NENA Standard for NG9-1-1 GIS Data Model

Abstract: This document defines the GIS data information, formats, requirements, and related information used in NENA Next Generation 9-1-1 (NG9-1-1) Core Services (NGCS).

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1 Executive Overview

Purpose and Scope

This document defines the Geographic Information Systems (GIS) Data Model, which supports the NENA Next Generation 9-1-1 (NG9-1-1) Core Services (NGCS) of location validation and routing, both geospatial call routing or to the appropriate agency for dispatch. This model also defines several GIS data layers (layers) used in local Public Safety Answering Point (PSAP) and response agency mapping applications for handling and responding to 9-1-1 calls.

The data structures defined in this document are related to, but different from the data structures defined in the NENA i3 Standard for Next Generation 9-1-1, NENA-STA-010 [3], Appendix B. Appendix B describes the Spatial Interface (SI). The purpose of the SI is to provision a functional element (e.g., the Emergency Call Routing Function) with GIS data. In contrast, this Data Model document describes the structure (e.g., field names, field data types, domains) of GIS data. Care has been taken to ensure that this Data Model is compatible with the SI provisioning process.

Spatial (GIS) data drives NG9-1-1. Spatial data is often grouped into layers or feature classes. Layers are homogenous collections of common features, each having the same spatial representation and a common set of attribute columns. Spatial data in this document consists of the following vector (discrete) layer types:

- Points - Discrete locations such as address points, premise locations, and mileposts
- Lines - Linear features such as roads, rivers, and railways
- Polygons - Geographic coverage areas such as service boundaries, lakes, and cities

While local government, public safety entities, and Public Safety Answering Points (PSAPs) currently use GIS address points, road centerlines, boundaries, and many other data layers in many different ways, the move to NG9-1-1 introduces and sometimes requires new uses of existing data and creation of new data layers. ***Required*** layers MUST be available for NGCS to process a 9-1-1 call on an ESInet, in particular the ECRF and LVF and for functionality of the SI. ***Strongly Recommended*** layers may aid in NGCS functionality, may be used for call taking and dispatch operations, and are used in other operations. The ***Recommended*** layers will not be provisioned into the LVF or the ECRF, but are beneficial for PSAP map display and 9-1-1 call taking.

This NENA Standard for NG9-1-1 GIS Data Model (NG9-1-1 GIS Data Model) and the NG9-1-1 system rely on standardized, accurate, and up-to-date GIS data. This document updates previous GIS Data Models for use in the NG9-1-1 system while remaining backwards compatible with existing Enhanced 9-1-1 (E9-1-1) GIS data needs.

The NG9-1-1 system makes use of a new location conveyance format, called the "Presence Information Data Format-Location Object" or PIDF-LO. The PIDF-LO serves as the representation of the location of the device calling 9-1-1 and allows for civic and geospatial

information. PIDF-LO is an international format. The United States profile/version of PIDF-LO for civic locations is the Civic Location Data Exchange Format (CLDXF) Standard, NENA-STA-004 [4].

This document conforms to CLDXF for the representation of addresses in United States NG9-1-1 environments. However, there are fields described in this document that provide additional information beyond what CLDXF describes.

This GIS Data Model for NG9-1-1 is designed to support the location conveyed in the PIDF-LO so that it supports both validation of the location information against the local 9-1-1 Authorities' GIS data as well as routes the 9-1-1 call to the appropriate responding PSAP. The process of validating the location information that is contained in the PIDF-LO occurs in the LVF of the NG9-1-1 system before the call is made. The location information within the PIDF-LO is used to route the 9-1-1 call to the appropriate PSAP and takes place within the ECRF of the NG9-1-1 system.

The LVF and ECRF require standardized GIS data to perform their respective roles. GIS data provided in accordance with this standard are used as input to the SI. The SI's role is to then provision the LVF and ECRF (and other Functional Elements). The Master Street Address Guide (MSAG) Conversion Service (MCS) will also make use of the information contained in the GIS data, in particular legacy attributes. In addition, public safety mapping applications use these GIS layers, allowing the PSAP to properly view the location of a 9-1-1 call on the map display and dispatch the correct emergency service(s) to the appropriate location.

The primary reasons to implement this standard are to:

- Promote the creation of complete, consistent, high quality GIS data for use within NENA NG9-1-1 systems
- Establish standardized GIS data provisioning requirements and structure for all users
- Establish provisioning guidelines for GIS data needed to support existing E9-1-1 systems, while transitioning into NG9-1-1 systems
- Enable validation of the 9-1-1 civic location information against the local 9-1-1 Authorities' GIS data using the LVF
- Enable routing of the 9-1-1 call to the appropriate destination, using the local 9-1-1 Authorities' GIS data provisioned to the ECRF
- Provide the data to determine the correct emergency responding agencies
- Enable compatibility and interoperability between GIS datasets while standardizing consistent data elements for software

Benefits

Adherence to this document provides a standardized, interoperable GIS data model that benefits users and providers of GIS data in the following manner:

- Enables the validation of civic locations before a 9-1-1 call is made
- Provides the data structure that allows the NG9-1-1 functionality that routes calls to the correct destination
- Maintains or improves support for accurate plotting of 9-1-1 calls in public safety mapping applications for call handling purposes
- Provides a framework to help migrate existing GIS datasets to NG9-1-1 systems
- Streamlines data maintenance
- Enhances interoperability and data sharing
- Reduces confusion and ambiguity that can result from unstandardized data

Table of Contents

List of Tables

List of Figures

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2 Document Conventions

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2. MUST NOT: This phrase, or the phrase "SHALL NOT", means that the definition is an absolute prohibition of the specification.
3. SHOULD: This word, or the adjective "RECOMMENDED", means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
4. SHOULD NOT: This phrase, or the phrase "NOT RECOMMENDED" means that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
5. MAY: This word, or the adjective "OPTIONAL", means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation which does not include a particular option "must" be prepared to interoperate with another implementation which does include the option, though perhaps with reduced functionality. In the same vein an implementation which does include a particular option "must" be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides.)

These definitions are based on IETF RFC 2119 [2].

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Reason for Issue/Reissue

NENA reserves the right to modify this document. Upon revision, the reason(s) will be provided in the table below.

Document Number	Approval Date	Reason For Issue/Reissue
NENA-STA-006.1-2018	June 16, 2018	Initial Document
NENA-STA-006.1.1-2020	February 18, 2020	Scrivener errors corrected and URLs updated
NENA-STA-006.2-2022	September 23, 2022	Added new content and revised existing content to: • Begin to address Canadian considerations related to the NG9-1-1 GIS Data Model. Additional changes will be made in a future version following publication of the CLDXF-Canada standard. • Resolve some issues related to Road Centerlines identified as future work in version 1 of the standard.

Document Number	Approval Date	Reason For Issue/Reissue
		• Resolve inconsistencies and other issues related to Layer Names, Domains, and Street Type field names identified by the GIS Data Model Template WG as needing further clarification in the Standard. • Update NENA Globally Unique ID structure to align with NENA-STA-010.3 [3], and update language to clarify that the structure is mandatory. • Update terminology and guidance around service boundary layers and eliminate the requirement to provide them as separate layers. • Specific structural changes to the Data Model that were made: ○ Redefined "P" field type and changed all "E" field type values to "P" field type in all layers. ○ Changed Discrepancy Agency ID field width from 75 to 100 in all layers. ○ Changed Street Name field width from 60 to 254 in the RoadCenterline layer and the SiteStructureAddressPoint layer. ○ Changed Alias Street Name field width from 60 to 254 in StreetNameAliasTable. ○ Changed field name for Longitude from "Long" to "Longitude" in the SiteStructureAddressPoint layer and CellSectorPoint layer. ○ Changed field name for Latitude from "Lat" to "Latitude" in the SiteStructureAddressPoint layer and CellSectorPoint layer.

Document Number	Approval Date	Reason For Issue/Reissue
		○ Changed field name for Elevation from "Elev" to "Elevation" in SiteStructureAddressPoint layer. ○ Changed County Left and County Right field width from 40 to 100 in the RoadCenterLine layer. ○ Changed County field width from 40 to 100 in the SiteStructureAddressPoint layer, the A2-A5 Administrative Unit layers, and the CellSectorPoint layer. ○ Changed field name for primary key NGUIDs to just "NGUID" (i.e., removed "RCL" from RCL_NGUID) in all layers. ○ Changed field name for Site NENA Globally Unique ID (Foreign Key) from "Site_NGUID" to "SSAP_NGUID" in the LandmarkNamePartTable, the LandmarkNameCompleteAliasTable, and the CellSectorPoint layer. ○ Changed field name for Complete Landmark Name Alias NENA Globally Unique ID (Foreign Key) from "ACLMNNGUID" to "CLNA_NGUID" in the LandmarkNamePartTable. ○ Changed field name for Legacy Street Name Type from "LSt_Type" to "LSt_Typ" in the RoadCenterLine layer and the SiteStructureAddressPoint layer. ○ Changed descriptive name "ZIP Plus 4" to "Postal Code Extension" and changed associated field name "Post_Code4" to "PostCodeEx" in the SiteStructureAddressPoint layer.

Document Number	Approval Date	Reason For Issue/Reissue
		○ Changed descriptive name "Mile Post" to "Milepost" and changed associated field name "Mile_Post" to "Milepost" in the SiteStructureAddressPoint layer. ○ Changed field name for Rail Line Name from "RLNameE" to "RLName" in the RailroadCenterLine layer. ○ Changed "State" field to Not Required in all service boundary layers. ○ Added "Country" field as a Not Required field to all service boundary layers. ○ Added "Incorporated Municipality" field as a Required field to the A4Polygon layer. ○ Removed Alias Legacy Street Name Pre Directional field, Alias Legacy Street Name field, Alias Legacy Street Name Type field, and Alias Legacy Street Name Post Directional field from the StreetNameAliasTable. ○ Made many changes to the descriptive names, the field names, and the M/C/O categorization in the LocationMarkerPoint layer (previously named Mile Marker Location). Also added the Location Marker Label field as a Conditional field.

3 Technical/Operational Description

3.1 Background

The NENA Next Generation (NG9-1-1) GIS Data Model meets the demands and needs of a NENA i3 NG9-1-1 system, as described in the NENA i3 Standard for Next Generation 9-1-1,

NENA-STA-010 [3], while permitting backward compatibility with existing E9-1-1 systems. This GIS Data Model can be used with today's E9-1-1 location conveyance format, Automatic Location Identification (ALI), and the Next Generation 9-1-1 location conveyance format, PIDF-LO. PIDF-LO is the Internet Engineering Task Force (IETF) Presence Information Data Format-Location Object as defined in the IETF Request for Comments (RFC) 4119 [5] and extended by RFC 5139 [6] and RFC 6848 [7]. NENA has adopted the PIDF-LO as the means of conveying location information within the NG9-1-1 system.

In an NG9-1-1 system, the location of the IP endpoint supporting the fixed or nomadic calling device is validated against the local 9-1-1 Authorities' provisioned GIS data by the Location Validation Function (LVF).

This same local provisioned GIS data is used with the Emergency Call Routing Function (ECRF). The ECRF uses the location of the call (civic or geodetic) to determine, primarily, to which PSAP the call should be routed, based on the local 9-1-1 Authorities' GIS data. The ability to perform validation of locations and routing of an emergency call will depend on the currency, standardization, quality, and accuracy of the GIS data being used. The local 9-1-1 Authorities' GIS data is used in validation, routing, and location delivery within NG9-1-1 to accomplish the same functions as the MSAG, ALI, and Selective Router perform in E9-1-1.

NG9-1-1 is designed to interoperate with other 9-1-1 systems, across a county, across a state, across North America, and throughout the world. In order to obtain this level of interoperability, strict adherence to standards is REQUIRED. Being able to transfer a 9-1-1 call to another PSAP, or to assist other PSAPs in times of emergencies depends on the core routing and validation database, the provisioned GIS data within the LVF and ECRF, and meeting and adhering to the standards in this document.

3.2 Metadata

Metadata is a file of information that captures the basic characteristics of the data and information resource. It represents the *who, what, when, where, why,* and *how* of the resource. Metadata is strongly recommended to be included and available for each GIS data layer described in this document.

Agencies are encouraged to use or transition to ISO 19115 [8] and other associated ISO metadata standards as they are able. More information about ISO metadata standards is available on the Federal Geographic Data Committee website [9] and the National Oceanic and Atmospheric Administration website [10].

3.3 Spatial Reference

Local GIS data may be developed and managed in any datum (typically NAD83) and coordinate system (ex. State Plane projection) desired. A datum is a reference surface that is used to provide a consistent reference for geospatial information, assuring that any comparisons or analysis are consistent (such as location determination).

Prior to loading GIS data into the Emergency Call Routing Function (ECRF) it MUST be transformed into World Geodetic System of 1984 (WGS 1984) [11]. All GIS data in i3 must be in this WGS84 format to support interoperability between all systems and all sites, as referenced in NENA-STA-010 [3].

Geodetic parameters for WGS84 are specified by the European Petroleum Survey Group (EPSG) for both 2-dimensional and 3-dimensional geometries [12].

- For 2-dimensional geometries the geodetic parameters are required to follow EPSG::4326.
- For 3-dimensional geometries the geodetic parameters are required to follow EPSG::4979.

3.4 Standardized Data Fields

Data domains must be utilized to ensure that information is not lost when merged with other GIS data and to ensure interoperability across all systems. In some fields, only certain values are accepted; therefore, any data outside of this format MAY be ignored or replaced with a null value. Regardless of how the data is being maintained locally, data SHALL be provided in accordance with this standard when exported. Attribute values other than those within the "domain" of allowed values will not be recognized. Non-standardized attributes will lead to problems with validation, routing, and interoperability.

In the current E9-1-1 system, GIS and MSAG data are usually contained within a jurisdiction or region, and as long as the data is consistent within that region, it does not matter how closely it conforms to a data standard. For example, some jurisdictions keep non-numeric prefix and suffix information in an address number data field.

In NG9-1-1, data may not be confined within a jurisdiction or an area. In disaster or overload conditions, calls may be answered out of area. Data may be consolidated into regional and/or statewide databases. For these reasons, it is essential that ALL jurisdictions define their GIS data layers and attributes as they are specified in this NENA NG9-1-1 GIS Data Model Standard. While this change may mean additional effort for many jurisdictions, it is important that every GIS conform to the GIS Data Model Standard contained in this document, in order to realize the many benefits of interoperable data and systems.

3.5 Case Sensitivity

All systems compliant with this standard that receive, and store data MUST preserve case. Fields using a domain of values MUST adhere to the casing rules of that domain. Legacy fields specified in this standard namely, "Legacy Street Name," "Legacy Street Name Post Directional," "Legacy Street Name Pre Directional," "Legacy Street Name Type," and "MSAG Community Name" (including left and right siblings), MUST be all uppercase. For all other fields that are not governed by domains, values SHOULD be provided using mixed casing (i.e., combination of uppercase and lowercase letters such as in "MacDonald", "LaCrosse",

"O'Reilly", "deHavilland", "Avenue of the Americas", "Bras d'Or") as deemed correct by the authoritative source.

3.6 NENA Globally Unique IDs (NGUID)

In this version of the NG9-1-1 GIS Data Model, the format of the NENA Globally Unique ID (NGUID) has changed. The changes make the form of these IDs match other similar IDs in i3. Like the changes in i3, this change lets a user see what kind of data the ID is from (GIS data), what layer it is from, and which organization created the data. Conversion from the NG9-1-1 GIS Data Model version 1 format is straightforward: a layer-sensitive string precedes the existing data and the "@" sign is replaced with a colon. The new format allows a host name containing the agency identifier to be used after the final colon, although just the agency identifier is acceptable. The extra information allows more than one system or instance in an agency to create identifiers without a risk of a duplicate identifier. For example, one system could use "system1.example.com" and another could use "system2.example.com." The extra information is optional.

A NGUID is REQUIRED for all GIS data elements. NGUIDs SHALL be generated and maintained within a GIS database by concatenating "urn:emergency:uid:gis:[Layer Indicator]:[Local Unique ID]:[Agency Identifier]" where the elements are defined as:

- **urn:emergency:uid:gis –** standardized unique prefix that defines this class of IDs associated with GIS data.
- **Layer Indicator –** the shorter name for the GIS data layer the feature is associated with as defined by the GIS Data Layers Registry in NENA-STA-010 [3]. See section 7.2 in this document for Layer Indicator values.
- **Local Unique ID –** a GIS Data Provider generated "locally assigned ID," which can be numeric and/or text. This local ID MUST be unique within the GIS Data Provider's dataset for all features associated with a specific Agency Identifier.
- **Agency Identifier –** a fully qualified domain name (FQDN) representing the GIS Data Provider, which is an "Agency." Agency and Agency Identifier are as defined in NENA-STA-010 [3]. The domain name is obtained from any Domain Name System (DNS) registrar.

Each NGUID MUST be unique as an aggregated NGUID following the structure described in this section.

The combination of the Local Unique ID with the rest of the values that construct the NGUID, provides a unique NGUID when multiple GIS Data Provider submissions are aggregated. The NGUID SHOULD be stable for as long as possible, so that it supports the reporting and resolution of errors from a quality control process, including the discrepancy reporting. The consistency of the ID between submissions also assists with managing downstream data sets.

Example NGUID:
urn:emergency:uid:gis:RCL:{AD873541-F41C-409E-A0BE-1B0C583902A4}:nortexrpc.org

URN	urn:emergency:uid:gis
Layer Indicator	RCL
Local Unique ID	{AD873541-F41C-409E-A0BE-1B0C583902A4}
Agency Identifier	nortexrpc.org

3.7 GIS Data Format

GIS data can be represented in a growing number of different GIS data file formats. In some cases, a GIS data file format can also be "versioned" which can create problems even when an entity believes it is fully-equipped to read a particular format from another entity. Due in part to the dynamic nature of GIS data file formats and in part to the variety of formats that an entity may or may not be in a position to support with their chosen GIS, this standard currently places no requirement on the GIS data file format to use for information exchange. This standard does however place requirements on the field names used, the properties of each field, and specific guidance on the attribution to be placed within the fields of an entity's chosen GIS data file format.

In many cases, when an entity is exchanging GIS data with a vendor, the vendor's requirements will drive the use of a particular GIS data file format. When exchanging GIS data between entities, it is expected that the entities will coordinate to ensure the receiving entity can read the GIS data file format provided. What should be consistent with GIS data exchange in an NG9-1-1 environment, regardless of the GIS data file format used for the exchange, are the naming conventions of each field in each layer, as well as the accompanying properties of each field described within this standard. This should be true whether the exchange is between a public safety entity and its vendor(s) or between one or more public safety entities and/or authoritative GIS sources. It is anticipated that by ensuring consistency at the field level, entities will be able to share information with any other public safety entity using a mutually-agreed-upon GIS data file format and that the information received will not be misinterpreted, or perceived as malformed by the recipient, in that exchange.

Within Section 4, GIS Data Model Layers, a table is provided for each layer with a "Descriptive Name" column for the field along with a REQUIRED "Field Name" column. The "Descriptive Name" column provides a fully-spelled-out name that is intended to be used when referencing other NENA documentation that uses the same fully-spelled-out names. The "Field Name" column contains the specific field names to assign within each layer and is intended to be used when exchanging GIS data between one or more entities for the purposes of NG9-1-1. Other columns within these tables provide guidance on the use of attributes within the field such as "Required" and data type/length specifications. Entities are also encouraged to refer to Section 5, Detailed Description of Field Names and Associated Attribute Data for more guidance on the fields. In some cases, it may also be

necessary to reference the Civic Location Data Exchange Format (CLDXF) Standard, NENA-STA-004 [4], for certain fields relating to addressing.

NENA Standard for NG9-1-1 GIS Data Model version 2 introduces a change in the naming convention for geopolitical/administrative boundaries that were previously defined as States, Counties, Incorporated Municipalities, Unincorporated Communities, and Neighborhood Communities in Section 4 GIS Data Model Layers. The new recommended polygon names of A1-A5 are used for alignment with the GEOPRIV Location Object Format described in RFC 4119 [5].

It is important to note that any entity MUST be capable of exporting their GIS data in a GIS data format that meets the specified field naming conventions, "Required" usage, type, and field width attributes. Entities SHOULD use the recommended layer names. Using the recommended layer names also simplifies the recognition and usage of layers through the SI or when sharing data between PSAPs and a GIS Data Provider.

It is not required that every entity will use the GIS Data Model, or the recommended layer names described within this standard for its day-to-day internal use and maintenance. However, entities are encouraged to use the standard for the development of their internal GIS data model to ensure they can meet the export requirements and improve interoperability. Utilization of the GIS Data Model attribute and layer naming benefits the user by eliminating the need for scripting or other data transformation processes to meet the export requirements. NENA recognizes that these name changes are an initial introduction of change and will take time to be recognized and adopted in internal GIS models.

4 GIS Data Model Layers

GIS data layer names shown below are represented in the GIS Data Layers Registry in NENA-STA-010 [3] and are meant to provide consistent naming conventions for GIS data layers across all NENA documents. It should be noted that the GIS Data Layers registry is an Internet Assigned Numbers Authority (IANA) registry, and the registry itself is always the most up to date source of GIS Data Layer names. The IANA registry should be referenced directly for the recommended GIS Data Layer names as there may be alignment issues with the current published version of NENA-STA-010 [3]. Please see section 2.7 GIS Data Format for more information on local layer naming conventions.

