

Geospatial Data Provisioning for Next Generation 9-1-1

SECOND DRAFT – OCTOBER 9, 2019

The purpose of this document is to provide context and key details to leadership on the current status and on-going interagency activities by municipal, county and regional partners in the Twin Cities metropolitan region to provide geospatial data for the future Next Generation 9-1-1 deployment in Minnesota.

What is Next Generation 9-1-1?

Next Generation 9-1-1 (also referred to as 'NextGen9-1-1' or 'NG9-1-1') is the next advancement in 9-1-1 system technology and processes to allow the handling of all types of emergency calls, including voice, text, data, and multimedia. One factor that distinguishes Next Generation 9-1-1 from legacy 9-1-1 technology is that it makes extensive use of **geospatial data** in the core processes for validating 9-1-1 call locations, delivering emergency calls to the designated dispatch center, and identifying appropriate response agencies. A summary of its features and functions are as follows:

- Requests for emergency service are sent to an emergency dispatch center (*known as a Public Safety Answering Point or PSAP*), based on call location, entirely over an Internet Protocol (IP) enabled infrastructure using standardized interfaces;
- Location is determined and transmitted with the call using **Presence Information Data Format – Location Object (PIDF-LO)**, a standard used to represent an address/location in an XML format;
- Use of Internet Protocol enables the transmission of photos, videos, real-time text messaging and other forms of multimedia communication and the integration of supplemental emergency call data that may be useful to call handling.

What is geospatial data and why is it so important to Next Generation 9-1-1?

Geospatial data (also called *geographic information systems [GIS] data*) uses digital geometry in the form of **points**, **lines** and **polygons** to represent real world features – such as streets, building footprints, parcels, addresses and service areas. These geometric features have data embedded in them (called 'attributes') and are referenced to a specific location on the surface of the earth with coordinates. This locational information provides enormous value in determining the appropriate agency to receive an emergency call and locating, verifying and responding to requests for emergency assistance.

What kinds of geospatial data are needed for NG9-1-1 systems?

The **primary geospatial datasets** needed for Next Generation 9-1-1 deployment are:

- **Street centerlines** – **linear** features representing roadways;
- **Address points** – **point** features which contain address attributes unique to their location;
- **Municipal and county boundaries** – **polygon** features which show the extent of jurisdictional control; and
- **Emergency service areas** – **polygon** features which show the service areas of the PSAPs, as well as law enforcement, fire and emergency medical service agencies.

