Barcelona GSE Graduate School of Economics

MASTER PROJECT

Measuring real broadband speeds using crowdsourcing data from the Internet Foundation

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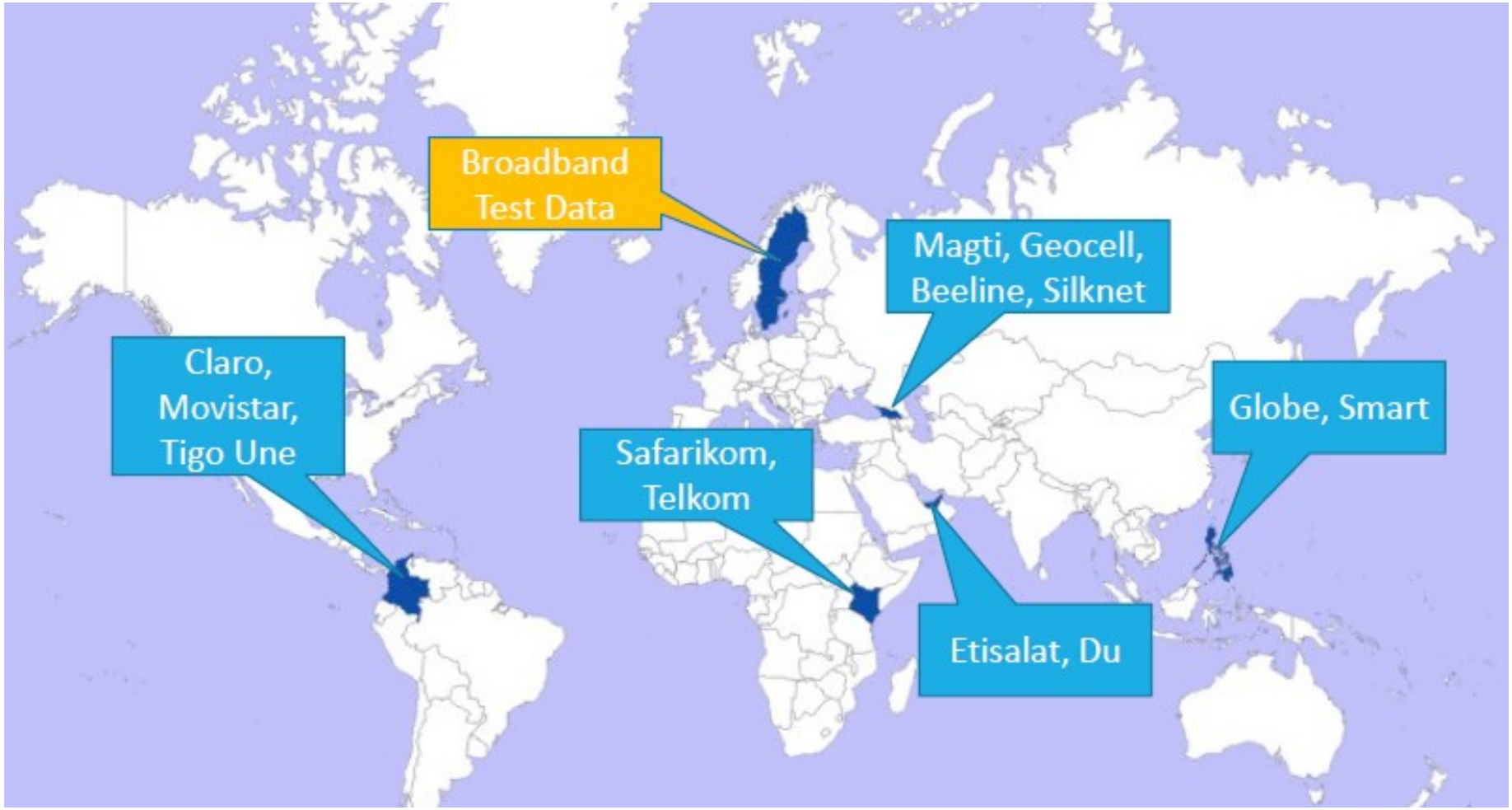
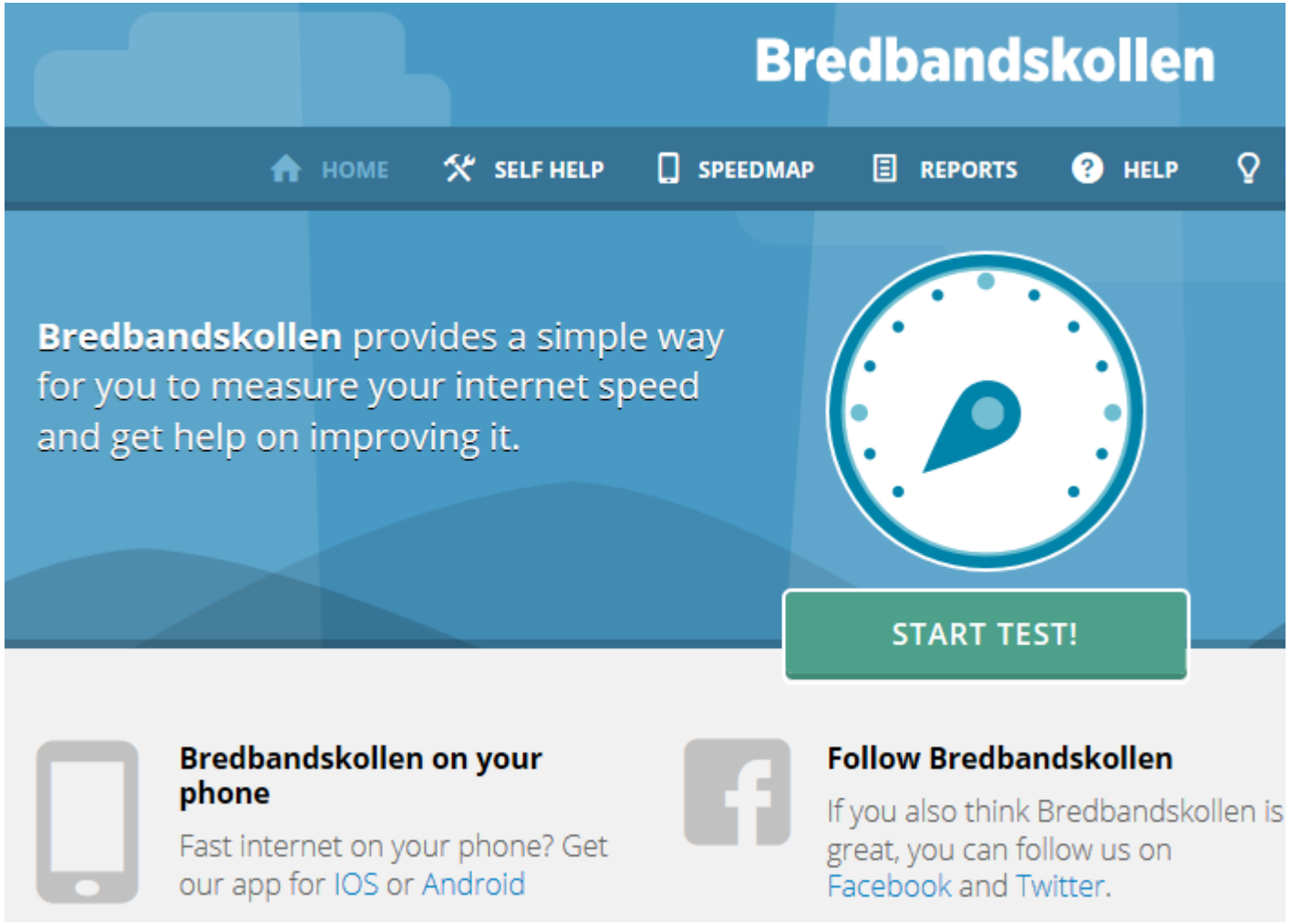
Big Data for Measuring the Information Society



Bredbanskollen



Relevance of Internet speed

- **Consumers**
  - 2nd most important factor
  - advertised ≠ real speed + congestion [1]
- **Regulators**
  - Quality of service (QoS) [2]
- **Policy makers**
  - Universal Service Funds, broadband plans [3]

Research question

Can crowdsourcing Internet data be used to measure real broadband speeds?

