

A New Approach on Estimating Germany's Mobile Broadband Coverage based on Crowdsourced Data

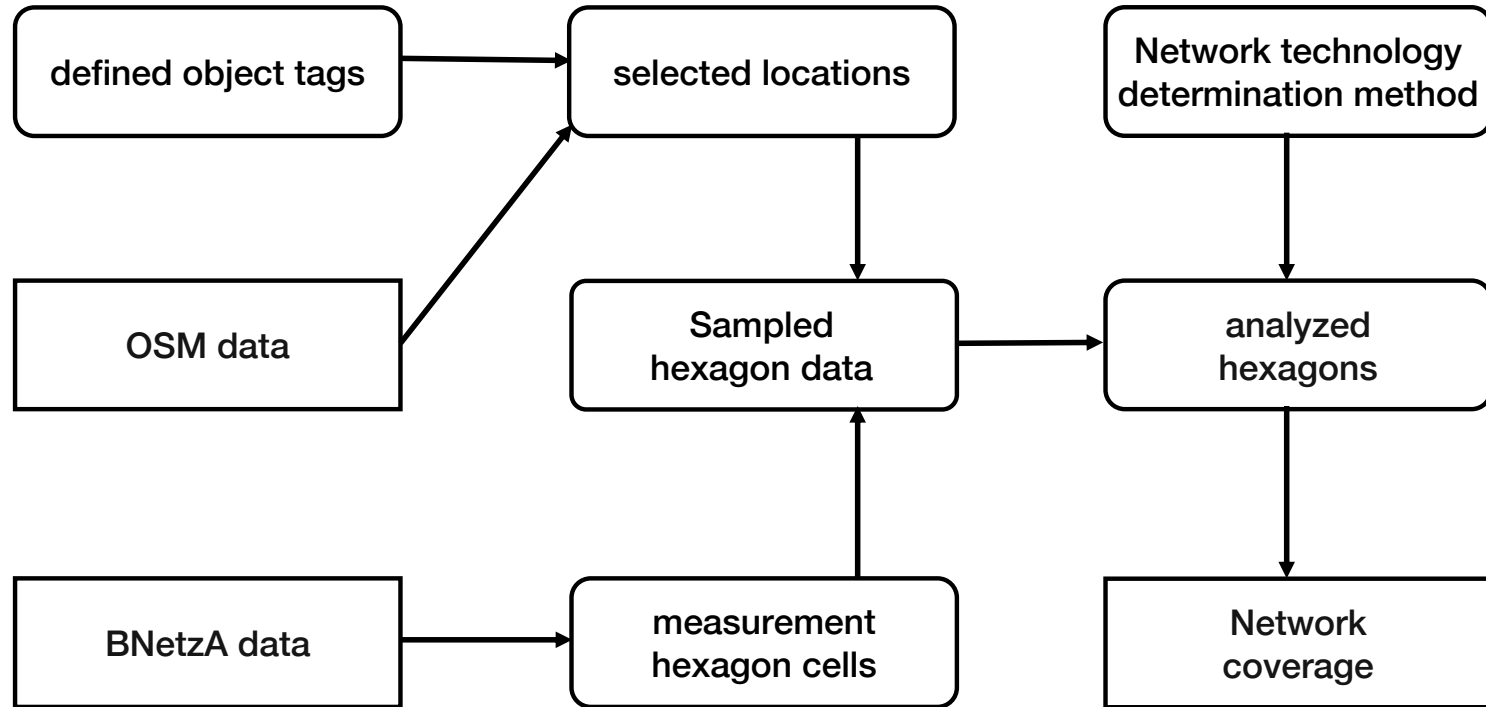
Cornelius Wolff, Alexander Tessmer, Nils Aschenbruck

