Spatial Interface

ESInet

Z-Axis

NG9-1-1

ECRF

MSAG

PSAP

ESN

GIS

ALI

CAD

**Second in a Series of Four Reports**

# Geographic Information Systems Technology

# Current Status of Required Entities

**March 2023**

National 911 Program

**911**.gov

# About the National 911 Program

The National Highway Traffic Safety Administration (NHTSA) National 911 Program (Program), in the Office of Emergency Medical Services (OEMS) at the United States (U.S.) Department of Transportation (DOT), provides leadership and coordination of federal efforts that support 911 across the nation. A seamless interoperable 911 system-of-systems across the U.S. advances NHTSA's mission to eliminate fatalities, illness, and injuries from motor vehicle crashes and improve post-crash care.

The Program works with many stakeholders—including federal, state, local, tribal, and territorial (FSLTT) governments, technology vendors, public safety officials, and 911 professionals—toward a goal of advancing 911 that takes advantage of existing and emerging communications technologies, improving response times and information available to first responders prior to and during a 911 incident.

## About this Document

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# Executive Summary

Accurate geographic information system (GIS) data is essential in the routing of 911 calls to the appropriate 911 emergency communications center (ECC)—also known as a public safety answering point (PSAP)—to ensure fast and efficient response by first responders. The implementation of next generation technologies for 911 requires a collaborative approach to the creation and maintenance of the GIS data between multiple technical and public safety stakeholders. To this end, the greatest risk to the success of the creation of GIS data for Next Generation 911 (NG911) is not identifying all stakeholders early in the migration planning and not engaging them repeatedly throughout the implementation process. The stakeholders assembled for participation in this research effort identified areas of concern to building a GIS team and keeping them connected to the project:

- The foundational message of why GIS is a key component to the NG911 migration is not being conveyed and understood by the necessary decision-makers.
- An operational blueprint for creating and maintaining GIS for NG911 is needed by local units of government to understand how to begin the process.
- Implementing GIS data for NG911 requires sharing locally, regionally, and nationally, but not all GIS data stewards are willing or legally able to share GIS data.

*The success of GIS in NG911 is dependent upon the active participation of stakeholders from 911, GIS, local, regional, state, tribal, and federal leadership, and the 911, legacy call routing data, and GIS service provider community toward the common goal of building an interoperable system of systems.*

These topics were fleshed out in a facilitated session of stakeholders from the public safety GIS community sponsored by the National Highway Traffic Safety Administration (NHTSA), National 911 Program (Program), housed within the Office of Emergency Medical Services (EMS) at the United States (U.S.) Department of Transportation (USDOT). This group identified the issues and offered some remediation options. The issues are discussed in this report and potential solutions will be included in the strategies report encompassing both this facilitated session and the first report *Current Status of 911 Geographic Information Systems Technologies[1]* report.

The unanimous conclusion among stakeholders is that the required entities exist and are serving the GIS community as they should. The issues stem from a lack of understanding between the required entities about each other's roles, lack of coordination between the required entities, uniformity in the guidance being provided to stakeholders, and understanding by local decision-makers of the value of GIS for end-state NG911.

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[1] GIS Assessment Project | 911.gov.

# 1  Introduction

The National 911 Program (Program), within the National Highway Traffic Safety Administration (NHTSA) at the United States (U.S.) Department of Transportation (USDOT), is sponsoring an evaluation and documentation of the current status of entities required for geographic information system (GIS) stakeholders within the nationwide 911 community to successfully create and maintain seamless GIS data across the U.S. These GIS data are furthering NHTSA's vision of eliminating fatalities and serious injuries on the Nation's roads by improving emergency response outcomes through deployment in support of Next Generation 911 (NG911). The Program's mission is to provide national leadership, coordination, and resources to advance and support optimal 911 services across the nation. The Program is seeking awareness into the status of the multiple entities actively involved in the GIS technologies supporting 911 or providing GIS data creation or maintenance services to the 911 community. Of particular interest are the partner entities enabling the development, transmission, receipt, utilization, processing, sharing, maintenance, and storage of the GIS data required for NG911.

To achieve this goal, the Program, met with government stakeholders to discuss their first-hand experiences in supporting the development of a national uniform GIS dataset for 911. This report provides a summary of the findings from a series of interactions with the GIS stakeholder community.