- Advertised speeds ✕
- Hardware-based measurements  $ $
- Software-based crowdsourcing?

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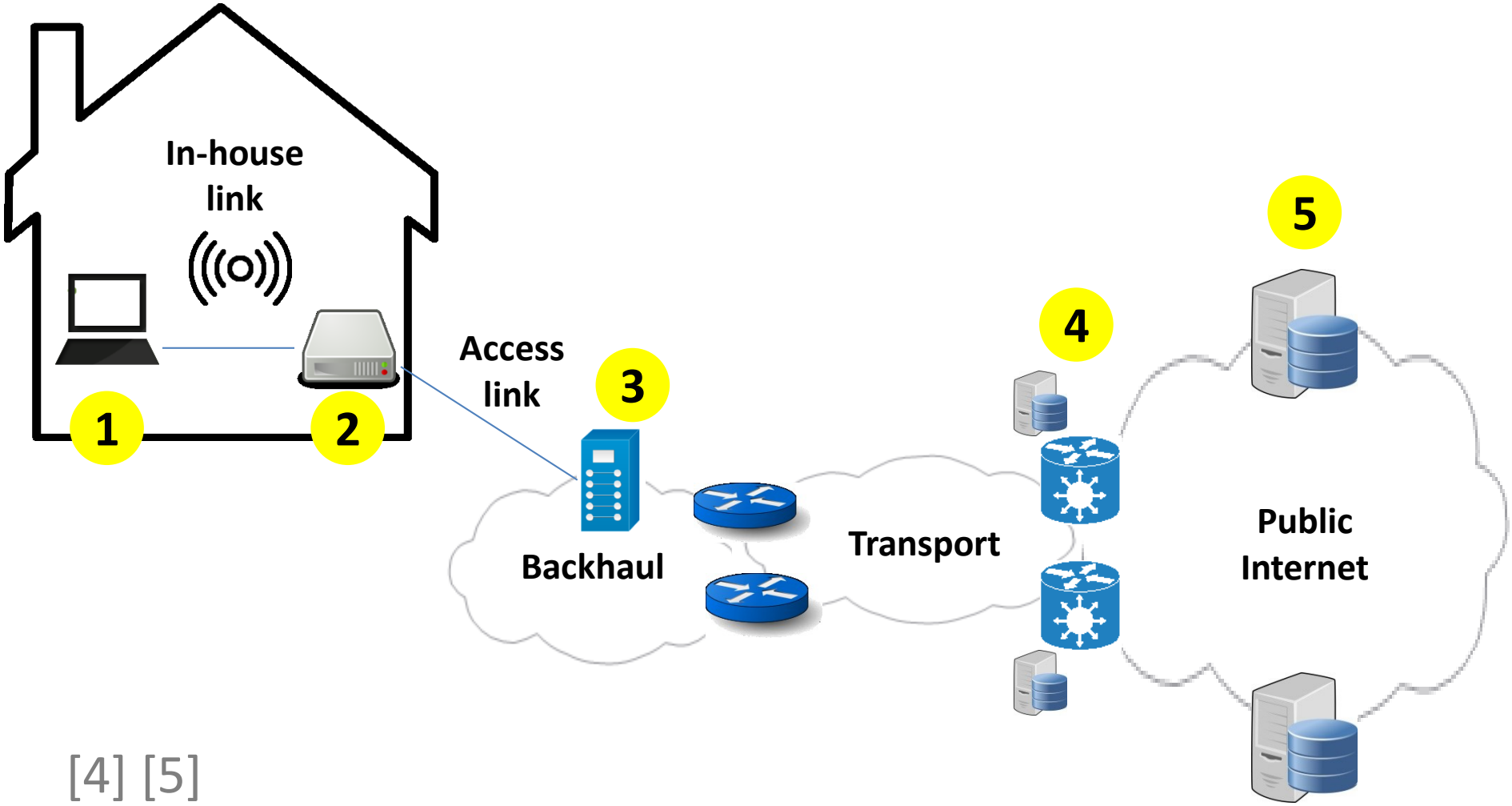
From where to where?



[4] [5]

Speed test comparison

	Test path	Active Passive	Voluntary Automatic	Statistical aggregation
Akamai	1-4 or 1-5	Passive	Real traffic	Unknown
Ookla	1-4 or 1-5	Active	Voluntary	Avg. after ramp-up. Excl. top 10% & bottom 30%
Breadband skollen	1-4 or 1-5	Active	Voluntary	Avg. first 2s or avg. 10s
SamKnows	2-5	Active	Automatic	Avg. after ramp-up. Excl. top & bottom percentiles

