

Barriers & solutions to quality of service

A Mobile Operator's perspective

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Overview

- **Challenges - for Mobile quality of service**
- **Solutions - Three's approach**
- **The future**



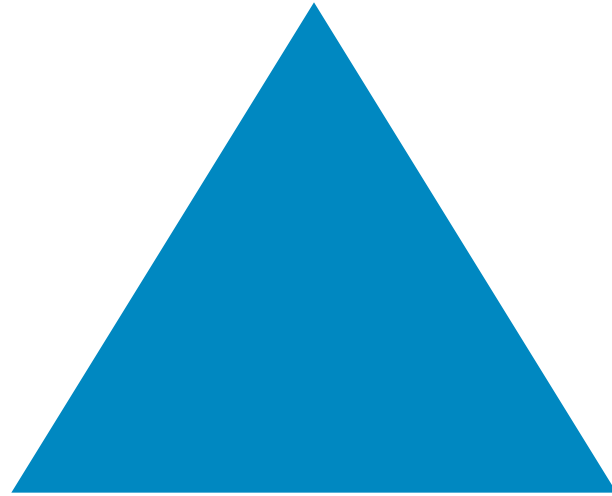
Challenges

Coverage

= # sites

@ a given frequency

@ a given speed



Capacity

= # sites x amount of spectrum

@ given technology

@ given average distance from site

Speed / Customer Experience

= # sites x spectrum @ given
technology

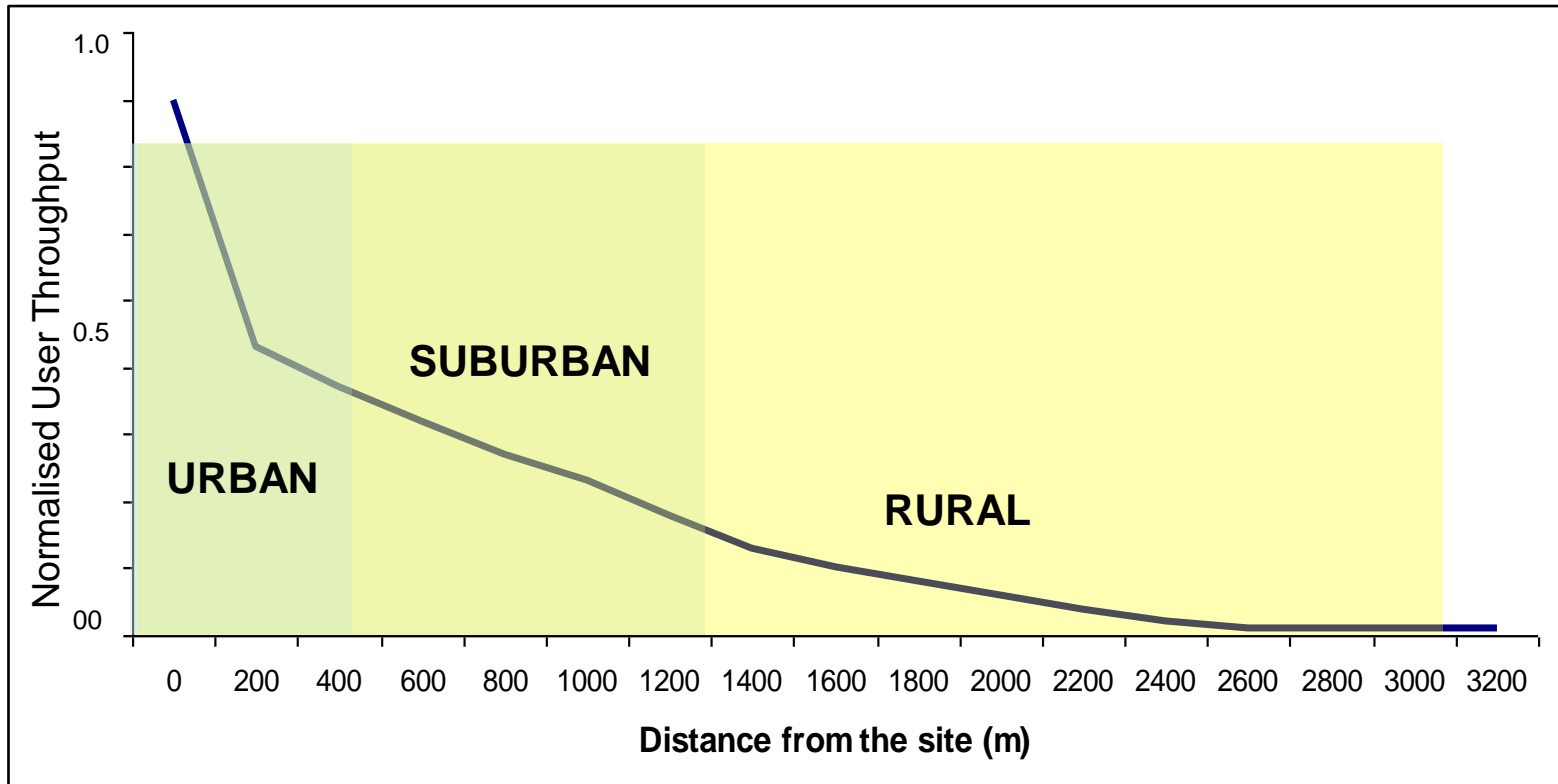
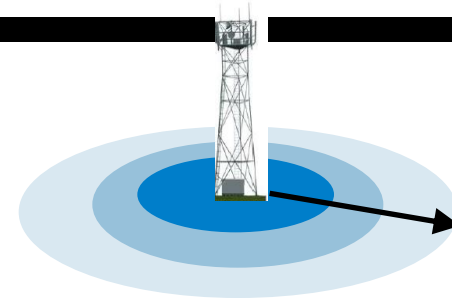
@ given traffic demand

