergency network" in addition to Phase II wireless E9-1-1.[34] Legislation has also been signed into law that will enable state or local governments to borrow from the Rural Utilities Service (RUS) to expand or improve 9-1-1 access and interoperable emergency communications.[35]

- **State Awareness and Action**. While changes in funding priorities have been slow in coming, other developments suggest that the issue of 9-1-1 fees and sustainable revenue are being recognized at the state and local levels. State legislative and executive bodies are more frequently considering the alteration of legislation that would address declining funding and changing call patterns.

[32] PL 110-283, known as the NET 911 Improvement Act of 2008, available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ283.110.pdf (last accessed February 2, 2009).

[33] PL 108-494, known as the ENHANCE 911 Act of 2004, available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_public_laws&docid=f:publ494.108.pdf (last accessed February 2, 2009).

[34] Op. Cit., PL 110-283.

[35] PL 110-246, known as the Food, Conservation, and Energy Act of 2008, available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ246.110.pdf (last accessed February 2, 2009).

What Could Be Done to Address NG9-1-1 Funding Issues?

Additional options are available at all levels of government to address potential funding shortfalls that could affect nationwide migration to NG9-1-1. These options include potential strategies or paths that would—

- Ensure NG9-1-1 upgrades are considered a fiscal priority for states and local jurisdictions and the Federal Government through outreach and education
- Transform the current funding mechanisms to address—
  - Diminishing revenue base
  - Population-based and geographical funding disparities
  - Funding allocation and governance models for shared resources
  - Service provider cost recovery
- Ensure 9-1-1 funds are preserved for 9-1-1 and emergency communications systems.

Actions could include the adoption of an entirely new funding model or use of mechanisms that may be available and authorized within the framework of existing legislation.

Ensure NG9-1-1 upgrades are considered a fiscal priority for states and local jurisdictions and the Federal Government through outreach and education

Although the Federal Government considers emergency communications systems as critical infrastructure, current economics and competing priorities at all levels of government present major challenges in making migration to NG9-1-1 a fiscal priority. Gaining that commitment requires 9-1-1 Authorities to convince decision-makers and the public of the essential connection between 9-1-1 funding and the public's continued access to lifesaving public safety services.

One of the key lessons learned from past E9-1-1 implementations is the effective role of statewide coordination in focusing priorities for funding and support of the 9-1-1 services. By applying this lesson to NG9-1-1 at the state level, governors can help lead statewide implementation of NG9-1-1 by designating a single point of contact for deployment, if one does not already exist. Such a coordinator could have authority to oversee implementation statewide and coordinate the allocation of resources, particularly during the transition period. The Federal Government may also be able to help by encouraging coordination and expanding the use of federal public safety grant program funds to include 9-1-1 services. Table 3 outlines some of the options government has to help make NG9-1-1 a fiscal priority.

Table 3: Options to Improve the Fiscal Priority of NG9-1-1

Responsible Party	Options
Federal Government 	▸ Encourage state governments and legislatures to give fiscal priority to NG9-1-1 upgrades and transition (based on nationally accepted standards and coherent statewide plans).
	▸ Encourage all levels of government to establish an effective mechanism for coordinating 9-1-1 services, where such a mechanism does not already exist.
	▸ Consider expanding the use of more federal public safety grant program funds for 9-1-1 services and for shared emergency services internetworks.

Responsible Party	Options
State Government 	▸ Consider legislation that identifies a state agency or other effective state-level mechanism (where one does not already exist) to be responsible for statewide 9-1-1 planning and coordination, and granting it appropriate authority and power.
	▸ Consider coordinating the development of statewide 9-1-1 plans to justify investments for upgrading critical emergency communications infrastructure for NG9-1-1, involving all appropriate stakeholders required for success.
	▸ Consider establishing a statewide coordinating body (where one does not already exist) that addresses the needs of all appropriate public and private representatives.
9-1-1 Authorities 	▸ Support state efforts to coordinate the development of statewide 9-1-1 plans and investment requests for upgrading critical emergency communications infrastructure for NG9-1-1.
	▸ Support state efforts to educate state and federal legislative and regulatory decision-makers on the importance of NG9-1-1 funding.

Transform current 9-1-1 funding mechanisms to address[36]—

- **Diminishing revenue base**
- **Population-based and geographical funding disparities**
- **Funding allocation and governance models for shared resources**
- **Service provider cost recovery**

With the current revenue mechanisms and funding distribution, funding for NG9-1-1 implementation (particularly during the transition period) will be limited and further complicated during tight budget times. As more consumers abandon their wireline services and move to using wireless, prepaid wireless, and VoIP technologies for their primary communications, overall revenues from the current funding model are decreasing. Consequently, changes are needed to sustain existing services while also advancing toward an IP-based NG9-1-1 system. Options that could be considered include creating technology-neutral revenue sources that reflect the complexity and diversity of the current telecommunications services and can more easily accommodate future services.

Cost recovery and cost allocation models for NG9-1-1 will also vary by implementation approach. NG9-1-1 involves moving away from closed and dedicated networks to a system with shared networks, databases, and applications in which costs related to the NG9-1-1 system are shared among all participants, some of which may be private sector entities or non-public safety governmental agencies. State governments and regulators can encourage shared services while also examining funding and cost recovery mechanisms and options. Table 4 outlines some of the options government has to improve NG9-1-1 funding levels and mechanisms.

[36] Actions could include the adoption of an entirely new funding model or use of other options available within the framework of existing legislation.

Table 4: Options to Improve NG9-1-1 Funding Levels and Funding Mechanisms

Responsible Party	Options
Federal Government 	▸ As possible and appropriate, provide funding for the capital costs of NG9-1-1 planning, design, procurement, and implementation.
	▸ Consider legislation that allows use of federal funds to pay for NG9-1-1 portion and use of underlying IP based emergency service internetworks and core services.[37]
State Government 	▸ Consider enacting legislation that imposes a technologically neutral 9-1-1 funding mechanism that accommodates all current and future devices and services capable of accessing 9-1-1 (e.g., text messaging, prepaid wireless, sensors and alarms).
	▸ Identify opportunities to offset the cost of NG9-1-1 by sharing infrastructure, resources, and services with, or simply interconnecting with, other public safety, non-public safety government, or private sector entities.
	▸ Consider enacting legislation that requires leveraging economies of scale to mitigate rural/urban disparities, ensuring efficient use of 9-1-1 revenues, and conducting annual audits on the use of the 9-1-1 funds.
	▸ Establish a funding mechanism or combination of funding mechanisms that best suit a state's needs.[38]
	▸ Consider legislation that allows 9-1-1 fees to be used to pay for the state's NG9-1-1 portion and use of an IP-based emergency service internetwork.
	▸ Review how cost recovery is allocated to ensure fairness across all technologies and services, and determine whether service provider cost recovery can and should be provided.
9-1-1 Authorities & PSAP Administrators 	▸ Work with state government to review how cost recovery is allocated to ensure fairness across all technologies and services, and determine whether service provider cost recovery can or should be provided.
	▸ Consider innovative funding approaches.

Ensure 9-1-1 funds are preserved for 9-1-1 and emergency communications systems

The diversion of funding for 9-1-1 implementation is an ongoing issue that is not solely related to NG9-1-1 implementation. In addition, there is no uniformity among states regarding what constitutes acceptable or unacceptable uses of 9-1-1 funds. Regardless, if funds dedicated for 9-1-1 continue to be used for unrelated purposes, then migration to NG9-1-1 will likely be affected. States and local governments that collect funds for 9-1-1 and restrict the use of those funds solely for the purposes for which they were collected will likely achieve NG9-1-1 more rapidly than those who continue to divert these funds. In addition, if surplus funds should accumulate, these funds could be reserved for implementation of NG9-1-1 and 9-1-1's portion of an emergency service internetwork.

[37] Additional information on core services is available at: http://www.comcare.org/Core_Services.html (last accessed February 2, 2009).

[38] The preponderance of stakeholder comments on the Preliminary Transition Plan supports a uniform statewide surcharge collected and distributed at the state level to (1) leverage economies of scale, (2) streamline the remittance process for carriers by eliminating the multiplicity of remittance points that currently exist, (3) eliminate population-based funding disparities between urban and rural areas.

At the federal level, the Congress has provided an incentive by withholding federal 9-1-1 grant monies from states and political subdivisions that misappropriate, misallocate, and divert 9-1-1 monies from their intended purpose. It has also required the FCC to monitor and report on states' collection and usage of 9-1-1 funds, including information regarding the diversion of 9-1-1 funds from intended purposes.[39] Table 5 outlines some of the options government has to eliminate diversion of 9-1-1 dedicated funds.

Table 5: Options to Preserve 9-1-1 Dedicated Funds for Emergency Communications

Responsible Party	Options
Federal Government 	▸ Consider expanding and strengthening existing Federal requirements that state and local 9-1-1 Authorities to use 9-1-1 funds, surcharges, and fees for costs attributable to 9-1-1 operations, services, and equipment.
	▸ Consider providing guidance regarding what constitutes minimum 9-1-1 features and functions that are appropriate uses of 9-1-1 revenues.
	▸ Implement and oversee existing requirements concerning eligibility for 9-1-1 grant funding to states that do not divert 9-1-1 funds.
	▸ Consider expanding and strengthening existing statutory provisions that 9-1-1 funds be used exclusively for the provision of 9-1-1 emergency communications services (e.g., 9-1-1, E9-1-1, NG9-1-1, and related or future upgrades).
State Government 	▸ Consider requiring that 9-1-1 funds be used exclusively for the provision of 9-1-1 emergency communications services (e.g., 9-1-1, E9-1-1, NG9-1-1, and related or future upgrades).
	▸ Review statutory provisions to ensure funding policies support next generation goals and visions (i.e., shared infrastructure and economies of scale).
	▸ Identify the appropriate uses of 9-1-1 funds and then monitor collected funds and 9-1-1 Authorities to ensure 9-1-1 funds are used for costs solely attributable to 9-1-1.
9-1-1 Authorities & PSAP Administrators 	▸ Strengthen checks and balances to ensure funds are used only for the provision of 9-1-1 services, including shared services (e.g., 9-1-1 portion of emergency services internetwork).
	▸ Analyze current 9-1-1 system costs and determine constant costs that will continue in an NG9-1-1 environment and new costs to assist regional or state entities responsible for NG9-1-1 funding and planning.

Why Does It Matter?

Achieving NG9-1-1 funding for emergency communications systems must be a priority. Approximately half of the Nation's public safety agencies plan to replace their existing radio systems within the next 5 years. Along with public safety radio systems, 9-1-1 systems will also need to be upgraded as the public continues to adopt, as their primary means of communications, newer IP-based technologies that cannot access 9-1-1. Furthermore, to promote information sharing among all emergency responders, 9-1-1 systems need to be on a technology platform similar to the systems used by other public safety agencies. This is important because NG9-1-1 is defined as an application within a larger next generation emergency communications system. These systems would run on a larger emergency services internetwork, which

[39] PL 110-283, known as the NET 911 Improvement Act of 2008, available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ283.110.pdf (last accessed February 2, 2009).

may be regional, statewide, or interstate in nature. Within such a framework, the inherent economies of scale would reduce overall cost and thereby minimize funding requirements.

Sufficient and sustained funding assures effective emergency communications for citizens in need and their connection with the public safety officials responding to those needs. If funding issues are not addressed, call takers and public safety agencies will continue to be unable to receive 9-1-1 calls from people using text messaging, and personal digital assistants (PDA) and other personal communications devices used with increasing frequency.

For Additional Information

As the NG9-1-1 system begins to become a reality, additional information regarding funding can be found at—

- 9-1-1 Industry Alliance: *2008 Study on the Health of the US9-1-1 System*: http://www.911alliance.org/9IA_Health_of_US_911%20_2_.pdf (last accessed February 2, 2009).
- NENA: *Funding 9-1-1 Into the Next Generation: An Overview of NG9-1-1 Funding Model Options for Consideration*: http://www.nena.org/media/File/NGFundingReport.pdf (last accessed February 2, 2009).
- Congressional Research Service Report for Congress: *Emergency Communications: The Future of 911:* http://opencrs.com/getfile.php?rid=65747 (last accessed February 2, 2009).
- Holloway, James E., et al., *Regulation and Public Policy In The Full Deployment of the Enhanced Emergency Call System (E9-1-1) and Their Influence on Wireless Cellular and Other Technologies*, 12 B.U. J. Sci. & Tech. L. 93, 125 (2006). Available (for viewing) at: http://www.bu.edu/law/central/jd/organizations/journals/scitech/volume121/documents/holloway_EIC_WEBformat.pdf (last accessed February 2, 2009).

Operations

Strategic Options for NG9-1-1 Operations

Background

As implementation of the NG9-1-1 architecture continues, PSAPs will have to determine how to modify their existing practices, procedures, and resources to implement and accommodate NG9-1-1 services. Several operational and administrative issues facing Authorities and PSAPs must be addressed, including—

- **New Expectations and Responsibilities of Call Takers**. As a result of the introduction of NG9-1-1 technologies, PSAP operations will face new challenges associated with the increase in different types of real-time multimedia information—text, still images, or video in addition to voice—passing between a person needing assistance or a sensor/automated device and the various routing end-points, including the call taker. The increased quantity of available multimedia data will enhance and expand existing call-taking functions. It may also extend the time it takes to process 9-1-1 calls, increase the workload of the call taker, and significantly change the call taker's experience (e.g., seeing the incident versus hearing the incident). Receipt of calls from IP-based communications devices will require administrators to establish appropriate processes and procedures that ensure call takers' ability to maintain efficient and effective response to emergency situations.

- **Broader Operational Responsibilities for 9-1-1 Authorities**. In addition to its effects on PSAP operations, including the call takers, the functions inherent to the NG9-1-1 environment will influence how 9-1-1 Authorities support PSAP operations and administration and how they coordinate with other nearby 9-1-1 Authorities. IP-based communications create the potential for resource, workload, and data sharing among formerly distinct PSAPs and 9-1-1 Authorities. 9-1-1 Authorities, especially those overseeing multiple PSAPs, will confront the challenge of managing a wider set of shared resources than is typical in the current system, enhancing and expanding capabilities while ensuring personnel, including call takers, can expeditiously and correctly handle the new workload. 9-1-1 Authorities will also have more options for solving problems (e.g., call overload, cost of shared services). 9-1-1 Authorities will likely have considerably more responsibility for database functions, along with system and network management in a multi-PSAP environment.

- **New Responsibilities and Challenges for PSAP Administrators.**[40] At the local level, responsibilities of PSAP Administrators will likely expand, particularly with regard to configuring and managing the NG9-1-1 system for their respective PSAPs. Although PSAP Administrators may receive support and guidance from governing 9-1-1 Authorities, at the local level, these individuals will be on the front line for ensuring their specific facilities, staff, and resources meet the requirements and expectations necessary for implementing NG9-1-1.

- **Hiring and Training Needs**. Although hiring standards and training programs for new call takers vary in duration, content, and format from PSAP to PSAP, the use of NG9-1-1 technologies may require new hiring and training, compensation, and curricula development methodologies as NG9-1-1 systems are introduced. Revamped introductory training, as well as continuing education (retraining in some cases) for experienced staff, will be critical to the success of any

[40] The PSAP Administrator directs the overall operation of a PSAP and is responsible for the direct supervision, training, and administration of the PSAP's staff. The PSAP Administrator may be responsible for the maintenance of PSAP call-taking equipment and supporting peripherals, as well as the PSAP's budget and staff support. *USDOT NG9-1-1 System Description and High-Level Requirements Document,* July 31, 2007. http://www.its.dot.gov/ng911/pdf/NG911_HI_RES_Requirements_v2_20071010.pdf (last accessed February 2, 2009).

NG9-1-1 implementation. In addition to operational staff, technical and support staff will need the skills to configure, maintain, and troubleshoot advanced networks, systems, and components. Likewise, public and private call taker and dispatcher certification programs will need to be updated to account for the new responsibilities and skill sets required of PSAP employees to fully use the capabilities of an NG9-1-1 system. While NG9-1-1 technologies enable consolidation of services, this benefit must be carefully weighed against the increased workload presented by additional forms of data in order to arrive at adequate and appropriate staffing levels for call taking.

What Has Been Done?

There has been recent progress in addressing NG9-1-1 operational issues:

- **Education and Training for Call Takers**. Future training needs and the framework for the necessary curriculum for NG9-1-1 training have been key topics of discussion throughout the PSAP community and public safety associations. As a starting point, public safety communications organizations and associations are reviewing existing education and training offerings and services to determine potential gaps and recommendations for training in the future.

- **Increased Awareness of NG9-1-1 Technology and Time Frames**. NG9-1-1 is still considered a "new topic" by many in public safety communications. Associations and organizations have been delivering orientations and informational sessions at trade shows, conferences, and other meetings in an effort to educate communities and public safety personnel about what NG9-1-1 is, the features it can provide, and reference information to assist in planning for NG9-1-1 implementation. Operationally focused involvement in development of needed technology and data, has increased, assuring that national technical recommendations and guidelines are appropriate.

- **Standard Operating Procedures**. 9-1-1 Authorities, trade associations, and other stakeholder groups are examining such issues as requirements for the development of remote PSAP functions, SOPs for handling 9-1-1 calls that are delivered with pictures and video, and SOPs for language services in the pre-next generation and next generation environments. NENA's Accessibility and Standard Operating Procedures Committees[41] continue to develop requirements and protocols for delivery and handling of text messaging.

- **NG9-1-1 Operations and Human Resources Requirements**. 9-1-1 Authorities and PSAP Administrators are beginning to examine NG9-1-1 hiring, staffing, and scheduling issues. Work has also started in NG9-1-1 contingency planning, including backup, overflow, and redundancy issues. This contingency planning, along with development of requirements for virtual PSAPs, is intended to assist PSAPs in building a comprehensive plan to test all aspects of their critical NG9-1-1 components using drills and exercises. Using lessons learned concerning the human-machine interface (HMI) within the Proof of Concept (POC)[42], additional focus on this important topic has begun.

- **Lessons Learned in Proof of Concept.** Several operationally-focused lessons learned resulted from the POC[43]. Appropriate entities have already begun to expand on those lessons and the

[41] NENA maintains several standing working groups within its Operational Development Committee (ODC). For more information, see the associated website http://www.nena.org/pages/ContentList.asp?CTID=15 (last accessed February 2, 2009).

[42] The POC demonstrated the feasibility of key features and functionalities planned as part of NG9-1-1. For example, the HMI is a PSAP user interface that allowed call takers to quickly and intuitively interpret the data and forward it as appropriate. POC system design, test plan and demonstration results documents are available at: http://www.its.dot.gov/ng911/ng911_pubs.htm (last accessed February 2, 2009).

[43] USDOT ITS JPO, *NG9-1-1 Initiative – Proof-of-Concept Testing Report* is available at: http://www.its.dot.gov/ng911/pdf/NG911_POCTesTReport091708.pdf (last accessed February 2, 2009).

issues revealed as part of the POC, including those gathered from the many stakeholders involved. The POC final report provides considerable detail regarding both the lessons and issues and the key stakeholders who must be involved to resolve the issues and gaps identified. Key topics include—

- Processes for handling abandoned, lost, and dropped calls
- Development of call-taker interactions specifically related to short messaging service (SMS) as part of text messaging
- CONOPS development for business rules and policy-based routing
- Expansion of integration of telematics data to include a metric that identifies criticality
- Processes related to automatic third-party conferencing
- Effective demonstration of sensor data integration into the system, including PSAPs
- Definition of a flexible, authoritative, hierarchical governance and operation model for call handling and routing
- Increased development of standards and interoperability processes for integrating external systems and services into NG9-1-1
- Creation of flexible HMI software architecture for taking in new data sets
- Consideration of accreditation of NG9-1-1 systems, including PSAPs, to ensure interoperability.

What Could Be Done to Address NG9-1-1 PSAP Operational Issues?

Additional options are available for stakeholders to address potential challenges that could affect PSAP operations. These options include potential strategies or paths that would—

- Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call
- Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs
- Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of virtual PSAPs.

Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call

Although it is anticipated that the NG9-1-1 system will include an HMI solution to assist call takers in answering and processing call data, call takers may still need to analyze and make decisions regarding what information should be transferred to the dispatchers and responder agencies based on their training and experience. Consequently, in the NG9-1-1 environment, call takers will need to be trained to address call-handling activities, such as answering multiple text messages from different callers during the same time period, and understand text message forms, such as the use of abbreviations, symbols, and short word sets. To date, many TTY/TDD 9-1-1 calls are not differentiated from voice 9-1-1 calls in terms of how they are distributed among the call takers; however, with the NG9-1-1 system, incoming voice, text message or TTY/TDD calls can be automatically distinguished so that an assigned set of PSAPs or call takers within a PSAP would handle text-based calls, while others would handle voice calls.

To address these needs, associations like NENA and APCO can work together to develop the model curriculum, protocols, and SOPs. These efforts can be supported through state and 9-1-1 Authority training guidelines and approved training programs. PSAP Administrators will ultimately be responsible for implementing training and ensuring compliance, so their participation and feedback in the development of such material and recommendations will be key in refining and improving training and performance of NG9-1-1 call takers.

It also behooves public safety authorities and organizations and industry developers of PSAP software and hardware to establish partnerships. Considerations related to the HMI are optimally addressed during the design phase, and call takers and dispatchers can be invaluable in providing ideas and advice in designing and manufacturing hardware and software that will facilitate rather than inhibit efficient and effective call processing. Partnerships between public safety and service providers are also key in providing 9-1-1 call data in standardized formats and delivery mechanisms as advanced technologies (e.g., text messaging) are added to 9-1-1 services.

Developing the appropriate educational materials and implementing or expanding existing training programs is critical to a successful NG9-1-1 implementation. It is important that such development include identifying and involving the appropriate representative organizations, state-level authorities, service and equipment providers, and others. Table 6 outlines some of the options to address call-taker training and staffing for NG9-1-1.

Table 6: Options to Address Call-Taker Training and Staffing for NG9-1-1

Responsible Party	Options
Public Safety Communications Organizations and Associations 	▸ Develop guidelines for personnel skills and qualifications and effective training programs, including model training requirements for processing NG9-1-1 calls (e.g., call handling, call treatment, and records management protocols). Analyze the possible impact on call takers of interactive visual presentation of emergency scene and develop appropriate educational and/or training recommendations to counter any possible negative impacts.
	▸ Develop models for sharing data and managing information among PSAPs, public safety responders, and other authorized stakeholders.
	▸ Develop standardized common terminology for call takers using a process similar to ongoing national standardization efforts involving various responder entities and others.
Federal Government 	▸ Promote and support funding methods that provide necessary training and training materials.
	▸ Consider promoting public safety communications as a rewarding career opportunity in an effort to improve PSAP staffing levels.
State Government 	▸ Maintain and improve state-level standard training requirements for call takers (e.g., 40 hours of training to maintain certification).
	▸ Promote and support additional funding for call taker training.
9-1-1 Authorities and PSAP Administrators 	▸ Adopt training standards and plans for processing NG9-1-1 call types, implement training programs, and establish personnel qualifications.
	▸ Involve call takers within the jurisdiction in developing the appropriate education and training materials and in developing the appropriate training methods. Also, seek call-taker input when developing local SOPs and related processes.
	▸ Participate in and provide feedback on any state-level call-taker training.

Responsible Party	Options
	▸ Maintain and expand internal training programs to ensure call-taker proficiency.
	▸ Update and maintain SOPs pertaining to system and data management, data sharing, and call transfer.
	▸ Update policies and procedures for effective disaster and contingency planning.
Service and Equipment Providers 	▸ Establish partnerships with public safety authorities during the design phase of equipment and services and through appropriate standards processes.
	▸ Work in partnership with public safety authorities to ensure hardware and software will provide 9-1-1 call data in a useful format and facilitate rather than inhibit efficient and effective call processing.

Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs

Much of the traditional 9-1-1 infrastructure is part of the existing telecommunications network, and its maintenance, upkeep, and oversight are typically handled by the dominant wireline telephone service provider in the region. Within NG9-1-1, the responsibility for the infrastructure, including its maintenance, upkeep, and oversight will likely fall under a 9-1-1 Authority at the local, regional, or state level (or a combination thereof). Consequently, as NG9-1-1 is deployed, 9-1-1 Authorities will need to adjust and adapt to a broader set of responsibilities inherent in managing more complex technology systems.

To ensure 9-1-1 Authorities are able to support and manage networks and system resources that are shared across PSAP service areas, it will be important for national and federal entities to consider developing necessary tools and guidance. In some cases, these tools may be best practices for system configuration and administration. 9-1-1 Authorities, in turn, will need to establish the appropriate mechanisms and structure to accomplish the database and network functions necessary to support the NG9-1-1 enterprise.

Table 7: Options to Improve 9-1-1 Authorities' Ability to Manage NG9-1-1

Responsible Party	Options
Public Safety Communications Organizations and Associations 	▸ Develop a generic templates (e.g., Memorandum of Understanding [MOU]) so that 9-1-1 Authorities can work together (across state and jurisdictional lines) to determine processes for call overflows, backup conditions, and other automatic routing conditions, as well as sharing of services (e.g., GIS).
	▸ Develop implementation, operations, and maintenance best practices and standards, and share them among 9-1-1 Authorities.
	▸ Develop SOPs, protocols, and definitions for system configuration and management of different call types (e.g., text messages).
	▸ Develop database management procedures.