# 2  Background

The Program provides a neutral place for states, technology providers, public safety officials, and 911 professionals to work together to ensure a smooth transition to an updated 911 system that takes advantage of new communications technologies. The Program also creates and shares a variety of resources and tools to help 911 systems.[2]

The first geographic information system was created in Canada in 1963 as a way to manage the natural resources inventory. Two years later, the first GIS computer program was developed. Fast forward to 1981 when Esri released the first commercial GIS product to the market.[3] The slow growth of the GIS industry was rapidly propelled in the late 1980s and the 1990s as the personal computer became a staple in government and technology consulting firms. Today there are dozens of national GIS-specific organizations, dozens more professional organizations with GIS committees or workgroups, scores of local and regional GIS governance groups, and hundreds of GIS firms across the U.S. Each of these potentially play a supporting role in constructing the GIS data fabric necessary for NG911 success.

The marriage between GIS and NG911 has created a very specialized niche in the geospatial industry. The Program sought out standards bodies, private sector companies, national GIS organizations, and 911 agencies to identify the governance, administrative, and technological issues that must be addressed to achieve true nationwide GIS for NG911. Consideration was given to the resources, budget, and partner agencies and organizations necessary to define and implement optimal resource utilization strategies.

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[2] National 911 Program Documents & Tools | 911.gov
[3] https://www.esri.com/en-us/what-is-gis/history-of-gis

# 3  Methodology

The Program solicited applicants from multiple disciplines within the 911 community representing a wide variety of organizations to participate in a facilitated discussion regarding the challenges with implementing the geospatial components of NG911. Participants were chosen based on experience, recommendations from federal partners, their ability to represent more than one entity (e.g., service provider and iCERT), and the need to assemble a well-rounded group.

The facilitated session was loosely guided by themes identified by the Program as pertinent to the success of NG911, and open dialogue within the group was encouraged. Although the required entities were isolated from the topics discussed in the current status of GIS technologies session, there was a great deal of overlap in the issues raised by participants of the two groups.

# 4  Findings

Much like the first report in this series, the *Current Status of 911 Geographic Information Systems Technologies*[4], the original intent of this effort was to identify and define the capability gaps with the entities providing geospatial services to the 911 industry. The Program sought to augment the information collected from the GIS stakeholder community with the experiences of GIS vendors and services providers.

The representatives from the required entities group also have been, and many still are, practicing GIS professionals. They shared the same frustrations as the GIS technologies group, but with a slightly different view. The required entities group have experienced these gaps both as a practitioner and as a service provider..

The stakeholders identified a need to better educate GIS professionals on public safety answering point (PSAP) and NG911 technical requirements. The public safety technical environment and the GIS and broader information technology (IT) framework must integrate for the partnership between 911 and GIS to realize the full technological benefits of geospatial science. The stakeholders identified the need for a document—similar to the *Next Generation 911 for Telecommunicators*[5] publication available through the Program on 911.gov—to be created for GIS and IT professionals. The GIS version of the publication should describe the role of GIS in providing each of the benefits from NG911 to 911 center staff described in the infographic (below) in that document.
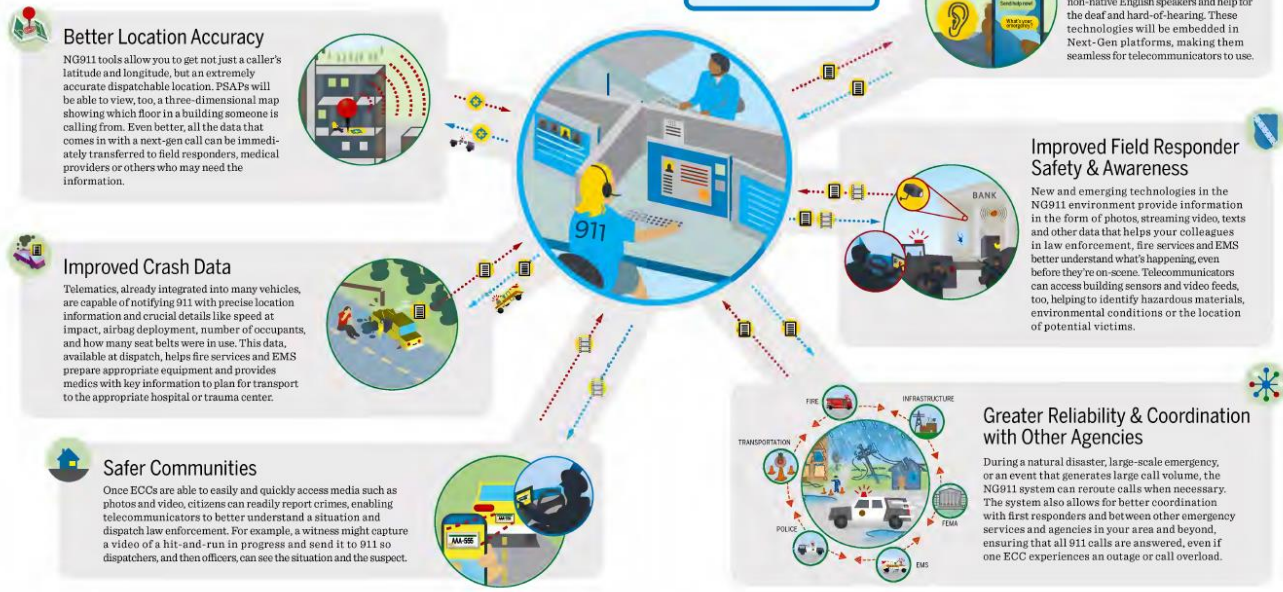
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[4] GIS Assessment Project | 911.gov

