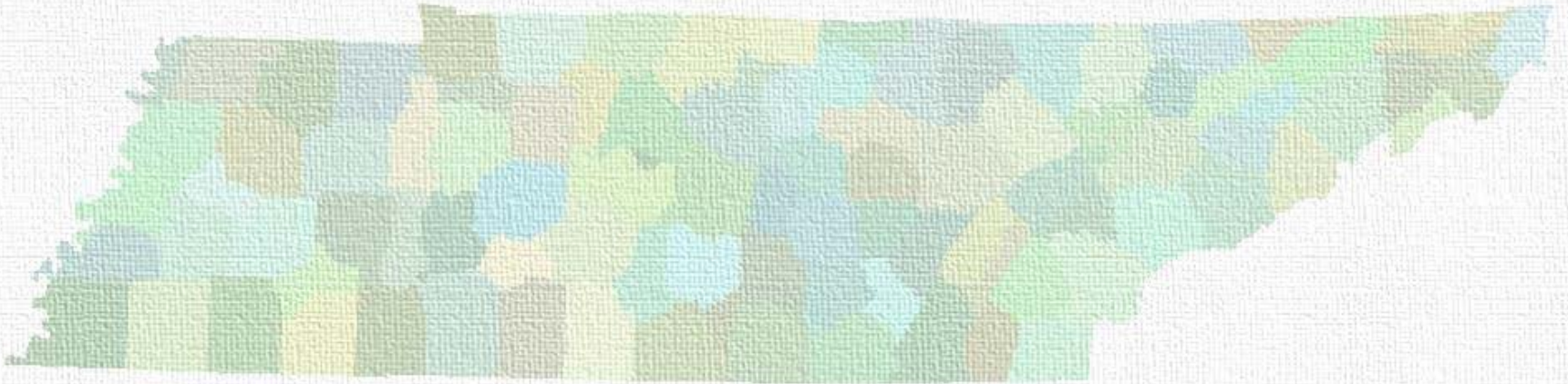


# **UTILIZING GIS IN NEXT GENERATION 9-1-1**

**Tennessee Information for Public Safety**

Presented by State of TN, OIR-GIS Services



Next Generation 9-1-1

# **WHAT IT IS AND HOW IT WORKS**

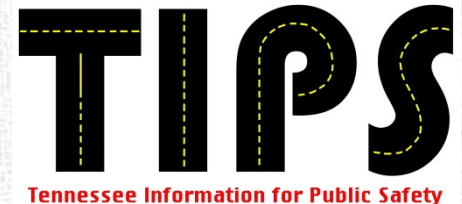
# Next Generation 9-1-1

- IP (Internet Protocol) based system
  - Information transferred digitally to responders
    - Voice
    - Soon – text and photos/video
      - This endeavor has its own challenges
  - Travels on ESI Net (Emergency Services IP Net)
    - In TN, this is NetTN

