

A Characterization of the COVID-19 Pandemic Impact on a Mobile Network Operator Traffic

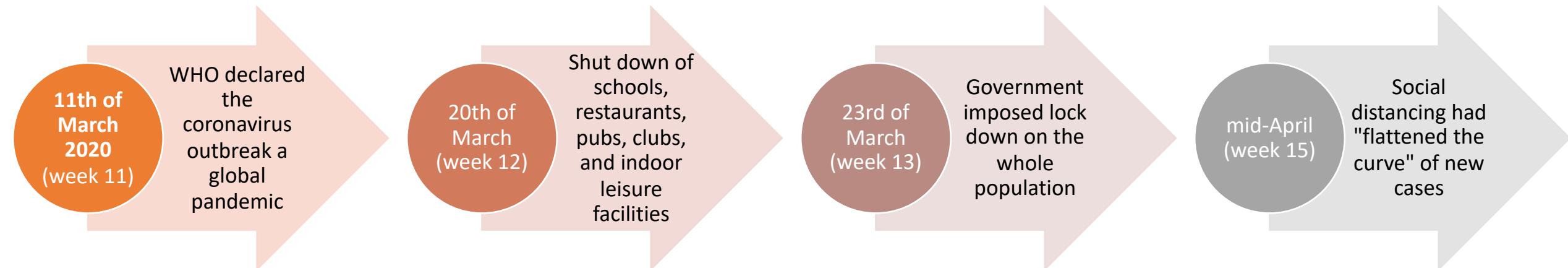
Andra Lutu
Telefonica Research

Diego Perino
Telefonica Research

Marcelo Bagnulo
Universidad Carlos III de Madrid

Enrique Frias-Martinez
Telefonica Research

Javad Khangosstar
Telefonica UK



10 weeks around the early days of the pandemic: February 24 until mid-May 2020

Main takeaways

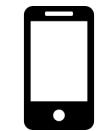
- **Mobility decreased nation-wide only after enforced by lockdown** (-60% in the area users move)
- **Mobile data traffic decreased** (-20% nation-wide)
- **London saw 10% of users leave** and, in central postal areas, **a steep decrease of traffic** (-70%) and radio users (-50%)
- **Voice traffic soared around lockdown** (+150%), and **remained high** during the following weeks (+50%)