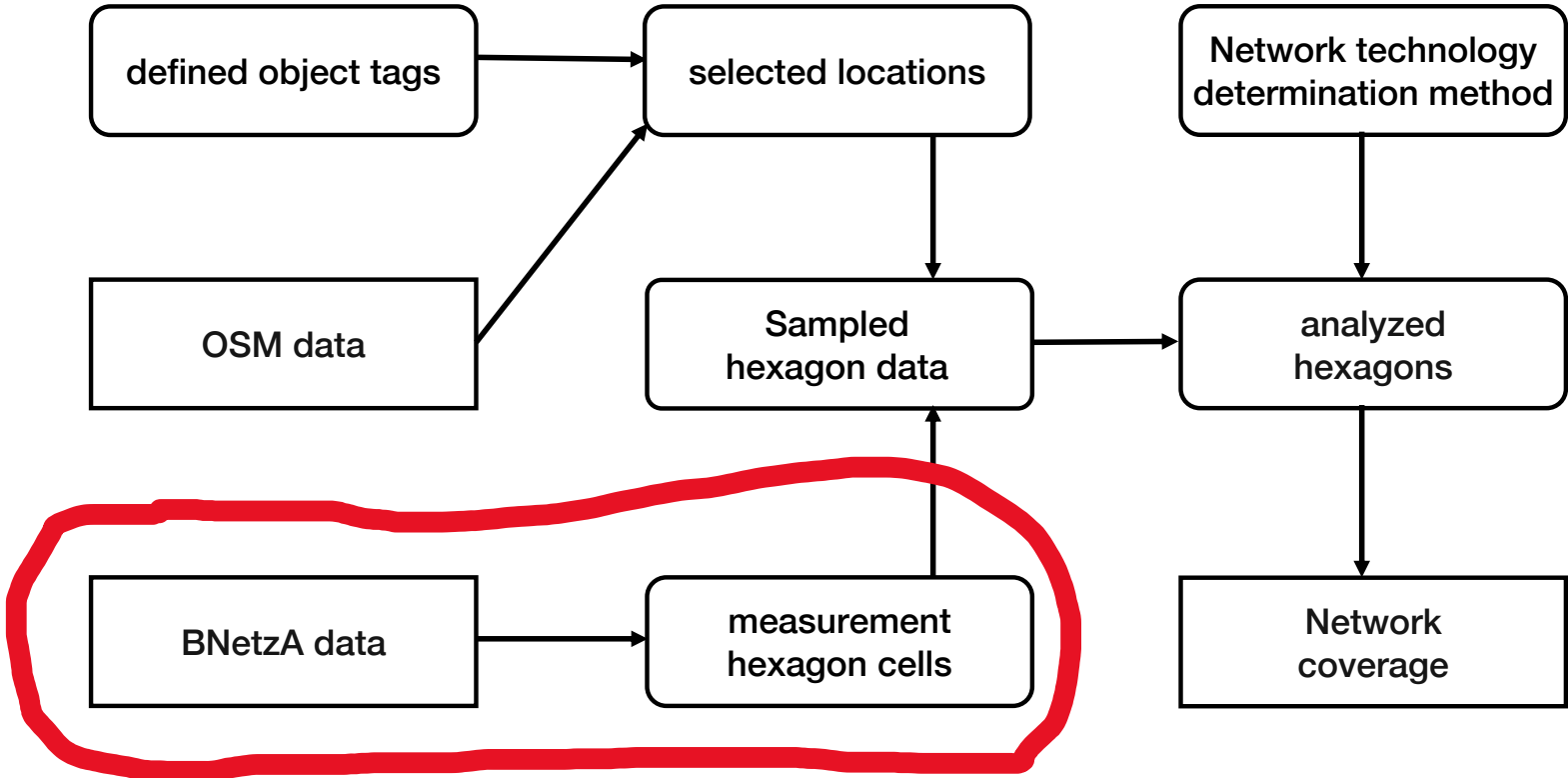
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- | A lot of available government and crowd-sourced coverage datasets
 - Crowd-sourced dataset provided by the Bundesnetzagentur (BnetzA)
- | Lack of common approach to evaluating such datasets
- | Contributions of this paper:
 - Introducing a new approach for evaluating such datasets
 - Testing this approach with the crowd-sourced dataset by the BNetzA
 - Testing different approaches to measuring the dominant network technology