@ given distance from site



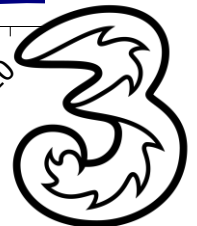
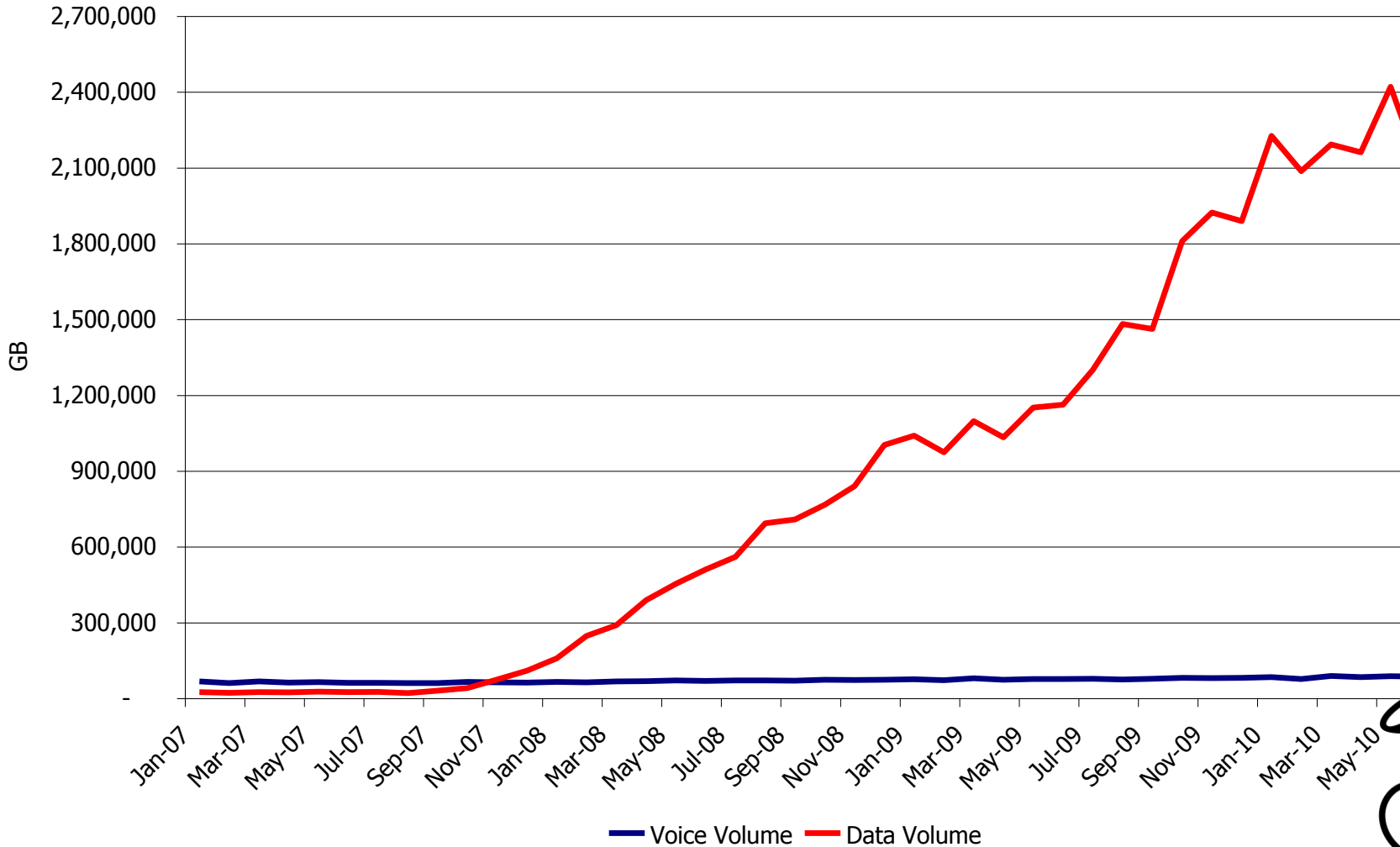
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Coverage



ically, the key to a great customer experience = number of

Capacity



Customer experience.

