Hands-on with GIS software

Brian Webster

Cameron Crum

Introduction

Cameron Crum

- RF Engineer/Software Developer
- Started in wireless in 1995 with Sprint Cellular
- Designed over 1000 cell sites in 12 cities and 3 different countries
- Developed GIS based Propagation Software Athena for the cellular industry
- Started a Wisp in 2003 which I sold to JAB (RISE) in 2010
- Developed Wispmon billing and OSS software starting in 2004 and sold to Sonar in 2017
- Currently COO/CTO and Founder of Regulatory Solutions, and CTO for Visp.net

Regulatory Solutions, Inc – Booth 420
Visp.net – Booth 421

Introduction

Brian Webster

- RF Engineer / GIS Specialist
- Data directory for Broadband IL
- Own and operate wirelessmapping.com
- Notable RF Projects include Earthlink Muni Wifi,
- Consulted to Ericsson on Google Fiber project in CA
- Currently President and Founder of Regulatory Solutions

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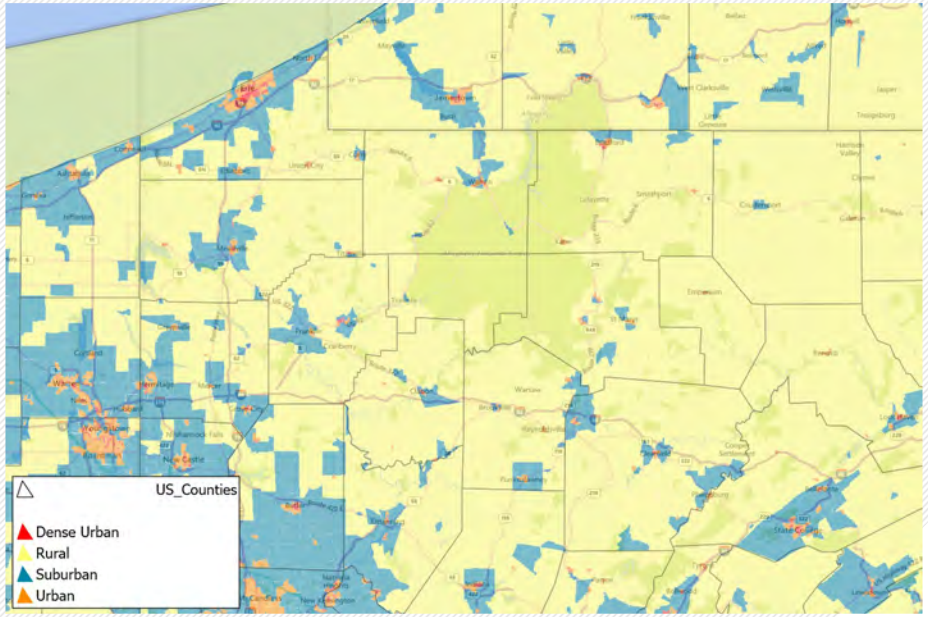
Geographic Information Systems

Definitions:

- A spatial system that allows you to display, analyze, manage, and map all types of data
- A computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface
- Very powerful tools
- As simple as a map from a spreadsheet to complex relational databases.
- More than just maps.

- Data is thought about as layers.