Responsible Party	Options
	▸ Develop, support, promote, and conduct appropriate education and training materials for 9-1-1 authority staff and for PSAP Administrators and other support staff.
	▸ Develop appropriate standards and subsequent recommendations; along with related education and training materials regarding the NG9-1-1 system, IP network, database operations, and system operations; for use by 9-1-1 authorities and other implementers.
Federal Government 	▸ Gather and make available implementation, and operations and maintenance best practices, standards, and lessons learned, and share them among 9-1-1 Authorities.
	▸ Develop model strategic plans to help 9-1-1 Authorities at all levels manage NG9-1-1 migration (e.g., interagency coordination, training, security).
	▸ Consider working with stakeholders to establish procedures and standards to enable coordination of data rights management, access control, and identity management procedures and registries (e.g., who has access to what database and information and who has authority to initiate and receive information).
State Government 	▸ Promote and support adequate funding for management of NG9-1-1.
	▸ Facilitate appropriate relationships to enhance statewide emergency management and interoperability plans.
	▸ Promote and support measures to ensure adequate security of the NG9-1-1 system.
	▸ Collectively develop operations processes and procedures for intrastate, statewide, and/or interstate systems.
	▸ Establish and implement data rights management, access control, and identity management procedures and registries specific to agencies within the respective state. Such registries and procedures concern the ability of agencies and individuals to send, receive, read, and manipulate emergency information, as authorized.
	▸ Collectively develop appropriate state requirements and recommendations for NG9-1-1 system, IP network, database operations, and system operations for use by the appropriate 9-1-1 Authority personnel.
9-1-1 Authorities and PSAP Administrators 	▸ Develop and execute MOUs so that 9-1-1 Authorities can work together (across state and jurisdictional limits) to determine processes for addressing call congestion, load sharing, backup conditions, and other automatic routing conditions, as well as sharing of services (e.g., GIS).
	▸ Where needed, redefine roles and responsibilities for NG9-1-1 system administration.
	▸ Test the NG9-1-1 system to ensure that the level of quality of service is maintained based on terms and conditions agreed upon with the service providers.
	▸ Test the NG9-1-1 client application (e.g., HMI) to ensure that the level of quality of service is maintained based on terms and conditions agreed upon with the service providers.
	▸ Assess the level of resources, both physical and human, necessary to provide NG9-1-1 coverage and service to an area based on population, number of calls, and other factors.

Responsible Party	Options
	▸ Adjust data management procedures, including data rights management, access controls and identity management, to meet the needs of the local 9-1-1 Authority and the needs of responder agencies.
	▸ Develop appropriate regionally focused education and training materials and programs to address altered and/or enhanced responsibilities and functions of various support staff.
Service and Equipment Providers 	▸ Establish relationships with public safety authorities during the design phase of databases and services to ensure consistency with and promote adherence to established standards and protocols.
	▸ Work in partnership with 9-1-1 and public safety governing authorities to harness the experience of industry, which has already developed complex data sharing systems for business that will be applicable to data sharing environment of NG9-1-1.

Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of virtual PSAPs

NG9-1-1 includes virtual PSAP capabilities, permitting flexible management of day-to-day operations and for disasters and major events. There are operational issues associated with this new concept and increased responsibilities for 9-1-1 Authorities and PSAP Administrators. For example, in a virtual PSAP arrangement, NG9-1-1 equipment serves multiple PSAPs, with each PSAP having its own privileges but using a global administrator. These multiple PSAPs may be part of an intrastate or even interstate region. Virtual PSAPs may also be configured with multiple geographically dispersed call takers, operating as a single logical PSAP, rather than being situated in a single building. Consequently, in an NG9-1-1 environment, where physical geographic location is no longer a limiting factor, virtual PSAPs and networks of PSAPs provide additional potential resiliency to support contingency planning. To address these issues, organizations like NENA, APCO, and NASNA could provide valuable insight and guidance to 9-1-1 Authorities and PSAPs.

Table 8: Options to Address Contingency Planning and Virtual PSAPs

Responsible Party	Options
Public Safety Communications Organizations and Associations 	▸ Develop requirements for virtual PSAPs.
	▸ Develop requirements and options for NG9-1-1 contingency planning, including those addressing backup, overflow, redundancy issues.
	▸ Develop, support, promote, and conduct appropriate education and training materials and programs.
Federal Government 	▸ Obtain PSAP operations best practices and lessons learned and share them among 9-1-1 Authorities and PSAPs.

Responsible Party	Options
State Government 	▸ Facilitate appropriate relationships to enhance statewide emergency management and interoperability plans.
	▸ Assist in the development of virtual PSAP capabilities.
9-1-1 Authorities and PSAP Administrators 	▸ Develop requirements for virtual PSAPs within the jurisdiction.
	▸ Develop requirements and options for NG9-1-1 contingency planning, including those addressing backup, overflow, redundancy issues, for the jurisdiction.
	▸ Participate in operational and technical working groups to help define model requirements for virtual PSAPs and contingency requirements.
	▸ Hold regular combined training exercises to test the contingency plans and work to ensure continuity of operations at all times.
	▸ Develop appropriate educational materials and implement appropriate training programs for all personnel affected by implemented virtual PSAP capabilities.
Service and Equipment Providers 	▸ Establish partnerships with public safety authorities during the design phase of equipment and services and through appropriate standards processes.
	▸ Work in partnership with 9-1-1 and public safety governing authorities to harness the expertise of international call center industry, which has significant experience in deploying distributed virtual call center technology.

Why Does It Matter?

NG9-1-1 will create new (and expand existing) complex systems that most likely will exceed current systems' scope and capabilities. As we migrate to—and effectively maintain—the new systems, many factors will affect the process—increased capabilities to receive and disseminate information; the changing roles of 9-1-1 Authorities, call takers, and other PSAP personnel; monetary and human resource issues; and an increased need for expanded and continuing training. If these new systems and their associated networks, policies, and procedures are not appropriately maintained and administered, key operational functions will be at risk. This could negatively affect the delivery and timely handling of 9-1-1 calls. Resolution of NG9-1-1 operational issues requires strategic decision-making regarding the creation and/or upkeep of emergency service, system management, data management, infrastructure, human resources, training, and contingency planning procedures at all levels of government. Well informed and considered decisions will ensure the availability and accuracy of information, as well as engender effective, stable, and consistent emergency response and incident management.

For Additional Information

Although some work has been done within the community to establish strategic operational guidelines to transition to NG9-1-1, much work remains. A coordinated effort to develop, share, implement, and refine these plans will maximize the PSAP's effectiveness. 9-1-1 Authorities should start or continue to heavily participate in training and educational opportunities, grant writing, public relations and awareness activities, and to forge relationships with legislators and regulators at all levels of government (local, state,

and federal). Knowledge and awareness of available opportunities is key, and that information is and will continue to be shared at meetings and conferences organized by a variety of organizations throughout the public safety community. Additional information regarding operations can be found at—

- NENA: *NENA IP-Capable PSAP Minimum Operational Requirements Standard*. http://www.nena.org/media/File/NENA58-001OpsIP-PSAPStd-final06092007.pdf (last accessed February 2, 2009).
- NENA: *2008 ODC Presentations, Documents and Notes:* http://www.nena.org/pages/Content.asp?CID=450&CTID=73 (last accessed February 2, 2009).
- NENA: NG9-1-1 system and PSAP operational standards currently being developed (will be published at: http://www.nena.org/)

Strategic Options for NG9-1-1 Standards and Technology

Background

The current 9-1-1 system is limited to receiving the established set of ANI/ALI information, which is typically only 512 characters in length. Additional information, which is sometimes available today, is not readily accessible or provided to the call takers because of constraints in the legacy equipment. Although consumer telecommunication products and services will continue to evolve, standards for NG9-1-1 related technology and communications protocols are still in the process of being developed and finalized. Standardization is essential to achieve national interoperability and to share data among geographically dispersed PSAPs and other emergency response agencies. The technological advancements and evolution of standards will support the need for change in the 9-1-1 system. The ability for the public emergency communications infrastructure to keep pace with the continuing evolution of technology and standards is predicated on the ability to recognize and address the following key standards and technology issues related to the migration to NG9-1-1:

- **NG9-1-1 Open Standards Development and Acceptance.** The underlying concept of the NG9-1-1 system is an open architecture and relies on many different technical standards to support its requirements. To date, many communications, networking, and telephony standards that will affect NG9-1-1 are still in development or need to be selected and accepted before the NG9-1-1 system can be implemented. IP is the technology of the future, and public safety related standards need to address the delivery and processing of 9-1-1 calls on an IP platform. Until NG9-1-1 related baseline standards are developed, selected, fully vetted, and ultimately adopted, uncertainty among 9-1-1 decision-makers and service and equipment providers may hinder migration to NG9-1-1.

- **NG9-1-1 System Access and Security Controls.** The NG9-1-1 system, like other mission-critical systems, will continually encounter attempts at illegal access, including concerted malicious attacks (e.g., denial of service, virus or worm transmission). Therefore, to mitigate security risks and control access to the NG9-1-1 system, prescribed, standardized security controls and certification and authentication mechanisms need to be developed that define the access methods, rules, and controls by which users and systems access the system.

- **Location Determination and Acquisition for NG9-1-1.** A 9-1-1 caller's location information is needed to route emergency calls to the most appropriate PSAP. Subsequently, the call taker must identify the location of the emergency to ensure that responder agencies are dispatched to the correct location. In the NG9-1-1 environment, the increased number of devices that can call 9-1-1 and the associated services, infrastructure, and access providers that provide the means to receive those calls will make it challenging to determine how to acquire the location information and who is responsible for providing that information.

- **NG9-1-1 Call Routing and Prioritization Protocol and Business Rules Development.** In the NG9-1-1 environment, call routing and prioritization will be challenging because the open architecture of the NG9-1-1 system will enable routing of 9-1-1 calls, based on multiple factors, throughout the Nation and internationally instead of limiting routing to a specific jurisdiction. It is expected that NG9-1-1 calls will continue to be routed based on location as the initial factor; however, other factors, such as call type and other data items, must be identified for use in routing and prioritizing NG9-1-1 calls.

- **NG9-1-1 Key Architecture Considerations.** The supporting technology infrastructure for NG9-1-1 must meet a variety of needs of the global community of public safety communications

professionals. Systems must be scalable, both vertically and horizontally, as well as extensible, permitting future technologies to be woven into the system without requiring wholesale replacement. To ensure reliability, interoperability across disparate systems and elimination of single points of failure are of utmost concern.

- **Determination of Data to Be Transmitted.** Digital, IP-based technologies enable video, photographs, data sets, and voice transmissions to the PSAP. Whether this additional information truly enhances 9-1-1 service depends on its utility as actionable information for first responders, including call takers. All appropriate stakeholders must "begin with the end in mind" and work with law enforcement, fire services, and EMS professionals to determine which data should be transmitted for a 9-1-1 call. For example, when a car crash occurs, more than 50 data elements can be transmitted from telematics providers to the PSAP. To avoid overwhelming the call taker, it is expected that NG9-1-1 will allow each individual emergency entity to pre-determine what data is available for its use. This flexibility will allow acquisition of only the most useful data for dispatch and patient triage—data that can add to the efficiency or effectiveness of the emergency response.

What Has Been Done?

Significant progress has been made to partially resolve elements of the NG9-1-1 standards and technology issues:

- **SDO Standards Efforts.** Several SDOs, including Internet Engineering Task Force (IETF), NENA, and APCO, have been actively working to develop NG9-1-1 related standards.
  - NENA's work to conceptualize what is now known as NG9-1-1 began in 2000, with active technical development beginning in 2003. NENA's 08-002 [IP] *Functional and Interface Standards for NG9-1-1* (`i3') Technical Standard Document identifies standards and requirements for various components of the NG9-1-1 System Architecture. NENA's geospatial and NG9-1-1 data standards, system operations, and PSAP operations standards are forthcoming.[44]
  - The IETF Emergency Context Resolution with Internet Technologies (ECRIT) working group has developed the Location to Service Translation Protocol (LoST) to route NG9-1-1 calls to the most appropriate PSAP. In addition, NG9-1-1 relies on an IP-based infrastructure that allows the transmission of voice, video, images, and data using different protocols.[45] For example, voice calls will use the Session Initiation Protocol (SIP), which is the focus of one of the IETF's working groups.
  - The OASIS Emergency Management Technical Committee currently promotes data interoperability standards, and several organizations, including NENA, are collaborating on a suite of specifications called the Emergency Data Exchange Language (EDXL). EDXL is an Extensible Markup Language (XML)-based model intended to create an integrated framework for a wide range of data exchange standards to support emergency operations.[46]

- **NG9-1-1 Initiative Architecture Analysis Report.** As part of the USDOT NG9-1-1 Initiative, an analysis of the notional NG9-1-1 architecture was performed. This resulting report[47] provides a high-level analysis and identifies the technological deficiencies and gaps that must be addressed

[44] NENA standards are available at: http://www.nena.org/pages/ContentList.asp?CTID=5 (last accessed February 2, 2009).

[45] Issues unique to emergency communications must be solved. These include the ability for IP to transmit background sounds on which call takers may rely. This is not a capability used in commercial VoIP calling but can be critical for 9-1-1 calls. Another requirement is that text messages must be handled as interactive conversations in NG9-1-1 system design.

[46] More information about the OASIS Emergency Management Technical Committee is available at: http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=emergency last accessed February 2, 2009). For more information on EDXL see: http://xml.coverpages.org/edxl.html (last accessed February 2, 2009).

[47] USDOT ITS JPO, *Next Generation 9-1-1 (NG9-1-1) System Initiative: Architecture Analysis Report*, November 2007, available at: http://www.its.dot.gov/ng911/pdf/1.F2_FINAL_MED_ArchitectureAnalysis_v1.0.pdf (last accessed February 2, 2009).

to achieve a nationwide solution. Although not a blueprint for implementing a production system, the report describes the framework for how a system could be constructed and many of the components and subsystems that must be considered.

- **NG9-1-1 Proof of Concept Test Report**. The USDOT NG9-1-1 POC task resulted in a set of lessons learned and functional results and issues gained from testing a prototype NG9-1-1 demonstration system of core NG9-1-1 capabilities. The report highlights a number of critical technical and standards issues verified or identified during POC testing, including—

  - Current product constraints drive integration challenges. The vendor community must evolve to meet the needs of NG9-1-1. Revised network and system management for NG9-1-1 will require improved means and a movement of responsibilities toward public safety entities.
  - Test tools, network monitoring applications, traffic generators, and packet sniffers should be improved. Security policies and best practices challenges must be addressed.
  - Redundancy, reliability, and overflow capabilities for 9-1-1 networks must be maintained and improved.
  - Study and standardization of video compression methodologies would provide the necessary quality and performance for emergency communications.
  - Call propagation timing should be optimized.
  - Addition to or upgrade of location acquisition technology for each call origination technology would provide mechanisms for injecting or acquiring emergency callers' location as the call is placed.
  - There are integration challenges associated with supporting multimedia in the NG9-1-1 and PSAP environments and related standardization improvements.
  - Geospatial data fusion with NG9-1-1 and PSAPs and integration of existing geospatial platforms and systems with NG9-1-1 software and infrastructure is necessary.

- **Revision of Trauma Triage Decision Scheme to Include Telematics Data.** In March 2005, a panel of experts convened to revise what was known as the American College of Surgeons Committee on Trauma (ACS COT) Field Triage Decision Scheme. The meeting was convened by the National Center for Injury Prevention and Control of the Centers for Disease Control and Prevention (CDC) with support from the Office of Emergency Medical Services of the National Highway Traffic Safety Administration. This new decision scheme, intended for widespread use, provides a uniform, nationally consistent method of conducting field triage with the ultimate goal of saving more lives. It will allow EMS providers to use advanced automatic collision notification data to inform them of the probable extent of the patient's injuries. This data can enhance the accuracy of decisions regarding resource utilization and triage of victims to appropriate levels of care.

- **Academic Research and POC Testing.** Universities such as Columbia University and Texas A&M University have undertaken research and development and testing of IP-based protocols and related software services in support of emergency communications. Many of the IETF IP design standards have been developed in university settings and applied in demonstration models, including the USDOT NG9-1-1 Initiative.

What Could Be Done to Further Address NG9-1-1 Standards and Technology?

Additional options are available throughout the 9-1-1 community to continue to address potential standards and technology shortfalls that could affect nationwide migration to NG9-1-1. These options include potential strategies or paths that would help various stakeholder groups to—

- Complete and accept NG9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing

- Establish system access and security controls to protect and manage access to the NG9-1-1 system of systems
- Determine the responsible entity and mechanisms for location acquisition and determination
- Determine routing and prioritization protocols and business rules.

Complete and accept NG9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing

The NG9-1-1 system relies on open, non-proprietary standards to develop an architectural framework that promotes system interoperability and emergency data sharing. Without the development and acceptance of NG9-1-1 related standards by the 9-1-1 community and service providers, the ability to interconnect systems and provide ubiquitous, interconnected NG9-1-1 services across the Nation may not be realized. All appropriate stakeholders should participate in identifying and developing critical and necessary NG9-1-1 related standards to ensure those standards meet the needs of the 9-1-1 community. Finally, the Federal Government could promote and support a standard coordinating entity with dedicated attention to the development of standards and technologies considered essential to NG9-1-1 and coordinate emergency data standard coordination and harmonization. Table 9 outlines some of the options federal and state governments and SDOs can take to develop and promote acceptance of NG9-1-1 open standards.

Table 9: Options to Develop and Promote Acceptance of NG9-1-1 Open Standards

Responsible Party	Options
Federal Government 	▸ Consider facilitation and coordination of 9-1-1 stakeholders (e.g., SDOs, private and public stakeholders) to identify all standards work and technology development currently underway regarding relevant communications technology.
	▸ Consider facilitation and coordination of SDOs and public and private stakeholders to conduct a gap analysis of existing standards development work against the industry-accepted architectural model and identify standards that will need to be developed and/or the standards already developed that are inconsistent with the model.
	▸ Encourage appropriate SDOs and industry groups to address standards work that must be completed or modified to ensure a comprehensive standards and technology environment for NG9-1-1.
	▸ Promote and support a coordinating entity with dedicated attention to the development of standards and technologies considered essential to NG9-1-1, and facilitate emergency data standard coordination and harmonization among all emergency response professions.
	▸ Encourage states to enact laws or regulations that mandate the use of open standards for NG9-1-1 systems.
State Government 	▸ Encourage 9-1-1 Authorities to procure equipment that meets open standards requirements.

Responsible Party	Options
SDOs 	▸ Accelerate work with the 9-1-1 community to identify critical standards, future technologies, and all relevant data generators and user communities based on an industry-accepted architectural model and detailed requirements.
	▸ Conduct a gap analysis of existing standards development work against the industry-accepted architectural model. Identify standards that will need to be developed and/or standards already developed that are inconsistent with the model.
	▸ Whenever possible and appropriate, strengthen rules and procedures to ensure that NG9-1-1 essential standards and technology development occurs in an open, fair, and competitively neutral environment (recognizing the nature of technology convergence and competitive interests involved).
Service and Equipment Providers 	▸ Participate in the definition and development of open standards for the NG9-1-1 system and equipment.
	▸ Develop NG9-1-1 equipment and update telecommunications services to meet the open standards identified by the 9-1-1 community and the Federal Government to promote interoperability.
	▸ Ensure compatibility with 9-1-1 specific standards and also other data exchange standards and interfaces to enable information sharing with all authorized emergency response and government agencies.

Establish system access and security controls to protect and manage access to the NG9-1-1 system of systems

The security of and authorized access to the NG9-1-1 system is critical to ensuring that the NG9-1-1 system of systems is secure from security breaches and illegal users to prevent disruption of the delivery of a 9-1-1 call and public safety response to emergencies. Government authorities, state utility commissions, and SDOs can play a role in ensuring that 9-1-1 Authorities and service providers have standards for meeting the security controls and system access requirements. The Federal Government could identify and leverage defense and homeland security solutions, standards, and best practices to determine an appropriate level of security for the NG9-1-1 system. In addition, state utility commissions could modify existing regulations that specify the 9-1-1 architecture, its components, or service provider landscape. A certification and authentication process could also be developed to ensure service providers and 9-1-1 Authorities meet security and system access requirements. Table 10 outlines some of the options the Federal Government, state utility commissions, and SDOs have to establish and promote security controls and system access rights.

Table 10: Options to Establish Security Controls and Access Rights

Responsible Party	Options
Federal Government	▸ Consider initiating establishment of new security regulations or modification of existing security regulations to promote consistency among states.
	▸ Consider modifying, as necessary, federal legislative or regulatory provisions that limit 9-1-1 architecture to traditional components and may constrain the transition to the NG9-1-1 environment.

Responsible Party	Options
	▸ Consider identifying a certification and authentication process to ensure service providers and 9-1-1 Authorities meet the security and system access requirements.
	▸ Consider leveraging industry and defense and homeland security solutions, standards, and best practices to ensure a consistent and appropriate level of security throughout the interconnected environment of NG9-1-1.
	▸ Promote the development of identity and data rights access and management to control access to the NG9-1-1 system and data.
State Utility Commissions 	▸ Coordinate and modify existing state regulations to allow additional service providers, beyond the common carriers, to access the NG9-1-1 system.
	▸ Identify and modify, as necessary, state contractual provisions that may constrain the transition to the NG9-1-1 environment.
	▸ Assist SDOs in developing a certification and authentication process to ensure service providers and 9-1-1 Authorities meet security and system access requirements.
SDOs 	▸ Identify the SDO role in the certification and authentication process to encourage service providers and 9-1-1 Authorities to meet the security and system access requirements.
	▸ Identify and leverage defense and homeland security solutions, standards, and best practices to establish security and system access standards and requirements for NG9-1-1.
	▸ Define identity and data rights access and management standards that can ensure that only specific entities or individuals can access the NG9-1-1 system and data.

Determine the responsible entity and mechanisms for location acquisition and determination

As new devices become available that are capable of calling 9-1-1, challenges will arise to determine and acquire the location of the caller and device, especially if the device is transportable. Furthermore, as new types of service providers (e.g., infrastructure, access) enter the market, it will be a challenge to identify the entity responsible for providing the location information. For example, technology does not currently exist to deliver text messages with ALI. In addition to collecting location information, that information should be standardized to promote the ability to use the data in NG9-1-1 system call or message processing, and to easily share data among PSAPs and emergency response entities. Table 11 outlines some of the options government and SDOs have to determine the responsible entity and mechanisms for location determination and acquisition.

Table 11: Options to Determine the Responsible Entity and Mechanisms for Location Determination and Acquisition

Responsible Party	Options
Federal Government	▸ Consider a gap analysis to identify the need to develop specific standards or requirements for obtaining and providing accurate location information for all call types that can access 9-1-1 in the next generation architecture.

Responsible Party	Options
	▸ Consider examining the responsibility issues associated with location validation and management of national and/or regional databases necessary for NG9-1-1.
	▸ Consider facilitating involvement of all appropriate stakeholders in examining the issue of responsibility for providing accurate location information for NG9-1-1 calls using various communications devices.
State Government 	▸ Consider examining the responsibility issues associated with location validation and management of national, regional, and/or local databases necessary for NG9-1-1.
	▸ Consider facilitating involvement of all appropriate stakeholders in examining who will be responsible for providing accurate location information for NG9-1-1 calls within the state.
SDOs 	▸ Develop technology-specific location determination, acquisition, and conveyance standards.
	▸ Develop data standards for the delivery of location information whether it is civic or geospatial. Develop standards for content and operation of NG9-1-1 databases.
Service and Equipment Providers 	▸ Develop methods or modify existing methods to obtain the necessary location information for all call types that access NG9-1-1.
	▸ Take part in working with SDOs and public and private stakeholders to determine responsibilities for obtaining and providing accurate location information for all call types that access NG9-1-1.

Determine routing and prioritization protocols and business rules

Accurately routing 9-1-1 calls to the appropriate PSAP will be more complex in the NG9-1-1 environment because of the amount of data that can potentially be used to route and prioritize NG9-1-1 calls. To ensure that the protocols and business rules developed for routing meet the needs of the 9-1-1 community, SDOs should collaborate with the 9-1-1 community and emergency response entities to identify what information is important and how the call should be routed. Table 12 outlines the options for developing routing and prioritization protocols and business rules.

Table 12: Options to Determine Routing and Prioritization Protocols and Business Rules

Responsible Party	Options
SDOs 	▸ Work with the user community to identify what types of data are needed and standardize the types of data, decisions, and/or policies that should be used to route and prioritize NG9-1-1 calls.
	▸ Define national-level protocols and business rules, leveraging efforts such as the COMCARE Core Services Initiative.

Why Does It Matter?

It is imperative that the necessary NG9-1-1 related standards and technology are determined and available for the 9-1-1 Authorities and PSAPs to begin transitioning to an open, non-proprietary NG9-1-1 system. Without the critical standards and technologies in place, service and equipment providers may develop new, proprietary solutions that will not benefit the global community. This unstandardized, unplanned approach can affect the ability of PSAPs and emergency response entities to effectively share information and be interoperable. Furthermore, without the critical processes and protocols (e.g., certification and authentication, routing business rules), the benefits of the NG9-1-1 system, including routing based on criteria beyond location and connection of service providers beyond common carriers to the 9-1-1 system, may not be realized.

For Additional Information

As the NG9-1-1 system begins to become a reality, additional information regarding standards and technology can be found at—

- USDOT Research and Innovative Technology Administration (RITA) ITS Next Generation 9-1-1 Initiative: http://www.its.dot.gov/ng911/index.htm (last accessed February 2, 2009).
- USDOT NHTSA / DOC NTIA National 9-1-1 ICO: http://www.e-911ico.gov/ (last accessed February 2, 2009).
- NENA Technical Committee and Operations Committee, Standards and Information Documents: http://www.nena.org/pages/ContentList.asp?CTID=16 (last accessed February 2, 2009).
- Network Reliability and Interoperability Council (NRIC) VII Focus Group 1: Enhanced 911: http://www.nric.org/fg/index.html (last accessed February 2, 2009).
- Internet Engineering Task Force (IETF): http://www.ietf.org/html.charters/wg-dir.html (last accessed February 2, 2009).
  - Emergency Context Resolution with Internet Technologies (ECRIT): http://www.ietf.org/html.charters/ecrit-charter.html (last accessed February 2, 2009).
  - Geographic Location/Privacy (GEOPRIV): http://www.ietf.org/html.charters/geopriv-charter.html (last accessed February 2, 2009).
- Centers for Disease Control and Prevention, National Center for Injury Prevention and Control: *National Trauma Triage Protocol*. (January 22, 2009): http://www.cdc.gov/fieldtriage/ (accessed February 2, 2009).
- OASIS—Emergency Management: http://oasis-open.org/committees/tc_home.php?wg_abbrev=emergency (last accessed February 2, 2009).
- COMCARE Core Services Initiative: http://www.comcare.org/Core_Services.html (last accessed February 2, 2009).
- NENA Next Generation Partner Program Transition Policy Brief – *Addressing Gaps in the Automatic Location of 9-1-1 Calls for Current and Emerging Devices and Services*: http://www.nena.org/media/File/NG9-1-1TransitionPolicyConsiderations-AutomaticLocationFINAL.pdf (last accessed February 2, 2009).