SERVICE	SPEED	LATENCY TOLERANCE	UP/DOWN DOMINANCE	DEMAND PROFILE
Browsing	100-1000 kb/s	Medium	Downlink	Bursty
Streaming	100-1600 kb/s	High	Downlink	Constant
Email Send	100-1000 kb/s	High	Uplink	Bursty
Download	400-4000 kb/s	High	Downlink	Constant
Real-time Gaming	200-600 kb/s	Low	Symmetric	Bursty
Peer-2-Peer	0-1000 kb/s	High	Symmetric	Background



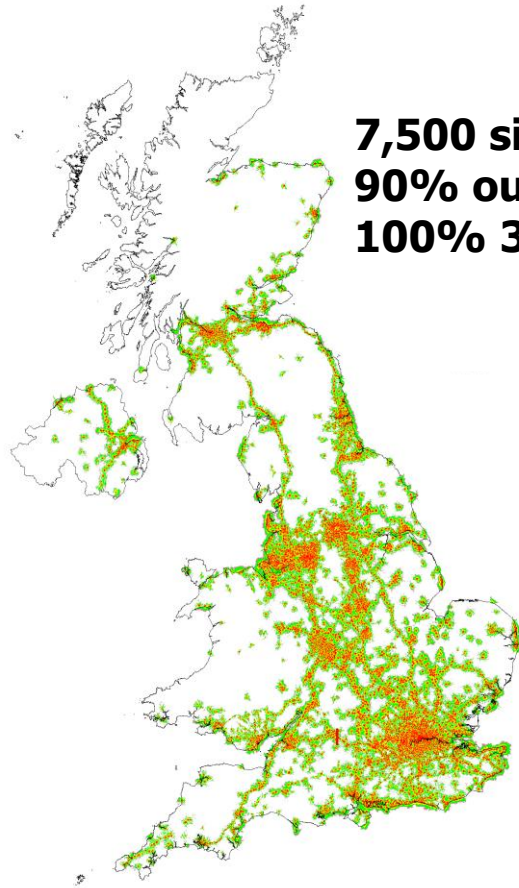
Solutions

- **Coverage**
 - Network share
- **Capacity**
 - Investment
 - New technology
 - Traffic management
 - Products
- **Customer experience**
 - Selling
 - Traffic monitoring
 - Customer Surveys



