National Geospatial Advisory Committee
National Addresses Database
Background Paper
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Across all levels of government, an enhanced effort to eliminate redundant data creation, improve access to quality data resources, and realize significant cost savings is needed.

Executive Summary

Current and accurate nationwide address data, in digital geospatial format, is critical to the quality and cost-effective provision of innumerable critical services required by multiple levels of government. Accurate addressing information is an essential requirement for a variety of functions, including administrative, emergency response, research, marketing, mapping, geographic information systems (GIS), routing and navigation, and many other purposes. Improving Public Safety by responding to emergencies efficiently and effectively require good address information is an especially important issue.

To meet this need, agencies closest to the task, with the most at stake related to local addressing, must be empowered and funded to develop, maintain, and share standardized and compatible digital geospatial address data. Those aggregating this data must be similarly supported to ensure that this valuable local data resource makes it into a National Addresses Database that is provided to state and federal address data consumers and the broadest range of stakeholders possible.

A National Addresses Database will allow federal stakeholders to access current local address resources curated by local data stewards. The creation and management of this database should be a federal priority. Where this data does not exist, and no suitable or willing partners exist, they should pursue other creative, cost-effective and persistent strategies to develop and maintain geospatial address data into a National Addresses Database. Efficiencies and service enhancements from the implementation of a National Addresses Database will undoubtedly be vast, and will attract widespread participation and utilization by multiple levels and sectors. However, the many benefits will only be maximized by a comprehensive National Address Database strategy that represents consolidated Federal initiative.

The Census Bureau currently maintains the Master Address File/Topologically Integrated Geographic Encoding and Referencing System (MAF/TIGER System), a nationwide address database , with cooperative input from Postal Service and local government. Both organizations cite federal law and court decisions for their inability to share their respective data inventories of street addresses and corresponding geographic coordinates. In addition, the longer periodicity of the Census's data update cycle and the Postal Service's focus on only deliverable addresses are barriers that would need to be overcome if either organization were to steward a National Address Database.

The FGDC is providing guidance to the National Geospatial Advisory Committee (NGAC) in 2012 requesting feedback and recommendations on the development of a National Addresses Database. This paper provides some initial background and information to help frame the NGAC's deliberations on this topic.

The Vision

A continuously updated, nation-wide, publicly available address dataset exists and is maintained, complete with geographic coordinates that will meet the needs of all stakeholders. The data will cover all residential and non-residential structures and interior units, plus other locations of critical interest. This dataset is built and maintained at the most local level possible by way of a distributed system that is accessible through regional and state web-based interfaces. The address data will be developed locally, with local and state custodians acting as regional integrators that merge local data into region-wide databases. The data will be updated in a timely and standard manner, including new building permits and construction. Federal stakeholders consume and utilize locally developed and aggregated local address data to create and maintain a National Addresses Database.

The Need

The need to improve public safety and the ability to respond quickly and accurately to the right address are major reasons to develop and maintain a shared National Addresses Database. In addition, other critical and essential government services, as well as businesses and individuals, depend on addresses and their digital locations in order to satisfy their mandates, business objectives, and pursue efficiencies. The table below provides examples of how address location data is used. Government agencies listed require high quality, current address data to function well. Lives and property are at risk, for example, if first responders cannot accurately locate emergency events.

USERS	PURPOSE
FEMA	Pinpoint disaster areas, provide relief
Emergency Response, E9-1-1	Police, Fire, Ambulance, Rescue
Department of Homeland Security	Locate and protect critical infrastructure
Public Safety	Crime analysis, incident/citation tracking
Voter Registration	Precinct assignment
State Dept. of Revenue	Sales tax collection and distribution
US Postal Service, *UPS, FedEx, etc*.	Mail and package delivery
US Census Bureau	Mail out census and survey forms, geocode responses
Health and Human Services Agency	Track medical benefits, disease, births/deaths, and vulnerable populations.
Call Before You Dig (8-1-1)	Infrastructure protections, development coordination
Department of Transportation	Locate traffic accidents, access to FHWA funds to improve dangerous non-state roads.
Utilities (public & private)	Hookup, service calls, billing
Map and address companies (e.g. MapQuest, NAVTEQ, TomTom, etc)	Sell to insurance companies, location based service companies, utilities, state and local government, etc.
Retail/Services (e.g., Sears, local plumber)	Delivery of goods and services
Assessor/Taxation	Building location
Recorder/Auditor	Property records
Planning & Zoning Office	Building permit, planning studies

A national-scale, accessible address database will also deliver significant secondary benefit. New business products and services can be built upon it – improving the quality of life to our citizens and

adding life to the economy. Denmark provides evidence of this. The Danish Government opened its address register in 2002. A recent study determined the direct economic benefit of sharing their national address data is $18 million annually. Given the size ratios of the two countries, this would equate to over $1 billion annually for the U.S. economy. Seventy percent of the economic benefits went to the private sector, benefitting the economy directly; 30% went to the public sector.