Each GIS data layer is denoted in this document as one of the following:

Table 4-1 NG9-1-1 GIS Data Layers

NG9-1-1 GIS Data Model Status	GIS Data Layers Registry Entries	Uses in NGCS	Some Additional Uses for all Layers
Required layers MUST be available for NGCS to process a 9-1-1 call on an ESInet, in particular the ECRF and LVF, and for functionality of the SI.	RoadCenterLine SiteStructureAddressPoint PsapPolygon FirePolygon PolicePolygon EmsPolygon ProvisioningPolygon	Emergency Call Routing Function (ECRF) Location Validation Function (LVF) Geocode Service (GCS) MSAG Conversion Service (MCS) Mapping Data Service (MDS) Spatial Interface (SI)	Emergency call taking Emergency dispatch PSAP map display Computer Aided Dispatch (CAD) systems GIS Basemaps Transportation Planning Utilities Environmental studies Computer Aided Drafting & Design (CADD) systems Parks & Recreation
Strongly Recommended layers may aid in NGCS functionality, may be used for call taking and dispatch operations, and are used in other operations.	Other service boundary layers (e.g., CoastGuardPolygon, PoisonControlPolygon) StreetNameAliasTable LandmarkNamePartTable LandmarkNameCompleteAliasTable A1Polygon A2Polygon A3Polygon A4Polygon A5Polygon	ECRF LVF GCS MDS	
Recommended layers will not be provisioned into the LVF or the ECRF but can enhance the GIS data for NG9-1-1 and E9-1-1 call taking and dispatch operations.	RailroadCenterLine HydrologyLine HydrologyPolygon CellSectorPoint LocationMarkerPoint	MDS	

The data structures defined in this document are related to, but different from the data structures defined in NENA-STA-010 [3], Appendix B. Appendix B describes the Spatial Interface (SI), that is a subset of this NG9-1-1 GIS Data Model. The purpose of the SI is to provision a functional element (e.g., the ECRF) with GIS data. In contrast, this Data Model document describes the structure (e.g., field names, field data types, domains) of GIS data. If fields are not included within locally maintained GIS data, the 9-1-1 Authority or its

designee must ensure that the data matches the model present in NENA-STA-010 [3], Appendix B, prior to the data being provided to the SI (by manual or automated means).

In the GIS data layer tables below, data fields include a specification of when they may appear in a record. The database systems that are used to store a GIS typically can only support a specification of whether a field is required to be present, or it is optional. The "Required" column provides this specification. Three values may occur in this column:

- "Yes" means the data element is required to be present in all records. It will appear as required in the database schema.
- "No" means that the data field is optional in a record. It will not appear as required in the database schema.
- "Conditional" means that the data field is conditional. This value alerts the reader that a business rule is specified that controls the presence of a value in the data field. It will not appear as required in the database schema. The prevailing business rule for all conditional attributes is that if an attribute value exists (e.g., if a Street Name Pre Directional such as "West" is part of the valid street name), it MUST be provided. If no value exists for the attribute (e.g., there is no Street Name Pre Directional as part of the valid street name), the data field is left unpopulated. All attributes that are governed by CLDXF PIDF-LO structure MUST follow the business rules identified in the CLDXF Standard, NENA-STA-004 [4]. If no business rule is identified, the prevailing rule will apply.

Locally maintained GIS data layers are REQUIRED to include all data fields specified as "Yes" within this GIS Data Model but are NOT REQUIRED to include data fields that are not specified as "Yes" if no data exists to be populated within the data fields. If there are no records in the entire database for a specific non-required data field, then the data field itself is NOT REQUIRED. Local policy may dictate that all data fields be included in the structure regardless of whether data exists.

The complete attribute definitions shown in the GIS data layer tables are described and defined in Section 5, Detailed Description of Field Names and Associated Attribute Data.

In the GIS data layer tables below, each layer has a heading of Descriptive Name, Field Name, Required, Type, and Field Width.

The "Descriptive Name" is provided to clarify the intent of the information contained in the "Field Name."

The "Field Name" column gives the standardized GIS data field name that MUST be used. While local entities MAY use their own field names for internal processes, utilization of GIS data within and between the NG9-1-1 system functional elements MUST conform to this standard structure.

The "Field Width" column refers to the maximum number of characters a field may contain. Field width represents guidelines for interoperability. Local implementations MAY use

smaller maximum widths, but their emergency call processing systems MUST be capable of managing the listed widths when handling out-of-area calls. A GIS system that allows longer widths must be used with great care as those attributes which exceed these widths may be truncated.

The "Type" column indicates the type of data used within the data field and attributes.

- **P** – Printable UTF-8 [13] characters that display recognizable glyphs when printed, plus the space character, (U+0020). This explicitly supports accented characters and does not permit other blank characters such as a non-breaking space or control characters such as carriage return, line feed, and escape. Indigenous characters are expressly allowed. It is up to the agency to verify with their 9-1-1 system vendor(s) that their systems support characters or pictographic glyphs for all of the indigenous languages within their service area, or for a service area from which they receive diverted or transferred emergency calls.
- **U** – A Uniform Resource Identifier (URI) as described in Section 9, Abbreviations, Terms, and Definitions, and as defined in RFC 3986 [14], and also conforming to any rules specific to the scheme (sip:, https:, etc.) of the chosen URI.
- **D** – Date and Time may be stored in the local database date/time format with the proviso that local time zone MUST be recorded, and time MUST be recorded to a precision of at least 1 second and MAY be recorded to a precision of 0.1 second. If the local database date/time format does not meet these specifications, the database SHOULD record the local date/time format in a string conforming to W3C dateTime format as described in XML Schema Part 2: Datatypes Second Edition [15].
- **F** – Floating (numbers that have a decimal place). There is no defined field length of a floating number; it is system dependent. Note that the decimal separator in other languages is a comma or space.
- **N** – Non-negative integer

Additional GIS data layers and data fields may be used as needed to best meet local purposes and needs. However, only those layers listed below and the associated attribute data shown in the layers provided in this document will be utilized for the loading and provisioning of GIS data for the LVF, ECRF, and MSAG Conversion Service (MCS) functions within NG9-1-1 as described in NENA-STA-010 [3].

The following sections are organized by data themes, with subsections for their feature types.

4.1 Roads

4.1.1 Road Centerlines – REQUIRED

Roads data is maintained as a line layer for representing the centerline of a real world roadway. This dataset is referred to as the RoadCenterLine layer in the GIS Data Layers

Registry in NENA-STA-010 [3] and in NENA documents going forward. GIS road centerline arc-node topology is associated with attribute data containing information on street names, address ranges, jurisdictional boundaries, and other attributes. The RoadCenterLine layer is an integral part of any public safety GIS due to its versatility and use for:

- Querying and geocoding of civic addresses based on dual (left/right) address ranges
- Tactical map display
- Map and attribute viewing
- Map production
- Location and driving directions
- Integration of network topology to allow vehicle routing, drive time analysis
- Integration of spatially related attributes for advanced applications including those focused on public safety, asset management, planning, utilities, and public works

Unnamed centerlines MUST have the Street Name field populated.

Table 4-2 RoadCenterLine Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Left Address Number Prefix	AdNumPre_L	Conditional	P	15
Right Address Number Prefix	AdNumPre_R	Conditional	P	15
Left FROM Address	FromAddr_L	Yes	N	6
Left TO Address	ToAddr_L	Yes	N	6
Right FROM Address	FromAddr_R	Yes	N	6
Right TO Address	ToAddr_R	Yes	N	6
Parity Left	Parity_L	Yes	P	1
Parity Right	Parity_R	Yes	P	1
Street Name Pre Modifier	St_PreMod	Conditional	P	15
Street Name Pre Directional	St_PreDir	Conditional	P	9
Street Name Pre Type	St_PreTyp	Conditional	P	50
Street Name Pre Type Separator	St_PreSep	Conditional	P	20
Street Name	St_Name	Yes	P	254

Descriptive Name	Field Name	Required	Type	Field Width
Street Name Post Type	St_PosTyp	Conditional	P	50
Street Name Post Directional	St_PosDir	Conditional	P	9
Street Name Post Modifier	St_PosMod	Conditional	P	25
Legacy Street Name Pre Directional*	LSt_PreDir	Conditional	P	2
Legacy Street Name*	LSt_Name	Conditional	P	75
Legacy Street Name Type*	LSt_Typ	Conditional	P	4
Legacy Street Name Post Directional*	LSt_PosDir	Conditional	P	2
ESN Left*	ESN_L	Conditional	P	5
ESN Right*	ESN_R	Conditional	P	5
MSAG Community Name Left*	MSAGComm_L	Conditional	P	30
MSAG Community Name Right*	MSAGComm_R	Conditional	P	30
Country Left	Country_L	Yes	P	2
Country Right	Country_R	Yes	P	2
State or Equivalent Left (A1)	State_L	Yes	P	2
State or Equivalent Right (A1)	State_R	Yes	P	2
County or Equivalent Left (A2)	County_L	Yes	P	100
County or Equivalent Right (A2)	County_R	Yes	P	100
Additional Code Left	AddCode_L	Conditional	P	6
Additional Code Right	AddCode_R	Conditional	P	6
Incorporated Municipality Left (A3)	IncMuni_L	Yes	P	100
Incorporated Municipality Right (A3)	IncMuni_R	Yes	P	100
Unincorporated Community Left (A4)	UnincCom_L	No	P	100
Unincorporated Community Right (A4)	UnincCom_R	No	P	100
Neighborhood Community Left (A5)	NbrhdCom_L	No	P	100
Neighborhood Community Right (A5)	NbrhdCom_R	No	P	100
Postal Code Left	PostCode_L	No	P	7
Postal Code Right	PostCode_R	No	P	7
Postal Community Name Left	PostComm_L	No	P	40
Postal Community Name Right	PostComm_R	No	P	40
Road Class	RoadClass	No	P	15
One-Way	OneWay	No	P	2
Speed Limit	SpeedLimit	No	N	3
Validation Left	Valid_L	No	P	1

Descriptive Name	Field Name	Required	Type	Field Width
Validation Right	Valid_R	No	P	1

* Used in legacy systems and is not used in a full NG9-1-1 implementation

4.1.2 Street Name Aliases

4.1.2.1 Street Name Alias Methodology

The street name as assigned by the local addressing authority MUST be the name in the RoadCenterLine layer. The street name assigned by the local addressing authority is the street name used for location validation, and call routing. However, many roads are known by more than one street name, and these are known as alias street names. There are many ways to represent an alias. This document describes one model. Regardless of the alias naming methodology selected, one MUST ensure it is compatible with the latest version of Appendix B of NENA-STA-010 [3]. Note that the representation shown in this section is compatible with the latest version of Appendix B of NENA-STA-010 [3].

Alias street names are common and must be considered. Examples include when a state route or state highway crosses into a city jurisdiction, when several streets "merge" to traverse the same road segment, or when honorary names are given to previously named and addressed roads. Many 9-1-1 Authorities will need to accommodate for alias street names during call taking and data sharing.

The method of maintaining alias street names is illustrated below in the StreetNameAliasTable, Figure 4-3. The attribute data in Figure 4-1 and Figure 4-3 below is only to illustrate the concept of managing alias street names. In the RoadCenterLine layer in Figure 4-1, the street names "Avenue of the Pines" and "Main Street" have been assigned by the local addressing authority. Each street name has two different segments associated with it. All the segments are in Any County, with the two segments associated with Main Street also being in Some City. Each road centerline segment has a NENA Globally Unique ID (NGUID) assigned to it as a primary key. In this example, the NGUID for each road centerline segment is in the first column.

NGUID (Primary Key)	St_Pre Mod	St_Pre Dir	St_PreTyp	St_PreSep	St_Name	St_Pos Typ	St_Pos Dir	St_Pos Mod	State _L	State _R	County_L	County_R	IncMuni_L	IncMuni_R
urn:emergency:uid: gis:RCL:1:AC911.tx.us			Avenue	of the	Pines				TX	TX	Any County	Any County		
urn:emergency:uid: gis:RCL:2:AC911.tx.us			Avenue	of the	Pines				TX	TX	Any County	Any County		
urn:emergency:uid: gis:RCL:3:AC911.tx.us					Main	Street			TX	TX	Any County	Any County	Some City	Some City
urn:emergency:uid: gis:RCL:4:AC911.tx.us					Main	Street			TX	TX	Any County	Any County	Some City	Some City

Figure 4-1 Street Name Alias Methodology

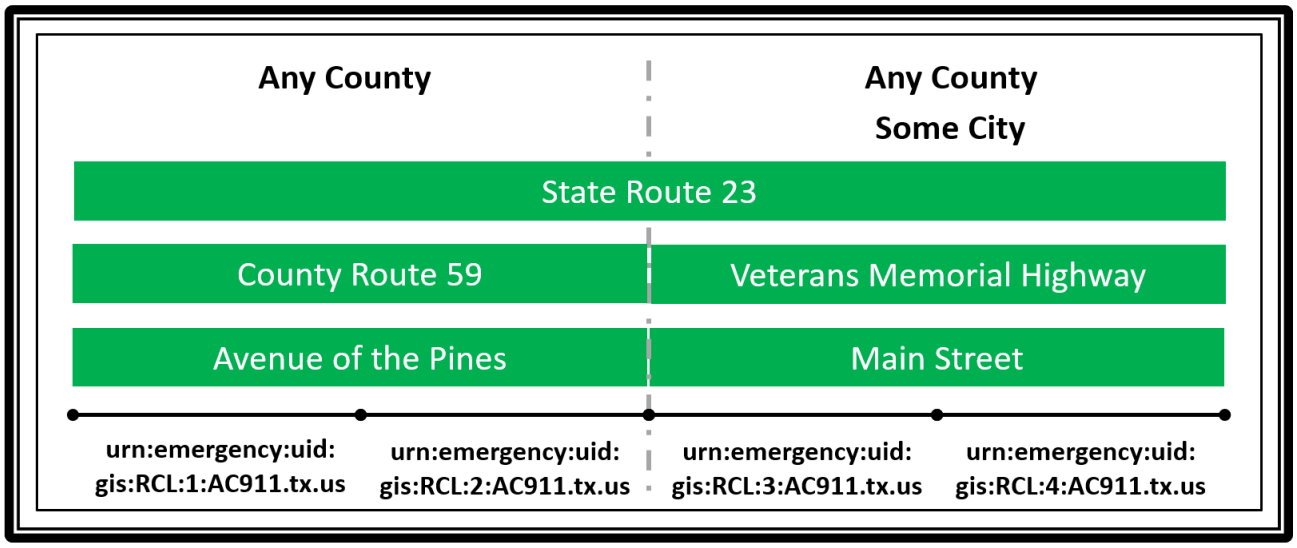


Figure 4-2 Graphic Depiction of Figure 4-1

In Figure 4-2, Avenue of the Pines and Main Street that have been assigned by the local addressing authority each has several alias street names:

- State Route 23, the street name assigned by the state department of transportation, is used as an alias for Avenue of the Pines and Main Street. These four segments have an individual RoadCenterLine layer NGUID of:
    - urn:emergency:uid:gis:RCL:1:AC911.tx.us
    - urn:emergency:uid:gis:RCL:2:AC911.tx.us
    - urn:emergency:uid:gis:RCL:3:AC911.tx.us
    - urn:emergency:uid:gis:RCL:4:AC911.tx.us
- County Route 59 is an alias for the two segments of Avenue of the Pines that are in Any County but not in Some City. These two segments have an individual RoadCenterLine layer NGUID of:
    - urn:emergency:uid:gis:RCL:1:AC911.tx.us
    - urn:emergency:uid:gis:RCL:2:AC911.tx.us
- Veterans Memorial Highway is an alias for the two segments of Main Street that are in Some City. These two segments have an individual RoadCenterLine layer NGUID of:
    - urn:emergency:uid:gis:RCL:3:AC911.tx.us
    - urn:emergency:uid:gis:RCL:4:AC911.tx.us

The RoadCenterLine layer NGUID is used to relate the alias street names in the StreetNameAliasTable to the road centerline segments in the RoadCenterLine layer in Section 4.1.1. Using this methodology, one can add as many alias street names as needed.

To ensure data integrity, the user MUST assign an NGUID (Primary Key) to each record in the StreetNameAliasTable. The NGUID (Primary Key), as with the other respective Unique IDs for each layer, MUST be globally unique and therefore has only one occurrence.

NGUID (Primary Key)	RCL_NGUID (Foreign Key)	ASt_Pre Mod	ASt_PreDir	ASt_PreTyp	ASt_PreSep	ASt_Name	ASt_PosTyp	ASt_PosDir	ASt_Pos Mod
urn:emergency:uid: gis:StrNA:1:AC911.tx.us	urn:emergency:uid: gis:RCL:1:AC911.tx.us			State Route		23			
urn:emergency:uid: gis:StrNA:2:AC911.tx.us	urn:emergency:uid: gis:RCL:2:AC911.tx.us			State Route		23			
urn:emergency:uid: gis:StrNA:3:AC911.tx.us	urn:emergency:uid: gis:RCL:3:AC911.tx.us			State Route		23			
urn:emergency:uid: gis:StrNA:4:AC911.tx.us	urn:emergency:uid: gis:RCL:4:AC911.tx.us			State Route		23			
urn:emergency:uid: gis:StrNA:5:AC911.tx.us	urn:emergency:uid: gis:RCL:1:AC911.tx.us			County Route		59			
urn:emergency:uid: gis:StrNA:6:AC911.tx.us	urn:emergency:uid: gis:RCL:2:AC911.tx.us			County Route		59			
urn:emergency:uid: gis:StrNA:7:AC911.tx.us	urn:emergency:uid: gis:RCL:3:AC911.tx.us					Veterans Memorial	Highway		
urn:emergency:uid: gis:StrNA:8:AC911.tx.us	urn:emergency:uid: gis:RCL:4:AC911.tx.us					Veterans Memorial	Highway		

Figure 4-3 StreetNameAliasTable

From the StreetNameAliasTable in Figure 4-3 above, we can tell that:

- RCL_NGUID (Foreign Key) = urn:emergency:uid:gis:RCL:1:AC911.tx.us has an alias of State Route 23 and another alias of County Route 59
- RCL_NGUID (Foreign Key) = urn:emergency:uid:gis:RCL:2:AC911.tx.us has an alias of State Route 23 and another alias of County Route 59
- RCL_NGUID (Foreign Key) = urn:emergency:uid:gis:RCL:3:AC911.tx.us has an alias of State Route 23 and another alias of Veterans Memorial Highway
- RCL_NGUID (Foreign Key) = urn:emergency:uid:gis:RCL:4:AC911.tx.us has an alias of State Route 23 and another alias of Veterans Memorial Highway

4.1.2.2 Street Name Aliases – Strongly Recommended

Street Name Aliases data is maintained as a table containing alternate street names related to the legal street name contained in the RoadCenterLine layer. This dataset is referred to as the StreetNameAliasTable in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward.

Table 4-3 StreetNameAliasTable

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100

Descriptive Name	Field Name	Required	Type	Field Width
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID (Primary Key)	NGUID	Yes	P	254
Road Centerline NENA Globally Unique ID (Foreign Key)	RCL_NGUID	Yes	P	254
Alias Street Name Pre Modifier	ASt_PreMod	Conditional	P	15
Alias Street Name Pre Directional	ASt_PreDir	Conditional	P	9
Alias Street Name Pre Type	ASt_PreTyp	Conditional	P	50
Alias Street Name Pre Type Separator	ASt_PreSep	Conditional	P	20
Alias Street Name	ASt_Name	Yes	P	254
Alias Street Name Post Type	ASt_PosTyp	Conditional	P	50
Alias Street Name Post Directional	ASt_PosDir	Conditional	P	9
Alias Street Name Post Modifier	ASt_PosMod	Conditional	P	25

4.2 Site/Structure Addresses

4.2.1 Site/Structure Address Points – REQUIRED

Site/Structure Addresses data is maintained as a point layer for representing the location of a site, a structure, or access to a site or structure. This dataset is referred to as the SiteStructureAddressPoint layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. Site/Structure Addresses data can also represent landmarks. While SiteStructureAddressPoint is a required layer, there is no requirement for the completeness of these data. It is understood that it will take time and resources to fully develop complete and accurate Site/Structure Addresses data.

Site/Structure Addresses data can be used to locate sites that otherwise may not geocode correctly using the road centerline data. It can also be used to locate areas of unusual addressing (i.e., odd addresses on even side of the road centerlines and vice versa), and other areas where the data is available. Some addressable locations may be problematic near boundaries.

The Address Number, Street Name, and place name attributes (e.g., Incorporated Municipality, Unincorporated Community, Neighborhood Community) in the SiteStructureAddressPoint layer SHOULD be consistent with the address number range, street name, and left/right place name attribute combinations found in the RoadCenterLine layer.

While there may be address data available, it may not be in the standardized format of this structure. GIS data providers should be working toward developing and maintaining the site structure point data described in this Standard.

Table 4-4 SiteStructureAddressPoint Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Country	Country	Yes	P	2
State or Equivalent (A1)	State	Yes	P	2
County or Equivalent (A2)	County	Yes	P	100
Additional Code	AddCode	Conditional	P	6
Additional Data URI	AddDataURI	Conditional	U	254
Incorporated Municipality (A3)	Inc_Muni	Yes	P	100
Unincorporated Community (A4)	Uninc_Comm	No	P	100
Neighborhood Community (A5)	Nbrhd_Comm	No	P	100
Address Number Prefix	AddNum_Pre	Conditional	P	15
Address Number	Add_Number	Conditional	N	6
Address Number Suffix	AddNum_Suf	Conditional	P	15
Street Name Pre Modifier	St_PreMod	Conditional	P	15
Street Name Pre Directional	St_PreDir	Conditional	P	9
Street Name Pre Type	St_PreTyp	Conditional	P	50
Street Name Pre Type Separator	St_PreSep	Conditional	P	20
Street Name	St_Name	Conditional	P	254
Street Name Post Type	St_PosTyp	Conditional	P	50
Street Name Post Directional	St_PosDir	Conditional	P	9
Street Name Post Modifier	St_PosMod	Conditional	P	25
Legacy Street Name Pre Directional*	LSt_PreDir	Conditional	P	2
Legacy Street Name*	LSt_Name	Conditional	P	75
Legacy Street Name Type*	LSt_Typ	Conditional	P	4
Legacy Street Name Post Directional*	LSt_PosDir	Conditional	P	2
ESN*	ESN	Conditional	P	5
MSAG Community Name*	MSAGComm	Conditional	P	30
Postal Community Name	Post_Comm	No	P	40

Descriptive Name	Field Name	Required	Type	Field Width
Postal Code	Post_Code	No	P	7
Postal Code Extension	PostCodeEx	No	P	4
Building	Building	No	P	75
Floor	Floor	No	P	75
Unit	Unit	No	P	75
Room	Room	No	P	75
Seat	Seat	No	P	75
Additional Location Information	Addtl_Loc	No	P	225
Complete Landmark Name	LandmkName	Conditional	P	150
Milepost	Milepost	Conditional	P	150
Place Type	Place_Type	No	P	50
Placement Method	Placement	No	P	25
Longitude	Longitude	No	F	-
Latitude	Latitude	No	F	-
Elevation	Elevation	No	N	6

* Used in Legacy Systems and is not used in a full NG9-1-1 implementation

4.2.2 Landmark Name Parts

4.2.2.1 Landmark Name Part Methodology

Note: Landmark Name Parts can quickly become complex. This section is being revisited in both the CLDXF Standard, NENA-STA-004 [4], and a future version of this document. The Landmark Name Part Methodology is likely to change.