Governance and Coordination

Strategic Options for NG9-1-1 Governance and Policy

Background

Although there are significant variations among regions, the current 9-1-1 environment supports a structured process with relatively clear delineation regarding roles and responsibilities among the parties as defined by common practices and statutes. As NG9-1-1 deployment begins, these relationships will become less clear, and the existing legal and regulatory environment will not effectively accommodate new technologies and arrangements. The deployment of NG9-1-1 will require increased coordination and partnerships among government and public safety stakeholders, 9-1-1 Authorities, service and equipment providers, and PSAP Administrators in planning and implementing NG9-1-1. Coordination with the general public will also be important to address concerns and to manage expectations. As a result, legislative and regulatory arrangements and demarcation points at every level of government may need to be reexamined and some modified to effectively support NG9-1-1 deployment. The corresponding NG9-1-1 issues that should be addressed include the following:

- **NG9-1-1 Roles and Responsibilities.** In an NG9-1-1 environment, the roles of the PSAPs, responders, communications service providers, and related entities are expected to expand beyond traditional 9-1-1 services with higher levels of interaction, managed situational intelligence, enhanced capabilities, and more comprehensive communication and coordinated response. Similarly, although the relative roles and authority of local, state, and federal governments in guiding the evolution and migration of the current 9-1-1 system to NG9-1-1 are expected to evolve, in many ways, the respective roles are unclear. Clear roles, responsibilities, and regulatory authority over all aspects of the system must be determined, from the regulation of originating communications service providers and 9-1-1 system service providers, to the management and oversight of 9-1-1 and public safety authorities. Lack of coordination and clarity regarding these roles will delay the decision-making needed to continue progress toward the national implementation of NG9-1-1 and may delay the process or potentially impair its effectiveness. Significant coordination at the earliest stages of NG9-1-1 deployment cannot be stressed enough.

- **NG9-1-1 Legislative and Regulatory Barriers.** While the Federal Government establishes 9-1-1 requirements for wireless and VoIP services, state and local government have always played an important role in determining 9-1-1 system service arrangements, costs, and funding mechanisms. An appropriate federal-state-regional-local balance will need to be established for NG9-1-1 as well. Differences in the service delivery environment inherent in NG9-1-1 may require commensurate changes in legislative and regulatory policy. Current state and federal laws were written in an era when all the possibilities and technological capabilities of NG9-1-1 simply did not exist. Many existing laws, regulations, and tariffs specifically reference older technologies or system capabilities that may inadvertently inhibit the migration to NG9-1-1. To foster the migration to NG9-1-1, state and federal legislatures and regulatory bodies will need to review current laws and regulations to keep pace with the rapidly changing 9-1-1 marketplace. Types of regulatory and statutory issues that may need to be updated include, but are not limited to, collection and eligible use of 9-1-1 funds; state 9-1-1 program authority; 9-1-1 system definition, technology, and interconnection requirements; rules concerning access and sharing of 9-1-1 related databases; authority to implement shared emergency service IP networks to replace dedicated 9-1-1 telephony systems; rules concerning which devices and services may connect to 9-1-1; privacy protection; and liability.

- **NG9-1-1 Privacy Concerns.** The NG9-1-1 system allows transmission and storage of a variety of personal information, such as medical and health data, photographs, and other visual images.

The range of personal and identifiable information that can be collected and transmitted by NG9-1-1 will likely raise concerns from the public and interest groups tracking privacy issues.

- **Liability Protection for Future Services.** Recently passed federal legislation (the New and Emerging Technologies Improvement Act of 2008—PL 110-283[48]) provides liability protection for PSAPs, service providers, and their vendors consistent with existing state liability laws. This protection applies to all communications services that are required by the FCC to provide 9-1-1/E9-1-1 (today and in the future), as well as for services that voluntarily provide information to PSAPs, in the absence of an FCC requirement, with approval from the appropriate state or local 9-1-1 governing authority. Thus, state liability protection laws now cover communications to PSAPs from new types of services enabled by NG9-1-1. This should encourage the entry of new service providers and provision of innovative data that could result in more effective emergency response services. However, other liability issues may still need to be addressed through state or federal statutes. For example, NG9-1-1 is designed to increase choices and opportunities to empower 9-1-1 governing authorities and PSAP Administrators to design 9-1-1 systems that enable the sharing and receipt of information consistent with local needs. One region may choose to receive all possible information (voice, text, images, and video) from all devices. Another area may choose to filter and limit receipt of certain information and to route calls differently based on unique local capabilities and needs. Differing 9-1-1 system policies and structures, enabled by standards-based NG9-1-1, is an advantage of NG9-1-1. However, it could also raise possible liability concerns if individual PSAPs choose not to receive all information (e.g., direct video communications) despite the technical availability of such information.

- **NG9-1-1 Awareness and Accessibility.** As NG9-1-1 systems are deployed, the general public will want to know what, how, and when next generation services will be available in their area. The public will likely have questions regarding NG9-1-1 system capabilities and limitations. The government may need to examine the impact NG9-1-1 deployment has on the elderly, deaf and hard of hearing, disabled, and non-English speaking populations. Consequently, keeping the public informed and involved throughout the planning and deployment of NG9-1-1 will be important to its ultimate success. Also, managing expectations of the public and correcting misconceptions about the capabilities of 9-1-1 services will be important as 9-1-1 continues to evolve toward complete NG9-1-1 deployment.

What Has Been Done?

Recent progress has been made on addressing several NG9-1-1 governance and policy issues:

- **Defining Responsibilities and Accountability in NG9-1-1.** Although federal, state, and local government roles and responsibilities still need to be defined, organizations like the 9-1-1 ICO and DHS, as well as Congress, have begun to consider 9-1-1 and NG9-1-1 within the context of homeland security policy and nationwide emergency communications planning.

- **Federal Legislation.** On July 23, 2008, the President signed into law the New and Emerging Technologies Improvement Act of 2008 (PL 110-283). The legislation addresses several aspects of NG9-1-1, including liability protection for current and future services that will depend on NG9-1-1, federal grant funding for "the migration to an IP-enabled emergency network," and a required report to Congress from the 9-1-1 ICO on necessary steps to facilitate the migration to NG9-1-1.

- **Regulatory/Legislative Barriers.** NENA's Next Generation Partner Program has examined and made initial recommendations concerning numerous regulatory and legislative issues. Most

[48] Available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ283.110.pdf (last accessed February 2, 2009).

recently, a report from the group was released entitled *A Policy Maker Blueprint for Transitioning to the Next Generation 9-1-1 System*.[49]

- **Education and Awareness.** Two resolutions were enacted by Congress in 2008 (S. Res. 468 and H. Res. 837) that designate April as "National 9-1-1 Education Month." National 9-1-1 Education Month will promote 9-1-1 education—which can include awareness of NG9-1-1—and will be a tool to help support the efforts of those currently involved in 9-1-1 education.

What Could Be Done to Address NG9-1-1 Governance and Policy Issues?

Additional options are available at all levels of government to address governance and policy that could affect nationwide migration to NG9-1-1. These options include potential strategies or paths that would—

- Clarify jurisdictional frameworks and responsibilities and identify the coordination required at each level of government to enable NG9-1-1
- Update regulations, legislation, and other policies to reflect modern communications and NG9-1-1 system capabilities
- Ensure continued access to the 9-1-1 system using current and future devices and services with which users would reasonably expect to access to 9-1-1.

Clarify jurisdictional frameworks, responsibilities, and coordination required at each level of government to enable NG9-1-1

The Nation's experience with the rollout of wireless E9-1-1 services has demonstrated that lack of coordination among the many public and private entities engaged in implementation delays deployment. Compared with wireless E9-1-1 implementation, the rollout of NG9-1-1 will be more complex because of the new types of services and service providers and changing roles of existing 9-1-1 system stakeholders. Therefore, federal, state, and local government leadership roles will need to be further defined to facilitate the deployment and operation of the NG9-1-1 system.

Coordinated approaches and partnerships among 9-1-1 Authorities, PSAPs, emergency responders, service and equipment providers, and government officials (elected or appointed) will be essential to take full advantage of the next generation opportunities and capabilities. At the federal level, policymakers could empower federal entities to coordinate and facilitate NG9-1-1 planning nationwide. Defining roles and responsibilities for regional and statewide coordination will also be important to provide accountability and guidance. Table 13 outlines the options for clarifying jurisdictional frameworks and responsibilities and identifying the coordination required at each level of government to enable NG9-1-1.

Table 13: Options to Clarify Responsibilities and Identify Required Coordination for NG9-1-1

Responsible Party	Options
Federal Government	▸ Facilitate a process for guidance and coordination of NG9-1-1 at the national level and promote NG9-1-1 as a fundamental federal homeland security and emergency communications policy objective.

[49] NENA Next Generation Partner Program – available at: http://www.nena.org/media/File/NG9-1-1PolicyMakerBlueprintTransitionGuide-Final.pdf (last accessed February 2, 2009).

Responsible Party	Options
	▸ Strongly encourage states to convene appropriate stakeholders, such as their state 9-1-1 Administrator, state homeland security/emergency management director, state utilities commissioner and state chief information officer (CIO), to plan for establishment of NG9-1-1 and its underlying emergency services internetworks.
	▸ Facilitate regional or national working groups and forums to coordinate business rules, data rights management, access control, and identity rights management with emergency systems at the state and local levels.
State Government 	▸ Convene appropriate state level officials (e.g., state 9-1-1 Administrator, state homeland security/emergency management director, state utilities commissioner, and state CIO) to plan for establishment of NG9-1-1 and its underlying emergency services internetwork.
	▸ Designate a central coordinating body and/or mechanism for NG9-1-1 implementation for each state (or region) where one does not already exist.
	▸ Facilitate the development of a statewide NG9-1-1 implementation plan based on effective stakeholder involvement, including identifying responsible parties, goals, and milestones.
	▸ Consider modifying current legislation to assign state 9-1-1 Authorities with the responsibility and authority to transition to and manage the NG9-1-1 system.
	▸ Consider modifying current legislation to assign appropriate entities the authority and responsibility for determining certification requirements for telecommunications services and service providers that may access NG9-1-1 as appropriate at the state level.
	▸ Coordinate business rules and data rights management for all stakeholders.
9-1-1 Authorities 	▸ Participate in the development of regional or statewide NG9-1-1 implementation plans, including identifying responsible parties, goals, and milestones.
	▸ Work with federal, state, and local level entities to coordinate business rules and data rights management within the appropriate jurisdictional boundaries.

Update regulations, legislation, and other policies to reflect communications and NG9-1-1 system capabilities

Typically, 9-1-1 telecommunications service providers and the services they offer are regulated through state public utility commissions and the FCC. Because current 9-1-1 services are, in part provided by regulated telecommunications companies, new non-local exchange carrier (LEC) service providers with new technologies may be unable to participate in 9-1-1 service delivery under current rules. Although the FCC has mandated that the wireless carriers and VoIP service providers have access to the 9-1-1 network, the current 9-1-1 governance environment does not always allow access for new, advanced communications technologies. Furthermore, in the current regulatory environment, 9-1-1 service providers have insufficient incentive to fund and deploy advanced system architectures.[50] Policymakers could use several legislative options to address regulatory shortcomings and ensure increased competition in the 9-1-1 marketplace in a technologically neutral manner. In particular, federal and state authorities can ensure that rules and regulations governing the transition from the legacy system to

[50] FCC NRIC VII Focus Group 1B, Properties of Emergency Communications Network by 2010, September 23, 2004, available at: http://www.nric.org/meetings/docs/meeting_20040923/NRIC%20VII%20Focus%20Group%201B%20Report_Sept.%20v10%20_120304_.pdf (last accessed February 2, 2009).

NG9-1-1 are neutral in all respects, including issues such as technology platforms, interconnection, system pricing, funding mechanisms, and certification.

Similarly, current policies are inconsistent concerning the disclosure of customer-specific information by telecommunications providers to government agencies for the delivery of emergency services. This inconsistency has resulted in delays in providing emergency response during real emergencies and can adversely affect effective 9-1-1 database provisioning. At the federal and state level, legislators could examine these issues and make the relevant statutory provisions consistent in how new and expanded personal information available with NG9-1-1 should be handled and treated.

Finally, liability protection will be needed for communications services that seek to connect to NG9-1-1 but are not yet required by the FCC to provide 9-1-1/NG9-1-1 service. Based on the New and Emerging Technologies 911 Improvement Act, such protection could occur with approval from the appropriate state or local 9-1-1 Authority. To ensure that future service providers are treated equally, the Federal Government could explore what criteria authorities should use in granting approval. Table 14 outlines the options for reducing potential regulatory and legislative barriers for NG9-1-1.

Table 14: Options to Reduce Potential Regulatory and Legislative Barriers for NG9-1-1

Responsible Party	Options
Federal Government 	▸ Consider updating federal laws and encourage the modification of state laws that may prohibit the use of location information for call routing beyond those covered under traditional 9-1-1 (e.g., include appropriate N-1-1 entities and 800-type emergency provisioning, such as poison control centers and suicide hotlines).
	▸ Consider developing new or modifying existing federal laws to address confidentiality of new data sources and types.
	▸ Review liability protection statutes to ensure that existing liability protection for PSAPs, users of technology, and service providers will continue to effectively apply as new services and technologies are enabled by NG9-1-1.
	▸ Ensure 9-1-1 obligations imposed on communications service providers is a Federal Government responsibility while retaining an appropriate state/local role for the regulation of the underlying NG9-1-1 system that is deployed at a local, regional, or state level.
	▸ Consider review and update of existing federal 9-1-1 requirements and definitions to ensure that calls that were previously required to be routed over the wireline E9-1-1 system can be routed over the NG9-1-1 system .
	▸ When possible and appropriate, provide emphasis and incentives through legislation and regulations to encourage the deployment of shared, secure, IP-based systems and networks.
State Government 	▸ Consider reviewing existing laws to determine whether existing laws address the confidentiality of new data sources and types (e.g., medical) that could be considered personally identifiable information (PII) and develop and/or modify laws as needed.
	▸ Consider creating incentives or requirements for E9-1-1 systems to move to IP-based platforms that would result in an acceleration of the transition to full NG9-1-1 and the promotion of competition and increased choices for 9-1-1 governing authorities for the current E9-1-1 system.
	▸ Consider updating laws that prohibit the transmission of non-human initiated calls to a PSAP (e.g., hazardous chemical, flood level, or vital sign sensors capable of transmitting data and/or initiating a voice call to a PSAP without human initiation).

Responsible Party	Options
	▸ Consider review and update of laws that prohibit entities other than tariffed LECs and competitive local exchange carriers (CLEC) from providing 9-1-1 service.
	▸ Consider review and update of laws to ensure existing statutes do not prohibit use of virtual PSAPs.
	▸ Consider review and update of laws that may prohibit the use of customer or device location information for routing of other calls beyond those covered under traditional 9-1-1 (e.g., include appropriate N-1-1 entities and 800-type emergency provisioning, such as poison control centers and suicide hotlines).
	▸ Review liability protection statutes to ensure that existing liability protection for PSAPs, users of technology, and service providers will continue to effectively apply as new services and technologies are enabled by NG9-1-1.
	▸ Consider review and update of laws concerning the collection and eligible use of 9-1-1 funds to ensure funds can be used for NG9-1-1.
	▸ Consider review and update of laws concerning access and sharing of 9-1-1 related databases

Ensure continued access to the 9-1-1 system using current and future devices and services with which users would reasonably expect to access 9-1-1

Public awareness has always been important to 9-1-1, and most 9-1-1 programs include a public education component. As text messaging and the use of camera telephones increase, expectations and misperceptions of what can and cannot be delivered to a 9-1-1 call taker increases. Imaginary technologies often shown in movies and on television further contribute to misperception and unfulfilled expectations. As services continue to change and become more mainstream, more and more consumers will be frustrated and confused about why the devices they use daily do not work when they need to call 9-1-1. The public expects 9-1-1 centers to keep up with technological change and that the NG9-1-1 system will deliver the accustomed level of service, if not a higher level of service. As NG9-1-1 services are rolled out and implemented, a key issue will be to ensure that the public understands how, where, and when next generation services are available.

In addition, NG9-1-1 offers new communications options for the elderly, deaf and hard of hearing, disabled, and non-English speaking populations that may need to be addressed by policymakers. Many deaf and hard of hearing persons are replacing their legacy communications devices (e.g., TTYs) and using mainstream text communications devices, IP-Relay Services, and Video Remote Interpreting (VRI) Services. NG9-1-1 is expected to eventually allow direct connection between these services and 9-1-1 and reduce delays in reaching call takers. As NG9-1-1 deployments allow this functionality, regulations ensuring that deaf and hard of hearing individuals can be efficiently connected to 9-1-1 must be immediately implemented. Table 15 outlines the options for improving awareness of and accessibility to NG9-1-1.

Table 15: Options to Improve Awareness of and Accessibility to NG9-1-1

Responsible Party	Options
Federal Government	▸ Increase involvement and awareness of NG9-1-1 for all appropriate federal stakeholders and consider regulations ensuring that deaf and hard of hearing individuals can be efficiently connected to 9-1-1 when such NG9-1-1 capability is available.

Responsible Party	Options
	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
	▸ Consider legislative, regulatory, or financial incentive to ensure that states and authorities provide individuals with disabilities access to the 9-1-1 system using the current and future technology and devices for daily communications.
State Government 	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
9-1-1 Authorities 	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
Service and Equipment Providers 	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities on telecommunications devices, as well as services used (e.g., VoIP). This would be similar to the way VoIP providers inform customers of the limitations of 9-1-1 capabilities with VoIP service.
General Public 	▸ Understand and be aware of available NG9-1-1 capabilities and coverage.
	▸ Provide recommendations and input into the NG9-1-1 development and deployment process to account for community needs.
Non Governmental Groups 	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
	▸ Ensure policy makers are consistently apprised of ongoing technology, service, and operational and standards development efforts to ensure policy making efforts are consistent with the needs of public safety and consumers.

Why Does It Matter?

Without effective policy development in conjunction with technical and operational NG9-1-1 system development, the best designs and system architectures will be just that—designs and architecture. To actually implement NG9-1-1 systems, NG9-1-1 needs to be a fundamental policy objective and will need effective laws and regulations to facilitate and make legal all aspects of NG9-1-1. If properly enabled by technology and policies, an effective governance structure can be implemented. 9-1-1 governing authorities, emergency response agencies, call takers, emergency responders, and communications service providers will need to have the appropriate governance, policies, and mechanisms to provide a coordinated and appropriate response in an NG9-1-1 environment. In many situations, the lack of coordination and necessary policies could impede the ability of PSAPs and call takers to respond quickly and effectively or to achieve their greatest capability. Elected and appointed officials, senior government

executives, and communications managers can foster and support effective NG9-1-1 partnerships and the appropriate statutory and regulatory policies. They can also ensure that the general public is part of the NG9-1-1 deployment process. The NG9-1-1 environment allows for and promotes a higher level of coordination among federal, state, and local government and the first responder community than does today's 9-1-1 system.

For Additional Information

Additional information regarding governance and policy can be found at—

- NENA: Next Generation Partner Program: http://www.nena.org/pages/ContentList.asp?CTID=14 (last accessed February 2, 2009).
  - *A Preliminary Policy Maker Blueprint for Transitioning to the Next Generation 9-1-1 System* (September 2008): http://www.nena.org/media/File/NG9-1-1PolicyMakerBlueprintTransitionGuide-Final.pdf (last accessed February 2, 2009).
  - *Summary of NG9-1-1 Development and NG Partner Program Results for 2007* (May 2008): http://www.nena.org/media/File/2007NGPartnerProgramfinalreport.pdf (last accessed February 2, 2009)
  - *Funding 9-1-1 Into the Next Generation: An Overview of NG9-1-1 Funding Model Options for Consideration* (March 2007): http://www.nena.org/media/File/NGFundingReport.pdf (last accessed February 2, 2009).
  - *Transitioning Emergency Communications Into the Next Generation*: NENA Next Generation Partner Program 2006 Report (February 2007): http://www.nena.org/media/File/2006NGPartnerProgramReport_1.pdf (last accessed February 2, 2009).
  - *Next Generation 9-1-1 Responding to an Urgent Need For Change*: Initial Findings and Recommendations of NENA's NG E9-1-1 Program (February 2006): http://www.nena.org/media/File/ng_final_copy_lo-rez.pdf (accessed February 2, 2009).

- 9-1-1 Industry Alliance (9IA): *2008 Study on the Health of the US 9-1-1 System* (undated) http://www.911alliance.org/9IA_Health_of_US_911%20_2_.pdf (last accessed February 2, 2009).

- Congressional Research Service Report for Congress: *Emergency Communications: The Future of 911:* http://opencrs.com/getfile.php?rid=65747 (last accessed February 2, 2009).

Strategic Options for NG9-1-1 Transition Education and Awareness

Background

Education about NG9-1-1 has always been an integral part of discussions on how to accelerate NG9-1-1 implementation. There is widespread agreement that all entities—PSAPs and 9-1-1 Authorities, the public safety community, services and equipment providers, policymakers, and the public—need to know more about and be kept informed of NG9-1-1 technologies and how they will affect emergency communications. Education is critical to the effectiveness of all aspects of NG9-1-1, including funding, operations, standards and technology, and governance and policy—certainly deserving of significant investment to increase the level of understanding about NG9-1-1 by all stakeholders. The importance of education to implementation of NG9-1-1, while sometimes underestimated, cannot be ignored. The identification of target audiences, the development of appropriate messages for each audience, the requests for action (or "asks"), and the methods by which those messages and requests for action will be delivered are all elements of a successful education program for NG9-1-1.

Issues that must be addressed within NG9-1-1 outreach and awareness activities include the following:

- Who are the target audiences that need to understand NG9-1-1?
- What are the messages for target audiences?
- Who is most appropriate to deliver those messages?
- What are the various delivery mechanisms for each target audience?

Examples of the types of target audiences, type of message to be delivered, and what should be requested of the target audiences are listed in Table 16 below.

Table 16: Target Audiences, Types of Messages, and Associated Requests for Action

Target Group	Message	Request for Action
Federal Government ▸ DHS ▸ DOJ ▸ HHS ▸ Department of Defense ▸ FCC ▸ Office of Management and Budget ▸ White House ▸ USDOT ▸ Department of Commerce ▸ Department of Agriculture ▸ Department of the Interior	▸ The limits of 9-1-1 today combined with NOT doing anything means capabilities have degraded. ▸ How NG9-1-1 benefits constituency. ▸ NG9-1-1 is an essential part of the solution for disaster readiness and interoperability. ▸ Improved emergency communications is an essential part of national response system. ▸ Value of shared infrastructure (IP backbone).	Support the concept. Provide funding. Participate in development.

Target Group	Message	Request for Action
State and Local Governments ▸ State legislatures ▸ State agencies (e.g., Public Utilities Commissions, Transportation, Emergency Management, Public Safety, Geographic Information System, Chief Information Officer/IT) ▸ State organizations and associations ○ Organizations representing first responders (police, fire, EMS) ○ National Association of Counties ○ Utility Commissioners ○ National Governors Association ○ US Conference of Mayors ○ National Conference of State Legislators ○ National Association of State Chief Information Officers ○ International City/County Management Association ○ N-1-1s ○ National Association of Regional Councils ○ National Association of State Telecom Directors ○ National Township Association	▸ Constituents already assume all methods of connection to 9-1-1 service. ▸ Cost savings potential of NG9-1-1. ▸ Benefits of deployment and liabilities of not deploying as others move forward. ▸ Favorable results experienced by early adopters.	State legislation to support NG9-1-1 funding, to ensure fees for 9-1-1 go to 9-1-1, and to update laws causing impediments. Funding support; enabling legislation; development of statewide network; establishment of statewide authority. Efforts can be more effective at county level; states need to be aware of and involved with NG9-1-1 issues. NG9-1-1 is a critical component of disaster readiness and interoperability.
PSAPs/9-1-1 Authorities ▸ PSAPs ▸ 9-1-1 Authorities—County, Regional, State	▸ NG9-1-1 will help call takers to do their job better. ▸ NG9-1-1 offers better tools and is faster and less expensive. ▸ Need to remove negative stereotypes and promote the NG9-1-1 positives, such as more data to support decisions, free up resources, and decision support systems. ▸ The value of shared services. ▸ Expand PSAP beyond 9-1-1 to include 2-1-1, other N-1-1s. ▸ Primary mission unchanged: to answer the call and to help the caller, regardless of how call comes into PSAP.	Coordination among 9-1-1 Authorities. Support through advocacy.

Target Group	Message	Request for Action
Service and Equipment Providers ▸ LECs ▸ Cellular providers ▸ VoIP providers ▸ Database vendors ▸ Computer-aided dispatch vendors ▸ Customer premises equipment vendors ▸ Suppliers of 9-1-1 products and services	▸ Open architecture and national standards are critical for NG9-1-1 systems of systems. ▸ Increased business opportunities in NG9-1-1. ▸ Increased demand for interoperable systems.	Accept open architecture for NG9-1-1 systems and support national standards.
General Public ▸ General public ▸ Special interest groups (e.g., deaf and hard of hearing, disabled) ▸ Organizations with large memberships (e.g., American Association for Retired Persons, community organizations)	▸ NG9-1-1 will provide greater access to 9-1-1 services for any device, anytime, anywhere. ▸ Improved response and level of service in more situations than could be handled previously. ▸ Importance of interoperability in times of disaster.	Broad support for NG9-1-1. Proper use of 9-1-1.

