Virginia Information Technologies Agency

9-1-1 Addressing Operational and Administrative Best Practice

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9-1-1 Addressing: Operational and Administrative Best Practices

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This document is an overview of 9-1-1 addressing with a focus on the administrative and operational aspects of the process. It is primarily geared toward local government officials in GIS and/or public safety who wish to learn the following:

- The importance of having a consistent, uniform 9-1-1 addressing process.
- The basics of the 9-1-1 addressing process, from assigning a 9-1-1 address to updating the address at the PSAP.
- An overview of what is typically involved in the 9-1-1 addressing process.

Developed by the

Integrated Services Program

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Purpose of this Document

A Best Practice is a method or technique that has consistently shown results superior to those achieved with other means, and is used as a benchmark. Compiling best practice documentation and educating stakeholders on those best practices is an intense area of focus for VITA's Integrated Services Program (ISP). Making sure every stakeholder is aware of, and striving to adhere to common benchmarks allows processes, systems, data, and etc. to be more easily integrated.

To assist with that, VITA's ISP is compiling best practices to support both the 9-1-1/Public Safety community and the Geographic Information System (GIS) community. This document is an overview of 9-1-1 addressing, which is an essential building block for effective 9-1-1 call processing and response, as well as being essential to other functions within government, many of which are addressed herein.

9-1-1 addressing is often a complex process that involves many persons and functions within local government. This document can serve as a guide to assist with developing and/or streamlining that process, and contains many items that can be put in place in totality or piecemeal. This document aims to assist those localities who want to improve addressing efficiency. Appendix A of this document cites additional 9-1-1 addressing resources.

Introduction

The purpose of 9-1-1 addressing is to provide the location of a structure, site or road for timely and efficient response in emergencies. Having a consistent, uniform addressing process is critical for emergency response.

A common misconception by the public is that the primary purpose of a 9-1-1 address is for mail carriers to locate delivery locations. Although mail carriers refer to 9-1-1 addresses for deliveries, the local government agency is responsible of creating and managing 9-1-1 addresses and road names and is deemed the addressing agent authority.

Having accurate 9-1-1 address information in a consistent structure is helpful in emergency response situations when seconds matter. Many localities follow commonly used standards when assigning addresses, such as having even-numbered addresses on one side and odd-numbered addresses on the other side. In most areas, even addresses are on the right side of the road increasing in range, and odd numbers are on the left.

According to "Addressing Guide 'Best Practices,'" the two major addressing types are **distance-based addressing** and **grid-based addressing**. In distance-based addressing, addresses are calculated sequentially, most commonly every 5.28 feet so that approximately 1000 addresses are available per mile of road starting from the previous intersection. In grid-based addressing, addresses are based on a pre-defined grid with a northing and easting coordinate system. The grid-based addressing is often used in cities where addresses are organized in blocks in structured increments, such as 100-199, 200-299, etc. When addressing in blocks, address ranges that allow for actual ranges, rather than potential ranges are recommended for more accurate geocoding along a road (pp. 14-15, 46).

Examples of localities that currently use distance-based addressing include Page and Scott Counties, and localities using grid-based addressing include Albemarle and Loudoun Counties. Links to ordinances describing both addressing types are in Appendix B.

Regardless of the addressing method used, maintaining a uniform, sequential system helps emergency responders more quickly determine which side of the street they will find the emergency and how far along the road the address is located, which is particularly beneficial for longer roads. For example, in distance-based addressing using the 1000-addresses-per-mile method with even addresses on the right side of the road, if an incident is at 4000 Something RD, then it is located approximately 4 miles from the beginning of Something RD on the right.

Standards

A standard is a uniform structure that is commonly recognized. The National Emergency Number Association (NENA) has an established, adopted 9-1-1 addressing standard. In addition, the United States Postal Service (USPS) has standards to which localities should adhere, including road name prefix and suffix standards. Also, VITA (Virginia Information Technologies Agency) is currently working on creating basic GIS data standards complementing the NENA and USPS standards. The focus is on data structure and types of basic 9-1-1 address data that all localities should follow as a minimum.