The Complete Landmark Name in the SiteStructureAddressPoint layer is the complete name by which a prominent feature is publicly known. The CLDXF Standard, NENA-STA-004 [4], further explains that a Complete Landmark Name is composed of one or more Landmark Name Parts. To be compatible with the CLDXF Standard, NENA-STA-004 [4], and Appendix B in NENA-STA-010 [3], the NG9-1-1 GIS Data Model MUST include the Landmark Name Part element. There are different ways to represent Landmark Name Part elements in a GIS data model. This document describes one model. Regardless of the Landmark Name Part Methodology used, one MUST ensure it is convertible via software, with no extra information, to the latest version of Appendix B in NENA-STA-010 [3].

Figure 4-4 below shows the Complete Landmark Names for two address points in the SiteStructureAddressPoint layer. Each address point has a NENA Globally Unique ID (NGUID) assigned to it as a primary key. "James A Haley Veterans Hospital" is the Complete Landmark Name for the address point with the SiteStructureAddressPoint layer NGUID of "urn:emergency:uid:gis:SSAP:72:911Authority.fl.us" and "University of South

Florida Sun Dome" is the Complete Landmark Name for the address point with the SiteStructureAddressPoint layer NGUID of "urn:emergency:uid:gis:SSAP:75:911Authority.fl.us."

NENA Globally Unique ID (NGUID)	Complete Landmark Name (LandmkName)
urn:emergency:uid:gis:SSAP:72:911Authority.fl.us	James A Haley Veterans Hospital
urn:emergency:uid:gis:SSAP:75:911Authority.fl.us	University of South Florida Sun Dome

Figure 4-4 Example of Complete Landmark Names with their unique IDs in the SiteStructureAddressPoint Layer

A Landmark Name Part is the name or a collection of names by which a prominent feature is publicly known. Often, a landmark can be located within another larger landmark and the name of the larger landmark is included as part of the name of the smaller landmark. In such a situation of nested landmarks where a landmark is denoted by multiple names in a series, each name is a separate Landmark Name Part and the Complete Landmark Name is created by concatenating the Landmark Name Parts. For example, "University of South Florida" and "Sun Dome" (an arena on the University of South Florida's campus) would each be a Landmark Name Part and the associated Complete Landmark Name would be "University of South Florida Sun Dome." The order in which to concatenate the parts is determined by a Landmark Name Part Order number where 1 is the first (or leftmost) Landmark Name Part, 2 is the second Landmark Name Part, etc. The Complete Landmark Name in the SiteStructureAddressPoint layer is conditional because a Landmark Name is NOT REQUIRED but a Landmark Name Part is REQUIRED to have a Complete Landmark Name.

A landmark may sometimes only have one Landmark Name Part. In such a situation, the Landmark Name Part and its associated Complete Landmark Name would be the same and have a Landmark Name Part Order of 1. For example, the landmark "James A Haley Veterans Hospital" would have a Complete Landmark Name of "James A Haley Veterans Hospital" in the SiteStructureAddressPoint layer and a single Landmark Name Part of "James A Haley Veterans Hospital" in the LandmarkNamePartTable with a Landmark Name Part Order of "1."

The LandmarkNamePartTable contains all Landmark Name Parts for each Complete Landmark Name in the SiteStructureAddressPoint layer in Section 4.2.1. The LandmarkNamePartTable also contains all Landmark Name Parts for each Complete Landmark Name Alias in the LandmarkNameCompleteAliasTable in Section 4.2.3.2. Each record in the LandmarkNamePartTable MUST have its own NGUID. The NGUID, as with the other respective Unique IDs for each layer, MUST be globally unique.

The SSAP_NGUID in the LandmarkNamePartTable is used to relate the Landmark Name Parts to each Complete Landmark Name in the SiteStructureAddressPoint layer. The CLNA_NGUID in the LandmarkNamePartTable is used to relate the Landmark Name Parts

to each Complete Landmark Name Alias in the LandmarkNameCompleteAliasTable. In the Landmark Name Part methodology described in this document, each Landmark Name Part record will have either the SSAP_NGUID populated or the CLNA_NGUID populated, but not both.

The method of maintaining Landmark Name Parts is illustrated below in Figure 4-5.

NGUID (Primary Key)	SSAP_NGUID (Foreign Key)	CLNA_NGUID (Foreign Key)	LMNamePart	LMNP_Order
urn:emergency:uid:gis: LnmkNamePart: 300:911Authority.fl.us	urn:emergency:uid:gis: SSAP:72:911Authority.fl.us		James A Haley Veterans Hospital	1
urn:emergency:uid:gis: LnmkNamePart: 301:911Authority.fl.us		urn:emergency:uid:gis: LnmkNameCompA: 27:911Authority.fl.us	Veterans Hospital	1
urn:emergency:uid:gis: LnmkNamePart: 302:911Authority.fl.us		urn:emergency:uid:gis: LnmkNameCompA: 28:911Authority.fl.us	Haley Veterans Hospital	1
urn:emergency:uid:gis: LnmkNamePart: 303:911Authority.fl.us		urn:emergency:uid:gis: LnmkNameCompA: 29:911Authority.fl.us	VA Hospital	1
urn:emergency:uid:gis: LnmkNamePart: 411:911Authority.fl.us	urn:emergency:uid:gis: SSAP:75:911Authority.fl.us		University of South Florida	1
urn:emergency:uid:gis: LnmkNamePart: 412:911Authority.fl.us	urn:emergency:uid:gis: SSAP:75:911Authority.fl.us		Sun Dome	2
urn:emergency:uid:gis: LnmkNamePart: 413:911Authority.fl.us		urn:emergency:uid:gis: LnmkNameCompA: 42:911Authority.fl.us	USF	1
urn:emergency:uid:gis: LnmkNamePart: 414:911Authority.fl.us		urn:emergency:uid:gis: LnmkNameCompA: 42:911Authority.fl.us	Sun Dome	2
urn:emergency:uid:gis: LnmkNamePart: 415:911Authority.fl.us		urn:emergency:uid:gis: LnmkNameCompA: 43:911Authority.fl.us	Sun Dome	1

Figure 4-5 Example of a LandmarkNamePartTable for Figure 4-4 and Figure 4-9

Figure 4-5 contains the Landmark Name Parts for the address point in Figure 4-4 with the Complete Landmark Name of "James A Haley Veterans Hospital" as follows:

- "urn:emergency:uid:gis:SSAP:72:911Authority.fl.us" is the SSAP_NGUID (Foreign Key) that relates Landmark Name Part "James A Haley Veterans Hospital" to the Site/Structure address point.
- "urn:emergency:uid:gis:LnmkNameCompA:27:911Authority.fl.us" is the CLNA_NGUID (Foreign Key) that relates Landmark Name Part "Veterans Hospital" to its associated Complete Landmark Name Alias in Figure 4-9.

- "urn:emergency:uid:gis:LnmkNameCompA:28:911Authority.fl.us" is the CLNA_NGUID (Foreign Key) that relates Landmark Name Part "Haley Veterans Hospital" to its associated Complete Landmark Name Alias in Figure 4-9.
- "urn:emergency:uid:gis:LnmkNameCompA:29:911Authority.fl.us" is the CLNA_NGUID (Foreign Key) that relates Landmark Name Part "VA Hospital" to its associated Complete Landmark Name Alias in Figure 4-9.
- Since each Landmark Name Part is the same as its associated Complete Landmark Name or Complete Landmark Name Alias, the Landmark Name Part Order for each is "1."

Figure 4-5 also contains the Landmark Name Parts for the address point in Figure 4-4 with the Complete Landmark Name of "University of South Florida Sun Dome" as follows:

- "urn:emergency:uid:gis:SSAP:75:911Authority.fl.us" is the SSAP_NGUID (Foreign Key) that relates Landmark Name Part "University of South Florida" to the address point and is assigned a Landmark Name Part Order of "1" since it is the first (or leftmost) Landmark Name Part of the Complete Landmark Name "University of South Florida Sun Dome."
- "urn:emergency:uid:gis:SSAP:75:911Authority.fl.us" is the SSAP_NGUID (Foreign Key) that relates Landmark Name Part "Sun Dome" to the address point and is assigned a Landmark Name Part Order of "2" since it is the second Landmark Name Part of the Complete Landmark Name "University of South Florida Sun Dome."

The address point in Figure 4-4 with the Complete Landmark Name of "University of South Florida Sun Dome" also has two Complete Landmark Name Aliases, shown in Figure 4-9 as "USF Sun Dome" and "Sun Dome." The Landmark Name Parts for these two Complete Landmark Name Aliases are contained in Figure 4-5 as follows:

- "urn:emergency:uid:gis:LnmkNameCompA:42:911Authority.fl.us" is the CLNA_NGUID (Foreign Key) that relates Landmark Name Part "USF" to its associated Complete Landmark Name Alias "USF Sun Dome" and is assigned a Landmark Name Part Order of "1" since it is the first (or leftmost) Landmark Name Part of "USF Sun Dome."
- "urn:emergency:uid:gis:LnmkNameCompA:42:911Authority.fl.us" is the CLNA_NGUID (Foreign Key) that relates Landmark Name Part "Sun Dome" to its associated Complete Landmark Name Alias "USF Sun Dome" and is assigned a Landmark Name Part Order of "2" since it is the second Landmark Name Part of "USF Sun Dome."
- "urn:emergency:uid:gis:LnmkNameCompA:43:911Authority.fl.us" is the CLNA_NGUID (Foreign Key) that relates Landmark Name Part "Sun Dome" to its associated Complete Landmark Name Alias "Sun Dome" and is assigned a Landmark Name Part Order of "1" since it is exactly the same as its associated Complete Landmark Name Alias.

4.2.2.2 Landmark Name Parts – Strongly Recommended

Landmark Name Parts data is maintained as a table containing the name or collection of names by which a prominent feature is publicly known. This dataset is referred to as the LandmarkNamePartTable in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. When a landmark is denoted by multiple names in a series, the Landmark Name Part element holds the separate individual names and specifies the order in which the separate Landmark Name Part names SHOULD be combined into a Complete Landmark Name.

Table 4-5 LandmarkNamePartTable

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID (Primary Key)	NGUID	Yes	P	254
Site NENA Globally Unique ID (Foreign Key)	SSAP_NGUID	Conditional	P	254
Complete Landmark Name Alias NENA Globally Unique ID (Foreign Key)	CLNA_NGUID	Conditional	P	254
Landmark Name Part	LMNamePart	Yes	P	150
Landmark Name Part Order	LMNP_Order	Yes	N	1

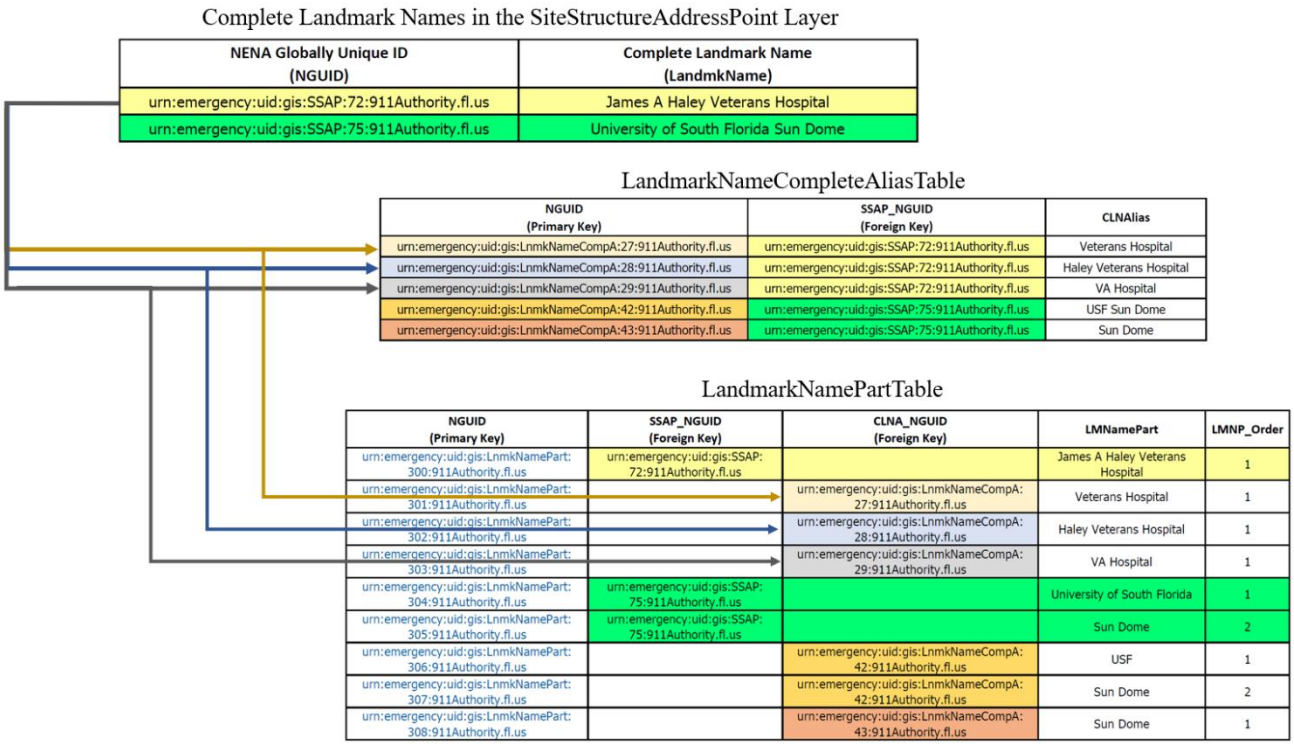
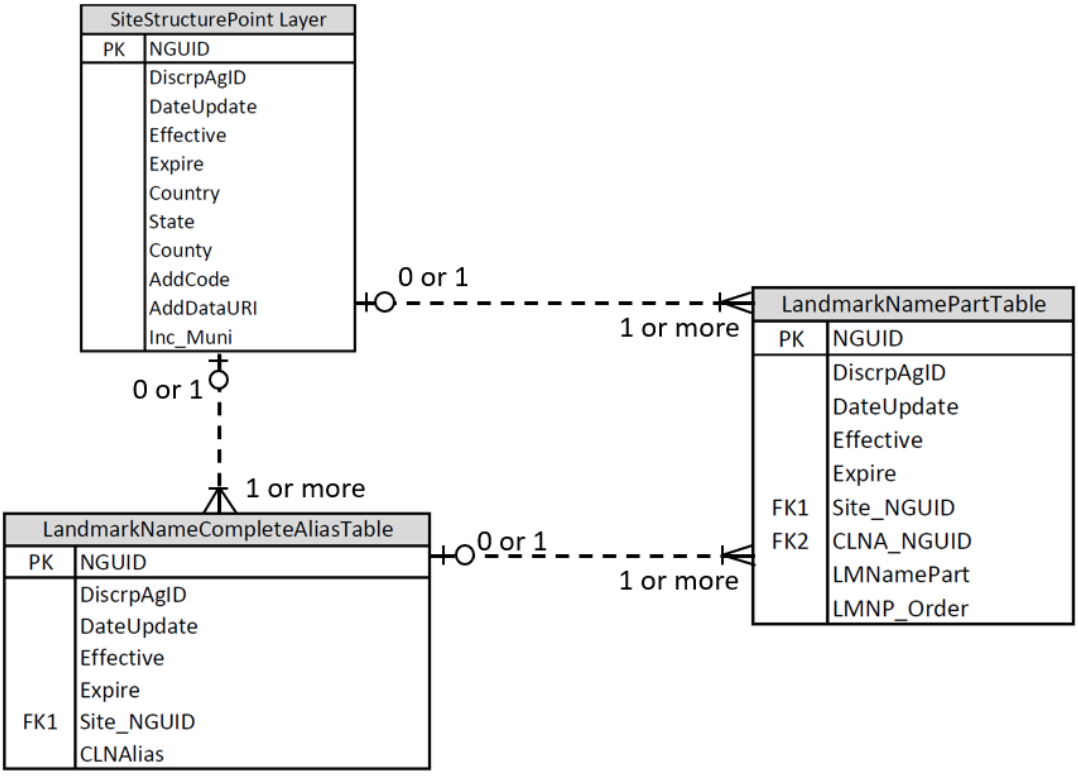


Figure 4-6 Relationship between SiteStructureAddressPoint Layer, LandmarkNameCompleteAliasTable, and LandmarkNamePartTable



PK - Primary keys are used to uniquely identify a row in a database table; no two rows can have the same primary key
FK - A foreign key is defined in a second table, but it refers (matches a primary key in the first table)

Figure 4-7 Graphical Relationship between the SiteStructureAddressPoint Layer, LandmarkNamePartTable, and LandmarkNameCompleteAliasTable

4.2.3 Complete Landmark Name Aliases

4.2.3.1 Complete Landmark Name Alias Methodology

The LandmarkNameCompleteAliasTable contains alias or "also known as" landmark names that are associated with the Complete Landmark Name in the SiteStructureAddressPoint layer. For example, "James A Haley Veterans Hospital" may commonly be known as "Veterans Hospital," "Haley Veterans Hospital," or "VA Hospital."

The LandmarkNameCompleteAliasTable allows for one address to have multiple Complete Landmark Names without having to create an address point for each different Complete Landmark Name. Figure 4-8 below shows the Complete Landmark Names for two address points in the SiteStructureAddressPoint layer. Each address point has a NENA Globally Unique ID (NGUID) assigned to it as a primary key. "James A Haley Veterans Hospital" is the Complete Landmark Name for the address point with the SiteStructureAddressPoint layer NGUID of "urn:emergency:uid:gis:SSAP:72:911Authority.fl.us" and "University of South Florida Sun Dome" is the Complete Landmark Name for the address point with the

SiteStructureAddressPoint layer NGUID of "urn:emergency:uid:gis:SSAP:75:911Authority.fl.us."

NENA Globally Unique ID (NGUID)	Complete Landmark Name (LandmkName)
urn:emergency:uid:gis:SSAP:72:911Authority.fl.us	James A Haley Veterans Hospital
urn:emergency:uid:gis:SSAP:75:911Authority.fl.us	University of South Florida Sun Dome

Figure 4-8 Example of Complete Landmark Names with their NGUIDs in the SiteStructureAddressPoint Layer

The method of maintaining Complete Landmark Name Aliases is illustrated below in Figure 4-9. "Veterans Hospital," "Haley Veterans Hospital," and "VA Hospital" are three alias names for the "James A Haley Veterans Hospital" and would be contained in the LandmarkNameCompleteAliasTable shown in Figure 4-9 below.

NGUID (Primary Key)	SSAP_NGUID (Foreign Key)	CLNAlias
urn:emergency:uid:gis:LnmkNameCompA:27:911Authority.fl.us	urn:emergency:uid:gis:SSAP:72:911Authority.fl.us	Veterans Hospital
urn:emergency:uid:gis:LnmkNameCompA:28:911Authority.fl.us	urn:emergency:uid:gis:SSAP:72:911Authority.fl.us	Haley Veterans Hospital
urn:emergency:uid:gis:LnmkNameCompA:29:911Authority.fl.us	urn:emergency:uid:gis:SSAP:72:911Authority.fl.us	VA Hospital
urn:emergency:uid:gis:LnmkNameCompA:42:911Authority.fl.us	urn:emergency:uid:gis:SSAP:75:911Authority.fl.us	USF Sun Dome
urn:emergency:uid:gis:LnmkNameCompA:43:911Authority.fl.us	urn:emergency:uid:gis:SSAP:75:911Authority.fl.us	Sun Dome

Figure 4-9 Example of a LandmarkNameCompleteAliasTable

Each record in the LandmarkNameCompleteAliasTable MUST have its own NGUID. The NGUID, as with the other respective Unique IDs for each layer, MUST be globally unique. The SSAP_NGUID is used to relate an alias landmark name in the LandmarkNameCompleteAliasTable to its corresponding address point.

In Figure 4-8, "urn:emergency:uid:gis:SSAP:72:911Authority.fl.us" is the Site NGUID that ties together, or relates, the first three Complete Landmark Name Aliases to the address point in Figure 4-9 that has a Complete Landmark Name of "James A Haley Veterans Hospital." "urn:emergency:uid:gis:SSAP:75:911Authority.fl.us" is the SSAP_NGUID that ties together, or relates, the fourth and fifth Complete Landmark Name Aliases to the address point in Figure 4-9 that has a Complete Landmark Name of "University of South Florida Sun Dome."

4.2.3.2 Complete Landmark Name Aliases – Strongly Recommended

Complete Landmark Name Aliases data is maintained as a table containing alternates for the landmark names that are associated with the Complete Landmark Name in the SiteStructureAddressPoint layer. This dataset is referred to as the LandmarkNameCompleteAliasTable in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward.