What Has Been Done?

Education is always a major component of any transition or change. A number of public safety organizations have initiated education programs to introduce and promote NG9-1-1. Efforts of these programs include—

- **Raising Awareness Through High-Visibility Research and Reports**. Many organizations and associations have recognized the need for NG9-1-1 and have included a focus on NG9-1-1 in virtually all activities throughout the organization. NENA, APCO, NASNA, and the 9-1-1 Industry Alliance have published reports about the need for and activities related to NG9-1-1.

- **Raising Awareness Within Industry Events.** NENA and APCO have conducted NG9-1-1 educational tracks at their annual and chapter conferences, and NENA offers a course titled "Introduction to Next Generation 9-1-1" and is developing a new course specific to the role of the NG9-1-1 call taker. Other organizations (e.g., International Wireless Communications Expo, ITS America) have included NG9-1-1 panels in their conference programs. Technical, operations, and policy committees within NENA and APCO all recognize that NG9-1-1 will change how 9-1-1 is delivered.

- **Creation of a National 9-1-1 Implementation and Coordination Office**. The ENHANCE 911 ACT of 2004 created the ICO, now known as the National 9-1-1 Office, to coordinate efforts to complete wireless Phase I and Phase II; to develop a grant program for states, PSAPs, and 9-1-1 Authorities; and, more recently, to provide technical assistance in the implementation of advanced 9-1-1 systems.[51] The Office is creating a Technical Assistance Center that will offer a number of educational services, including a Clearinghouse for 9-1-1, a user-friendly website, a deployment profile for NG9-1-1 projects, and technical and operational assistance to states, 9-1-1 Authorities, and PSAPs.

[51] PL 108-494, known as the ENHANCE 911 Act of 2004, available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_public_laws&docid=f:publ494.108.pdf (last accessed February 2, 2009).

- **Efforts to Convene Federal Agencies Regarding NG9-1-1**. As part of its NG9-1-1 Initiative, USDOT brought together representatives from Federal Government agencies to explore how NG9-1-1 will affect future 9-1-1 services and related emergency communications services. Coordination among agencies will be required as IP-based systems are developed, and plans are now being formulated to ensure that all government agencies involved in emergency services are aware of progress toward NG9-1-1, and their potential role in making it happen. For example, the DHS Office of Emergency Communications (OEC) has been educated on NG9-1-1 and is ensuring that states and local governments are taking these new services into account as they develop statewide emergency communications plans.

- **States Are Moving Toward NG9-1-1**. Several states have already begun moving toward NG9-1-1, with others well into the planning process. Involvement of 9-1-1 Authorities and the education that accompanies that involvement is occurring and will continue as other states begin to plan for NG9-1-1.

- **National 9-1-1 Education Month.** In early 2008, Congress endorsed April as "National 9-1-1 Education Month." The resolution (H. Res. 110-537[52]) urges government officials, parents, teachers, school administrators, caregivers, businesses, non-profit organizations, and the people of the United States to observe the month with appropriate ceremonies, training events, and activities. In addition, NENA, APCO, NASNA, COMCARE, the E9-1-1 Institute, 9-1-1 For Kids, and CTIA–the Wireless Association, also adopted similar resolutions.

- **Public Education.** Many public safety organizations, including 9-1-1 agencies and first responder agencies (police, fire, EMS) have ongoing public education programs. In addition, several other organizations have a focus on public education, including among others 9-1-1 for Kids and the National Center for Missing & Exploited Children.[53]

What Could Be Done to Address Education and Awareness Issues?

Additional options are available at all levels of government to address potential education shortfalls that could affect nationwide migration to NG9-1-1. These options include potential strategies or paths that would—

- Encourage stakeholders to embrace change through effective education programs
- Reduce barriers for NG9-1-1 through education programs
- Educate PSAP and 9-1-1 Authority personnel regarding their role in NG9-1-1
- Develop effective public education programs.

Encourage stakeholders to embrace change through effective education programs

Enabling the creation of an NG9-1-1 system will require buy-in from numerous and varied stakeholder groups. Educating them at a high level about NG9-1-1, and in particular, about the vast improvements that would result from advancing from the current system to NG9-1-1, is the first step toward building a consensus among decision-makers and agents of change that this transition is imperative.

These stakeholder groups will not all share the same roles or responsibilities during the transition to NG9-1-1 or after its implementation. For this reason, a "one-size-fits-all" approach to educating the various parties, which may at times represent divergent interests, is not recommended. Instead, materials must be crafted to address the concerns and areas of responsibility of each individual stakeholder group.

[52] House Resolution 537 (110th Congress): *Expressing support for the designation and goals of "National 9-1-1 Education Month…"* available at: http://www.govtrack.us/congress/bill.xpd?bill=hr110-537 (last accessed February 2, 2009).

[53] Additional information available at: http://911forkids.com/ and http://www.ncmec.org/

Table 17: Options to Encourage Stakeholders to Embrace Change

Responsible Party	Options
Federal Government 	▸ Work with stakeholders and facilitate development of general education materials regarding the vision of NG9-1-1 and its benefits to stakeholders and the public.
	▸ Encourage states to develop coordinated programs for NG9-1-1.
	▸ Support and promote state NG9-1-1 education programs.
	▸ Working with stakeholders and facilitate development of materials that educate policymakers on the value and benefits of NG9-1-1.
State Government 	▸ Develop state-specific education materials to support NG9-1-1 and distribute to all stakeholders within their respective states.
	▸ Consider development of materials that educate legislators and other state agencies regarding their potential role as leaders and change agents.
9-1-1 Authorities 	▸ Educate the public on how NG9-1-1 provides public benefits far greater than current E9-1-1 system.
	▸ Identify and/or create “champions” for NG9-1-1 at the local and state levels.
Public Safety Communications Organizations and Associations 	▸ Develop materials that clearly present a vision of the future of NG9-1-1 to members, federal and state officials, and other stakeholders.
	▸ Provide opportunities at national and state/regional conferences to educate attendees on NG9-1-1.
	▸ Publish reports on NG9-1-1 policy issues, implementation successes, and deployment progress.
Service and Equipment Providers 	▸ Develop training programs for NG9-1-1 related products and services.
Responder Agencies 	▸ Distribute educational materials promoting benefits of NG9-1-1 at public open houses and other events.

Reduce barriers for NG9-1-1 through education programs

Creating a culture of awareness regarding the robust capabilities of an NG9-1-1 system will expedite the transition and implementation process immensely. Providing decision-makers at all levels of government, as well as within the public safety community, with information on the necessity and benefits of NG9-1-1 will create an atmosphere more amenable to providing funding, creating and updating legislation, and addressing other issues that could potentially impede the transition.

Table 18: Options to Reduce Barriers

Responsible Party	Options
Federal Government 	▸ Provide information on successful NG9-1-1 deployments and lessons learned.
	▸ Create a national clearinghouse for NG9-1-1 legislation, funding models, and other related topics.
State Government 	▸ Assist 9-1-1 Authorities in either statewide or sub-state implementation programs.
	▸ Provide information to other state entities regarding the value of shared services.
Service and Equipment Providers 	▸ Assist states and 9-1-1 Authorities in the dissemination of information regarding NG9-1-1.
Public Safety Communications Organizations and Associations 	▸ Provide information to members on implementation successes and how barriers have been overcome.
Responder Agencies 	▸ Assist with dissemination of information regarding how barriers have been overcome.

Educate PSAP and 9-1-1 Authority personnel regarding their role in NG9-1-1

In an NG9-1-1 environment, almost all those employed in the emergency communications field will be expected to take on new and/or altered responsibilities. Once NG9-1-1 goes live, public expectations will continue to mandate that emergency response always be timely and effective. To ensure a seamless transition that is invisible to the public and to promote full use of NG9-1-1's expanded feature set and capabilities within the PSAP, the education of this target audience is essential.

Table 19: Options to Educate PSAP and 9-1-1 Authority Personnel on Their Roles

Responsible Party	Options
State Government 	▸ Develop policy and other informational materials targeted to PSAP/9-1-1 Authority personnel for use in gaining acceptance of expanded responsibilities and other changes resulting from migration to NG9-1-1. This may involve changes to SOPs, job descriptions, and job analyses at PSAPS/9-1-1 Authorities.
	▸ Ensure that call takers are educated about the value of training requirements for NG9-1-1
Public Safety Communications Organizations and Associations 	▸ Develop education and training materials for chapters and members.
	▸ Provide educational sessions at national and state/regional events oriented to the role of PSAP and 9-1-1 Authority personnel in NG9-1-1.

Develop effective public education programs

Educating the public about NG9-1-1 should be done in two phases, with two distinct results in mind. First, the public should be educated about the benefits of NG9-1-1 to create a groundswell of support for its implementation. An informed and engaged public will act as an extremely powerful and influential lobbying group with decision-makers who may be under-informed or opposed to creating an NG9-1-1 system. Later, once transition is nearing completion, the public must also be educated about NG9-1-1's expanded capabilities for receiving information and about how they can best use these new options for contacting emergency services.

Table 20: Options to Develop Effective Public Education Programs

Responsible Party	Options
Federal Government 	▸ Work with appropriate stakeholders to facilitate development of public education materials.
State Government 	▸ Develop and distribute materials that educate the public, policymakers, and other state agencies on the benefits and value of NG9-1-1.
Public Safety Communications Organizations and Associations 	▸ Develop and distribute materials that educate members and other stakeholders on the benefits and value of NG9-1-1.
	▸ Explore ways to obtain additional funding for public education programs.

Responsible Party	Options
Service and Equipment Providers 	▸ Assist with the development and distribution of public education materials.
Responder Agencies 	▸ Assist with distribution of education materials to the general public.

Why Does It Matter?

The value of education in the effort to transition to an NG9-1-1 system cannot be overstated. To achieve full, ubiquitous implementation of NG9-1-1 in a timely manner, PSAPs and 9-1-1 Authorities, the public safety community, government officials and policymakers, and the public must all receive clear, relevant, and consistent information on the subject. In turn, they must then become active participants in the process of educating others and advocating for the transition. If these stakeholder groups are not adequately informed and engaged, or do not receive the tools with which they can inform and engage others, NG9-1-1 implementation becomes exponentially more challenging as it competes with other industries and initiatives seeking the same monetary and human capital in an increasingly competitive marketplace. Making education a key component of any and all transition plan elements—funding, operations, governance and policy, and standards and technology—ensures that the parties involved in and necessary to the migration to an NG9-1-1 system are equipped to perform their role in the process.

For Additional Information

As the NG9-1-1 system begins to become reality, additional information regarding education and awareness can be found at—

- USDOT Research and Innovative Technology Administration (RITA) ITS Next Generation 9-1-1 Initiative: http://www.its.dot.gov/ng911/index.htm (last accessed February 2, 2009).
- USDOT NHTSA / DOC NTIA National 9-1-1 ICO: http://www.e-911ico.gov/index.html (last accessed February 2, 2009).
- NENA Technical Committee and Operations Committee: http://www.nena.org/pages/ContentList.asp?CTID=16 (last accessed February 2, 2009).
- NENA Next Generation Partner Program Reports: http://www.nena.org/pages/ContentList.asp?CTID=14 (last accessed February 2, 2009).

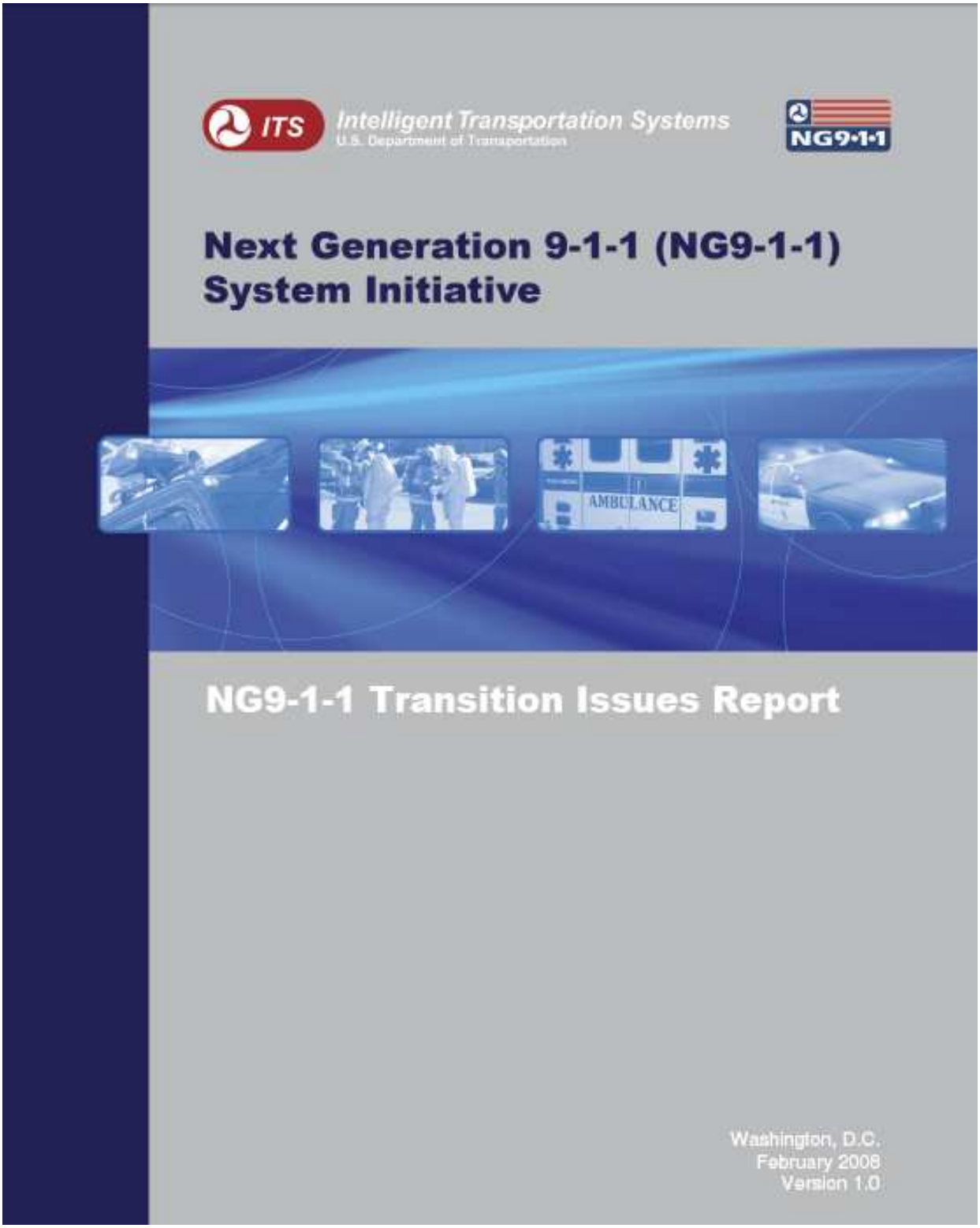
Conclusion

The successful completion of the USDOT NG9-1-1 Initiative marks a critical transition point for the public, emergency communications, and public safety communities. Stakeholders are increasingly concerned about the evolution and use of new technologies by the general public and emergency responders. The NG9-1-1 Initiative examined the most vital transition issues, as well as the associated strategic options that the Nation can implement to address migration to NG9-1-1. Through an extensive series of stakeholder workshops and other stakeholder engagements, the Initiative identified a broad range of perspectives on the role of the emergency response community, industry, decision makers, and the general public in the NG9-1-1 transition. In addition, the Initiative identified several key issues that must be addressed to assure a successful transition to NG9-1-1:

- Traditional funding mechanisms are a constraint that must give way to more appropriate and adequate mechanisms for supporting an NG9-1-1 environment.
- Current governance and policy practices that limit or even prohibit intergovernmental coordination and planning, sharing of resources, competitive options, and interconnection must be addressed to achieve NG9-1-1.
- Standards and technology must enable interconnectivity among multiple PSAPs, 9-1-1 Authorities, and other public safety and emergency communications entities (both intra-state and interstate), support local operations, and provide the necessary security and confidentiality.
- PSAP operational policies and procedures must be customized to support the requirements of NG9-1-1.
- Education is more important than ever because of the increased complexity of NG9-1-1—without coordinated education campaigns, the benefits of NG9-1-1 will not be understood.

It is important to recognize that this *NG9-1-1 Transition Plan* is the beginning of a process. The commitment demonstrated by diverse stakeholders over the past 2 years and the energy generated on behalf of the NG9-1-1 Initiative should now be channeled toward lasting, tangible progress. The *NG9-1-1 Transition Plan* was developed for all 9-1-1 stakeholders, to ensure the dialogue and cooperation established by the Initiative continues and extends into the future.

Appendix A: NG9-1-1 Transition Issues Report



Available at: http://www.its.dot.gov/ng911/pdf/NG911_TransitionIssuesReport_FINAL_v1.0.pdf (last accessed February 2, 2009).

Table of Contents

Introduction

A key outcome of the U.S. Department of Transportation (USDOT) Next Generation 9-1-1 (NG9-1-1) Initiative is the identification of well-supported options and crucial transition issues for migrating from today's 9-1-1 system to a NG9-1-1 system across the country. The following analysis documents and summarizes many of the issues facing government, industry, and the general public as the Nation plans for future NG9-1-1 implementation. The scope and breadth of the transition issues characterized here are intentionally broad and includes issues that need to be addressed at the national, state, regional, and local levels to implement NG9-1-1. Based on stakeholder input and existing research, this analysis explores several of the key issues that need to be addressed for successful transition to the NG9-1-1 environment by posing the following questions:

- What are the key questions that need to be answered and what needs to be decided?
- What is the impact of each issue on NG9-1-1 transition activities?
- Who is affected by the issues and how?
- How will varying deployment scenarios change the nature of an issue?
- What are the assumptions or constraints for each issue?

This analysis recognizes that each issue may affect transition to NG9-1-1 and its stakeholders in different ways. Similarly, the priority of the key issues is also expected to vary over time and by location. Therefore, this analysis presents a list of transition issues that is ordered for ease of reference, not in order of priority. Lastly, as highlighted in this analysis, the answers to these critical questions acknowledge that the migration path chosen by a state, regional, or local 9-1-1 Authority[54] may lessen or exacerbate the importance or impact of these transition issues.

Deployment Framework

As defined by the NG9-1-1 Initiative, the NG9-1-1 System is expected to be an interconnected system of local and regional emergency services networks ("system of systems")[55]. However, the boundaries of emergency service networks may vary, depending on local requirements and organizational frameworks. Consequently, although the architecture and underlying requirements of NG9-1-1 will be consistent, it is expected that there will be several paths to implementation of NG9-1-1—all with merit. In some cases, the path to NG9-1-1 implementation will depend on the underlying infrastructure and state of the Public Service Answering Points (PSAP) and 9-1-1 Authorities. Regardless of where PSAPs and 9-1-1 Authorities begin, the majority of NG9-1-1 implementation paths will likely be characterized by some variation of the two deployment frameworks discussed below and in Table 1:

- **Independent Deployment:** Building out NG9-1-1 in a piecemeal or "stand-alone" approach that local 9-1-1 Authorities (e.g., townships, counties, parishes, cities) could pursue by deploying NG9-1-1 capabilities without wider coordination or interconnecting guidance and planning. These local 9-1-1 Authorities would have the flexibility to determine how and when to implement the NG9-1-1 requirements and standards. Potentially, different PSAPs would continue to have inconsistent or incomplete 9-1-1 capabilities and functionality, and the opportunity for sharing costs, infrastructure and services with other 9-1-1 Authorities on a larger scale would be limited.

[54] A 9-1-1 authority has jurisdiction over and/or supports a particular 9-1-1 system or PSAP. The 9-1-1 authority could be a county/parish or city government, a special 9-1-1 or Emergency Communications district, a Council of Governments, an individual PSAP, a statewide agency, or other similar body.

[55] USDOT ITS JPO, *Next Generation 9-1-1 (NG9-1-1) System Initiative: Concept of Operations*, April 2007, available at http://www.its.dot.gov/ng911/pdf/NG911ConOps_April07.pdf

- **Coordinated Deployment:** Building out NG9-1-1 in a uniformed, guided approach by regional or state 9-1-1 Authorities to upgrade identified PSAPs to meet a consistent set of nationally accepted NG9-1-1 requirements and standards. PSAPs would have coordinated functions and interconnection. To reach large-scale deployment, 9-1-1 Authorities could employ several different transition paths, including upgrading individual PSAPs, upgrading PSAPs within a region or state, providing functionally specialized PSAPs, consolidating PSAPs, and/or phased approaches based on size or resource availability—but all would involve guidance and coordination through appropriate regional, state, and national mechanisms.

Table 1: Summary of Deployment Frameworks

	Independent	Coordinated
Summary	Customized set of capabilities reflecting conditions, needs, and priorities at the local level	Consistent, guided standardized capabilities and technology platforms at the regional or state level
How	▸ Independent upgrade of individual PSAPs or some PSAPs within a local jurisdiction (e.g., township, county, parish, city) ▸ Inconsistent capabilities	▸ Centrally planned and coordinated upgrade of individual PSAPs, PSAPs within a region, or PSAPs within a state ▸ Coordinated phased approach to upgrade the PSAPs (e.g., based on size of population served and/or availability of resources) ▸ Consistent capabilities
Who Defines	▸ Individual 9-1-1 Authorities	▸ Coordinated 9-1-1 Authorities
Advantages	▸ Enables migration to NG9-1-1 based upon local conditions, needs, and priorities	▸ Promotes consistent and coordinated adoption of NG9-1-1 capabilities and functions ▸ Potentially enables ubiquitous NG9-1-1 capability throughout the regions and states involved
Disadvantages	▸ Limits the opportunity for cost and resource sharing, as well as for consistent large-scale service delivery ▸ Promotes a fractured community further dividing “haves” and “have nots” ▸ Creates limits in realizing full benefit of NG9-1-1 capabilities	▸ Requires a high level of coordination, cooperation, and planning among the state, regional, and local 9-1-1 Authorities involved ▸ May encounter limited support from state or regional entities in some instances

NG9-1-1 Transition Issues

Issue: Current funding, budgeting, and cost recovery policies may not be able to support the implementation and sustainment of NG9-1-1

Impact on NG9-1-1: This may create an inconsistent nationwide footprint of NG9-1-1 by furthering the disparity among PSAPs (e.g., between the “haves” and “have nots”), as well as delay the implementation of NG9-1-1 throughout the Nation. Inconsistent application of NG9-1-1 features will allow persistent misconception by end users who currently expect that the same level and quality of service is available throughout the Nation.

Stakeholder(s) Affected: Funding issues will affect a variety of stakeholders, including 9-1-1 Authorities, state and local governments. 9-1-1 Authorities require sufficient financial resources to upgrade to and maintain the NG9-1-1 system. State and local government agencies may need to determine how to adapt the 9-1-1 surcharge model to accommodate how 9-1-1 will work in tomorrow's environment to ensure that sufficient funds are collected to maintain the 9-1-1 services. In addition, states and local entities that are expecting to use funds designated for 9-1-1, may continue to face funding shortfalls if such funds are redirected to other programs.

Background and Description: The current and prevailing 9-1-1 funding model is to assess subscriber fees on wireline, wireless, and some Voice over Internet Protocol (VoIP) telephone services, which are collected by service providers and then transferred to government agencies to support 9-1-1 services. There is little consistency among and within states on 9-1-1 surcharge rates, which often differ based on the service type (e.g., wireless, wireline, or VoIP) or the location in which the fee is being collected. 9-1-1 Authorities at every level are already experiencing a decline in wireline surcharge revenues as consumers abandon their wireline services and move to using wireless and IP-based technologies (e.g., VoIP) for their primary voice communications. Furthermore, many states and local governments are continuing to divert 9-1-1 funds for non-9-1-1 uses such as balancing state budgets or funding other initiatives. The current funding allocation and cost recovery mechanisms may be insufficient to ensure sustainable funding for future 9-1-1 services, and raises issues of fairness and equitability. For example, there may be new types of equipment that may generate additional costs, such as devices for IP routing and automatic call distribution (ACD) that could be shared among State and local jurisdictions and are not eligible for payment by the funding allocation and cost recovery mechanisms. In addition, sharing the NG9-1-1 backbone network among many state and local jurisdictions will make it difficult to determine how much each jurisdiction must contribute to total network costs.

Assumptions/Considerations: The analysis of this issue assumes funding shortfalls are generally contingent on the continued trend and transition away from traditional wireline service and toward wireless and VoIP services. In addition, it is assumed that there is a failure of state legislatures to take remedial measures to update state laws.

Issue: Security controls for the NG9-1-1 system and emergency data need to be defined and properly managed and maintained

Impact on NG9-1-1: The NG9-1-1 network, like other networks, will continually encounter attempts at illegal access including concerted attacks (e.g., denial of service). If the NG9-1-1 network is compromised by security breaches, it is possible that there will be a disruption in delivering a 9-1-1 call from the public to a PSAP, resulting in delayed or complete interruption of public safety response to emergencies.

Stakeholder(s) Affected: Security is an overarching concern for the entire NG9-1-1 system and will affect 9-1-1 stakeholders, including service providers, equipment providers, 9-1-1 Authorities, and PSAPs. For example, service providers may be responsible for ensuring that the location databases (e.g., Location Information Server [LIS], Location-to-Service Translation [LoST]) and access networks they maintain are secure against threats. 9-1-1 Authorities, on the other hand, may be responsible for ensuring that all connection points to the PSAPs from the NG9-1-1 network meet or exceed the security controls needed to protect the system from hackers. PSAPs are increasingly putting their public safety systems on a shared city or county network, further exposing their systems to attacks from outside sources.