Current System is Fractured
Addresses are created by local *Address Authorities*, usually a city or town, but sometimes the county. The new address information is provided to the owner and MAY BE distributed to other organizations who need it including various city and county offices, the US Postal Service, the phone company, other utilities, the school district, and the 9-1-1 authority. From that point, each of these offices is responsible for maintaining its own address file. Weaknesses of such a system include:
- No recognized standard for address data
- No central, authoritative database
- Need to assign and collect addresses as parcels are created
- Agency databases diverge over time
- No feedback loop to address authority or other stakeholders
- Inconsistent delivery of new addresses to stakeholders
- 9-1-1 (emergency response service) and 8-1-1 (call-before-you-dig service) cannot wait until structures are built or homes become occupied for the creation and provision of address locations
- Spotty capture of geographic coordinates

The 9-1-1/Emergency Response community maintains their own legacy location services (ALI/ANI) that link land-line 9-1-1 calls to a physical address, and routes the incoming emergency call to the appropriate Public Service Answering Point (PSAP). The PSAP then assigns the call to a fire, police, or ambulance dispatcher, when a separate process is undertaken to locate the call and assign responders. The legacy location services have many recognized shortcomings including: range-based addressing, no inclusion of sub units which can be physically separated, no differentiation between real and relative addresses, no visual map component to aid quality control, and no precise geographic coordinates for the address location. In most cases, the data supporting the legacy location services is maintained separately from the data and processes that are used by the dispatch process, and is usually of poorer locational and attribution quality due to issues related to ease of maintenance. To date, any standards created for the sharing of locational address data across systems or jurisdictions do not have a high adoption rate, since those standards have not been integrated by software providers.

The 9-1-1/Emergency Response community also faces a growing challenge as more homes go without a conventional landline, and more 9-1-1 calls come from cell phones. New investments in Phase II technology, which enables a wireless phone to transmit its geographic coordinates, are helping 9-1-1 centers to properly locate the cell phone callers and dispatch the proper first responders find those cell phone caller locations. Rural areas are lagging in implementing this new technology. The 9-1-1/Emergency Response office frequently has the most complete address data, but often is not sharing this information with other government offices. Due to a lack of coordinated information, outside response teams, perhaps from adjoining communities, may struggle to find unfamiliar addresses.

Federal agencies end up creating independent address databases because there have been no consistent or reliable sources across state or local government. The US Bureau of the Census has developed an

independent Master Address File (MAF), complete with geographic coordinates, which it cannot share with others because of Title 13 of the US Code. The Department of Homeland Security has hired contractors to identify and locate critical infrastructure, because few states have that information available. This duplication of effort in collecting the same basic information is inefficient and uneconomical.

While it may be the de facto leading federal agency for addresses, the Census Bureau is constrained from sharing address data by Title 13 of the U.S. Code, which requires all Census Bureau address information to remain confidential. The Census Address List Improvement Act (Public Law 103-430) amended Title 13 in 1994 and directs the Census Bureau to provide tribal, state, and local government officials access to confidential census address information, specifically for verifying the accuracy of that information for census and survey purposes. Government officials must sign an agreement of confidentiality, agreeing to destroy the address list when the review has ended, and agreeing they will not use the list for any other purpose. Public Law 103-430 also directs the U.S. Postal Service to share its Delivery Sequence File (confidentiality protected under Title 39 of the U.S. Code) with the Census Bureau.

If not for Title 13, the Census Bureau's MAF/TIGER System would be the logical National Address Database. In addition to mailing addresses, there are coordinates associated with each housing unit, thus making it useful for emergency response in the public safety arena, as well as the delivery goods and services to citizens in both urban and rural areas. The Census Bureau has decades of experience updating, verifying, and maintaining addresses, and more importantly, has built partnerships with thousands of governments that participate in the Census Bureau's address data update efforts.
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Problems We Face Today
Lives and property are lost because first responders cannot quickly locate the accurate address of an emergency. This is a serious problem. It occurs in every large city and in rural areas as well. In the wake of Hurricane Katrina, the lack of information about where people lived slowed and frustrated rescue and recovery operations. It is a problem today as properties go into foreclosure, but inconsistent address systems clog communication among courts, sheriff offices, banks, inspectors, and residents. Construction sites are an ongoing problem where there is no record of a worksite address so that 911 centers can assist injured workers.

Other problems resulting from this fragmented system include:
- Taxpayer money is wasted as multiple agencies collect and maintain similar data. The Census Bureau spent $444 million of taxpayer dollars to create address points for the 2010 Census[1] and that dataset of address points cannot be shared with others.
- The US Postal Service (USPS) cannot keep up with the 2 million addresses added each year by new construction and conversions of existing buildings into multiple occupancy units. They rely on input from cities and their own carriers, but that data is often inconsistent or untimely.[2]

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[1] Commerce Department, 2010 Census: Quarterly Report to Congress, December 2010, Office of Inspector General, Report OIG 19791-2.