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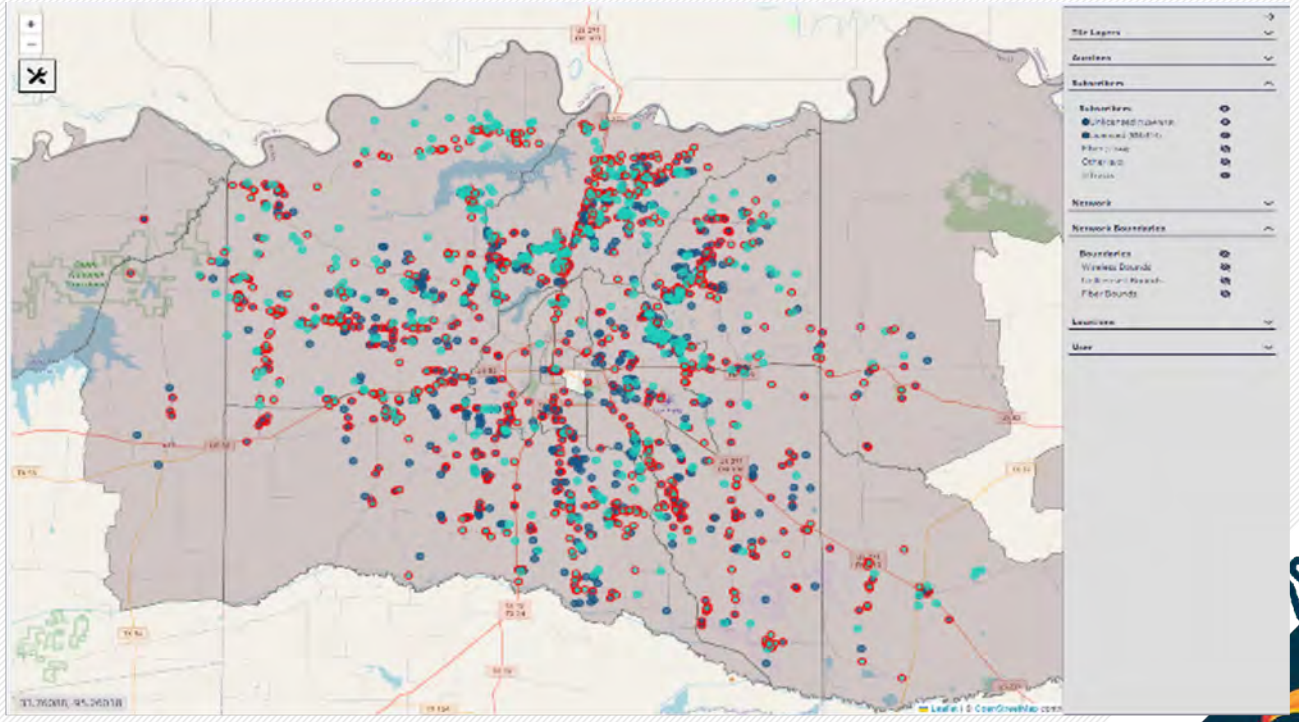
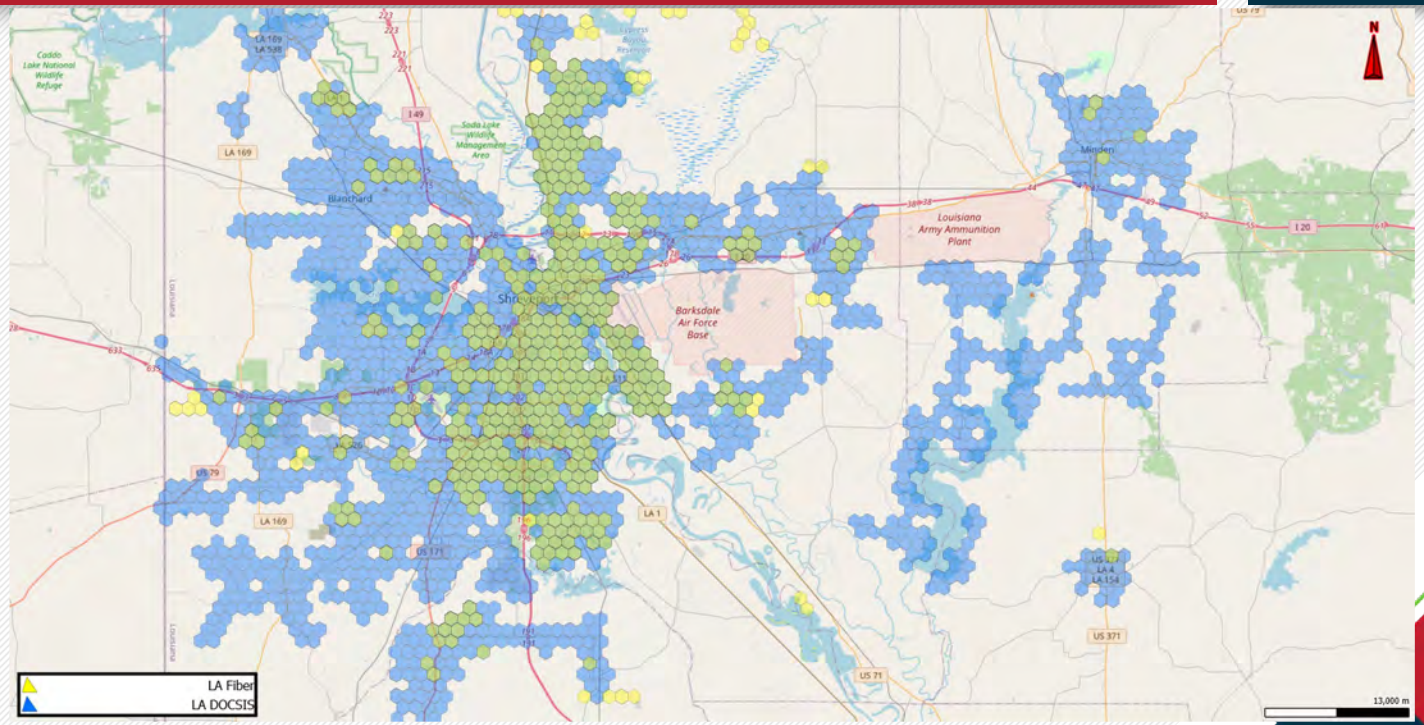
Think of pivot charts, but location based

