GIS Standard Concept

A review of the Oklahoma NG9-1-1 GIS Standard

DATAMARK

Welcome

- Introductions
- Housekeeping
- Agenda
  - Module 1 – GIS Overview
  - Module 2 – Introduction to GIS Data Models and the OK NG9-1-1 and Addressing Standard
  - Module 3 – Understanding the Oklahoma NG9-1-1 Standard and Requirements
  - Module 4 – Putting it all Together

Technical Glossary

Refer to Section 4.05 for a description of key terms used throughout the training

The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2, Section 4.05 Technical Glossary.

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Module 1: GIS (Geographic Information System) Overview

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What is GIS?

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GIS is…

- A framework for gathering, managing, analyzing and displaying data that has a geographical or spatial component
- An integration of hardware, software, data and people

GIS is…

- A system that allows us to answer questions and make decisions that involve a ‘where’
  - Where is it?
  - How far away is it?
  - What is near it?
  - How do I get to it?
  - Where is the best location to do X?

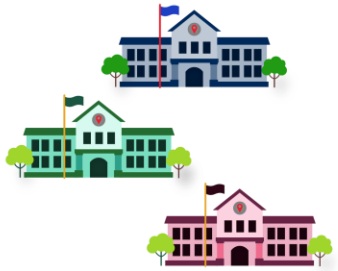
History

1960's

- Canada Land Inventory System
- Harvard Graduate School of Design

1970's

- Expanded use in universities



1980's

- M&S Computing/Bentley Systems-CAD platform
- ESRI-Environmental Systems Research Institute
- ERDAS-Earth Resource Data Analysis System

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GIS uses geospatial data

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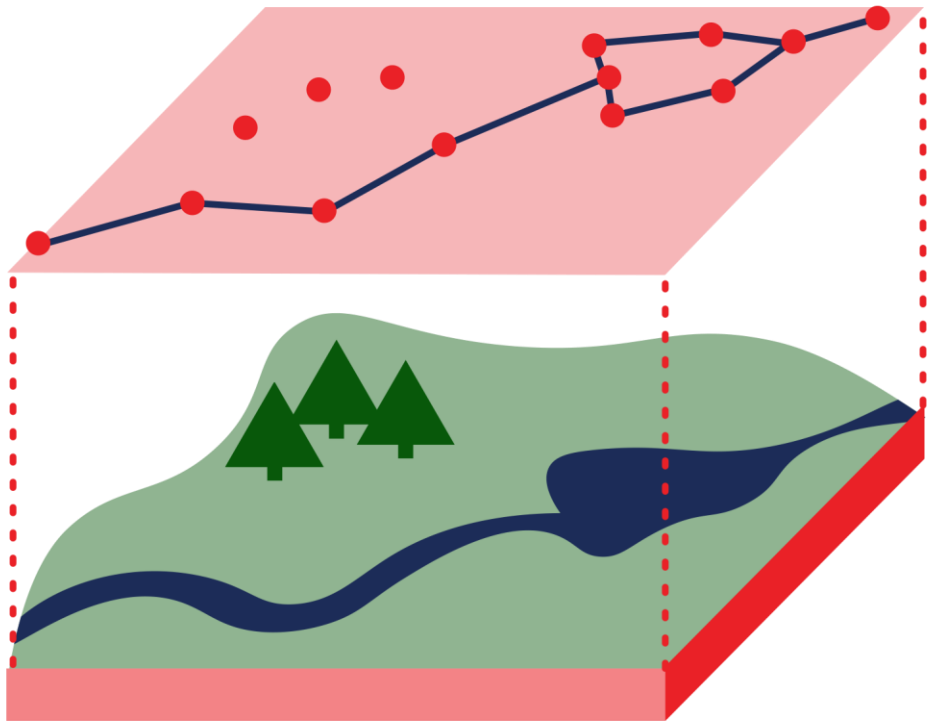
GIS models reality

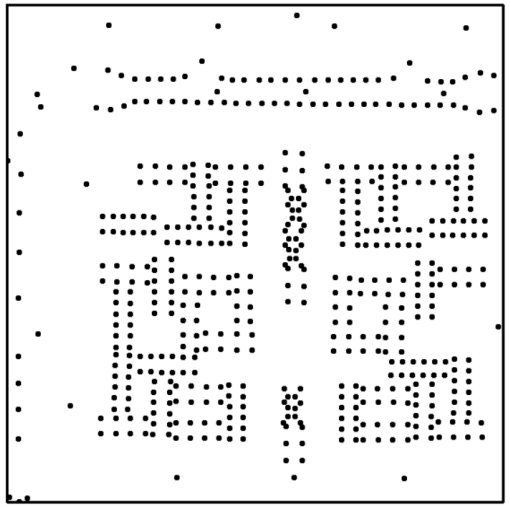
- A combination of cartography, statistical analysis, and database technology
- Identify patterns, relationships, and situations



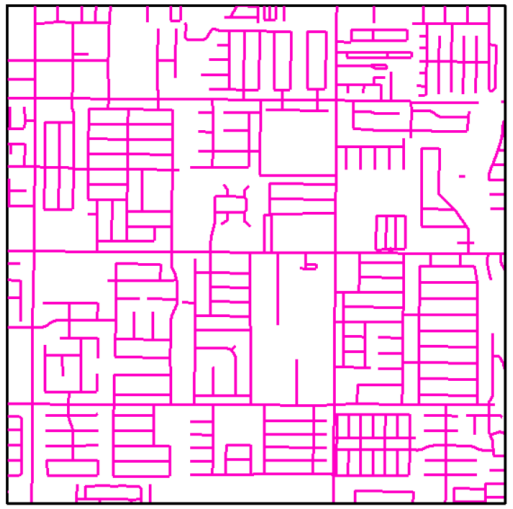
Vector data format

- Points, lines, polygons (areas) whose geometry is defined by their associated x,y coordinate pairs
- Topology rules that model the relationships between points, lines and polygons and determine how they share geometry

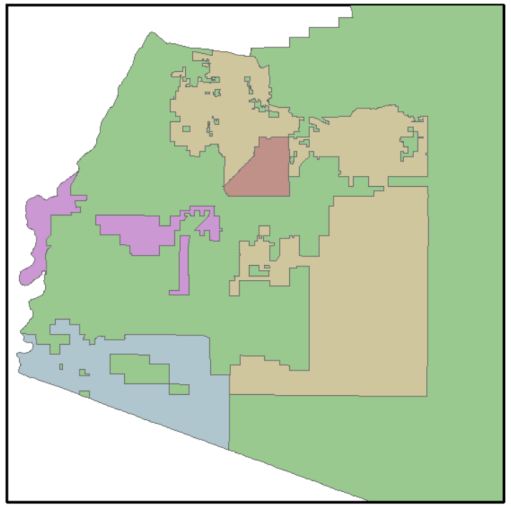
Points



Lines



Polygons



Storage formats for vector data

- Shapefiles
- Geodatabase

Poll Question

Which type of storage format do you use predominantly?
(Shapefile or Geodatabase)

Raster data format

- Matrix of cells organized into rows and columns

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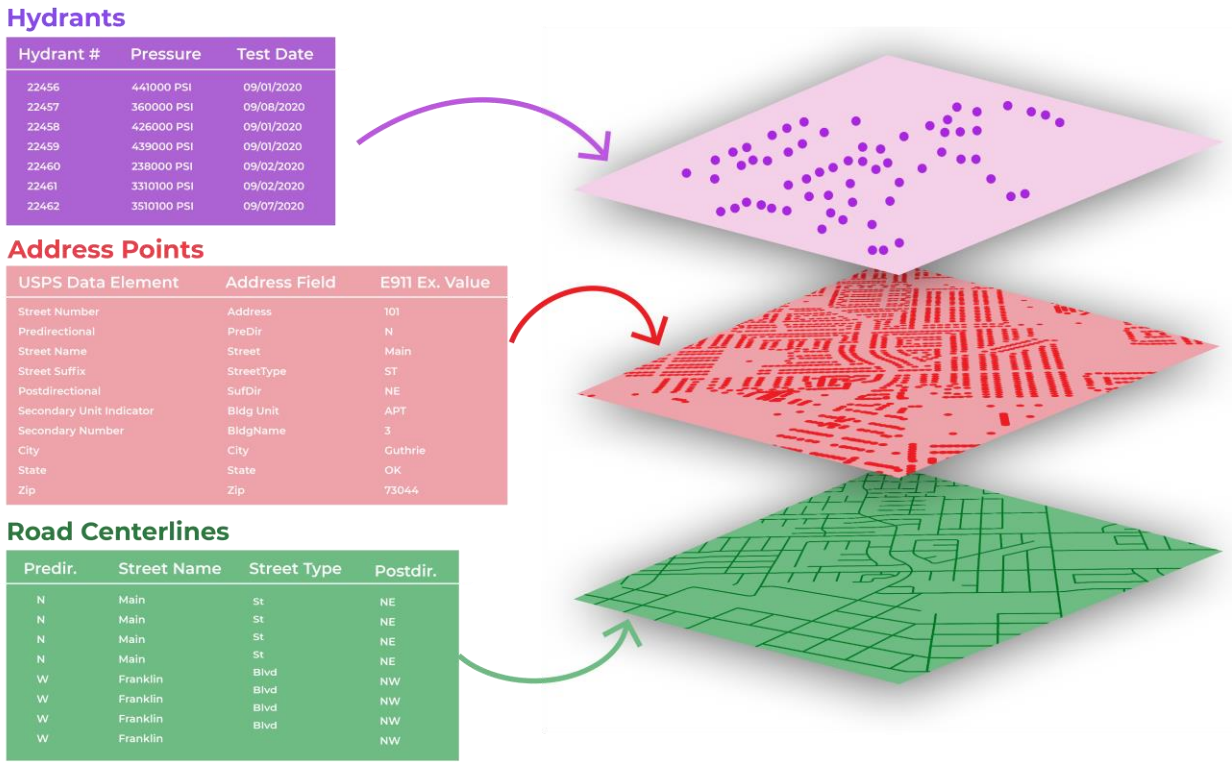
Attributes

- Information about each feature in the data
- Maps are just a picture!
- GIS links maps and data



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Poll Questions

1. Do you use GIS today?

2. What GIS layers do you use or maintain?

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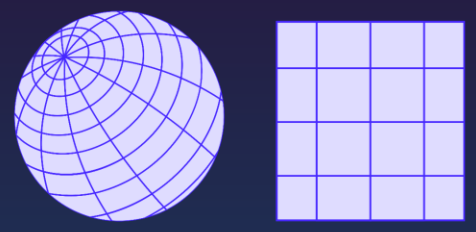
Where does data come from?

- Databases
- Digitized maps
- GPS field collection
- Aerial photography
- Remote sensing

Model the earth: coordinate systems

- Geographic
  - Define locations using a sphere
  - Latitude/longitude based
- Projected
  - Model the earth on a flat surface
- Coordinate systems are integral to NG9-1-1

Model the earth-coordinate systems



Projected Coordinate System

- Flat, 2D surface (map or computer screen)
- Based on a geographic coordinate system
- Locations defined by x, y coordinates
- Enables ground-unit measurement
  - Feet, meters, etc.
- Several different systems depending on area being mapped and what characteristic of the area being preserved (distance, shapem size, etc.)