Using a Geographic Information System (GIS) to consistently maintain and manage 9-1-1 addressing information provides a standard data format that can be utilized by many other location-based government systems and processes. Those may include the PSAP mapping system, building permitting systems, land parcel management systems, public utilities systems and services, etc. GIS data may be stored geospatially as vectors (points, lines, and polygons) or rasters (i.e., orthoimagery). The attribute tables in GIS data store

more information about spatial features. For example, an address point in a GIS may have the following information in its attribute table: address number, street name, community name, and Emergency Service Number (ESN). Within a GIS or mapping application, a user can easily access information.

As a minimum, one or more employees at a locality that assigns and maintains addresses must be familiar with the adopted addressing process, USPS addressing standards, and GIS data maintenance standards. It is recommended that GIS personnel who work with 9-1-1 addressing are familiar with the addressing process and adhere to GIS data standards for 9-1-1 data maintenance.

Some localities that do not have a dedicated person focusing on GIS tasks have a contractor updating and maintaining GIS data at the PSAP. In this case, ensuring that GIS data are properly maintained is important.

Ordinance: Establishing a Uniform Addressing Procedure

One of the key steps in 9-1-1 addressing is to establish an addressing ordinance. An addressing ordinance lays out a uniform addressing procedure that provides guidelines and enforcement of addressing policies.

Common topics in an addressing ordinance may include, but are not limited to, the following:

- **Identification of addressing authority**
- **Addressing procedures**
- **Road name designations**: Include road naming process and standards used.
- **Address signs**: Include types of signs designating public or private road. Also, this section identifies who is responsible of putting them up and maintaining them. Costs associated to homeowner/resident, if any, should be included as well.
- **Address changes:** Include purpose of changing an address and process originating from the locality and the homeowner/resident. Should also include any costs associated with an address change.
- **Enforcement:** States the department that enforces violations and details what the penalties are, if there are any.

Ideally, all addresses should conform to the addressing ordinance for consistency and reliability in emergency response. However, in some cases, exceptions are made at the discretion of the decision-making official(s) at the locality.

Many local government agencies have an E-9-1-1 Addressing Ordinance. You may find some examples of existing addressing ordinances at the end of this document (Appendix B).

Workflow: Identifying Roles in the 9-1-1 Addressing Process

A workflow documents the step-by-step process of completing a task. In order to establish a workflow for 9-1-1 addressing, it is important to know everyone involved in the 9-1-1 addressing process. The following are some questions to consider when creating a workflow for your agency:

1. Where does a homeowner need to go to obtain a 9-1-1 address?
2. Who determines a new 9-1-1 address, and how is it determined?
3. Who maintains the ALI (Automatic Location Information) and MSAG (Master Street Address Guide) databases?
4. Who updates and maintains CAD (Computer Aided Dispatch) data?
5. What departments and agencies need to know when a new 9-1-1 address is assigned?
6. Who is responsible for informing the homeowner of the new 9-1-1 address?
7. Who is involved with the naming of new roads? Are property owners involved in this process?
8. Should a committee be developed for deciding address changes?
9. Who maintains and orders road signs?
10. Who is responsible of posting the address? If it is the property owner, what is the penalty when the address is not posted?
11. Are there fees associated with name changes initiated by the homeowner(s) if they are allowed?
12. Who is the final authority for all of the above? Is there an appeals process? Should a waiver option exist for property owners wishing to avoid an address change?

The jurisdiction needs to plan out and determine who does what from the creation of the locality's 9-1-1 address application to the update of address data at the PSAP. Various offices need to be immediately informed of new addresses. Examples include the PSAP, police/fire/rescue agencies, GIS, Voter Registrar, Commissioner of the Revenue, townships within a jurisdiction, utilities, and USPS offices, among others.