| A new approach to evaluate coverage data

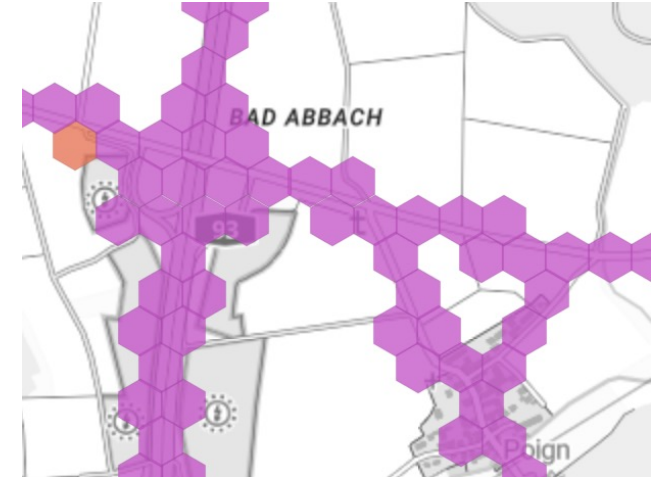


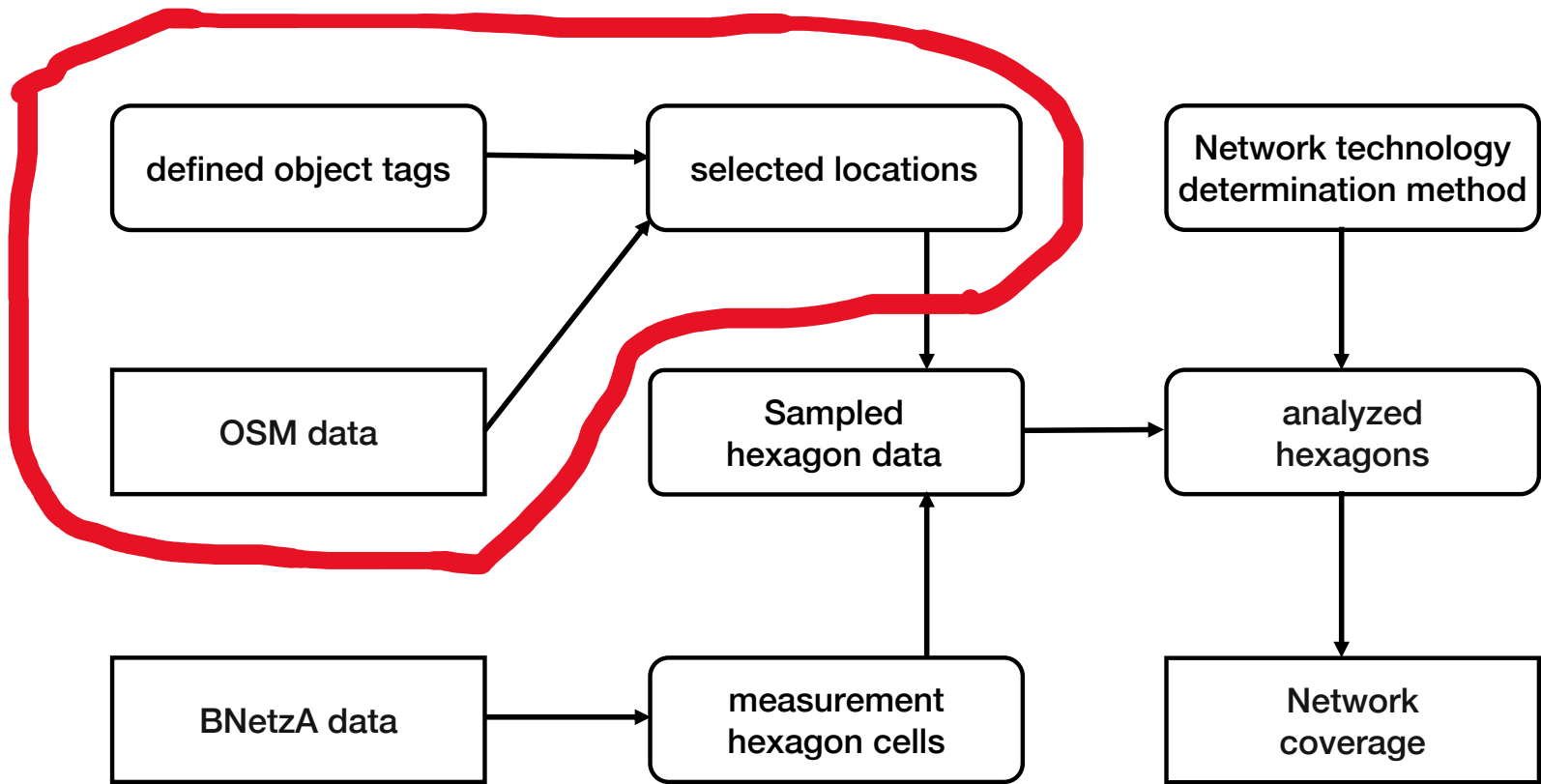


BNetzA dataset

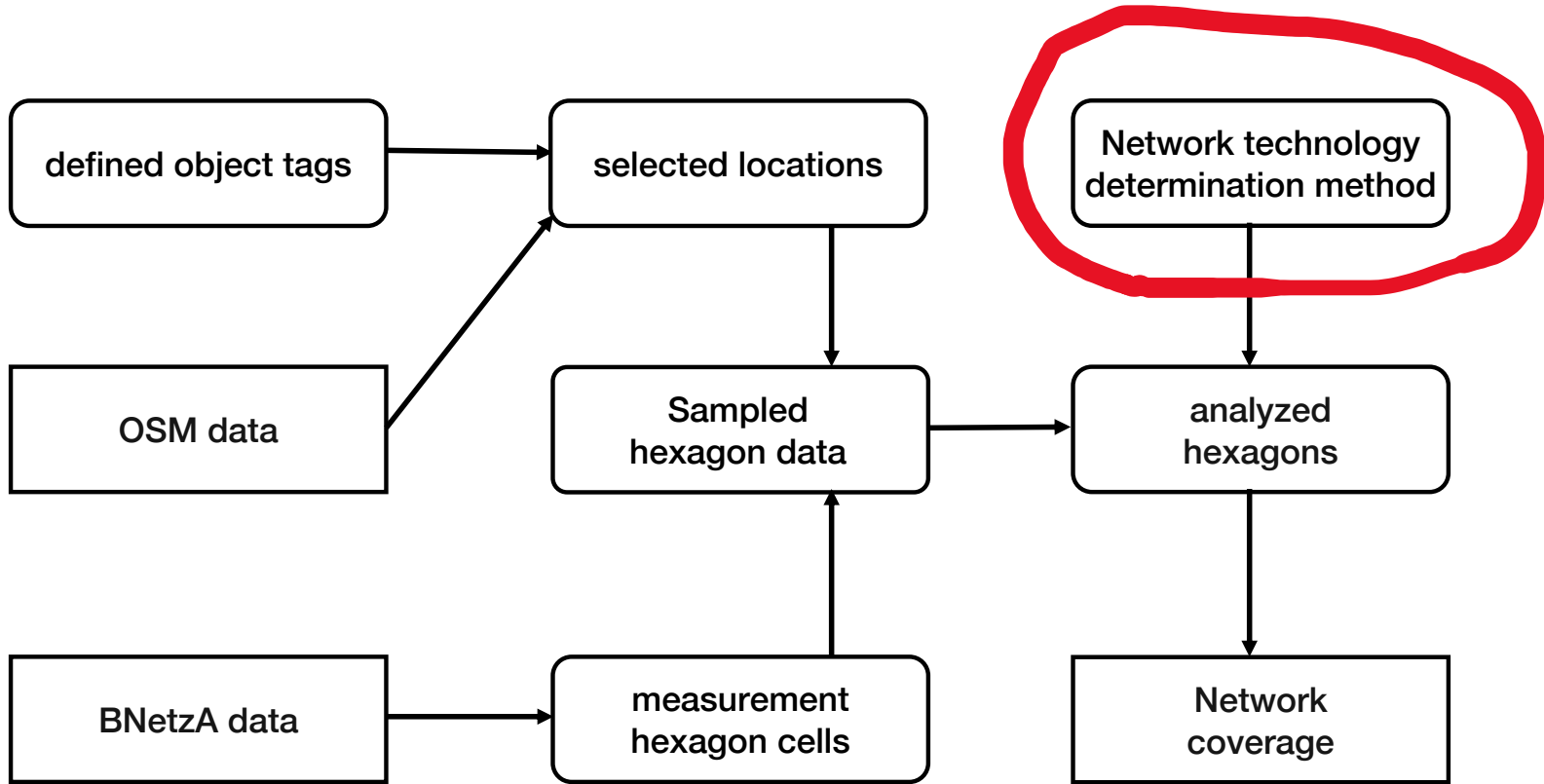
- Measurements are aggregated hexagons for each provider
- Records currently connected network technology, not network strength
- Limitations: Measurements dependent on user setup

Operator	Hexagons	Measurements
Operator 1	4,128,266	79,131,865
Operator 2	3,666,789	52,339,685
Operator 3	4,295,819	74,908,288
All	6,439,963	206,379,835