- Just like charts and graphs, GIS data is displayed using location information.
- This can be as simple as a customer address list, or as complex as market studies of FCC BDC data.
- Many sources have location data such as a zip code, coordinates, tracts, blocks, counties, etc.
- You can map this data!



Competition research matters

- GIS systems can help you bring together multiple sources of information.
- This can be a combination of your own proprietary and public data.
- This map shows BDC data by the hex grid



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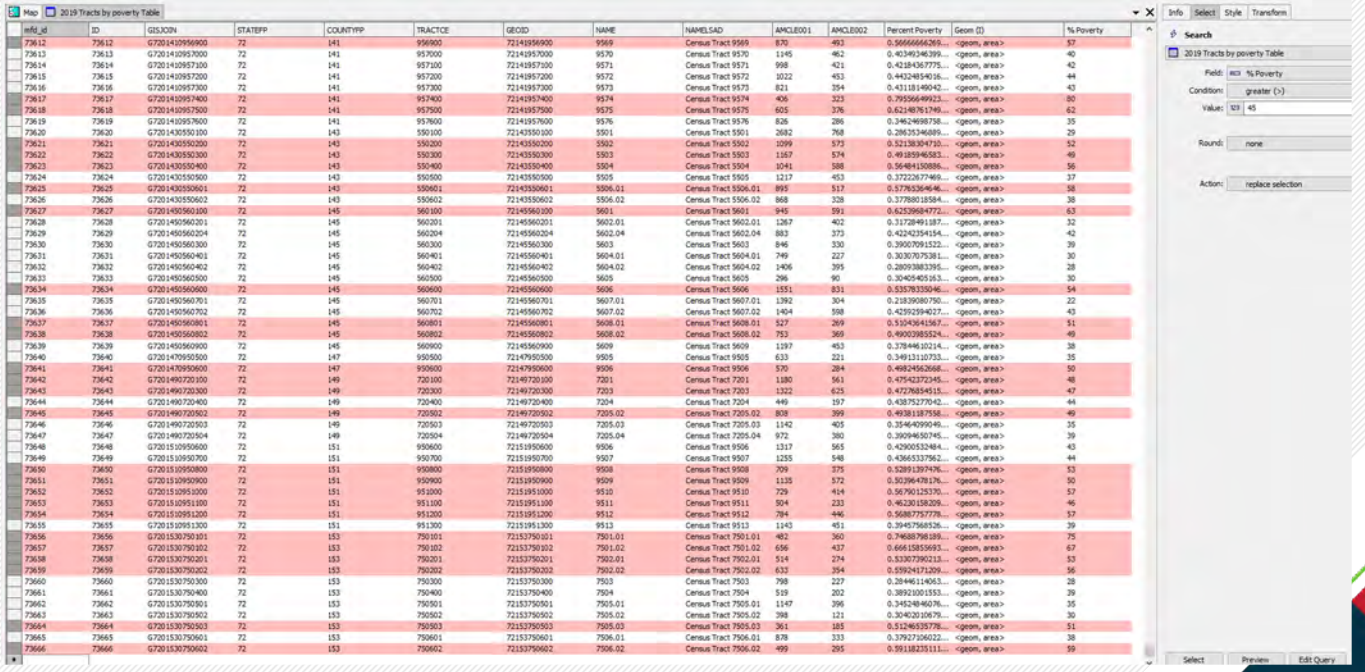
Map layers have associated data tables

- In GIS all map layers have tables of data associated with them.
- You can search, query and sort these tables like any other data and “see” the results in both the table and map.
- You do very complex with queries across multiple layers.