[5] https://www.911.gov/projects/ng911-for-public-safety-leaders/ng911-guide-for-telecommunicators/

NG911 FOR TELECOMMUNICATORS
How PSAP/Emergency Communications Center Staff Benefit from Next Generation 911

The GIS data necessary to meet the needs of the NG911 migration across the U.S. will require coordination and partnership among key entities so no lives or property are lost in the transition of this technology. It also is important to highlight the relationships between the legacy 911 stakeholders and the NG911 stakeholders since a lengthy transitional period likely will see an overlap in operations of both systems in tandem.

## 4.1  911 System Migration Messaging

State and local progress in migrating to NG911 fully runs the gamut from foundational[6]—we are thinking about NG911 to regional end state with some early adopters geospatially routing at least a portion of 911 calls since 2013[7]. However, the stakeholders believed that the messaging from partner agencies and required entities is more focused on advancing NG911 while neglecting to repeat the foundational messages of "Why? and What?" is driving the need for NG911 and "Who? or How?" are the technologies that will make the NG911 implementation successful for the entire country being implemented.

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[6] FCC TFOPA Model https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG3_Supplemental_Report-120216.pdf
[7] North Central Texas 911 Authority began geospatially routing 911 calls in 2013.

The Program acknowledges that messaging regarding the impending sunsetting of legacy 911 systems due to technology and hardware obsolescence and the nationwide necessity to replace the existing 911 system with NG911 has not been well communicated to many in local and state leadership and the 911 and GIS industries in recent years. Focusing the messaging on the majority in the middle of the bell curve may seem like the best use of the limited resources but has unintentionally caused many local and state 911 and GIS programs to become alienated and confused as to the first steps they must take in the NG911 transition. As many states and localities move from foundational status to transitional, the requirement for advanced GIS data and analytics in the NG911 system must be communicated in tandem with the migration messaging. It is crucial to restart this conversation from the foundational state and acknowledge that those on the training end of the NG911 migration wave must make up a great deal of ground.

## 4.2 Legacy 911 and NG911 Technology Relationships

GIS data is used in NG911 for all location-based needs. These services are provided by antiquated flat tables in the existing 911 system. The migration to NG911 will require a period of parallel systems maintenance—both legacy and NG911 systems—but ultimately will reduce the burden on 911 entities and shift the level of effort for maintaining location services to GIS. The table that follows shows the relationships between legacy location and NG911 GIS functions.

| Function | Legacy | Next Generation | Why |
|---|---|---|---|
| Address Validation | Master Street Address Guide (MSAG)—A table of all possible addresses within a jurisdiction | Location Validation Function (LVF)—Civic location information is validated against GIS database(s) | More dynamic than MSAG<br><br>All location services use the same source data; eliminates discrepancies |
| Caller Location | Automatic Location Identification (ALI)—A table of all landline telephone numbers and the associated address for each<br><br>Also contains pseudo-Automatic Number Identification (pANI) information for cell tower antenna sectors | Provided by the caller—Physical location of the caller using GIS data and longitude/latitude either from the cellphone or geocoded address validated using the LVF for landline calls<br><br>Location information is provided as part of the call setup; no separate step to retrieve it | Increased caller location accuracy using geospatial location services<br><br>No need to maintain duplicative location data |
| Call Routing to the PSAP | Selective Router—Apparatus in the telephone company network used to select the appropriate destination PSAP for a 911 call based on the location associated with the caller's ANI or pANI in the case of a wireless call | Emergency Call Routing Function (ECRF)—A point (caller location) in polygon (PSAP boundary) query of the GIS data determines the call routing | Legacy hardware is antiquated technology, has reached end of life, does not meet the needs of a mobile (wireless) customer base, and is not capable of supporting the ever-expanding internet of things (IoT) |