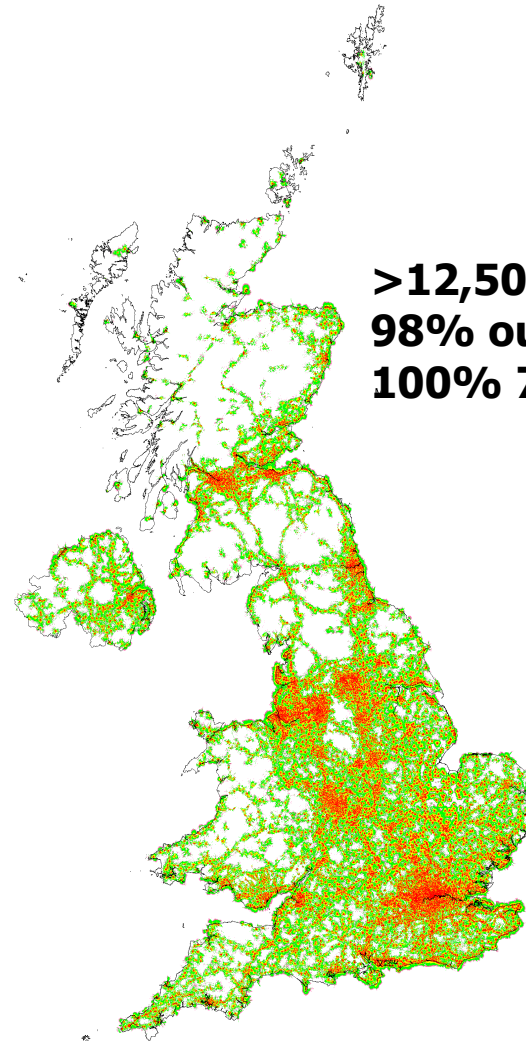
Coverage

Network Share



7,500 sites
90% outdoor coverage
100% 3.6Mbps

End 2008



>12,500 sites
98% outdoor coverage
100% 7.2Mbps & HSUPA

End 2010



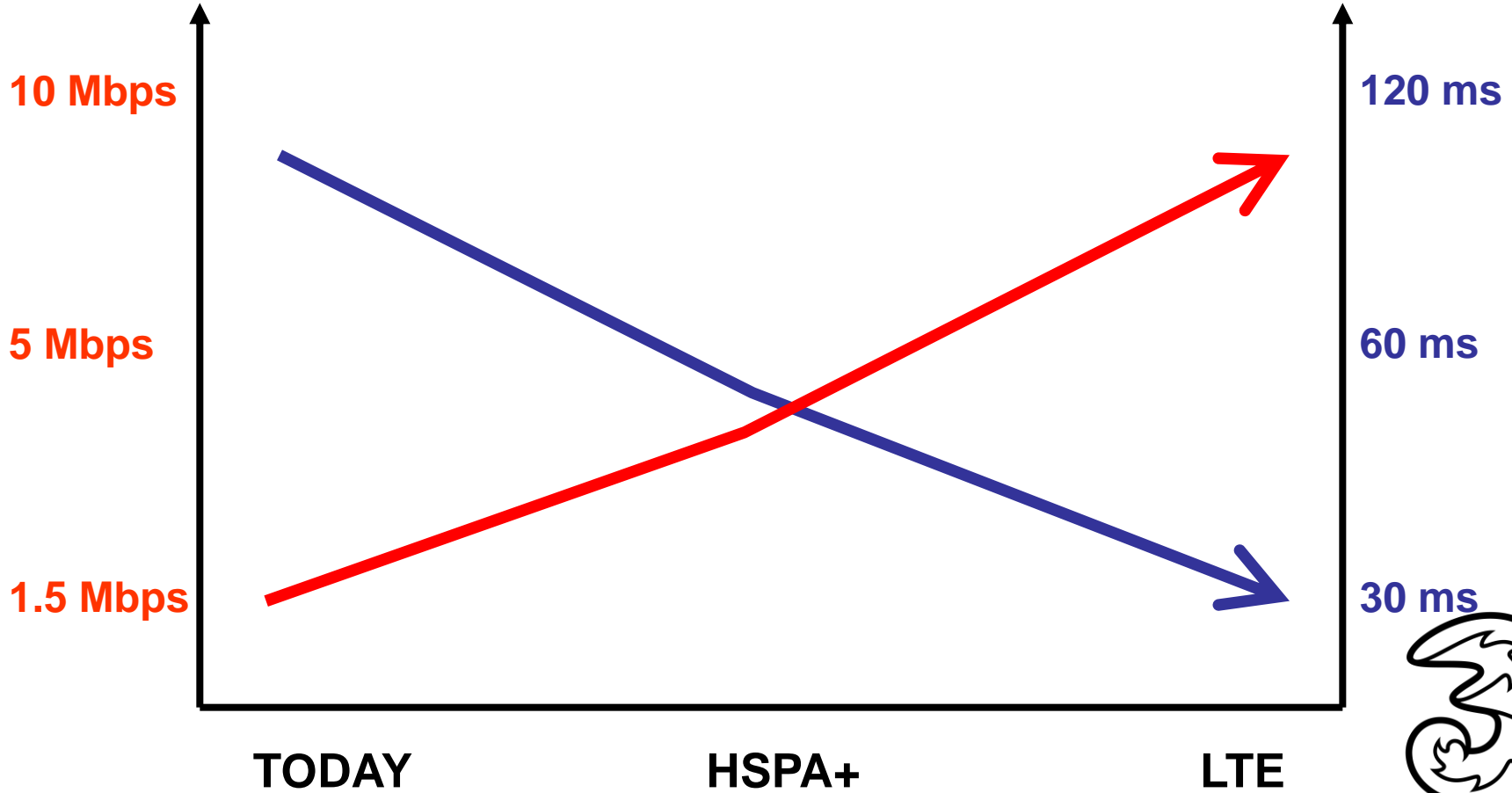
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Capacity