The determination of an address is typically based on where the driveway intersects the road. The location may be determined by field work, such as collecting GPS coordinates in the field. In addition, many localities use GIS software to calculate the address number.

Below is an example of an addressing workflow:

Homeowner completes a 9-1-1 Address Application at ___.

___ determines 9-1-1 address based on where the driveway meets the road.

Is a new road name or address change necessary due to the creation of this address?

___ sends mass memo: All department heads at locality including the PSAP, GIS, Sheriff's Office, Fire/Rescue, Building Department, Planning, Registrar's Office, and Commissioner of Revenue. Also externally, town officials, USPS contacts, and police, fire, and rescue chiefs are informed.

__ informs homeowner of new address via letter.

__ updates GIS data at the PSAP.

__ updates MSAG, ALI, and CAD data, as needed.

Idea: Create a hard copy map book periodically with all of the road names and addresses for emergency personnel in case of a power outage or system failure.

Who needs to be involved at your agency?

The locality needs to determine who does what from the receipt of a new 9-1-1 application to the update of address data at the PSAP.

The PSAP, Emergency Services, GIS, Building, and Planning, among others, are offices that may need to be involved in the 9-1-1 addressing process.

Also, keep in mind someone needs to maintain 9-1-1 data and ensure that the GIS, MSAG, ALI, and CAD data are accurate and up-to-date.

Some localities have an external company doing some of the tasks, such as GIS data maintenance at the PSAP.

It is recommended that everyone involved in the 9-1-1 addressing process be familiar with the locality's 9-1-1 addressing workflow. The primary goal of developing a workflow is to have up-to-date 9-1-1 GIS data at the PSAP, which helps in an emergency when time is critical. 9-1-1 dispatchers and emergency responders rely on accurate 9-1-1 information from their GIS mapping as well as the CAD, and ALI and MSAG databases.

ALI (Automatic Location Information) and MSAG (Master Street Address Guide) databases are maintained by the 9-1-1 service provider or another third party (i.e., Intrado) and must be updated as new addresses and roads are created and addresses and road names are changed. In Virginia, the two 9-1-1 service providers are Verizon and CenturyLink . In some cases, another party houses the ALI and MSAG databases. For example, for those on the Intrado A-9-1-1 network, Intrado provides these databases. Location determination depends on the ALI database, and the MSAG database contains road name and address range information for each road segment from where the road begins to where it ends. Often, PSAP or emergency services personnel update ALI and MSAG databases, since they are in contact with their 9-1-1 service provider, but others may do it as well.

CAD (Computer Aided Dispatch) data is also often updated by the PSAP or emergency services, with exceptions, and the database is maintained by the CAD provider. Similar to the ALI and MSAG, CAD must also reflect up-to-date address and cross street information.

New Road Names and Address Changes

When naming a new road or making an address change, a PSAP or emergency services manager is often involved in the process. Others involved often include GIS personnel and landowners as well as leaders at the local government agency, such as the county administrator and Board of Supervisors. As with a new address assignment, all offices impacted by the change need to be informed once the road is named. Also, external offices such as USPS offices, town managers, and police/fire/rescue chiefs, must be informed, as needed. Creating a workflow similar to 9-1-1 addressing is recommended for new road names and address changes.

New road names should not be identical to or sound similar to an existing road name to prevent confusion when someone dials 9-1-1. Oftentimes, localities refer to a list of existing road names when deciding on a new one.

Address changes are sometimes necessary to facilitate efficient and effective emergency response. Address changes involve informing individuals, such as the homeowner/landowner, USPS, and townships. A workflow should exist for address changes so that each person who needs to be involved is informed in a methodical, organized process.

For address changes that require new road names, some jurisdictions ask the homeowners/residents affected by the address change to make a list of suggested new road names.