Tools available from simple to complex

- Google Earth Pro - https://www.google.com/earth/versions/#earth-pro
  - Simple, free, can view most any data type. Limited when creating data with complex data tables

- QGIS – https://www.qgis.org/en/site/
  - Super powerful, free, Open Source, great on line help, Plug-ins of all kinds to add features, steep learning curve. Support for linking to large databases.

- ArcGIS - https://www.esri.com/en-us/arcgis/about-arcgis/overview
  - Expensive, powerful, closed source, very recognized and mature software. It what to colleges train students to operate. Heavy in government use.

- Map Info -https://www.precisely.com/product/precisely-mapinfo/mapinfo-pro
  - Expensive, powerful, used to be defacto standard in cellular.

- Manifold - https://manifold.net/
  - Mature, inexpensive, commercial software, very powerful, very fast, coded specifically for multi-processor hardware support.

BDC Data and the H3 Grid System

- The public data from the BDC web site has location information.
- It's all based on the H3 Grid system. https://h3geo.org/docs
- The hex grid ID's actually draw the hexagons on a map.
- One of the easiest ways is with a QGIS plugin https://plugins.qgis.org/plugins/h3_toolkit/

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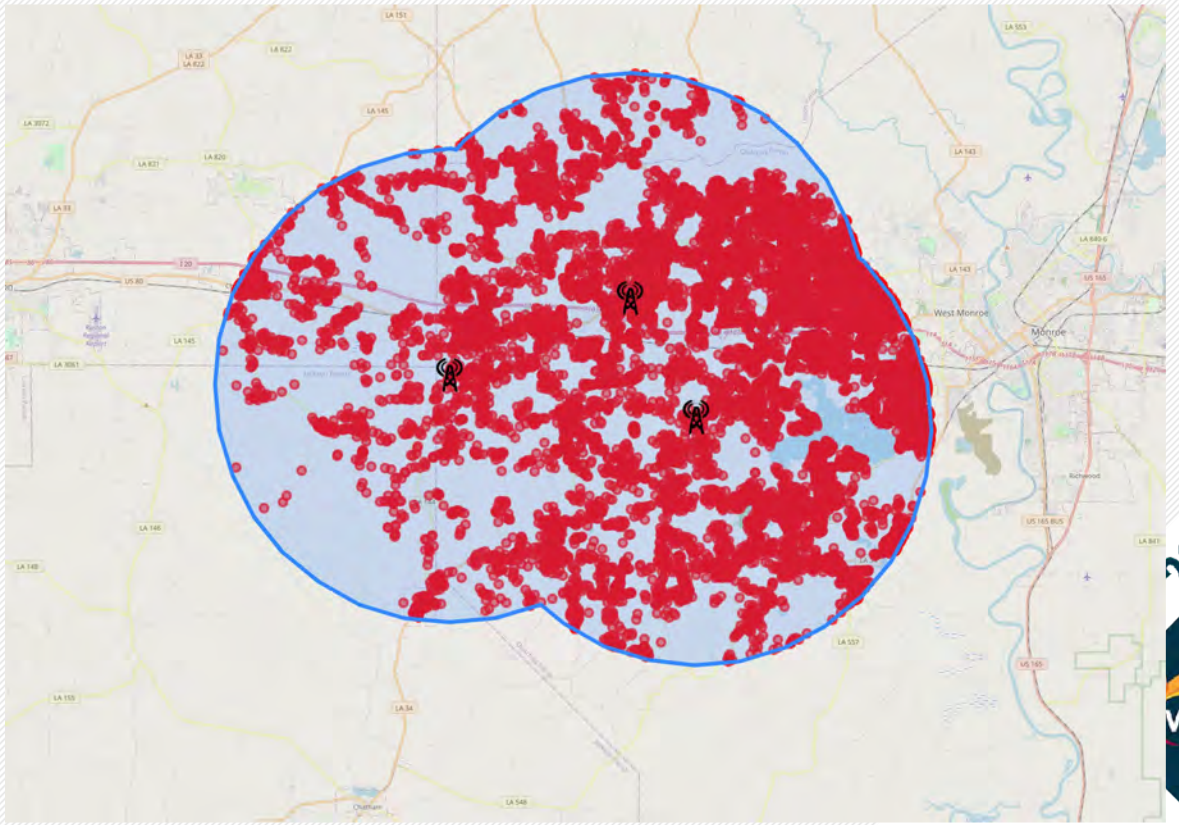
Analysis with BDC Data