Table 4-6 LandmarkNameCompleteAliasTable

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID (Primary Key)	NGUID	Yes	P	254
Site NENA Globally Unique ID (Foreign Key)	SSAP_NGUID	Yes	P	254
Complete Landmark Name Alias	CLNAlias	Conditional	P	150

4.3 Service Boundaries

Service Boundaries data is maintained as polygon layers for representing the geographic area for the providers of response services. These layers are collectively referred to as the service boundary layers in NENA documents or individually as the PsapPolygon layer, PolicePolygon layer, FirePolygon layer, and EmsPolygon layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. All other service boundary layers (e.g., CoastGuardPolygon, PoisonControlPolygon) would follow the naming conventions found in NENA-STA-010 [3] GIS Data Layers Registry.

Within the i3 architecture, all service boundary layers follow the same data structure. GIS Data Providers MAY locally maintain these layers as separate or combined. It is important to consult with your NGCS Provider to determine if they have a requirement that each Service Boundary is provisioned as an individual layer, or a consolidated Service Boundary layer (one combined layer for all Service Boundaries). Additionally, confirm if there is a specific requirement for Service Boundary geometry and if they mandate a single versus multipart geometry. Within the ECRF, LVF, MCS, GCS (Geocode Service), and MDS (Mapping Data Service), the PsapPolygon layer is a service boundary. It is listed as a separate layer here, although in every respect it is equivalent to a service boundary with urn:service:sos as its Service URN. It should be noted that the Policy Routing Function of an ESRP (Emergency Service Routing Proxy) may override the predefined PSAP route provided by an ECRF based on certain policies established by the PSAP. The boundary that corresponds to the Service URN urn:service:sos depends on the architecture of the ESInet and deals with how unintentional gaps and overlaps of this layer are handled by the ECRF.

How the ECRF determines what boundary it uses for urn:service:sos is beyond the scope of this document.

4.3.1 Primary PSAP Services – REQUIRED

In an NG9-1-1 deployment, the initial routing of a 9-1-1 call cannot happen without Primary PSAP boundaries. It is the most critical layer and MUST be provided. Its data structure is the same as all service boundary layers defined in this section. All polygons in this layer MUST have a Service URN of urn:service:sos.

The PsapPolygon layer may have one or many PSAP Boundaries contained in the layer. Each PSAP Boundary defines the geographic area of a PSAP that has primary responsibilities for an emergency request. This layer is used by the ECRF to perform a geographic query to determine the PSAP to which an emergency request is routed. An emergency request is routed using the NG9-1-1 Core Services based upon the geographic location of the request, provided by either a civic address, geographic coordinate, or geodetic shapes as defined in NENA-STA-010 [3].

4.3.2 Primary Emergency Services – REQUIRED

In an NG9-1-1 deployment, the selective transfer of 9-1-1 calls and Emergency Incident Data Objects (EIDOs) to another PSAP or downstream agency uses service boundary layers, all with the same data structure.

The following layers (formerly known as Emergency Service Boundaries), which may be maintained as separate or combined, are the next highest priority for NG9-1-1 deployment. Primary Emergency Services MUST include the following:

- Police
- Fire
- Emergency Medical Services

Each of these layers is used by the ECRF to perform a geographic query to determine which agencies are responsible for providing service to a location in the event a selective transfer is desired, or to direct an EIDO to an agency for dispatch, or to display the responsible agencies at the PSAP. In addition, service boundary layers are used by PSAPs to identify the appropriate entities/first responders to be dispatched. Each layer representing a primary emergency service may contain one or more polygon boundaries that define the primary emergency services for that geographic area.

*Note: The service boundary layers described here are intended to represent the entirety of the service boundary of the agencies. In many agencies, the service boundary is broken into smaller areas served by a station/beat/platoon, with the service area of the agency being the union of the smaller areas. The layer can contain a polygon set (more than one polygon), which is intended to cover holes, and disconnected areas of service, which does occur. Because a polygon set is allowed, if this layer had the smaller polygons, if all of

them have the same Service URI and Service URN (but not necessarily the same Display Name, for example), it would work correctly. It has the downside of increasing work on the ECRF since it has more polygons to consider. The SI Operator can advise whether small polygons can be accommodated in any given implementation. A future edition of this document will address this issue and specifically handle station/beat/platoon service areas directly.

4.3.3 Other Services – Strongly Recommended

In an NG9-1-1 deployment, the transfer of 9-1-1 calls uses service boundary layers, all with the same data structure. These agencies may be served by a call center, dispatch center, or other terms.

Other service boundary layers, which may be maintained as separate or combined, MAY include, but are not limited to:

- Poison Control
- Forest Service
- Coast Guard
- Animal Control

4.3.4 Data Structure for each Service Boundary Layer

Table 4-7 Service Boundary Layers

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID (Primary Key)	NGUID	Yes	P	254
Country	Country	No	P	2
State or Equivalent (A1)	State	No	P	2
Agency Identifier	Agency_ID	Yes	P	100
Service URI	ServiceURI	Yes	U	254
Service URN	ServiceURN	Yes	P	50
Service Number	ServiceNum	No	P	15
Agency vCard URI	AVcard_URI	Yes	U	254
Display Name	DsplayName	Yes	P	60

4.4 Provisioning Boundaries – REQUIRED

Provisioning Boundaries data is maintained as a polygon layer for representing the area of GIS data provisioning responsibility, with no unintentional gaps or overlaps. This dataset is commonly referred to as the ProvisioningPolygon layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. The Provisioning Boundary MUST align with data from all adjoining GIS Data Providers.
A Provisioning Boundary can take on a variety of shapes; for example, it may represent the extent of a city, the extent of a county, a region with multiple cities and counties, or possibly the extent of all areas served by a particular PSAP.

When provisioning data for an ECRF and LVF through the SI, a GIS Data Provider MUST only include GIS data within their Provisioning Boundary and MUST ensure the data includes coverage for the entire extent of their Provisioning Boundary. The Spatial Interface Operator will utilize the ProvisioningPolygon layer to ensure that these requirements are met.

Note: The 9-1-1 Authority is ultimately responsible for the GIS data within the area they provide service for.

Table 4-8 ProvisioningPolygon Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID	NGUID	Yes	P	254

4.5 Administrative Units (A1 – A5)

In prior versions of this document, and in common use, we have layers named "State/Province," "County or Equivalent," "Incorporated Municipality," "Unincorporated Community," and "Neighborhood Community." As use of this document expands beyond the typical US experience, these terms are evolving to the PIDF-LO A1, A2, A3, A4, A5 names, respectively. Territories, indigenous person managed lands, military installations, and widespread differences within Canadian naming has shown that using names, even with a few alternative names, does not cover the wide variety of nomenclature for these levels. The PIDF-LO names were created by an international standards organization (IETF) which covers a much wider variation but using the A1 for what was "State/Province," A2 for what was "County or equivalent," A3 for what was "Incorporated Municipality," A4 for what was "Unincorporated Community," and A5 for what was "Neighborhood Community" is seen as a better choice.

4.5.1 States or Equivalents (A1) – Strongly Recommended

States or Equivalents (A1) data is maintained as a polygon layer for representing the geographic area of a state, province, or other top-level subdivision of the larger country corresponding to PIDF-LO element A1. This dataset is referred to as the A1Polygon layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward.

Table 4-9 A1Polygon Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Country	Country	Yes	P	2
State or Equivalent (A1)	State	Yes	P	2

4.5.2 Counties or Equivalents (A2) – Strongly Recommended

Counties or Equivalents (A2) data is maintained as a polygon layer for representing the geographic area of a county, parish, province, or other subdivision of the larger country corresponding to PIDF-LO element A2. This dataset is referred to as the A2Polygon layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. This layer may be useful for addressing and emergency response.

Table 4-10 A2Polygon Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Country	Country	Yes	P	2
State or Equivalent (A1)	State	Yes	P	2
County or Equivalent (A2)	County	Yes	P	100

4.5.3 Incorporated Municipalities (A3) – Strongly Recommended

Incorporated Municipalities (A3) data is maintained as a polygon layer for representing the geographic area of a city, town, village, or other subdivision of the larger country

corresponding to PIDF-LO element A3. This dataset is referred to as the A3Polygon layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. This layer may be useful for addressing and emergency response.

Table 4-11 A3Polygon Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Country	Country	Yes	P	2
State or Equivalent (A1)	State	Yes	P	2
County or Equivalent (A2)	County	Yes	P	100
Additional Code	AddCode	Conditional	P	6
Incorporated Municipality (A3)	Inc_Muni	Yes	P	100

4.5.4 Unincorporated Communities (A4) – Strongly Recommended

Unincorporated Communities (A4) data is maintained as a polygon layer for representing the geographic area of a borough, ward, or other subdivision of the larger country (e.g., United States; Canada) corresponding to PIDF-LO element A4. This dataset is referred to as the A4Polygon layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. This layer may be useful for addressing and emergency response.

Table 4-12 A4Polygon Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Country	Country	Yes	P	2
State or Equivalent (A1)	State	Yes	P	2
County or Equivalent (A2)	County	Yes	P	100
Additional Code	AddCode	Conditional	P	6
Incorporated Municipality (A3)	Inc_Muni	Yes	P	100
Unincorporated Community (A4)	Uninc_Comm	Yes	P	100

4.5.5 Neighborhood Communities (A5) – Strongly Recommended

Neighborhood Communities (A5) data is maintained as a polygon layer for representing the geographic area of a neighborhood, commercial area, or other subdivision of the larger country (e.g., United States; Canada) corresponding to PIDF-LO element A5. This dataset is referred to as the A5Polygon layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. The most intuitive way to refer to a place is often by the neighborhood name. Locations of similar sounding street names may be resolved when the neighborhood name is known. This layer is often beneficial to telecommunicators.

Table 4-13 A5Polygon Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Effective Date	Effective	No	D	-
Expiration Date	Expire	No	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Country	Country	Yes	P	2
State or Equivalent (A1)	State	Yes	P	2
County or Equivalent (A2)	County	Yes	P	100
Additional Code	AddCode	Conditional	P	6
Incorporated Municipality (A3)	Inc_Muni	Yes	P	100
Unincorporated Community (A4)	Uninc_Comm	Conditional	P	100
Neighborhood Community (A5)	Nbrhd_Comm	Yes	P	100

4.6 Railroads – Recommended

Railroads data is maintained as a line layer for representing the centerline of a real-world rail line. This dataset is referred to as the RailroadCenterLine layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. A database structure crosswalk between this model and the United States Federal Railroad Administration's Rail Lines database is in Appendix A of this document. A database structure crosswalk between this model and Canada's National Railway Network database is in Appendix B of this document.

Table 4-14 RailroadCenterLine Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Rail Line Owner	RLOwn	Conditional	P	100
Rail Line Operator	RLOp	Conditional	P	100
Rail Line Name	RLName	No	P	100
Rail Mile Post Low	RMPL	No	F	-
Rail Mile Post High	RMPH	No	F	-

4.7 Hydrology

4.7.1 Hydrology Lines – Recommended

Hydrology data is maintained as a line layer for representing creeks, streams, rivers, and other linear water features. This dataset is referred to as the HydrologyLine layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. A database structure crosswalk between this model and the United States Geological Survey's National Hydrography Dataset (NHD) database is in Appendix C of this document. A database structure crosswalk between this model and Canada's National Hydrographic Network database is in Appendix D of this document.

Table 4-15 HydrologyLine Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Hydrology Segment Type	HS_Type	No	P	100
Hydrology Segment Name	HS_Name	No	P	100

4.7.2 Hydrology Polygons – Recommended

Hydrology data is maintained as a polygon layer for representing areal water body features. This dataset is referred to as the HydrologyPolygon layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. A database structure crosswalk between this model and the United States Geological Survey's National Hydrography Dataset (NHD) database is in Appendix C of this document. A database

structure crosswalk between this model and Canada's National Hydrographic Network database is in Appendix D of this document.

Table 4-16 HydrologyPolygon Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Hydrology Polygon Type	HP_Type	No	P	100
Hydrology Polygon Name	HP_Name	No	P	100

4.8 Cell Sectors – Recommended

Cell Sectors data is maintained as a point layer for representing the point location for each cell sector as agreed to between the wireless operator and the 9-1-1 Authorities associated with each cell sector. This dataset is referred to as the CellSectorPoint layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward.

The location information received with a Phase 1 response for a call comes from the wireless routing spreadsheet agreed to between the 9-1-1 Authority and the wireless operator. That information may not be representative of the location of the caller. In some circumstances, PSAPs are able to obtain an approximation of the coverage area of a cell sector from the carrier. This layer is used, when the data is available, to indicate to the telecommunicator the approximate area where the caller may be located. Since the only Phase 1 information received with the call comes from the wireless routing spreadsheet, that location must be unique enough to find the right record in this layer.

The location of the cell sector may provide a gross level of information to the telecommunicator. If provided by the Mapping Data Service to an out of area PSAP, this capability is even more important when receiving a Phase 1 wireless call.

For more information, see the NENA Wireless Call Routing & Testing Validation Standard 57-002 [16].

In NG9-1-1, wireless operators will introduce the concept of an "Associated Location" which is an address or point agreed to between the wireless operator and the 9-1-1 Authorities associated with each cell sector. The Associated Location is chosen so that calls from that sector will route to the appropriate PSAP.

Table 4-17 CellSectorPoint Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
Country	Country	Yes	P	2
State or Equivalent (A1)	State	Yes	P	2
County or Equivalent (A2)	County	Yes	P	100
NENA Globally Unique ID (Primary Key)	NGUID	Yes	P	254
Site ID	Site_ID	Conditional	P	10
Sector ID	Sector_ID	Yes	P	4
Switch ID	Switch_ID	Conditional	P	10
Market ID	CMarket_ID	Conditional	P	10
Cell Site ID	CSite_Name	Conditional	P	10
ESRD or First ESRK	ESRD_ESRK	Conditional	N	10
Last ESRK	ESRK_Last	Conditional	N	10
Sector Orientation	CSctr_Ornt	Yes	P	4
Technology	Technology	Yes	P	10
Site NENA Globally Unique ID (Foreign Key)	SSAP_NGUID	No	P	254
Longitude	Longitude	Conditional	F	-
Latitude	Latitude	Conditional	F	-

4.9 Location Markers – Recommended

Location Markers data is maintained as a point layer for a marker geospatially. These may represent a numeric measurement of a point along a route, such as a mile marker, or may be a separate feature, such as a billboard or buoy. This dataset is referred to as the LocationMarkerPoint layer in the GIS Data Layers Registry in NENA-STA-010 [3] and in NENA documents going forward. Location markers may also be represented as address points, if required for ECRF and LVF purposes.

Table 4-18 LocationMarkerPoint Layer

Descriptive Name	Field Name	Required	Type	Field Width
Discrepancy Agency ID	DiscrpAgID	Yes	P	100
Date Updated	DateUpdate	Yes	D	-
NENA Globally Unique ID	NGUID	Yes	P	254
Location Marker Unit of Measurement	LM_Unit	Conditional	P	15
Location Marker Measurement Value	LM_Value	Conditional	F	-
Location Marker Route Name	LM_Rte	Conditional	P	100
Location Marker Label	LM_Label	Conditional	P	100
Location Marker Type	LM_Type	Conditional	P	15
Location Marker Indicator	LM_Ind	Yes	P	1

5 Detailed Description of Field Names and Associated Attribute Data

Each of the Field Names given in the tables in Section 4, GIS Data Model Layers, are listed in alphabetical order below. Each Field Name has a description, attribute data domain, and an example. For details on case sensitivity, please refer to section 2.5 Case Sensitivity.

An attribute data domain defines the set of all valid values that are allowed in the attribute data field. If the domain is none, then any value that matches the data type and description MAY be used for the attribute field. Those with a given data domain MUST use only those values with the domain given. Web links in the examples are for illustrative purposes.

5.1 Additional Code

Description: A code that specifies a geographic area. Used in Canada to hold a Standard Geographical Classification code; it differentiates two municipalities with the same name in a province that does not have counties.
Domain: Statistics Canada, Standard Geographical Classification 2011, Volume I, Statistical Area Classification by Province and Territory – Variant of SGC 2016 at https://www.statcan.gc.ca/eng/subjects/standard/sgc/2016/index
Example: 3318013; 5926005

5.2 Additional Code Left

Description: The Additional Code on the Left side of the road segment relative to the FROM Node.
Domain: See Additional Code
Example: 4611040; 6106023

5.3 Additional Code Right

Description: The Additional Code on the Right side of the road segment relative to the FROM Node.
Domain: See Additional Code
Example: 5926005; 4711066

5.4 Additional Data URI

Description: URI(s) for additional data associated with the address point. This attribute is contained in the SiteStructureAddressPoint layer and will define the Service URI of additional information about a location, including building information (blueprints, contact info, floor plans, etc.).
Domain: List of one or more URIs
Example: https://addl68603.example.com

5.5 Additional Location Information

Description: A part of a sub-address that is not a Building, Floor, Unit, Room, or Seat.
Domain: None
Example: Pediatric Wing; Loading Dock; Concourse B; Gate B27; Corridor 5

5.6 Address Number

Description: The numeric identifier of a location along a thoroughfare or within a defined community.
Domain: Whole numbers from 0 to 999999
Example: "1600" in "1600 Pennsylvania Avenue"
Note: The Address Number MUST be a whole number. This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.7 Address Number Prefix

Description: An extension of the Address Number that precedes it and further identifies a location along a thoroughfare or within a defined area.
Domain: None
Example: "75-" in "75-6214 Kailua Place"; "3W2N-" in "3W2N-4551"
Note: The Address Number Prefix contains any alphanumeric characters, punctuation, and spaces preceding the Address Number. This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.8 Address Number Suffix

Description: An extension of the Address number that follows it and further identifies a location along a thoroughfare or within a defined area.
Domain: None
Example: "B" in "223B Jay Avenue"; "½" in 119½ Elm Street"
Note: This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.9 Agency Identifier

Description: A Domain Name System (DNS) domain name which is used to uniquely identify an agency. An agency is represented by a fully qualified domain name as defined in NENA-STA-010 [3]. In order to correlate actions across a wide range of calls and incidents, each agency MUST use one domain name consistently. Any domain name in the public DNS is acceptable so long as each distinct agency uses a different domain name. This ensures that each agency identifier is globally unique.
Domain: Fully qualified domain name
Example: psap.harriscounty.tx.us; police.allegheny.pa.us; newbrunswick.ca; flctnecd.gov
Note: The Agency Identifier is a field in service boundary layers which identifies the agency the boundary defines. It is also used in the Emergency Incident Data Object, the Service/Agency Locator, and MUST be used in constructing NGUIDs.

5.10 Agency vCard URI

Description: A vCard is a file format standard for electronic business cards. The Agency vCard URI is the internet address of JavaScript Object Notation (JSON) data structure which contains contact information (Name of Agency, Contact phone numbers, etc.) in the form of a jCard (RFC 7095). The vCard URI is used in the service boundary layers to provide contact information for that agency. The Agency Locator (see NENA-STA-010 [3]) provides these URIs for Agencies listed in it.
Domain: None
Example: https://vcard.psap.allegheny.pa.us; https://jcard.houstontx.gov/fire
Note: This field will be considered for deletion in a future version of this document to align with future changes in NENA-STA-010 [3].

5.11 Alias Street Name

Description: An alias street name associated with the road centerline segment in the RoadCenterLine layer. The alias street name does not include any street types, directionals, or modifiers. If an alias street name is used in the StreetNameAliasTable this field MUST be populated.
Domain: None
Example: "Scenic" in the Alias Street Name "Scenic Boulevard"

5.12 Alias Street Name Post Directional

Description: A word following the Street Name element that indicates the direction taken by the road from an arbitrary starting point or line, or the sector where it is located.
Domain: North; South; East; West; Northeast; Northwest; Southeast; Southwest; Nord; Sud; Est; Ouest; Nord-Est; Nord-Ouest; Sud-Est; Sud-Ouest; or equivalent words in other languages.
Example: "West" in the Alias Street Name "Foley Street West"; "Ouest" in "Boulevard Jean-Talon Ouest"

5.13 Alias Street Name Post Modifier

Description: A word or phrase that follows and modifies the Alias Street Name element, but is separated from it by an Alias Street Name Post Type or an Alias Street Name Post Directional or both.
Domain: None
Example: **"**Bypass" in the Alias Street Name "Loop 601 North Bypass"

5.14 Alias Street Name Post Type

Description: A word or phrase that follows the Alias Street Name element and identifies a type of thoroughfare in a complete alias street name.
Domain: Restricted to values found in the "NENA Registry of Street Name Pre Types and Street Name Post Types" or combinations thereof at: http://technet.nena.org/nrs/registry/StreetNamePreTypesAndStreetNamePostTypes.xml
Example: "Avenue" in the Alias Street Name "Fashion Avenue"; "Rue" in "48e Rue Ouest"

5.15 Alias Street Name Pre Directional

Description: A word preceding the Alias Street Name element that indicates the direction taken by the road from an arbitrary starting point or line, or the sector where it is located.
Domain: North; South; East; West; Northeast; Northwest; Southeast; Southwest; Nord; Sud; Est; Ouest; Nord-Est; Nord-Ouest; Sud-Est; Sud-Ouest; or equivalent words in other languages.
Example: "North" in the Alias Street Name "North Commerce Street"

5.16 Alias Street Name Pre Modifier

Description: A word or phrase that precedes and modifies the Alias Street Name element but is separated from it by an Alias Street Name Pre Type or an Alias Street Name Pre Directional or both.
Domain: None
Example: "Alternate" in the Alias Street Name "Alternate Route 8"

5.17 Alias Street Name Pre Type

Description: A word or phrase that precedes the Alias Street Name element and identifies a type of thoroughfare in a complete street name.
Domain: Restricted to values found in the "NENA Registry of Street Name Pre Types and Street Name Post Types" or combinations thereof at: http://technet.nena.org/nrs/registry/StreetNamePreTypesAndStreetNamePostTypes.xml
Example: "Avenue" in the Alias Street Name "Avenue C";
"County Road" in the Alias Street Name "County Road 12";
"Avenue" in the Alias Street Name "Avenue of the Americas";
"Chemin" in "Chemin de la Canardière";
"Rue" in "Rue Principale"

5.18 Alias Street Name Pre Type Separator

Description: A preposition or prepositional phrase between the Alias Street Name Pre Type and the Alias Street Name. This element is defined in the CLDXF Standard, NENA-STA-004 [4], as a US specific extension of PIDF-LO per RFC 6848 [7].
Domain: Restricted to values found in the "NENA Registry of Street Name Pre Type Separators" at:
http://technet.nena.org/nrs/registry/StreetNamePreTypeSeparators.xml
Example: "in the" in the Alias Street Name "Circle in the Woods"; "du" in "Rue du Petit-Champlain"

5.19 Building

Description: One among a group of buildings that have the same address number and complete street name.
Domain: None
Example: Building A; Building 4

5.20 Cell Site ID

Description: Name provided by the wireless service provider on the wireless routing sheet, usually unique to the cell site.
Domain: None
Example: 234-1; HX0441-4412

5.21 Complete Landmark Name

Description: The name by which a prominent site/structure is publicly known.
Domain: None
Example: Empire State Building; The Alamo; South Central High School; Kirkwood Mall; James A Haley Veterans Hospital; University of South Florida Sun Dome
Note: Landmarks may or may not be associated with a civic address. There are two landmark name elements: Landmark Name Part and Complete Landmark Name. Within a record, Landmark Name Part MAY occur multiple times, while Complete Landmark Name MAY occur only once. When a landmark is denoted by multiple names in a series (such as "University of South Florida" and "Sun Dome," an arena on the university campus), the Landmark Name Part element holds the separate individual names, and the Complete Landmark Name holds the complete combination. The Landmark Name Part element also allows specification of the order in which the separate names SHOULD be combined into the complete name. This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.22 Complete Landmark Name Alias

Description: An alias or alternate name by which a prominent site/structure is publicly known.
Domain: None
Example: JFK Library; SUNY Buffalo; Veterans Hospital; VA Hospital; USF Sun Dome; Sun Dome
Note: Landmarks may or may not be associated with a civic address.