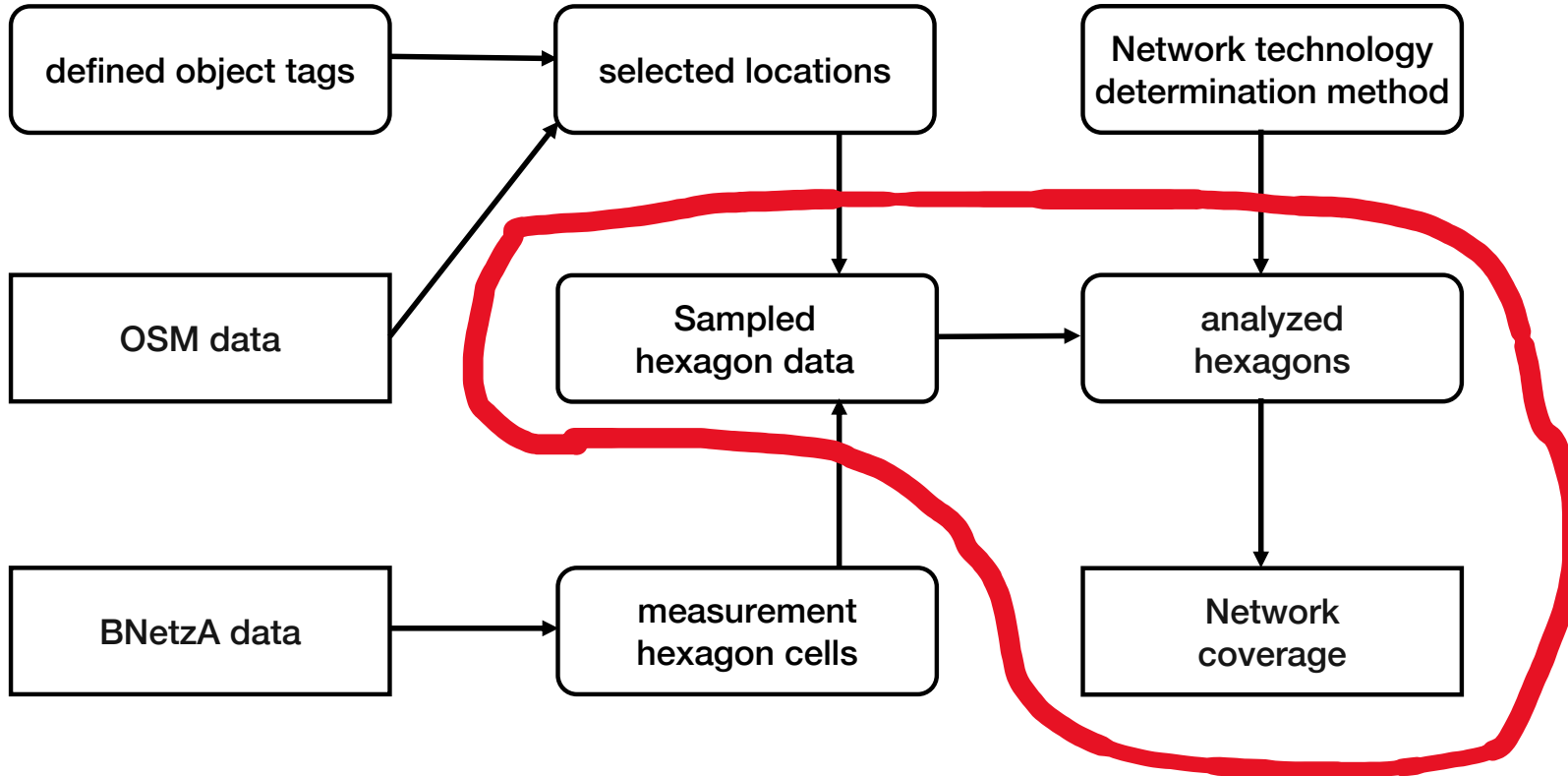


- | OpenStreetMap Data
- | Data is stored as nodes, way and relations
- | Provides a lot of exact geo locations
 - Sometimes inconsistent
- | For testing we selected
 - Residential areas
 - Education buildings (schools, colleges, universities)
 - Public transportation infrastructure (rail, highways)