Diverse and complex set of Data Feeds



General Signaling Dataset



Devices Catalog



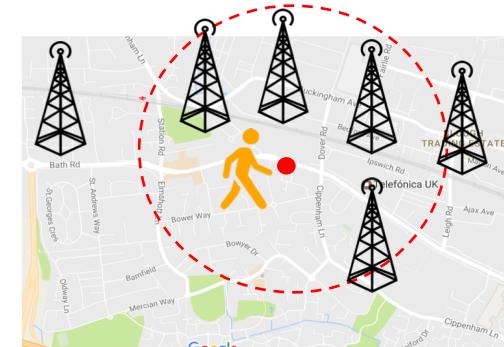
Radio Network Topology



Radio Network Performance



UK Administrative and
Geo-demographic Datasets



Mobility Metrics:
* Gyration



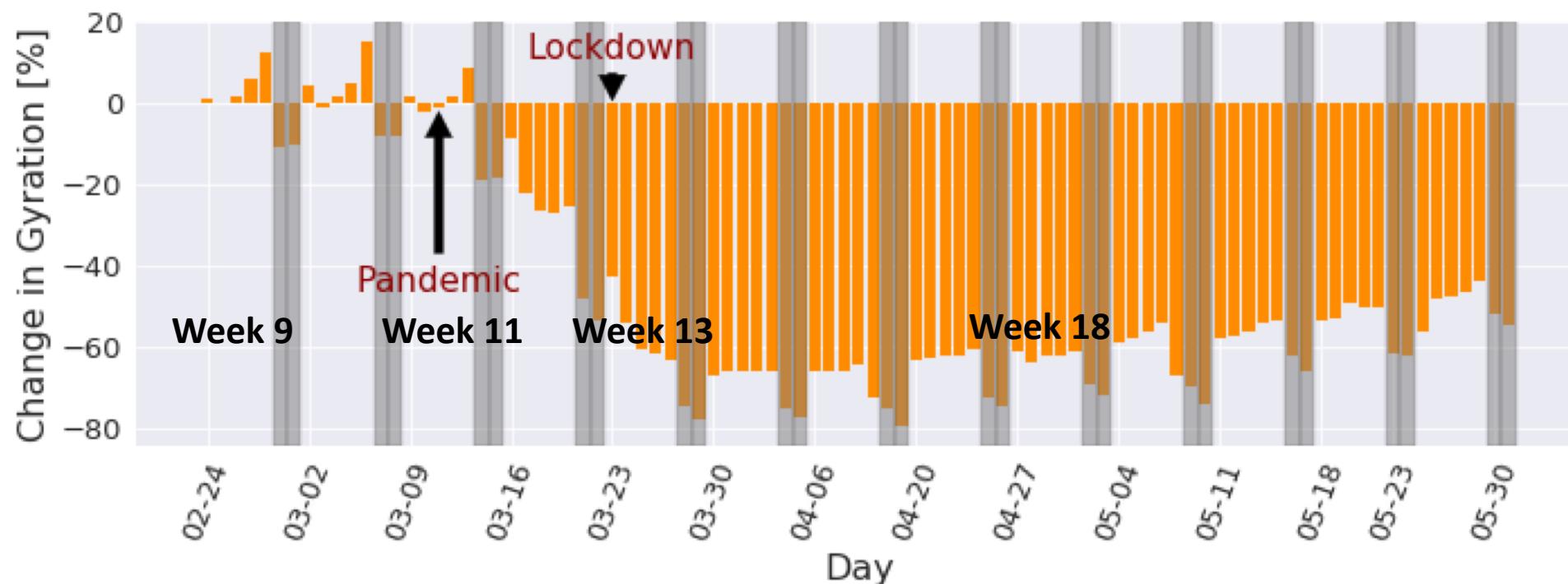
Home Location



Reduction in Mobility: Radius of Gyration

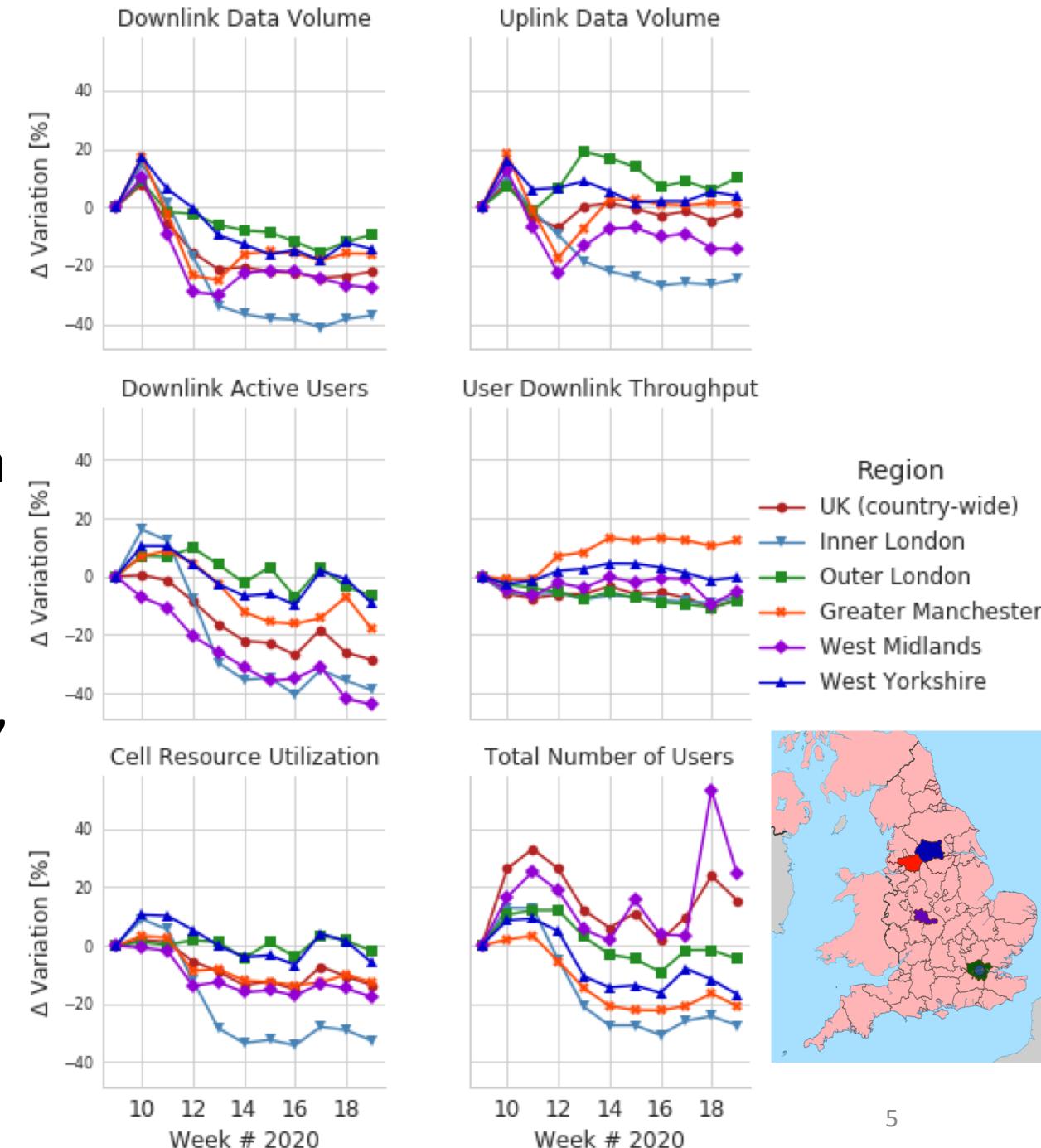
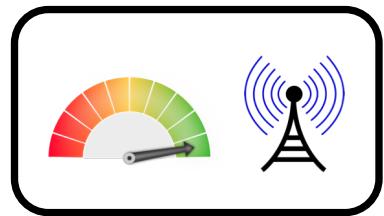