| Function | Legacy | Next Generation | Why |
|---|---|---|---|
| Policy Routing | Cannot split a large PSAP between several smaller ones in an abandonment or overflow situation<br><br>If neighboring PSAP is on a different selective router, calls likely forwarded to administrative line without ALI and location information | Policy Routing Rules—PSAPs can stage rules that, when met, automatically alternate-route 911 calls to other PSAPs<br><br>GIS plays a key role in policy routing through geofencing or delineating alternate call routing boundaries | Large PSAPs can divide 911 call traffic by geographic location to multiple smaller PSAPs<br><br>Location information retained in transfers between PSAPs in NG911 environment(s) even with different ESInet[8] providers |

## 4.3 Defining the GIS Statkeholder Community

The width and breadth of GIS-related contributors to the NG911 migration affected by and affecting change upon the ability of GIS to meet the challenges associated with developing and maintaining GIS data for NG911 far exceeds the average GIS endeavor. NHTSA's third report in this series, GIS *Next Generation 911 Partner Agencies and Organizations* report broadly outlined the stakeholder community necessary to preserve the GIS data supply chain and move the NG911 implementation forward. The Required Entities stakeholder group offered a slightly different version of the GIS team best suited to successful NG911 implementation as shown in the graphic below.



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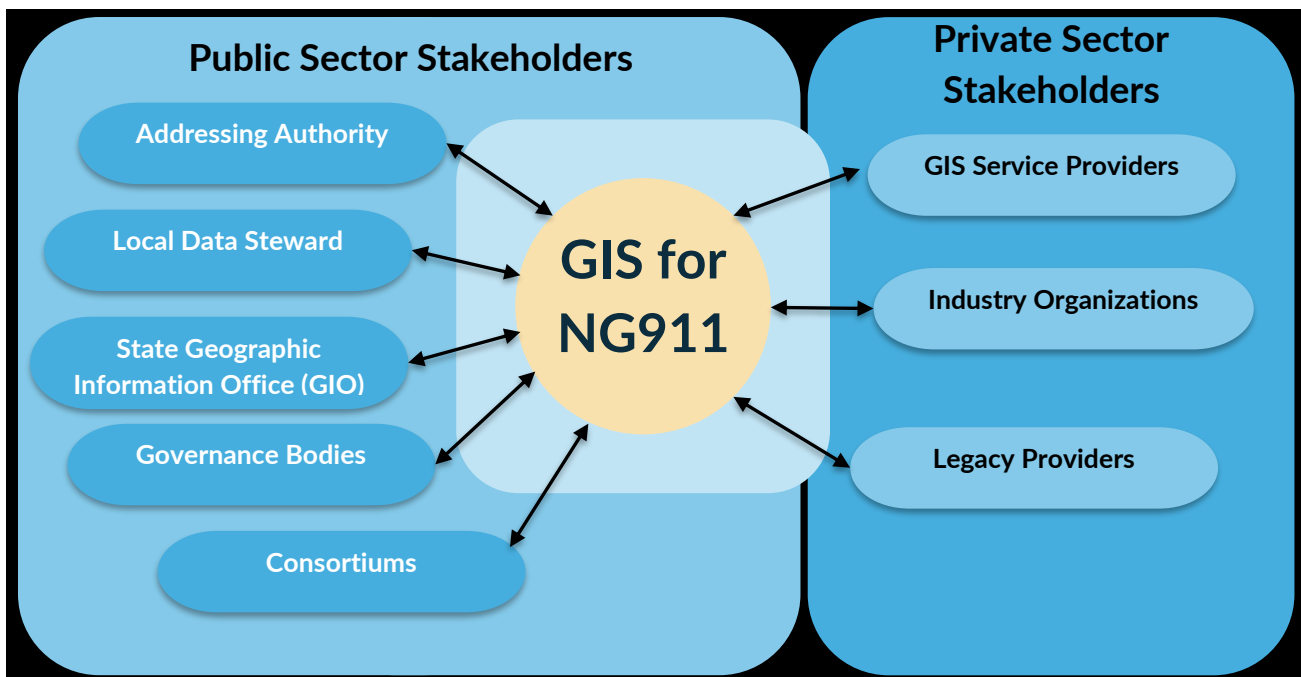
The NG911 messaging must reach each of these members in addition to the 911 staff. All members of the team need to better understand the relationship between GIS and authoritative addressing and geospatial routing and how the success of NG911 relies on solidifying that relationship.