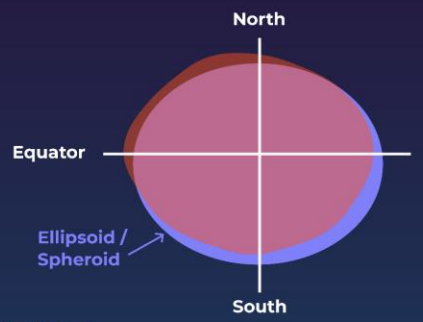
GIS

- Use Arc Toolbox for both geographic and projected coordinate systems
- Verify coordinate system by going through ArcCatalog

Model the earth-coordinate systems

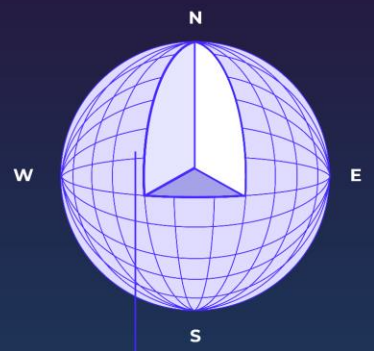
Model the Earth-Spheroid

- Earth is not a perfect sphere
- Spheroid / ellipsoid is more realistic
- Earth is wider along the equator than between poles
- There are numerous spheroids, designed for the area being mapped (local or regional vs. global or geocentric)
  - Clarke 1866 (local)
  - GRS80 (geocentric)



Datum

- Defines position of spheroid relative to center of earth
- Provides frame of reference for measuring locations on surface of the earth
- Defines origin and orientation of latitude/longitude lines
- Based off spheroids
  - NAD1927 local being phased out
  - NAD1983-geocentric most widely used
  - WGS84- geocentric almost identical to NAD83
- Difference in between datums = shift in data



Geographic Coordinate System

- 3D spherical surface to define locations
- Based on datum
- Locations defined by lat/long coordinates
  - Measured in degrees, minutes, seconds
- Not accurate for measuring distanced

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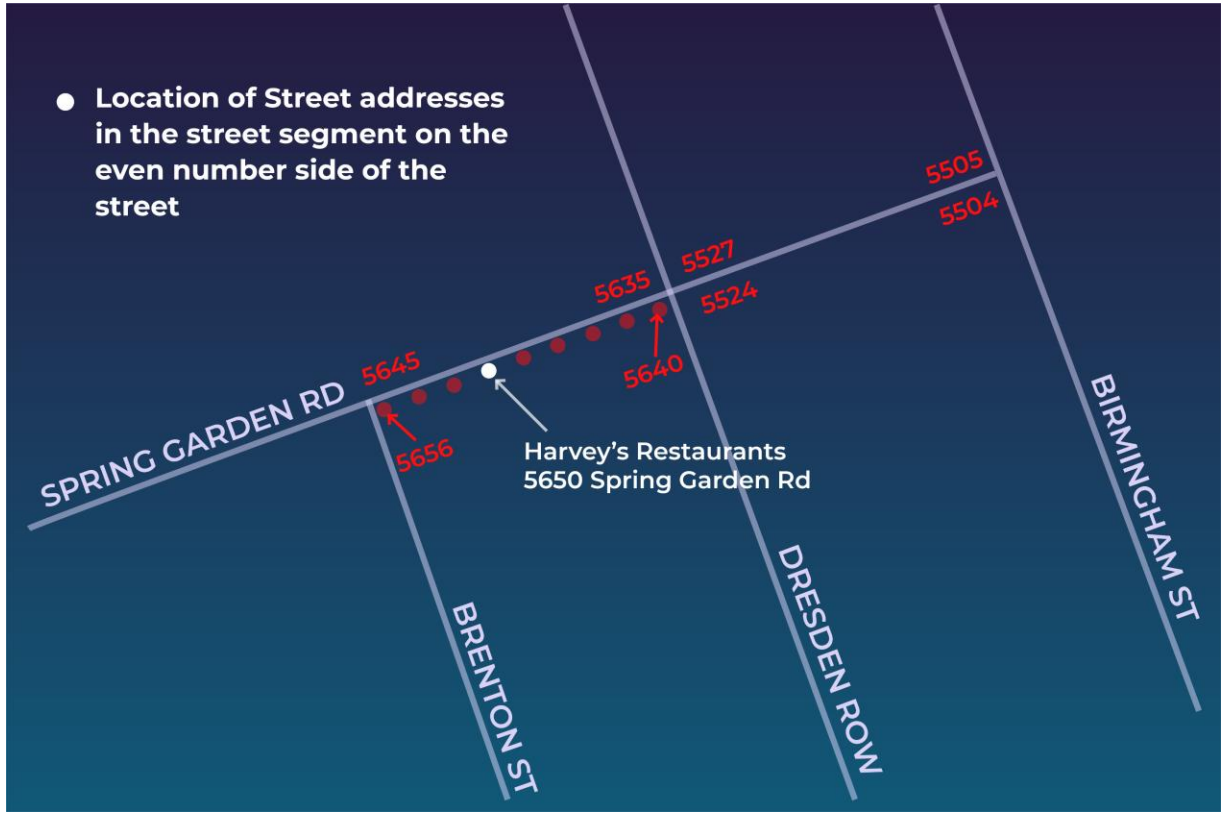
Geocoding

- Point-Based
- Linear-Based
- Composite



What is a GIS data model?

- Describes thematic data layers
  - i.e. road centerlines, address points
- Describes spatial representation/formats of layers
  - i.e. points, lines, polygons
- Attributes of the layers (data schema)
- Defines topology-relationships among features within layers or between other layers
  - i.e. node to node topology for road centerlines
  - i.e. county boundaries must be totally contained by their state boundary

ArcGIS Desktop demo

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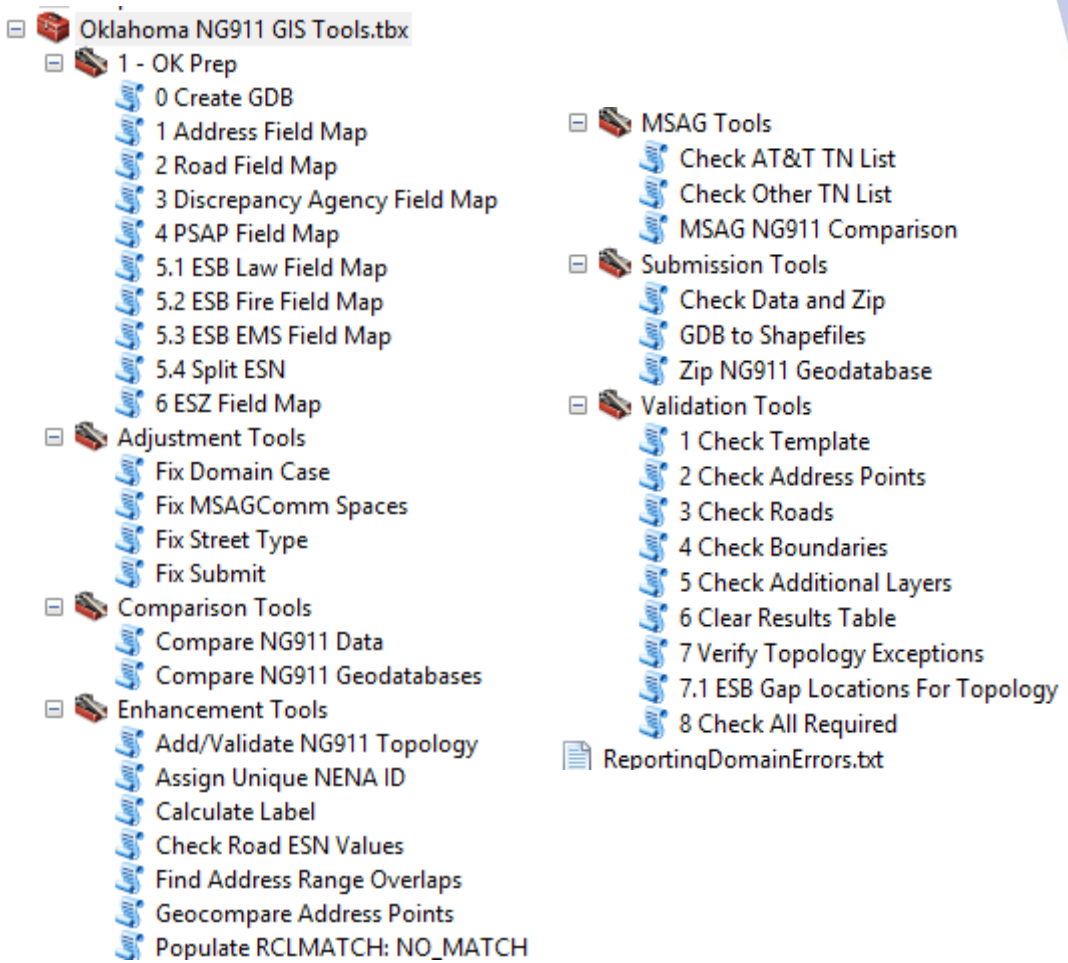
OK Statewide GIS Toolkit

- The State of OK has developed a toolkit to assist in preparing data for NG9-1-1
- A future course(s) will cover tool functionality and a how-to



The State of Oklahoma Geographic Information NG911 and Addressing Standard - Toolkit

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LET’S TAKE A BREAK!
10 minutes

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GIS for the PSAP
E9-1-1 vs NG9-1-1

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How is an emergency located?

- Which PSAP (Public Safety Answering Point) should the call go to?
  - How is the call routed to the appropriate PSAP when someone dials 9-1-1?
- Is the caller's location valid, i.e. locatable?
  - How is the caller located after the call is received?

Enhanced 9-1-1

(Current State 9-1-1)

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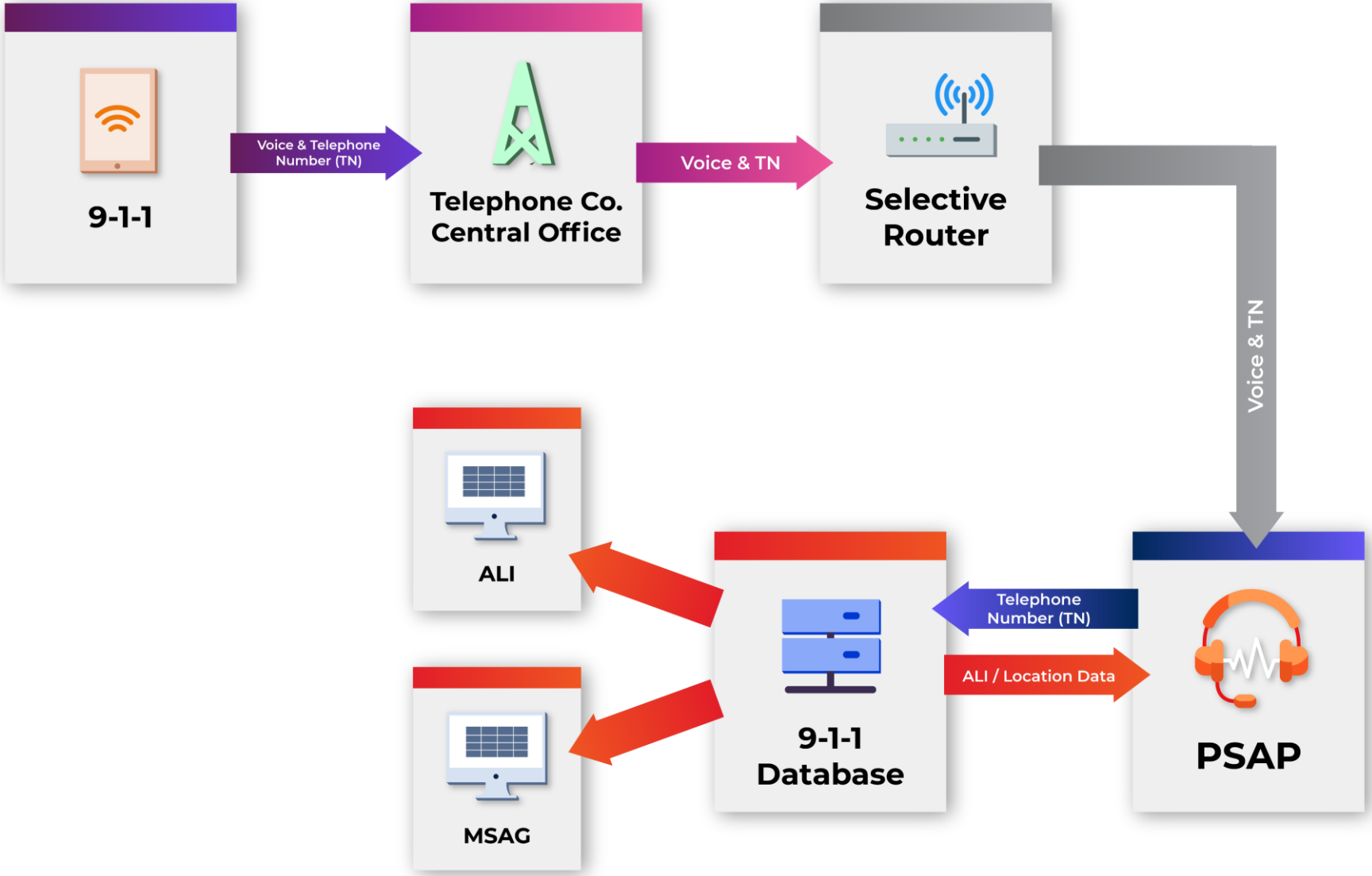
9-1-1
Voice & Telephone Number (TN)
Telephone Co. Central Office
Voice & TN
Selective Router
Voice & TN
ALI
MSAG
9-1-1 Database
Telephone Number (TN)
ALI / Location Data
PSAP

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Automatic Location Information (ALI)

Telephone #	House #	House # Suffix	Street Name	Post Dir	Community Name	State	ESN
4105550001	123		Main ST		North East	MD	00072
4015550002	124		Main ST		North East	MD	00072
4015550003	125		Main ST		North East	MD	00072
4015550004	126	N	Main ST		North East	MD	00072
4105550005	127	N	Main ST		North East	MD	00072
4105550006	128	N	Main ST		North East	MD	00072

Master Street Address Guide (MSAG)