- The gyration drops nation-wide by 60% in the week the “stay-at-home” government order was issued compared to week 9 nation-wide



Data Traffic Evolution

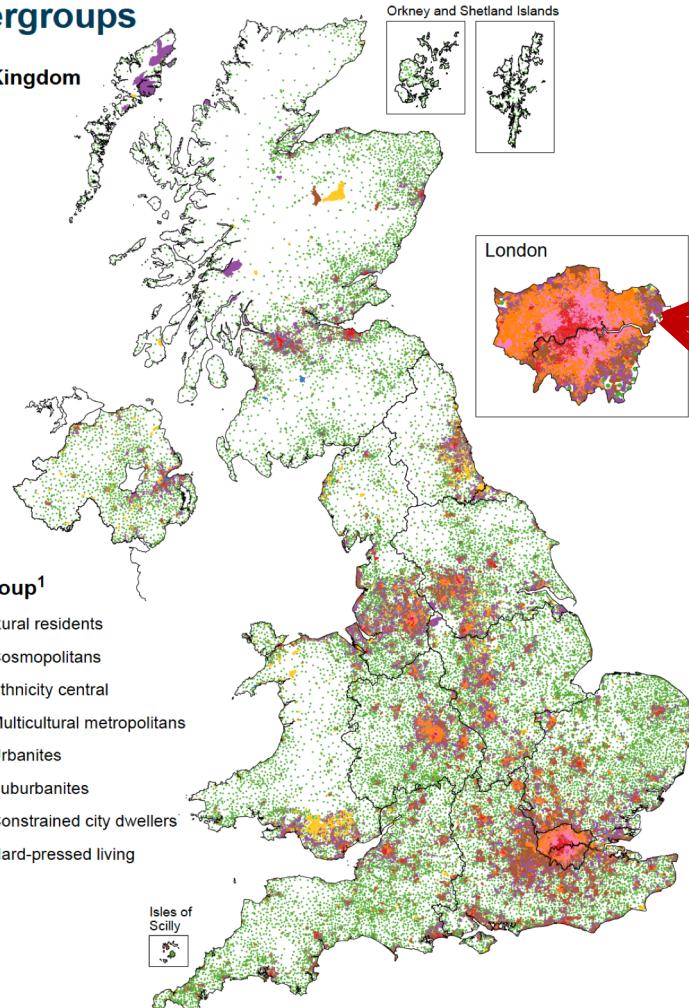
- Overall reduction (-24% in week 17 compared to week 9) in downlink data traffic volume
- Decrease in cell resource utilization
- The throughput drops by at most 10%, likely due to application throttling