New technology

Av User Throughput

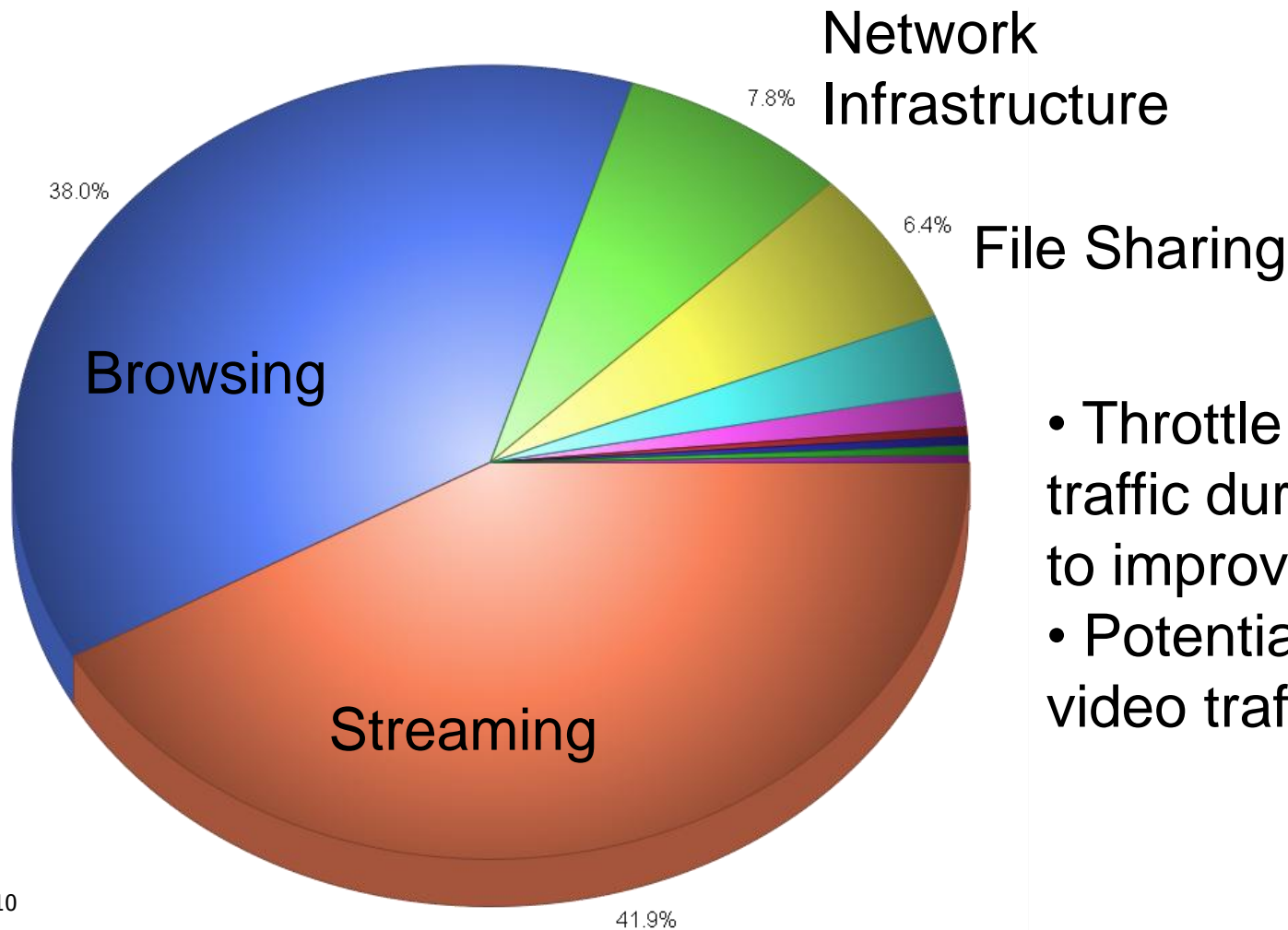
Expected Latency



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Capacity

Traffic management

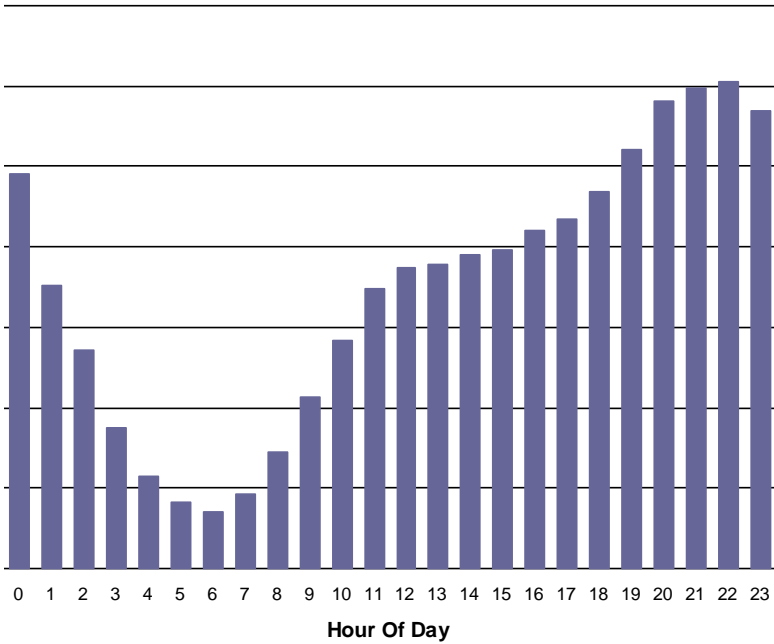


- Throttle background traffic during congestion to improve browsing
- Potential to optimise video traffic

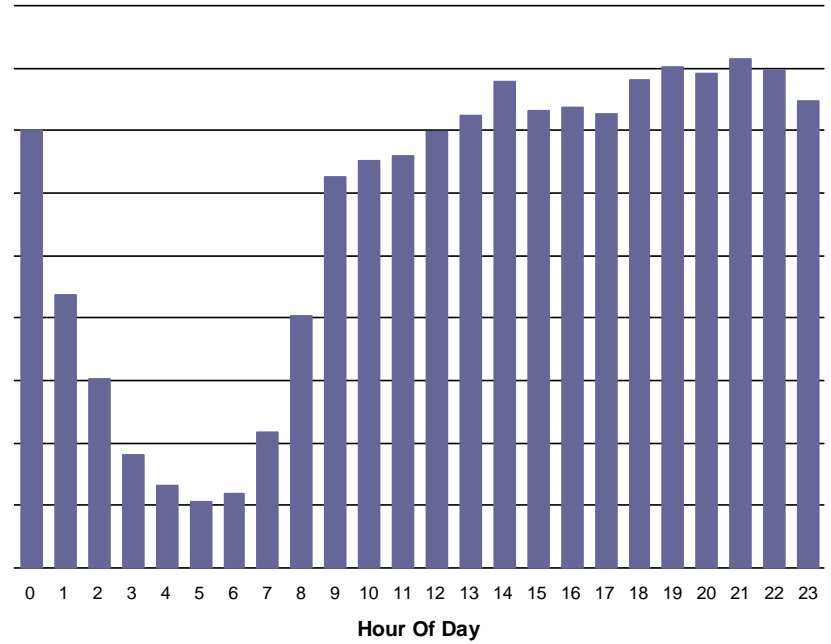


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Traffic Products



Dongle



iPad



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Customer experience

Selling

You can search up to 3 postcodes or place names.