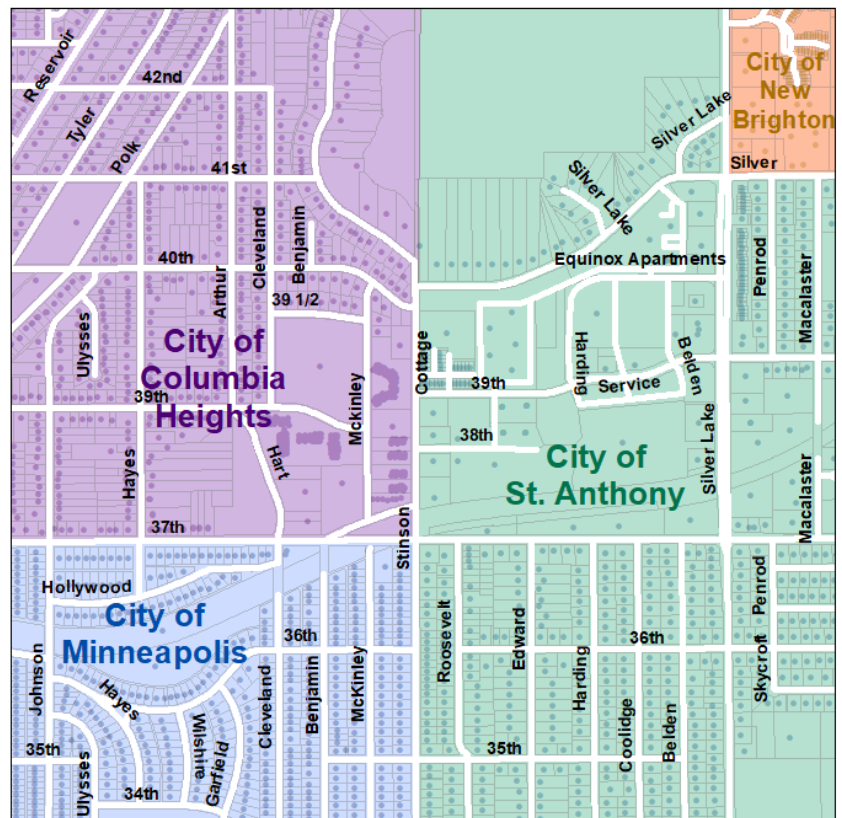
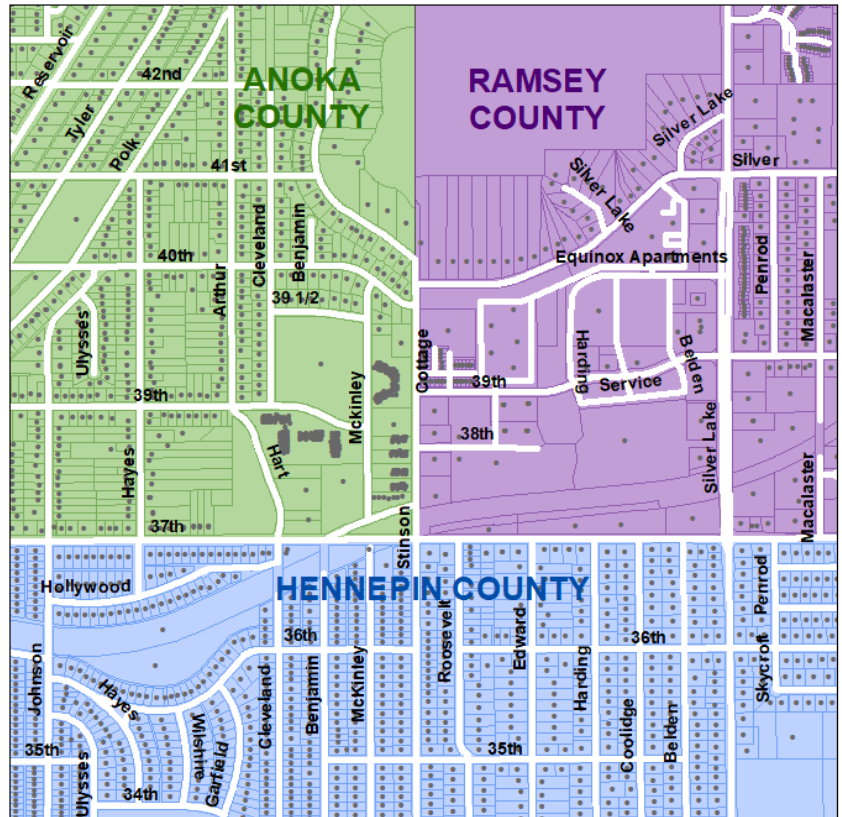
Examples of geospatial data are displayed on the images at right >>

Road centerlines are shown in **white**, in addition to containing the name of the road, these lines are embedded with other data such as the ZIP Code, address range, if they are one way or two way and other information.


Address points are shown as the **small individual dots**—each point contains a unique set of address information, generally each representing a unique building, house, or place of business. The 'clusters' of dots in the south-eastern corner of Anoka County represent apartment and townhouse complexes where each individual dwelling unit receives a unique address point.

The second map at lower right (showing the same coverage area) contrasts the **municipal boundaries** (lower map) with the **county boundaries** (upper map); it is not uncommon for a city's municipal limits to extend into another county. In this example, the City of St. Anthony encompasses part of both Ramsey and Hennepin Counties. Similarly, emergency service areas for PSAP jurisdiction, as well as police, fire and emergency medical services (not shown in these examples) may overlap municipal and/or county boundaries depending on their defined jurisdictions.

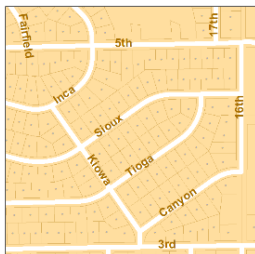
Additional geospatial datasets that capture park boundaries, trail networks, property parcel boundaries and landmark sites (locations of schools, police departments, hospitals, nursing homes, etc.) are also useful to provide context to emergency responders.