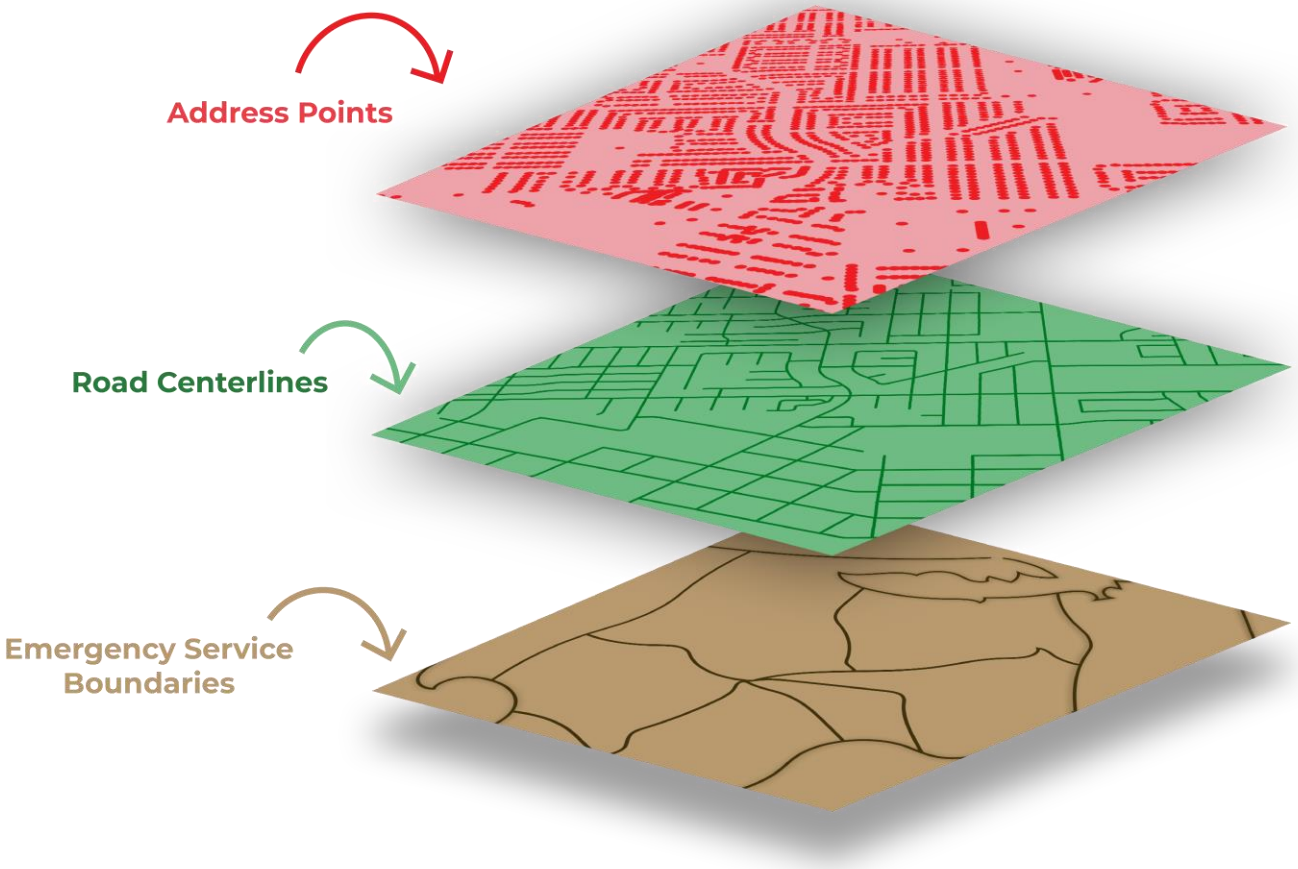
Low	High	Dir	Street	Community	St	ESN	Exch	Entity	MSAG SYS
1500	1798	E	Taylor-Page Ave	Clarinda	CA	4970		416	CASSIA
2050	2138	W	Taylor-Page Ave	New Market	CA	4970		416	CASSIA
2139	2199		Taylor-Page Ave	New Market	CA	4970		416	CASSIA
2700	2798	E	Denver Ave	Velisca	CA	4935		416	CASSIA
1200	1249	W	10th St	Velisca	CA	4935		416	CASSIA
1400	1425		110th St	Atlantic	CA	4954		416	CASSIA

ESN/ESZ/ESB Boundaries

- Emergency Service Number
  - A 3-5 digit number assigned to each record of the MSAG which represents the proper emergency service agencies
- Emergency Service Zone
  - Area related to an ESN (Emergency Service Number)
  - Geometric union of law, fire, and EMS service polygons
- Emergency Service Boundary
  - Polygon representing service areas for emergency service agencies
  - Minimum: PSAP, Law, Fire, EMS, but also Coast Guard, poison control, etc.

E9-1-1 GIS Data

- Address Points
- Road Centerlines
- Emergency Service Zone (ESZ) Boundaries



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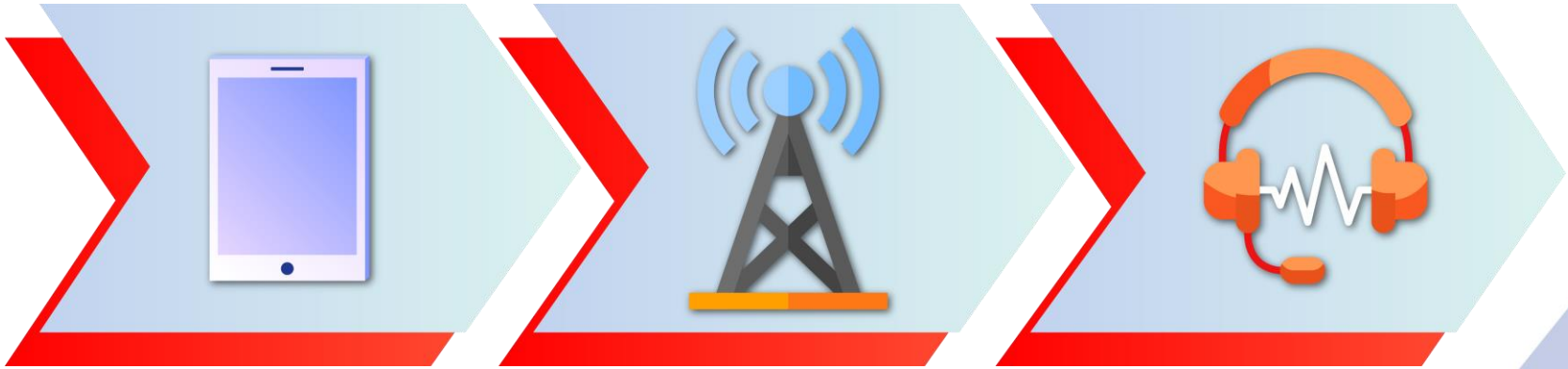
Next Generation 9-1-1



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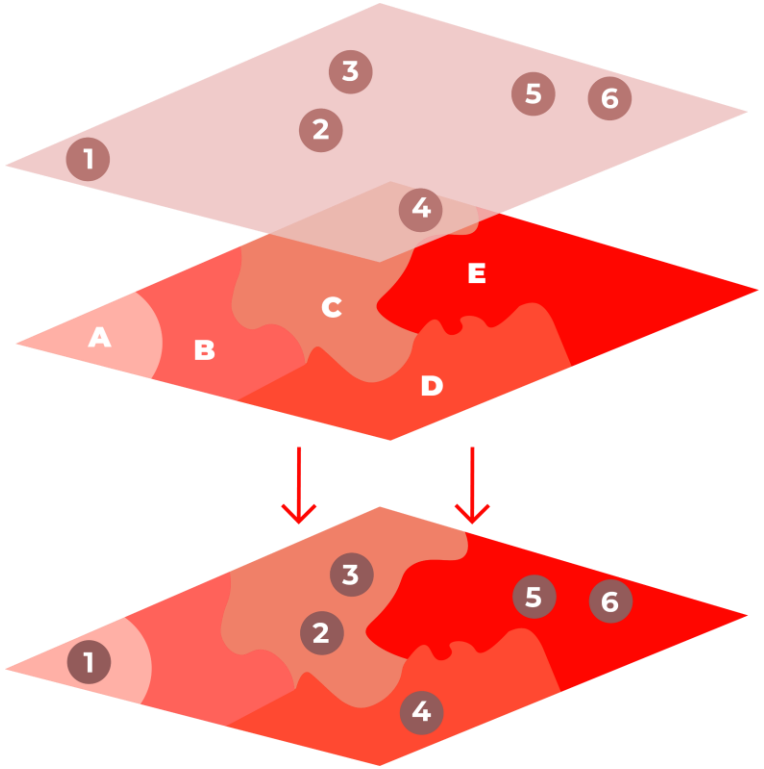
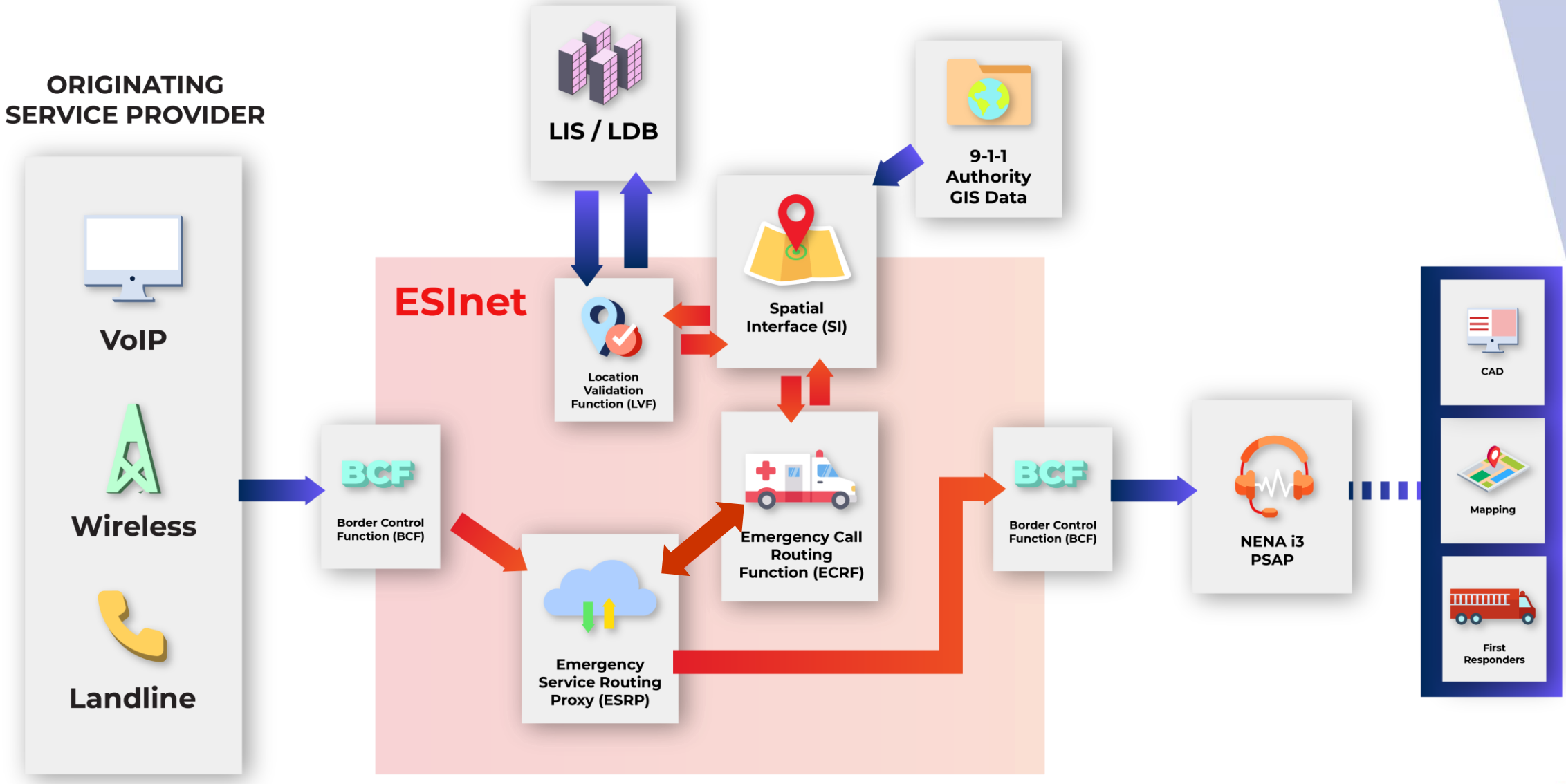
NG9-1-1 GIS data-mission critical!