Some citizens affected by address changes may protest or request for an appeal, often because they require making various adjustments, which consume time and/or money. Examples include updating the doctor's office, bank, and other organizations. In localities where citizens are responsible of maintaining their address postings at their residences and businesses, their address postings need to be changed or replaced. In addition, business owners need to change their letterheads and business cards to reflect their new addresses. Therefore, it is important to understand and clearly communicate the purpose of changing addresses to the citizens affected as well as to the local government agency. Also, it is a good practice to keep a record of documentation and correspondence.

Communication: Getting the Message Out Effectively

In addition to understanding the role of each individual in the 9-1-1 addressing process, getting the message out effectively requires knowing who to contact and a structured means of contacting everyone involved. Many localities use standardized forms and templates as part of their workflow in communicating the right information to the right people. The following forms and templates may be used in 9-1-1 addressing:

- 9-1-1 Address Application: What a homeowner/resident fills out to request a 9-1-1 address for a structure that has not been assigned an address. The locality decides whether to assess a fee to a 911 address assignment and determines whether the locality or the homeowner/resident installs a house number sign.
- Road Name Request form: What a homeowner/resident fills out to request a new road name.
- Data Discrepancy form: Form used internally to identify, detail, and track discrepancies found in locality datasets and field data. It may also be used to update the various databases at the locality when a new address is assigned.

- Address Assignment template: Template letter used to send new address assignment to homeowner/resident.
- Address Change Notification template: Template letter used to send an address change assignment to homeowner/resident.

The State of Michigan's "Addressing Guide 'Best Practices' Document, Version 2.0" shows examples of the above forms and templates for reference, in addition to other references pertaining to 9-1-1 addressing (pp. 50-67). A link to this document may be found in Appendix A.

Each local government agency should develop their forms and templates in consultation with others at the agency involved in 9-1-1 addressing.

Maintaining Accurate and Up-to-Date 9-1-1 GIS Data at the PSAP

Regular maintenance of accurate and up-to-date 9-1-1 GIS data at the PSAP is an ongoing process. Localities need personnel to maintain the 9-1-1 GIS data as well as to ensure the MSAG, ALI, and CAD databases are updated by responsible parties. As soon as a 9-1-1 address is created or changed, the GIS data should reflect the change as well as in the MSAG, ALI, and CAD databases.

Data quality checks are part of maintaining 9-1-1 data integrity. It is also known as Quality Assurance/Quality Control (QA/QC). When checking for data quality, localities may rely on various methods to work on improving their 9-1-1 data. They may include the following:

- Field checks (real world vs. GIS data)
- Comparing ALI and MSAG databases with GIS data
- Comparing Assessor's Office/Commissioner of Revenue database with GIS data
- Comparing voter registration database with GIS data
- Comparing utilities database with GIS data
- Comparing USPS information with GIS data

Comparing the 9-1-1 GIS data to each of the databases helps identify discrepancies between the databases and the GIS. The inconsistencies may stem from an error in the GIS or in one of the databases. Once discovered, errors should be processed in a timely manner, whether they are fixed or reported to the database owner. Field checks are also important, because the 9-1-1 GIS data, the ALI database, and the MSAG database should ultimately be

consistent with the real world. Working with emergency personnel and others in the locality who do field work help facilitate field checking. Also, some people keep a record of processed fixes for reference.

A locality may obtain the ALI and MSAG databases from the PSAP's 9-1-1 Service Provider or a third party that maintains them. In Virginia, the PSAP manager is usually able to receive these databases at no cost a limited number of times per year.

Databases from the Assessor's Office/Commissioner of Revenue, voter registration, and utilities may be obtained internally from these offices. USPS may sometimes help in providing information for purposes of improving 9-1-1 data. In addition, USPS benefits from having accurate 9-1-1 address information.

Ultimately, field checks ensure that 9-1-1 address data are consistent with reality. Regardless of whether these addresses conform to standards, emergency responders usually rely on what is posted in the field. However, checking the GIS data with other databases help improve GIS data quality as well as the quality of the respective databases.

