Backcasting of Mobile Infrastructure: An application to Mexico

Method

Preprocessing of boundary and cell data:

* Use the OpenCelliD API to extract data
* Process country boundary for Mexico
* Process regional boundaries for Mexico
* Create shapefile from OpenCelliD data
* Segment data to GID\_1 regions as .csv file
* Segment data to GID\_2 regions as .csv file
* Aggregate cell data cellular generation (2G, 3G, 4G) by GID\_2 regions as .csv file

Preprocessing of population data:

* Extract settlement layer for Mexico from the WorldPop 2020 1 km2 global population mosaic
* Extract population metrics (including density) for GID\_2 regions as .csv file

Results processing:

* Import population lookup table and range by population density (from highest to lowest)
* Import cells by GID\_2 region and convert to dictionary with the GID\_2 code as the key
* Generate the backcasting results for 2G, 3G and 4G cells, with the following initial (dummy) simulation parameters:
  + $100 million to spend per year on building cells
  + $30,000 as the cost for a single cell
  + 2G starts in 2000, 3G starts in 2008 and 4G starts in 2013
  + Total time-horizon run from 2000-2020
* The results export the following metrics:
  + Build year
  + GID region id
  + Number of cells built
  + Radio type (cellular generation)
  + Cost
  + Population served