- Road Centerlines
- Address Points
- PSAP Boundary
- Discrepancy Agency Boundary
- ESB Fire
- ESB Law
- ESB EMS



1	A
2	C
3	C
4	D
5	E
6	E


ORIGINATING SERVICE PROVIDER
VoIP
Wireless
Landline
LIS / LDB
9-1-1 Authority GIS Data
ESInet
Location Validation Function (LVF)
Spatial Interface (SI)
BCF
Border Control Function (BCF)
Emergency Call Routing Function (ECRF)
Emergency Service Routing Proxy (ESRP)
BCF
Border Control Function (BCF)
NENA i3 PSAP
CAD
Mapping
First Responders

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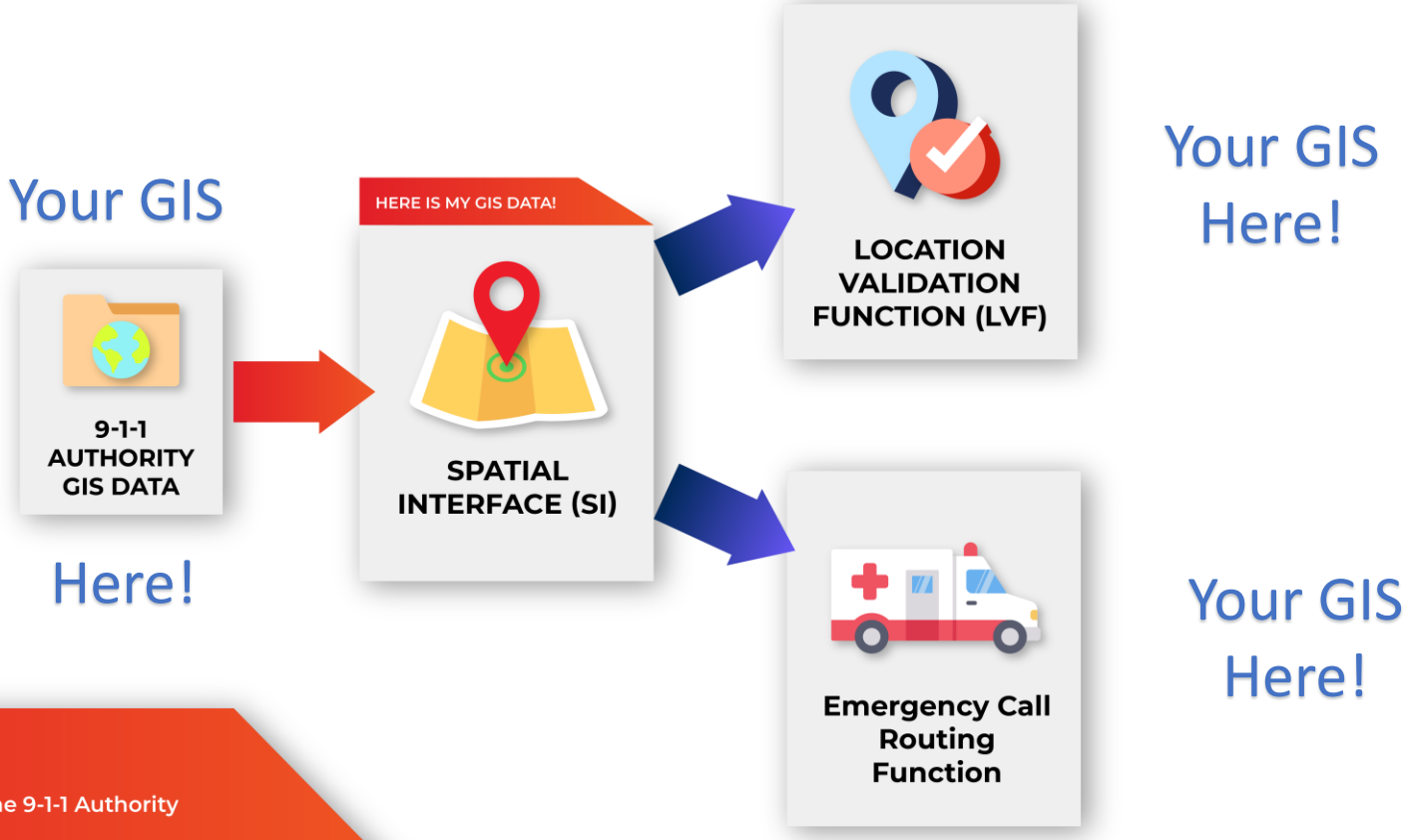
The Spatial Interface (SI)



SI - SPATIAL INTERFACE

- Provides interface between the 9-1-1 Authority GIS Data and LVF and ECRF
- Provisioned by the 9-1-1 Authority, or their designee
- Provisioned Datum WGS 84
- Quality assurance checks can be performed

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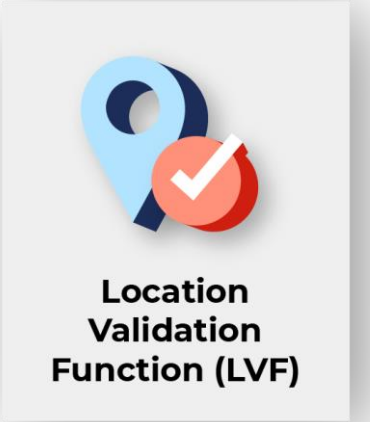
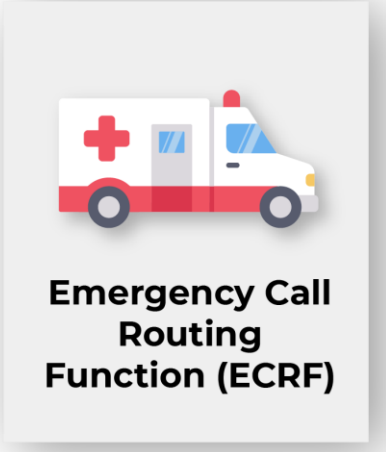


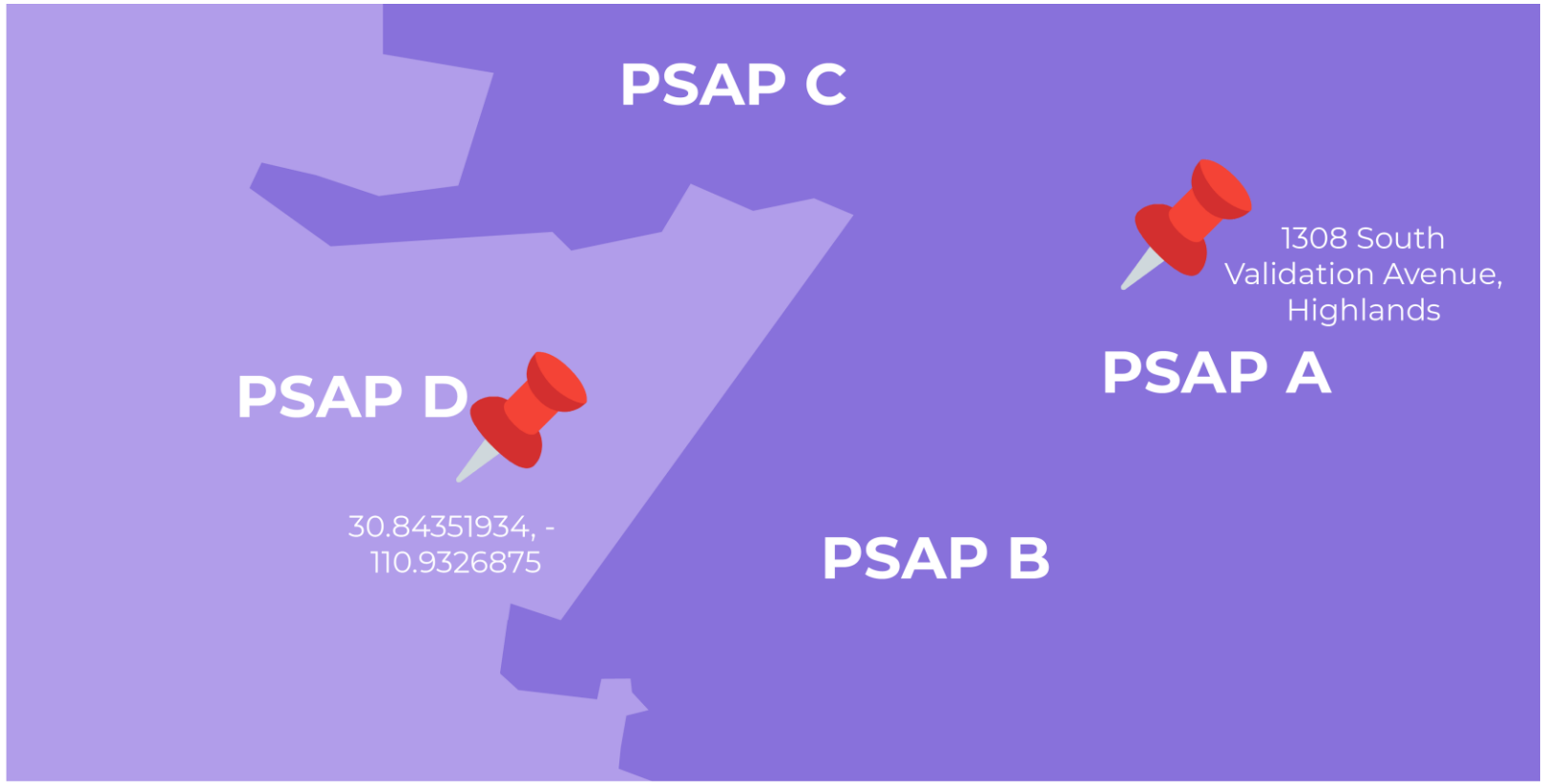
Location Validation Function (LVF) – validates the location information of the caller

- Valid “locations” are pre-verified against the GIS
- Location errors are reported to the GIS Data Authority for analysis and update
  - *i.e.,* A discrepancy report for more than one unique location “found”
- The ‘new’ MSAG



Emergency Call Routing Function (ECRF) – gets the call to the right place

- Determines the correct PSAP to which the call is routed
- Uses a spatial point-in-polygon query to support geospatial call routing
- ‘Validates’ locations differently than the LVF but *uses the same data*


PSAP C
1308 South
Validation Avenue,
Highlands
PSAP A
PSAP D
30.84351934, -
110.9326875
PSAP B


1308
1300
1301
1398
1399

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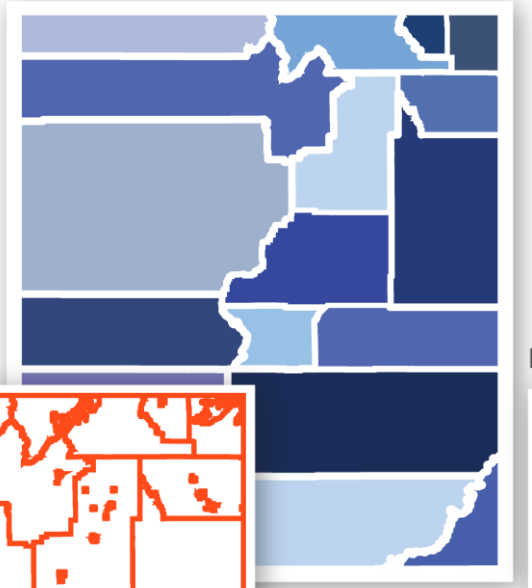
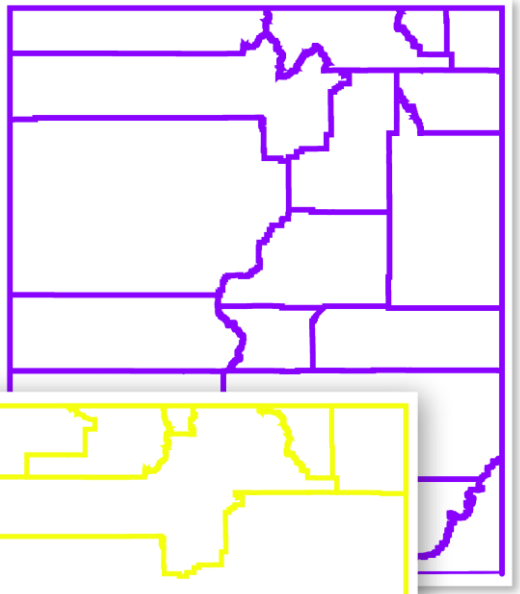
Counties