VITA does complimentary GIS, MSAG, and ALI analyses for local government agencies that provide them with the locality's MSAG and ALI databases and GIS data. Also, some GIS vendors perform these services.

Conclusion

Many people are directly or indirectly impacted by new 9-1-1 addresses and address changes. Understanding the role of each individual in the 9-1-1 addressing process from start to finish is important. In addition, everyone, internally and externally, who needs to be notified of new 9-1-1 addresses and address changes must be informed in a timely manner. Ordinances and standards help localities create and maintain organized, uniform 9-1-1 addresses in a jurisdiction.

The purpose of 9-1-1 addressing is for emergency personnel to respond to emergencies. Having accurate, consistent, and up-to-date 9-1-1 data is imperative for quick and effective emergency response.

Appendix A: References

"Addressing Guide 'Best Practices' Document, Version 2.0." L.R. Kimball. State of Michigan. http://www.michigan.gov/documents/cgi/DOC120313LRK_State_of_Michigan_Addressing_Guide_379249_7.pdf

"Addressing Services in Jefferson County." Jefferson County Commission. http://www.jeffersoncountywv.org/government/departments/gis-addressing/addressing/addressing-services.html

"Forms and Publications." State of Vermont Enhanced 911 Services Board. http://e911.vermont.gov/municipalities/forms

"GIS Data Collection and Maintenance." NENA. http://www.nena.org/general/custom.asp?page=gisdatacollection

"Publication 28 – Postal Addressing Standards." USPS. http://pe.usps.gov/text/pub28/welcome.htm

"Street Suffix Abbreviations." USPS. http://pe.usps.gov/text/pub28/28apc_002.htm

"Synchronizing GIS with MSAG and ALI." NENA. http://www.nena.org/general/custom.asp?page=synch_gis_msag_ali

Appendix B: Examples of Addressing Ordinances and Documents in Virginia

Albemarle County, VA
Road Naming and Property Numbering Ordinance and Manual
https://www.albemarle.org/upload/images/Forms_Center/Departments/Geographic_Data_Services/Forms/Road_Naming_and_Property_Numbering_Ordinance_and_Manual.pdf

Goochland County, VA
Chapter 12 – Streets and Roads: Article II Road Names; Address Numbers
https://www.municode.com/library/va/goochland_county/codes/code_of_ordinances?nodeId=COOR_CH12STRO_ARTIIRONAADNU

Loudoun County, VA
1026.06 Determination of Addresses
http://www.amlegal.com/nxt/gateway.dll/Virginia/loudounco_va/partten-streetsutilitiesandpublicservice/titletwo-streetandsidewalkareas/chapter1026addressingofpremises?f=templates$fn=default.htm$3.0$vid=amlegal:loudounco_va$anc=JD_1026.06

Page County, VA
Chapter 127: E-911 Addressing
http://ecode360.com/9200544

Prince William County, VA
County Code Chapter 24 – Streets
https://www.municode.com/library/va/prince_william_county/codes/code_of_ordinances?nodeId=CH24ST

Scott County, VA
Ordinance No. 2005-01: Ordinance to Provide for the Naming of Streets and Roads in Scott County, Virginia
http://scottcountyva.com/911law.pdf

Wise County, VA
County Code Chapter 18 – E911 Addressing System
https://www.municode.com/library/va/wise_county/codes/code_of_ordinances?searchRequest=%7B%22searchText%22:%22addressing%22,%22pageNum%22:1,%22resultsPerPage%22:25,%22booleanSearch%22:false,%22stemming%22:true,%22fuzzy%22:false,%22synonym%22:false,%22contentTypes%22:%5B%22CODES%22%5D,%22productIds%22:%5B%5D%7D&nodeId=COCO_CH18.5STSI_ARTIIIE-ADSY