What do you want info for?
 Mobile phone Mobile Broadband

Search

Mobile Broadband coverage in... maidenhead [Delete](#)

To get more detailed information please search again for a specific postcode.

[Check your Mobile phone coverage here>](#)

[> Rate my network here](#)

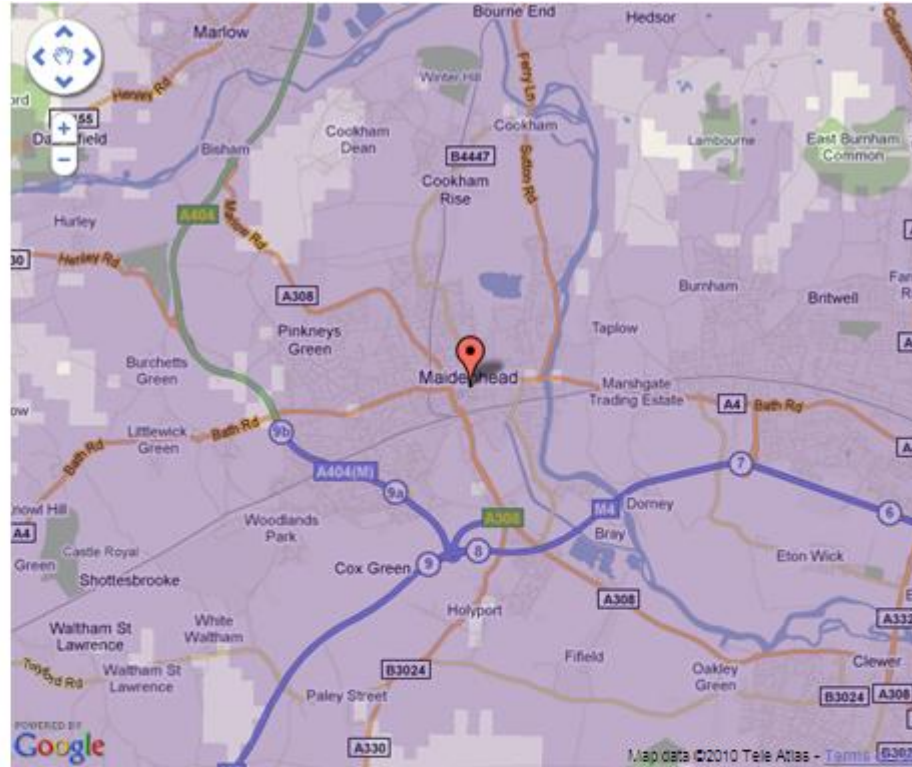
[> Report any network issue here](#)

Rated Best Network for Mobile Broadband.*



YouGov DongleTrack
Understanding the mobile broadband market

*All figures from the independent YouGov Dongle Tracker report wave 9 (July 10). MVNOs have been excluded.



Map Views: [Map only](#), [Coverage information](#).

Key to coverage map.

- Indoor & outdoor coverage. For your Mobile Broadband.
- Outdoor coverage. For your Mobile Broadband.

Although we try to make our maps as accurate as possible, the information is only a guide and doesn't guarantee service availability in a particular location. If you'd like more detailed coverage information, please call us on 333(free) from a Three mobile, or 0843 373 3333 (national rate) from any other phone.



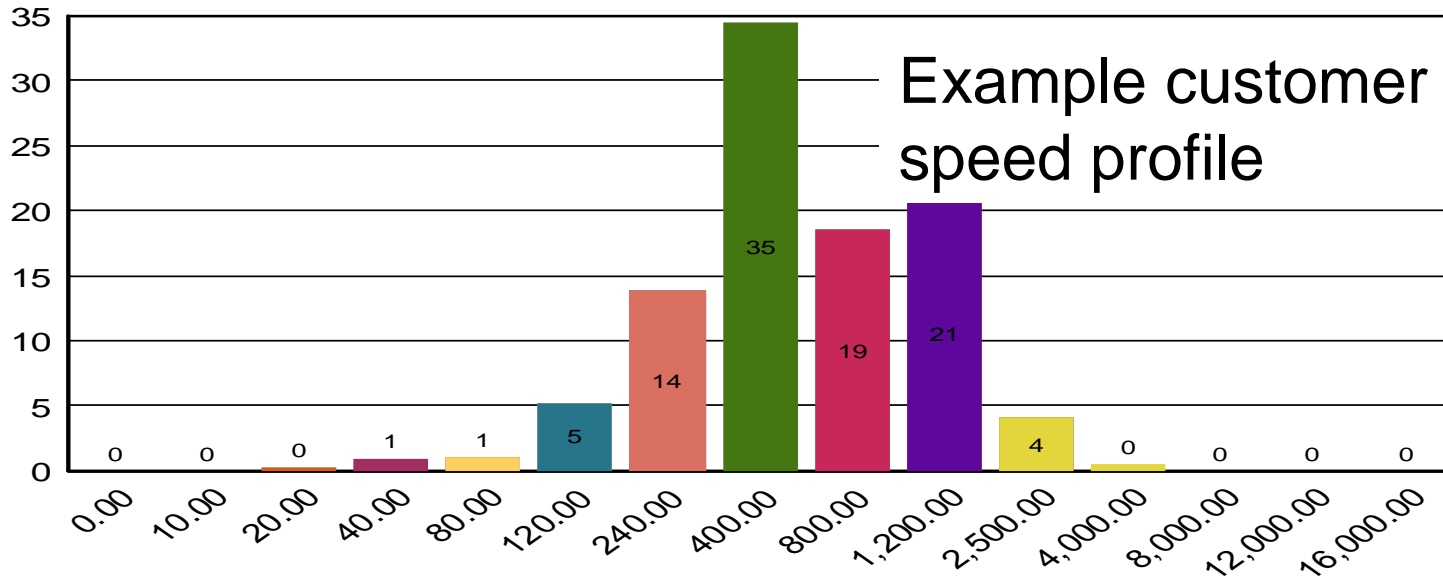
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Customer Experience