5.23 Complete Landmark Name Alias NENA Globally Unique ID (Foreign Key)

Description: The Complete Landmark Name Alias NENA Globally Unique ID (CLNA_NGUID) is used in the LandmarkNamePartTable as a foreign key relationship between the LandmarkNamePartTable and the LandmarkNameCompleteAliasTable. A foreign key acts as a cross-reference between the CLNA_NGUID field in the LandmarkNamePartTable because it references the NGUID field primary key in the LandmarkNameCompleteAliasTable, thereby establishing a link between them. A record in the LandmarkNameCompleteAliasTable may have one to many (1:M) LandmarkNamePartTable records. Without this relationship, it would not be possible to identify any landmark name parts associated with a LandmarkNameCompleteAliasTable record. The values in the CLNA_NGUID field MUST exist in the values of the NGUID field in the LandmarkNameCompleteAliasTable layer.
Domain: None
Example: "urn:emergency:uid:gis:clna:1:city911.fl.us" value in the LandmarkNameCompleteAliasTable NGUID would appear in all related alias records in the CLNA_NGUID field of the LandmarkNamePartTable.

5.24 Country

Description: The name of a country represented by its two-letter ISO 3166-1 English country alpha-2 code elements in UPPER CASE letters.
Domain: Restricted to the two-letter designations provided in ISO 3166-1.
Example: "US" for the United States of America; "CA" for Canada

5.25 Country Left

Description: The name of the Country on the Left side of the road segment relative to the FROM Node, represented by its two-letter ISO 3166-1 English country alpha-2 code elements in UPPER CASE letters.
Domain: Restricted to the two-letter designations provided in ISO 3166-1.
Example: "US" for the United States of America; "CA" for Canada

5.26 Country Right

Description: The name of the Country on the Right side of the road segment relative to the FROM Node, represented by its two-letter ISO 3166-1 English country alpha-2 code elements in UPPER CASE letters.
Domain: Restricted to the two-letter designations provided in ISO 3166-1.
Example: "US" for the United States of America; "MX" for Mexico

5.27 County or Equivalent (A2)

Description: The name of a County or County-equivalent where the address is located. A county (or its equivalent) is the primary legal division of a state or territory.
Domain: Restricted to the names of counties and county equivalents. For the US, a complete list is maintained by the US Census Bureau as ANSI INCITS 31:2009 [17] (Formerly FIPS 6-4) and the Domain is restricted to the exact listed values as published in ANSI INCITS 31:2009 [17], including casing and use of abbreviations.
Example: Washington County; Kenai Peninsula Borough; Jefferson Parish; Carson City; Falls Church city; District of Columbia
Note: The following clarifications are provided directly from the CLDXF Standard, NENA-STA-004 [4]:

- County equivalents include parishes (LA), boroughs and census areas (AK), federal district (DC), independent cities (VA, MD, MO, NV), municipios (PR), and districts (AS, GU, MP, VI).
- The county name or county equivalent name indicates location, not jurisdiction. Many counties include federal, state, tribal, and other lands within which county government powers, including powers to name roads and assign address numbers, may be limited or superseded by other government bodies. Indicating who has what jurisdiction at a given address is well beyond the scope or intent of this standard.
- FIPS Codes have been superseded, renamed, and updated by the InterNational Committee for Information Technology Standards (INCITS) and can be found at: https://www.census.gov/library/reference/code-lists/ansi.html.

5.28 County or Equivalent Left (A2)

Description: The name of a County or County-equivalent on the Left side of the road segment relative to the FROM Node. A county (or its equivalent) is the primary legal division of a state or territory.
Domain: See County
Example: St. Louis County; Adams County

5.29 County or Equivalent Right (A2)

Description: The name of a County or County-equivalent on the Right side of the road segment relative to the FROM Node. A county (or its equivalent) is the primary legal division of a state or territory.
Domain: See County
Example: St. Johns County; DeSoto County; Doña Ana County

5.30 Date Updated

Description: The date and time that the record was created or last modified. This value MUST be populated upon modifications to attributes, geometry, or both.
Domain: Date and Time may be stored in the local database date/time format with the proviso that local time zone MUST be recorded and time MUST be recorded to a precision of at least 1 second and MAY be recorded to a precision of 0.1 second. If the local database date/time format does not meet these specifications, the database SHOULD record both the local date/time format and a string conforming to W3C dateTime format as described in XML Schema Part 2: Datatypes Second Edition [15].
Example: (of a W3C dateTime with optional precision of .1 second)
2017-12-21T17:58.03.1-05:00 (representing a record updated on December 21, 2017 at 5:58 and 3.1 seconds PM US Eastern Standard Time);
2017-07-11T08:31:15.2-04:00 (representing a record updated on July 11, 2017 at 8:31 and 15.2 seconds AM US Eastern Daylight Time)

5.31 Discrepancy Agency ID

Description: Agency that receives a Discrepancy Report (DR), should a discrepancy be discovered, and will take responsibility for ensuring discrepancy resolution. This may or may not be the same as the 9-1-1 Authority. This MUST be represented by a domain name that is an Agency Identifier as defined in the NENA Master Glossary of 9-1-1 Terminology, NENA-ADM-000 [1].
Domain: None
Example: Vermont911.vt.us.gov; nct911.dst.tx.us

5.32 Display Name

Description: A description or "name" of the service provider that offers services within the area of a Service Boundary. This value MUST be suitable for display.
Domain: None
Example: New York Police Department; Med-Life Ambulance Services

5.33 Effective Date

Description: The date and time that the record is scheduled to take effect.
Domain: Date and Time may be stored in the local database date/time format with the proviso that local time zone MUST be recorded and time MUST be recorded to a precision of at least 1 second and MAY be recorded to a precision of 0.1 second. If the local database date/time format does not meet these specifications, the database SHOULD record both the local date/time format and a string conforming to W3C dateTime format as described in XML Schema Part 2: Datatypes Second Edition [15].
Example: (of a W3C dateTime with optional precision of .1 second) 2017-02-18T02:30:00.1-05:00 (representing a record that will become active on February 18, 2017 at 2:30 and 0.1 seconds AM US Eastern Standard Time); 2017-10-09T13:01:35.2-04:00 (representing a record that will become active on October 9, 2017 at 1:01 and 35.2 seconds PM US Eastern Daylight Time)
Note: This field is used when time and date of a change is known. For example, the time and date an annexation takes effect.

5.34 Elevation

Description: The elevation, given in meters above a reference surface defined by the coordinate system, associated with the site/structure address.
Domain: Restricted to whole numbers.
Example: "68" representing the elevation (in meters) associated with the address "123 Main Street, Suite 401"
Note: WGS84 (GPS) elevation is measured as height above the ellipsoid, which varies significantly from height above the geoid (approximately Mean Sea Level).

5.35 ESN

Description: A 3-5 character numeric string that represents one or more Emergency Service Zones (ESZ).
Domain: Characters from 000 to 99999
Example: 54321; 120; 001
Note: An ESZ is not necessarily the same as a Service Boundary as outlined in this document. ESN is used for routing in Legacy Systems. This field may also provide backward compatibility with legacy map displays and Computer Aided Dispatch (CAD) systems.

5.36 ESN Left

Description: The Emergency Service Number (ESN) on the Left side of the road segment relative to the FROM Node.
Domain: Characters from 000 to 99999
Example: 5422; 124; 005

5.37 ESN Right

Description: The Emergency Service Number (ESN) on the Right side of the road segment relative to the FROM Node.
Domain: Characters from 000 to 99999
Example: 5423; 125; 007

5.38 ESRD or first ESRK

Description: Pseudo ANI, for the Emergency Service Routing Digit (ESRD) or the Emergency Service Routing Key (ESRK) as provided on the wireless providers wireless routing spreadsheet.
Domain: 10-digit whole numbers
Example: 5121112123
Note: ESRDs and ESRKs are used for 10-digit routing in Legacy Systems and are not used in a fully transitioned NG9-1-1 implementation that does not include legacy emergency service gateways. For more information, see the NENA Wireless Call Routing & Testing Validation Standard 57-002 [16].

5.39 Expiration Date

Description: The date and time when the information in the record is no longer considered valid.
Domain: Date and Time may be stored in the local database date/time format with the proviso that local time zone MUST be recorded and time MUST be recorded to a precision of at least 1 second and MAY be recorded to a precision of 0.1 second. If the local database date/time format does not meet these specifications, the database SHOULD record both the local date/time format and a string conforming to W3C dateTime format as described in XML Schema Part 2: Datatypes Second Edition [15].
Example: (of a W3C dateTime with optional precision of .1 second)
2017-02-18T02:30:00.1-05:00 (representing a record that will expire and no longer be valid on February 18, 2017 at 2:30 and 0.1 seconds AM US Eastern Standard Time);
2017-10-09T13:01:35.2-04:00 (representing a record that will expire and no longer be valid on October 9, 2017 at 1:01 and 35.2 seconds PM US Eastern Daylight Time)
Note: This field is used when the time and date of a change is known. For example, the time and date an annexation takes effect and the previous boundary is retired.

5.40 Floor

Description: A floor, story, or level within a building.
Domain: None
Example: Floor 5; 5th Floor; Mezzanine

5.41 Hydrology Polygon Name

Description: Name of a lake, pond, waterway, or similar body of water.
Domain: None
Example: Mirror Lake; intracoastal waterway

5.42 Hydrology Polygon Type

Description: Type of water body.
Domain: None
Example: lake; pond; stream; river

5.43 Hydrology Segment Name

Description: The name of a creek, stream, river, or similar linear water feature.
Domain: None
Example: Willow Creek; Red River

5.44 Hydrology Segment Type

Description: The type of surface water.
Domain: None
Example: stream; river

5.45 Incorporated Municipality

Description: The name of the Incorporated Municipality or other general-purpose local governmental unit (if any) where the address is located.
Domain: None; however, use "Unincorporated" if the address is not within an incorporated local government.
Example: Southlake; Alpine; Yellowknife; Unincorporated

5.46 Incorporated Municipality Left

Description: The name of the Incorporated Municipality or other general-purpose local governmental unit (if any), on the Left side of the road segment relative to the FROM Node.
Domain: None; however, use "Unincorporated" if the address is not within an incorporated local government.
Example: Lexington; Columbus; Mont-Saint-Grégoire; Unincorporated

5.47 Incorporated Municipality Right

Description: The name of the Incorporated Municipality or other general-purpose local governmental unit (if any), on the Right side of the road segment relative to the FROM Node.
Domain: None; however, use "Unincorporated" if the address is not within an incorporated local government.
Example: Tampa; Yonkers; Toronto; Unincorporated

5.48 Landmark Name Part

Description: The name or collection of names by which a prominent feature is publicly known. This element is defined in the CLDXF Standard, NENA-STA-004 [4], as a US-specific extension of PIDF-LO per RFC 6848 [7].
Domain: None
Example: University of South Florida; Sun Dome (a part of University of South Florida Sun Dome)
Note: There are two landmark name elements: Landmark Name Part and Complete Landmark Name. Within a record, Landmark Name Part MAY occur multiple times, while Complete Landmark Name MAY occur only once. When a landmark is denoted by multiple names in a series (such as "University of South Florida" and "Sun Dome," an arena on the university campus), the Landmark Name Part element holds the separate individual names, and the Complete Landmark Name holds the complete combination. The Landmark Name Part element also allows specification of the order in which the separate names SHOULD be combined into the complete name. This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.49 Landmark Name Part Order

Description: The order in which to concatenate Landmark Name Parts where 1 is the first (or leftmost) Landmark Name Part, 2 is the second Landmark Name Part, 3 is the third Landmark Name Part, etc.
Domain: Whole numbers starting at 1
Example: 1; 2; 3

5.50 Last ESRK

Description: The last 10-digit number in the Emergency Service Routing Key (ESRK) pseudo ALI range.
Domain: 10-digit whole numbers
Example: 5121112130
Note: Used for 10-digit routing in Legacy Systems and is not used in a fully transitioned NG9-1-1 implementation that does not include legacy emergency service gateways.

5.51 Latitude

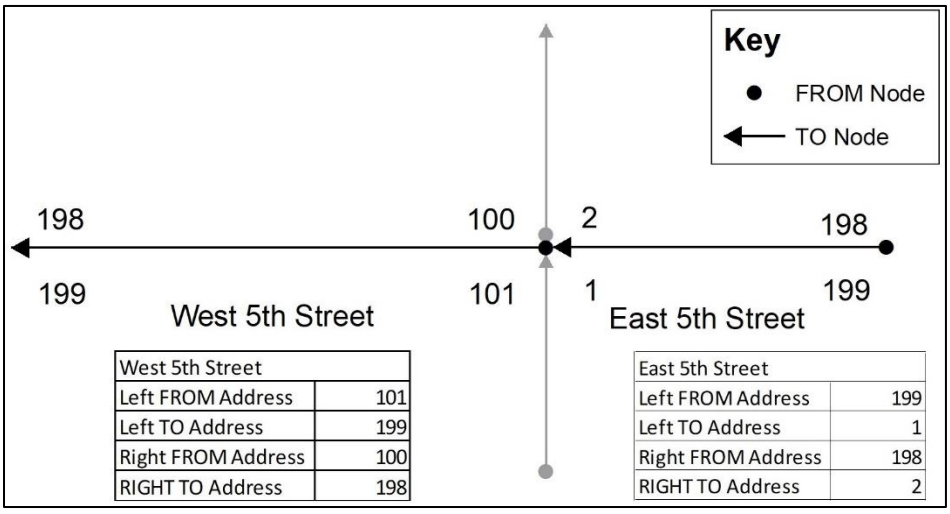
Description: The angular distance of a location north or south of the equator as defined by the coordinate system, expressed in decimal degrees.
Domain: +90 degrees to -90 degrees
Example: 80.868686

5.52 Left Address Number Prefix

Description: An extension of the Address Number that precedes it and further identifies a location along a thoroughfare or within a defined area, on the Left side of the road segment relative to the FROM Node. It contains any alphanumeric characters, punctuation, and spaces preceding the Left FROM Address and Left TO Address.
Domain: None
Example: "101-" in "101-123 Grid Drive"; "N" in "N46999 Holden Road"; "0" in "012 Portland D"

5.53 Left FROM Address

Description: In the RoadCenterLine layer, each feature has a begin point and an endpoint. The FROM Node is the begin point while the TO Node is the endpoint. Each has a left side and a right side relative to a begin node and an end node. The Left FROM address is the address number on the Left side of the road segment relative to the FROM Node.
Domain: Whole numbers from 0 to 999999
Example: See Figure 5-1 below
Note: This address can be higher than the Left TO Address



West 5th Street	
Left FROM Address	101
Left TO Address	199
Right FROM Address	100
RIGHT TO Address	198

East 5th Street	
Left FROM Address	199
Left TO Address	1
Right FROM Address	198
RIGHT TO Address	2

Figure 5-1 Example of Left FROM and Left TO Addresses

5.54 Left TO Address

Description: In the RoadCenterLine layer, each feature has a begin point and an endpoint. The FROM Node is the begin point while the TO Node is the endpoint. Each has a left side and a right side relative to a begin node and an end node. The Left TO address is the address number on the Left side of the road segment relative to the TO Node.

Domain: Whole numbers from 0 to 999999
Example: See Figure 5-1 above
Note: This address can be lower than the Left FROM Address.

5.55 Legacy Street Name

Description: The street name as it currently exists in the MSAG. Ideally this is the name as assigned by the local addressing authority. However, it is imperative that the content of the "Legacy Street Name" field in the GIS data and the content of the "Street Name" field in the MSAG are identical. If there are discrepancies, one of these two databases (GIS and/or MSAG) MUST be updated to match the other.
Domain: None
Example: "STATE" in "STATE ST"; "ELMWOOD" in "N ELMWOOD AVE"
Note: This field is included in the GIS Data Model primarily for use with the MCS. Attributes in this field MUST match the corresponding field in the MSAG to ensure civic locations are accurately converted and stored as PIDF-LO for use in NG9-1-1 systems. This field may also provide backward compatibility with legacy map displays and Computer Aided Dispatch (CAD) systems.

5.56 Legacy Street Name Post Directional

Description: The trailing street direction suffix as it currently exists in the MSAG. Ideally this is the street name post directional as assigned by the local addressing authority. However, it is imperative that the content of the "Legacy Street Name Post Directional" field in the GIS data and the "Post Directional" field in the MSAG are identical. If there are discrepancies, one of these two databases (GIS and/or MSAG) MUST be updated to match the other.
Domain: N; S; E; W; NE; NW; SE; SW; O; NO; SO; or equivalent abbreviations in other languages.
Example: "E" in "CHURCH ST E"; "O" in "JEAN TALON BD O"
Notes:

- The domain values "O," "NO," and "SO" are the French equivalent abbreviations for "West," "Northwest," and "Southwest."
- This field is included in the GIS Data Model primarily for use with the MCS. Attributes in this field MUST match the corresponding field in the MSAG to ensure civic locations are accurately converted and stored as PIDF-LO for use in NG9-1-1 systems. This field may also provide backward compatibility with legacy map displays and Computer Aided Dispatch (CAD) systems.

5.57 Legacy Street Name Pre Directional

Description: The leading street direction prefix as it currently exists in the MSAG. Ideally this is the street name pre directional as assigned by the local addressing authority. However, it is imperative that the "Legacy Street Name Pre Directional" field in the GIS data and the "Prefix Directional" field in the MSAG are identical. If there are discrepancies, one of these two databases (GIS and/or MSAG) MUST be updated to match the other.
Domain: N; S; E; W; NE; NW; SE; SW; O; NO; SO; or equivalent abbreviations in other languages.
Example: "S" in "S PINE AVE"
Notes:

- The domain values "O," "NO," and "SO" are the French equivalent abbreviations for "West," "Northwest," and "Southwest."
- This field is included in the GIS Data Model primarily for use with the MCS. Attributes in this field MUST match the corresponding field in the MSAG to ensure civic locations are accurately converted and stored as PIDF-LO for use in NG9-1-1 systems. This field may also provide backward compatibility with legacy map displays and Computer Aided Dispatch (CAD) systems.

5.58 Legacy Street Name Type

Description: The valid street abbreviation as it currently exists in the MSAG. Ideally this is the street name type as assigned by the local addressing authority. However, it is imperative that the "Legacy Street Name Type" in the GIS data and the "Street Suffix" field in the MSAG are identical. If there are discrepancies, one of these two databases (GIS and/or MSAG) MUST be updated to match the other.
Domain: None
Example: "ST" for "STREET"; "STR" for "STREET"; "BLVD" for "BOULEVARD"; "AVE" for "AVENUE"; "TRCE" for "TRACE"; "RU" in "48 RU O"; "BD" in "JEAN TALON BD O"
Note: This field is included in the GIS Data Model primarily for use with the MCS. Attributes in this field MUST match the corresponding field in the MSAG to ensure civic locations are accurately converted and stored as PIDF-LO for use in NG9-1-1 systems. This field may also provide backward compatibility with legacy map displays and Computer Aided Dispatch (CAD) systems.