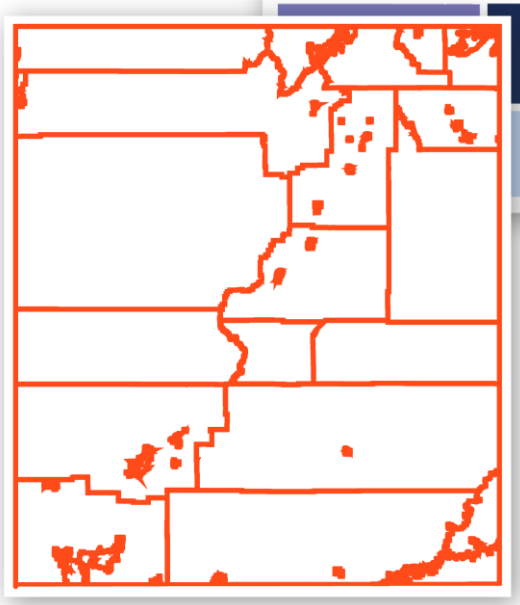


Municipalities

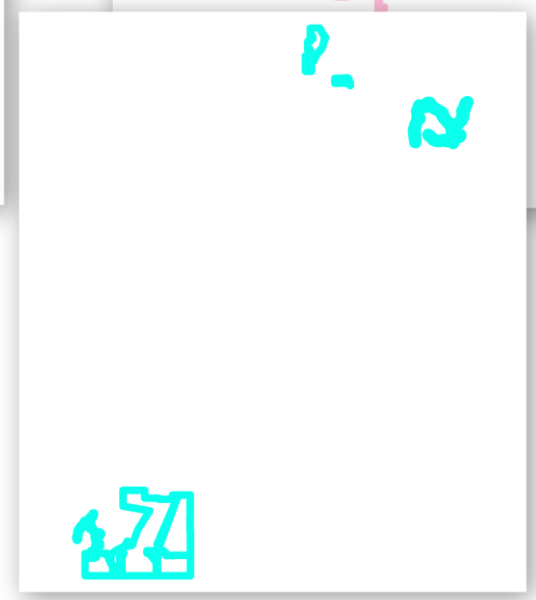
PSAP



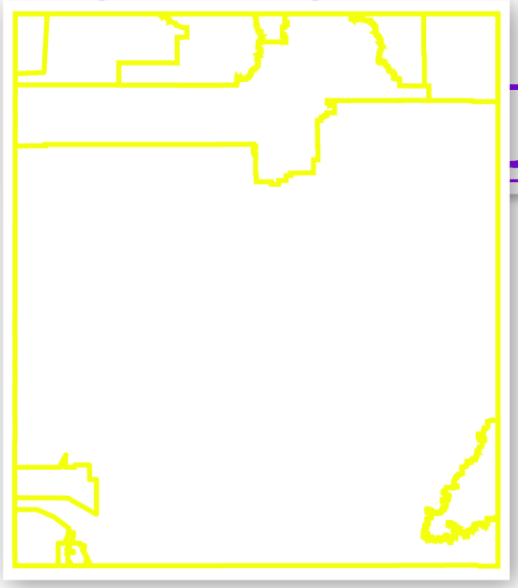
Law Boundaries



Fire



EMS



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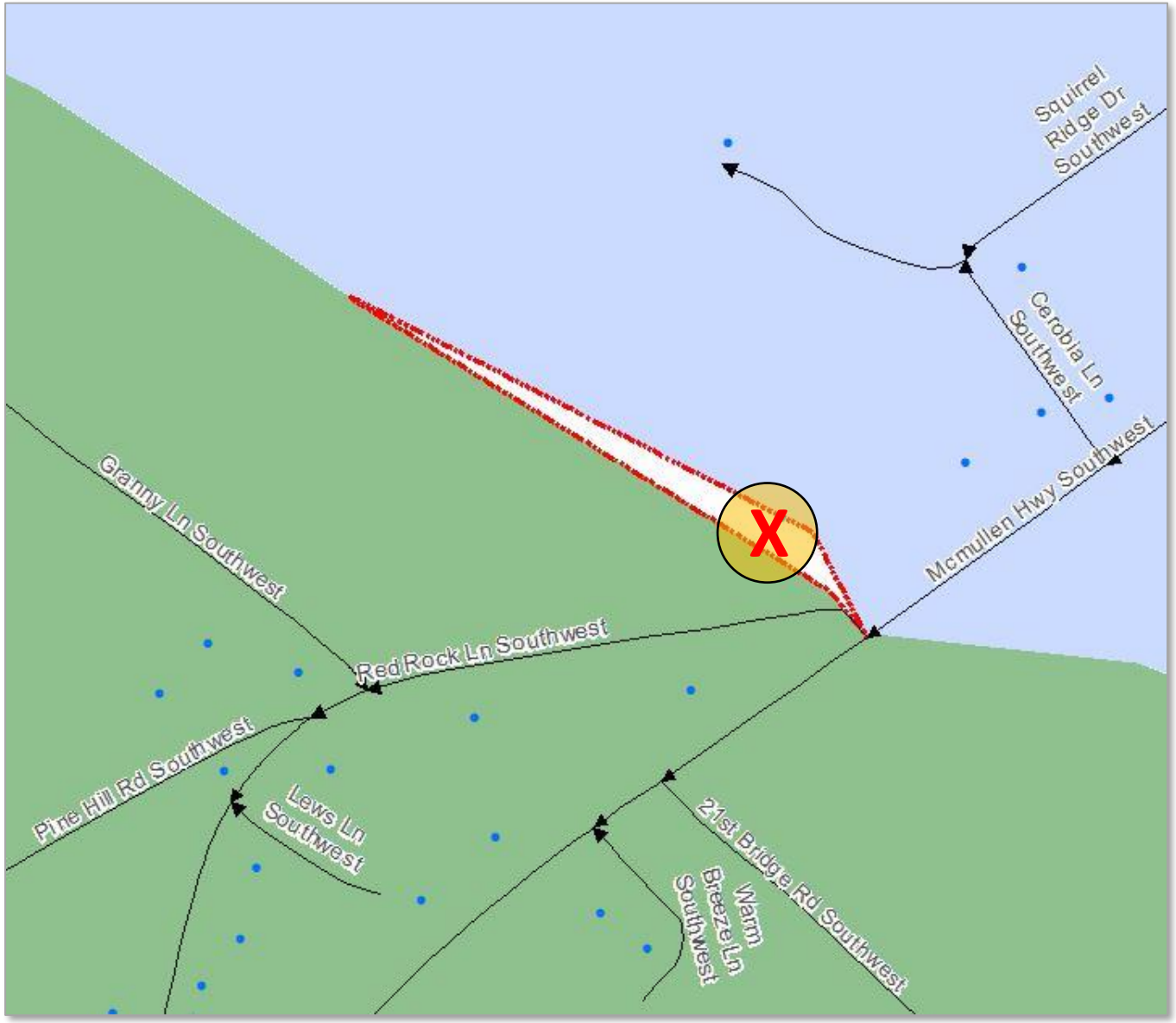
30.084896, -97.701788

DATAMARK


Squirrel Ridge Dr Southwest
Cerobla Ln Southwest
Mcmullen Hwy Southwest
X
Granny Ln Southwest
Red Rock Ln Southwest
Pine Hill Rd Southwest
Lews Ln Southwest
21st Bridge Rd Southwest
Warm Breeze Ln Southwest

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LET’S TAKE A BREAK!
10 minutes

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Module 2: Introduction to GIS Data Models and the Oklahoma NG9-1-1 GIS Standard

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Oklahoma's NG9-1-1 and GIS Standard

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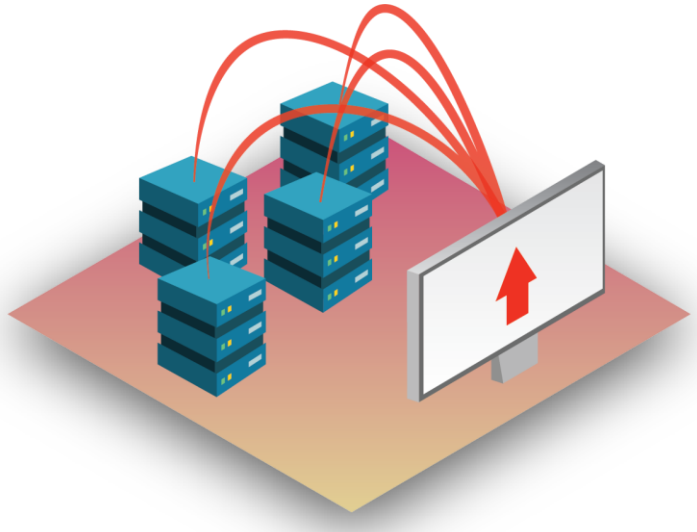
What is a GIS Standard

- Describes recommended practices to facilitate developing, sharing and using GIS data, GIS software, and GIS services
- Technical document for common and repeated use
- Includes recommendations and requirements

Why is a standard necessary?

- Integration of geospatial information
- Diverse datasets
- Establish minimal requirements for addresses
- NG9-1-1 relies on GIS data for emergency call routing
- GIS data used in NG9-1-1 must adhere to the OK Standard



OK NG9-1-1 GIS Standard

- Defines applications and usages associated with NG9-1-1 and the address standard
- Defines components required for accurately representing caller location technology and addresses in a GIS
- NG9-1-1 data defined by the standard must meet or exceed minimum standards to be considered compliant for OK NG9-1-1

The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2.

OK NG9-1-1 GIS Standard

- Supports the NENA Standard for NG9-1-1 GIS Data Model (NENA-STA-006.1.1-2020)
- Defines layers required for NG9-1-1
- Describes spatial representation of layers
  - i.e. street centerlines are a line dataset
- Defines attributes for each dataset
  - i.e. mandatory, conditional, optional, transportation
  - Domain values for standardization

Standard background

1994

- State GIS Council formed

2011

- Address Standard Workgroup formed

2004

- State GIS Council changed to state GI Council, created Office of Geographic Information (OGI)

2016

- Oklahoma 9-1-1 Management Authority created
- Subcommittee for NG9-1-1 deployment in the State
- 9-1-1 Authority and Geographic Information (GI) Council formed a partnership to develop Statewide GIS standard to meet or exceed NENA requirement for NG9-1-1

The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2.

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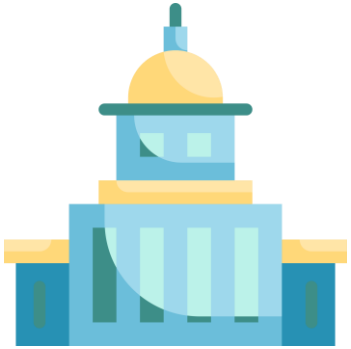
Legislative duties

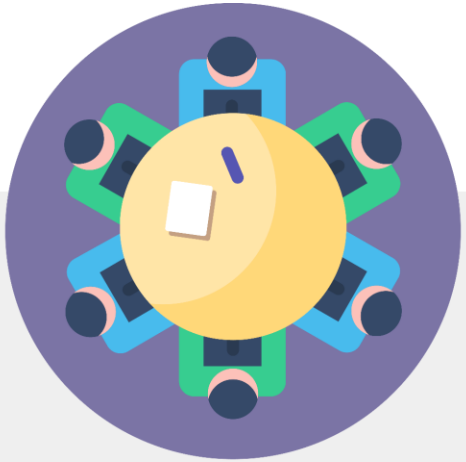


- **The GI Council**
  - Oversee the Office of Geographic Information
  - Development, adoption, and recommendation of standards and procedures that may be applied to geographic information and GIS to promote consistency of data elements
- **Office of Geographic Information**
  - Develop, maintain, update, and interpret GIS standards under direction of the Council and work with state and local agencies

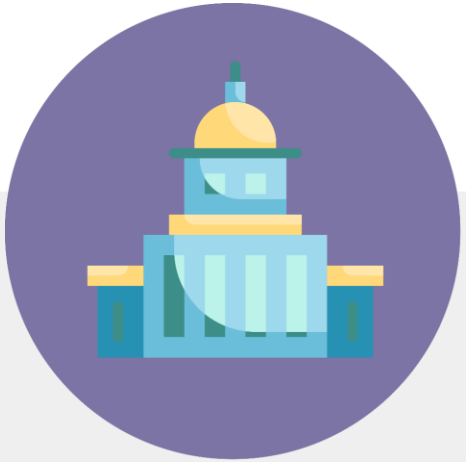
The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.02 Legislative Duties

Standard authority and maintenance

Oklahoma 9-1-1 Management Authority



The Oklahoma Geographic Information Council



Oklahoma Office of Geographic Information

[The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.02 Legislative Duties]

Intended use of the standard

- Primary reference document for NG9-1-1 GIS Components and Address Standards in the State of OK for GIS based addressing, transportation and routing
- Guideline for developing and maintaining NG9-1-1 required GIS datasets
- Provides basic structure/schema for addressing data
- Provides structure for tabular and attribute data
- For both public and private sector

The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.09 and 2.12 (*)

Who should use the standard?