[2] Clayton Bonnell, "Postal Service addressing problem," US Postal Service, email sent to representatives of GITA, NENA, NSGIC, and URISA on December 3, 2007

- Many jurisdictions try to maintain redundant or inconsistent address data about the same territory, causing significant additional expenses. These include the city, county, school district, watershed district, election office, and emergency responders. The City of St. Paul, Minnesota, spent 1000 hours of staff time on the 2000 Census LUCA (Local Update of Census Addresses) activity, mostly because of record disparities among the various city departments that were maintaining separate address files.[3]
- Late or missed deliveries and service appointments frustrate homeowners. Those problems cause additional costs and lost revenue for the private sector as it faces corrective measures and lost business.
- States working to collect and distribute sales taxes are struggling to do their work economically and equitably. Tax rates can vary across the state because of local additions to the state rate. Knowing which addresses are in each taxing jurisdiction is necessary when collecting taxes on goods purchased by mail order or Internet.[4] Services that find address locations and corresponding taxing entity and rates should be accessible to the merchant at time of purchase, but is too often not available. Partly due to the current difficulty of authoritatively locating addresses, online, out of state businesses have a competitive advantage over local businesses that are required to collect sales tax.
- Opportunities are missed to identify potential cost savings from using addresses to conduct geographic-based fraud analysis.
- There is an increasing need to share address location resources between emergency response agencies for coordination and/or the ability to provide fail over backups to each other and this need will increase with the advent of NG9-1-1.

Best Practices

Many local governments have developed centralized databases that share information across departments and with the local 9-1-1 authority. The best of these assign addresses early in the process, beginning with the acceptance of subdivision plats and authorization of building permits. Geographic coordinates are added from GPS field measurements, from orthophotography, or from official maps and sketches of building location submitted with the permit application. New entries are verified with quality control before being accepted. Information is sent to all stakeholders as soon as the address is issued, either directly or via a regional custodian.

The FGDC has adopted the United States Thoroughfare, Landmark, and Postal Address Data Standard (FGDC-STD-016-2011). Once implemented, this standard will make it significantly easier to share data across jurisdictions and upward to state and national repositories. This may be a new standard, but local governments are paying attention to it. They intend to use it as tools become available to assist in its implementation.

In a few places the county or 9-1-1 authority has become the regional custodian, assuming responsibility for maintaining a central authoritative database. The regional custodian is responsible for synchronizing new information streaming in from cities and towns (with various levels of computer sophistication and in different formats). Corrections identified by any of the participants are reported back to the local and regional custodians where they are verified, implemented, and distributed. Address and geographic

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[3] Mark VanderSchaaf, former employee of St. Paul Department of Planning and Development, personal conversation, March 29, 2006.
[4] The Streamlined Sales and Use Tax agreement involves a majority of the states; see http://www.streamlinedsalestax.org/

coordinates are made available to the public via the Internet; personal information, name and phone number, are kept private.

Several states have developed a statewide system, or are supporting their counties in the development of a federated system, that maintains and delivers address data across the state. The states of Maine, Connecticut, and Vermont in New England are collecting this data from their towns and Rhode Island is developing such a system. Ohio, Indiana, and West Virginia are working to build systems that will collect the data from their counties. Arkansas has created a state-level database of address ranges. 9-1-1 fees cover the cost of the Vermont system. The Ohio program includes both roads and addresses, and matches local efforts with state capital funding and a mix of other sources.

The National Emergency Number Association (NENA) is working diligently to assist local 9-1-1 authorities' move to the Next Generation 9-1-1. NG911 is driving requirements for better, more accurate mapping so that emergency calls made with mobile devices that transmit their location coordinates (points) can be accurately matched to street addresses and other map data to assist 9-1-1 dispatchers.

Next Steps
A National Address Database could be developed to aggregate and integrate local address data – to make it comprehensive and seamless at the national level on a regular frequency. This database would then be available to meet the needs of federal, state, and local government, as well as provide opportunities for new products and services from the private sector. It would provide significant benefits both to citizens and to the economy.

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Strategic and business plans specifically oriented toward address data creation, maintenance and access need to be developed. There is a role for each level government as well as the private sector. In general terms, these roles may include:
- Local government continues to be the Address Authority, creating new addresses as needed, using national standards and locating these addresses with x-y coordinates.
- Counties or 9-1-1 authorities serve as the regional custodians of the data, receiving local updates and distributing address and coordinate data free of charge to the public and all participants.
- States provide statewide coordination and technical support to counties and 9-1-1 authorities. States provide address data aggregation services to state, national, and international interests,
- Federal government supports the National Address Database portfolio management, following the tenets of the A-16 Supplemental Guidance, as a shared resource allowing updates from authorized federal agencies as well as state and regional custodians.
- Private sector is available to support system development for any level of government. It is further expected that the private sector might be able to take advantage of the National Address Database to develop new products and services if access is deemed advisable.