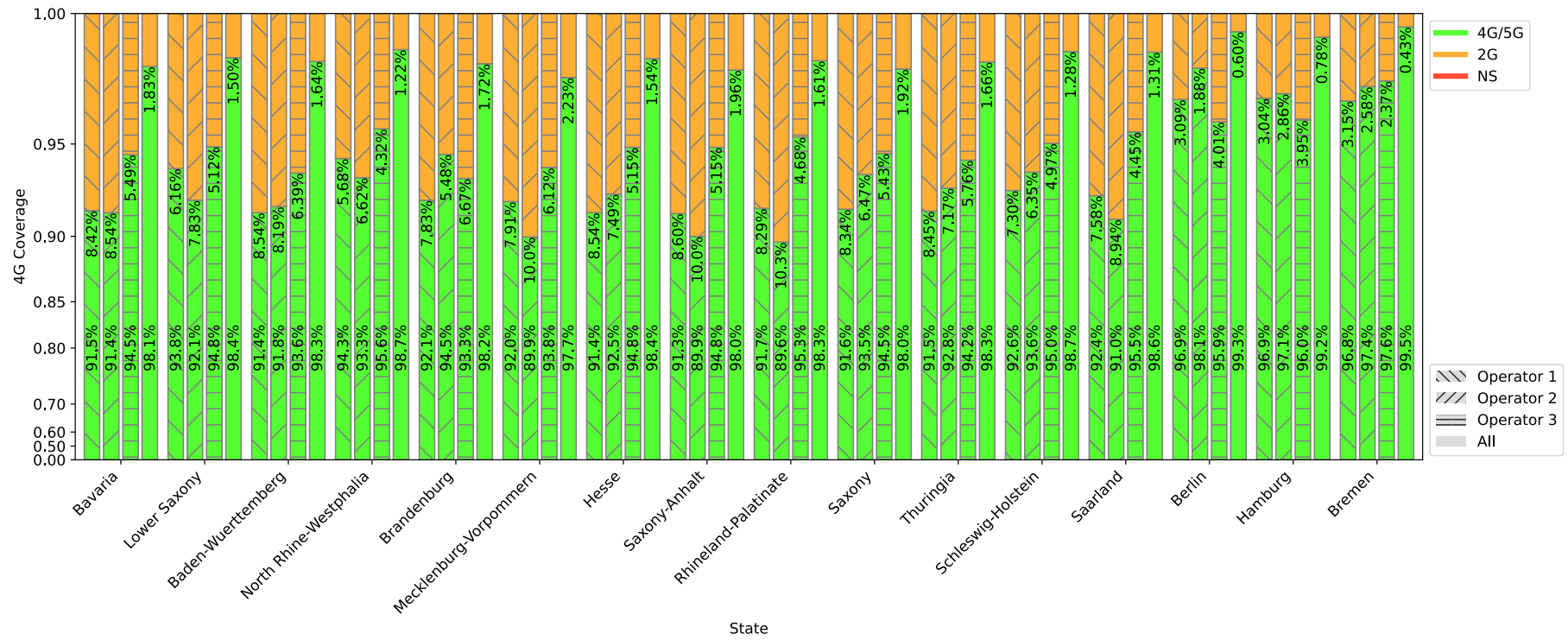


- | Network determination methods
- | BNetzA map shows the technology with the highest number of measurements
- | Different thresholds show significantly less 4G/LTE coverage

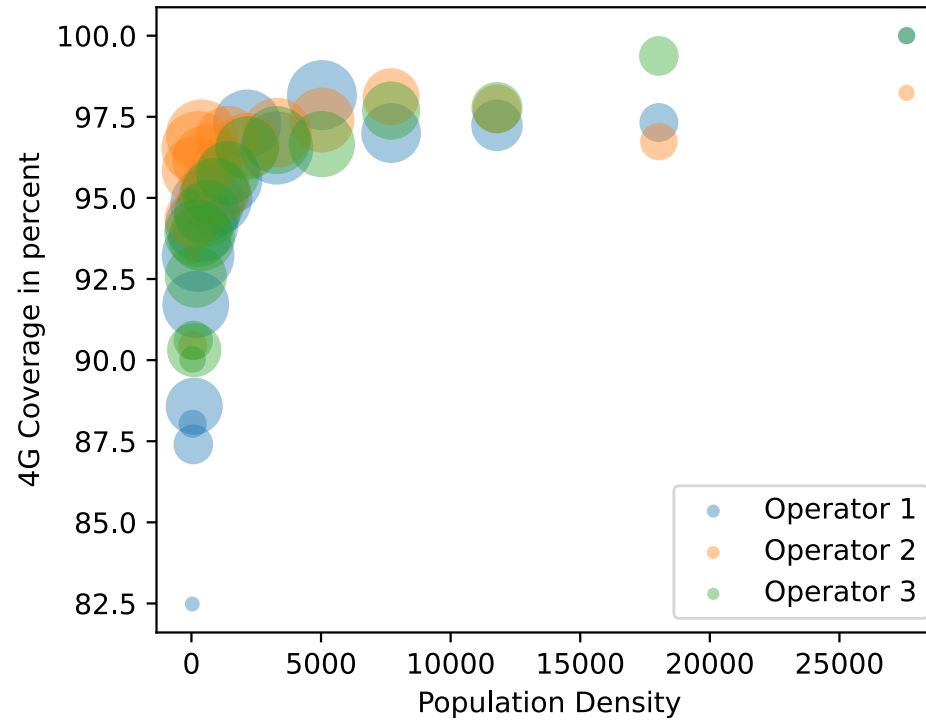
Threshold	Operator 1	Operator 2	Operator 3
BNetzA	87.8%	88.9%	91.9%
70%	83.0%	84.6%	86.9%
90%	74.0%	76.7%	79.3%