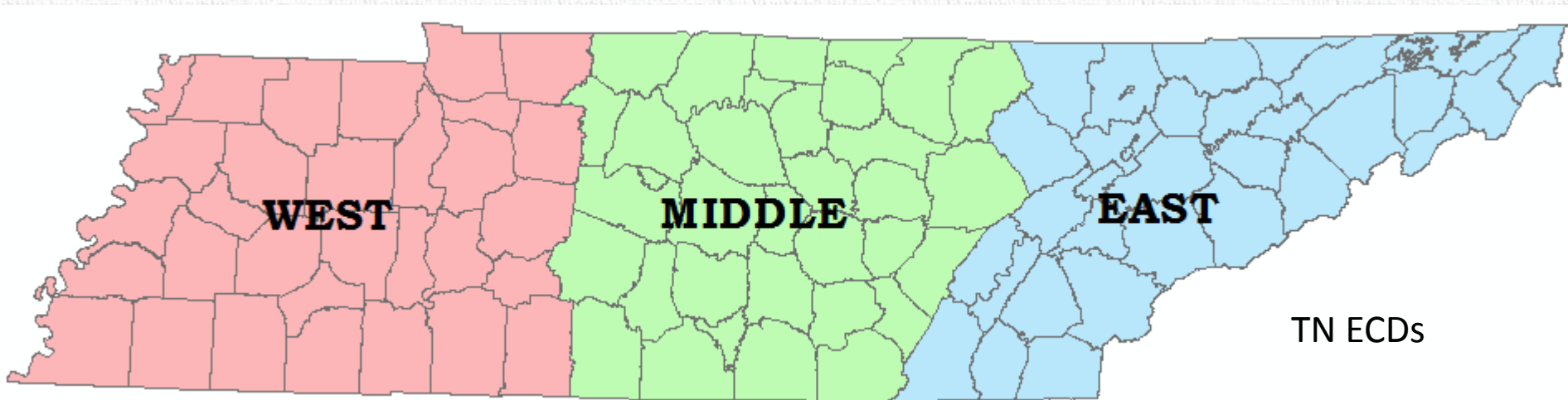


# GIS and NG911 in TN

- Tennessee Information for Public Safety (TIPS)
  - Conforms to National Emergency Number Association (NENA) Standards
    - Street Centerlines
    - Address Points
    - Emergency Service Number (ESN) Polys
  - Uniform GIS Platform
    - ESRI ArcGIS Based
      - Not using Arc at all Districts
      - Product provided is ArcGIS Based
    - Currently receiving weekly updates
      - All 100 Emergency Communications Districts (ECDs)



# Regional Stats



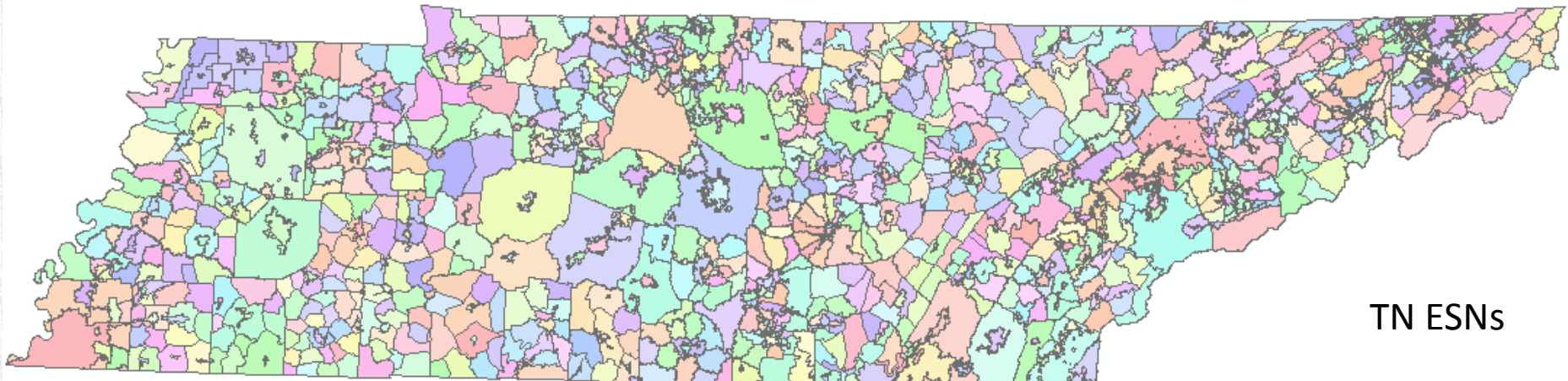
- The Stats:
  - 100 ECDs broken up by region
    - 94 county ECDs
      - Overton and Pickett Co in Middle TN are combined into one district
    - 6 municipal ECDs
      - 5 of which are in East TN
      - 1 in Middle TN

# Next Gen vs. Current System

- Critical parts in current system:
  - MSAG (Master Street Address Guide)
  - ALI (Automatic Location ID)
    - Separately maintained, apart from GIS
    - Provided by phone co – record of each phone line
      - Tied to addresses
- Problems with current system
  - Separate records
    - Multi step process to update MSAG, ALI and GIS
  - Potential for missing addresses/streets in GIS
- Solution: Next Generation 9-1-1
  - Next Gen employs seamless integration of GIS into 9-1-1
    - GIS is Everything
      - ECDs' GIS data will be default “correct” dataset moving forward
      - In-house phone records (ALI) will be validated against GIS data
    - Edit GIS data – Done!