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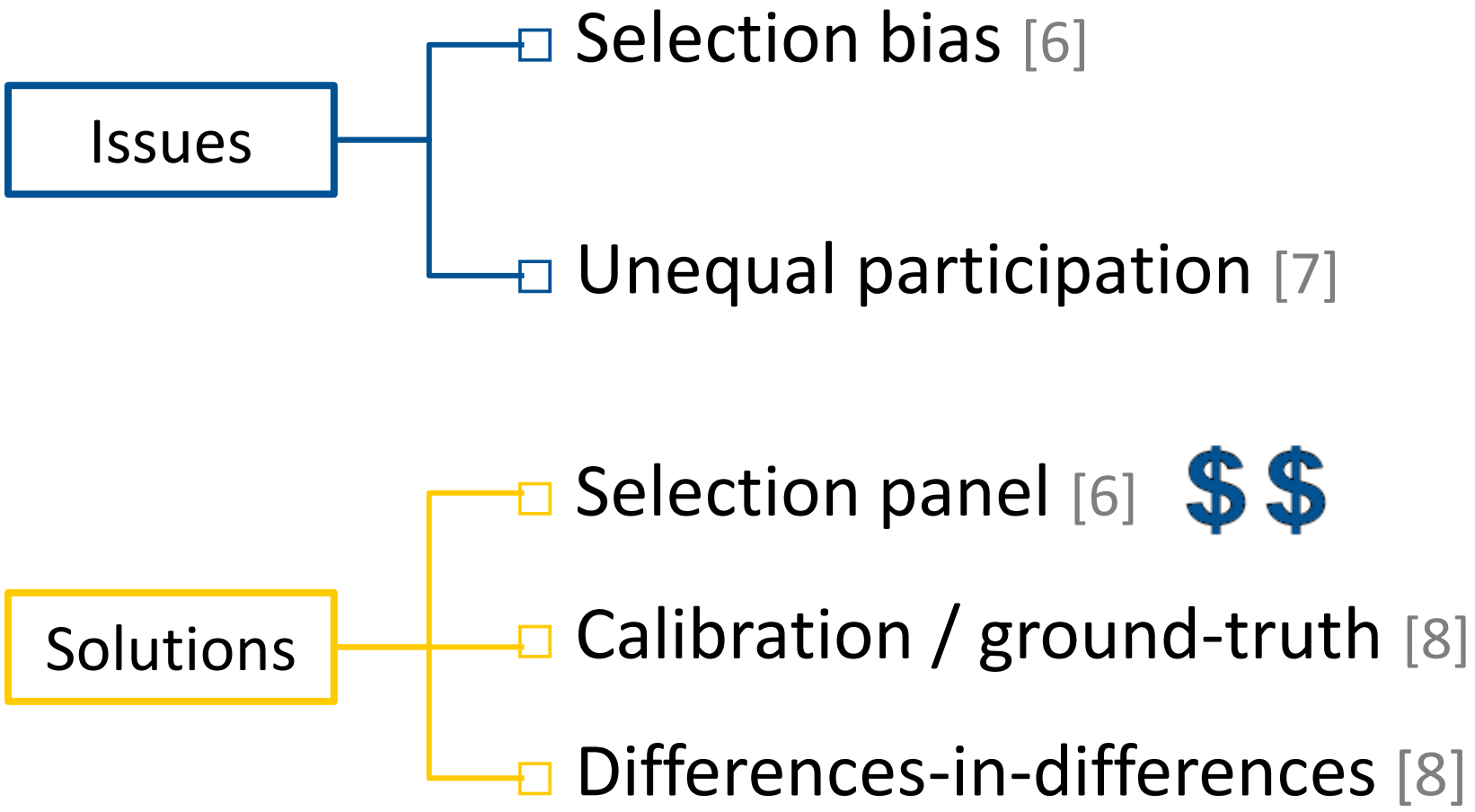
Non-probabilistic samples



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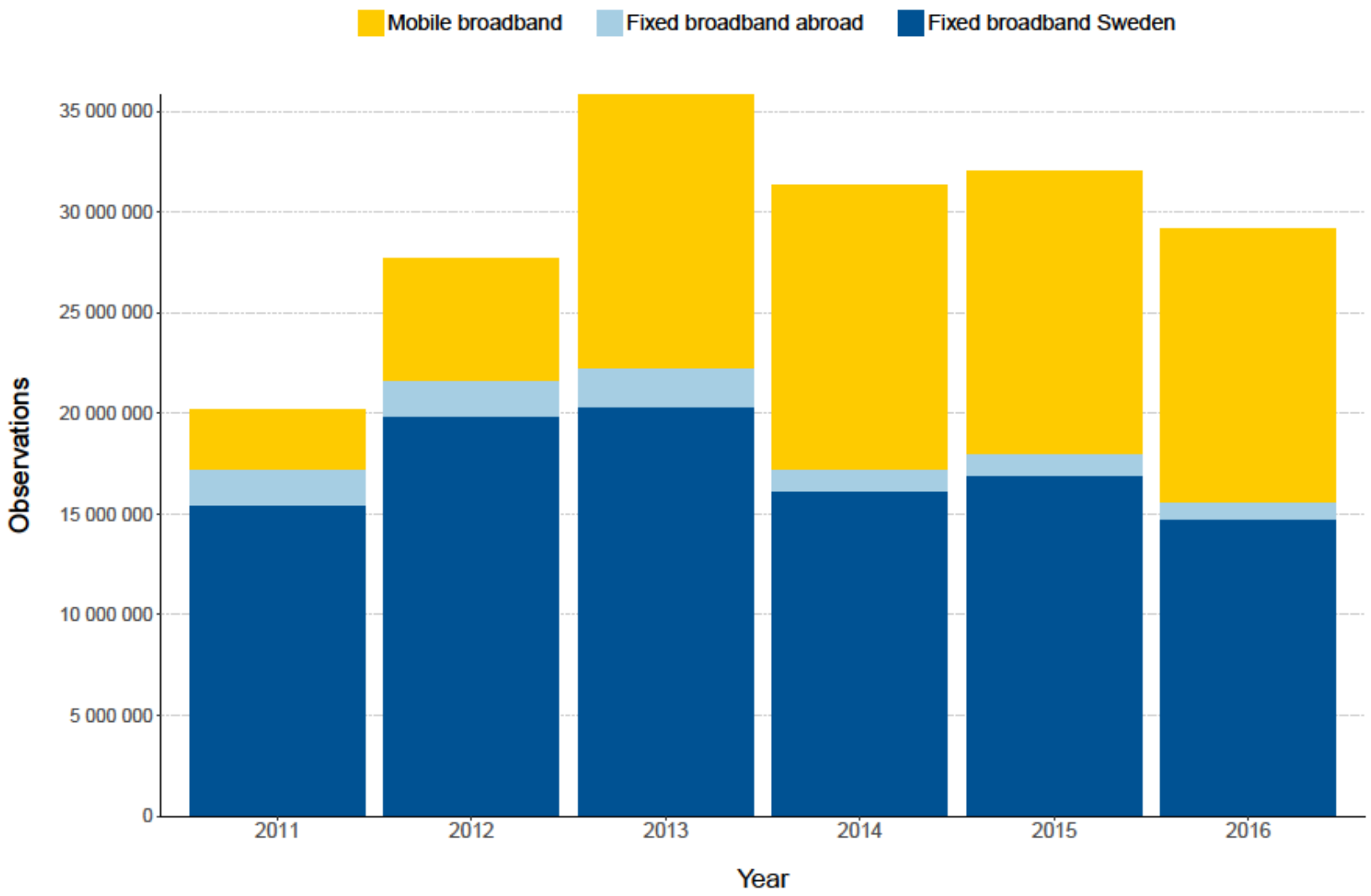
Observations