Background and Description: Security control issues for the NG9-1-1 network can affect several different areas of the network, including connection or gateway points to the PSAPs, to the IP access network, to the Internet, and to other public networks via the Emergency Services Network (ESNet), and to external databases potentially managed by other entities. The NG9-1-1 network architecture is designed to interface with various legacy and next generation access and emergency service networks to

provide a seamless, interconnected delivery and response environment. The network connection or gateway points between the NG9-1-1 network and other networks or external databases may be exposed to security vulnerabilities, including denial of service attacks, spoofing, and malformed messages that can disrupt 9-1-1 services (e.g., flooding the NG9-1-1 system with fake information and preventing real 9-1-1 calls from being completed). In addition, interfaces may be created with other networks, including public safety entities, third party service providers, and public Internet, which may expose the NG9-1-1 Network to viruses or hacker attacks. Likewise, databases used by the NG9-1-1 network and managed by other entities need to be secured to prevent hackers from potentially manipulating the information in the database. To ensure the NG9-1-1 system of systems is secure, it is crucial that security controls are established to mitigate security risks throughout the NG9-1-1 network. Security controls throughout the NG9-1-1 network may need to be tailored for each network connection because security needs may vary.

Assumptions/Considerations: The analysis of this issue assumes that NG9-1-1 implementations will incorporate industry-leading best practices for security measures to prevent, detect, and mitigate such attacks while continuing to provide seamless and efficient service to legitimate callers. However, security measures should not become an impeding factor for establishing end-to-end emergency calls over IP networks.

Issue: Responsibility for the acquisition and delivery of location information and the mechanism to obtain and verify the location data needs to be defined

Impact on NG9-1-1: Automatic location information is essential in an NG9-1-1 environment to route the 9-1-1 call to the appropriate PSAP, dispatch emergency responders to the right location, and allow for future 9-1-1 capabilities. To continue the current level of 9-1-1 service that provides location information automatically and to allow other 9-1-1 features (e.g., accepting 9-1-1 text messages), location information must be obtained and delivered automatically with an NG9-1-1 call for wireline, wireless, VoIP and other IP-based devices, and any future devices.

Stakeholder(s) Affected: Issues related to the acquisition and delivery of location information will affect service providers (such as infrastructure and access service providers), PSAPs, public safety entities, and the Federal Government. All 9-1-1 service providers, including next generation infrastructure and access providers, have responsibility for helping determine and deliver location information. As for PSAPs and first responders, location information is vital in responding to an emergency. Lastly, a national mandate may be necessary to require service providers to obtain and provide accurate location information for VoIP and other IP device calls.

Background and Description: Caller's location information, whether civic or geospatial in nature, is needed to route emergency calls to the most appropriate PSAP, as well as to ensure responder agencies are dispatched to the correct location. With the transition to NG9-1-1, several location data acquisition, conveyance, and determination issues arise, including—

- Obtaining and verifying caller location information despite the increased mobility and nomadic nature of the general public
- Ensuring that communications devices or systems are capable of delivering location information
- Accurately converting between civic and geospatial information
- Standardizing the location data structures and types received and provided to the PSAPs.

To date, the responsibility to obtain and verify location information for wireline and wireless 9-1-1 calls has been assigned to the common carriers. However, as in the case of 9-1-1 calls from IP-enabled devices using WiFi or WiMax hotspots, the responsible party has not been identified because such service involves not only a service provider (providing the WiFi service hotspot), but an access provider as well (providing the IP/Internet Service). As such, the responsibility could rest with the service and/or

the access provider. Before accurate location information can be obtained, the responsible party must be identified and a mechanism that associates and verifies the location data or reference of the caller needs to be developed and deployed.

Assumptions/Considerations: The analysis of this issue assumes that PSAPs will be able to receive 9-1-1 calls from IP-based devices that ultimately connect to an emergency communication network. There may be a variety of 9-1-1 call originating sources public or private that may connect to NG9-1-1 (e.g., WiFi Hotspot, enterprise local area network). This issue also assumes that E9-1-1 is the baseline of 9-1-1 services available at many PSAPs.

Issue: With the increase of personally identifiable information available with a NG9-1-1 call, existing laws may not be sufficient to protect the privacy of a 9-1-1 caller

Impact on NG9-1-1: For public safety to respond to 9-1-1 calls, personal and identifiable information must be obtained both automatically (e.g., location and telephone number) and directly from the caller or from call stream data. The ability to positively identify the location of a caller, coupled with the ability to automatically identify other personal information that may contribute to effective emergency response, but poses privacy concerns that are certainly present today, and will increase in the NG9-1-1 environment. To further compound privacy concerns, NG9-1-1 offers the ability to interconnect other systems or databases to provide supplemental information such as medical and health data that are currently not widely available to PSAPs and public safety agencies in an automated or electronic fashion. This raises issues of legal privacy and the need for NG systems to adequately address user access and data rights management and the ability to respond to compromised access.

Stakeholder(s) Affected: The confidentiality of 9-1-1 call information can be required by state legislation and regulation, and maintained by adequate system controls and mechanisms. State governments are responsible for developing appropriate legislation and regulation allowing or denying the release of 9-1-1 call records (e.g., voice recording, electronic or printed data, or transcriptions) to ensure the caller's privacy. System service and infrastructure providers may be responsible for ensuring that the mechanisms are in place to adequately control user access and manage the rights to data and information.

Background and Description: Data privacy involves safeguarding personally identifiable information (PII) which can be used to uniquely identify or locate a single person. With the implementation of wireless E9-1-1, many privacy advocates raised concerns that the E9-1-1 technology allowed a wireless service provider to determine the location of the caller based on the cellular telephone. Privacy advocates feared that cellular telephones would become tracking devices for the benefit of both the government and private industry[56]. For example, in the NG9-1-1 environment, service providers could implement a solution that positively identifies the location of a 9-1-1 caller using a mobile IP-based device. In addition to tracking location, the NG9-1-1 system will allow digital transmission and storage of a variety of new types of personal information, such as medical and telematics data, photos of victims, and other visual images. The range of PII that can be collected and transmitted may raise concerns from the many interest groups tracking privacy issues because the quantity and quality of information NG9-1-1 will make accessible to the PSAPs and public safety agencies is well beyond what is currently available. Today's patchwork of privacy legislation from federal, state and local governments make it impossible to identify a lowest common denominator for privacy regulations. The challenge will be to develop legislation, proper system controls and capabilities (e.g., who has access), and business processes (e.g., how often is information provided, what information is provided) to minimize privacy concerns while balancing the need for data access against the right for privacy.

[56] Duke Law and Technology Review, *Enhanced 9-1-1 Technology and Privacy Concerns: How Has the Balance Changed Since September 11?*, October 26, 2001, available at http://www.law.duke.edu/journals/dltr/articles/pdf/2001DLTR0038.pdf

Assumptions/Considerations: The analysis of this issue assumes that service providers (e.g., infrastructure and/or access) will automatically obtain and provide location information for callers. In addition, it assumes that some states do not have appropriate privacy laws to protect against the illegal access to and use of a caller's identity and information. Finally, this analysis assumes that external, third-party databases or systems will be accessible to NG9-1-1 to provide supplemental data such as medical information and crash data associated with a 9-1-1 call.

Issue: Routing and prioritization in the NG9-1-1 environment is more complex with the ability to dynamically route calls based on factors beyond location of the caller

Impact on NG9-1-1: Call routing, a core component of the NG9-1-1 system, is critical to the functionality of the system. With the IP open architecture, the NG9-1-1 System will enable the ability to route 9-1-1 calls throughout the Nation instead of being limited to a specific area as in today's 9-1-1. Location-to-Service Translation (LoST) servers and a national PSAP uniform resource locator (URL) registry must be developed to support the ability to route NG9-1-1 calls at a national level. LoST servers contents the necessary information (e.g., map service identifiers, geospatial or civic location information) to take the caller's location and determine the routing path to the appropriate NG9-1-1 PSAP based on the PSAP's URL. Without appropriate routing, 9-1-1 calls on the NG9-1-1 system may not reach their destination—the PSAPs. If 9-1-1 calls do not reach the PSAPs, it is possible that they may go unanswered.

Stakeholder(s) Affected: Issues related to routing and prioritizing 9-1-1 calls will affect PSAPs, and are beginning to be addressed by Standards Development Organizations (SDOs). Without defined call treatment protocols and a corresponding PSAP URL registry, 9-1-1 calls may be routed to an inappropriate or unavailable PSAP, affecting the ability of the PSAPs to answer 9-1-1 calls in a timely manner, and may not take full advantage of the routing and treatment capabilities of NG9-1-1. It may require PSAPs to re-route or transfer the 9-1-1 call to another PSAP within the jurisdiction that is capable of answering 9-1-1 calls from specific devices. While SDOs are currently in the process of developing standards or protocols that will allow 9-1-1 calls to be prioritized as emergency calls and routed appropriately within call origination networks, additional work is necessary to add other call treatment features including the application of business rules addressing factors like calling devices, PSAP jurisdiction, and others.

Background and Description: PSAPs typically serve a well-defined, but local geographic region and vary in 9-1-1 capabilities ranging from basic (i.e., landline three-digit dialing, circuit-based transmission) to Wireless Phase II 9-1-1 (e.g., receives wireless 9-1-1 calls and automatically identifies caller location). To date, 9-1-1 calls, for the most part, are routed based on a single factor—location of the caller. However, as NG9-1-1 capabilities are phased into the current 9-1-1 capabilities, it is crucial that a call treatment protocol is created to determine how 9-1-1 calls are routed over an IP network to the appropriate PSAP based on the location of the caller, the capability of the PSAP, and business rules. Business rules describe the operational definitions and constraints that can be applied to the system to dynamically specify how the system should react under different circumstances. As an example, if a deaf or hearing impaired caller calls 9-1-1 and potentially requires relay services, business rules must be developed determine how the call will be routed to a PSAP that can automatically conference in an interpreting service.

Assumptions/Considerations: The analysis of this issue assumes that if NG9-1-1 is implemented in a phased approach nationwide, not all PSAPs will have NG9-1-1 capabilities simultaneously. It is also important to note that NG9-1-1 system routing will also depend on establishment of the appropriate regulations, protocols, and databases to support nationwide PSAP call routing and the provision of caller location.

Issue: Mechanisms need to be developed to certify and authenticate service and infrastructure providers to allow access to NG9-1-1

Impact on NG9-1-1: Telecommunications services and the access to 9-1-1 by such services are potentially much more complex in the NG environment. The actual services themselves, whether they are the delivery of a 9-1-1 call, or an enhancement to the treatment of that call, could be provided by third party service providers separate from those that provide access to such services. Consequently, mechanisms to regulate, certify, and authenticate service providers of all types critical to emergency communications must be defined to ensure consistent, authorized, and standard contributions to the process and NG9-1-1 PSAPs can receive data-related to 9-1-1 calls.

Stakeholder(s) Affected: The regulation, certification, and authentication of all types of service providers that need to gain access to the NG9-1-1 network will affect service providers and the federal and state government. Without mechanisms to connect to the NG9-1-1 network, service providers will not be able to provide the necessary data and service capabilities. Currently no mandate exists that identifies prerequisites that service providers would be required to meet (e.g., security and standards requirements) to be allowed to directly connect to the NG9-1-1 system as the Local Exchange Carriers (LEC) do to the current system.

Background and Description: To date, LECs serving as 9-1-1 service providers are regulated through the Federal Communications Commission (FCC) and individual state regulatory commissions, and are the only entities with direct access to the 9-1-1 functions. To access the 9-1-1 functions, wireless and VoIP providers must access to the Public Switched Telephone Network (PSTN) through such providers. The FCC requires LECs to allow access to the 9-1-1 network through the PSTN to wireless and VoIP providers. However, this method of connecting to the 9-1-1 network can only handle voice 9-1-1 calls. To ensure that only reputable service providers have access to the NG9-1-1 system, certification and authentication mechanisms must be developed to identify and determine which service providers are allowed to access the NG9-1-1 network in a prescribed and standardized manner. The mechanisms may outline service providers' prerequisites, standards, and requirements to protect the security and promote an open architecture of the NG9-1-1 network.
Assumptions/Considerations: The analysis of this issue assumes that callers will use IP-based device capabilities such as instant messaging, multimedia messaging services, and photo functions to call 9-1-1 in addition to the traditional voice 9-1-1 call.

Issue: NG9-1-1 allows for a level of coordination and resource sharing that does not currently exist in today's 9-1-1 environment

Impact on NG9-1-1: The nature of NG9-1-1 system allows for the sharing of services and resources, including infrastructure and applications. Without establishing an agreed upon framework (institutional arrangement) among PSAPs, 9-1-1 Authorities, and other entities (e.g., public safety dispatch, service providers, etc.), the benefits of sharing resources and services will not be fully realized. This may prevent the realization of potential cost savings by a region or state that has multiple PSAPs and other entities.

Stakeholder(s) Affected: NG9-1-1 enables interconnection of a variety of services and resources not currently used by PSAPs and 9-1-1 Authorities. Cooperation and collaboration with multiple new partners is necessary to realize the full benefit of NG capabilities. The sharing of service and resources will involve PSAPs, 9-1-1 Authorities, and service providers. The PSAPs and 9-1-1 Authorities will need to establish a framework to manage and coordinate sharing relationships. In addition, service providers may be responsible for managing and maintaining some of the shared resources involved. Lack of coordination has consequences at all levels. Local jurisdictions may be unprepared to upgrade their PSAPs for IP-based communications because of a lack of coordination by state and local stakeholders, both public and private, and may be unable to take full advantage NG9-1-1 features like re-routing and call overflow management. The Nation as a whole may also be unable to gain the benefits of a national interconnected emergency number system without stakeholder coordination at the national, state,

regional and local levels including potential economies of scale, and more consistent application of NG9-1-1 across the country.

Background and Description: Currently, many PSAPs are individually managed and upgraded, while in some areas PSAP services and upgrades are coordinated through higher level regional or state authorities. Regardless, the current circuit-based dedicated 9-1-1 system architecture does not promote or support the sharing of resources and services among the PSAPs. However, the NG9-1-1 system is based on an open IP architecture. This allows any PSAP to manage and share resources and services to potentially reduce the cost of upgrading and maintaining NG9-1-1 services. It is important that the PSAPs develop and agree upon terms and conditions that identify what will be shared and who will be responsible for operation and maintenance issues. In addition to establishing institutional arrangements among PSAPs, service providers should be involved because they may be responsible for managing and maintaining infrastructure or databases that will be used by the PSAPs. For example, components of the NG9-1-1 system for which responsibility may be shared between public (e.g., PSAPs) and private (e.g., service providers) entities include the PSAP URL registry and routing databases (e.g., LoST). The service providers may be responsible for managing and maintaining the databases, while the PSAPs may be responsible for updating the database based on their jurisdictional boundaries and capabilities. These opportunities for sharing need to be identified and codified to determine who will be responsible for the resource and how the resource will be managed, maintained, and staffed.

Assumptions/Considerations: The analysis of this issue assumes that in an NG9-1-1 environment, the roles of the PSAPs, responders, and related entities are expected to expand beyond traditional 9-1-1 services with higher levels of interaction, managed situational intelligence, enhanced capabilities, and more comprehensive communication and coordinated response services.

Issue: Industry may be reluctant to develop and adopt open standards which could limit the availability of interoperable NG9-1-1 services and equipment

Impact on NG9-1-1: Lack of support from service providers and equipment manufacturers in developing and adopting open standards will limit the availability of interoperable services and equipment. This will have an impact on the ability of the NG9-1-1 system to interconnect and achieve the NG9-1-1 vision to provide ubiquitous, interconnected NG9-1-1 services across the Nation.

Stakeholder(s) Affected: The availability of open, nonproprietary standards and technology will affect PSAPs and 9-1-1 Authorities procuring equipment and services to upgrade to NG9-1-1. For entities choosing to take an independent approach to NG9-1-1 implementation, the risk of implementing proprietary solutions that do not interoperate with other 9-1-1 and NG9-1-1 systems increases. Some PSAPs will face difficult decisions about which technology to embrace when there are competing proprietary platforms to choose from and not fully realize the ramifications of that decision until a later time when their network cannot be integrated into NG9-1-1.

Background and Description: Open architecture allows for the ability of system architects and maintainers to incorporate new components, install upgrades, or swap one manufacturer's device for another's without being restricted by proprietary constraints. However, given the relatively small market for 9-1-1 equipment compared with business and consumer electronics, and/or the lack of timely and effective open standards, service and equipment providers may choose to move forward by offering proprietary solutions to prospective buyers. Furthermore, to upgrade to new open architecture hardware and software for a small market such as 9-1-1 may make it difficult for service and equipment providers to meet profit margin goals because the cost associated with upgrading may out weight the revenues realized. Similarly, first responder agencies are facing challenges in getting manufacturers to adopt standards for private land mobile radio systems in order to promote interoperability among federal, state, and local emergency responders. Lack of support from service providers and equipment manufacturers in adopting open standards will limit the availability of interoperable services and equipment.

Assumptions/Considerations: The analysis of this issue assumes that the NG9-1-1 system architecture is based on open, non-proprietary standards and technology. In addition, it assumes that implementers of NG9-1-1 solutions will use open architecture to promote interoperability among disparate systems.

Issue: Liability protection or parity needs to be extended to protect stakeholders involved in NG9-1-1

Impact on NG9-1-1: Experience in the deployment of E9-1-1 has shown that a lack of legal clarity on the issue of liability parity can lead to delays in the provisioning of E9-1-1 service. NG9-1-1 will potentially promote a more complex service delivery environment, which will further complicate how liability protection is appropriately provided for new and future services.

Stakeholder(s) Affected: In the current system, 9-1-1 wireless and wireline service providers are afforded protection from liability by legislative action. With the transition to NG9-1-1, new types of service providers will be entering the system. Their standing with respect to liability has not been defined by law. This may prevent the entry of new parties and the provision of data that could speed the delivery of more effective emergency response services.

Background and Description: Within NG9-1-1, a call may include multimedia information containing essential information about the emergency situation that may be necessary to appropriately route the call. The NG9-1-1 call stream could also contain supportive or supplemental data (e.g., weather, traffic information, and medical data) obtained through free or paid services. These third-party sources traditionally make their information available to the public or to a limited set of subscribers with access to sensitive information, such as PSAPs. Many of the third-party information sources from which the services will be built are only now being developed. The providers of these data should be aware of the potential for use of their services by PSAP call takers, public safety dispatchers, and first responders. Examples of such information include map displays and other integrated geospatial data, such as those that are becoming available that integrate maps, three-dimensional images, and detailed information about a particular location of the caller. Another example is vehicle telematics crash data that could be used to make dispatch decisions about the quantity and type of responders, and the triage of crash victims to the appropriate medical facility.

Assumptions/Considerations: The analysis of this issue assumes that some 9-1-1 Authorities will be reluctant, or even refuse, to complete VoIP emergency calls because they lack the legal safeguards that protect them from liability which exist today for wireline and wireless emergency calls.

Issue: New capabilities and services enabled by NG9-1-1 could impact PSAP operations and training for both PSAP administrators and call takers

Impact on NG9-1-1: As implementation of the NG9-1-1 occurs, 9-1-1 Authorities and PSAP directors will have to determine how to modify existing PSAP practices and procedures (e.g., standard operating procedures [SOP] and training) and resources (e.g., human machine interface [HMI] solutions for existing customer premises equipment [CPE]) to accommodate NG9-1-1 services. Currently, neither nationwide SOPs nor a training curriculum fully exist NG9-1-1 system operation.

Stakeholder(s) Affected: It is anticipated that the demands on PSAP call takers are likely to increase with the complexity of call taking functions caused by new types of multimedia data. Likewise, 9-1-1 Authorities and PSAPs directors will face the challenge of configuring systems and training call takers to accept and process this new NG9-1-1 data.

Background and Description: As a result of the introduction of the NG9-1-1, PSAP operations will face new challenges associated with the increase in real-time multimedia information—text, still images, or

video in addition to voice—passing between a person needing assistance and the call taker. While NG9-1-1 will provide new and enhanced tools to deal with such complexity, the increased quantity of multimedia data will complicate existing call taking functions. Receipt of calls from IP-based communication devices, in addition to conventional wireline calls, could test call takers' ability to maintain their quick and accurate response to emergency situations. In addition, the NG9-1-1 environment will influence how 9-1-1 Authorities and PSAP directors support PSAP operations (e.g., including configuring business rules and systems to limit transmission of extraneous data transactions that can slow response times). Within the NG9-1-1 system, once a call is answered, the PSAP call takers may face increased stress and workloads because of the wide range of information types that could be delivered in each 9-1-1 call.[57] Moreover, the increase in multimedia data may make call records management[58] more challenging because NG9-1-1 will present new information types and formats to archive, such as audio, video, text, still imagery, and other data types.[59].

Assumptions/Considerations: The analysis of this issue assumes that responsibilities of 9-1-1 Authorities will likely expand, particularly with regard to configuring the NG9-1-1 system for their PSAP. While the PSAP director's responsibilities will also likely increase, it is assumed that they will be more focused on the daily operations of their specific PSAP and training of call takers to ensure that their PSAP meets the requirements set forth by their 9-1-1 Authority. It also assumes that even though it is anticipated that the NG9-1-1 system will include HMI solutions to assist call takers in answering and processing call data, they may still need to analyze and make decisions regarding what information should be transferred to the dispatchers and first responder agencies based on their training and experience.

Conclusion

The USDOT has identified potential transition issues to be addressed at the national, state, regional, and local levels before and during the implementation of NG9-1-1. As noted earlier, the level of impact and priority of each issue depends on the implementation pathway employed by the state, regional, or local 9-1-1 Authorities. These deployment scenarios will be further evaluated in the NG9-1-1 Transition Plan to identify strategies that can be adapted and used by the 9-1-1 community in implementing NG9-1-1 across the country. Collectively, the analysis of the issues and the NG9-1-1 Transition Plan will provide a foundation for local and state 9-1-1 Authorities in planning and deploying NG9-1-1.

[57] In addition to essential information that is necessary to route the call appropriately, call takers (at most PSAPs) may receive a wide range of additional information that is categorized as supportive or supplemental. Supportive data is call data that may support call handling and dispatch beyond essential data (e.g., ACN data). Supplemental data is call data that may complement, but is not necessary for, call handling and dispatch or emergency response (e.g., allergies to certain medications).

[58] Call records management involves creating, logging, archiving, retrieving, and transmitting call records. A call record is the complete, end-to-end record of a call and includes the voice recording, text communications, and essential and supplemental data associated with a call, as well as information added by the call taker.

[59] An NG9-1-1 call will potentially also include considerably more call stream data than is provided in traditional E9-1-1 (which is basically a 10-digit telephone number or, in the case of some wireless 9-1-1 setups, a 20-digit number).

Appendix A—Definition of NG9-1-1 Stakeholders

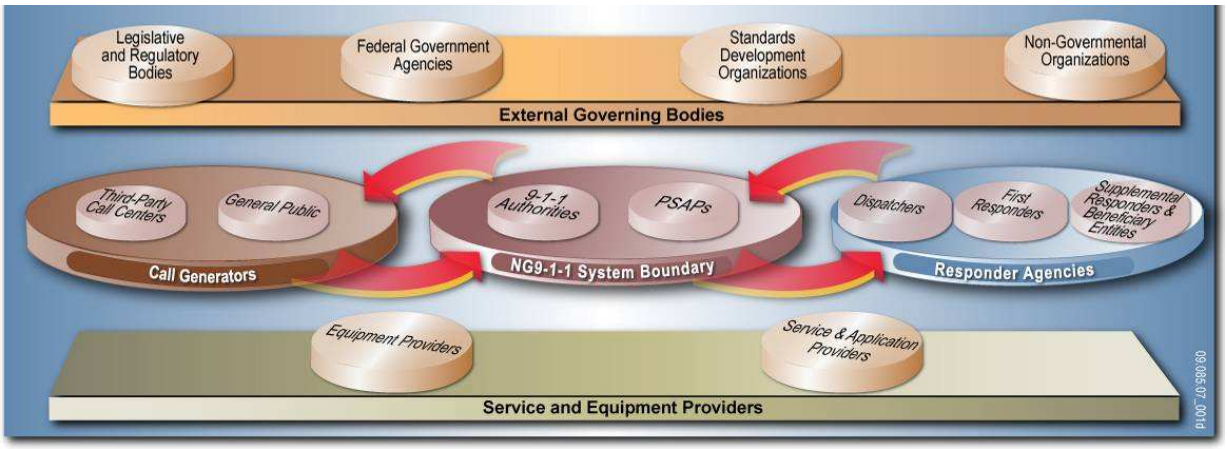


Figure A-1. NG9-1-1 Stakeholder Relationships

Stakeholder roles may change in the transition from today's 9-1-1 environment to the NG9-1-1 environment; however, the extent of change will vary among the types of stakeholders. In this context, "type of stakeholder" refers to an entire stakeholder category rather than individual entities within that category (e.g., responder agencies versus individual first responders). To better understand the fundamental roles and functions of each 9-1-1 stakeholder, the following subsections provide a high-level description of each stakeholder type.

Service and Equipment Providers

Service and equipment providers are responsible for developing, supplying, and sometimes maintaining the hardware, software, and other equipment used by PSAPs in transferring 9-1-1 calls; providing public access to 9-1-1 services, physical and network access, and telecommunications and IT equipment; and helping to maintain the data and information necessary to route and deliver emergency calls. Types of service and equipment providers include 9-1-1 service providers, service access providers, service application providers, and equipment suppliers.

Third-Party Call Center

Third-party call centers receive voice, video, text, images, and other data originating from the public via various services, such as automobile telematics, relay services, medical alert, poison control hotlines, and satellite telecommunications services. These call centers intercede between the general public and 9-1-1 services for a growing number of emergency calls to help support the delivery and processing of the calls involved.

9-1-1 Authority

A 9-1-1 authority has jurisdiction over and/or supports a particular 9-1-1 system. The 9-1-1 authority could be a county/parish or city government, a special 9-1-1 or Emergency Communications district, a Council of Governments, an individual PSAP, a statewide agency, or other similar body. The 9-1-1 authority generally manages human resource requirements and activities, oversees service delivery, performs high-level database management and support functions, oversees funding and procurement of supporting infrastructure and services, establishes SOPs and operational policies, and is responsible for security at the PSAPs.