Traffic Monitoring



- Monitors every data session for every customer (a DVD of data every 2 seconds)

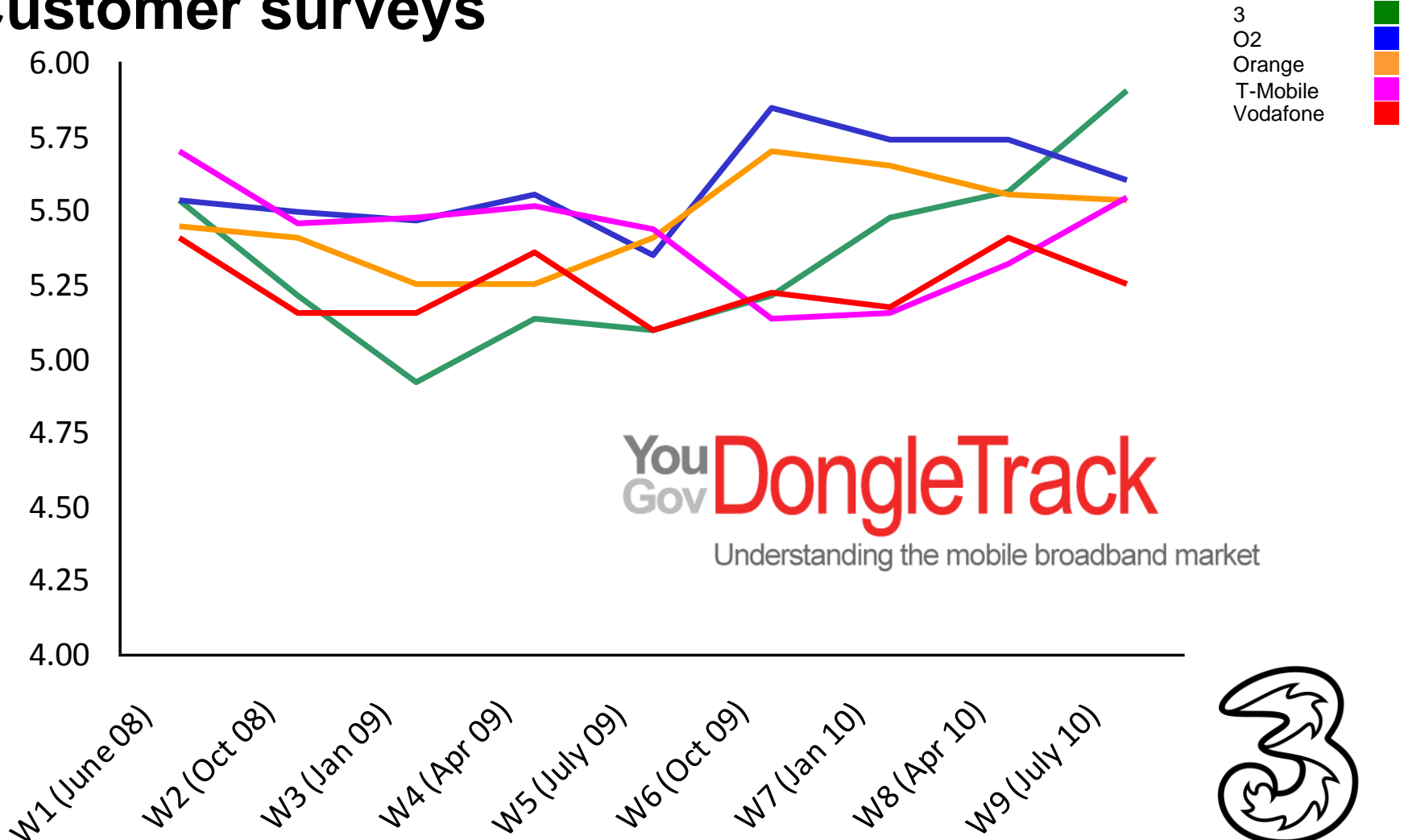


- Speeds – sell typical speeds not peak
e.g. typical 0.6 to 1.8 Mbps rather than 7.2 Mbps