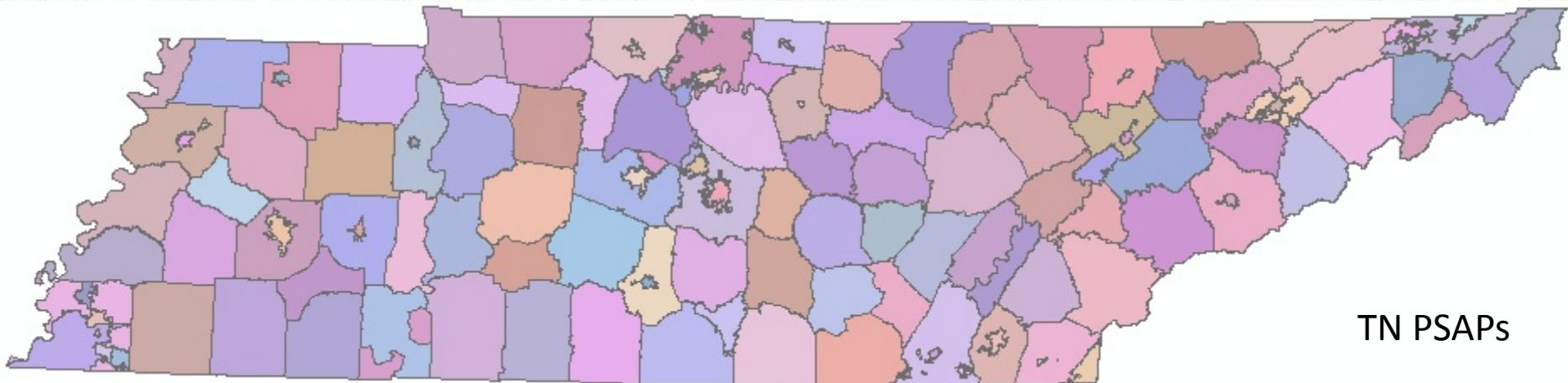
# Emergency Service Numbers

- All 100 ECDs have seamless call routing (ESN) boundaries in State GIS database
  - Nearly 2,000 ESN polygons within the State of TN
- Did You Know?
  - TN has no “official” county boundaries
    - Each County (and ECD) maintains their own boundary
      - None match
    - TDOT maps and signs are simply “close approximations”
  - OIR GIS orchestrated Herculean task of matching all ESN (Emergency Service Number) boundaries
    - Used for call routing only



# Public Safety Answering Points

- PSAP polygons are related to ESN polygons
  - Routing information is tied to the PSAPID field within ESNs
    - Call plots (Lat/Lon from ALI validated point)
    - Lat/Lon falls within a PSAP polygon
    - Call routes to that particular PSAP
  - For visual reference, ESNs are dissolved here on the PSAPID field
    - Some ECDs have multiple PSAPs
    - Total of 140 PSAPs in TN





# The Future of NG911 in TN

- Near Future

- Statewide database will be replicated between Nashville and Seattle/Phoenix
  - Phoenix is backup database
- TCS, based in Seattle, validates the address and street data against ALI records
- Data then sent back to TN for use in NetTN system
  - Used for **initial call routing**
- Jackson area will be first to deploy
  - Should be live sometime in 2015

# Next Gen: Data Centers

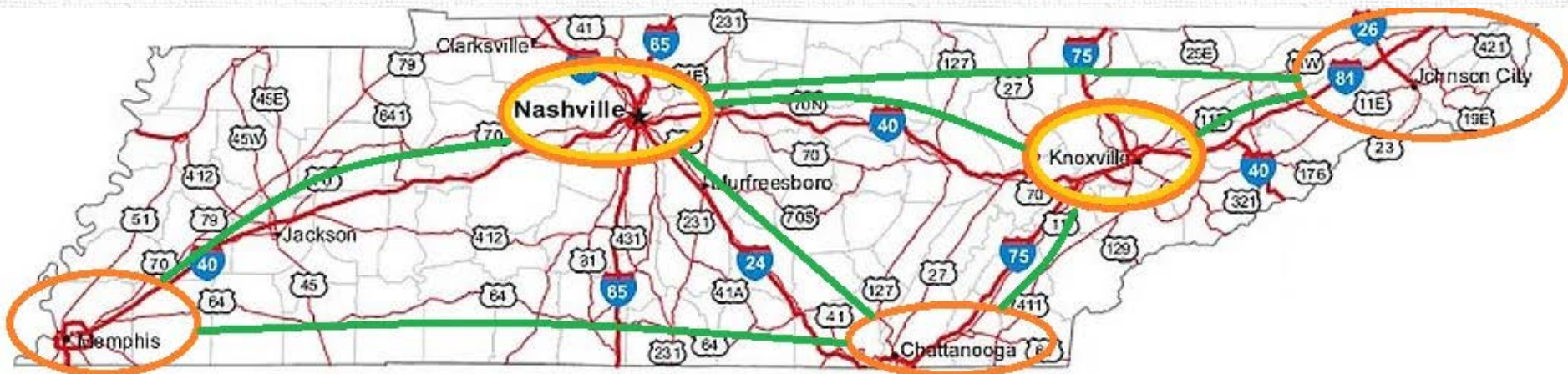
- NetTN:

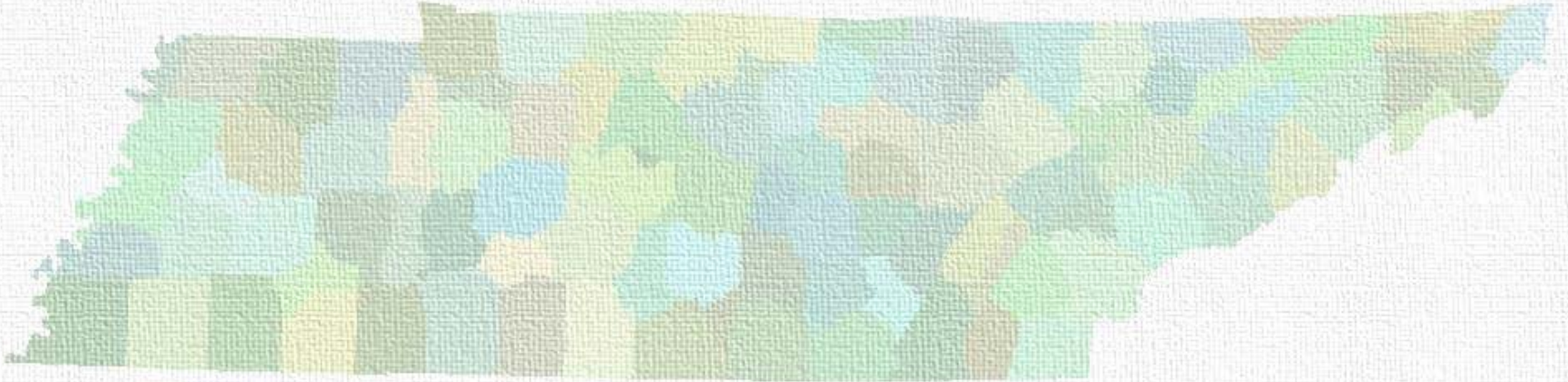
- Data backups stored in Nashville and Knoxville

- Regional hubs in Memphis, Nashville, Chattanooga, Knoxville, Tri-Cities
  - Each has a dedicated high speed connection to at least two other regional hubs

- System Used for initial call routing

- Call routing is not the same as dispatch
- Dispatching is up to each district and separate from 9-1-1
  - Most districts take calls and perform dispatching





When GIS Based Routing is Deployed

# **THE 4-1-1 ON 9-1-1 CALL PROCESSING**

# Land Line Calls: Using GIS

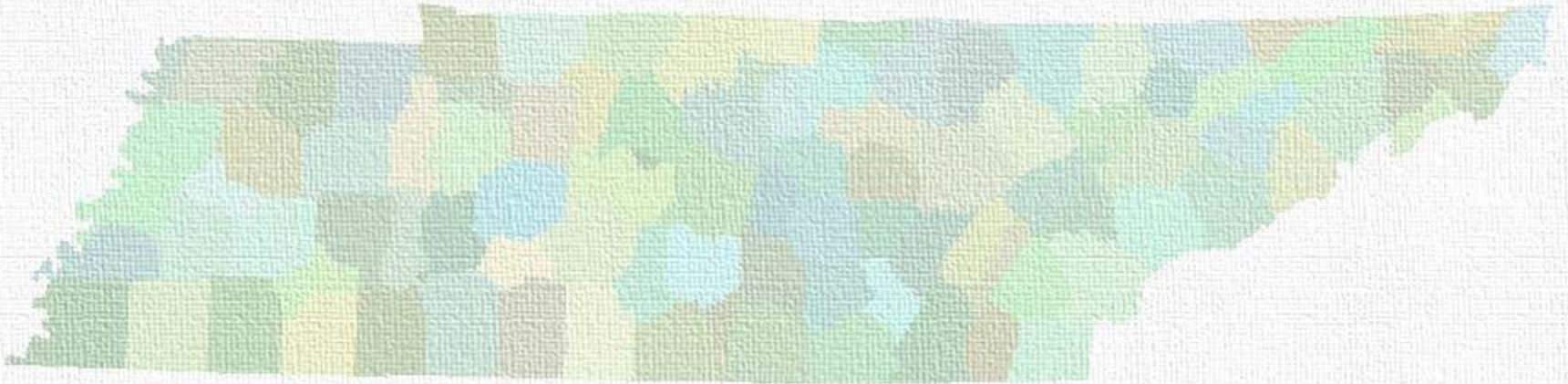
- The Lat/Lon data is tied to the address point
- If the address point is in the GIS data, it will be found and the call sent to the appropriate PSAP
  - This is the goal: every point in the GIS data
    - Primary and sub-addresses
  - Ensures fastest call routing
  - What if the point isn't found?
    - Geocode based on centerlines
    - Goes to regional call center
      - Takes additional time
      - Responder must talk to caller