5.59 Location Marker Indicator

Description: Indicator of the type of location marker.
Domain: P (for Posted); L (for Logical/calculated measurement)
Example: P; L

5.60 Location Marker Label

Description: The label or text on a physical marker, or description of a logical or calculated marker.
Domain: None
Example: MM 3.5; River Mile 5; South Beaver Creek Trailhead; Station 51006; HWY 102 SOUTH 19 KM; Blue Blaze

5.61 Location Marker Measurement Value

Description: Linear distance from a reference point, or the actual value of the distance measurement.
Domain: None
Example: 357.44; 10.0

5.62 Location Marker Route Name

Description: The primary route name the location marker is associated with.
Domain: None
Example: I 90; US 66; St. Lawrence River; South Beaver Creek Trail

5.63 Location Marker Type

Description: The type of location marker.
Domain: None
Example: Road; Waterway; Beach; Trail

5.64 Location Marker Unit of Measurement

Description: Unit of measurement used for the location marker.
Domain: Standardized units of measure
Example: miles; nautical miles; feet; meters; kilometers

5.65 Longitude

Description: The angular distance of a location east or west of the prime meridian of the coordinate system, expressed in decimal degrees.
Domain: -180 degrees to +180 degrees
Example: -112.945833

5.66 Market ID

Description: The mobile switch ID provided on the wireless routing spreadsheet.
Domain: None
Example: 87-83; 00062

5.67 Milepost

Description: A distance travelled along a route such as a road or highway, typically indicated by a milepost sign. There is typically a post or other marker indicating the distance in miles/kilometers from or to a given point.
Domain: None
Example: Milepost 13; Mile Marker 327.5; Station 101 North
Note: Milepost numbers, which may or may not be an actual milepost distance, are useful for specifying locations along interstate highways, recreational trails, navigable waterways and other unaddressed routes, as well as stretches of county, state, federal, and other routes where distance measurements are posted. Milepost numbers are a numeric measurement from a beginning point and MAY be used in place of, or in addition to, Address Numbers. This element is a conditional element. Including it as a conditional field within the SiteStructureAddressPoint layer allows for another means of location verification, particularly at the PSAP level. Including the field allows for matching an Address, assigned by an Addressing Authority using the local addressing interval, to the Mile Marker. It should be noted that Mile Markers may not be placed at the exact mile intervals, due to post placement issues such as underground rock ledges or bridges. Tying an Address to the Mile Marker reduces potential ambiguity about location. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.68 MSAG Community Name

Description: The Community name associated with an address as given in the MSAG and may or may not be the same as the Community Name used by the postal service.
Domain: None
Example: Cypress; Spring; Austin; ALBANY; VERSAILLES; WICHITA COUNTY
Note: Used in Legacy Systems and is not used in a full NG9-1-1 implementation.

5.69 MSAG Community Name Left

Description: The existing MSAG Community Name on the Left side of the road segment relative to the FROM Node.
Domain: None
Example: Harris County; SALEM; MATSU BOROUGH
Note: Used in Legacy Systems and is not used in a full NG9-1-1 implementation.

5.70 MSAG Community Name Right

Description: The existing MSAG Community Name on the Right side of the road segment relative to the FROM Node.
Domain: None
Example: Crystal City; BROWN TWP; FRONTIER SHORES
Note: Used in Legacy Systems and is not used in a full NG9-1-1 implementation.

5.71 Neighborhood Community

Description: The name of an unincorporated neighborhood, subdivision, or area, either within an incorporated municipality or in an unincorporated portion of a county or both, where the address is located.
Domain: None
Example: Copperfield; University Heights; Shady Oaks Mobile Home Park
Note: Neighborhood communities are only used when they are known and have a clearly defined boundary. Neighborhood communities are usually not used for addressing purposes, but are often used as differentiators within an area that have the same or similar sounding street names.

5.72 Neighborhood Community Left

Description: The name of an unincorporated neighborhood, subdivision or area, either within an incorporated municipality or in an unincorporated portion of a county or both, on the Left side of the road segment relative to the FROM Node.
Domain: None
Example: East Harlem; Cypress Meadows Subdivision

5.73 Neighborhood Community Right

Description: The name of an unincorporated neighborhood, subdivision or area, either within an incorporated municipality or in an unincorporated portion of a county or both, on the Right side of the road segment relative to the FROM Node.
Domain: None
Example: Edgewater Park; The Meadows

5.74 NENA Globally Unique ID

Description: The NENA Globally Unique ID (Primary Key) for each record in a GIS data layer. Each record in the GIS data layer MUST have a globally unique ID. When coalescing data from other local 9-1-1 Authorities into the ECRF and LVF, this unique ID MUST continue to have only one occurrence. Additional detail on how to construct the NGUID can be found in section 2.6 NENA Globally Unique IDs (NGUID).
Domain: None
Example:

- urn:emergency:uid:gis:SSAP:3458:caloes.ca.gov
- urn:emergency:uid:gis:RCL:987364:lincoln911.gov
- urn:emergency:uid:gis:Psap:84274599:newbrunswick.ca
- urn:emergency:uid:gis:Pol:3184974-8:coronado.ca.us
- urn:emergency:uid:gis:Fire:{123e4567-e89b-12d3-a456-426652340000}:hanovercounty.gov
- urn:emergency:uid:gis:Ems:6ee38f8e-20e4-4e5e-aa37-a22b7a42d9b4:alleghany.pa.us

5.75 One-Way

Description: The direction of traffic movement along a road in relation to the FROM node and TO node of the line segment representing the road in the GIS data. The one-way field has three possible designations: B (Both), FT (From-To), and TF (To-From).
B – Travel in both directions allowed
FT – One-way traveling from the FROM node to the TO node
TF – One way traveling from the TO node to the FROM node
Domain: B; FT; TF
Example: See Figure 5-2 below

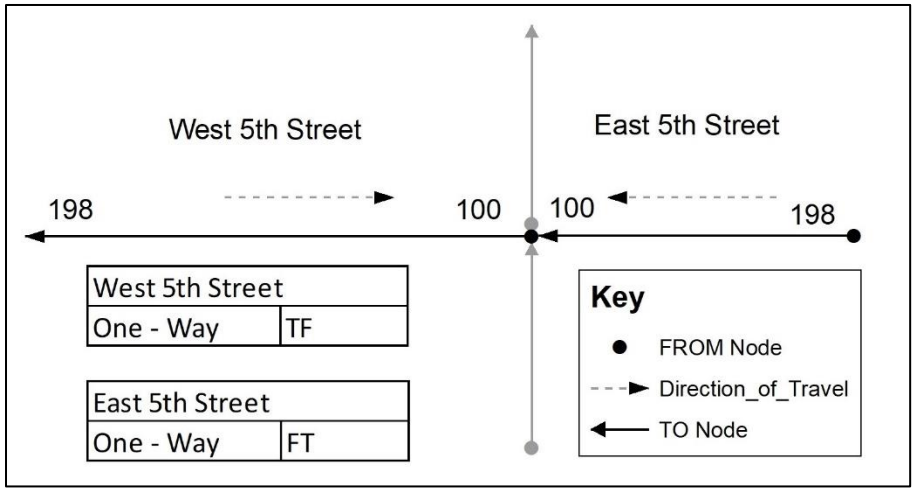


Figure 5-2 Example of One Way

5.76 Parity Left

Description: The even or odd property of the address number range on the Left side of the road segment relative to the FROM Node.
Domain: O=Odd; E=Even; B=Both; Z=Address Range 0-0
Example: O; E; B; Z

5.77 Parity Right

Description: The even or odd property of the address number range on the Right side of the road segment relative to the FROM Node.
Domain: O=Odd; E=Even; B=Both; Z=Address Range 0-0
Example: O; E; B; Z

5.78 Place Type

Description: The type of feature identified by the address.
Domain: The Registry of Location Types proposed in RFC 4589 (https://tools.ietf.org/rfc/rfc4589.txt) is: https://www.iana.org/assignments/location-type-registry/location-type-registry.xml. A new value in the registry may be added by sending an email to iana@iana.org. Indicate you want to add a new value to the Location Types Registry as defined in Section 5.1 of RFC 4589.
Example: airport; bank; cafe; club; office; hotel

5.79 Placement Method

Description: The methodology used for placement of the address point
Domain: Restricted to values found in the "NENA Site/Structure Address Point Placement Method Registry" at: http://technet.nena.org/nrs/registry/SiteStructureAddressPointPlacementMethod.xml
Example: Structure; Site; Parcel; Geocoding; PropertyAccess; Unknown

5.80 Postal Code

Description: A system of 5-digit (US) or 7-character codes (Canada) that identify the individual USPS or Canadian Post Office or metropolitan area delivery station associated with an address.
Domain: The domain of values comes from the *USPS City State Product*, which is a comprehensive list of Postal Codes with corresponding USPS city and county names.
Example: 02109 (Postal Code in Boston, MA); M4E 2V4 (Canadian Postal Code in Toronto, ON)
Note: Postal Codes in the US are the same as ZIP Codes. The USPS considers ZIP Codes to be delivery routes instead of areas. There may be differences between this depiction and actual ZIP Code mailing address. When Postal Code is used, it only includes the ZIP Code portion in the US and not the ZIP Plus 4 portion of a ZIP Code. The Canadian Postal Code is a uniformly structured, alphanumeric code in the form "ANA NAN" where "A" represents an alphabetic character and "N" represents a numeric character. It is made up of two 3-character segments, "forward sortation area" and "local delivery unit," separated by a space for a total of 7 characters in length. However, the *USPS City State Product* only contains city and community names and their associated ZIP Codes. To perform complete 5-digit ZIP coding of address files, City State Product must be used in conjunction with Five-Digit ZIP Product, ZIP + 4® Product, or Carrier Route Product.

5.81 Postal Code Extension

Description: The addition of the Postal Code Extension refines the mail delivery point down to a specific block or building, and may prove useful to validate locations. Postal Code Extensions change more often than US Postal Codes, and this additional data field should make maintaining these optional codes easier.
Domain: Defined by the USPS
Example: "0001" in "02109-0001" (the Postal Code Extension for Boston, MA)

5.82 Postal Code Left

Description: The Postal Code on the Left side of the road segment relative to the FROM Node.
Domain: See Postal Code
Example: 44114 (Postal Code in Cleveland, OH); H3B 3B0 (Canadian Postal Code in Montreal, QC)

5.83 Postal Code Right

Description: The Postal Code on the Right side of the road segment relative to the FROM Node.
Domain: See Postal Code
Example: 84101 (Postal Code in Salt Lake City, UT); R3C 3Z0 (Canadian Postal Code in Winnipeg, MB)

5.84 Postal Community Name

Description: A city name for the Postal Code of an address.
Domain: Restricted to city names given in the *USPS City State Product* for a given ZIP Code. The *USPS City State Product* is a comprehensive list of ZIP Codes with corresponding USPS city and county names.
Example: Bowen; Cypress; Sarnia
Note: The Postal Community Name is the name assigned to the post office that delivers mail to a given address, and may differ from the 9-1-1 city or community location. Only the "preferred" Postal Community Name as defined by the *USPS City State Product* is allowed. The Postal Community Name is also defined in the USPS ZIP Code lookup at https://tools.usps.com/go/ZipLookupAction_input. However, the *USPS City State Product* only contains city and community names and their associated ZIP Codes. To perform complete 5-digit ZIP coding of address files, the *USPS City State Product* must be used in conjunction with Five-Digit ZIP Product, ZIP + 4® Product, or Carrier Route Product. The USPS Postal City name is the "preferred" name assigned to the post office from which the USPS delivers mail to the address, and may differ from the 9-1-1 city or community name.

5.85 Postal Community Name Left

Description: A city name for the Postal Code of an address, as given in the *USPS City State Product* on the Left side of the road segment relative to the FROM Node.
Domain: See Postal Community Name
Example: Dublin; Magnolia; Sainte-Agathe-des-Monts

5.86 Postal Community Name Right

Description: A city name for the Postal Code of an address, as given in the *USPS City State Product* on the Right side of the road segment relative to the FROM Node.
Domain: See Postal Community Name
Example: Wicket; Zanesville; Yellowknife

5.87 Rail Line Name

Description: The word or phrase that constitutes the distinctive designation of the rail line.
Domain: None
Example: Chester to Rock Hill; Florence to Kingstree to Charleston; Portage la Prairie; Prince Rupert; Winnipeg Terminal

5.88 Rail Line Operator

Description: The name of the operator of the rail line or the primary rail company with rights to use the rail line.
Domain: None
Example: UP; CSX; Abilene & Smoky Valley Railroad; VIA Rail; Canadian National

5.89 Rail Line Owner

Description: The name of the owner of the rail right-of-way.
Domain: None
Example: CSX; South Carolina Central Railroad; Canadian Pacific; Canadian National

5.90 Rail Mile Post High

Description: The ending linear reference of the named rail line.
Domain: None
Example: 120; 257.33

5.91 Rail Mile Post Low

Description: The beginning linear reference of the named rail line.
Domain: None
Example: 5.68; 14.0

5.92 Right Address Number Prefix

Description: An extension of the Address Number that precedes it and further identifies a location along a thoroughfare or within a defined area, on the Right side of the road segment relative to the FROM Node. It contains any alphanumeric characters, punctuation, and spaces preceding the Right FROM Address and Right TO Address.
Domain: None
Example: "2N3W-" in "2N3W-124 Township Drive"; "S" in "S877 Highway 88"

5.93 Right FROM Address

Description: In the RoadCenterLine layer, each feature has a begin point and an endpoint. The FROM Node is the begin point while the TO node is the endpoint. Each has a left side and a right side relative to a begin node and an end node. The Right FROM address number is the address number on the Right side of the road segment relative to the FROM Node.
Domain: Whole numbers from 0 to 999999
Example: See Figure 5-3 below
Note: This address can be higher than the Right TO Address.

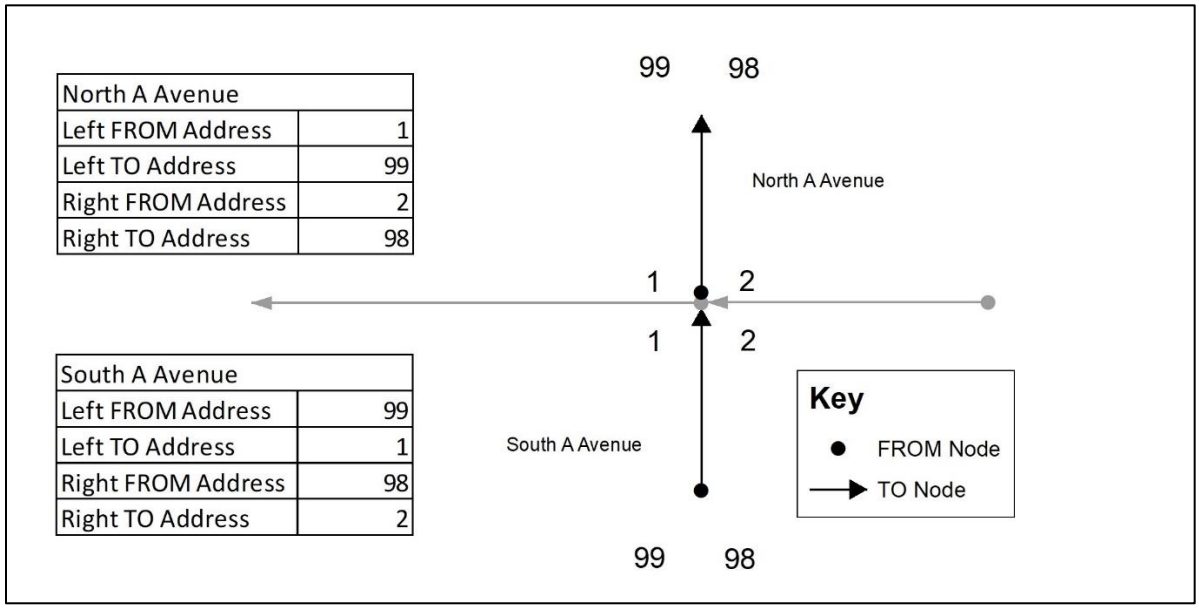


Figure 5-3 Example of Right FROM and Right TO Addresses

5.94 Right TO Address

Description: In the RoadCenterLine layer, each feature has a begin point and an endpoint. The FROM Node is the begin point while the TO node is the endpoint. Each has a left side and a right side relative to a begin node and an end node. The Right TO address number is the address number on the Right side of the road segment relative to the TO Node.

Domain: Whole numbers from 0 to 999999
Example: See Figure 5-3 above
Note: This address can be lower than the Right FROM Address.

5.95 Road Centerline NENA Globally Unique ID (Foreign Key)

Description: The Road Centerline NENA Globally Unique ID (RCL_NGUID) is used in the StreetNameAliasTable as a foreign key relationship between the StreetNameAliasTable and the RoadCenterLine layer. A foreign key acts as a cross-reference between RCL_NGUID field in the StreetNameAliasTable because it references the NGUID field primary key in the RoadCenterLine layer, thereby establishing a link between them. A RoadCenterLine record may have zero to many (0:M) StreetNameAliasTable records. Without this relationship, it would not be possible to identify any street name aliases of a road centerline. The values in the RCL_NGUID field MUST exist in the values of the NGUID field in the RoadCenterLine layer.
Domain: None
Example: "urn:emergency:uid:gis:RCL:1:AC911.tx.us" value in the RoadCenterLine layer NGUID would appear in all related alias records in the RCL_NGUID field of the StreetNameAliasTable.

5.96 Road Class

Description: The general description of the type of road. The Road Classifications used in this document are derived from the US Census MAF/TIGER Feature Classification Codes (MTFCC), which is an update to the now deprecated Census Feature Class Codes (CFCC).
Domain: Primary; Secondary; Local; Ramp; Service Drive; Vehicular Trail; Walkway/Pedestrian Trail; Stairway; Alley; Private; Parking Lot; Bike Path or Trail; Bridle Path; Other
Example: Ramp
Note: The Road Class is completely spelled out in the attribute fields. Road Classification is based on the Census road classification found in the MAF/TIGER Feature Class Code (MTFCC) Definitions [18]. The values are taken from the S series information in this document which provided the classification scheme for surface roads and can be found at:
https://www2.census.gov/geo/pdfs/reference/mtfccs2019.pdf

- *Primary* roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
- *Secondary* roads are main arteries, usually in the US Highway, State Highway, or County Highway system. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade

intersections with many other roads and driveways.

- *Local* roads are generally a paved non-arterial street, road, or byway that usually has a single lane of traffic in each direction. Roads in this classification include neighborhood, rural roads, and city streets.
- *Ramp* designates a road that allows controlled access from adjacent roads onto a limited access highway, often in the form of a cloverleaf interchange. Ramps typically do not have address ranges.
- *Service Drive* provides access to structures along the highway, usually parallel to a limited access highway. If these roads are named and addressed, they may be considered local roads.
- *Vehicular Trail* (4WD, snowmobile) is an unpaved trail or path where a four-wheel-drive vehicle, snowmobile, or similar vehicle is required.
- *Walkway/Pedestrian Trail* is a path that is used for walking, being either too narrow for or legally restricted from vehicular traffic.
- *Stairway* is a pedestrian passageway from one level to another by a series of steps.
- *Alley* is generally a service road that does not generally have associated addressed structures and is usually unnamed. It is located at the rear of buildings and properties.
- *Private* (service vehicles, logging, oil fields, ranches, etc.) is a road within private property that is privately maintained for service, extractive, or other purposes. These roads are often unnamed.
- *Parking Lot* is the main travel route for vehicles through a paved parking area.
- *Bike Path or Trail* is a path that is used for manual or small, motorized bicycles, being either too narrow for or legally restricted from vehicular traffic.
- *Bridle Path* is a path that is used for horses, being either too narrow for or legally restricted from vehicular traffic.
- *Other* is any road or path type that does not fit into the above categories.

5.97 Room

Description: A single room within a building.
Domain: None
Example: Room 137; Lobby

5.98 Seat

Description: A place where a person might sit within a building.
Domain: None
Example: Cubicle 5A; 5A; Desk 11; 11
Note: From the CLDXF Standard, NENA-STA-004 [4]:

- The Seat element "designates a place where a person might sit, such as a seat in a stadium or theater, or a cubicle in an open-plan office or a booth in a trade show" (IETF RFC 4776, section 3.4).
- Subaddress elements typically include both a "type" word (such as "seat" or "desk") and an identifier (a specific name or number). Include both the type word, the identifier in this element, and any separating characters or spaces.
- The type word may precede or follow the identifier ("Registration Desk" vs. "Desk 17"). Either order is acceptable; local usage should be followed. In some cases, no type word is used.

5.99 Sector ID

Description: The cell sector ID of the cell tower sector antenna face associated with the location.
Domain: None
Example: Omni; 1; 3

5.100 Sector Orientation

Description: The orientation of cell tower sector antenna face associated with the location.
Domain: None
Example: Omni; N; SE

5.101 Service Number

Description: The numbers that would be dialed on a 12-digit keypad to reach the service appropriate for the location. This is not the same as an Emergency Service Number (ESN) in Legacy E9-1-1 systems. This field is used for all service boundary layers including PsapPolygon, PolicePolygon, FirePolygon, EmsPolygon, and others such as PoisonControlPolygon. Within North America, the Service Number for most services is 9-1-1; however, there may be service boundaries that have a different number that may be associated with them such as Poison Control. Additionally, in some countries, different numbers may be used for Police, Fire, and EMS – this field would be used to denote those numbers.
Domain: A dialable number or dial string
Example: 911; 18002221222

5.102 Service URI

Description: URI for call routing. This attribute is contained in the service boundary layers and will define the Service URI of the service. The URI is usually a Session Initiation Protocol (e.g., SIP or SIPs) URI that defines the route to reach the service.
Domain: Registered domain name
Example: sips:sos.psap@eoc.houston.tx.us
sip:cambriaallianceems.com
sip:dispatch@harriscountyso.org
sip:22444032@ohiocountywv.gov:5061
sip:wexford-fire@psap.allegheny.pa.us

5.103 Service URN

Description: The URN used to select the service for which a route is desired. The ECRF is queried with a location and a Service URN that returns the Service URI.
Domain: RFC 5031 defines the Service URN; NENA-STA-010 [3] defines the domain of allowable values. PSAP boundaries SHOULD only contain features with Service URN values of "urn:emergency:service:sos.psap." Values to be used for service boundaries for other responding agencies are found in the IANA urn:emergency:service:responder registry.
Example: urn:emergency:service:sos.psap
urn:emergency:service:responder.police
urn:emergency:service:responder.fire
urn:emergency:service:responder.ems

5.104 Site ID

Description: Some carriers have cell site identifications unique for that cell site within the entire carrier network.
Domain: None
Example: XMO92348; NX0552-1432

5.105 Site NENA Globally Unique ID (Foreign Key)

Description: The Site NENA Globally Unique ID (SSAP_NGUID) is used in the LandmarkNamePartTable, LandmarkNameCompleteAliasTable, and CellSectorPoint layers as a foreign key relationship between the layers and the SiteStructureAddressPoint layer. A foreign key acts as a cross-reference between the layer's foreign key (e.g., SSAP_NGUID field in the CellSectorPoint layer) because it references the NGUID field primary key in the SiteStructureAddressPoint layer, thereby establishing a link between them. A record in the SiteStructureAddressPoint layer may have zero to many (0:M) records in the associated layers. Without this relationship, it would not be possible to identify any record associated with a SiteStructureAddressPoint record. The values in the SSAP_NGUID field MUST exist in the values of the NGUID field in the SiteStructureAddressPoint layer.
Domain: None
Example: "urn:emergency:uid:gis:SSAP:1:city911.fl.us" value in the SiteStructureAddressPoint layer NGUID would appear in all related alias records in the SSAP_NGUID field of the related layers.