Using Data downloaded from the broadband map, you can use simple sql type queries to create things like:

1. Competitive Analysis
2. Combine data to find specific unserved or underserved locations (i.e. for grant applications) *make sure you have the appropriate license
3. Determine ineligible addresses (i.e. addresses that already fall within other grant or program boundaries.
4. Create complex polygons for areas still eligible for other programs like USDA

BDC Locations clipped against an ISPs Coverage Boundaries



Analysis with BDC Data

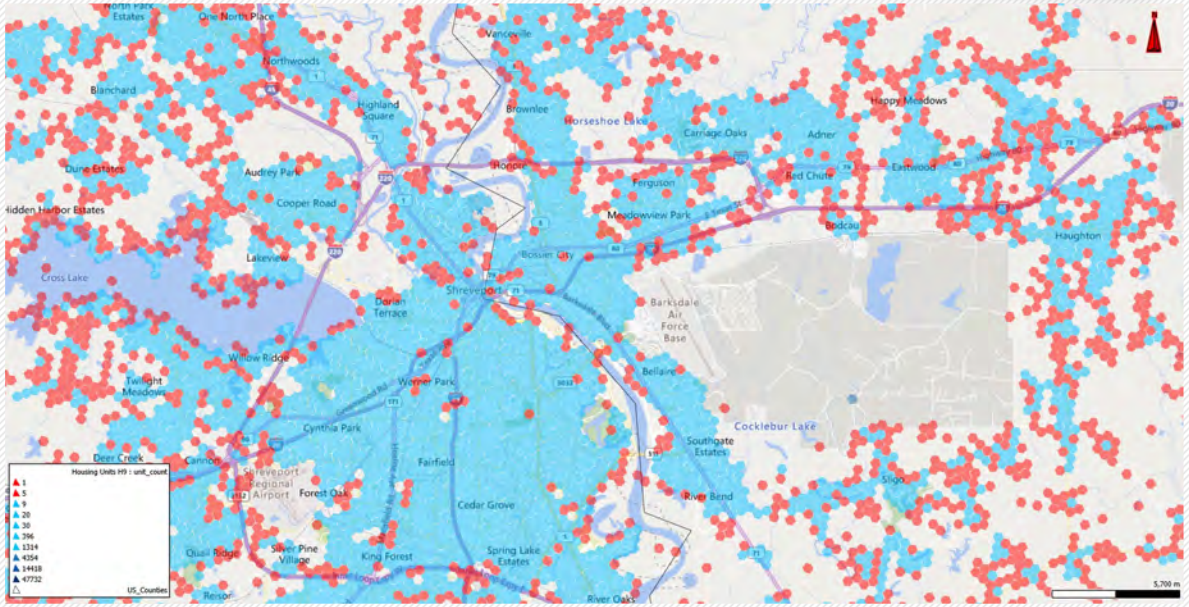
- From the previous map image, we can run a query against the published Broadband Map data and determine how many addresses in that same region are covered by competition.
- Useful for determining percentage of addresses that may be un- or underserved.
- Useful for responding to the FCC about why you only have 2-5% of the addresses as customers

Example Query Results for Determining Competition within a given ISPs Wireless Service Area:
16967 Total BDC addresses in area

Brand Name,Technology,Count
AT&T Inc,50,1781
Hunt Telecommunications,50,2
Optimum,40,82
SkyRider Communications LLC,50,141
Southern Light, LLC,50,4
Sparklight,40,134
Starlink,61,10254
T-Mobile US,71,850
US WiFi LLC,70,629
VERIZON,71,5
Xfinity,40,6793

You can analyze the data with database queries

- Examine household densities
- Investigate business location density
- See reported serviceable locations by other carriers to see their footprint accurate to within a 250 meter diameter grid size



