State of North Carolina NG911 GIS Project
Educational Session

June 4, 2019 | June 6, 2019 | June 12, 2019 | June 25, 2019
E9-1-1 vs. Next Generation 9-1-1

E9-1-1

NG9-1-1

GEOCOMM

NC DIT
E9-1-1 critical database
MSAG (Master Street Address Guide)

Tabular database of street names, address ranges, routing numbers (ESN)

Validates addresses before 9-1-1 call

Provides routing information for 9-1-1 call to the correct 9-1-1 center (PSAP)

Control address format for querying GIS data

Maintained by Public Safety*

*Housed with Telcos
E9-1-1 process – GIS department today

GIS Department

PSAP

Telcos / Database Provider

GIS

CAD

MSAG

Telco Records

Mobile Systems

ALI
NG9-1-1 critical database
GIS database

GIS database:
Street centerline
Address Points
Boundaries

Location Validation Function (LVF)
Validates addresses before 9-1-1 call

Emergency Call Routing Function (ECRF)
Routes call to the correct 9-1-1 center (PSAP)

Maintained by GIS department
NG9-1-1 process – GIS department, soon

- GIS Departments
- PSAP
- NG9-1-1 Systems

GIS Departments
Regional or Statewide GIS

PSAP
CAD
Mobile Systems

NG9-1-1 Systems
Transitional NG9-1-1
ECRF
LVF
Impacts of NG9-1-1 on GIS programs

- New responsibility level – Education!
- New data model standard specifically for NG9-1-1
- Maintenance update process and schedule
- Discrepancy report resolution
- Extract, Transform, Load (ETL) – local, regional, or state level
Preserve local schema – ETL process (Extract, Transform, Load)
NENA Standard for NG9-1-1 GIS Data Model

Mapping the Future of 9-1-1
June 16, 2018

NENA Standard for NG9-1-1 GIS Data Model was approved!

NENA-STA-006.1-2018

And it only took 8 years….
Fitting it all together

- If YOU build your data to the standard…
- and your NEIGHBOR builds their data to the standard…
- and THEIR neighbor builds their data to the standard…
Key Points

- **Supports legacy E9-1-1 and transitional systems**
- **Local data model change for mandatory & conditional attributes**
- **Spatial reference MUST be WGS84 (not locally)**
- **Offers set list attributes to ensure data integrity**

NENA NG9-1-1 GIS Data Model Standard
Required GIS Layers

- **Street Centerline**: Standard location layer
  - May not contain all address locations
  - Landmarks, problem addressing areas, etc

- **Address Points**: Most important
  - Call routing functionality

- **PSAP Boundary**: Not limited to fire, law, medical
  - Separate layers

- **Emergency Service Boundaries**: GIS data provisioning authority
  - Only features within boundary

**No Gaps or Overlaps**
Strongly Recommended GIS Layers

- Street Name Alias Table
- States or Equivalents
- Counties or Equivalents
- Incorporated Municipal Boundary
- Unincorporated Community Boundary
- Neighborhood Community Boundary
- Landmark Name Part Table
- Complete Landmark Name Alias Table

Being reviewed with CLDXF doc update
Recommended GIS Data Layers

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

PSAP

CAD
Attribute Requirements

Mandatory
Data field MUST NOT be blank

Conditional
If attribute value exists, it MUST be provided
If no value Blank or Null

Optional
An attribute value MAY or MAY NOT be provided in the data file
Notable Mandatory Attributes

- Discrepancy Agency ID: 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.
  - E.g. drhmncem1.durham.nc.us; rcmdncec1.richmond.nc.us
- Incorporated Municipality: Municipality name or “UNINCORPORATED”
- ESN and MSAG Community: Mandatory through transition to NG911
Notable Mandatory Attributes | NENA Globally

Unique ID

- Each feature (record) must have a globally unique ID. When coalesced together with other local 9-1-1 authority’s data into the NG9-1-1 system the ID must continue to have only one occurrence.
Notable Mandatory Attributes | NENA Globally