These datasets can also be combined with up-to-date aerial photography to provide additional locational context. In the NextGen9-1-1 environment, an emergency call coming from a cell phone would be 'triangulated' to its coordinate location (*proximal to nearest address point and street, within the polygon area of municipality, county, PSAP and emergency service area represented in the geospatial data*) to determine its location, select the appropriate agency to receive the call and facilitate accurate dispatch and response.

 **Who produces the geospatial data needed for NextGen9-1-1 and what are the roles of the participating agencies in maintaining this data?**

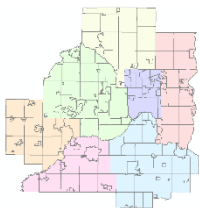
County governments, specifically, County GIS Departments play the central role in providing the geospatial data needed for Next Generation 9-1-1 systems in the Twin Cities metropolitan region, as they **either create the data directly** as an authoritative source, or work to **aggregate, federate and manage the data from authoritative sources** such as municipalities within their county. The following text briefly outlines the origins of the primary geospatial datasets needed for the work of NextGen9-1-1.



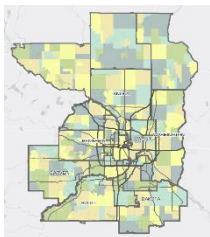
Geospatial data representing road centerlines: While a variety of entities such as counties, cities, townships, MnDOT, park districts and other interests engage in the construction and maintenance of the physical roadways, it is the County GIS Departments which are the trusted aggregators and maintainers of geospatial data representing roadway systems. Counties in the metro region are relied upon to have the most up-to-date and accurate roadway data.



Geospatial data representing address points: **City councils** are the final legal authority for assigning addresses within their municipal boundaries (*Mn. Stat. 412.221, Subd. 18*). Counties have authority for assigning addressing in unincorporated portions of the counties, usually in the form of rural addressing and emergency numbering (*Mn. Stat 429.021*).




Geospatial data representing municipal and county boundaries: Currently, County GIS Departments document the known changes of the boundaries of their constituent municipalities—resulting primarily from annexations—and update their geospatial data to reflect these changes. Tracking changes in municipal boundaries is essential to delineating and maintaining the correct PSAP, law enforcement, fire and emergency medical service areas.



Geospatial data representing emergency service areas. In the metropolitan region, the Metropolitan Emergency Services Board (MESB)—an agency created by a Joint Powers Agreement between ten metropolitan counties and the City of Minneapolis— prepares, maintains and publishes the dataset of the current PSAP, law enforcement, fire and emergency medical service area boundaries for 9-1-1 system use.

While the counties aggregate the data for these datasets and translate them into agreed upon standards, the Metropolitan Council performs **schema validation** (ensuring data coming in aligns to the standard) and federates the regional dataset and the MESB performs **9-1-1 validation** (ensuring the data accuracy, completeness, and consistency is suitable for 9-1-1 uses.) Both the Metropolitan Council and MESB provide reports back to the county GIS partners on anything they find in their process of review.

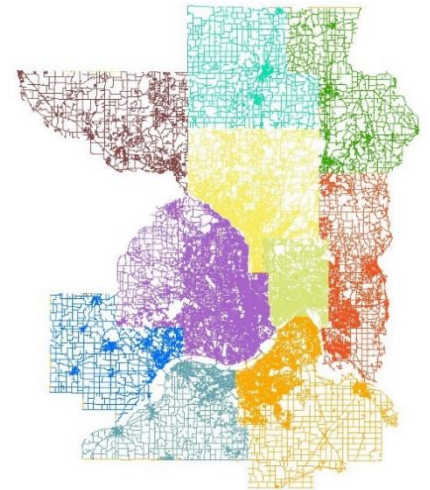
 **What interjurisdictionally federated datasets already exist that could be used to support Next Generation 9-1-1 deployment and how frequently are they updated?**

In the Twin Cities metropolitan region, several regionally standardized datasets of the data mentioned on the previous page are currently maintained and made publicly available. These datasets have enormous potential to serve the data needs of the Next Generation 9-1-1 initiative.