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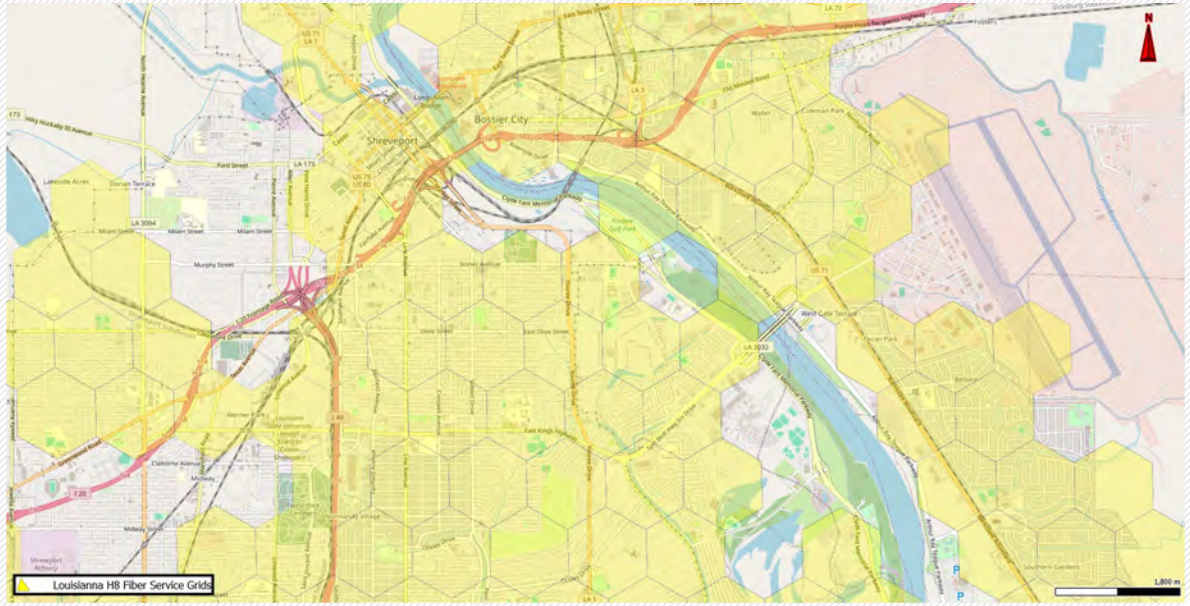
For BDC data there are 2 different grid sizes

- H8 grid size is 1 KM in diameter and how most service is reported by carrier and technology.
- You can get service by address location ID's but the only location data is the hex grid 9 level.
- That is a grid size that is 250 meters in diameter.