# Cellular Phone Calls

- Handled exclusively by location of phone
  - No address information is involved as in land-line calls
  - AT&T bases locations off of cell tower triangulation
  - All other carriers use GPS location
    - All initialized phones have GPS receiver capability
- When call is received:
  - Phase 1
    - Displays location at “handling tower”
      - Happens immediately
  - Phase 2
    - Refined location based on carrier method
    - Takes a few seconds for Phase 2 to come to PSAP
      - Maximum time delay dictated by FCC





Standards and QC Metrics

# QUALITY STANDARDS

# Feature Classes

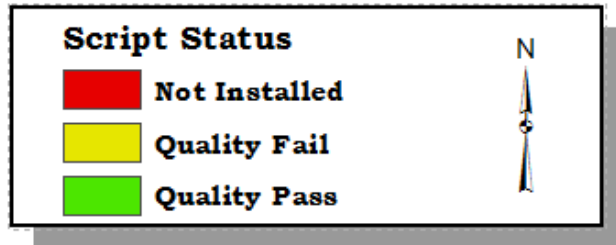
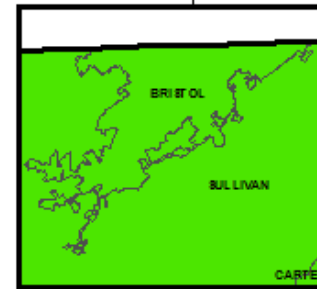
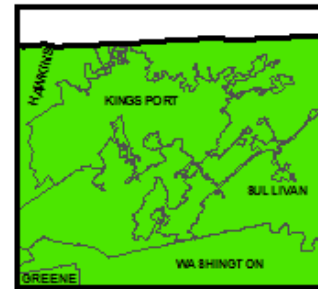
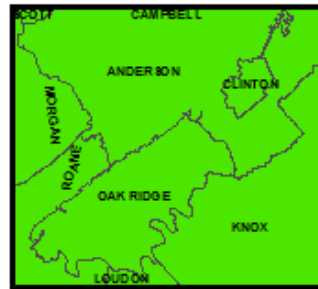
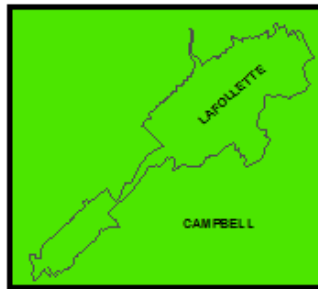
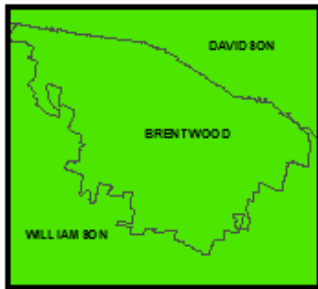
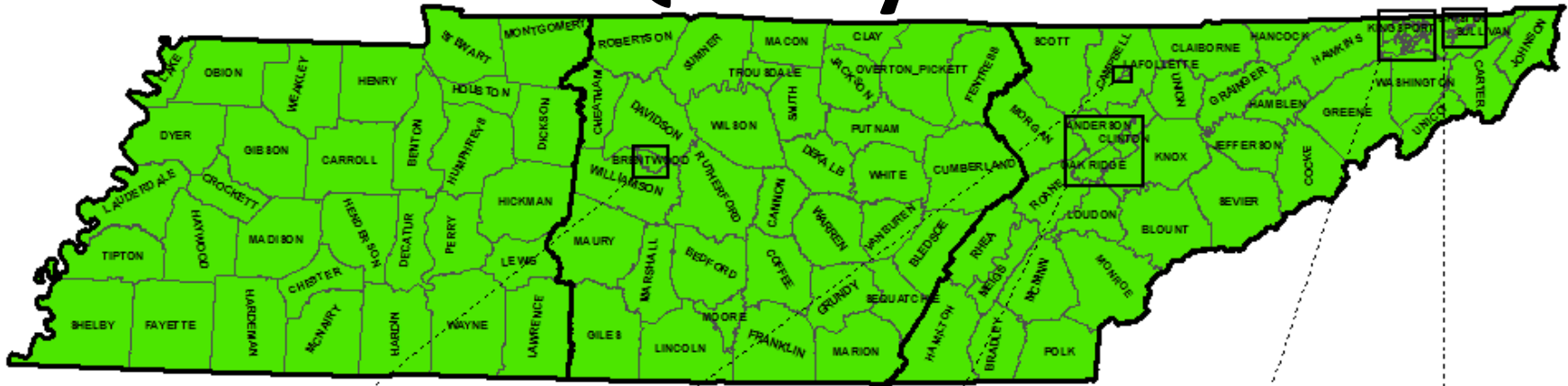
- Address Points and Centerlines
  - Maintained by ECDs
  - Updated via weekly upload to State
    - Conglomerated into single statewide DB
- ESNs
  - Changes directed by ECDs via interactive website
    - Updated as needed
  - Edits maintained by State
    - Not all districts have ability to maintain topology
    - Calls will be routed based on poly
      - Essential that no gaps/overlaps are present