Bredbandskollen records

USED

Unique ID | Client | Date/time | Country | Region

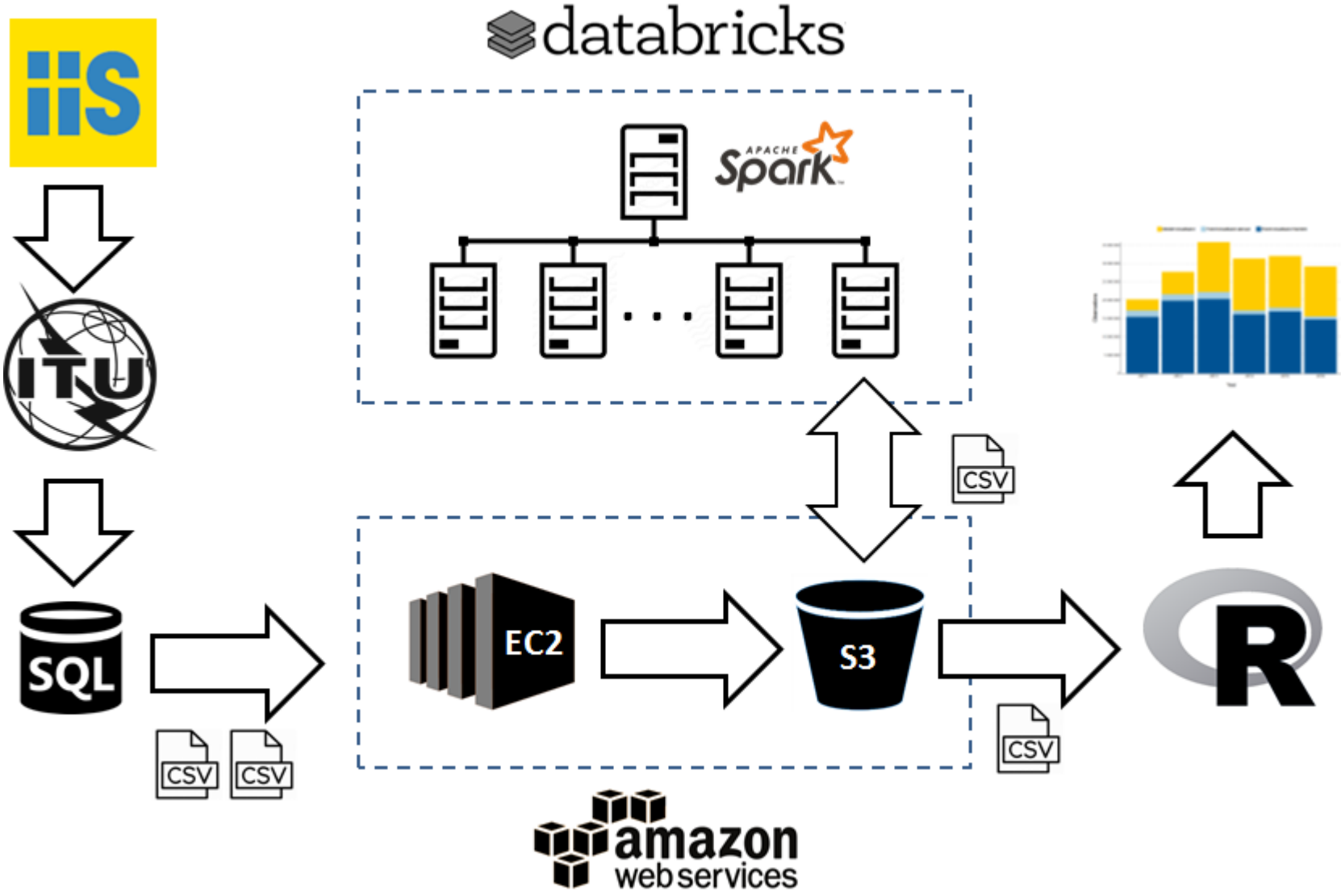
Download Speed | Upload Speed | Network type

Operator

NOT USED

Latency | Municipality

Data processing



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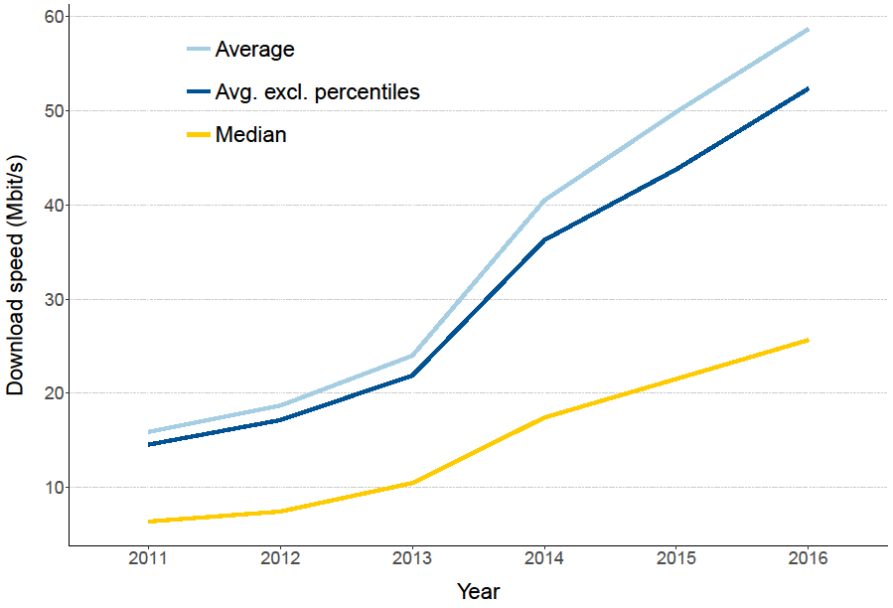
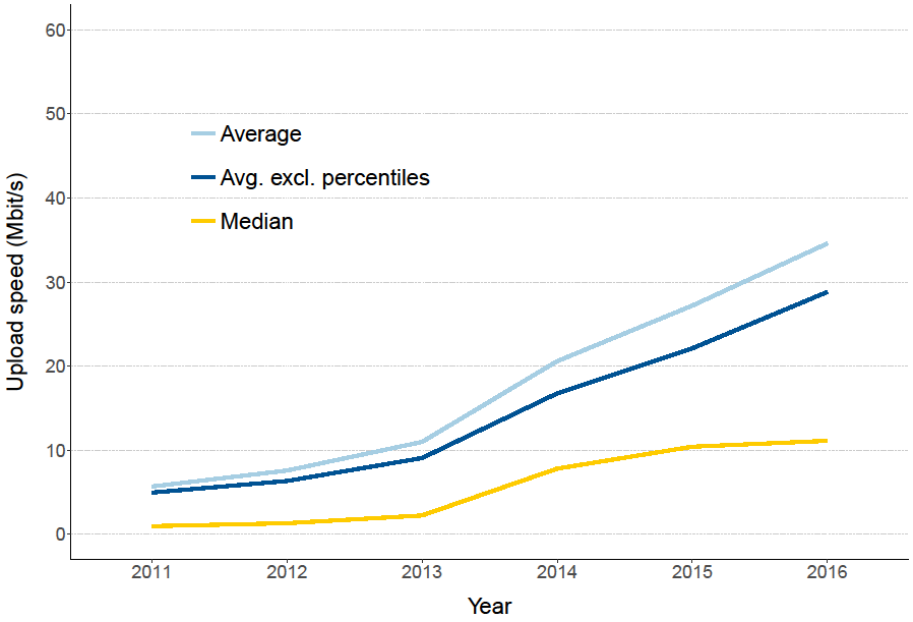
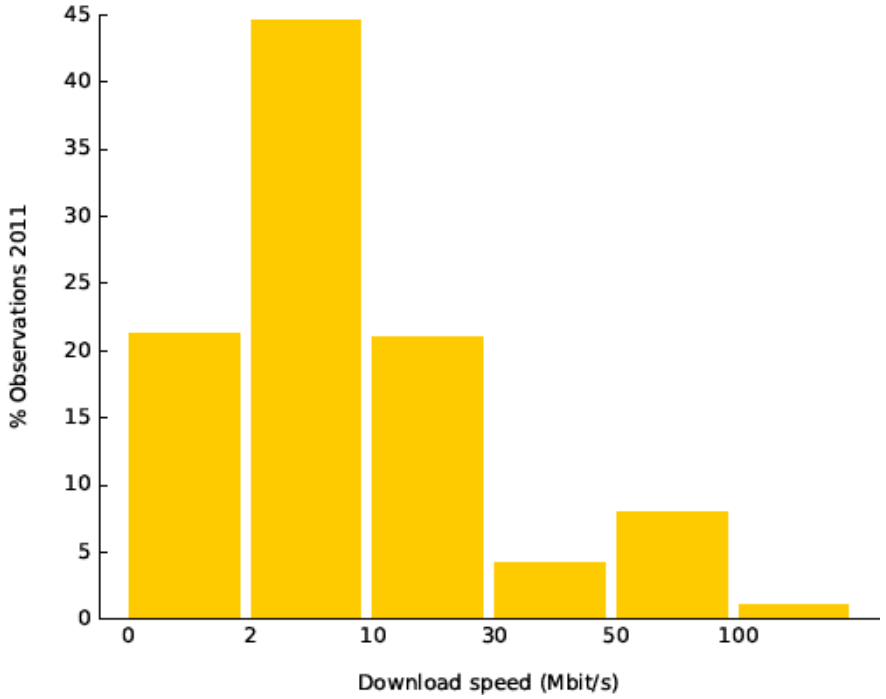
- Background & research question
- Methodology review
  - Broadband speed measurement platforms
  - Statistical inference from non-probabilistic samples
- Data set and environment
- **Results**
- Conclusions