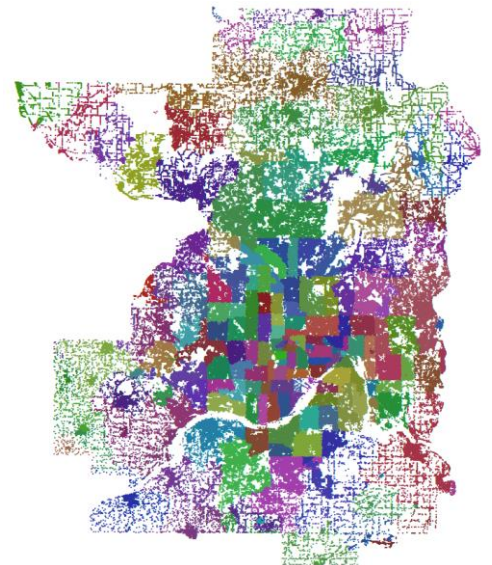
Primary geospatial datasets needed for Next Generation 9-1-1:

The datasets described below would be foundational datasets directly consumed by a Next Generation 9-1-1 system.

Metro Regional Road Centerline Dataset. The metro partners began working on a shared road data schema in May 2014, including attribution in support of NextGen9-1-1. The first version of this regionally federated road centerline datasets was published in April 2017, including data for the seven metro counties. Since that time, the three counties to the north of the immediate metro region, Chisago, Isanti and Sherburne have also been added. Automated scripting has been created and made available for nightly updates to the participating partners, but the current goal is to work toward maintaining at least monthly updates of this data. This dataset contains over 180,000 segments of road, representing over 20,000 miles of roadway.

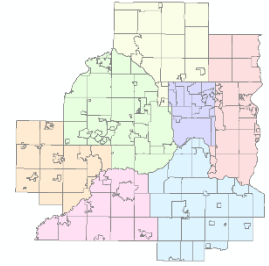


Metro Regional Address Point Dataset. The metro partners began working on an address point data standard as early as 2004. By 2010, the metro partners had developed a shared data schema for addresses, based largely on the Federal Geographic Data Committee's (FGDC) address standard. During 2015-2016, the metro partners worked with state-level 9-1-1 interests to merge the metro standard with the emerging needs for NextGen9-1-1 data, and this 'hybrid' standard was eventually adopted by the Minnesota Geospatial Advisory Committee as a statewide standard in December 2017.

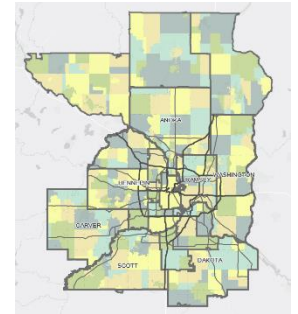


The metro partners have been publishing a regionally standardized address point dataset since August 2018 for the seven metro counties and recently added both Chisago and Isanti Counties; the dataset will also include Sherburne County in late 2019. This dataset contains nearly 1.2 million unique addresses and, as with road centerlines, automated scripting tools have been made available for nightly updates to the participating partners, but the current goal is to work toward maintaining at least monthly updates of this data.

Metro Regional County and Municipal Boundary Dataset. This dataset has been produced and available since 2002. Under current practice, County GIS Departments document known changes in the boundaries of their constituent municipalities and update their geospatial data to reflect these changes. These county datasets are collected and federated into a metro-wide regional dataset on a quarterly basis (January, April, July and October) by the Metropolitan Council and published as a regional dataset resource.



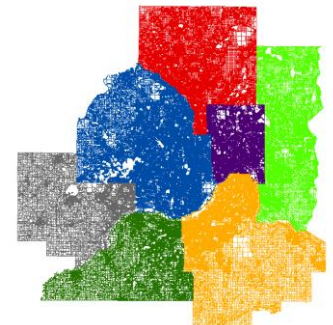
Metro Regional Emergency Service Area Dataset In the metropolitan region, the Metropolitan Emergency Services Board (MESB) works in tandem with PSAP and county agency partners to collect and maintain an up-to-date geospatial dataset reflecting the current boundaries of PSAP, law enforcement, fire and emergency medical service areas. This dataset includes the seven-county metropolitan region, plus the adjacent northern metro counties of Sherburne, Isanti and Chisago, and it is regularly updated and published by MESB staff.