## 4.4  Step-by-Step NG911 GIS Blueprint

The stakeholders identified a common disconnect between 911 leadership and GIS. Communication between the two teams is vital to the continued success of NG911. PSAP and government leaders lack an understanding of the importance of GIS to NG911. GIS leaders have been maintaining GIS data for other uses for decades and frequently do not possess an appreciation for the standards to which GIS must be maintained to support NG911. The stakeholders unanimously cited the need for a blueprint to implementing GIS for NG911 as vital to bridging this knowledge gap and achieving success. The national *NG911 Roadmap* and metrics for success can be found on 911.gov and should play a key role in defining strategies to overcome obstacles identified in this report[9].

The stakeholders stated there is a need for a blueprint that outlines the path to NG911 GIS readiness for all jurisdictions—regardless of the current situation or capabilities. The blueprint must be high level to accommodate the widely varied landscape across the country, yet detailed enough to steer strategic planning and highlight a pathway to success. The Department of Homeland Security's Cybersecurity & Infrastructure Security Agency (CISA) developed a very high-level GIS best practices guide[10] that provides guidance on the creation and ongoing operation of a GIS program to support NG911. However, the stakeholders acknowledged that the document does not provide enough details on how NG911 GIS is achieved and the processes and key partnerships necessary to sustain operational readiness. The stakeholders further expressed a desire for an authoritative guide detailing the next level of guidance beyond the CISA document.

## 4.5  NG911 GIS Data Sharing

The implementation of NG911 forces the 911 industry to expand operational considerations beyond each individual PSAP boundary and adopt a holistic view of emergency response across all of North America. PSAPs must work with their neighbors to establish and maintain boundary data and foster relationships with GIS to edit these polygons and provide them to the Next Generation Core Services (NGCS), which drives the emergency call routing and location services within the NG911 environment. This new cooperative paradigm also requires the sharing of GIS data with neighbors at the federal, state. local, tribal, territorial (FSLTT) and regional governments.

The data-sharing policies necessary for the success of NG911 too frequently are counter to local practices and, in some cases, legislation that secures the GIS data as proprietary. The antiquated practice of selling GIS data to recoup development and maintenance costs limits these jurisdictions' abilities to cooperatively develop NG911 GIS data to national standards and interferes with the NG911 rollout. The

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[9] The NG911 Roadmap https://www.911.gov/projects/ng911-roadmap/
[10] CISA GIS Lifecycle Best Practices Guide https://www.cisa.gov/sites/default/files/publications/SAFECOM-NCSWIC_GIS%20Lifecycle%20Best%20Practices%20Guide_9.22.20%20-%20FINAL_%28508c%29.pdf

stakeholders identified jurisdictions with limiting GIS data-sharing requirements as high-risk impediments to NG911 success. Stakeholders identified four examples of states or regions with successful open GIS data policies that still accommodate the need to protect some components of the data from public distribution.

| Jurisdiction | Link to Policy |
|---|---|
| National Capital Region (DC, MD, VA)—NCR GDX[11] | https://storymaps.arcgis.com/stories/56b1cd4a77064a91bd2ea7b589a0b364 |
| Commonwealth of Pennsylvania—PASDA[12] | https://www.pasda.psu.edu/about.html |
| State of Arizona—AZGeo | https://azgeo-data-hub-agic.hub.arcgis.com/ |
| State of Vermont—Geodata Portal | https://geodata.vermont.gov/ |

For the GIS data supply chain[13] to successfully support the daily operation of NG911 across North America, there must be a seamless GIS dataset across the continent. The stakeholders identified several issues with the construction and maintenance of seamless GIS data:

- Data silos and ownership roadblocks limit collaborative GIS data development.
- Far too many jurisdictions do not have the IT infrastructure—servers and wide-area network bandwidth—to support frequent uploading and downloading of large GIS datasets.
- The Department of Defense's NG911 directive is effective as of June 8, 2022.[14] It is unknown if this directive will include sharing data with primary PSAPs in its jurisdictions.
- The National Address Database (NAD) currently is in production and many states have submitted data, but holes remain within states or entire states have not provided data.
- Tribal entities are reluctant to share GIS data with FSLTT and regional agencies and many do not have addressing data or the authority to create addresses and author and enforce addressing regulations.

The Program and stakeholders agree that guidance and leadership from the public safety and GIS communities are necessary to coordinate the many GIS data stewards across multiple levels of government. There is a lack of national governance of the NG911 GIS data that only will increase the GIS data silos unless this gap is remedied.