5.106 Speed Limit

Description: Posted Speed Limit in MPH in US or Km/h in Canada.
Domain: Whole numbers from 1 to 999
Example: 35; 55; 70

5.107 State or Equivalent (A1)

Description: The name of a state or state equivalent, represented by the two-letter UPPER CASE abbreviation given in USPS Publication 28 [19], Appendix B. A state is a primary governmental division of the United States.
Domain: ISO 3166-2 includes the same abbreviations as USPS Publication 28 [19], Appendix B, with the exception of the additional one for the nine minor uninhabited islands owned by the US. These abbreviations are also freely available at https://www.census.gov/library/reference/code-lists/ansi/ansi-codes-for-states.html
Example: TN; NM; OR

5.108 State or Equivalent Left (A1)

Description: The name of a state or state equivalent on the Left side of the road segment relative to the FROM Node, represented by the two-letter UPPER CASE abbreviation given in USPS Publication 28 [19], Appendix B.
Domain: ISO 3166-2 or USPS Publication 28 [19], Appendix B for the US
Example: LA; OK

5.109 State or Equivalent Right (A1)

Description: The name of a state or state equivalent on the Right side of the road segment relative to the FROM Node, represented by the two-letter UPPER CASE abbreviation given in USPS Publication 28 [19], Appendix B.
Domain: ISO 3166-2 or USPS Publication 28 [19], Appendix B for the US
Example: PA; KY

5.110 Street Name

Description: The official name of the road, usually defined by the lowest jurisdictional authority (e.g., city). The street name does not include any street types, directionals, or modifiers.
Domain: None
Example: "Fifth" in "Fifth Avenue"
Note: This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.111 Street Name Post Directional

Description: A word following the Street Name element that indicates the direction taken by the road from an arbitrary starting point or line, or the sector where it is located.
Domain: North; South; East; West; Northeast; Northwest; Southeast; Southwest; Nord; Sud; Est; Ouest; Nord-Est; Nord-Ouest; Sud-Est; Sud-Ouest; or equivalent words in other languages.
Example: "North" in "Elm Avenue North"; "Ouest" in "Boulevard Jean-Talon Ouest"
Note: This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.112 Street Name Post Modifier

Description: A word or phrase that follows and modifies the Street Name element, but is separated from it by a Street Name Post Type or a Street Name Post Directional or both.
Domain: None
Example: "Number 5" in "Fire Road Number 5";
"Extension" in "Main Street North Extension"
Note: This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.113 Street Name Post Type

Description: A word or phrase that follows the Street Name element and identifies a type of thoroughfare in a complete street name.
Domain: Restricted to values found in the "NENA Registry of Street Name Pre Types and Street Name Post Types" or combinations thereof at: http://technet.nena.org/nrs/registry/StreetNamePreTypesAndStreetNamePostTypes.xml
Example: "Parkway" in "Ocean Parkway"; "Rue" in "48e Rue Ouest"
Note: This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.114 Street Name Pre Directional

Description: A word preceding the Street Name element that indicates the direction taken by the road from an arbitrary starting point or line, or the sector where it is located.
Domain: North; South; East; West; Northeast; Northwest; Southeast; Southwest; Nord; Sud; Est; Ouest; Nord-Est; Nord-Ouest; Sud-Est; Sud-Ouest; or equivalent words in other languages.
Example: "South" in "South Congress Avenue"
Note: This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.115 Street Name Pre Modifier

Description: A word or phrase that precedes and modifies the Street Name element but is separated from it by a Street Name Pre Type or a Street Name Pre Directional or both.
Domain: None
Example: "Alternate" in "Alternate Route 8";
"Old" in "Old North Church Street"
Note: This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.116 Street Name Pre Type

Description: A word or phrase that precedes the Street Name element and identifies a type of thoroughfare in a complete street name.
Domain: Restricted to values found in the "NENA Registry of Street Name Pre Types and Street Name Post Types" or combinations thereof at:
http://technet.nena.org/nrs/registry/StreetNamePreTypesAndStreetNamePostTypes.xml
Example: "Avenue" in "Avenue A";
"Highway" in "Highway 443";
"Bypass Highway" in "Bypass Highway 22";
"Boulevard" in "Boulevard of the Allies";
"Chemin" in "Chemin de la Canardière";
"Rue" in "Rue Principale";
"Allée" in "Allée de la Vallée"
Note: Occasionally two or more type words occur together before the Street Name element (e.g., Bypass Highway 22). All of the words are placed in the Street Name Pre Type, unless the local address authority has included any of them in Street Name element. If the two type words are not part of the Street Name element and are not separated from each other by a directional word or other word, they are all placed in the Street Name Pre Type. This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.117 Street Name Pre Type Separator

Description: A preposition or prepositional phrase between the Street Name Pre Type and the Street Name. This element is defined in the CLDXF Standard, NENA-STA-004 [4], as a US specific extension of PIDF-LO per RFC 6848 [7].
Domain: Restricted to values found in the "NENA Registry of Street Name Pre Type Separators" at:
http://technet.nena.org/nrs/registry/StreetNamePreTypeSeparators.xml
Example: "of the" in "Avenue of the Stars"; "du" in "Rue du Petit-Champlain"
Note: This element is a conditional element. For more details, please see the CLDXF Standard, NENA-STA-004 [4].

5.118 Switch ID

Description: The wireless switch to which the site is homed or associated with, as given in the wireless routing spreadsheet. For more information see the NENA E9-1-1 Wireless Maintenance Call Routing & Testing Validation Standard (NENA 57-002) [16].
Domain: None
Example: 12-3; 002

5.119 Technology

Description: The type of wireless technology used for the cell sector locations.
Domain: None
Example: TDMA; LTE Advanced; CDMA

5.120 Unincorporated Community

Description: The name of an Unincorporated Community, either within an incorporated municipality or in an unincorporated portion of a county, or both, where the address is located.
Domain: None
Example: Cypress; Bowen; Mont-Élie
Note: An Unincorporated Community typically is a region of land that is not governed by its own local municipal corporation.

5.121 Unincorporated Community Left

Description: The Unincorporated Community, either within an incorporated municipality or in an unincorporated portion of a county, or both, on the Left side of the road segment relative to the FROM Node.
Domain: None
Example: Latham; Moose; Sherwood Park

5.122 Unincorporated Community Right

Description: The Unincorporated Community, either within an incorporated municipality or in an unincorporated portion of a county, or both, on the Right side of the road segment relative to the FROM Node.
Domain: None
Example: Mountain View; Palmer; Picard

5.123 Unit

Description: A group or suite of rooms within a building that are under common ownership or tenancy, typically having a common primary entrance.
Domain: None
Example: Apartment C2; Penthouse; Suite 710

5.124 Validation Left

Description: Indicates if the address range on the left side of the road segment, relative to the FROM node, should be used for civic location validation. A value of "Y" MAY be entered if any Address Number within the address range on the left side of the road segment should be considered by the LVF to be valid. A value of "N" MAY be entered if the Address Number should only be validated using the SiteStructureAddressPoint layer. If not present, a value of "Y" is assumed.
Domain: Y; N
Example: Y; N
Note: This field does not affect routing of emergency calls, nor display of GIS data. It controls how the LVF determines its response when an address does not match an address point but is within a valid range of a Road Centerline**.**

5.125 Validation Right

Description: Indicates if the address range on the right side of the road segment, relative to the FROM node, should be used for civic location validation. A value of "Y" MAY be entered if any Address Number within the address range on the right side of the road segment should be considered by the LVF to be valid. A value of "N" MAY be entered if the Address Number should only be validated using the SiteStructureAddressPoint layer. If not present, a value of "Y" is assumed.
Domain: Y; N
Example: Y; N
Note: This field does not affect routing of emergency calls, nor display of GIS data. It controls how the LVF determines its response when an address does not match an address point but is within a valid range of a Road Centerline.

6 NENA Registry System (NRS) Considerations

Not applicable.

7 IANA Actions

Registries mentioned below are all within the "emergency" registry.

7.1 "urn:emergency:uid" Registry

IANA is requested to add the following values to the urn:emergency:uid registry:

Name	Purpose	Reference
gis	GIS feature identifier	This document

7.2 "GIS Data Layers" Registry

IANA is requested to add the following entries to the GIS Data Layers registry:

Name	Layer Indicator	Reference
RoadCenterLine	RCL	This document
SiteStructureAddressPoint	SSAP	This document
PsapPolygon	Psap	This document
PolicePolygon	Pol	This document
FirePolygon	Fire	This document
FireForestPolygon	FireFor	This document
FireAirportPolygon	FireAir	This document
FireMilitaryPolygon	FireMil	This document
FirePrivatePolygon	FirePrivt	This document
EmsPolygon	Ems	This document
EmsPrivatePolygon	EmsPrivt	This document
EmsAirPolygon	EmsAir	This document
EmsMilitaryPolygon	EmsMil	This document
PoisonControlPolygon	PoisonCntl	This document
MountainRescuePolygon	MntnResc	This document
CoastGuardPolygon	CoastG	This document
PoliceCountyPolygon	PolCnty	This document
PoliceStateProvincialPolygon	PolStProvl	This document
PoliceFederalPolygon	PolFed	This document
PoliceFederalFbiPolygon	PolFedFbi	This document
PoliceFederalRcmpPolygon	PolFedRcmp	This document
PoliceFederalSecretServicePolygon	PolFedScrtSrv	This document
PoliceFederalDeaPolygon	PolFedDea	This document
PoliceFederalMarshalPolygon	PolFedMars	This document
PoliceFederalCustomsBorderProtectionPolygon	PolFedCustBPrtcn	This document
PoliceFederalImmigrationCustomsPolygon	PolFedImmCust	This document
PoliceFederalAtfPolygon	PolFedAtf	This document
PoliceFederalParkPolygon	PolFedPark	This document
PoliceFederalDiplomaticSecurityPolygon	PolFedDipScrty	This document
PoliceFederalProtectiveServicePolygon	PolFedPrttvSrv	This document
PoliceSheriffPolygon	PolSheriff	This document
PoliceMilitaryPolygon	PolMil	This document
PoliceCampusPolygon	PolCamp	This document
PolicePrivatePolygon	PolPrivt	This document
PoliceAirportPolygon	PolAir	This document
PoliceHousingPolygon	PolHous	This document
PoliceParkPolygon	PolPark	This document
StreetNameAliasTable	StrNA	This document
LandmarkNamePartTable	LnmkNamePart	This document
LandmarkNameCompleteAliasTable	LnmkNameCompA	This document
A1Polygon	A1	This document

Name	Layer Indicator	Reference
A2Polygon	A2	This document
A3Polygon	A3	This document
A4Polygon	A4	This document
A5Polygon	A5	This document
RailroadCenterLine	RrCL	This document
HydrologyLine	HydL	This document
HydrologyPolygon	HydPgn	This document
CellSectorPoint	CellSect	This document
LocationMarkerPoint	LocMark	This document

8 Impacts and Considerations

NENA's NG9-1-1 uses GIS data provided by the local 9-1-1 Authority as the core database for civic location validation, all call routing, and PSAP map display functionality.

NENA's NG9-1-1 introduces the concept of an Emergency Services Internet Protocol network (ESInet) to facilitate communications among NG9-1-1 functional elements such as the ESRP, ECRF, LVF, and the PSAP. The ECRF is the primary location-based routing element. The LVF is the primary mechanism to determine that a civic address location is valid for routing and dispatch. Both ECRF and LVF use the same underlying GIS data.

The data format described in this document is expressly designed to facilitate conversion to the NENA-STA-010 [3], Appendix B Spatial Interface (SI) data model. This allows a GIS system conforming to this data model, or capable of being automatically converted to this model, to be used to provision the ECRF and the LVF. The former is used to route emergency calls, and the latter is used to validate civic location prior to loading it into a Location Information Server (LIS). LVF validation is analogous to MSAG validation of an address prior to loading it into an ALI within an E9-1-1 system.

If both address points and road centerline ranges exist in the ECRF for the location of the caller, the address point route will be used. If there is no match of address points, but a road centerline or range segment matches, the route for that centerline segment will be used.

8.1 Operations Impacts Summary

The NENA NG9-1-1 GIS Data Model requires higher levels of standardization and attribute detail than existing E9-1-1 GIS data standards contained in NENA Standard Data Formats for 9-1-1 Data Exchange & GIS Mapping, NENA-STA-015 [21]. Existing GIS data may need to be manipulated and/or enhanced to conform to this standard structure.

Local 9-1-1 Authorities are responsible for provisioning their NG9-1-1 systems with local GIS data, which may require new procedures, processes, and training.

This GIS data model provides guidance on formatting of GIS data prior to use in NG9-1-1. This document defines the minimum GIS Data Model required for E9-1-1 and NG9-1-1. 9-1-1 Authorities and other agencies must understand that a common baseline GIS data model must be established, recognized, and followed in order to participate in an interoperable NG9-1-1 environment. This document provides that baseline GIS data model.

This NG9-1-1 GIS Data Model represents not only the minimum set of GIS data which should be used for 9-1-1, but also recommended and in some cases locally required data for public safety. Non-standard field names and their associated attributes, as well as additional GIS data layers not discussed within this document, are allowed in order to meet individual entity needs. For example, additional data fields may be added to the road centerline data for number of lanes, maintaining entity, planning district, and so forth. Additional layers, data fields, and associated attributes are allowed and encouraged to meet local, regional, and other organizational needs but are beyond the scope of this document.

8.2 Technical Impacts Summary

Hardware and software manufacturers may need to adapt their existing Customer Premise Equipment (CPE) or call handling software, Computer Aided Dispatch (CAD), map display, and related software to support this new format.

Service vendors may need to adapt their existing processes, procedures, and services to meet the new data needs.

Originating service providers may need to adapt existing software and systems to handle the new formats and use the PIDF-LO data structure.

8.3 Security Impacts Summary

GIS data may contain confidential, proprietary, and/or sensitive information which must not be introduced into the public domain. For example, certain information that telephone companies, other data providers, and the Federal government (e.g., United States Postal Service, Department of Defense, Department of the Interior) furnish to local governmental entities, including those which provide 9-1-1 emergency services, are confidential or controlled under many laws and policies. Such information may be considered confidential and/or proprietary when included in databases and on maps used by entities in the provision of emergency services. Confidential information must not be redistributed outside of 9-1-1. Sensitive information implies a loss of security when disclosed to others.

More information regarding guidelines for data and physical security is located in NENA Security for Next-Generation 9-1-1, NENA 75-001 [22], NENA Next Generation 9-1-1 Security (NG-SEC) Audit Checklist, NENA 75-502 [23], and NENA NG9-1-1 Security Information, NENA-INF-015 [24].

8.4 Recommendation for Additional Development Work

This document references existing NENA Standards. Additional work may be required as noted in the tables below.

Table 8-1 Future Work to be Considered by the GIS Data Model Working Group

Section	Future Work
2	Define a uniform GIS Database precision, in consultation with the i3 Working Group.
3	A thorough review between this document and NENA-STA-010 [3] version 3 is needed to identify and resolve discrepancies not referenced elsewhere in this section.
4	This document substantially refers to US standards and addresses some Canadian considerations. It will be fully extended to Canada and brought into alignment with CLDXF-CA once that standard is complete.
3	Consider whether field names for the Administrative Units (i.e., State, County, Incorporated Municipality, Unincorporated Community, Neighborhood Community) in all of the data layers in which they exist should be revised to include their associated PIDF-LO element.
3	Consider adding an IANA GIS Data Layers registry entry for the 988 Suicide Prevention and Mental Health Crisis Lifeline.
4.1 and 4.2	Future work will implement a more relational approach to facilitate data integration, data management, and attribute consistency between layers. For example: Currently, an address point record includes both address attributes and geographic location. A normalized database structure stores address points separately and links them to address records in a one-to-many relationship. A typical use case would be an address point representing a single multifamily structure linked via a primary key to multiple address records for individual units. This would facilitate the editing of point locations and avoid potential problems associated with stacking points. Road centerlines and address points may be based on different data sources and may have inconsistent attributes. A relational approach would involve linking both address points and road centerlines to an authoritative list of street names for each jurisdiction, thus ensuring consistency between the two layers.
4.2	Inclusion of a site/structure polygon layer is deferred to future work.

Section	Future Work
4.2.1	In many cases, it is impossible to determine exactly which of multiple structures to associate with a given address. As detailed in NENA Information Document for Development of Site/Structure Address Point GIS Data for 9-1-1, NENA-INF-014 [20], a single point may be used to represent a collection of buildings at a site. Future work on the data model will consider the use of a multipoint in such situations. Multipoints are first-class GIS features in the Simple Features standards implemented by OGC 06-103r4 and the parallel ISO 19125-1:2004. Advantages of multipoints include the ability to account for all structures and to convey more information about site configuration than a single, arbitrarily placed point. It will also be necessary to consider disadvantages such as lack of support in vendor systems and complications with GIS overlay operations.
4.2.2	Landmark Name Parts can quickly become complex and are being revisited in the CLDXF Standard, NENA-STA-004 [4] document. This document will be brought into alignment with CLDXF v2 once that standard is complete to address the needed changes to Landmark Name Parts, revisions to field name definitions, and other changes made in CLDXF v2.
4.3	NENA-STA-010 [3], Appendix B includes County, Incorporated Municipality, Unincorporated Community, and Neighborhood Community fields in the service boundary layers. Additional work is needed with the i3 Architecture Workgroup on usage of these fields.
4.5	Clarification on how to handle tribal nations, military bases, and other general purpose governmental units in the place name fields is deferred for future work.
4.6	Review of planned FRA (Federal Railroad Administration) rail data standardization efforts to consider alignment between those efforts and a future version of this document.
4.6	Inclusion of railroad crossing information deferred to future work.
4.7	The National Hydrography Dataset (NHD) is expected to assess the relationship between the representations of hydrologic data relative to elevation data. Additional future work should assess the alignment between the HydrologyLine and HydrologyPolygon layers and future revisions to the NHD data model.
3.8	Review the use and purpose of CellSectorPoint layer in i3 and determine if this layer should remain in the Data Model, including discussion on whether polygon representation of cell sectors should be considered for inclusion.

Section	Future Work
4.75	Determine use and purpose of the OneWay attribute as part of the alignment with i3v3 and discuss potential inclusion of "N" in the domain to indicate "no traffic allowed." This will be part of a larger discussion with the Road Class attribute, or potentially a new attribute, and overall use and purpose as it relates to the Mapping Data Service, map display and functionality requirements, and whether an RCL can be used or traveled on by an Emergency Responder.
4.80	Update Postal Code attribute with country-neutral text in alignment with CLDXF-CA once that standard is complete.
4.84	Update Postal Community Name attribute with country-neutral text in alignment with CLDXF-CA once that standard is complete.
5.96	Attributes in the Road Class field could be used to help responders better determine which vehicle type to use to reach an incident. This would be useful for data within the Mapping Data Service described in i3. Currently the data model has this as an optional field, but i3 has it as Mandatory. An overall review of the use and purpose of the attribute values should be done to determine if any updates are needed to ensure its use in NG9-1-1 systems is clarified, determine if it needs to be Mandatory or Optional, and determine if the appropriate classification strategy is applied.
8.6	Defer alignment with vertical accuracy requirements defined in NENA Requirements for 3D GIS for E9-1-1 and NG9-1-1, NENA-REQ-003, to future work, once that standard is complete.

Table 8-2 Future work to be considered by other NENA Working Groups

Section	Future Work
3.2	Development of a Metadata template based on the NG9-1-1 GIS Data Model Standard. Recommended Working Group: Establish a new Working Group
2.3	Develop guidance related to spatial reference, horizontal accuracy, and vertical accuracy. Recommended Working Group: GIS Data Stewardship
3.5	Expand language in GIS Data Stewardship around the new NGUID structure. Include discussion on field width of each component, in particular the local unique ID. Recommended Working Group: GIS Data Stewardship

Section	Future Work
3	Create updated NG9-1-1 GIS Data Template files (NENA-REF-006.2) to align with NENA-STA-006.2. Recommended Working Group: GIS Template
4	Development of a database structure crosswalk that establishes comparable matches between the CLDXF Standard, NENA-STA-004 [4], NENA-STA-010 [3] Appendix B, and NG9-1-1 GIS Data Model (NENA-STA-006) is deferred for future work. Recommended Working Group: Establish a new Working Group
4.2.1	Document that stacked address points will result in topology errors and goes against existing GIS data standards. Deferred to future work. Recommended Working Group: GIS Data Stewardship
4.2.1	The Location Type Registry that references the Internet Engineering Task Force Request for Comments (RFC) 4589 (https://tools.ietf.org/rfc/rfc4589.txt) is: https://www.iana.org/assignments/location-type-registry/location-type-registry.xml. Additional location types for this registry need to be defined and be worked on through the formal Internet Assigned Numbering Authority as defined in Section 5.1 of RFC 4589. Coordination with the CLDXF work group is needed if the Location Type Registry is no longer to be used as a domain for Place Type. Recommended Working Group: Establish a new Working Group
4.4	Provisioning of data from authoritative sources will be addressed in a future revision of NENA-STA-010 [3]. Additional work is needed to determine what standard mechanisms are needed, if any, for detecting inadvertent or malicious provisioning of data from a non-authoritative source to the ECRF and LVF. Recommended Working Group: i3 Architecture
4.4	Consideration of multiple ProvisioningPolygon layers or adding a provisioning control field(s) will be considered for future work. This would be used in circumstances where different GIS Data Providers are submitting data for different GIS Data Layers. For example, a County GIS Data Provider provides road centerlines for the entire extent of the County. In the same county, an Incorporated Municipality GIS Data Provider provides site/structure addresses data for everything within their boundary, while the County GIS Data Provider provides site/structure addresses data for everything outside of that Incorporated Municipality. Recommended Working Group: i3 Architecture

8.5 Anticipated Timeline

The time required to develop the necessary NG9-1-1 GIS data will depend on the level and quality of one's existing GIS data. Since NG9-1-1 requires adherence to the GIS database structure standards outlined in this document, the time required to migrate to the NG9-1-1 GIS data model will vary.