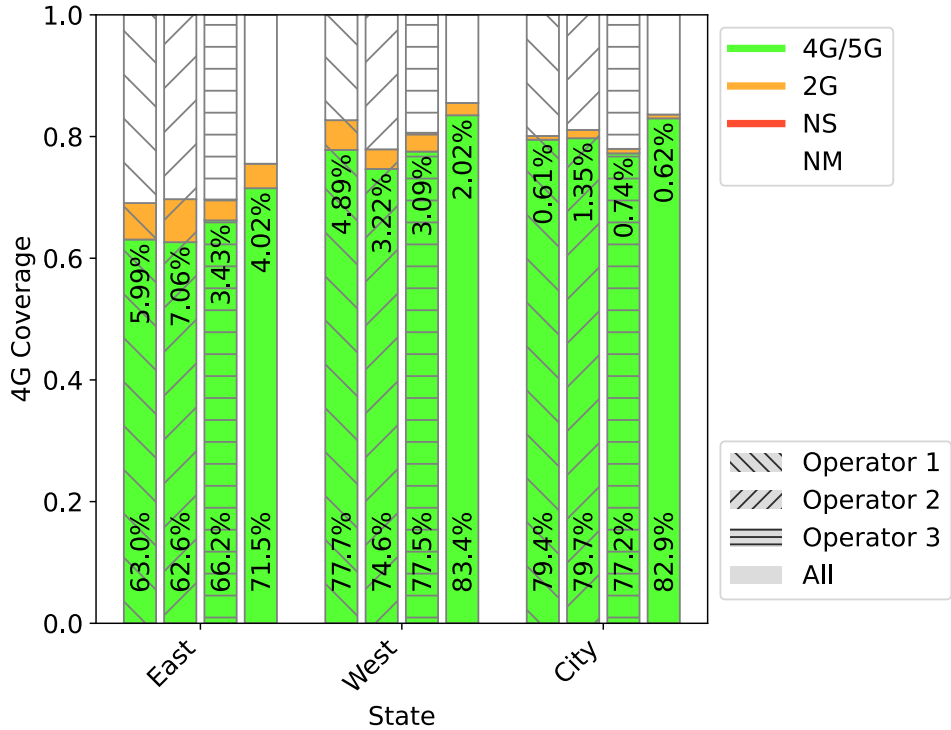
Residential areas



| Educational buildings

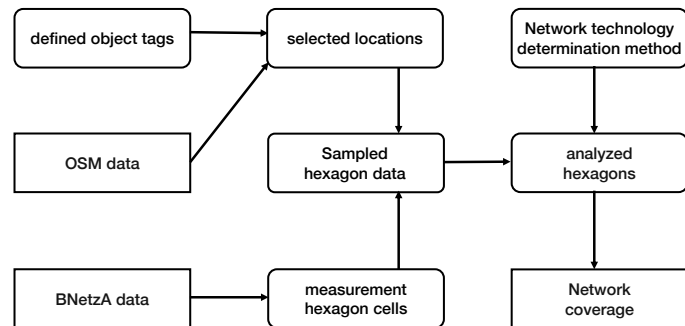


Public infrastructure



Summary

- Developed a new approach for evaluating coverage data
- Tested the approach on crowdsourced data provided by the BNetzA
- Showed the impact of different thresholds



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