Unique ID

- Unique across ALL GIS layers (RCL)
- Unique for EACH GIS feature (123456)
- Unique across merged databases (drhmncem1.durham.nc.us)

Reporting & resolution of discrepancy errors

Example: RCL123456@drhmncem1.durham.nc.us
# Street Name Elements

<table>
<thead>
<tr>
<th>CLDXF</th>
<th>Legacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Name Pre Modifier</td>
<td>Legacy Street Name Pre Directional</td>
</tr>
<tr>
<td>Street Name Pre Directional</td>
<td>Legacy Street Name</td>
</tr>
<tr>
<td>Street Name Pre Type</td>
<td>Legacy Street Name Type</td>
</tr>
<tr>
<td>Street Name Pre Type Separator</td>
<td>Legacy Street Name Post Directional</td>
</tr>
<tr>
<td>Street Name*</td>
<td>Legacy Street Name Post Modifier</td>
</tr>
<tr>
<td>Street Name Post Type</td>
<td></td>
</tr>
<tr>
<td>Street Name Post Directional</td>
<td></td>
</tr>
<tr>
<td>Street Name Post Modifier</td>
<td></td>
</tr>
</tbody>
</table>
Example 3

CLDXF Fields

- Street Name Pre Modifier
- Street Name Pre Directional
  NORTH
- Street Name Pre Type
  UNITED STATES HIGHWAY
- Street Name Pre Separator
- Street Name
  63
- Street Name Post Type
- Street Name Post Directional
- Street Name Post Modifier
  BYPASS

Legacy Fields

- Street Name Pre Directional
  N
- Street Name
  US HWY 63 BYPASS
  HWY 63 BYPASS
  HIGHWAY 63 BYPASS
  US HIGWAY 63 BYPASS
- Street Name Post Type
- Street Name Post Directional

GEOCOMM

NC DIT
Accuracy Benchmark for i3 Transition

- 98% synchronization rate for ALI to road centerline

Teamwork is a MUST!
NG911 GIS Managed Services

PSAP Mapping

GIS Data Hub QC Checks

Statewide Aggregated GIS Data

Emergency Call Routing Function (ECRF)

Location Validation Function (LVF)

Location Information Server (LIS)

Emergency Services Routing Proxy (ESRP)

Service Order Input
Is this location valid in the GIS?

Communication Service Providers

Emergency Call
Where do I need to go?

You go to this PSAP!
What is GIS Data Hub?
GIS Data Hub Overview

Log In to GIS Data Hub

Navigate to Upload page

Upload GIS Data

GDH Performs QC (less than 24 hours*)

GDH sends email notification with link for results & a report

Log in to GDH; Automatic Download of Results

Dashboard with Current Accuracy (Always Available)

*Most results will be available in 1 to 2 hours.
Access to GIS Data Hub

GIS Data Hub link

- https://gdh.sonc.nc.geo-comm.com/GMS_API

User configuration

- Invitation email is sent for registration and password creation
- Permissions can be set to allow individual users to upload data, download results, view the Dashboard and download converted dataset in desired schema
Access to GIS Data Hub
GIS Data and Database Uploads | Consistency is Important!

**CONSISTENCY FROM UPLOAD TO UPLOAD IS IMPORTANT!**

GIS data file names and schema needs to be consistent

ALI and MSAG database sheet tab names need to be consistent

Browse to your zip file or drag and drop your zip file that contains your GIS data, ALI, MSAG or any of the three.

Upload your data for QC checks in a zipped file format.
GIS Data Hub – Behind the Scenes

Secure web browser-based configuration management
QC Results Notification E-mail and Download Link

GIS Data Hub Notification

Hello,

Data for North Carolina - NCRichmond has been processed by GeoComm's GIS Data Hub.

The export package for 'QC Results' is ready for download.

Please contact the GIS Team if you have any questions.