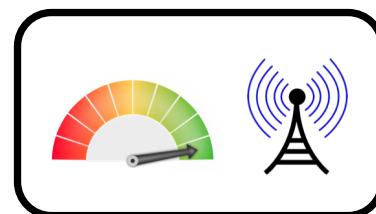
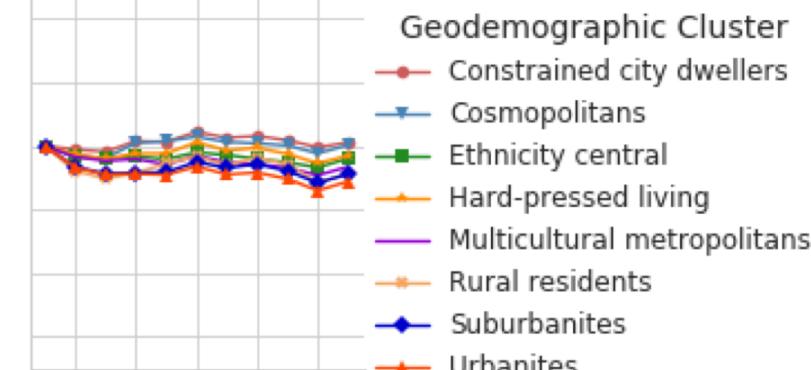
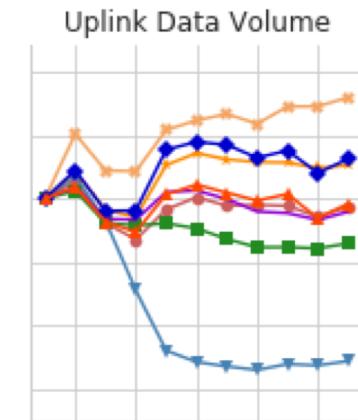
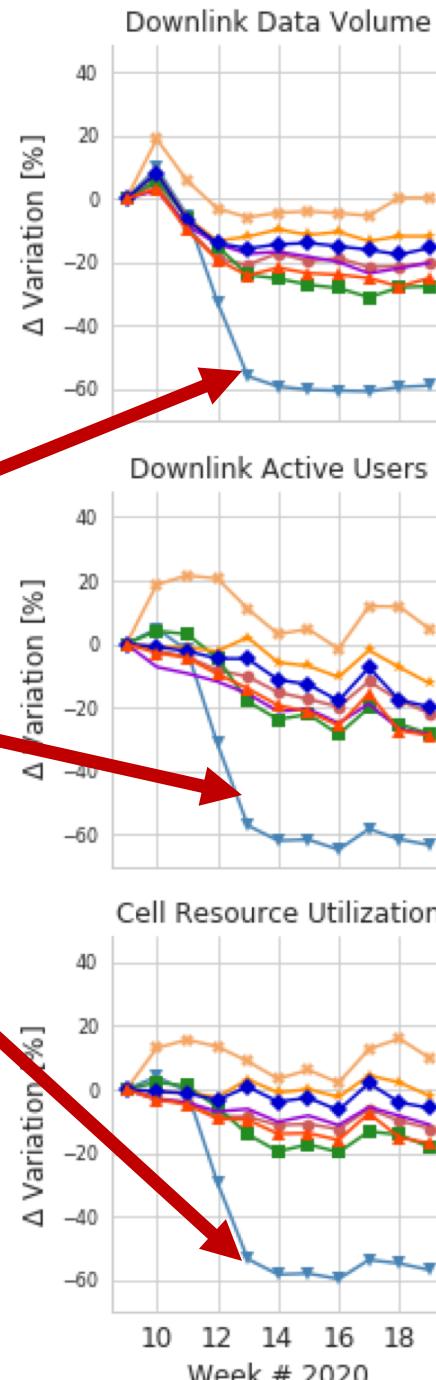
Geodemographic Clusters show inconsistent patterns