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[11] The National Capital Region Geospatial Data Exchange
[12] Pennsylvania Spatial Data Access
[13] Please refer to the *Current Status of 911 Geographic Information Systems Technologies* report for more details on the GIS data supply chain.
[14] DOD Directive 8422.01E, DOD Public Safety Communications Capability, June 8, 2022. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/842201e.PDF?ver=L4-o2Gcn3BpuXkJHpqFqxQ%3D%3D

## 4.6 NG911 GIS Education and Outreach

The stakeholders unanimously agreed that the greatest need is to develop and spread a consistent message on the importance of GIS to the success of NG911. Those decision makers tertiary to 911 but controlling funding and staffing for GIS must fully support not only the creation of GIS programs capable of supporting NG911 but also the ongoing maintenance of the GIS data to national and local standards. Promoting a consistent message to GIS, 911, and leadership at all levels of government, will advance the collaborative creation of the GIS data necessary for NG911 across the country. The stakeholders identified several required components of this message:

- The technology used by current 911 systems has reached end of life and will not be refreshed. NG911 is the solution and will only work if the requisite GIS data is available and properly maintained.
- Costs related to the development and maintenance of GIS data for NG911 are acceptable uses for state and local 911 fees.
- GIS for NG911 and GIS for everything else are not the same; the current level of coordinated, standards-based training and outreach through state and national GIS organizations is insufficient to bridge the gap.
- The use of commercial and other sourced data (public and private utilities, tax records) as a foundation for developing local NG911 addressing is encouraged.
- Memoranda of understanding (MOUs) or other agreements with neighboring FSLTT and regional, jurisdictions on data sharing, creation, and maintenance—including boundary resolution, gaps, and overlaps—are strongly recommended to ensure continued collaborative NG911 GIS data development.
- MOUs and other agreements between local 911 authorities and tribal communities are necessary and may require impartial, third-party mediation.

*The Federal Communications Commission has authorized the use of state and local 911 fees to offset the costs related to GIS data development and maintenance to support NG911—a policy that should be adopted by every state 911 authority*

# 5  Conclusion

There are multiple pathways to successfully implement GIS to support NG911 with slight variations in the right team to achieve steady state support for NG911 operations. What does not change is the end result—highly accurate, current, sharable (within government networks) GIS data for emergency location and 911 call routing. The GIS capabilities of each jurisdiction will dictate the entities required to meet or exceed the national NG911 standards for GIS.

Education of and outreach to GIS and PSAP personnel on NG911 GIS data standards and the role of GIS data in 911 call routing is a vital component to moving forward with a national dataset. Providing insights on how a local jurisdiction's GIS data can help achieve a seamless dataset for the sake of all citizens may help unlock data silos that were created from a lack of understanding.

The stakeholders see the need for independent governance over the messaging for NG911 implementation and the need to restart the messaging from the foundational stage of implementation.

# Acronym Dictionary

Some definitions provided are from the NENA's Master Glossary.[15]

| Acronym | Term | Definition |
|---------|------|------------|
| ALI | Automatic Location Identification | Tabular reference for the current 911 system. Defines destination PSAP for every landline telephone number and cellular tower. |
| APCO | Association of Public-Safety Communications Officials | APCO (Association of Public Safety Communications Officials) is the world's oldest and largest not-for-profit professional organization dedicated to the enhancement of public safety communications. |
| CAD | Computer-Aided Dispatch | A computer-based system that aids PSAP telecommunicators by automating selected dispatching and record-keeping activities. |
| CISA | Cybersecurity and Infrastructure Security Agency | CISA (Cybersecurity and Infrastructure Security Agency) is a federal agency that is the Nation's risk advisor, working with partners to defend against today's threats and collaborating to build more secure and resilient infrastructure for the future. "CISA Central" replaces the NCCIC (National Cybersecurity and Communications Integration Center) |
| CLDXF | Civic Layer Data Exchange Format | A set of data elements that describe detailed street address information. All components are spelled out – no abbreviations. |
| COOP | Continuity of Operations Planning | A plan to implement continuity of operations to ensure that primary mission essential functions continue to be performed during a wide range of emergencies, including localized acts of nature, accidents, and technological or attack-related emergencies. |
| E911 | Enhanced 911 | A telephone system that includes network switching, database, and PSAP premise elements capable of providing automatic location identification data, selective routing, selective transfer, fixed transfer, and a call back number |
| ECC | Emergency Communications Center | ECC is a facility designated to receive and process requests for emergency assistance, which may include 9-1-1 calls, determine the appropriate emergency response based on available resources, and coordinate the emergency response according to a specific operational policy. |
| ECRF | Emergency Call Routing Function | A functional element in an ESInet. The ECRF is a Location to Service Translation (LoST) protocol server where location information (either civic address or geo-coordinates) and a Service Uniform Resource Name (Service URN) serve as input to a mapping function that returns a Uniform Resource Identifier (URI) used to route an emergency call toward the appropriate PSAP for the caller's location or toward a responder agency. |
| EMS | Emergency Medical Services | EMS is a service providing out-of-hospital acute care and transport to definitive care, to patients with illnesses and injuries which the patient believes constitute a medical emergency. |