Thank you,
GeoComm GIS Team
gis@geo-comm.com

Download Your Files

Copyright © Geo-Comm

No Reply

GIS Data Hub ready to download

To: Jessica Frye, ENP

Subject: GIS Data Hub ready to download

Hello,

Data for North Carolina - NCRichmond has been processed by GeoComm's GIS Data Hub.

The export package for 'QC Results' is ready for download.

Please contact the GIS Team if you have any questions.

Thank you,
GeoComm GIS Team
gis@geo-comm.com
Summary report is created with each quality control check run.
### Available Documentation & Supporting Applications

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User Guide</strong></td>
<td>• The User Guide includes the QC Plan</td>
</tr>
<tr>
<td></td>
<td>• The QC check table lists applicable exception codes</td>
</tr>
<tr>
<td><strong>GDH Help File</strong></td>
<td>• All available QC checks are described in the help file</td>
</tr>
<tr>
<td></td>
<td>• Exception codes associated with each QC check are listed in the help file</td>
</tr>
<tr>
<td><strong>Resolver</strong></td>
<td>• Can be installed locally and added into ArcMap</td>
</tr>
<tr>
<td></td>
<td>• Allows for exception code field population with one click by linking to features using the unique ID</td>
</tr>
</tbody>
</table>
Workflow Diagrams and User Guide

**Workflow diagram**
- GeoComm Process Overview
- Data submission, QC Error Report and Remediation Management

**Data conversion and quality control checks – User Guide QC Plan**
- ETL fallouts
- Ingest validation
- General QC checks
- SSAP QC checks
- RCL QC checks
- Boundary layer QC checks
- Synchronization QC checks
Review of QC Process Results

- Summary Report
- ETLFallouts.csv
- QCFallouts.csv
- QCFallouts.gdb
- GIS data QC results
- ALI database and MSAG synchronization checks
- Summary reports
- Dashboard
GIS Data Exceptions

- An even address was assigned to the odd side of the road in previous years. The addressing authority does not want to readdress the structure. This even address will be found as an error in the QC checks. What do I do? It isn’t an error that I can correct!
QC Exception Codes

- Exception codes are used to notify GIS Data Hub that a feature is an anomaly and that an identified error is a quality control check exception.
Correcting Reported Errors & GIS Data Hub Help File

Quality Control Checks

The GIS Data Hub performs quality control checks on the submitted GIS data to ensure addresses are synchronized, roads are connected, standards are met, errors are identified, and more. These QC checks are flexible to add or take away from what they do so the limit of QC checks are virtually unlimited. When executed, the application begins the process of running a series of quality control (QC) checks to ensure current, accurate data. Processing occurs on a first in first out basis. The more information that is processed, and the more customized the schemas, the longer the processing takes.

Following is a list of common QC checks types that may be processed.

- Boundary Layer QC Checks
- General QC Checks
- Ingest Validation QC Checks
- Road Centerline QC Checks
- SSAP QC Checks
- Synchronization QC Checks

Overlapping Address Range Values

The Road Centerline - Overlapping Address Range Values quality control (QC) check identifies where roads have overlapping address ranges in a given community or zone. Overlapping ranges can produce poor geocoding results, as a given address may fall within range of multiple different segments. If these segments are spatially distant from one another, an emergency responder could be routed to a location far away from the actual incident.

**Example**

In the example below, a call coming in from 54 9th Ave could geocode to either of the street segments in red, putting responders on the wrong block.

The check takes into account several potential overlap scenarios.

- Overlapping ranges are found on named streets.
- Overlapping ranges are generated on named streets due to the use of an alias name. For instance, say the segment 100-110 Main St is also known by its alias State Highway 2B. If State Highway 2B with a range of 2-3 also exists somewhere else in the community, then an overlap is generated when using the alias for Main St.
- Overlapping ranges are generated when streets with generic names such as driveway or parking lot have ranges and appear multiple times in a dataset.
Recap

- Teamwork is a MUST! GIS and 911 must work together during and after transition.
- Each jurisdiction is responsible for resolving the errors identified. GeoComm and the State of NC are available to provide guidance and assistance.
Questions

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Mapping the Future of 9-1-1