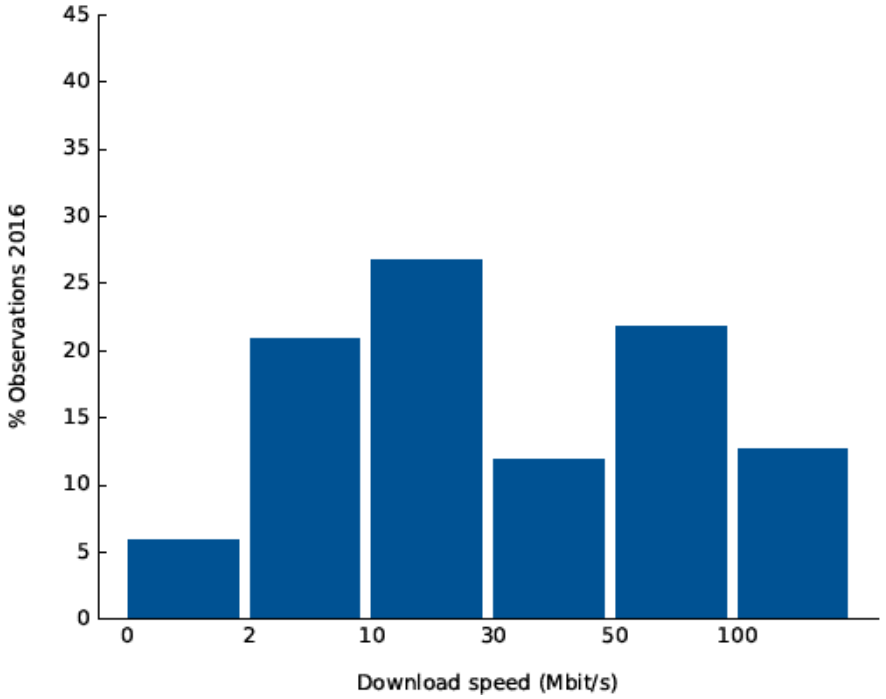
Aggregate speeds



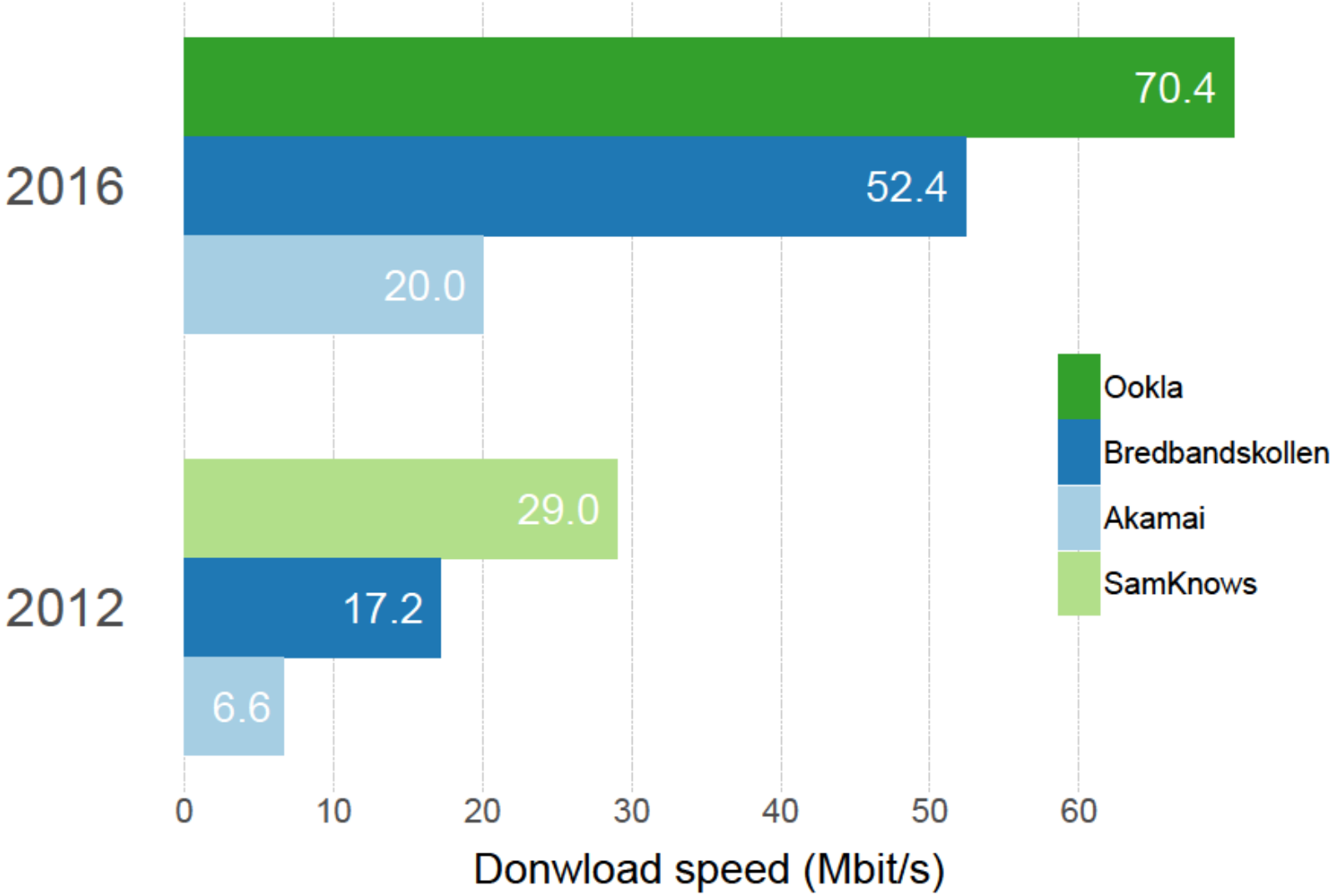


Histogram speeds

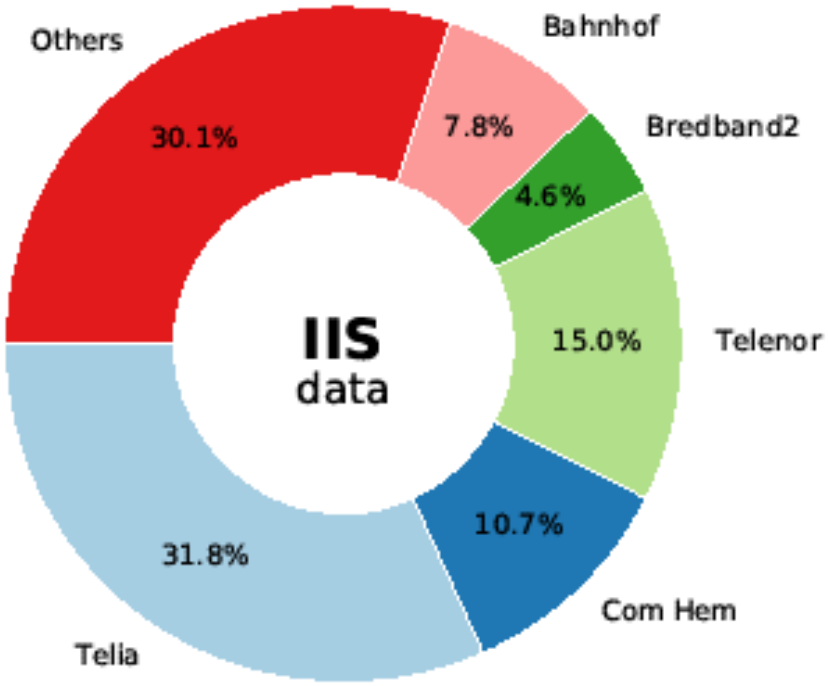


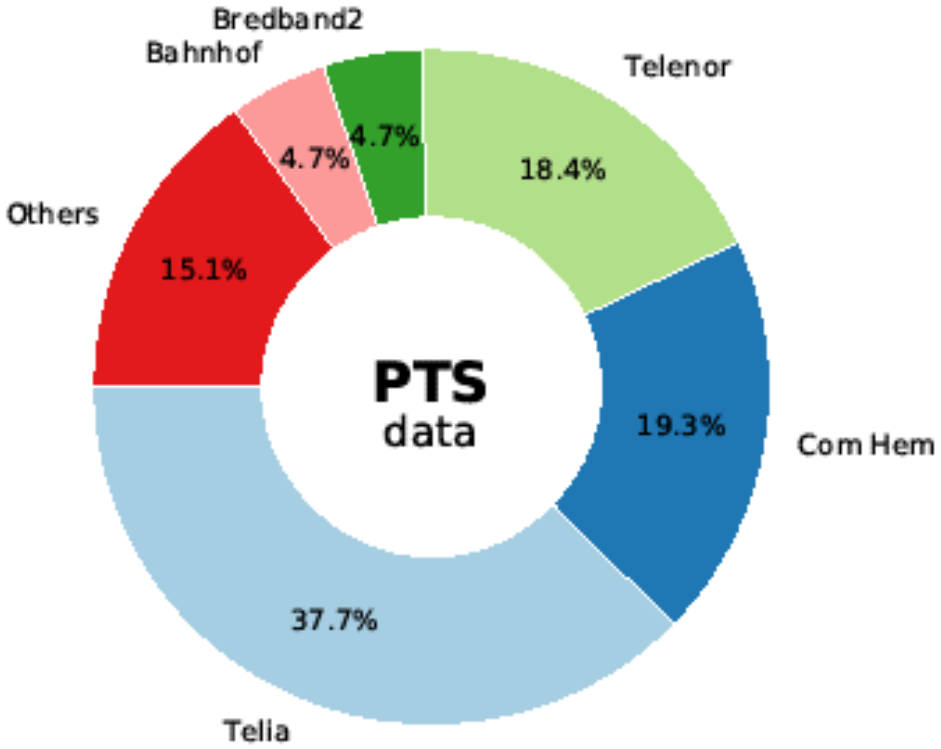


Comparison speed tests

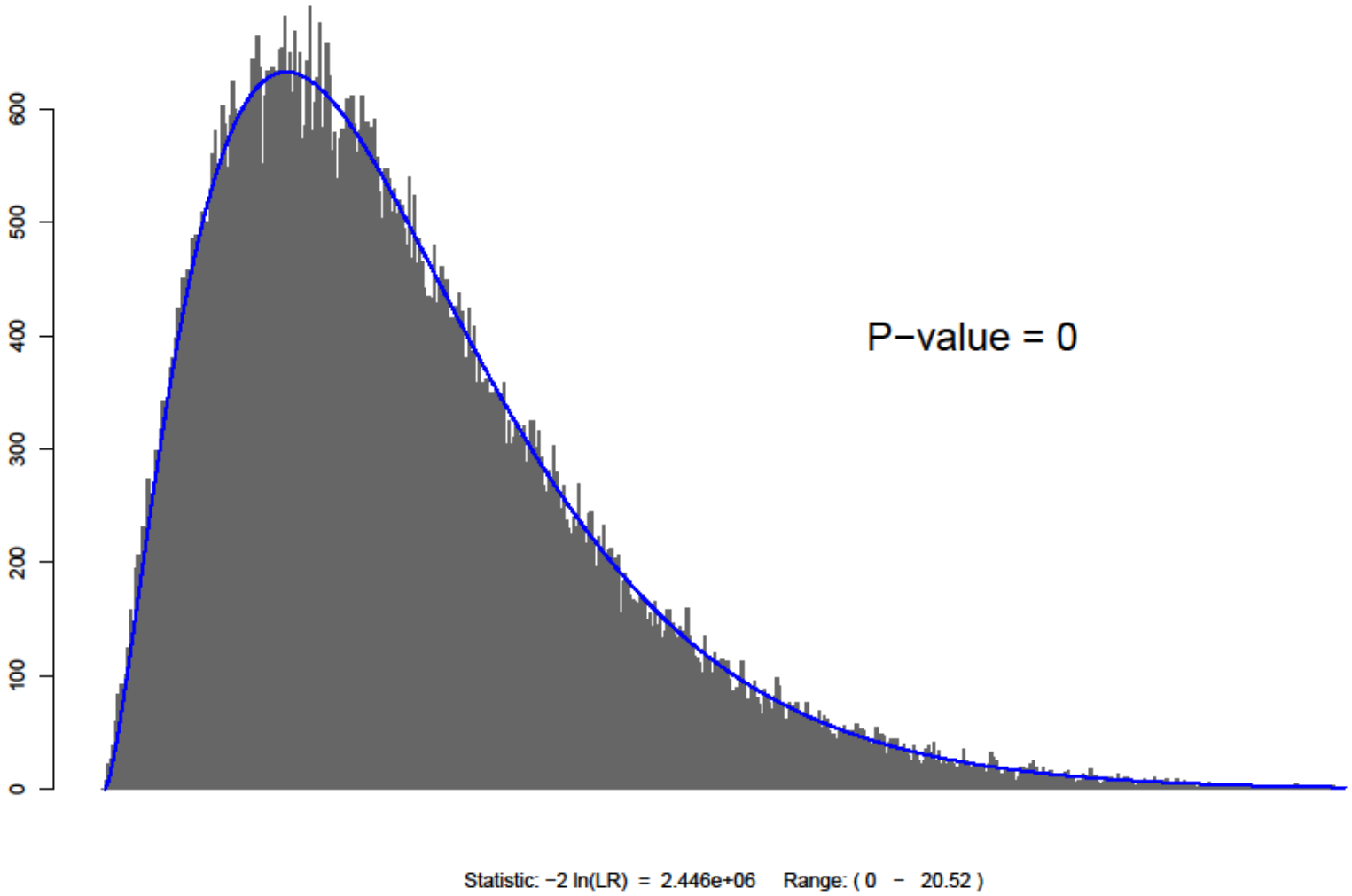