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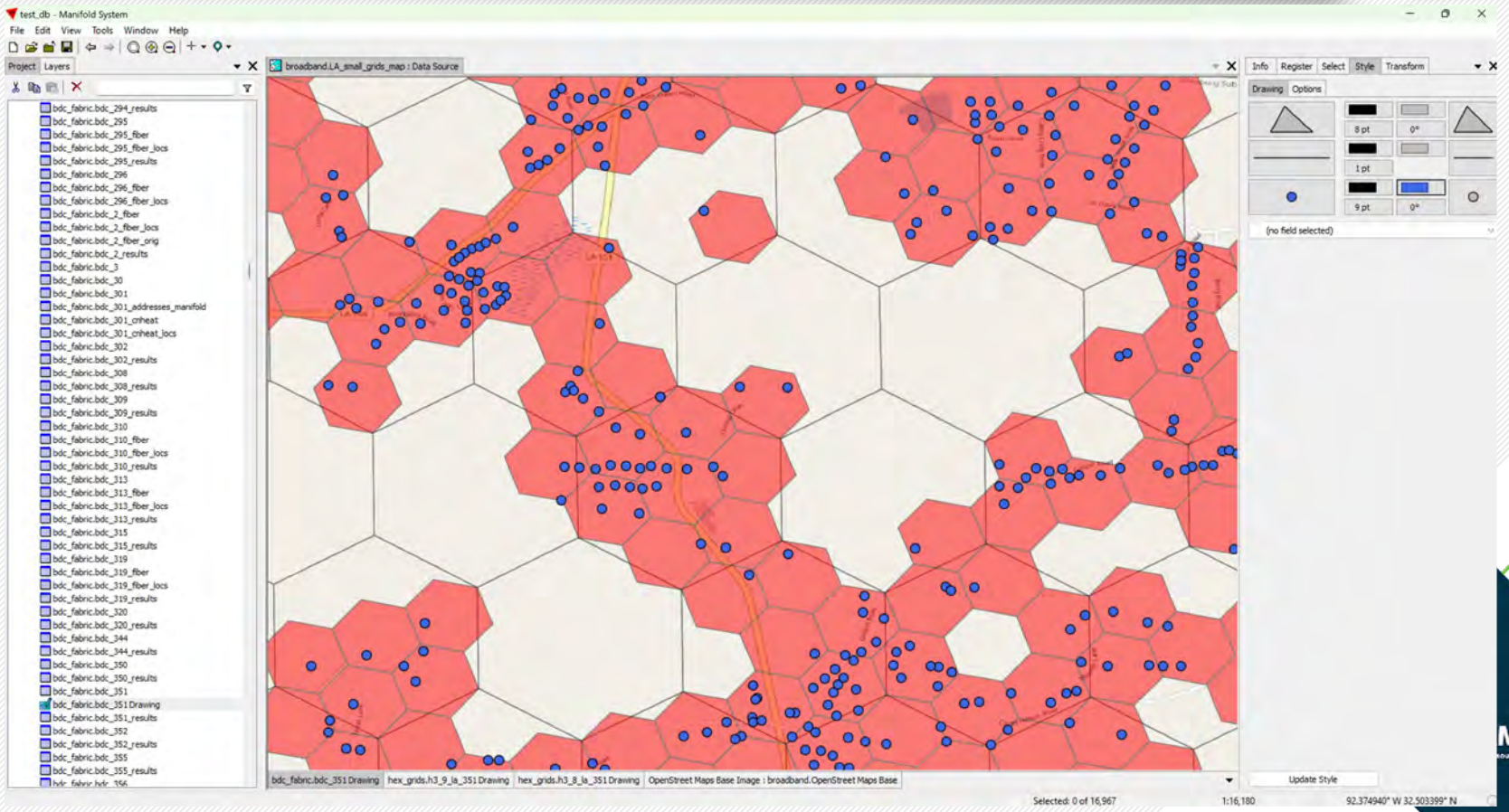
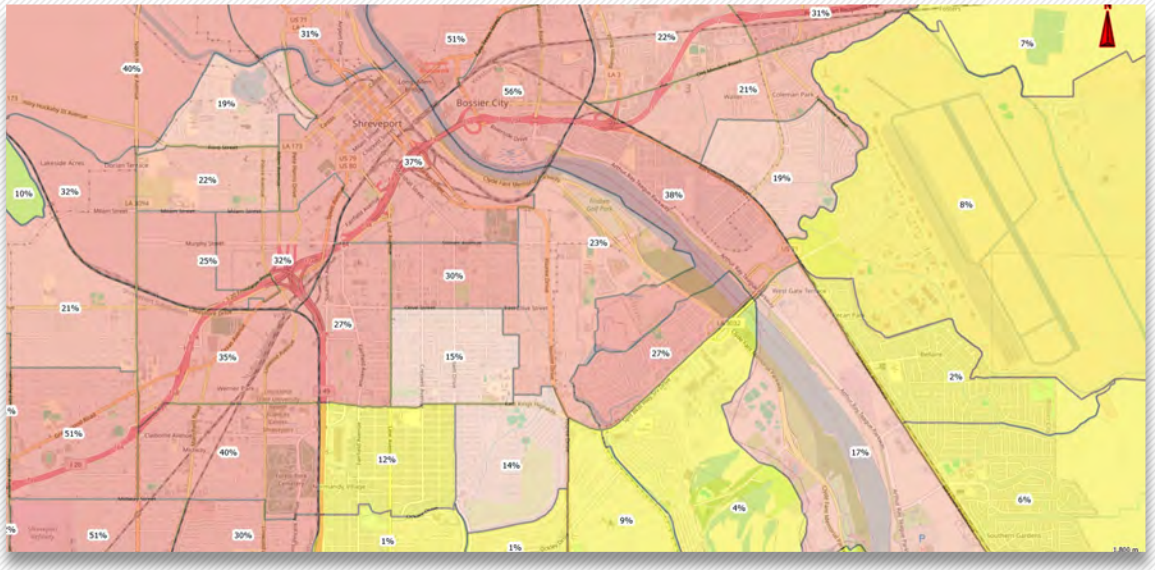
For BDC data there are 2 different grid sizes

Here is a visual of the difference between H8 and H9 grids with address points overlaid to show the difference in resolution and how many addresses you can expect to find within the H9 grids.



Other important data can be studied as well

- Data such as survey results or demographic information can be displayed and overlaid
- Information from your state broadband office can be included such as address location that are unserved



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THANK YOU