2011 Area Classification for Output Areas: Supergroups

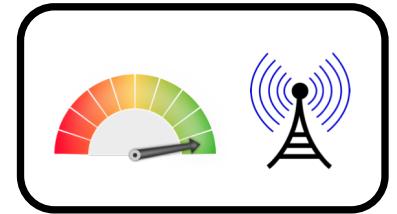
United Kingdom



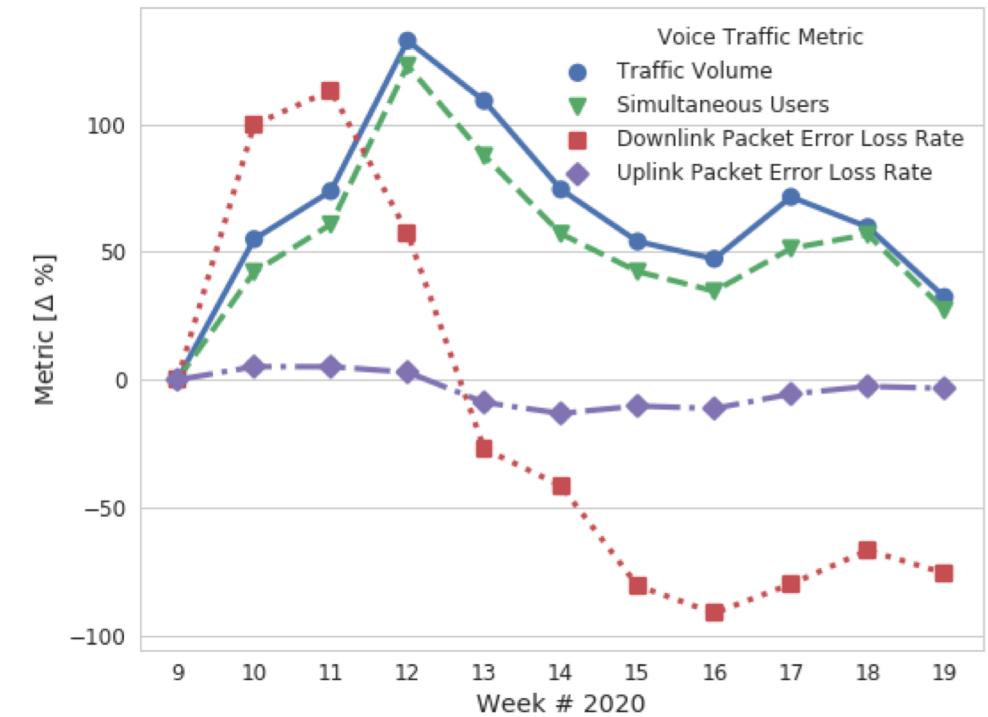
¹ The Rural residents supergroup is shown differently to the other supergroups. For habited areas, residential postcodes within output areas (England, Wales and Scotland) and small areas (Northern Ireland) are shown, rather than the whole of the output/small area as shown for the other supergroups.



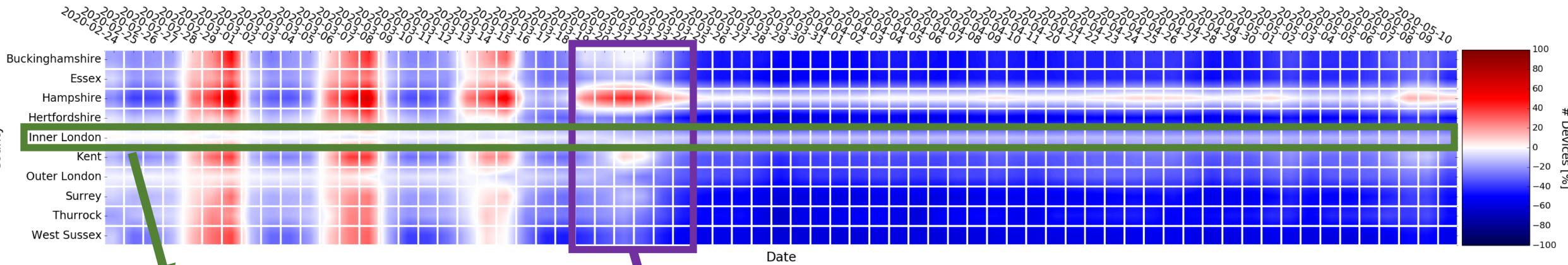
Unexpected Surge in Voice Traffic



- Spike of 140% in the median value of voice traffic volume around lockdown; stabilized at around 50% increase after week 13
- The surge exceeded the capacity of the interconnection infrastructure between MNOs
- The rapid response of the network operators and service providers restored the network status back to normal quickly after week 13



Temporary Relocation of residents from London



- **10% decrease in the number of Inner London residents who actually are present in their area of residence from week 13 onward (after the lockdown is imposed)**
- Many **moving from Inner London to outside areas** such as Hampshire or Kent on the 21st-22nd of March, just prior to the stay-at-home order being enforced

Bonus: Ongoing analysis of current restrictions

The UK is imposing region-based lockdowns...

Tier 3 lockdown rules in England: latest coronavirus restrictions explained

South Yorkshire, Greater Manchester, Lancashire and Liverpool City Region are on highest restriction level

- [Tier 1 explained | Tier 2 explained](#)
- [Coronavirus - latest updates](#)
- [See all our coronavirus coverage](#)



▲ A person wearing a protective mask walks past a Covid warning sign in Liverpool. Photograph: Phil Noble/Reuters

Tier 2 lockdown rules in England: latest Covid restrictions explained

Coronavirus 'high alert' warning covers the north-east, parts of the Midlands, London, York and most of Essex among other areas

- [Tier 1 explained | Tier 3 explained](#)
- [Coronavirus - latest updates](#)
- [See all our coronavirus coverage](#)



▲ A man walks past a coronavirus advice sign in Nottingham, which is already in the tier 2 coronavirus category. Jacob King/PA Wire Photograph: Jacob King/PA



The COVID-19 Fall Wave... Tier-based Lockdowns in UK

