

**MAF/TIGER® System,**  
**Horizontal Spatial Accuracy Assessments Since 2000**  
**John S. Liadis**

**ABSTRACT:** The U.S. Census Bureau plays a vital role in the development, maintenance, and sharing of spatial and attribute data for Geographic Information Systems (GIS) on the local, regional, national, and international levels. The origins of the MAF/TIGER® system date back to the mid 60s with development of the GBF/DIME (Geographic Base File/Dual Independent Map Encoding) files that supported the 1970 and 1980 censuses. The TIGER® (Topologically Integrated Geographic Encoding and Referencing) database built on and replaced GBF/DIME to support decennial censuses and ongoing surveys since the 1990 census. With the advent of GPS technology for commercial use and the elimination of selective availability in the late 90s, it became feasible to use this technology to improve the spatial quality of the Census Bureau's TIGER® database. To this end, the Census Bureau began evaluating the accuracy of road features that formed the backbone of addressable features in the database.

The GPS/TIGER® Accuracy Assessment Tool (GTAAT) was developed to capture road intersection coordinates and calculate the distance and azimuth differences between GPS (ground truth) and their corresponding TIGER® database intersection. In 1999, the Census Bureau ran a pilot test in eight sites across the nation, the results from which identified the need for wholesale spatial improvement to the base particularly in high growth areas that experienced multiple cycles of feature updates. The Census Bureau uses the FGDC's National Standard for Spatial Data Accuracy specification for Horizontal Spatial Accuracy Assessment. Census Bureau statisticians identified the sample size as 100 per geographic testing unit (usually a county). The bureau contracted with a variety of local survey companies to collect quality control point coordinates in the field (at pre-selected right-angle intersections).

The Census Bureau and Harris Corporation identified an accuracy standard that would assure the correct placement of field collected housing unit structures using GPS enabled enumeration devices. The horizontal spatial accuracy standard was set at circular error of 7.6 meters at the 95% confidence level (7.6m CE95 ). Staff assessed all potential Tribal, State, County & Local GIS and imagery files as well as field collected road features to assure they met the standard prior to their acceptance for upload into the TIGER® database.

Mapping the spatial accuracy assessments over time identifies where spatial and coverage improvements were made to the MAF/TIGER® system and where improvements are still needed. The maps and graphs also depict the variety of methodologies used over the past two decades to assess and quantify spatial data quality and coverage. The MAF/TIGER® system remains the most comprehensive geospatial and address database for the nation.

For areas where there is room for improvement we have robust data capture/exchange mechanisms like Community TIGER® available for Tribal, state, local and federal partners to contribute updates. .

**KEYWORDS:** MAF/TIGER® System, Horizontal spatial accuracy, Road feature coverage and fidelity

**John S. Liadis**, Branch Chief, Geographic Research & Innovation Staff, Geography Division, Census Bureau, Washington DC 20233