- Approved agencies
  - Public Safety Answering Point (PSAP)
  - Council of Government
  - Vendor
- Agency ID-reference format:

  PSAP: psap.XXXX.ok.gov (XXX is the Registered FCC ID #)

  COG: cog.cogname.ok.gov (Abbreviated name of the COG)

  VENDOR: ven.companyname.ok.gov (Company Name)
- Discrepancy Agency

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The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.19 Approved Agencies

Discrepancy Agency

- Agency officially submits data
- Receives a discrepancy report back from the State of OK NG9-1-1/GIS Repository
- May submit data on behalf of another agency as approved by the State 9-1-1 Coordinator
  - It is always the Discrepancy Agency's responsibility to ensure any discrepancies get resolved back at the local level
- Correct the data IF it is the same Agency that locally maintains the data within their jurisdiction and submits to the State GIS Repository

Data Stewardship

- If a feature has more than one responsible agency (i.e. road between two Agencies), each Agency shall work in conjunction to resolve any conflicts locally for their respective portion of data associated with the feature
- No one method for resolution
- Goal is seamless statewide interoperability and avoidance of confusion
- Clear reference in metadata and tabular data regarding the development and maintenance

The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.20 Data Stewardship

Data Stewardship

- Example:
  - A specific method currently being utilized is two roads of identical geometry (vertices to vertices) that overlap the data of the two owners. The road name within one ownership with a boundary layer separating the road by PARITY (Odd, Even) could have a duplicate road with opposing parity which could be of a different name (Stacking). The direction or purpose of the Discrepancy Agency of the data, whether a multi-jurisdictional collection, COG or State GIS repository, will be to ensure the EDGE Matching of these single owners or stewards to allow for routing topology (intersection breaks, boundary breaks, etc.) between the individual owners.

Data Stewardship

- Guidelines for Maintenance of Municipal Boundary GIS Files
  - Annexations and De-Annexations
  - Minor Corrections to Existing Municipal Boundaries
- 9-1-1 PSAP Boundary Change Request
- Tax Commission Pamphlet

9-1-1 PSAP BOUNDARY CHANGE REQUEST
Oklahoma 9-1-1 Management Authority

APPENDIX B

The Oklahoma 9-1-1 Management Authority (OK911MA) creates population estimates from the primary land line answering areas of Public Safety Answering Points (PSAPs). The percentage of population within the answering area is then compared to the State population estimate and used by the Oklahoma Tax Commission to distribute wireless funding to the local PSAPs. The answering area will also be used in a Next Generation environment to route calls to the correct PSAP. It is important that the polygons representing the boundaries are as accurate and current as possible.

The below instructions are to be followed when a PSAP boundary change or an error is found in the boundary.

1. The notification letter must include the following:
   a. A detailed explanation of the requested change.
   b. Letter from neighboring PSAPs that are impacted by the requested change.
   c. Shapefile of the change
   d. Supporting documentation including but not limited to: Map from the Oklahoma Tax Commission; map error correction; jurisdictional agreements)

2. The notification must be on official agency letterhead and signed by the agency head. The letter can be scanned and emailed or mailed to the State 9-1-1 Coordinators office.
   a. Mail to:
      Oklahoma Emergency Management
      Attn: Oklahoma State 9-1-1 Coordinator
      2401 N Lincoln Blvd.
      Oklahoma City, OK 73105
   b. Email:
      911@OEM.ok.gov

When notification is received, the State 9-1-1 Coordinators office will review the request and send notifications to all PSAPs that could be affected by a change; the notification will include the date in which a response to the possible change is needed. After all impacted areas have reviewed, responded, and agree to the area change, the information will be delivered to the Oklahoma Office of Geographic Information with a request to modify the PSAP boundaries.

The Oklahoma Office of Geographic Information will make the necessary changes and if more details are needed then the impacted PSAPS will be notified by the 9-1-1 Coordinators office. The 9-1-1 Coordinators office will notify each of the PSAPS when the final changes have been made and maps will be provided to each PSAP.

If you have any questions you may reach out to the State 9-1-1 Coordinators Office, they can been reached by phone at 405-521-2481 or by email at 911@oem.ok.gov.

2401 N. Lincoln Blvd. Oklahoma City, OK 73105
405-521-2481 | 911@oem.ok.gov | www.ok.gov/911 | online @911oklahoma | #WhereIsThe911Guy

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Data Stewardship

- Local agency is ultimately responsible for ensuring NG9-1-1 data is maintained and submitted to the State Repository
- How to submit data?
  - Directly work with State of OK NG9-1-1/GIS Repository <u>OR</u>
  - Enter into agreement with other Agencies to allow data to be maintained and/or submitted to Repository on behalf of the local Agency

The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.20 Data Stewardship

LET’S TAKE A BREAK!
10 minutes

DATAMARK

Module 3: Understanding the Oklahoma NG9-1-1 Standard and Requirements

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Understanding the Schema

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Data field requirement attributes

- **Mandatory** (**M**) – field must be populated
  - i.e. “County” field will always have a value such as Garvin County
- **Conditional** (**C**) – IF an attribute value exists, it MUST be populated. If no value exists, the field is left blank unless other guidance is given.
  - i.e. “PreDir” MAY have a value such as “North” in 100 North Main
- **Optional** (**O**) – field must be present but may or may not be populated
- **Transportation** (**T**) – fields that are essential to Transportation and Routing functionality, fields must be present but may or may not be populated
  - “SpeedLimit” may have a value such as 25, which should be included in the field. Default speed should be set at 21 unless the limit is known.

Data field types

- ALPHANUMERIC – any combination of letters, numbers, and characters
- DATETIME – Date/Time format
- NUMERIC – Consisting of whole numbers only (no decimals)
- DECIMAL – Consisting of whole numbers including decimals

Required for all layers

- NGUID-unique identifier for every feature record in the GIS
  - Required for all databases (tabular or spatial)
  - Enable tracking the address data element back to the original owner
  - (LayerName)_(Local911UniqueID)@(Agency_ID)
  - Example: ROAD_CENTERLINE_24965@psap.5585.ok.gov
- Agency ID
- Discrepancy Agency ID
  - Agency that receives the discrepancy report

Schema provided for:

- Address Point
- Road Centerline
- Emergency Service Zone (ESZ) Boundary
- Public Safety Answering Point (PSAP) Boundary
- Emergency Service Boundary (Fire, Law, EMS)
- Discrepancy Agency Boundary (Provisioning Boundary)

Domain values

- Provide a pick list of preset values for various attributes in order to standardize data values both within an organization as well as across multiple jurisdictions
- Prevents introducing human error into attributes

(i) Reference **OK_ADDRESS_SCHEMAS_22.XLS** –PARITY

Code	Description	Data Source - NENA Standard for NG9-1-1 GIS Data Model - NENA-STA-006.1-2018 - 4.88-4.89 -Page 67
O	ODD	https://www.nena.org/resource/resmgr/standards/nena-sta-006_ng9-1-1_gis_dat.pdf
E	EVEN	
B	BOTH	
Z	ZERO	

Address Points:

Maintained at the local agency level and submitted to the State of Oklahoma NG9-1-1/GIS Repository

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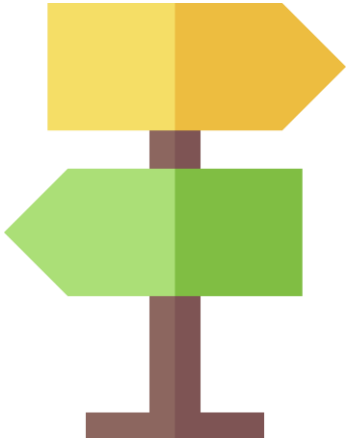
Address data formats

- Addresses exist in one of three formats:
  - Single address field or multiple fields in tabular database
  - Specific address associated with a spatial point feature
  - Address range associated with a linear feature, i.e. a street



The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.05 Address Formats

NENA Next Generation 9-1-1 (NG9-1-1) United States
Civic Location Data Exchange Format (CLDXF) Standard
NENA-STA-004.1.1-2014, March 23, 2014

C3. Address Number Data Elements

Complete Address Number	*Address Number Prefix*	*Address Number*	*Address Number Suffix*	Notes
123		123		Ordinary integer *Address Number*
210		210		Ordinary integer *Address Number*
12005		12005		Ordinary integer *Address Number*
119 ½		119	½	*Address Number* with *Address Number Suffix*
123B		123	B	*Address Number* with *Address Number Suffix*
121 E		121	E	*Address Number* with *Address Number Suffix;* includes the space
A119	A	119		*Address Number* with alphanumeric prefix (Toa Alta, Puerto Rico)
194-23	194-	23		*Address Number Prefix* with hyphen (Que
194-03	194-0	3		*Address Number Prefix* with hyphen and l
194-03 ½	194-0	3	½	*Address Number Prefix* with hyphen and l address number includes Address Number
5-5415	5-	5415		*Address Number Prefix* with hyphen (Han
0123	0	123		Leading zero as *Address Number Prefix* (f

```
    <civicAddress
        xmlns-“urn:ieft:params:xml:ns:pidf:geopriv10:civicAddr”>
        <country>US</country>
        <A1>OH</A1>
        <A3>Columbus</A3>
        <RD>Airport</RD>
        <STS>Drive</STS>
        <HNO>2901</HNO>
        <NAM>Courtyard Marriott</NAM>
        <PC>43219</PC>
        <ROOM>Board Room B</ROOM>
    <civicAddress>
</location>
<service>urn:service:sos</service>
```

Address Exchange

OK NG9-1-1 and Addressing Standard:
Address Point Schema

Field Name	Field Description
DiscrpAgID	Discrepancy Agency ID (Agency that receives the Discrepancy Report)
NGUID_ADD	NENA Globally Unique ID : (LayerName)_(Local911UniqueID)@(Agency_ID)
Agency_ID	ID Assigned to each Agency by the State of Oklahoma 911 Coordinator
FullAddr	Full Address (ie.101 West Main Street)
FullName	Full Name of the Primary Street
Label	Map Label of the Address
AddPre	Extension that Precedes an Address Number (ie "A" 100 North Main Street)
Address	Address Number (ie "100" North Main Street)
AddSuf	House Number Suffix (ie 100 A)
PreMod	Primary Street Modifier (ie "Old" Church Street)
PreDir	Primary Street))Directional Prefix (ie "North" Main Street) (Unabbreviated DIRECTION Domain)
PreType	Primary Street Prefix Type (ie "Highway" 70 East)
PreTypeSep	Primary Street Name Pre Type Separator (ie Circle "in the" Woods)
Street	Primary Street Name (ie North "Main" Street)
StreetType	Primary Street Type (ie North Main "Street") (Unabbreviated STREETTYPE Domain)
SufDir	Primary Street Directional Suffix (ie Highway 70 "East") (Unabbreviated DIRECTION Domain)
SufMod	Primary Street Name Suffix Modifier (ie North Main Street "Extension")
Country	Name of Country the Address Resides In (US) (Abbreviated COUNTRY Domain)
State	Name of the State the Address Resides In (OK) (Abbreviated STATE Domain)
County	Name of the County the Address Resides In (Kay County)
City	Name of the Municipality the Address Resides In

Address Exchange

NENA PIDF-LO Elements

<country>US</country>
<A1>OH</A1>
<A3>Columbus</A3>
<RD>Airport</RD>
<STS>Drive</STS>
<HNO>2901</HNO>
<NAM>Courtyard Marriott</NAM>
<PC>43219</PC>
<ROOM>Board Room B</ROOM>

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Address Number Elements

- Indicate where along a thoroughfare the numbered feature is found
  - Address Number Prefix, Address Number, Address Number Suffix, Milepost

OK NG9-1-1 and Addressing Standard Schema Fields:

AddPre	Extension that Precedes an Address Number (ie "A" 100 North Main Street)	ALPHANUMERIC	15	C
Address	Address Number (ie "100" North Main Street)	NUMERIC	6	C
AddSuf	House Number Suffix (ie 100 A)	ALPHANUMERIC	15	C
MilePost	Mile Post	ALPHANUMERIC	150	C

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National Emergency Number Association (NENA) Next Generation 9-1-1 United States Civic Location Data Exchange Format (CLDXF), NENA-STA-004.1.1-2014

Subaddress Elements

- Occur within a wide variety of residential and commercial buildings
  - **Building** - One among a group of buildings that have the same address number and complete street name
    - *Building A* in 456 Oak Street, Building A, Apartment 206
  - **Floor** - A floor, story, or level within a building
    - *Floor 5* in 800 Jefferson Street, Floor 5
  - **Unit** - A group or suite of rooms within a building that are under common ownership or tenancy, typically having a common primary entrance
    - *Apartment 12* in 422 Via Casitas, Apartment 12

National Emergency Number Association (NENA) Next Generation 9-1-1 United States Civic Location Data Exchange Format (CLDXF), NENA-STA-004.1.1-2014

Subaddress Elements contd.