Public Safety Answering Point

A PSAP is the generic name for an emergency communications center agency that receives, processes, and transfers 9-1-1 calls. Some PSAPs also direct or dispatch 9-1-1 or other emergency calls to appropriate police, fire, and emergency medical services (EMS). PSAPs throughout the Nation have different levels of capabilities and functions and are typically categorized as follows: "Greenfield" 9-1-1, Basic 9-1-1, E9-1-1, or Wireless E9-1-1.[60]

PSAP Call Taker

A PSAP call taker is a person who receives emergency and non-emergency calls, determines the nature of caller situations, elicits the location of the emergency and other necessary information, and relays essential information to dispatchers, staff, and other agencies as needed, using telephony and computer equipment. In some instances, the call taker may also be the dispatcher, and in that case, the call taker/dispatcher communicates directly with the responders. In other cases, the call taker may provide emergency instructions to the caller prior to the arrival of first responders.

Responder Agencies

Responder agencies—dispatch entities, law enforcement, fire and rescue, EMS, supplemental responders, and beneficiary entities—have a legal or consensual obligation to respond to or obtain information from emergency calls to support comprehensive incident management.

Legislative and Regulatory Bodies

Legislative bodies exist at the federal, state, and local levels to draft and pass legislation for the welfare and benefit of the public. Of interest to this report is legislation related to the 9-1-1 services. To ensure that the provisions of the legislation are implemented and enforced, regulatory bodies at each level of government may write draft regulations that are open to public comment, but binding on the public once promulgated in final form. The regulatory body itself or a court having the appropriate jurisdiction may impose sanctions for regulatory infractions. For example, revising tariffs, mandating a nationwide IP-enabled emergency network, enforcing IP security standards to ensure privacy of information transmitted on the NG9-1-1 System, and regulating how 9-1-1 fees are collected can be completed in a way that is consonant with the entire policy context for 9-1-1. Examples of legislative and regulatory bodies include state legislatures, Public Utility Commissions (PUCs), and the FCC.

Federal Government Agencies

Federal Government agencies are responsible for establishing policies and funding, providing leadership, and promoting coordination and communications between agencies and organizations involved with 9-1-1 services. The Federal Government also provides a framework for state and local governments to transition from the current 9-1-1 system to the NG9-1-1 System. The most prominent government organizations involved in 9-1-1 include the USDOT Intelligent Transportation Systems Joint Program Office, Department of Homeland Security, USDOT National Highway Traffic Safety Administration–National Telecommunications and Information Administration National 9-1-1 Implementation and Coordination Office, Department of Justice, FCC, and Department of Health and Human Services.

Non-Governmental Organizations

Non-governmental organizations include those agencies and organizations that are considered part of the private sector. Non-governmental organizations play a critical role in the implementation of the NG9-1-1 System because of their involvement in identifying the needs of their membership, thereby shaping the products and services used by consumers and PSAPs who use the NG9-1-1 System. Examples of non-governmental organizations include SDOs, professional and industry associations, citizen and

[60] "Greenfield" 9-1-1 refers to PSAPs that lack a call center and only provides 9-1-1 service through remote call forwarding. See Appendix A, p. A-1 for definitions of the PSAP categories.

special interest advocacy organizations, private emergency response and recovery organizations, and research and academia.

General Public

The general public relies heavily on the ability to access 9-1-1 service with full functionality through any communications device during an emergency. The public expects a timely response from the emergency responder agencies once a call is made to 9-1-1 and determines the success of the 9-1-1 service based on the response time. To date, the general public can make 9-1-1 calls through wireline telephone, wireless telephone, teletype/telecommunications device for the deaf (TTY/TDD) over wireline, and VoIP, and indirectly through third-party call centers associated with telematics and relay services.

Appendix B—Acronym List

ACD	Automatic Call Distribution
CPE	Customer Premises Equipment
E9-1-1	Enhanced 9-1-1
EMS	Emergency Medical Services
ESNet	Emergency Services Network
FCC	Federal Communications Commission
HMI	Human Machine Interface
IP	Internet Protocol
LEC	Local Exchange Carrier
LIS	Location Information Server
LoST	Location-to-Service Translation
NG9-1-1	Next Generation 9-1-1
PII	Personally Identifiable Information
PSAP	Public Service Answering Point
PSTN	Public Switched Telephone Network
PUC	Public Utility Commission
SDO	Standards Development Organization
SOP	Standard Operating Procedure
TTY/TDD	Teletype/Telecommunications Device for the Deaf
USDOT	U.S. Department of Transportation
VoIP	Voice over Internet Protocol
WiFi	Wireless Fidelity

Appendix B: Acronyms

ACRONYM	DEFINITION
ACS COT	American College of Surgeons Committee on Trauma
AIP	Access Infrastructure Provider
ALI	Automatic Location Identification
ANI	Automatic Number Identification
APCO	Association of Public-Safety Communications Officials
ASL	American Sign Language
CDC	Centers for Disease Control and Prevention
CIO	Chief Information Officer
CLEC	Competitive Local Exchange Carrier
CONOPS	Concept of Operations
CPE	Customer Premises Equipment
DHS	Department of Homeland Security
DOC	Department of Commerce
DOJ	Department of Justice
DoS	Denial of Service
E9-1-1	Enhanced 9-1-1
ECRIT	Emergency Context Resolution with Internet Technologies
EDXL	Emergency Data Exchange Language
EMS	Emergency Medical Services
ESInet	Emergency Services IP Network
FCC	Federal Communication Commission
FEMA	Federal Emergency Management Agency
HHS	Department of Health and Human Services
HMI	Human Machine Interface
ICO	Implementation and Coordination Office
IETF	Internet Engineering Task Force
IP	Internet Protocol
IT	Information Technology
ITS	Intelligent Transportation Systems
JPO	Joint Programs Office
LEC	Local Exchange Carrier
LoST	Location-to-Service Translation Protocol
MOU	Memorandum of Understanding
NASNA	National Association of State 9-1-1 Administrators
NENA	National Emergency Number Association
NG9-1-1	Next Generation 9-1-1
NHTSA	National Highway Traffic Safety Administration
NTIA	National Telecommunications and Information Administration
NRIC	Network Reliability and Interoperability Council
ODC	Operational Development Committee
OEC	Office of Emergency Communications
PDA	Personal Digital Assistant
PII	Personally Identifiable Information
POC	Proof of Concept
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
RUS	Rural Utilities Service

ACRONYM	DEFINITION
SDO	Standards Development Organizations
SIP	Session Initiation Protocol
SMS	Short Message Service
SOP	Standard Operating Procedure
TDD/TTY	Telecommunications Device for the Deaf / Teletypewriter
USDOT	U.S. Department of Transportation
VoIP	Voice over Internet Protocol
VRI	Video Remote Interpreting
XML	Extensive Markup Language

Appendix C: Glossary

TERM	DEFINITION
9-1-1	A three-digit telephone number to facilitate the reporting of an emergency requiring response by a public safety agency.
9-1-1 Authority	Usually created by statute or executive order, or operates as a function of an existing authority. Authority generally covers funding, implementation and oversight, although the specific control ranges from outright and complete authority over PSAP service operations and delivery, to limited powers of encouragement, coordination, and guidance of the same.
9-1-1 System	The set of network, database, and customer premises equipment (CPE) components required to provide 9-1-1 service.
Access Control	Ability to permit or deny the use of a particular resource by a particular entity. Access control methods can be applied to physical or electronic resources.
Analog	Continuous and variable electrical waves that represent an infinite number of values; as opposed to digital.
Association for Public-Safety Communications—International (APCO)	A not-for-profit organization established in 1935 and the world's largest organization dedicated to public safety communications. Members rely on APCO for their professional needs—from examining standards and issues to providing education, products and services, and frequency coordination services.
Authentication	Determination or verification of a user's identity and/or the user's eligibility to access a system, network, or data; measures to prevent unauthorized access to information and resources.
Automatic Call Distributor (ACD)	Equipment or application that automatically distributes incoming calls to available PSAP call takers in the order the calls are received, or queues calls until a call taker becomes available.
Automatic Collision Notification (ACN)	The process of identifying that a motor vehicle has been involved in a collision, collecting data from sensors in the vehicle, and communicating those data to a PSAP.
Automatic Event Alert	9-1-1 calls placed by sensors or similar initiating devices. Includes alarms, telematics, and sensor data, and may also include real-time communications.
Automatic Location Identification (ALI)	The automatic display at the PSAP of the caller's telephone number, the address or location of the telephone, and supplementary emergency services information.
Automatic Location Identification (ALI) Database	The set of ALI records residing on a computer system.
Automatic Number Identification (ANI)	Telephone number associated with the access line from which a call originates.
Availability	The operational ability of necessary and beneficial data interfaces to support call processing and emergency response; or the amount or percentage of time that the system provides service.

TERM	DEFINITION
Backup Public Safety Answering Point (Backup PSAP)	Typically, a disaster recovery answering point that serves as a backup to the primary PSAP and is not collocated with the primary PSAP.
Business Rules	A set of defined policies that describe the operational definitions and constraints that can be applied to the system that dynamically specify how the system should react under different circumstances. Business rules are used throughout the NG9-1-1 system, enabling jurisdictions and 9-1-1 authorities to configure the system based on the needs of the locality or region and can be modified or updated as needed.
Call	For the purposes of this NG9-1-1 report, any real-time communication—voice, text, or video—between a person needing assistance and a PSAP call taker. This term also includes non-human-initiated automatic event alerts, such as alarms, telematics, or sensor data, which may also include real-time communications.
Callback	The ability to re-contact the calling party.
Call Delivery	The capability to route a 9-1-1 call to the designated selective router for ultimate delivery to the designated PSAP for the caller's ANI/KEY.
Call Detail Record	All system (including network) data accessible with the delivery of the call, and all data automatically added as part of call processing. This includes Essential Data (including reference key to network component and call progress records) and Supportive Data. Part of the Call Record.
Caller Location Information	Data pertaining to the geospatial location of the caller, regardless of whether the caller is a person or an automatic event alert system.
Call Narrative	Supplemental Data (or caller-generated data) manually gathered and entered by the call taker for the purposes of documenting the call. Part of the Call Record.
Call Record	The collection of all information related to a call (including Essential, Supportive, and Supplemental data); composed of Call Detail Record, Call Recording, and Call Narrative.
Call Recording	The electronic documentation of the interactive communication (e.g., audio, video, text, image) between the caller, call taker, and any conferenced parties. Part of the Call Record.
Call Routing	The capability to selectively direct the 9-1-1 call to the appropriate PSAP.
Call Taker	As used in 9-1-1, a person (sometimes referred to as a telecommunicator) who receives emergency and non-emergency calls by telephone and other sources, determines situations, elicits necessary information, and relays essential information to dispatches, staff, and other agencies, as needed, using telephony and computer equipment.
Call Transfer	The capability to redirect a call to another party.
Call Type	Classification of a 9-1-1 call that indicates the call access method, which can affect call treatment, routing, and processing. Call types may include voice caller, short message service (SMS) text, Simple Mail Transfer Protocol (SMTP) text, multimedia, telematics data, ANI, silent alarms, etc.

TERM	DEFINITION
Circuit-Switch	The establishment, by dialing, of a temporary physical path between points. The path is terminated when either end of the connection sends a disconnect signal by hanging up.
Civic Address Information	Street address data, inclusive of suite/office number, where appropriate.
Configurability	Property of a system that supports the rearrangement of interfaces and functionalities.
Continuity of Operations (COOP)	A system's ability to prevent critical system failures (e.g., via component redundancy) and to seamlessly conduct updates and repairs.
Cross-System Authentication	Authentication across a number of systems or networks via a single authentication process, sometimes referred to as Single Sign-On (SSO), and potentially achieved via proxy authentication.
Customer Premises Equipment (CPE)	Communications or terminal equipment located in the customer's facilities; terminal equipment at a PSAP.
Database	An organized collection of information, typically stored in computer systems, composed of fields, records (data), and indexes. In 9-1-1, such databases include the master street address guide, telephone number, and telephone customer records.
Data Integrity	The property of not having been altered or destroyed in an unauthorized manner.
Data Rights Management	The control of restrictions to system users' ability to interact with, use, transmit, and govern access to data.
Digital	Relating to calculation, storage, or transmission by numerical methods or discrete units, as opposed to the continuously variable analog. Computerized.
Disaster	Any event that can cause a significant disruption to normal emergency calling capability.
Dispatcher	As used in public safety, a person responsible for receiving and transmitting information pertaining to requests for emergency service and other related activities, tracking vehicles and equipment, and recording other important information using a telephone, radio, and other communications resources.
Dispatch Operations	The distribution of emergency information to responder organizations responsible for delivery of emergency services to the public.
Emergency Call	A telephone request for public safety agency emergency services that requires immediate action to save a life, to report a fire, or to stop a crime. May include other situations as determined locally.
Emergency Location Information	Data pertaining to the location of the emergency, which may be different from the caller location.
Emergency Medical Service (EMS)	A system providing pre-hospital emergency care and transportation to victims of sudden illness or injury.
Emergency Response	An effort by public safety personnel and citizens to mitigate the impact of an incident on human life and property.

TERM	DEFINITION
Enhanced 9-1-1 (E9-1-1)	An emergency telephone system that includes network switching, database, and CPE elements capable of providing selective routing, selective transfer, fixed transfer, caller routing and location information, and ALI.
Enterprise	The highest level of system functionality.
Essential Call Data	Data that support call delivery and adequate response capability. These data, or a reference to them, is automatically provided as a part of call or message initiation. Examples include location, callback data, and call type.
Extensibility	The property of a system to be adaptable for future growth. The ability to add extended functionality to a system.
Fixed Transfer	The capability of a PSAP call taker to direct a 9-1-1 call to a predetermined location by depressing a single button.
Firewall	The primary method for keeping a computer secure from intruders. It allows or blocks traffic into and out of a private network or the user's computer.
Gateway	The point at which a circuit-switched call is encoded and repackaged into IP packets; equipment that provides interconnection between two networks with different communications protocols; two examples are packet assembler/disassemblers and protocol converters.
Geographic Information System (GIS)	A computer software system that enables one to visualize geographic aspects of a body of data. It contains the ability to translate implicit geographic data (such as a street address) into an explicit map location. It has the ability to query and analyze data in order to receive the results in the form of a map. It also can be used to graphically display coordinates on a map (i.e., latitude/longitude) from a wireless 9-1-1 call.
Geospatial	Used to describe the combination of spatial software and analytical methods with terrestrial or geographic datasets.
Global Positioning System (GPS)	A satellite-based location determination technology.
Human Machine Interface (HMI)	Graphical, textual, and auditory means by which an end user interacts with a system. HMI within 9-1-1 systems enables direct interaction between the end-user (human) and a system (computer, machine). For the call takers at the PSAP, HMI provides them with the ability to manipulate the system via commands and inputs, and receive an output from the system based on specified criteria.
Identity Management	The control, verification, and administration of user identification and system access to ensure confidentiality, integrity, authentication, and non-repudiation of sensitive data.
Integrity	See “Data Integrity.”
International Telecommunications Union (ITU)	The telecommunications agency of the United Nations established to provide worldwide standard communications practices and procedures.
Internet Engineering Task Force (IETF)	The lead standards-setting authority for Internet protocols.

TERM	DEFINITION
Internet Protocol (IP)	The set of rules by which data are sent from one computer to another on the Internet or other networks.
Internetwork	To go between one network and another; a large network made up of a number of smaller networks.
Interoperability	The capability for disparate systems to work together.
Landline	Colloquial term for the Public Switched Telephone Network access via an actual copper or fiber optic transmission line that located underground or on telephone poles. Used to differentiate the "wireless" connectivity of a cellular or personal communications services system. Also referred to as "wireline."
Local Exchange Carrier (LEC)	A telecommunications carrier under the state/local Public Utilities Act that provides local exchange telecommunications services. Also known as incumbent local exchange carrier (ILEC), alternate local exchange carrier (ALEC), competitive local exchange carrier (CLEC), competitive access provider (CAP), certified local exchange carrier (CLEC), and local service provider (LSP).
Location	See "Caller Location Information" and "Emergency Location Information."
National Emergency Number Association (NENA)	A not-for-profit corporation established in 1982 to further the goal of "One Nation–One Number." NENA is a networking source and promotes research, planning, and training. It strives to educate, set standards, and provide certification programs, legislative representation, and technical assistance for implementing and managing 9-1-1 systems.
Network	An arrangement of devices that can communicate with each other.
Overflow	The telecommunications term for the condition when there are more calls than the primary network path is designated to handle. This condition invokes the need to perform some form of call treatment, such as busy signals or alternate routing.
Packet	Logical grouping of information that includes a header containing control information and (usually) user data. Packets are most often used to refer to network layer units of data. The terms *datagram*, *frame*, *message*, and *segment* are also used to describe logical information groupings at various layers of the Operating System Interface (OSI) reference model and in various technology circles.
Packet Switch	A network technology that breaks up a message into small packets for transmission. Each packet contains a destination address. Thus, not all packets in a single message must travel the same path. As traffic conditions change, they can be dynamically routed via different paths in the network, and they can even arrive out of order. The destination computer reassembles the packets into their proper sequence.
Personal Digital Assistant (PDA)	Small, handheld device used to store address book information, telephone numbers, personal contacts, and other personal information.
Protocol	A set of rules or conventions that govern the format and relative timing of delivery of data in a communications network. There are three basic types of protocols: character-oriented, byte-oriented, and bit-oriented. The protocols for data communications cover such activities as framing, error handling, transparency, and line control.

TERM	DEFINITION
Public Safety Answering Point (PSAP)	A facility equipped and staffed to receive 9-1-1 calls; a generic name for a municipal or county emergency communications center dispatch agency that directs 9-1-1 or other emergency calls to appropriate police, fire, and emergency medical services agencies and personnel.
Public Switched Telephone Network (PSTN)	The network of equipment, lines, and controls assembled to establish communication paths between calling and called parties in North America.
Redundancy	Duplication of components, running in parallel, to increase reliability; a backup system (either a device or a connection) that serves in the event of primary system failure.
Reliability	The ability of a system or component to perform its required functions under stated conditions for a specified period of time.
Requirement	A statement of a characteristic that the system must possess in order to be acceptable; the desired system is defined as one that fulfills all of the requirements.
Router	An interface device between two networks that selects the best path to complete the call even if there are several networks between the originating network and the destination.
Scalability	The property of a system that allows it to be readily enlarged, e.g., by adding hardware to increase capacity or throughput.
Security	The ability to provide adequate data and service protection to mitigate unauthorized access, service exploitation, and leakage of confidential or sensitive information.
Selective Routing	Direction of a 9-1-1 call to the proper PSAP based on the location of the caller.
Selective Transfer	The capability to convey a 9-1-1 call to a response agency by operation of one of several buttons typically designated as police, fire, and emergency medical.
Service Provider	An entity providing one or more of the following 9-1-1 elements: network, CPE, or database service.
Session Initiation Protocol (SIP)	A signaling protocol used to exchange data (including voice, video, text) among an association of participants. [RFC 3261]
Short Message Service (SMS)	A text message service that enables messages generally no more than 140–160 characters in length to be sent and transmitted from a cellular telephone. Short messages are stored and forwarded at SMS centers, allowing their retrieval later if the user is not immediately available to receive them.
Spatial	Concept of describing a space or area of space.
Stakeholder	An individual or group with an interest in the successful delivery of intended results by a project.

TERM	DEFINITION
Supplemental Call Data	Information that may complement, but is not necessary for, call handling and dispatch. These data typically would be automatically or manually queried after the call is delivered to the call taker. Examples include contact information for someone who should be notified of a medical emergency, building blueprints, other addresses in the immediate vicinity, etc.
Supportive Call Data	Information beyond essential data that may support call handling and dispatch. The addition of these data to the call stream is triggered by one or more of the data or reference items in essential data for a given call type. An example is ACN data such as "vehicle rollover."
System of Systems	Interconnected and decentralized system of interoperable networks.
Telecommunications Industry Association (TIA)	A lobbying and trade association, which is the result of the merger of the USTA (United States Telephone Association) and the EIA (Electronic Industries Association).
TCP (Transmission Control Protocol)	The set of rules within the TCP/IP protocol suite that ensures that all data arrives accurately and 100-percent intact at the destination.
Telematics	The system of components that supports two-way communications with a motor vehicle for the collection or transmission of information and commands.
Telephony	The electronic transmission of the human voice.
Transfer	A feature that allows PSAP call takers to redirect a 9-1-1 call to another location.
Transmission Control Protocol/Internet Protocol (TCP/IP)	A layered set of protocols (sets of rules) used to connect dissimilar computers together. TCP provides the transport service required by the application layer. The TCP layers in the two host computers that are sending data will communicate with each other to ensure reliable data packet transport. IP provides the service user to deliver the datagram to its destination, providing the routing through the network and the error messages if the datagram is undeliverable.
User Authentication	See "Authentication."
Voice over Internet Protocol (VoIP)	A set of rules that provides distinct packetized voice information in digital format using the Internet Protocol. The IP address assigned to the user's telephone number may be static or dynamic.
Wireless	In the telecommunications industry, a term that typically refers to mobile telephony and communications through handheld devices that make a connection using radio frequency (in particular frequency bands often reserved for mobile communications) for personal telecommunications over long distances.
Wireline	See "Landline."

Appendix D: Strategic Options Categorized by Stakeholders

Federal Government

	Federal Government
Funding	**Ensure NG9-1-1 upgrades are considered a fiscal priority for states and local jurisdictions and the Federal Government through outreach and education**
	▸ Encourage state governments and legislatures to give fiscal priority to NG9-1-1 upgrades and transition (based on nationally accepted standards and coherent statewide plans).
	▸ Encourage all levels of government to establish an effective mechanism for coordinating 9-1-1 services, where such a mechanism does not already exist.
	▸ Consider expanding the use of more federal public safety grant program funds for 9-1-1 services and for shared emergency services internetworks.
	Transform current 9-1-1 funding mechanisms to address— ▸ **Diminishing revenue base** ▸ **Population-based and geographical funding disparities** ▸ **Funding allocation and governance models for shared resources** ▸ **Service provider cost recovery**
	▸ As possible and appropriate, provide funding for the capital costs of NG9-1-1 planning, design, procurement, and implementation.
	▸ Consider legislation that allows use of federal funds to pay for NG9-1-1 portion and use of underlying IP based emergency service internetworks and core services.
	Ensure 9-1-1 funds are preserved for 9-1-1 and emergency communication systems
	▸ Consider expanding and strengthening existing Federal requirements that state and local 9-1-1 Authorities to use 9-1-1 funds, surcharges, and fees for costs attributable to 9-1-1 operations, services, and equipment.
	▸ Consider providing guidance regarding what constitutes minimum 9-1-1 features and functions that are appropriate uses of 9-1-1 revenues.
	▸ Implement and oversee existing requirements concerning eligibility for 9-1-1 grant funding to states that do not divert 9-1-1 funds.
	▸ Consider expanding and strengthening existing statutory provisions that 9-1-1 funds be used exclusively for the provision of 9-1-1 emergency communications services (e.g., 9-1-1, E9-1-1, NG9-1-1, and related or future upgrades).
Operations	**Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call**
	▸ Promote and support funding methods that provide necessary training and training materials.
	▸ Consider promoting public safety communications as a rewarding career opportunity in an effort to improve PSAP staffing levels.
	Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs
	▸ Gather and make available implementation, and operations and maintenance best practices, standards, and lessons learned, and share them among 9-1-1 Authorities.
	▸ Develop model strategic plans to help 9-1-1 Authorities at all levels manage NG9-1-1 migration (e.g., interagency coordination, training, security).
	▸ Consider working with stakeholders to establish procedures and standards to enable coordination of data rights management, access control, and identity management procedures and registries (e.g., who has access to what database and information and who has authority to initiate and receive information).
	Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of virtual PSAPs
	▸ Obtain PSAP operations best practices and lessons learned and share them among 9-1-1 Authorities and PSAPs.

Federal Government	
Standards and Technology	**Complete and accept NG9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing**
	▸ Consider facilitation and coordination of 9-1-1 stakeholders (e.g., SDOs, private and public stakeholders) to identify all standards work and technology development currently underway regarding relevant communications technology.
	▸ Consider facilitation and coordination of SDOs and public and private stakeholders to conduct a gap analysis of existing standards development work against the industry-accepted architectural model and identify standards that will need to be developed and/or the standards already developed that are inconsistent with the model.
	▸ Encourage appropriate SDOs and industry groups to address standards work that must be completed or modified to ensure a comprehensive standards and technology environment for NG9-1-1.
	▸ Promote and support a coordinating entity with dedicated attention to the development of standards and technologies considered essential to NG9-1-1, and facilitate emergency data standard coordination and harmonization among all emergency response professions.
	▸ Encourage states to enact laws or regulations that mandate the use of open standards for NG9-1-1 systems.
	Establish system access and security controls to protect and manage access to the NG9-1-1 system of systems
	▸ Consider initiating establishment of new security regulations or modification of existing security regulations to promote consistency among states.
	▸ Consider modifying, as necessary, federal legislative or regulatory provisions that limit 9-1-1 architecture to traditional components and may constrain the transition to the NG9-1-1 environment.
	▸ Consider identifying a certification and authentication process to ensure service providers and 9-1-1 Authorities meet the security and system access requirements.
	▸ Consider leveraging industry and defense and homeland security solutions, standards, and best practices to ensure a consistent and appropriate level of security throughout the interconnected environment of NG9-1-1.
	▸ Promote the development of identity and data rights access and management to control access to the NG9-1-1 system and data.
	Determine the responsible entity and mechanisms for location acquisition and determination
	▸ Consider a gap analysis to identify the need to develop specific standards or requirements for obtaining and providing accurate location information for all call types that can access 9-1-1 in the next generation architecture.
	▸ Consider examining the responsibility issues associated with location validation and management of national and/or regional databases necessary for NG9-1-1.
	▸ Consider facilitating involvement of all appropriate stakeholders in examining the issue of responsibility for providing accurate location information for NG9-1-1 calls using various communications devices.
Governance and Policy	**Clarify jurisdictional frameworks, responsibilities, and coordination required at each level of government to enable NG9-1-1**
	▸ Facilitate a process for guidance and coordination of NG9-1-1 at the national level and promote NG9-1-1 as a fundamental federal homeland security and emergency communications policy objective.
	▸ Strongly encourage states to convene appropriate stakeholders, such as their state 9-1-1 Administrator, state homeland security/emergency management director, state utilities commissioner and state chief information officer (CIO), to plan for establishment of NG9-1-1 and its underlying emergency services internetworks.
	▸ Facilitate regional or national working groups and forums to coordinate business rules, data rights management, access control, and identity rights management with emergency systems at the state and local levels.