# Quality Control Process

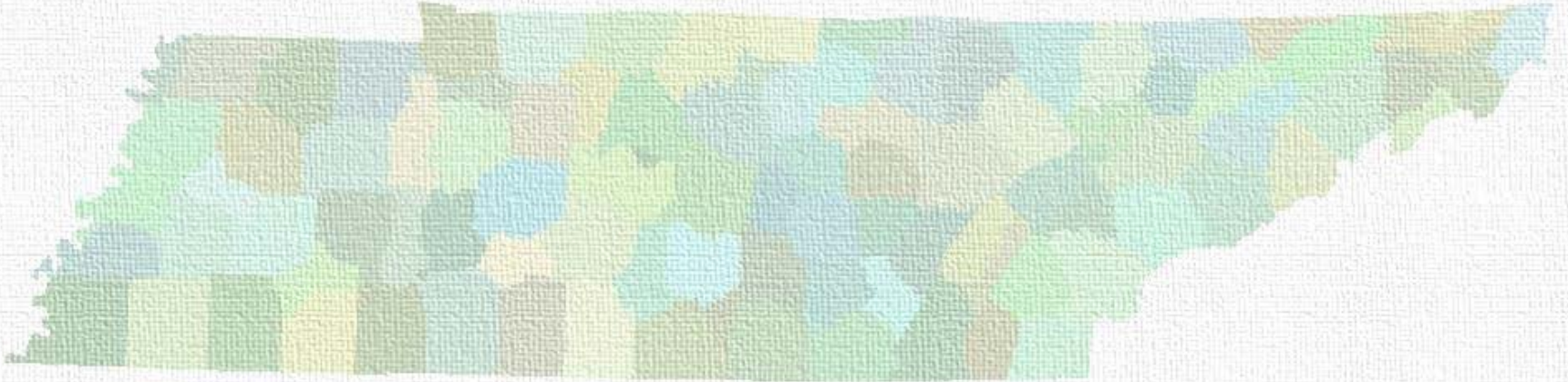
- Primary automatic quality checks:
  - Data is checked and filtered prior to upload into statewide DB
    - Several “pass/fail” fields
      - Other fields lumped together and checked for >2% error rate
    - If any of these parameters fail, the upload is stopped
      - Ensures that we maintain “clean” data in our statewide DB
    - Reports are generated, showing any errors that need to be addressed
      - ECDs are using these to improve the overall quality of their local GIS data
  - Point/poly analysis to ensure address point ESN value matches the ESN polygon where it resides
    - Reports of these errors are also generated for ECD benefit
- Other manual periodic quality checks:
  - Topology
  - Compare ALI (Automatic Location ID) table to address points



# Data Quality Status



- As of the end of 2014: All 100 ECDs have data quality at 98% or higher



How we did it – and how you can, too!