Observations per operator

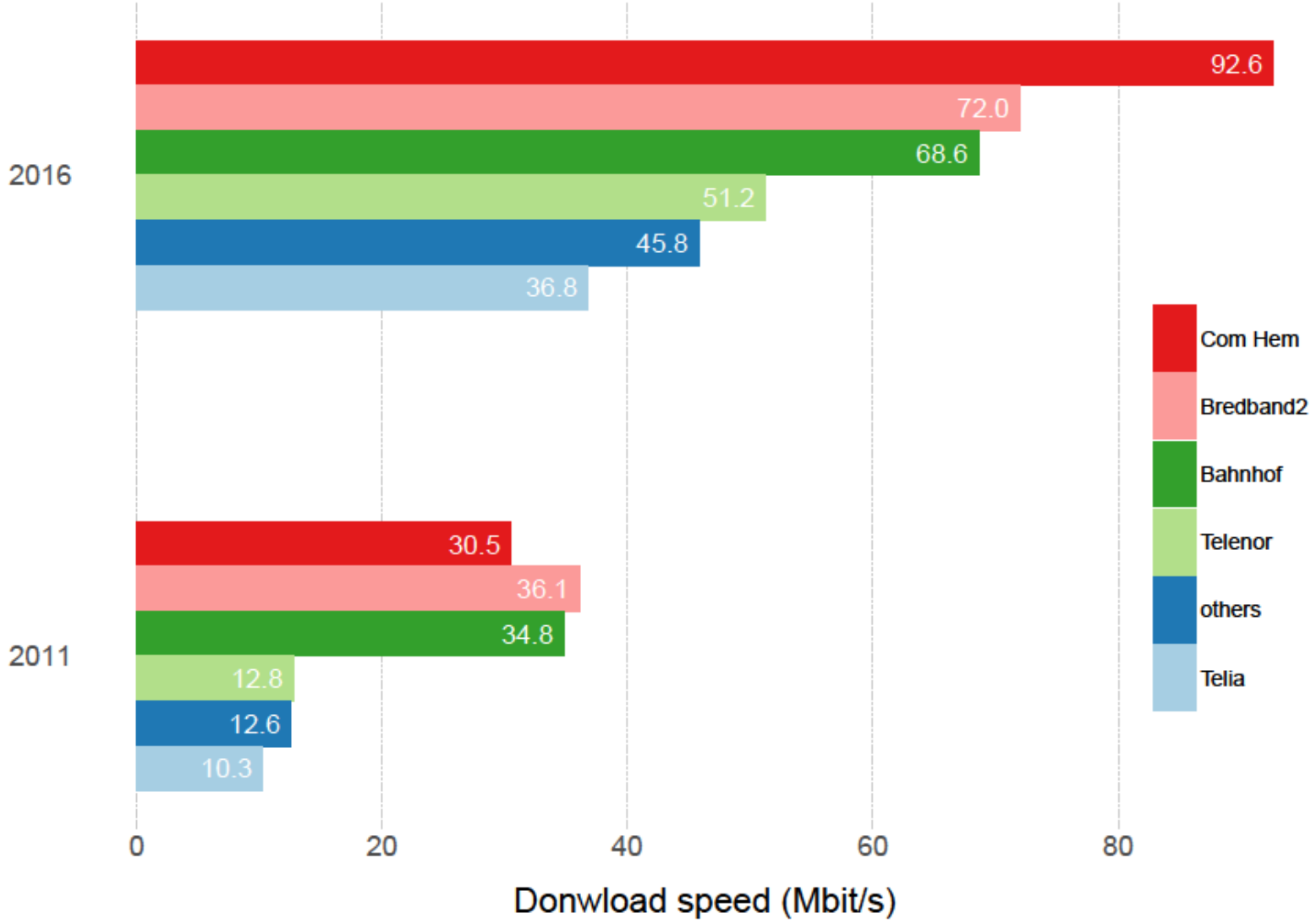




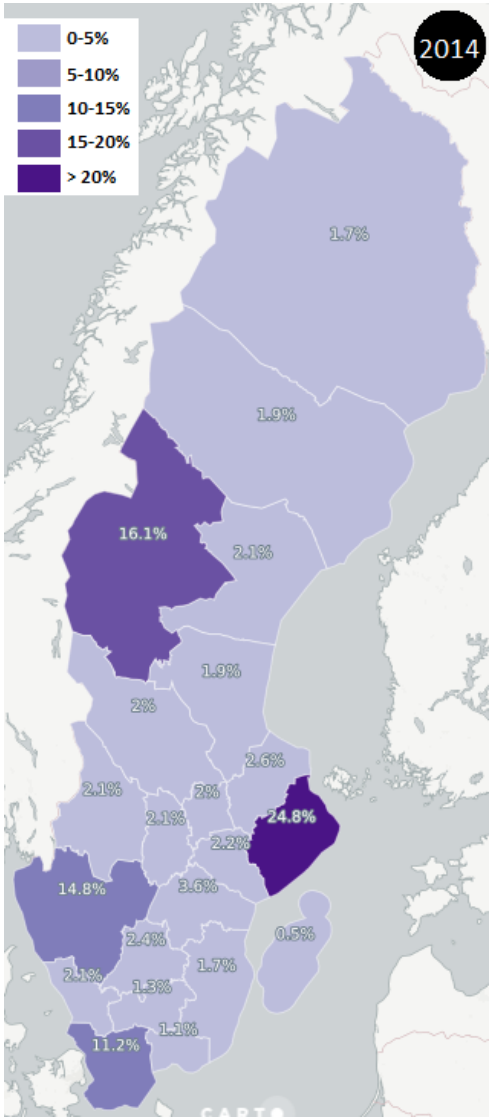
Selection bias

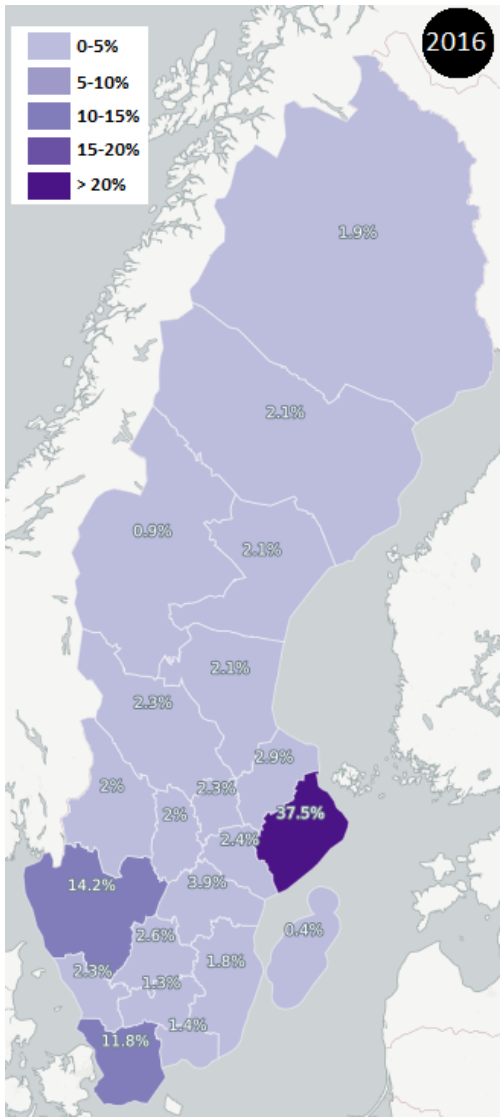


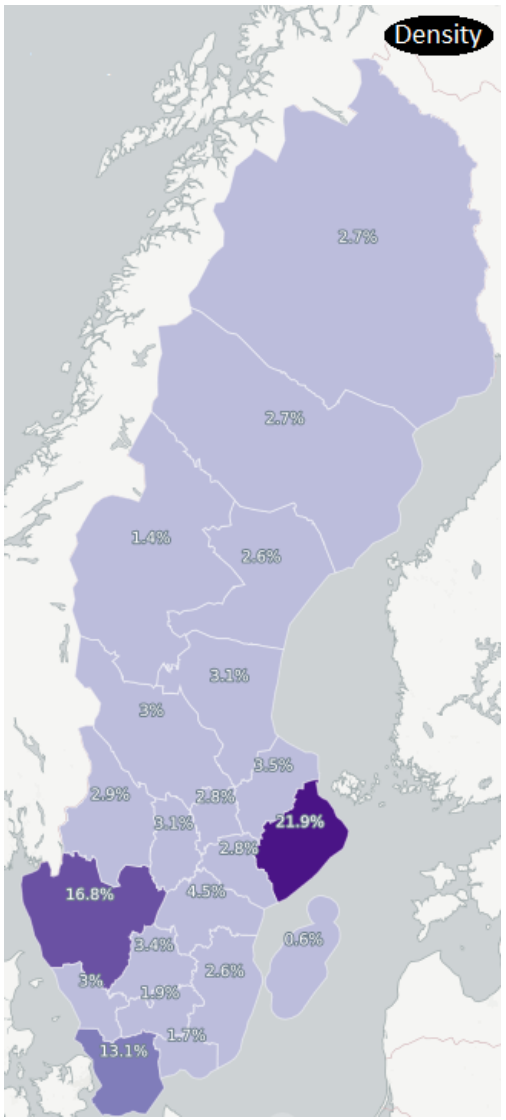
Speed by operator