Federal Government	
Governance and Policy	**Update regulations, legislation, and other policies to reflect modern communications and NG9-1-1 system capabilities**
	▸ Consider updating federal laws and encourage the modification of state laws that may prohibit the use of location information for call routing beyond those covered under traditional 9-1-1 (e.g., include appropriate N-1-1 entities and 800-type emergency provisioning, such as poison control centers and suicide hotlines).
	▸ Consider developing new or modifying existing federal laws to address confidentiality of new data sources and types.
	▸ Review liability protection statutes to ensure that existing liability protection for PSAPs, users of technology, and service providers will continue to effectively apply as new services and technologies are enabled by NG9-1-1.
	▸ Ensure 9-1-1 obligations imposed on communications service providers is a Federal Government responsibility while retaining an appropriate state/local role for the regulation of the underlying NG9-1-1 system that is deployed at a local, regional, or state level.
	▸ Consider review and update of existing federal 9-1-1 requirements and definitions to ensure that calls that were previously required to be routed over the wireline E9-1-1 system can be routed over the NG9-1-1 system .
	▸ When possible and appropriate, provide emphasis and incentives through legislation and regulations to encourage the deployment of shared, secure, IP-based systems and networks.
	Ensure continued access to the 9-1-1 system using current and future devices and services that users would reasonably expect to access to 9-1-1
	▸ Increase involvement and awareness of NG9-1-1 for all appropriate federal stakeholders and consider regulations ensuring that deaf and hard of hearing individuals can be efficiently connected to 9-1-1 when such NG9-1-1 capability is available.
	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
	▸ Consider legislative, regulatory, or financial incentive to ensure that states and authorities provide individuals with disabilities access to the 9-1-1 system using the current and future technology and devices for daily communications.
Education and Awareness	**Encourage stakeholders to embrace change through effective education programs**
	▸ Work with stakeholders and facilitate development of general education materials regarding the vision of NG9-1-1 and its benefits to stakeholders and the public.
	▸ Encourage states to develop coordinated programs for NG9-1-1.
	▸ Support and promote state NG9-1-1 education programs.
	▸ Working with stakeholders and facilitate development of materials that educate policymakers on the value and benefits of NG9-1-1.
	Reduce barriers for NG9-1-1 through education programs
	▸ Provide information on successful NG9-1-1 deployments and lessons learned.
	▸ Create a national clearinghouse for NG9-1-1 legislation, funding models, and other related topics.
	Develop effective public education programs
	▸ Work with appropriate stakeholders to facilitate development of public education materials.

State Government

	State Government
Funding	**Ensure NG9-1-1 upgrades are considered a fiscal priority for states and local jurisdictions and the Federal Government through outreach and education**
	▸ Consider legislation that identifies a state agency or other effective state-level mechanism (where one does not already exist) to be responsible for statewide 9-1-1 planning and coordination, and granting it appropriate authority and power.
	▸ Consider coordinating the development of statewide 9-1-1 plans to justify investments for upgrading critical emergency communications infrastructure for NG9-1-1, involving all appropriate stakeholders required for success.
	▸ Consider establishing a statewide coordinating body (where one does not already exist) that addresses the needs of all appropriate public and private representatives.
	Transform current 9-1-1 funding mechanisms to address— ▸ **Diminishing revenue base** ▸ **Population-based and geographical funding disparities** ▸ **Funding allocation and governance models for shared resources** ▸ **Service provider cost recovery**
	▸ Consider enacting legislation that imposes a technologically neutral 9-1-1 funding mechanism that accommodates all current and future devices and services capable of accessing 9-1-1 (e.g., text messaging, prepaid wireless, sensors and alarms).
	▸ Identify opportunities to offset the cost of NG9-1-1 by sharing infrastructure, resources, and services with, or simply interconnecting with, other public safety, non-public safety government, or private sector entities.
	▸ Consider enacting legislation that requires leveraging economies of scale to mitigate rural/urban disparities, ensuring efficient use of 9-1-1 revenues, and conducting annual audits on the use of the 9-1-1 funds.
	▸ Establish a funding mechanism or combination of funding mechanisms that best suit a state's needs.[61]
	▸ Consider legislation that allows 9-1-1 fees to be used to pay for the state's NG9-1-1 portion and use of an IP-based emergency service internetwork.
	▸ Review how cost recovery is allocated to ensure fairness across all technologies and services, and determine whether service provider cost recovery can and should be provided.
	Ensure 9-1-1 funds are preserved for 9-1-1 and emergency communication systems
	▸ Consider requiring that 9-1-1 funds be used exclusively for the provision of 9-1-1 emergency communications services (e.g., 9-1-1, E9-1-1, NG9-1-1, and related or future upgrades).
	▸ Review statutory provisions to ensure funding policies support next generation goals and visions (i.e., shared infrastructure and economies of scale).
	▸ Identify the appropriate uses of 9-1-1 funds and then monitor collected funds and 9-1-1 Authorities to ensure 9-1-1 funds are used for costs solely attributable to 9-1-1.
Operations	**Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call**
	▸ Maintain and improve state-level standard training requirements for call takers (e.g., 40 hours of training to maintain certification).
	▸ Promote and support additional funding for call taker training.

[61] The preponderance of stakeholder comments on the Preliminary Transition Plan supports a uniform statewide surcharge collected and distributed at the state level to (1) leverage economies of scale, (2) streamline the remittance process for carriers by eliminating the multiplicity of remittance points that currently exist, (3) eliminate population-based funding disparities between urban and rural areas.

State Government	
Operations	**Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs**
	▸ Promote and support adequate funding for management of NG9-1-1.
	▸ Facilitate appropriate relationships to enhance statewide emergency management and interoperability plans.
	▸ Promote and support measures to ensure adequate security of the NG9-1-1 system.
	▸ Collectively develop operations processes and procedures for intrastate, statewide, and/or interstate systems.
	▸ Establish and implement data rights management, access control, and identity management procedures and registries specific to agencies within the respective state. Such registries and procedures concern the ability of agencies and individuals to send, receive, read, and manipulate emergency information, as authorized.
	▸ Collectively develop appropriate state requirements and recommendations for NG9-1-1 system, IP network, database operations, and system operations for use by the appropriate 9-1-1 Authority personnel.
	Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of virtual PSAPs
	▸ Facilitate appropriate relationships to enhance statewide emergency management and interoperability plans.
	▸ Assist in the development of virtual PSAP capabilities.
Standards and Technology	**Complete and accept NG9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing**
	▸ Encourage 9-1-1 Authorities to procure equipment that meets open standards requirements.
	Determine the responsible entity and mechanisms for location acquisition and determination
	▸ Consider examining the responsibility issues associated with location validation and management of national, regional, and/or local databases necessary for NG9-1-1.
	▸ Consider facilitating involvement of all appropriate stakeholders in examining who will be responsible for providing accurate location information for NG9-1-1 calls within the state.
Governance and Policy	**Clarify jurisdictional frameworks, responsibilities, and coordination required at each level of government to enable NG9-1-1**
	▸ Convene appropriate state level officials (e.g., state 9-1-1 Administrator, state homeland security/emergency management director, state utilities commissioner, and state CIO) to plan for establishment of NG9-1-1 and its underlying emergency services internetwork.
	▸ Designate a central coordinating body and/or mechanism for NG9-1-1 implementation for each state (or region) where one does not already exist.
	▸ Facilitate the development of a statewide NG9-1-1 implementation plan based on effective stakeholder involvement, including identifying responsible parties, goals, and milestones.
	▸ Consider modifying current legislation to assign state 9-1-1 Authorities with the responsibility and authority to transition to and manage the NG9-1-1 system.
	▸ Consider modifying current legislation to assign appropriate entities the authority and responsibility for determining certification requirements for telecommunications services and service providers that may access NG9-1-1 as appropriate at the state level.
	▸ Coordinate business rules and data rights management for all stakeholders.

State Government	
Governance and Policy	**Update regulations, legislation, and other policies to reflect modern communications and NG9-1-1 system capabilities**
	▸ Consider reviewing existing laws to determine whether existing laws address the confidentiality of new data sources and types (e.g., medical) that could be considered personally identifiable information (PII) and develop and/or modify laws as needed.
	▸ Consider creating incentives or requirements for E9-1-1 systems to move to IP-based platforms that would result in an acceleration of the transition to full NG9-1-1 and the promotion of competition and increased choices for 9-1-1 governing authorities for the current E9-1-1 system.
	▸ Consider updating laws that prohibit the transmission of non-human initiated calls to a PSAP (e.g., hazardous chemical, flood level, or vital sign sensors capable of transmitting data and/or initiating a voice call to a PSAP without human initiation).
	▸ Consider review and update of laws that prohibit entities other than tariffed LECs and competitive local exchange carriers (CLEC) from providing 9-1-1 service.
	▸ Consider review and update of laws to ensure existing statutes do not prohibit use of virtual PSAPs.
	▸ Consider review and update of laws that may prohibit the use of customer or device location information for routing of other calls beyond those covered under traditional 9-1-1 (e.g., include appropriate N-1-1 entities and 800-type emergency provisioning, such as poison control centers and suicide hotlines).
	▸ Review liability protection statutes to ensure that existing liability protection for PSAPs, users of technology, and service providers will continue to effectively apply as new services and technologies are enabled by NG9-1-1.
	▸ Consider review and update of laws concerning the collection and eligible use of 9-1-1 funds to ensure funds can be used for NG9-1-1.
	▸ Consider review and update of laws concerning access and sharing of 9-1-1 related databases
	Ensure continued access to the 9-1-1 system using current and future devices and services that users would reasonably expect to access to 9-1-1
	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
Education and Awareness	**Encourage stakeholders to embrace change through effective education programs**
	▸ Develop state-specific education materials to support NG9-1-1 and distribute to all stakeholders within their respective states.
	▸ Consider development of materials that educate legislators and other state agencies regarding their potential role as leaders and change agents.
	Reduce barriers for NG9-1-1 through education programs
	▸ Assist 9-1-1 Authorities in either statewide or sub-state implementation programs.
	▸ Provide information to other state entities regarding the value of shared services.
	Educate PSAP and 9-1-1 Authority personnel regarding their role in NG9-1-1
	▸ Develop policy and other informational materials targeted to PSAP/9-1-1 Authority personnel for use in gaining acceptance of expanded responsibilities and other changes resulting from migration to NG9-1-1. This may involve changes to SOPs, job descriptions, and job analyses at PSAPS/9-1-1 Authorities.
	▸ Ensure that call takers are educated about the value of training requirements for NG9-1-1
	Develop effective public education programs
	▸ Develop and distribute materials that educate the public, policymakers, and other state agencies on the benefits and value of NG9-1-1.

9-1-1 Authorities and PSAP Administrators

9-1-1 Authorities and PSAP Administrators	
Funding	**Ensure NG9-1-1 upgrades are considered a fiscal priority for states and local jurisdictions and the Federal Government through outreach and education**
	▸ Support state efforts to coordinate the development of statewide 9-1-1 plans and investment requests for upgrading critical emergency communications infrastructure for NG9-1-1.
	▸ Support state efforts to educate state and federal legislative and regulatory decision-makers on the importance of NG9-1-1 funding.
	Transform current 9-1-1 funding mechanisms to address— ▸ **Diminishing revenue base** ▸ **Population-based and geographical funding disparities** ▸ **Funding allocation and governance models for shared resources** ▸ **Service provider cost recovery**
	▸ Work with state government to review how cost recovery is allocated to ensure fairness across all technologies and services, and determine whether service provider cost recovery can or should be provided.
	▸ Consider innovative funding approaches.
	Ensure 9-1-1 funds are preserved for 9-1-1 and emergency communication systems
	▸ Strengthen checks and balances to ensure funds are used only for the provision of 9-1-1 services, including shared services (e.g., 9-1-1 portion of emergency services internetwork).
	▸ Analyze current 9-1-1 system costs and determine constant costs that will continue in an NG9-1-1 environment and new costs to assist regional or state entities responsible for NG9-1-1 funding and planning.
Operations	**Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call**
	▸ Adopt training standards and plans for processing NG9-1-1 call types, implement training programs, and establish personnel qualifications.
	▸ Involve call takers within the jurisdiction in developing the appropriate education and training materials and in developing the appropriate training methods. Also, seek call-taker input when developing local SOPs and related processes.
	▸ Participate in and provide feedback on any state-level call-taker training.
	▸ Maintain and expand internal training programs to ensure call-taker proficiency.
	▸ Update and maintain SOPs pertaining to system and data management, data sharing, and call transfer.
	▸ Update policies and procedures for effective disaster and contingency planning.
	Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs
	▸ Develop and execute MOUs so that 9-1-1 Authorities can work together (across state and jurisdictional limits) to determine processes for addressing call congestion, load sharing, backup conditions, and other automatic routing conditions, as well as sharing of services (e.g., GIS).
	▸ Where needed, redefine roles and responsibilities for NG9-1-1 system administration.
	▸ Test the NG9-1-1 system to ensure that the level of quality of service is maintained based on terms and conditions agreed upon with the service providers.
	▸ Test the NG9-1-1 client application (e.g., HMI) to ensure that the level of quality of service is maintained based on terms and conditions agreed upon with the service providers.
	▸ Assess the level of resources, both physical and human, necessary to provide NG9-1-1 coverage and service to an area based on population, number of calls, and other factors.
	▸ Adjust data management procedures, including data rights management, access controls and identity management, to meet the needs of the local 9-1-1 Authority and the needs of responder agencies.

9-1-1 Authorities and PSAP Administrators	
Operations	**Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs (continued)**
	▸ Develop appropriate regionally focused education and training materials and programs to address altered and/or enhanced responsibilities and functions of various support staff.
	Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of virtual PSAPs
	▸ Develop requirements for virtual PSAPs within the jurisdiction.
	▸ Develop requirements and options for NG9-1-1 contingency planning, including those addressing backup, overflow, redundancy issues, for the jurisdiction.
	▸ Participate in operational and technical working groups to help define model requirements for virtual PSAPs and contingency requirements.
	▸ Hold regular combined training exercises to test the contingency plans and work to ensure continuity of operations at all times.
	▸ Develop appropriate educational materials and implement appropriate training programs for all personnel affected by implemented virtual PSAP capabilities.
Governance and Policy	**Clarify jurisdictional frameworks, responsibilities, and coordination required at each level of government to enable NG9-1-1**
	▸ Participate in the development of regional or statewide NG9-1-1 implementation plans, including identifying responsible parties, goals, and milestones.
	▸ Work with federal, state, and local level entities to coordinate business rules and data rights management within the appropriate jurisdictional boundaries.
	Ensure continued access to the 9-1-1 system using current and future devices and services that users would reasonably expect to access to 9-1-1
	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
Education and Awareness	**Encourage stakeholders to embrace change through effective education programs.**
	▸ Educate the public on how NG9-1-1 provides public benefits far greater than current E9-1-1 system.
	▸ Identify and/or create “champions” for NG9-1-1 at the local and state levels.

Public Safety Communications Organizations and Associations

	Public Safety Communications Organizations and Associations
Operations	**Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call**
	▸ Develop guidelines for personnel skills and qualifications and effective training programs, including model training requirements for processing NG9-1-1 calls (e.g., call handling, call treatment, and records management protocols). Analyze the possible impact on call takers of interactive visual presentation of emergency scene and develop appropriate educational and/or training recommendations to counter any possible negative impacts.
	▸ Develop models for sharing data and managing information among PSAPs, public safety responders, and other authorized stakeholders.
	▸ Develop standardized common terminology for call takers using a process similar to ongoing national standardization efforts involving various responder entities and others.
	Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs
	▸ Develop a generic templates (e.g., Memorandum of Understanding [MOU]) so that 9-1-1 Authorities can work together (across state and jurisdictional lines) to determine processes for call overflows, backup conditions, and other automatic routing conditions, as well as sharing of services (e.g., GIS).
	▸ Develop implementation, operations, and maintenance best practices and standards, and share them among 9-1-1 Authorities.
	▸ Develop SOPs, protocols, and definitions for system configuration and management of different call types (e.g., text messages).
	▸ Develop database management procedures.
	▸ Develop, support, promote, and conduct appropriate education and training materials for 9-1-1 authority staff and for PSAP Administrators and other support staff.
	▸ Develop appropriate standards and subsequent recommendations; along with related education and training materials regarding the NG9-1-1 system, IP network, database operations, and system operations; for use by 9-1-1 authorities and other implementers.
	Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of virtual PSAPs
	▸ Develop requirements for virtual PSAPs.
	▸ Develop requirements and options for NG9-1-1 contingency planning, including those addressing backup, overflow, redundancy issues.
	▸ Develop, support, promote, and conduct appropriate education and training materials and programs.
Education and Awareness	**Encourage stakeholders to embrace change through effective education programs.**
	▸ Develop materials that clearly present a vision of the future of NG9-1-1 to members, federal and state officials, and other stakeholders.
	▸ Provide opportunities at national and state/regional conferences to educate attendees on NG9-1-1.
	▸ Publish reports on NG9-1-1 policy issues, implementation successes, and deployment progress.
	Reduce barriers for NG9-1-1 through education programs
	▸ Provide information to members on implementation successes and how barriers have been overcome.
	Educate PSAP and 9-1-1 Authority personnel regarding their role in NG9-1-1
	▸ Develop education and training materials for chapters and members.
	▸ Provide educational sessions at national and state/regional events oriented to the role of PSAP and 9-1-1 Authority personnel in NG9-1-1.

Education and Awareness	Develop effective public education programs
	▸ Develop and distribute materials that educate members and other stakeholders on the benefits and value of NG9-1-1.
	▸ Explore ways to obtain additional funding for public education programs.

Standards Development Organizations

Standards Development Organizations	
Standards and Technology	**Complete and accept NG9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing**
	▸ Accelerate work with the 9-1-1 community to identify critical standards, future technologies, and all relevant data generators and user communities based on an industry-accepted architectural model and detailed requirements.
	▸ Conduct a gap analysis of existing standards development work against the industry-accepted architectural model. Identify standards that will need to be developed and/or standards already developed that are inconsistent with the model.
	▸ Whenever possible and appropriate, strengthen rules and procedures to ensure that NG9-1-1 essential standards and technology development occurs in an open, fair, and competitively neutral environment (recognizing the nature of technology convergence and competitive interests involved).
	Establish system access and security controls to protect and manage access to the NG9-1-1 system of systems
	▸ Identify the SDO role in the certification and authentication process to encourage service providers and 9-1-1 Authorities to meet the security and system access requirements.
	▸ Identify and leverage defense and homeland security solutions, standards, and best practices to establish security and system access standards and requirements for NG9-1-1.
	▸ Define identity and data rights access and management standards that can ensure that only specific entities or individuals can access the NG9-1-1 system and data.
	Determine the responsible entity and mechanisms for location acquisition and determination
	▸ Develop technology-specific location determination, acquisition, and conveyance standards.
	▸ Develop data standards for the delivery of location information whether it is civic or geospatial. Develop standards for content and operation of NG9-1-1 databases.
	Determine routing and prioritization protocols and business rules
	▸ Work with the user community to identify what types of data are needed and standardize the types of data, decisions, and/or policies that should be used to route and prioritize NG9-1-1 calls.
	▸ Define national-level protocols and business rules, leveraging efforts such as the COMCARE Core Services Initiative.

State Utility Commissions

State Utility Commissions	
Standards and Technology	**Establish system access and security controls to protect and manage access to the NG9-1-1 system of systems**
	▸ Coordinate and modify existing state regulations to allow additional service providers, beyond the common carriers, to access the NG9-1-1 system.
	▸ Identify and modify, as necessary, state contractual provisions that may constrain the transition to the NG9-1-1 environment.
	▸ Assist SDOs in developing a certification and authentication process to ensure service providers and 9-1-1 Authorities meet security and system access requirements.

Service and Equipment Providers

	Service and Equipment Providers
Operations	**Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call**
	▸ Establish partnerships with public safety authorities during the design phase of equipment and services and through appropriate standards processes.
	▸ Work in partnership with public safety authorities to ensure hardware and software will provide 9-1-1 call data in a useful format and facilitate rather than inhibit efficient and effective call processing.
	Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs
	▸ Establish relationships with public safety authorities during the design phase of databases and services to ensure consistency with and promote adherence to established standards and protocols.
	▸ Work in partnership with 9-1-1 and public safety governing authorities to harness the experience of industry, which has already developed complex data sharing systems for business that will be applicable to data sharing environment of NG9-1-1.
	Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of virtual PSAPs
	▸ Establish partnerships with public safety authorities during the design phase of equipment and services and through appropriate standards processes.
	▸ Work in partnership with 9-1-1 and public safety governing authorities to harness the expertise of international call center industry, which has significant experience in deploying distributed virtual call center technology.
Standards and Technology	**Complete and accept NG9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing**
	▸ Participate in the definition and development of open standards for the NG9-1-1 system and equipment.
	▸ Develop NG9-1-1 equipment and update telecommunications services to meet the open standards identified by the 9-1-1 community and the Federal Government to promote interoperability.
	▸ Ensure compatibility with 9-1-1 specific standards and also other data exchange standards and interfaces to enable information sharing with all authorized emergency response and government agencies.
	Determine the responsible entity and mechanisms for location acquisition and determination
	▸ Develop methods or modify existing methods to obtain the necessary location information for all call types that access NG9-1-1.
	▸ Take part in working with SDOs and public and private stakeholders to determine responsibilities for obtaining and providing accurate location information for all call types that access NG9-1-1.
Governance and Policy	**Ensure continued access to the 9-1-1 system using current and future devices and services that users would reasonably expect to access to 9-1-1**
	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities on telecommunications devices, as well as services used (e.g., VoIP). This would be similar to the way VoIP providers inform customers of the limitations of 9-1-1 capabilities with VoIP service.

Education & Awareness	**Encourage stakeholders to embrace change through effective education programs**
	▸ Develop training programs for NG9-1-1 related products and services.
	Reduce barriers for NG9-1-1 through education programs
	▸ Assist states and 9-1-1 Authorities in the dissemination of information regarding NG9-1-1.
	Develop effective public education programs
	▸ Assist with the development and distribution of public education materials.

Non Governmental Groups

Non Governmental Groups	
Governance and Policy	**Ensure continued access to the 9-1-1 system using current and future devices and services that users would reasonably expects to access to 9-1-1**
	▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
	▸ Ensure policy makers are consistently apprised of ongoing technology, service, and operational and standards development efforts to ensure policy making efforts are consistent with the needs of public safety and consumers.

Responder Agencies

Responder Agencies	
Education & Awareness	**Encourage stakeholders to embrace change through effective education programs**
	▸ Distribute educational materials promoting benefits of NG9-1-1 at public open houses and other events.
	Reduce barriers for NG9-1-1 through education programs
	▸ Assist with dissemination of information regarding how barriers have been overcome.
	Develop effective public education programs
	▸ Assist with distribution of education materials to the general public.

General Public

General Public	
Governance and Policy	**Ensure continued access to the 9-1-1 system using current and future devices and services that users would reasonably expects to access to 9-1-1**
	▸ Understand and be aware of available NG9-1-1 capabilities and coverage.
	▸ Provide recommendations and input into the NG9-1-1 development and deployment process to account for community needs.

Appendix E: Strategic Options Categorized by Strategic Elements

Funding

Most state and local Authorities obtain funding by imposing and collecting fees on telecommunications services such as landline, wireless, and IP-enabled voice services. Jurisdictions must be willing to commit the resources necessary to ensure the success of any next generation effort. For example, ongoing maintenance and support of the system must be planned for and incorporated into the budget.

Funding Strategies and Options	
Strategy 1:	**Ensure NG9-1-1 upgrades are considered a fiscal priority for states and local jurisdictions and the Federal Government through outreach and education**
Federal Government	
▸ Encourage state governments and legislatures to give fiscal priority to NG9-1-1 upgrades and transition (based on nationally accepted standards and coherent statewide plans).	
▸ Encourage all levels of government to establish an effective mechanism for coordinating 9-1-1 services, where such a mechanism does not already exist.	
▸ Consider expanding the use of more federal public safety grant program funds for 9-1-1 services and for shared emergency services internetworks.	
State Government	
▸ Consider legislation that identifies a state agency or other effective state-level mechanism (where one does not already exist) to be responsible for statewide 9-1-1 planning and coordination, and granting it appropriate authority and power.	
▸ Consider coordinating the development of statewide 9-1-1 plans to justify investments for upgrading critical emergency communications infrastructure for NG9-1-1, involving all appropriate stakeholders required for success.	
▸ Consider establishing a statewide coordinating body (where one does not already exist) that addresses the needs of all appropriate public and private representatives.	
9-1-1 Authorities and PSAP Administrators	
▸ Support state efforts to coordinate the development of statewide 9-1-1 plans and investment requests for upgrading critical emergency communications infrastructure for NG9-1-1.	
▸ Support state efforts to educate state and federal legislative and regulatory decision-makers on the importance of NG9-1-1 funding.	
Strategy 2:	**Transform the current funding mechanisms to address—** ▸ **Diminishing revenue base** ▸ **Population-based and geographical funding disparities** ▸ **Funding allocation and governance models for shared resources** ▸ **Service provider cost recovery**
Federal Government	
▸ As possible and appropriate, provide funding for the capital costs of NG9-1-1 planning, design, procurement, and implementation.	
▸ Consider legislation that allows use of federal funds to pay for NG9-1-1 portion and use of underlying IP based emergency service internetworks and core services.	
State Government	
▸ Consider enacting legislation that imposes a technologically neutral 9-1-1 funding mechanism that accommodates all current and future devices and services capable of accessing 9-1-1 (e.g., text messaging, prepaid wireless, sensors and alarms).	
▸ Identify opportunities to offset the cost of NG9-1-1 by sharing infrastructure, resources, and services with, or simply interconnecting with, other public safety, non-public safety government, or private sector entities.	