It is strongly advised that one go through the process of standardizing and synchronizing their existing GIS data with their MSAG and ALI as described in NENA Information Document for Synchronizing Geographic Information System Databases with MSAG & ALI, NENA 71-501 [25]. NENA recommends the MSAG and GIS data reach a 98% or greater match rate, with an option of matching with ALI, before using GIS data for NG9-1-1.

8.6 Cost Factors

In order to create and enhance the quality and accuracy of GIS data, the 9-1-1 Authority may need to dedicate additional resources for GIS data development and maintenance. The 9-1-1 Authority is ultimately responsible for the quality and accuracy of the GIS data used in the 9-1-1 system, even if the development and/or maintenance of this data is outsourced, shared, or obtained through others. It is anticipated that the rigorous requirements and highly standardized nature of the GIS data needed for a NG9-1-1 system to function may require:

- Additional training, personnel, and/or time to update or modify existing GIS data to meet this Standard
- New or revised procedures to meet the requirements of NG9-1-1 data
- Software upgrades or updates
- Improvements to the currency, accuracy, quality, and completeness of existing data
- Security-related standard operating procedures be developed or revised
- In all cases, strict adherence to the minimum standards outlined in this document is required to ensure compatibility with NG9-1-1 systems and interoperability

8.7 Cost Recovery Considerations

Collaborating, coordinating, and sharing the cost of data development and maintenance with neighboring 9-1-1 entities and other stakeholders outside of 9-1-1 may offset the cost of collecting and maintaining high quality, current GIS data. Other stakeholders include local and state planning departments, engineering, taxing authorities, and public/private partnerships with utilities, and other organizations that have need for highly accurate and current GIS data. Consistent addressing, data scrubbing, and data maintenance will benefit all stakeholders that can use this address information.

8.8 Additional Impacts (non-cost related)

Certain information or requirements contained in this NENA document are known to have 9-1-1 technical impacts that may include:

- Better performance of all 9-1-1 systems
- Better information available for Public Safety
- Reduced response time
- Minimization of miscommunication
- Efficient use of limited resources
- Improved communications with adjacent 9-1-1 entities to ensure layers match properly at the boundaries

9 Abbreviations, Terms, and Definitions

See the NENA Knowledge Base for a Glossary of terms and abbreviations used in NENA documents. Abbreviations and terms used in this document are listed below with their definitions.

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
Agency Identifier	A domain name for an agency used as a globally unique identifier.	In Glossary
ALI (Automatic Location Identification)	The automatic display at the PSAP of the caller's telephone number, the address/location of the telephone, and supplementary emergency services information of the location from which a call originates.	In Glossary
Associated Location	A location (civic, geodetic, or polygon) within the designated PSAP jurisdiction that may be used in wireless call scenarios to route the call toward the designated PSAP.	In Glossary
CAD (Computer Aided Dispatch)	A computer-based system which aids PSAP Telecommunicators by automating selected dispatching and record keeping activities.	In Glossary
CLDXF (Civic Location Data Exchange Format)	A United States profile of PIDF-LO that defines a set of standard data elements that describe detailed street address information.	Modify

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
Data Domain	An enumerated listing or range of valid values that may be used as an attribute. If no Data Domain is provided, then any value that meets the format criteria may be used.	In Glossary
Data Model	A set of standardized design specifications for objects in a GIS database or other databases. A data model defines the data layers, data features, data fields and attributes, and other defining requirements of a database for use in an application.	Don't Add
E9-1-1 (Enhanced 9-1-1)	A telephone system which includes network switching, database, and Public Safety Answering Point premise elements capable of providing automatic location identification data, selective routing, selective transfer, fixed transfer, and a call back number. The term also includes any enhanced 9-1-1 service so designated by the Federal Communications Commission in its Report and Order in WC Docket Nos. 04-36 and 05-196, or any successor proceeding.	In Glossary

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
ECRF ***(Emergency Call Routing Function)***	A functional element in NGCS (Next Generation Core Services) which is a Location-to-Service Translation (LoST) protocol server where location information (either civic address or geo-coordinates) and a Service URN serve as input to a mapping function that returns a URI used to route an emergency call toward the appropriate PSAP for the caller's location or towards a responder agency. **Related Terms:** ***External ECRF*** An ECRF instance that resides outside of an NGCS instance. ***Internal ECRF*** An ECRF instance that resides within and is only accessible from an NGCS instance.	In Glossary
EMS ***(Emergency Medical Service)***	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.	In Glossary
ESInet ***(Emergency Services IP Network)***	A 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 NG9-1-1 services. ESInets may be constructed from a mix of dedicated and shared facilities. ESInets may be interconnected at local, regional, state, federal, national, and international levels to form an IP-based inter-network (network of networks). The term ESInet designates the network, not the services that ride on the network. See NG9-1-1 Core Services.	In Glossary

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
ESN (Emergency Service Number)	A 3-5 digit number that represents one or more ESZs (Emergency Service Zone), stored as a 3-5 character numeric string in a GIS database. An ESN is defined as one of two types: Administrative ESN and Routing ESN.	Modify
ESRP (Emergency Service Routing Proxy)	An i3 functional element which is a SIP proxy server that selects the next hop routing within the ESInet based on location and policy. There is an ESRP on the edge of the ESInet. There is usually an ESRP at the entrance to an NG9-1-1 PSAP. There may be one or more intermediate ESRPs between them.	In Glossary
FGDC (Federal Geographic Data Committee)	An interagency coordinating body responsible for facilitating cooperation among federal agencies whose missions include producing and using geospatial data. **External References:** https://www.fgdc.gov	In Glossary
Geocoding	Interpolation-based computational techniques to derive estimates of geographic locations.	In Glossary
Geospatial Call Routing	The use of an ECRF (Emergency Call Routing Function) and GIS (Geographic Information System) data to route an emergency call to the appropriate PSAP or emergency service provider based on the civic location or geographic coordinates provided with the call.	In Glossary
GIS (Geographic Information System)	A system for capturing, storing, displaying, analyzing, and managing data and associated attributes which are spatially referenced.	In Glossary
GIS Attribute	Tabular information about features contained in GIS data.	In Glossary
GIS Data Layer	A spatial dataset containing a common feature type.	Modify

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
IANA (Internet Assigned Numbers Authority)	The departmental entity within ICANN (Internet Corporation for Assigned Names and Numbers) that oversees coordination of global IP address allocation, DNS root zone management, protocol name and number registries, and other Internet protocol assignments. Some NENA documents may use IANA Protocol Registries following the processes described in RFC 8126. **Related Term:** ***IANA Registry*** A place where globally coordinated account records reflecting internet codes and numbers used in technical standards are centrally maintained by the Internet Assigned Numbers Authority, usually at the behest of the IETF. **Relevant NENA Documents:** NENA-STA-010, Detailed Functional and Interface Standards for the NENA i3 Solution **External References:** • IANA website • RFC 8126, Guidelines for Writing an IANA Considerations Section in RFCs	In Glossary
IETF ***(Internet Engineering Task Force)***	Lead standard setting authority for Internet protocols.	In Glossary
ISO ***(International Standards Organization)***	An independent, non-governmental international organization of national standards bodies. **External References:** www.iso.org	In Glossary

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
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. A civic address is considered valid if it can be located within the database uniquely, is suitable to provide an accurate route for an emergency call, and adequate and specific enough to direct responders to the right location.	In Glossary
MCS ***(MSAG Conversion Service)***	A web service providing conversion between PIDF-LO (Presence Information Data Format – Location Object) and MSAG (Master Street Address Guide) data.	In Glossary
Metadata	A record of information, usually presented as an eXtensible Markup Language (XML) document, which captures the basic characteristics of a data or information resource. Metadata records include core library catalog elements such as Title, Abstract, and Publication Data; geographic elements such as Geographic Extent and Projection Information; and database elements such as attribute label definitions and attribute domain values.	Don't Add
MSAG ***(Master Street Address Guide)***	A database of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls.	In Glossary

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
NENA ***(National Emergency Number Association)***	NENA is the National Emergency Number Association, also referred to as The 9-1-1 Association, which is fully dedicated to the continued improvement and modernization of the 9-1-1 emergency communication system. NENA's approach includes research, standards development, training, education, certification, outreach, and advocacy through communication with stakeholders. As an ANSI-accredited Standards Developer, NENA works with 9-1-1 professionals, public policy leaders, emergency services and telecommunications industry partners, like-minded public safety associations, and more. Current NENA activities center on awareness, documentation, and implementation for Next Generation 9-1-1 (NG9-1-1) and international three-digit emergency communication systems. NENA's worldwide members join with the emergency response community in striving to protect human life, preserve property, and maintain the security of all communities. www.nena.org	In Glossary
NGCS (Next Generation 9-1-1 Core Services)	The set of services needed to process a 9-1-1 call on an ESInet. It includes, but is not limited to, the ESRP, ECRF, LVF, BCF, Bridge, Policy Store, Logging Services, and typical IP services such as DNS and DHCP. The term NG9-1-1 Core Services includes the services and not the network on which they operate. See Emergency Services IP Network.	In Glossary
NGUID ***(NENA Globally Unique ID)***	A globally unique ID generated and maintained within a GIS database as defined in NENA-STA-006. Each NGUID MUST be unique.	Modify

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
PIDF-LO ***(Presence Information Data Format – Location Object)***	Provides a flexible and versatile means to represent location information in a SIP header using an XML schema.	In Glossary
PSAP ***(Public Safety Answering Point)***	A physical or virtual entity where 9-1-1 calls are delivered by the 9-1-1 Service Provider. • Primary PSAP: A PSAP to which 9-1-1 calls are routed directly from the 9-1-1 Control Office. • Secondary PSAP: A PSAP to which 9-1-1 calls are transferred from a Primary PSAP. • Alternate PSAP: A PSAP designated to receive calls when the primary PSAP is unable to do so. • Consolidated PSAP: A facility where multiple Public Safety Agencies choose to operate as a single 9-1-1 entity. • Legacy PSAP: A PSAP that cannot process calls received via i3-defined call interfaces (IP-based calls) and still requires the use of CAMA or ISDN trunk technology for delivery of 9-1-1 emergency calls. • Serving PSAP: The PSAP to which a call would normally be routed. • NG9-1-1 PSAP: This term is used to denote a PSAP capable of processing calls and accessing data services as defined in NENA's i3 specification, NENA-STA-010, and referred to therein as an "i3 PSAP." • Virtual PSAP: An operational model directly enabled through NG9-1-1 features and/or network hosted PSAP equipment in which telecommunicators are geographically dispersed, rather than	In Glossary

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
	working from the same physical location. Remote access to the PSAP applications by the dispersed telecommunicators requires the appropriate network connections, security, and work station equipment at the remote location. The virtual work place may be a logical combination of physical PSAPs, or an alternate work environment such as a satellite facility, or any combination of the above. Workers are connected and interoperate via IP connectivity.	
RFC ***(Request for Comment)***	A document published by the Internet Engineering Task Force (IETF). Note that the name is a historic artifact — An RFC is finalized. RFCs are never revised; updates are published as new RFCs. Errata are noted separately. (Documents for which input and comments are requested are called Internet Drafts. Most RFCs are originally published as an Internet Draft)..	In Glossary
SI ***(Spatial Interface)***	A standardized interface between the GIS data and the functional elements that consume GIS data, such as the ECRF, LVF, Mapping Data Service, etc.	Modify
Spatial data	Information stored as coordinates and topology that identifies the geographic location of features and boundaries on Earth. **Also known as:** *Geospatial Data* *Geographic Information*	In Glossary

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
URI ***(Uniform Resource Identifier)***	An identifier consisting of a sequence of characters matching the syntax rule that is named <URI> in RFC 3986 [14]. It enables uniform identification of resources via a set of naming schemes. A URI can be further classified as a locator, a name, or both. The term "Uniform Resource Locator" (URL) refers to the subset of URIs that, in addition to identifying a resource, provides a means of locating the resource by describing its primary access mechanism (e.g., its network "location"). The term "Uniform Resource Name" (URN) has been used historically to refer to both URIs under the "urn" scheme [RFC2141], which are required to remain globally unique and persistent even when the resource ceases to exist or becomes unavailable, and to any other URI with the properties of a name. An example of a URI that is neither a URL nor a URN is **sip:psap@example.com**.	In Glossary
URN ***(Uniform Resource Name)***	A type of URI. Uniform Resource Names (URNs) are intended to serve as persistent, location-independent, resource identifiers and are designed to make it easy to map other namespaces (which share the properties of URNs) into URN-space. An example of a URN is **urn:service:sos**. **External References:** RFC 8141, Uniform Resource Names (URNs)	In Glossary
USPS ***(United States Postal Service)***	An independent agency of the United States government responsible for providing mail service in the United States.	Don't Add

Term or Abbreviation (Expansion)	Definition / Description	Recommendations for NENAkb Glossary
XML (eXtensible Markup Language)	An internet specification for web documents that enables tags to be used that provide functionality beyond that in Hyper Text Markup Language (HTML). In contrast to HTML, XML has the ability to allow information of indeterminate length to be transmitted to a PSAP call taker or dispatcher versus the current restriction that requires information to fit the parameters of pre-defined fields.	In Glossary

10 Recommended Reading and References

[1] National Emergency Number Association. *Master Glossary of 9-1-1 Terminology*. NENA-ADM-000.24-2021. Arlington, VA: NENA, approved June 22, 2021.

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11 Exhibits

Not applicable

Appendix A – United States' Federal Railroad Association (FRA) Rail Lines Database Structure Crosswalk to NENA's RailroadCenterLine Layer

The Federal Railroad Association (FRA) maintains GIS data on the rail system in the United States, including the RailroadCenterLine layer which contains the railway network. The data is available from https://www.bts.gov/geospatial/national-transportation-atlas-database.

This data may be used if no higher quality rail data is available. Before use, it SHOULD be checked for accuracy and completeness in the area of interest, and it MUST be adjusted to meet the database structure requirements in Section 4.6 Railroads.

Table A-1 FRA Rail Lines Database Structure Crosswalk Table

NENA-STA-006 Descriptive Name	NENA-STA-006 Field Name	US FRA Rail Lines Field Name
Discrepancy Agency ID	DiscrpAgID	None: Will be the 911 Authority adjusting the data
Date Updated	DateUpdate	None: Will be the date the 911 Authority performed the adjustment
NENA Globally Unique ID	NGUID	FRAARCID
Rail Line Owner	RLOwn	Rail company identified in RROWNER1
Rail Line Operator	RLOp	Rail company identified in TRKRGHTS1
Rail Line Name	RLName	-
Rail Mile Post Low	RMPL	-
Rail Mile Post High	RMPH	-

Appendix B – Canada's National Railway Network Database Structure Crosswalk to NENA's RailroadCenterLine Layer

The National Railway Network (NRWN) is produced by Natural Resources Canada, for the Canadian Council on Geomatics, with data contributions from the public sector (Transport Canada and mapping agencies of the three levels of government) and the private sector (CN, VIA Rail Canada, Railway Association of Canada, Esri). The NRWN provides the geographic locations of all tracks, crossings, structures (bridges, tunnels, rail ferries) and junctions (diamonds, switches), as well as partial coverage of stations and marker posts. In addition, the NRWN includes a set of attributes such as railway subdivision with start and end mileages, track classification, track name, track operator, track owner, track user, station name, and station type. The NRWN is available at:

https://open.canada.ca/data/en/dataset/ac26807e-a1e8-49fa-87bf-451175a859b8.

This data may be used if no higher quality railroads data is available. Before use, it SHOULD be checked for accuracy and completeness in the area of interest, and it MUST be adjusted to meet the database structure requirements in Section 3.6 Railroads.

Table B-1 National Railway Network Database Structure Crosswalk Table

NENA-STA-006 Descriptive Name	NENA-STA-006 Field Name	NRWN Track Segment Field Name
Discrepancy Agency ID	DiscrpAgID	None: Will be the 911 Authority adjusting the data
Date Updated	DateUpdate	None: Will be the date the 911 Authority performed the adjustment
NENA Globally Unique ID	NGUID	None: Will be the GUID generated by the 911 Authority
Rail Line Owner	RLOwn	Owner Name Name of the company that owns the track system
Rail Line Operator	RLOp	Operator Name Information relative to the rail company that operates the track
Rail Line Name	RLName	Subdivision Name Note: A field Track Name is also available but has no mileages associated. Only subdivision (and operator) is associated with start and end miles.
Rail Mile Post Low	RMPL	Subdivision Start of the linear reference
Rail Mile Post High	RMPH	Subdivision End of the linear reference

Appendix C – United States' National Hydrography Dataset (NHD) Database Structure Crosswalk to NENA's HydrologyLine Layer and HydrologyPolygon Layer

The United States Geological Survey (USGS) maintains the National Hydrography Dataset (NHD) for capturing hydrologic (surface water) features. The data is available from https://www.usgs.gov/core-science-systems/ngp/national-hydrography.

This data may be used if no higher quality hydrologic data is available. Before use, it SHOULD be checked for accuracy and completeness in the area of interest, and it MUST be adjusted to meet the database structure requirements in Section 4.7.1 Hydrology Lines and Section 4.7.2 Hydrology Polygons.

Table C-1 National Hydrography Dataset Database Structure Crosswalk Table: Lines

NENA-STA-006 Descriptive Name	NENA-STA-006 Field Name	US NHD Feature Class and Field Name
Discrepancy Agency ID	DiscrpAgID	None: Will be the 911 Authority adjusting the data
Date Updated	DateUpdate	None: Will be the date the 911 Authority performed the adjustment
NENA Globally Unique ID	NGUID	NHDFlowline:Permanent_Identifier
Hydrology Segment Type	HS_Type	NHDFlowline:FType
Hydrology Segment Name	HS_Name	NHDFlowline:GNIS_Name

Table C-2 National Hydrography Dataset Database Structure Crosswalk Table: Polygons

NENA-STA-006 Descriptive Name	NENA-STA-006 Field Name	US NHD Feature Class and Field Name
Discrepancy Agency ID	DiscrpAgID	None: Will be the 911 Authority adjusting the data
Date Updated	DateUpdate	None: Will be the date the 911 Authority performed the adjustment
NENA Globally Unique ID	NGUID	NHDWaterbody: Permanent_Identifier and NHDArea: Permanent_Identifier
Hydrology Polygon Type	HP_Type	NHDWaterbody: FType and NHDArea: FType
Hydrology Polygon Name	HP_Name	NHDWaterbody: GNIS_Name and NHDArea: GNIS_Name

Appendix D – Canada's National Hydrographic Network Database Structure Crosswalk to NENA's HydrologyLine Layer and HydrologyPolygon Layer

The National Hydrographic Network (NHN) is produced by Natural Resources Canada, for the Canadian Council on Geomatics, from the best available data and is maintained jointly by the federal and interested provincial and territorial partners. The NHN provides the geographic locations of inland surface water bodies such as lakes, reservoirs, watercourses (rivers and streams), canals, islands, drainage networks, geographic names, infrastructure and obstacles. In addition, the NHN includes a set of basic surface water attributes such as: permanency, validity date and planimetric accuracy. The NHN (Canada) and the NHD (US) data has been aligned, converted, and integrated, and therefore provides seamless data for Canada/US transboundary watersheds. The NHN is available at: https://open.canada.ca/data/en/dataset/a4b190fe-e090-4e6d-881e-b87956c07977#wb-auto-6.

This data may be used if no higher quality hydrology data is available. Before use, it SHOULD be checked for accuracy and completeness in the area of interest, and it MUST be adjusted to meet the database structure requirements in Section 3.7.1 Hydrology Lines and Section 3.7.2 Hydrology Polygons.

Table D-1 National Hydrographic Database Structure Crosswalk Table: Lines

NENA-STA-006 Descriptive Name	NENA-STA-006 Field Name	NHN Hydrographic Network Layer Name and Field Name
Discrepancy Agency ID	DiscrpAgID	None: Will be the 911 Authority adjusting the data
Date Updated	DateUpdate	None: Will be the date the 911 Authority performed the adjustment
NENA Globally Unique ID	NGUID	None: Will be the GUID generated by 911 Authority
Hydrology Segment Type	HS_Type	HD_SLWATER_1: TYPE_TEXT Single line hydrographic feature type of waterbody
Hydrology Segment Name	HS_Name	HD_SLWATER_1: NAME_1 Single line hydrographic feature name of the waterbody

Table D-2 National Hydrographic Database Structure Crosswalk Table: Polygons

NENA-STA-006 Descriptive Name	NENA-STA-006 Field Name	NHN Hydrographic Network Layer Name and Field Name
Discrepancy Agency ID	DiscrpAgID	None: Will be the 911 Authority adjusting the data
Date Updated	DateUpdate	None: Will be the date the 911 Authority performed the adjustment
NENA Globally Unique ID	NGUID	None: Will be the GUID generated by 911 Authority
Hydrology Polygon Type	HP_Type	ND_ WATERBODY _2: TYPE_TEXT Type of the waterbody
Hydrology Polygon Name	HP_Name	ND_WATERBODY_2: LAKENAME_1 Name of the waterbody

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