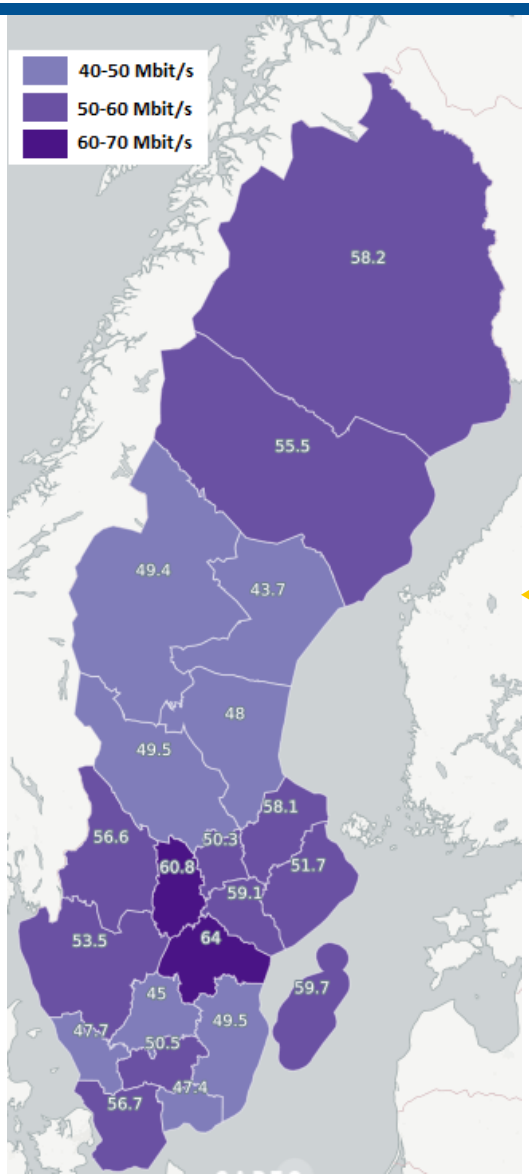
Observations per region







Speeds per region



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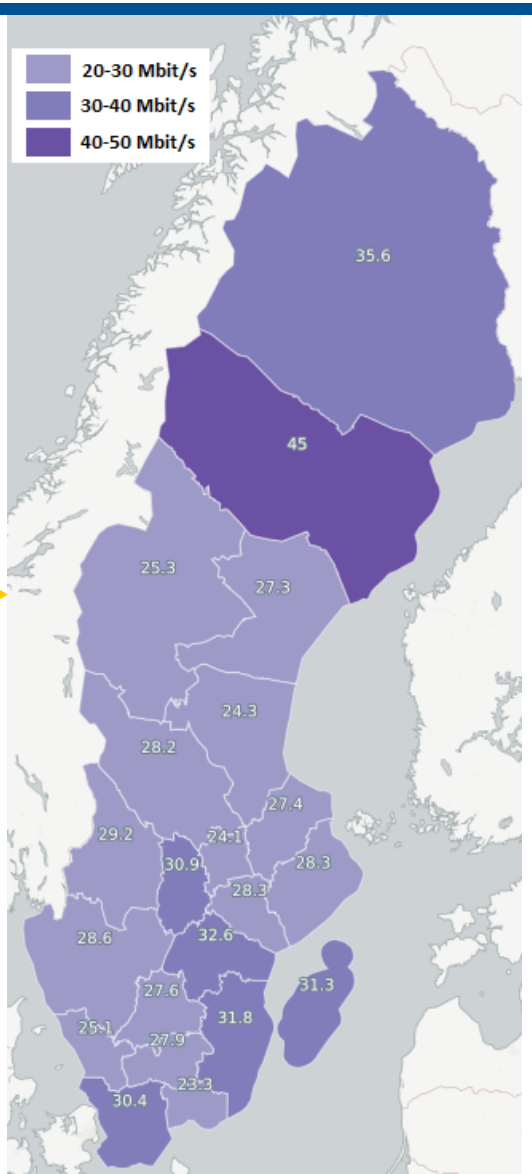
Upload



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Conclusions

Findings

- Selection bias
- Unstable sample composition
- In-house congestion (hypothesis)

Way forward

- + data: unique users, by technology
- + analysis: time, link socio-econ covariates

List of references

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Thank you