Funding Strategies and Options
State Government (continued)
▸ Consider enacting legislation that requires leveraging economies of scale to mitigate rural/urban disparities, ensuring efficient use of 9-1-1 revenues, and conducting annual audits on the use of the 9-1-1 funds.
▸ Establish a funding mechanism or combination of funding mechanisms that best suit a state's needs.
▸ Consider legislation that allows 9-1-1 fees to be used to pay for the state's NG9-1-1 portion and use of an IP-based emergency service internetwork.
▸ Review how cost recovery is allocated to ensure fairness across all technologies and services, and determine whether service provider cost recovery can and should be provided.
9-1-1 Authorities and PSAP Administrators
▸ Work with state government to review how cost recovery is allocated to ensure fairness across all technologies and services, and determine whether service provider cost recovery can or should be provided.
▸ Consider innovative funding approaches.
Strategy 3: Ensure 9-1-1 funds are preserved for 9-1-1 and emergency communication systems
Federal Government
▸ Consider expanding and strengthening existing Federal requirements that state and local 9-1-1 Authorities to use 9-1-1 funds, surcharges, and fees for costs attributable to 9-1-1 operations, services, and equipment.
▸ Consider providing guidance regarding what constitutes minimum 9-1-1 features and functions that are appropriate uses of 9-1-1 revenues.
▸ Implement and oversee existing requirements concerning eligibility for 9-1-1 grant funding to states that do not divert 9-1-1 funds.
▸ Consider expanding and strengthening existing statutory provisions that 9-1-1 funds be used exclusively for the provision of 9-1-1 emergency communications services (e.g., 9-1-1, E9-1-1, NG9-1-1, and related or future upgrades).
State Government
▸ Consider requiring that 9-1-1 funds be used exclusively for the provision of 9-1-1 emergency communications services (e.g., 9-1-1, E9-1-1, NG9-1-1, and related or future upgrades).
▸ Review statutory provisions to ensure funding policies support next generation goals and visions (i.e., shared infrastructure and economies of scale).
▸ Identify the appropriate uses of 9-1-1 funds and then monitor collected funds and 9-1-1 Authorities to ensure 9-1-1 funds are used for costs solely attributable to 9-1-1.
9-1-1 Authorities and PSAP Administrators
▸ Strengthen checks and balances to ensure funds are used only for the provision of 9-1-1 services, including shared services (e.g., 9-1-1 portion of emergency services internetwork).
▸ Analyze current 9-1-1 system costs and determine constant costs that will continue in an NG9-1-1 environment and new costs to assist regional or state entities responsible for NG9-1-1 funding and planning.

Operations

Operations include PSAP operations, as well as broader standard operating procedures (SOP), formal written guidelines and/or instructions for calls and incidents (e.g., PSAP goes down), as well as training, exercises, and operational optimization (e.g., business process reengineering, change management).

Operations Strategies and Options	
Strategy 1:	**Prepare and train call takers and other personnel to handle increased quantity and quality of information available with an NG9-1-1 call**
Federal Government	
▸ Promote and support funding methods that provide necessary training and training materials.	
▸ Consider promoting public safety communications as a rewarding career opportunity in an effort to improve PSAP staffing levels.	
State Government	
▸ Maintain and improve state-level standard training requirements for call takers (e.g., 40 hours of training to maintain certification).	
▸ Promote and support additional funding for call taker training.	
9-1-1 Authorities and PSAP Administrators	
▸ Adopt training standards and plans for processing NG9-1-1 call types, implement training programs, and establish personnel qualifications.	
▸ Involve call takers within the jurisdiction in developing the appropriate education and training materials and in developing the appropriate training methods. Also, seek call-taker input when developing local SOPs and related processes.	
▸ Participate in and provide feedback on any state-level call-taker training.	
▸ Maintain and expand internal training programs to ensure call-taker proficiency.	
▸ Update and maintain SOPs pertaining to system and data management, data sharing, and call transfer.	
▸ Update policies and procedures for effective disaster and contingency planning.	
Public Safety Communications Organizations and Associations	
▸ Develop guidelines for personnel skills and qualifications and effective training programs, including model training requirements for processing NG9-1-1 calls (e.g., call handling, call treatment, and records management protocols). Analyze the possible impact on call takers of interactive visual presentation of emergency scene and develop appropriate educational and/or training recommendations to counter any possible negative impacts.	
▸ Develop models for sharing data and managing information among PSAPs, public safety responders, and other authorized stakeholders.	
▸ Develop standardized common terminology for call takers using a process similar to ongoing national standardization efforts involving various responder entities and others.	
Service and Equipment Providers	
▸ Establish partnerships with public safety authorities during the design phase of equipment and services and through appropriate standards processes.	
▸ Work in partnership with public safety authorities to ensure hardware and software will provide 9-1-1 call data in a useful format and facilitate rather than inhibit efficient and effective call processing.	

Operations Strategies and Options	
Strategy 2:	**Prepare 9-1-1 Authorities to handle NG9-1-1 system administration, including configuration management, database management, quality assurance, and SOPs**
Federal Government	
▸ Gather and make available implementation, and operations and maintenance best practices, standards, and lessons learned, and share them among 9-1-1 Authorities.	
▸ Develop model strategic plans to help 9-1-1 Authorities at all levels manage NG9-1-1 migration (e.g., interagency coordination, training, security).	
▸ Consider working with stakeholders to establish procedures and standards to enable coordination of data rights management, access control, and identity management procedures and registries (e.g., who has access to what database and information and who has authority to initiate and receive information).	
State Government	
▸ Promote and support adequate funding for management of NG9-1-1.	
▸ Facilitate appropriate relationships to enhance statewide emergency management and interoperability plans.	
▸ Promote and support measures to ensure adequate security of the NG9-1-1 system.	
▸ Collectively develop operations processes and procedures for intrastate, statewide, and/or interstate systems.	
▸ Establish and implement data rights management, access control, and identity management procedures and registries specific to agencies within the respective state. Such registries and procedures concern the ability of agencies and individuals to send, receive, read, and manipulate emergency information, as authorized.	
▸ Collectively develop appropriate state requirements and recommendations for NG9-1-1 system, IP network, database operations, and system operations for use by the appropriate 9-1-1 Authority personnel.	
9-1-1 Authorities and PSAP Administrators	
▸ Develop and execute MOUs so that 9-1-1 Authorities can work together (across state and jurisdictional limits) to determine processes for addressing call congestion, load sharing, backup conditions, and other automatic routing conditions, as well as sharing of services (e.g., GIS).	
▸ Where needed, redefine roles and responsibilities for NG9-1-1 system administration.	
▸ Test the NG9-1-1 system to ensure that the level of quality of service is maintained based on terms and conditions agreed upon with the service providers.	
▸ Test the NG9-1-1 client application (e.g., HMI) to ensure that the level of quality of service is maintained based on terms and conditions agreed upon with the service providers.	
▸ Assess the level of resources, both physical and human, necessary to provide NG9-1-1 coverage and service to an area based on population, number of calls, and other factors.	
▸ Adjust data management procedures, including data rights management, access controls and identity management, to meet the needs of the local 9-1-1 Authority and the needs of responder agencies.	
▸ Develop appropriate regionally focused education and training materials and programs to address altered and/or enhanced responsibilities and functions of various support staff.	
Public Safety Communications Organizations and Associations	
▸ Develop a generic templates (e.g., Memorandum of Understanding [MOU]) so that 9-1-1 Authorities can work together (across state and jurisdictional lines) to determine processes for call overflows, backup conditions, and other automatic routing conditions, as well as sharing of services (e.g., GIS).	
▸ Develop implementation, operations, and maintenance best practices and standards, and share them among 9-1-1 Authorities.	
▸ Develop SOPs, protocols, and definitions for system configuration and management of different call types (e.g., text messages).	
▸ Develop database management procedures.	

Operations Strategies and Options
Public Safety Communications Organizations and Associations (continued)
▸ Develop, support, promote, and conduct appropriate education and training materials for 9-1-1 authority staff and for PSAP Administrators and other support staff.
▸ Develop appropriate standards and subsequent recommendations; along with related education and training materials regarding the NG9-1-1 system, IP network, database operations, and system operations; for use by 9-1-1 authorities and other implementers.
Service and Equipment Providers
▸ Establish relationships with public safety authorities during the design phase of databases and services to ensure consistency with and promote adherence to established standards and protocols.
▸ Work in partnership with 9-1-1 and public safety governing authorities to harness the experience of industry, which has already developed complex data sharing systems for business that will be applicable to data sharing environment of NG9-1-1.
Strategy 3: Prepare 9-1-1 Authorities and PSAP Administrators to handle contingency planning and use of virtual PSAPs
Federal Government
▸ Obtain PSAP operations best practices and lessons learned and share them among 9-1-1 Authorities and PSAPs.
State Government
▸ Facilitate appropriate relationships to enhance statewide emergency management and interoperability plans.
▸ Assist in the development of virtual PSAP capabilities.
9-1-1 Authorities and PSAP Administrators
▸ Develop requirements for virtual PSAPs within the jurisdiction.
▸ Develop requirements and options for NG9-1-1 contingency planning, including those addressing backup, overflow, redundancy issues, for the jurisdiction.
▸ Participate in operational and technical working groups to help define model requirements for virtual PSAPs and contingency requirements.
▸ Hold regular combined training exercises to test the contingency plans and work to ensure continuity of operations at all times.
▸ Develop appropriate educational materials and implement appropriate training programs for all personnel affected by implemented virtual PSAP capabilities.
Public Safety Communications Organizations and Associations
▸ Develop requirements for virtual PSAPs.
▸ Develop requirements and options for NG9-1-1 contingency planning, including those addressing backup, overflow, redundancy issues.
▸ Develop, support, promote, and conduct appropriate education and training materials and programs.
Service and Equipment Providers
▸ Establish partnerships with public safety authorities during the design phase of equipment and services and through appropriate standards processes.
▸ Work in partnership with 9-1-1 and public safety governing authorities to harness the expertise of international call center industry, which has significant experience in deploying distributed virtual call center technology.

Standards and Technology

Progress in each of the other elements is essential to proper planning, use, and implementation of NG9-1-1 technology, and should drive technology procurement. Technology is highly dependent on existing infrastructure within a region and/or what is available to states and PSAPs from service providers. Multiple technology solutions may be required to support unique situations.

Standards and Technology Strategies and Options	
Strategy 1:	**Complete and accept NG9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing**
Federal Government	
▸ Consider facilitation and coordination of 9-1-1 stakeholders (e.g., SDOs, private and public stakeholders) to identify all standards work and technology development currently underway regarding relevant communications technology.	
▸ Consider facilitation and coordination of SDOs and public and private stakeholders to conduct a gap analysis of existing standards development work against the industry-accepted architectural model and identify standards that will need to be developed and/or the standards already developed that are inconsistent with the model.	
▸ Encourage appropriate SDOs and industry groups to address standards work that must be completed or modified to ensure a comprehensive standards and technology environment for NG9-1-1.	
▸ Promote and support a coordinating entity with dedicated attention to the development of standards and technologies considered essential to NG9-1-1, and facilitate emergency data standard coordination and harmonization among all emergency response professions.	
▸ Encourage states to enact laws or regulations that mandate the use of open standards for NG9-1-1 systems.	
State Government	
▸ Encourage 9-1-1 Authorities to procure equipment that meets open standards requirements.	
Standards Development Organizations	
▸ Accelerate work with the 9-1-1 community to identify critical standards, future technologies, and all relevant data generators and user communities based on an industry-accepted architectural model and detailed requirements.	
▸ Conduct a gap analysis of existing standards development work against the industry-accepted architectural model. Identify standards that will need to be developed and/or standards already developed that are inconsistent with the model.	
▸ Whenever possible and appropriate, strengthen rules and procedures to ensure that NG9-1-1 essential standards and technology development occurs in an open, fair, and competitively neutral environment (recognizing the nature of technology convergence and competitive interests involved).	
Service and Equipment Providers	
▸ Participate in the definition and development of open standards for the NG9-1-1 system and equipment.	
▸ Develop NG9-1-1 equipment and update telecommunications services to meet the open standards identified by the 9-1-1 community and the Federal Government to promote interoperability.	
▸ Ensure compatibility with 9-1-1 specific standards and also other data exchange standards and interfaces to enable information sharing with all authorized emergency response and government agencies.	
Strategy 2:	**Establish system access and security controls to protect and manage access to the NG9-1-1 system of systems**
Federal Government	
▸ Consider initiating establishment of new security regulations or modification of existing security regulations to promote consistency among states.	
▸ Consider modifying, as necessary, federal legislative or regulatory provisions that limit 9-1-1 architecture to traditional components and may constrain the transition to the NG9-1-1 environment.	

Standards and Technology Strategies and Options
▸ Consider identifying a certification and authentication process to ensure service providers and 9-1-1 Authorities meet the security and system access requirements.
▸ Consider leveraging industry and defense and homeland security solutions, standards, and best practices to ensure a consistent and appropriate level of security throughout the interconnected environment of NG9-1-1.
▸ Promote the development of identity and data rights access and management to control access to the NG9-1-1 system and data.
State Utility Commissions
▸ Coordinate and modify existing state regulations to allow additional service providers, beyond the common carriers, to access the NG9-1-1 system.
▸ Identify and modify, as necessary, state contractual provisions that may constrain the transition to the NG9-1-1 environment.
▸ Assist SDOs in developing a certification and authentication process to ensure service providers and 9-1-1 Authorities meet security and system access requirements.
Standards Development Organizations
▸ Identify the SDO role in the certification and authentication process to encourage service providers and 9-1-1 Authorities to meet the security and system access requirements.
▸ Identify and leverage defense and homeland security solutions, standards, and best practices to establish security and system access standards and requirements for NG9-1-1.
▸ Define identity and data rights access and management standards that can ensure that only specific entities or individuals can access the NG9-1-1 system and data.
Strategy 3: Determine the responsible entity and mechanisms for location acquisition and determination
Federal Government
▸ Consider a gap analysis to identify the need to develop specific standards or requirements for obtaining and providing accurate location information for all call types that can access 9-1-1 in the next generation architecture.
▸ Consider examining the responsibility issues associated with location validation and management of national and/or regional databases necessary for NG9-1-1.
▸ Consider facilitating involvement of all appropriate stakeholders in examining the issue of responsibility for providing accurate location information for NG9-1-1 calls using various communications devices.
State Government
▸ Consider examining the responsibility issues associated with location validation and management of national, regional, and/or local databases necessary for NG9-1-1.
▸ Consider facilitating involvement of all appropriate stakeholders in examining who will be responsible for providing accurate location information for NG9-1-1 calls within the state.
Standards Development Organizations
▸ Develop technology-specific location determination, acquisition, and conveyance standards.
▸ Develop data standards for the delivery of location information whether it is civic or geospatial. Develop standards for content and operation of NG9-1-1 databases.
Service and Equipment Providers
▸ Develop methods or modify existing methods to obtain the necessary location information for all call types that access NG9-1-1.
▸ Take part in working with SDOs and public and private stakeholders to determine responsibilities for obtaining and providing accurate location information for all call types that access NG9-1-1.
Strategy 4: Determine routing and prioritization protocols and business rules
Standards Development Organizations
▸ Work with the user community to identify what types of data are needed and standardize the types of data, decisions, and/or policies that should be used to route and prioritize NG9-1-1 calls.
▸ Define national-level protocols and business rules, leveraging efforts such as the COMCARE Core Services Initiative.

Governance and Policy

Governance and policy includes leadership and planning—both key to entities transitioning to NG9-1-1. For example, many regions face difficulties related to political issues and the relationships within and across jurisdictions and disciplines. Leadership can help to work through these challenging internal and jurisdictional conflicts, as well as set the stage for a region's commitment to the NG9-1-1 effort. Success in this element is also based on public's awareness, use, and satisfaction with NG9-1-1 services.

Governance and Policy Strategies and Options	
Strategy 1:	**Clarify jurisdictional frameworks, responsibilities, and coordination required at each level of government to enable NG9-1-1**
Federal Government	
▸ Facilitate a process for guidance and coordination of NG9-1-1 at the national level and promote NG9-1-1 as a fundamental federal homeland security and emergency communications policy objective.	
▸ Strongly encourage states to convene appropriate stakeholders, such as their state 9-1-1 Administrator, state homeland security/emergency management director, state utilities commissioner and state chief information officer (CIO), to plan for establishment of NG9-1-1 and its underlying emergency services internetworks.	
▸ Facilitate regional or national working groups and forums to coordinate business rules, data rights management, access control, and identity rights management with emergency systems at the state and local levels.	
State Government	
▸ Convene appropriate state level officials (e.g., state 9-1-1 Administrator, state homeland security/emergency management director, state utilities commissioner, and state CIO) to plan for establishment of NG9-1-1 and its underlying emergency services internetwork.	
▸ Designate a central coordinating body and/or mechanism for NG9-1-1 implementation for each state (or region) where one does not already exist.	
▸ Facilitate the development of a statewide NG9-1-1 implementation plan based on effective stakeholder involvement, including identifying responsible parties, goals, and milestones.	
▸ Consider modifying current legislation to assign state 9-1-1 Authorities with the responsibility and authority to transition to and manage the NG9-1-1 system.	
▸ Consider modifying current legislation to assign appropriate entities the authority and responsibility for determining certification requirements for telecommunications services and service providers that may access NG9-1-1 as appropriate at the state level.	
▸ Coordinate business rules and data rights management for all stakeholders.	
9-1-1 Authorities	
▸ Participate in the development of regional or statewide NG9-1-1 implementation plans, including identifying responsible parties, goals, and milestones.	
▸ Work with federal, state, and local level entities to coordinate business rules and data rights management within the appropriate jurisdictional boundaries.	
Strategy 2:	**Update regulations, legislation, and other policies to reflect communications capabilities in an NG9-1-1 system**
Federal Government	
▸ Consider updating federal laws and encourage the modification of state laws that may prohibit the use of location information for call routing beyond those covered under traditional 9-1-1 (e.g., include appropriate N-1-1 entities and 800-type emergency provisioning, such as poison control centers and suicide hotlines).	
▸ Consider developing new or modifying existing federal laws to address confidentiality of new data sources and types.	

Governance and Policy Strategies and Options
Federal Government (continued)
▸ Review liability protection statutes to ensure that existing liability protection for PSAPs, users of technology, and service providers will continue to effectively apply as new services and technologies are enabled by NG9-1-1.
▸ Ensure 9-1-1 obligations imposed on communications service providers is a Federal Government responsibility while retaining an appropriate state/local role for the regulation of the underlying NG9-1-1 system that is deployed at a local, regional, or state level.
▸ Consider review and update of existing federal 9-1-1 requirements and definitions to ensure that calls that were previously required to be routed over the wireline E9-1-1 system can be routed over the NG9-1-1 system .
▸ When possible and appropriate, provide emphasis and incentives through legislation and regulations to encourage the deployment of shared, secure, IP-based systems and networks.
State Government
▸ Consider reviewing existing laws to determine whether existing laws address the confidentiality of new data sources and types (e.g., medical) that could be considered personally identifiable information (PII) and develop and/or modify laws as needed.
▸ Consider creating incentives or requirements for E9-1-1 systems to move to IP-based platforms that would result in an acceleration of the transition to full NG9-1-1 and the promotion of competition and increased choices for 9-1-1 governing authorities for the current E9-1-1 system.
▸ Consider updating laws that prohibit the transmission of non-human initiated calls to a PSAP (e.g., hazardous chemical, flood level, or vital sign sensors capable of transmitting data and/or initiating a voice call to a PSAP without human initiation).
▸ Consider review and update of laws that prohibit entities other than tariffed LECs and competitive local exchange carriers (CLEC) from providing 9-1-1 service.
▸ Consider review and update of laws to ensure existing statutes do not prohibit use of virtual PSAPs.
▸ Consider review and update of laws that may prohibit the use of customer or device location information for routing of other calls beyond those covered under traditional 9-1-1 (e.g., include appropriate N-1-1 entities and 800-type emergency provisioning, such as poison control centers and suicide hotlines).
▸ Review liability protection statutes to ensure that existing liability protection for PSAPs, users of technology, and service providers will continue to effectively apply as new services and technologies are enabled by NG9-1-1.
▸ Consider review and update of laws concerning the collection and eligible use of 9-1-1 funds to ensure funds can be used for NG9-1-1.
▸ Consider review and update of laws concerning access and sharing of 9-1-1 related databases
Strategy 3: Ensure continued access to the 9-1-1 system using current and future devices and services that users would reasonably expect to access 9-1-1
Federal Government
▸ Increase involvement and awareness of NG9-1-1 for all appropriate federal stakeholders and consider regulations ensuring that deaf and hard of hearing individuals can be efficiently connected to 9-1-1 when such NG9-1-1 capability is available.
▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
▸ Consider legislative, regulatory, or financial incentive to ensure that states and authorities provide individuals with disabilities access to the 9-1-1 system using the current and future technology and devices for daily communications.
State Government
▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
9-1-1 Authorities and PSAP Administrators
▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.

Governance and Policy Strategies and Options
Service and Equipment Providers
▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities on telecommunications devices, as well as services used (e.g., VoIP). This would be similar to the way VoIP providers inform customers of the limitations of 9-1-1 capabilities with VoIP service.
General Public
▸ Understand and be aware of available NG9-1-1 capabilities and coverage.
▸ Provide recommendations and input into the NG9-1-1 development and deployment process to account for community needs.
Non Governmental Groups
▸ Educate the public and policymakers on the availability of NG9-1-1 capabilities.
▸ Ensure policy makers are consistently apprised of ongoing technology, service, and operational and standards development efforts to ensure policy making efforts are consistent with the needs of public safety and consumers.

Education and Awareness

Education about NG9-1-1 has always been an integral part of discussions on how to accelerate the implementation of NG9-1-1. There is widespread agreement that all entities—PSAPs and 9-1-1 Authorities, the public safety community, policymakers, and the public—need to know more about and be kept informed of next generation technologies and how they will affect emergency communications. Education is critical to the effectiveness of all aspects of NG9-1-1, including funding, operations, jurisdictions and policy, and standards and technology—certainly deserving of significant investment to increase the level of understanding about NG9-1-1 by all stakeholders.

Education and Awareness Strategies and Options
Strategy 1: Encourage stakeholders to embrace change through effective education programs
Federal Government
▸ Work with stakeholders and facilitate development of general education materials regarding the vision of NG9-1-1 and its benefits to stakeholders and the public.
▸ Encourage states to develop coordinated programs for NG9-1-1.
▸ Support and promote state NG9-1-1 education programs.
▸ Working with stakeholders and facilitate development of materials that educate policymakers on the value and benefits of NG9-1-1.
State Government
▸ Develop state-specific education materials to support NG9-1-1 and distribute to all stakeholders within their respective states.
▸ Consider development of materials that educate legislators and other state agencies regarding their potential role as leaders and change agents.
9-1-1 Authorities
▸ Educate the public on how NG9-1-1 provides public benefits far greater than current E9-1-1 system.
▸ Identify and/or create “champions” for NG9-1-1 at the local and state levels.
Public Safety Communications Organizations and Associations
▸ Develop materials that clearly present a vision of the future of NG9-1-1 to members, federal and state officials, and other stakeholders.
▸ Provide opportunities at national and state/regional conferences to educate attendees on NG9-1-1.
▸ Publish reports on NG9-1-1 policy issues, implementation successes, and deployment progress.
Service and Equipment Providers
▸ Develop training programs for NG9-1-1 related products and services.
Responder Agencies
▸ Distribute educational materials promoting benefits of NG9-1-1 at public open houses and other events.
Strategy 2: Reduce barriers for NG9-1-1 through education programs
Federal Government
▸ Provide information on successful NG9-1-1 deployments and lessons learned.
▸ Create a national clearinghouse for NG9-1-1 legislation, funding models, and other related topics.
State Government
▸ Assist 9-1-1 Authorities in either statewide or sub-state implementation programs.
▸ Provide information to other state entities regarding the value of shared services.
Service and Equipment Providers
▸ Assist states and 9-1-1 Authorities in the dissemination of information regarding NG9-1-1.
Public Safety Communications Organizations and Associations
▸ Provide information to members on implementation successes and how barriers have been overcome.
Responder Agencies
▸ Assist with dissemination of information regarding how barriers have been overcome.

Education and Awareness Strategies and Options
Strategy 3: Educate PSAP and 9-1-1 Authority personnel regarding their role in NG9-1-1
State Government
▸ Develop policy and other informational materials targeted to PSAP/9-1-1 Authority personnel for use in gaining acceptance of expanded responsibilities and other changes resulting from migration to NG9-1-1. This may involve changes to SOPs, job descriptions, and job analyses at PSAPS/9-1-1 Authorities.
▸ Ensure that call takers are educated about the value of training requirements for NG9-1-1
Public Safety Communications Organizations and Associations
▸ Develop education and training materials for chapters and members.
▸ Provide educational sessions at national and state/regional events oriented to the role of PSAP and 9-1-1 Authority personnel in NG9-1-1.
Strategy 4: Develop effective public education programs
Federal Government
▸ Work with appropriate stakeholders to facilitate development of public education materials.
State Government
▸ Develop and distribute materials that educate the public, policymakers, and other state agencies on the benefits and value of NG9-1-1.
Public Safety Communications Organizations and Associations
▸ Develop and distribute materials that educate members and other stakeholders on the benefits and value of NG9-1-1.
▸ Explore ways to obtain additional funding for public education programs.
Service and Equipment Providers
▸ Assist with the development and distribution of public education materials.
Responder Agencies
▸ Assist with distribution of education materials to the general public.