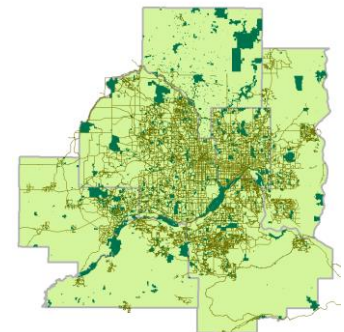
Secondary and supportive geospatial datasets useful for Next Generation 9-1-1:

The datasets described below would be supplemental and supportive to a Next Generation 9-1-1 deployment, providing context to the primary datasets mentioned above.

Metro Regional Parcel Dataset. The metro partners have maintained and published a regional parcel dataset since 2002. This dataset contains all parcel boundaries and a wealth of related attributes including owner name, tax payer name, parcel size, value of land and improvements and so forth. The dataset contains information on just over 1.1 million individual parcels in the seven county metropolitan region. The source data is authoritatively produced by the County GIS Departments and collected quarterly (January, April, July and October) by the Metropolitan Council to produce the regional dataset.



Metro Regional Park and Trail Dataset. The metro partners began working on a data schema for parks and trails during late 2016 and in early 2018 the first iteration of the dataset was assembled and published. This dataset shows over 3,700 unique park and recreational properties and illustrates the location of over 8,500 miles worth of pedestrian, hiking and cycling trail networks throughout the Seven County Metropolitan region. The data is compiled and collected by the County GIS Departments and federated into a regional dataset by the Metropolitan Council. At present, the data is updated bi-annually (January and July) and is fully publicly available.



Numerous other regional datasets of potential value to support and augment NextGen9-1-1 deployment—showing features such as land use categories, bus and light rail service areas, transit centers, flood hazard sites and so on—are also maintained and published by the Metropolitan Council and are readily available to regional partners from the Minnesota Geospatial Commons.

 **How do agencies producing and consuming the geospatial data work together to maintain these regional datasets?**



MetroGIS collaborative. Since 1996, the partners of the metropolitan region have participating in the MetroGIS collaborative. MetroGIS is best defined as a **voluntary collaborative** of interests in the metropolitan region who create and consume geospatial data and who wish to share their data, applications and experiences for the benefit of the entire geospatial professional community. MetroGIS provides a means for the partners of the region to define their shared needs, develop data standards and best practices, share techniques and insights and work together to institutionalize the usage, sharing, maintenance and deployment of geospatial data. MetroGIS maintains an annual work plan which reflects the priorities of the participating agencies for regional geospatial data needs. MetroGIS is housed at and funded by the Metropolitan Council, however the Council does not dictate the collaboratives direction or its priorities. Each participating agency, including the Metropolitan Council, sends a delegate to represent its interest at collaboratives Coordinating Committee and Policy Board. Within MetroGIS there are numerous on-going work groups, these include:

- **Metro Regional Centerlines Collaborative Work Group.** Primarily active from 2014 to 2017, this group was responsible for the creation and deployment of the Metro Road Centerline Dataset.
- **Metro Addressing Work Group.** This group guides and shapes the work around metro regional address points and is the steward of the Metro Address Point Editor Tool resource.
- **Metro Park and Trail Work Group.** This group guides and shapes the work of maintaining and improving the regional park and trail datasets and supporting documentation;

Other work groups are created, and technical sessions are held to meet the needs expressed by the collaborative. More information on MetroGIS can be found here: www.metrogis.org

Metro Data Producers Work Group. This group is composed primarily of the GIS managers and coordinators of the seven metropolitan counties. Meeting monthly, this group reviews on-going maintenance and availability of regional datasets that are sourced from county sources. This group is particularly attentive to the needs of delivering data. Bi-monthly, the work group, including representatives from MESB and the additional three northern metro counties, dedicates a portion of their agenda to NextGen9-1-1 geospatial data related topics.

 **What data standards are in use to ensure the geospatial data to be used by Next Generation 9-1-1 is consistent across jurisdictions?**

The metro partners have led the state in the development of geospatial data standards. Data standards for address points, parcel data and road centerlines originally developed and used by the metro partners have emerged as the foundation for later-adopted state standards. The Geospatial Advisory Council (as created by Mn. Stat. 16E.30 Subd. 8) has a Standards Committee which facilitates the documentation and stakeholder review of geospatial data standards through consensus, rather than mandate, a process that includes a statewide stakeholder review of proposed standards. More information about the Standards Committee and adopted geospatial data standards in use or development in Minnesota can be found here: <http://www.mngeo.state.mn.us/committee/standards/>.