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[15] https://kb.nena.org/wiki/Category:Glossary

| Acronym | Term | Definition |
|---|---|---|
| ESInet | Emergency Services IP Network | Managed IP network that is used for emergency services communications, and which can be shared by all public safety agencies. It provides the IP transport infrastructure upon which independent application platforms and core services can be deployed, including, but not restricted to, those necessary for providing NG911 services. |
| ESZ | Emergency Service Zone | A geographical area that represents a unique combination of emergency service agencies (e.g., law enforcement, fire/rescue, and emergency medical service) that is within a specified 911 governing authority's jurisdiction. |
| ETL | Extract, Transform, Load | Three database functions that are combined into one tool to pull data out of one database, properly map the fields to the schema of a second database, and place it into the other database. |
| FCC | Federal Communications Commission | An independent U.S. government agency overseen by Congress, the commission is the United States' primary authority for communications law, regulation, and technological innovation. |
| GIS | Geographic Information System | A system for capturing, storing, displaying, analyzing, and managing data and associated attributes which are spatially referenced. |
| iCERT | Industry Council for Emergency Response Technologies | iCERT-is the only industry trade association focused exclusively on emergency response technologies and related equipment, systems, and services. iCERT is dedicated to improving public safety through innovation. |
| ILA | Interlocal Agreement | An agreement among governmental jurisdictions or privately owned systems, or both, within a specified area to share 911 system costs, maintenance responsibilities, and other considerations. |
| IP | Internet Protocol | The method by which data is sent from one computer to another on the ESInet, Internet, or other networks. |
| IT | Information Technology | The use of any computers, storage, networking, and other physical devices, infrastructure, and processes to create, process, store, secure, and exchange all forms of electronic data. |
| LVF | Location Validation Function | A functional element in an NGCS that is a LoST protocol server where civic location information is validated against the authoritative GIS database information. |
| MLTS | Multi-Line Telephone System | Communications equipment comprised of common control unit(s), telephone sets, control hardware and software, and adjunct systems used typically in enterprise settings such as hotels, government agencies, commercial offices, and campuses. |
| MOA | Memorandum of Agreement | A document written between parties to cooperatively work together on an agreed upon project or meet an agreed upon objective. |
| MSAG | Master Street Address Guide | Tabular reference for address validation in the current 911 system. Defines all possible addresses within a jurisdiction. |
| NACo | National Association of Counties | The National Association of Counties is an organization that represents county governments in the United States. It is the only national organization that represents county governments in the United States. |

| Acronym | Term | Definition |
|---|---|---|
| NAD | National Address Database | The US Department of Transportation (USDOT) and its partners at all levels of government recognize the need for a national address database. Accurate, up-to-date address are a critical to transportation safety and are a vital part of NG911. They are also essential for a broad range of government services including mail delivery, permitting and school siting. To meet this need the USDOT partners with address programs from state, local and tribal government to compile their authoritative data into the NAD. |
| NASNA | National Association of State 911 Administrators | NASNA is the voice of the states on public policy issues impacting 911. State 911 leaders' expertise can assist industry associations, public policymakers, the private sector, and emergency communications professionals at all levels of government as they address complex issues surrounding the evolution of emergency communications. An association that represents state 911 programs in the field of emergency communications. |
| NCSWIC | National Council of Statewide Interoperability Coordinators | NCSWIC purpose is the promotion and coordination of activities designed to ensure the highest level of public safety communications across the nation. |
| NENA | National Emergency Number Association | Standards body for 911 and NG911. |
| NHTSA | National Highway Traffic Safety Administration | The Federal Government agency tasked with transportation-related education, research, safety standards, and enforcement. Is also the home of the National 911 Program, under it's Office of Emergency Medical Services. |
| NG911 | Next Generation 911 | NG911 refers to an initiative aimed at updating the 911 service infrastructure in the United States and Canada to improve public emergency communications services in a growingly wireless mobile society. |
| NG911 GIS | Next Generation 911 Geographic Information System | All GIS components necessary to support NG911 operations:<br><br>• Personnel<br> – MSAG/ALI coordinator<br> – GIS professional(s)<br><br>• GIS data<br> – Core seven datasets<br>  ▪ Site structure address points (SSAP)<br>  ▪ Road centerlines (RCL)<br>  ▪ Fire service polygon<br>  ▪ EMS[16] service polygon<br>  ▪ Police service polygon<br>  ▪ PSAP polygon<br>  ▪ Provisioning boundary polygon<br> – Additional GIS data as needed |