- **Room** - A single room within a building
  - *Room 137* in 123 Main Street, Room 137
  - *Lobby* in 1200 Main Street, Lobby
- **Seat** - A place where a person might sit within a building
  - *Cubicle 23* in 2500 Seventh Street, Room 105, Cubicle 23
  - *Registration Desk* in Grand Hotel, 1101 Madison Street, Registration Desk
- **Additional Location Information** - A part of a subaddress that is not a building, floor, unit, room, or seat
  - *Loading Dock* in 1601 Terminal Street, Loading Dock

National Emergency Number Association (NENA) Next Generation 9-1-1 United States Civic Location Data Exchange Format (CLDXF), NENA-STA-004.1.1-2014

Subaddress Elements

OK NG9-1-1 and Addressing Standard Schema Fields:

AddtnlLoc	Additional Location Information (ie Loading Dock, Gate A1, West Wing)	ALPHANUMERIC	225	O
BldgName	Building or Unit Name (ie Building A, Building 1)	ALPHANUMERIC	75	O
Floor	Floor of the Building	ALPHANUMERIC	75	O
BldgUnit	Building Unit Type (ie Suite B, Apartment 206)	ALPHANUMERIC	75	O
Room	Room Number in the Building	ALPHANUMERIC	75	O
Seat	Seat in the Room	ALPHANUMERIC	75	O

Address Descriptor

- Describes type of feature indicated at an address
  - Place Type
  - Airport, arena, bank, hospital, hotel, government, industrial, library, office, parking, warehouse, water, etc.

OK NG9-1-1 and Addressing Standard Schema Fields:

PlaceType	Type of Feature Identified by an Address	ALPHANUMERIC	50	O

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National Emergency Number Association (NENA) Next Generation 9-1-1 United States Civic Location Data Exchange Format (CLDXF), NENA-STA-004.1.1-2014

Street Name Elements

- Street Name Pre Modifier (*Alternate* in Alternate Route 8)
- Street Name Pre Directional (*North* in North Fairfax Drive)
- Street Name Pre Type (*Avenue* in Avenue A; *County Route* in County Route 88)
- Street Name Pre Type Separator (*of the* in Avenue of the Americas)
- Street Name (*Fairfax* in North Fairfax Avenue)
- Street Name Post Type (*Avenue* in North Fairfax Avenue)
- Street Name Post Directional (*East* in Seventh Street East)
- Street Name Post Modifier (*Extended* in East End Avenue Extended)

National Emergency Number Association (NENA) Next Generation 9-1-1 United States Civic Location Data Exchange Format (CLDXF), NENA-STA-004.1.1-2014

Street Name Elements

OK NG9-1-1 and Addressing Standard Schema Fields:

PreMod	Primary Street Modifier (ie "Old" Church Street)	ALPHANUMERIC	15	C	
PreDir	Primary Street))Directional Prefix (ie "North" Main Street) (Unabbreviated DIRECTION Domain)	ALPHANUMERIC	9	C	DIRECTION
PreType	Primary Street Prefix Type (ie "Highway" 70 East)	ALPHANUMERIC	50	C	STREETTYPE
PreTypeSep	Primary Street Name Pre Type Separator (ie Circle "in the" Woods)	ALPHANUMERIC	20	C	SEPARATOR
Street	Primary Street Name (ie North "Main" Street)	ALPHANUMERIC	60	C	
StreetType	Primary Street Type (ie North Main "Street") (Unabbreviated STREETTYPE Domain)	ALPHANUMERIC	50	C	STREETTYPE
SufDir	Primary Street Directional Suffix (ie Highway 70 "East") (Unabbreviated DIRECTION Domain)	ALPHANUMERIC	9	C	DIRECTION
SufMod	Primary Street Name Suffix Modifier (ie North Main Street "Extension")	ALPHANUMERIC	25	C	

Country, State, and Place Name Elements

- Legislative: created by law
  - Country, State, County, City

- Postal: recognized & assigned by USPS
  - Postal Community Name, Postal Code

- Unofficial: neighborhoods, subdivisions, shopping districts, crossroads, hamlets (informal use & recognition)
  - Unincorporated Community, Neighborhood Community

National Emergency Number Association (NENA) Next Generation 9-1-1 United States Civic Location Data Exchange Format (CLDXF), NENA-STA-004.1.1-2014

Country, State, and Place Name Elements

OK NG9-1-1 and Addressing Standard Schema Fields:

Country	Name of Country the Address Resides In (US) (Abbreviated COUNTRY Domain)	ALPHANUMERIC	2	M	COUNTRY
State	Name of the State the Address Resides In (OK) (Abbreviated STATE Domain)	ALPHANUMERIC	2	M	STATE
County	Name of the County the Address Resides In (Kay County)	ALPHANUMERIC	40	M	COUNTY
City	Name of the Municipality the Address Resides In	ALPHANUMERIC	100	M	
UnincComm	Name of the Unincorporated Community the Address Resides In	ALPHANUMERIC	100	O	
NbrhdComm	Name of Neighborhood, Subdivision, Community	ALPHANUMERIC	100	O	
PostComm	Postal Community	ALPHANUMERIC	40	C	
Zipcode	Zipcode	ALPHANUMERIC	7	C	

National Emergency Number Association (NENA) Next Generation 9-1-1 United States Civic Location Data Exchange Format (CLDXF), NENA-STA-004.1.1-2014

Landmark Name Elements

- The name or collection of names by which a prominent feature is publicly known
- Specifies a location by naming it
- May be given in place of or in addition to an address
  - Landmark Name Part, Complete Landmark Name

LandmkName	Business or Agency at the Address	ALPHANUMERIC	150	C

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National Emergency Number Association (NENA) Next Generation 9-1-1 United States Civic Location Data Exchange Format (CLDXF), NENA-STA-004.1.1-2014

Essential address elements and parsing

USPS Publication 28 Data Element	OK Address Standard Field Name	E911 Example Value
Street Number	Address	101
Predirectional	PreDir	N
Street Name	Street	Main
Street Suffix	StreetType	ST
Postdirectional	SufDir	NE
Secondary Unit Indicator	BldgUnit	APT
Secondary Number	BldgName	3
City	City	Guthrie
State	State	OK
Zipcode	Zipcode	73044

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The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.06 Essential Address Elements – USPS Publication 28

Road Centerlines:

Maintained at the local agency level and submitted to the State of Oklahoma NG9-1-1/GIS Repository

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Transportation Related Data Elements

- Transportation fields have been included for other public safety applications
- Transportation denotes fields that are only essential to transportation and routing functionality
- Data fields <u>must be present</u> but <u>may or may not be populated</u>

FromLevel	Level from Overpass / Underpass	ALPHANUMERIC	10	T
ToLevel	Level to Overpass / Underpass	ALPHANUMERIC	10	T
BoundLane	Direction of the Lane of Traffic if Dedicated Direction	ALPHANUMERIC	9	T
RoadLength	Length of Street Segment	DECIMAL	15	T
DriveTime	Drivetime of the Street Segment	DECIMAL	15	T
DeadEnd	Dead End Street Segment	ALPHANUMERIC	1	T
Surface	Paving Surface of the Street	ALPHANUMERIC	10	T
Lanes	Number of Lanes Represented by the Street Segment	ALPHANUMERIC	5	T
Toll	Requires Toll to Access	ALPHANUMERIC	1	T
LtdAccess	Limited Access to the General Public	ALPHANUMERIC	1	T

Emergency Service Zone (ESZ) Boundary:

Maintained at the local agency level and submitted to the State of Oklahoma NG9-1-1/GIS Repository

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Emergency Service Boundary (ESB):

Maintained at the local agency level and submitted to the State of Oklahoma NG9-1-1/GIS Repository

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Public Safety Answer Point (PSAP) Boundary:

Maintained at a statewide dataset housed in the State of Oklahoma NG9-1-1/GIS Repository

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Discrepancy Agency Boundary:

Maintained at a statewide dataset housed in the State of Oklahoma NG9-1-1/GIS Repository

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ECRF & LVF recommended layers

- Street Name Alias Table
- Landmark Name Part Table
- Complete Landmark as Table
- States
- Counties
- Incorporated Municipal Boundaries (aka City)
- Unincorporated Community Boundaries
- Neighborhood Community Boundaries
- Other ESB (Poison Control, Forest Service, Animal Control)

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The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 3.07 Other Recommended Layers

Other recommended layers

- Railroad Centerline
- Hydrology Line
- Hydrology Polygon
- Cell Site Location
- Mile Marker Location

Data Quality and Accuracy

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Data Quality

Accuracy

Currency

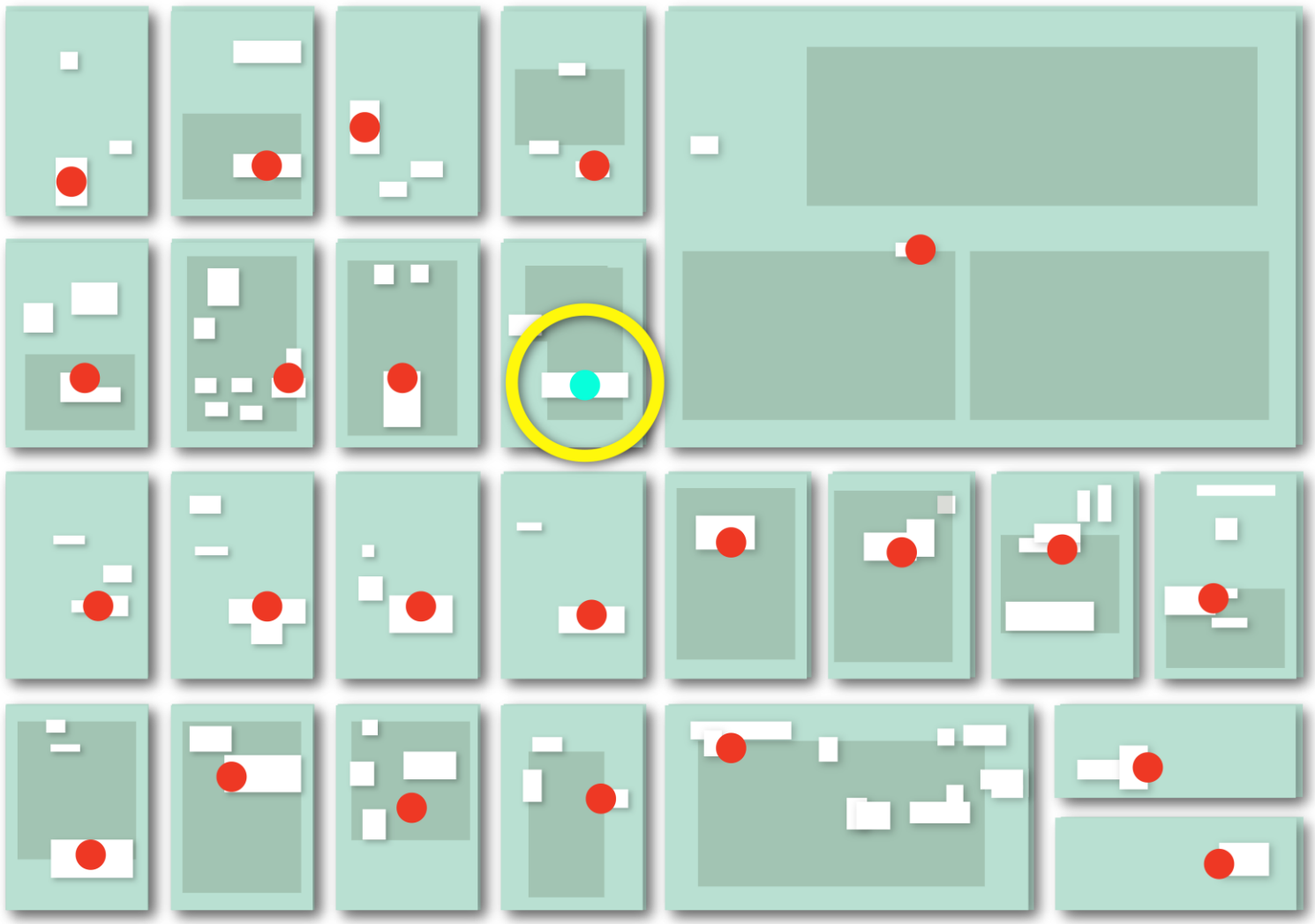
Consistency

Completeness

Positional Accuracy

- Absolute - A measure of the location of features on a map compared to their true position on the face of the earth
- Relative - A measure of the accuracy of individual features on a map when compared to other features on the same map.
- Equipment and methodology used to acquire and derive data must be that of a grade capable of collecting data to within a horizontal accuracy of +/- 13.1234 feet at 95% confidence

The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.16 Positional Accuracy Standards



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Spatial Reference

EPSG: 4326 WGS 84 / Latlong
Projection: Geographic, Plate Carrée, Equidistant Cylindrical, Equirectangular
Latitude of the origin: 0°
Longitude of the origin: 0°
Scaling factor: 1
False eastings: 0°
False northings: 0°
Ellipsoid: WGS84
Horizontal Datum: WGS84
Vertical Datum: WGS84 Geoid, which is equivalent to Local Mean Sea Level (MSL)
Units: decimal degrees
Global extent: -180, -90, 180, 90

The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.17 Spatial Reference

Content Accuracy

- The individual components of the data must be complete (filled in where appropriate) and contain the correct information.
- The data must be correct for the location in question. Routing to someplace is important but locating that someplace is critical.
- The data must be correct sequentially in terms of its relationship with the overall addressing schema.
- The data must be both current and valid regarding content in order to function correctly.