# **BUILDING A STATEWIDE 9-1-1 DATABASE**

# Standardization

- Standardization of database schema
  - Allows for easy integration into statewide DB
  - Provides common ground for addressing data quality issues
  - Allows for easy data sharing between ECDs
    - Access to surrounding ECDs' data

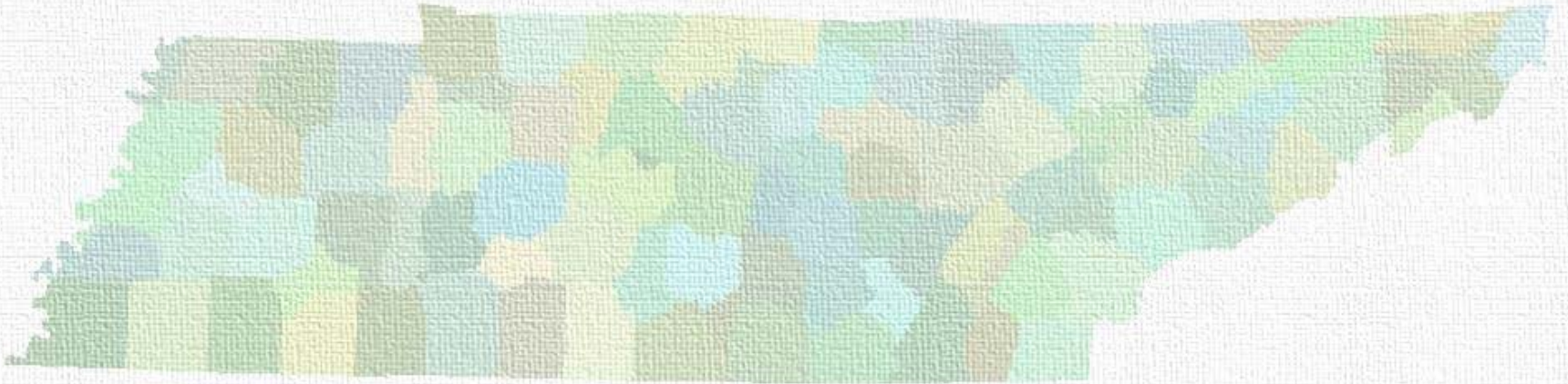


# Facilitation of Data and Support

- Incentive funding for GIS
  - Provided by TN ECB (Emergency Comm. Board)
    - Allowed ECDs to build or contract out GIS Infrastructure
    - Provides money toward maintenance of GIS accuracy
    - Helps with ECD buy-in for the project
- Dedicated support staff
  - Regional analysts
    - Provides a “face” for the project at the district level
    - Assisted in transitioning ECDs to a standard schema
    - Tasked with assisting and facilitating quality control



Johnny Address-Seed



Local, State and Federal

# **OTHER USES FOR 9-1-1 DATA**

# Other Entities Using TIPS Data

- TN Fire Marshal's Office
- TN Dept. of Safety and Homeland Security
- TN Highway Patrol
- TN One Call (811)
- TN Dept. of Health
- TN National Guard
- TN Dept. of Forestry



Know what's below.  
**Call before you dig.**



# Addressing at a National Level

- Beginning of April, 2015:
  - National Summit held in Baltimore, MD
  - Many representatives from Local, State, Federal Government, non-profit, and for-profit companies attended
- Single, unified addressing database
  - Efforts underway to orchestrate
- Likely data source will be local jurisdictions such as 9-1-1 districts
  - Data will pass from Local → State → Federal
    - Assimilated into single DB

# Addressing at a National Level

- Difficulties to overcome:
  - Branding
    - Memorable (for the right reasons)
    - Something that is authoritative
      - “System” implies living, up-to-date entity
      - “Database” implies static digital storage facility
  - Logistics
    - Data will need to be updated periodically to maintain currency
    - Ownership and legal issues remain in the air
      - Which Federal Agency will spearhead the effort



# Questions?



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**West: Ryan Pittenger (731)421-6819**  
**Middle: Michael Riter (615)770-1102**  
**East: Kevin Williams (865)594-9424**



**TIPS**  
Tennessee Information for Public Safety