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[16] Emergency medical services

| Acronym | Term | Definition |
|---|---|---|
| | | • Systems<br>    – Hardware<br>    – Software<br>        ▪ Optional third-party GIS provider data maintenance applications<br>        ▪ NGCS provider-specific spatial interface (SI) applications<br><br>• Training<br>    – GIS<br>    – NG911<br>    – Third-party tools |
| NGCS | Next Generation Core Services | The base set of services needed to process a 911 call on an ESInet. Includes the ESRP, ECRF, LVF, BCF, Bridge, Policy Store, Logging Services, and typical IP services such as DNS and DHCP. The term NGCS includes the services and not the network on which they operate. |
| NSGIC | National States Geographic Information Council | NSGIC promotes the coordinated, impactful, and cost-efficient application of GIS and other location-based information and analytics to best serve the nation, with emphasis on the power of initiatives and public policy that connect across local, state, federal, and private sector partners. |
| N.T.G.I.S.C. | National Tribal Geographic Information Support Center | Also known as Tribal GIS, NTGISC is a non-profit organization with an objective to provide assistance to Native American tribal governments and organizations regarding GIS technology[17] |
| OEMS | Office of Emergency Medical Services | The Office of Emergency Medical Services (OEMS) is responsible for planning and coordinating an effective and efficient statewide EMS system |
| PBX | Private Branch Exchange | A private telephone switch that is connected to the public switched telephone network. |
| PSAP | Public Safety Answering Point | The entity responsible for receiving 911 calls and processing those calls according to a specific operational policy. |
| RDBMS | Relational Database Management System | Software that gives users the ability to update, query and administer a relational database. |
| REST | Representational State Transfer | An interface that transmits domain-specific data over HTTP without an additional messaging layer such as SOPA or session tracking via HTTP cookies. |
| RMS | Records Management System | Public safety RMS are often interfaced to public safety communication centers. RMSs are sometimes accessed directly through computer systems deployed within communication centers for research and analysis purposes. |
| SDE | Spatial Database Engine | An umbrella term that describes how virtualization and abstracting workloads from the underlying hardware can be used to make information technology (IT) infrastructures more flexible and agile. |
| SI | Spatial Interface | A standardized interface between the GIS and the functional elements that consume GIS data, such as the ECRF and/or LVF. |

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[17] TribalGIS.com About Us page: https://tribalgis.com/aboutus

| Acronym | Term | Definition |
|---------|------|------------|
| SLA | Service Level Agreement | A contract between a service provider and the end user that defines the level of service expected from the service provider. |
| SOP | Standard Operating Procedure | A written directive that provides a guideline for carrying out an activity. |
| SQL | Structured Query Language | A standardized programming language that's used to manage relational databases and perform various operations on the data in them. |
| TFOPA | Task Force on Optimal Public Safety Answering Point Architecture | The federal task force directed to study and report findings and recommendations on structure and architecture in order to determine whether additional consolidation of PSAP infrastructure and architecture improvements would promote greater efficiency of operations, safety of life, and cost containment while retaining needed integration with local first responder dispatch and support. |
| USDOT | U.S. Department of Transportation | The top priorities at DOT are to keep the traveling public safe and secure, increase their mobility, and have our transportation system contribute to the nation's economic growth. |
| USGS | U.S. Geological Survey | The USGS provides science for a changing world, which reflects and responds to society's continuously evolving needs. As the science arm of the Department of the Interior, the USGS brings an array of earth, water, biological, and mapping data and expertise to bear in support of decision-making on environmental, resource, and public safety issues. |
| VoIP | Voice Over Internet Protocol | Telephone service provided through the internet rather than traditional telephone lines. This includes fiber-optic and coaxial cable services such as Comcast and Time Warner, and purchased devices like Ooma®, Google Voice, or magicJack. |