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The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.18 Content Accuracy

Currency

- Data provisioned into 911 systems should be current
- Discrepancies must be resolved within three business days

NENA Next Generation 9-1-1 Data Management Requirements (NENA-REQ-002.1-2016, March 10, 2016)

Consistency: Standard Addressing Practices

- NGUID
- Legacy fields
- Alias tables
- Abbreviations
- Street naming
- Vanity street names
- Avoiding obvious conflicts
- Street segment break & naming rules
- Non-grid street names
- Street types
- Logical address consistency
- Consistency with distance-based address grid
- Address number assignment
- Address sequential direction
- Address parity

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The State of Oklahoma Geographic Information NG911 and Addressing Standard Version 2.2. Section 2.13 Standard Addressing Practices

Completeness

- All layers present
- All attributes filled in where appropriate
- All features represented within the layer

Poll Question

1. How do you plan to migrate/maintain your NG9-1-1 GIS data?

LET’S TAKE A BREAK!
10 minutes

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Module 4: Putting it all Together

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Tips & Tricks: Address Points

- Include all fields in the OK Standard
- Include legacy fields to support NG9-1-1 transition and other local business needs
- Ensure your locality's addresses are in the correct PSAP Boundary
- Focus on compiling a complete data set
  - What are sources you can use to locate missing addresses?
  - Identify apartments, condos, etc.
  - Field verification

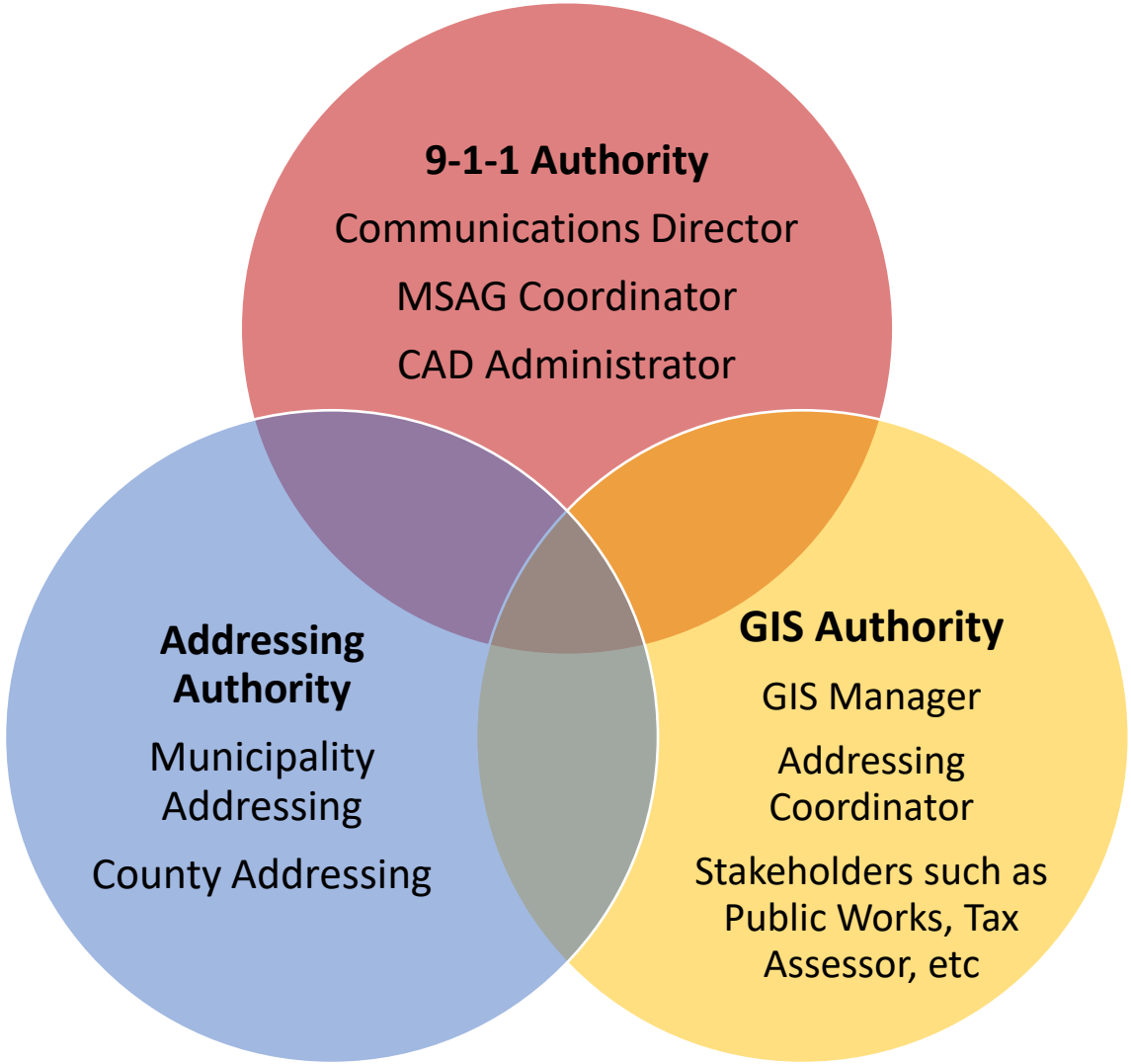
Tips & Tricks: Road Centerlines

- Include all fields in the OK Standard
- Include legacy fields to support NG9-1-1 transition and other local business needs
- Topology
  - Remove duplicate lines
  - Snap to PSAP boundaries
  - Digitize in the direction of travel
- Addressing ranges
  - Hypothetical vs actual ranges-which is better?
  - Are your ranges complete?

Tips & Tricks: Emergency Service Boundaries

- Emergency Service Boundaries – PSAP, Fire, Law, EMS, ESZ
  - May require research if starting with political boundaries
  - Topology
    - No gaps or overlaps
  - Engage neighboring jurisdictions
  - MUST engage PSAP staff, boundaries are not solely a GIS decision

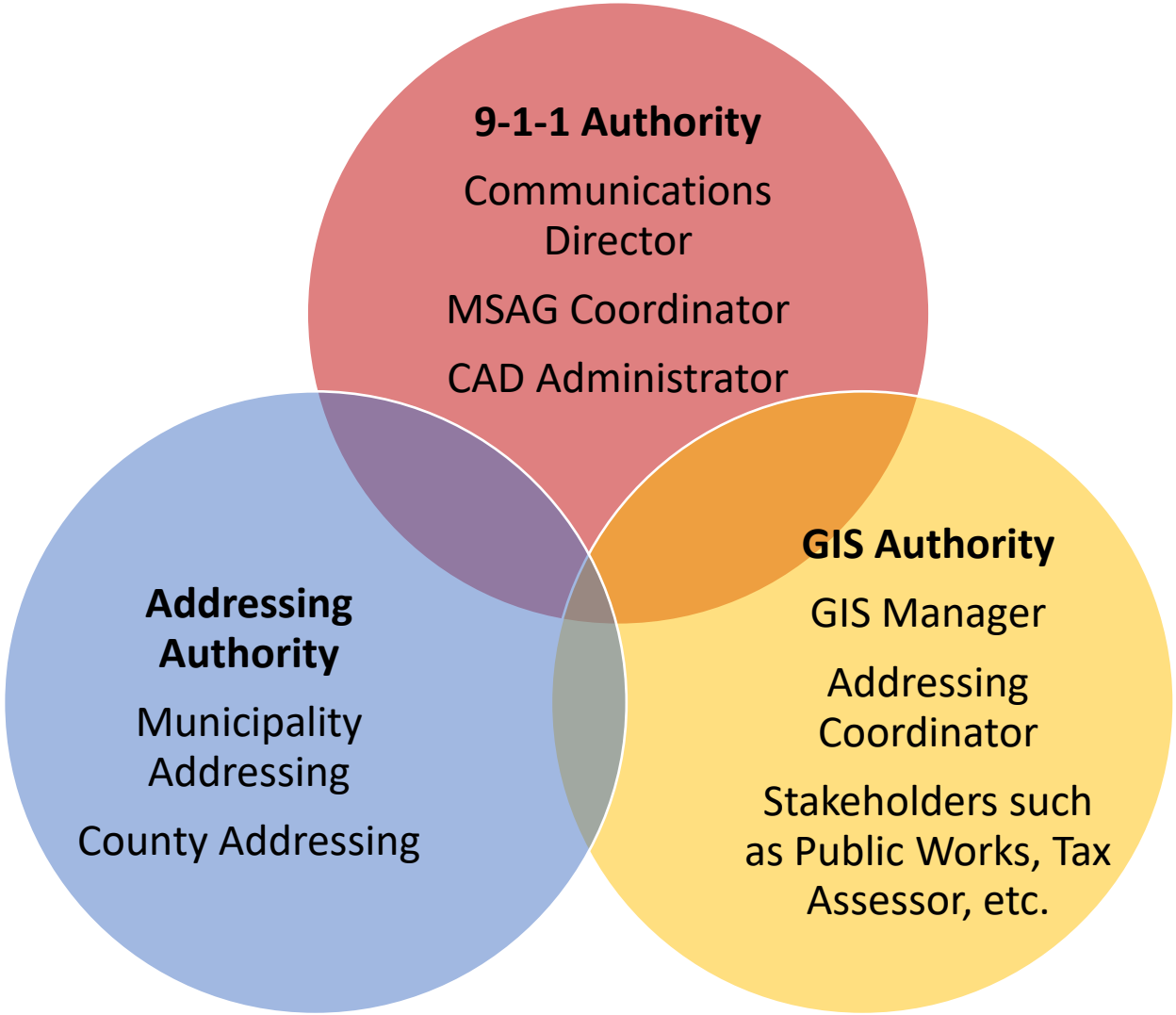
Considerations for Collaboration



NG9-1-1 success depends on the collaboration of organizational communities that haven't necessarily worked closely together previously.

DATAMARK

Considerations for Collaboration



Potential collaboration with 3rd party NG9-1-1 consultants

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Do I need assistance?

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Do I need assistance?

- Staff
  - ✓ GIS personnel
  - ✓ Can staff manage the demands of NG9-1-1?
- Knowledge
  - ✓ OK standards
  - ✓ NENA requirements
  - ✓ NG9-1-1 stakeholder engagement
- Time to get it done
  - ✓ Funding timelines
  - ✓ Multiple commitments
  - ✓ Preparing GIS data is demanding in time and resources

Do I need assistance?

- Do you have all the required GIS data layers?
  - ✓ ESBs for call routing/ESZs for dispatch
  - ✓ All other required layers
  - ✓ Correct schema
- Do your address points and road centerlines reflect the same information?
  - ✓ For call routing
- Is your data complete, accurate and precise?
  - ✓ Intra-layer (complete and accurate attributes)
  - ✓ Inter-layer relationships
- Have you performed a GIS to ALI and MSAG comparison?

Do I need assistance?

- Do you have software and tools for validating, correcting, and maintaining your data?
  - ✓ On-premise vs cloud-native
  - ✓ Staff skill levels
- Are you able to easily access data from relevant sources?
- Are you able to easily load your data into other relevant systems?

Do I need assistance?

- Do you have the hardware needed to process your GIS data?
  - ✓ Servers
  - ✓ Storage
  - ✓ Memory

When asking for help

This is your unique journey!

There is no cookie cutter solution for any agency, municipality, county or state.

Understanding your unique situation

- What resources do you have to support NG9-1-1?
  - ✓Stakeholder Education on Why NG9-1-1
    - Public Safety and GIS Professionals (like this training!)
  - ✓Time Commitment to Meet Oklahoma NG9-1-1 Goals
    - Don’t start a project if you don’t have it in your schedule
    - Preparing GIS data for NG9-1-1 is a commitment
    - GIS data maintenance is ongoing
  - ✓Knowledge of NG9-1-1 GIS
    - Staff who understands NG9-1-1 needs
  - ✓Technology to Support
  - ✓Communication with Stakeholders
  - ✓MOUs to Ensure Continuity and Understanding

Getting help with your data

- GIS data considerations
  - ✓Fully assess data to determine level of effort and associated costs
    - Budgeting justification
    - Many vendors provide a free data assessment
- ALI and MSAG considerations
  - ✓Study NENA 71-501 and NENA INF-028
  - ✓Is there a fee associated with obtaining data?
  - ✓Remove PII from all data before providing to vendor for assessment

Using a vendor for GIS assistance

- Consider how the data will be delivered to you
  - ✓NG9-1-1 data requires continual validation and remediation
  - ✓A GIS data maintenance plan should be part of the data delivery ‘package’
- Stay involved and engaged
  - ✓Your local knowledge is essential!
  - ✓Review data and always ask questions

Budget and funding

- There is funding available!
  - ✓ Federal dollars from the Oklahoma 9-1-1 Management Authority
  - ✓ State dollars from the Oklahoma 9-1-1 Management Authority
  - ✓ Ask for help with these grants – Oklahoma is committed to this project
- There is an inherent business justification here – you just need information to paint the full picture