Customer experience

Customer surveys



Understanding the mobile broadband market

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Getting Connected	1 st	4 th	2 nd	3 rd	5 th
Staying Connected	1 st	3 rd	2 nd	5 th	4 th
Reliability Day	1 st	3 rd	3 rd	2 nd	5 th
Reliability Evening	1 st	2 nd	3 rd	4 th	5 th
Download Speeds	1 st	2 nd	4 th	3 rd	5 th
Upload Speeds	1 st	3 rd	4 th	2 nd	5 th



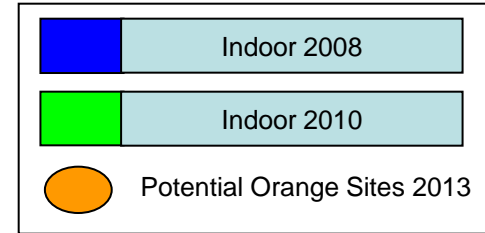
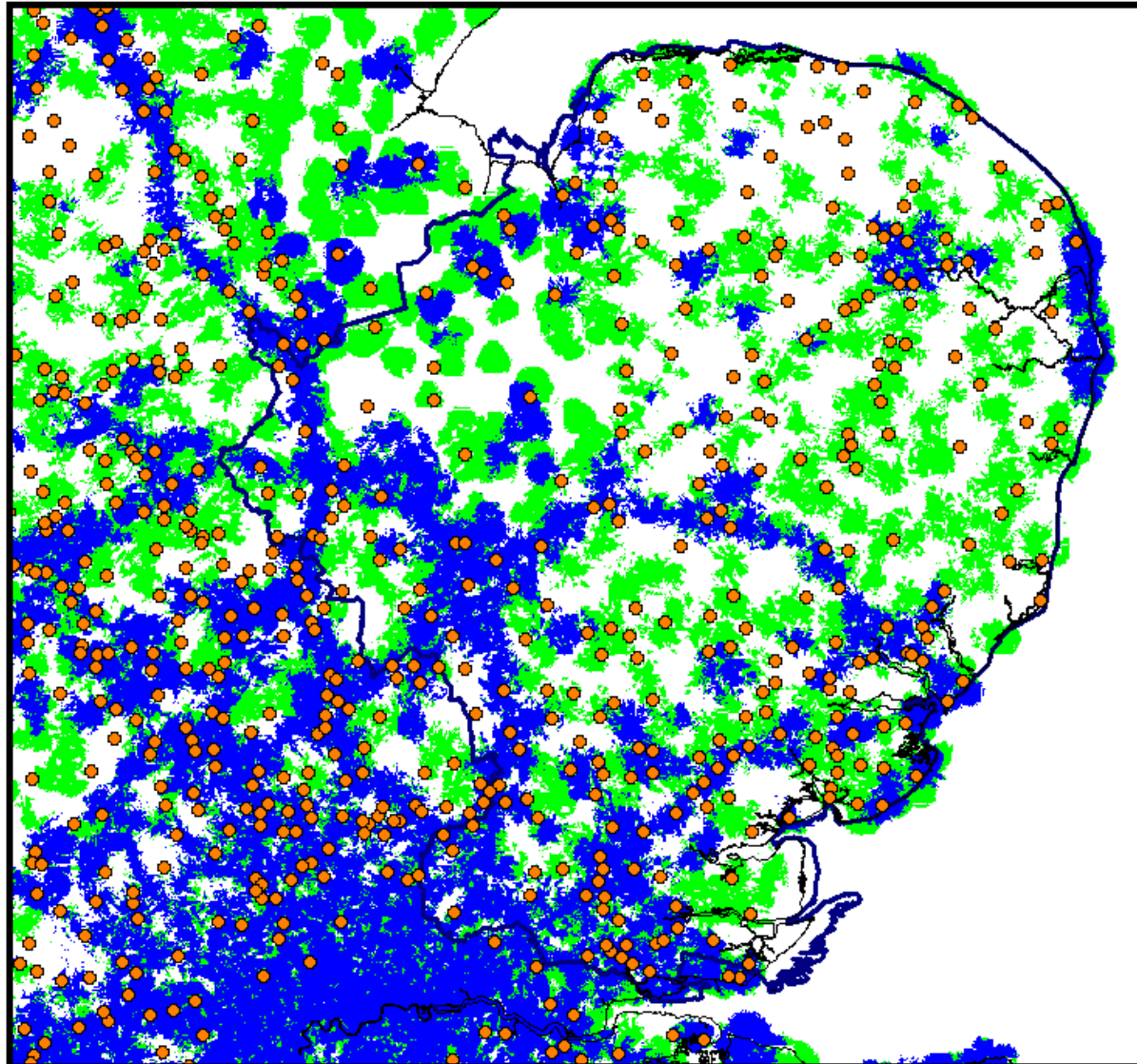
Future

- **Network share expansion**
- **Spectrum**



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Network Share expansion

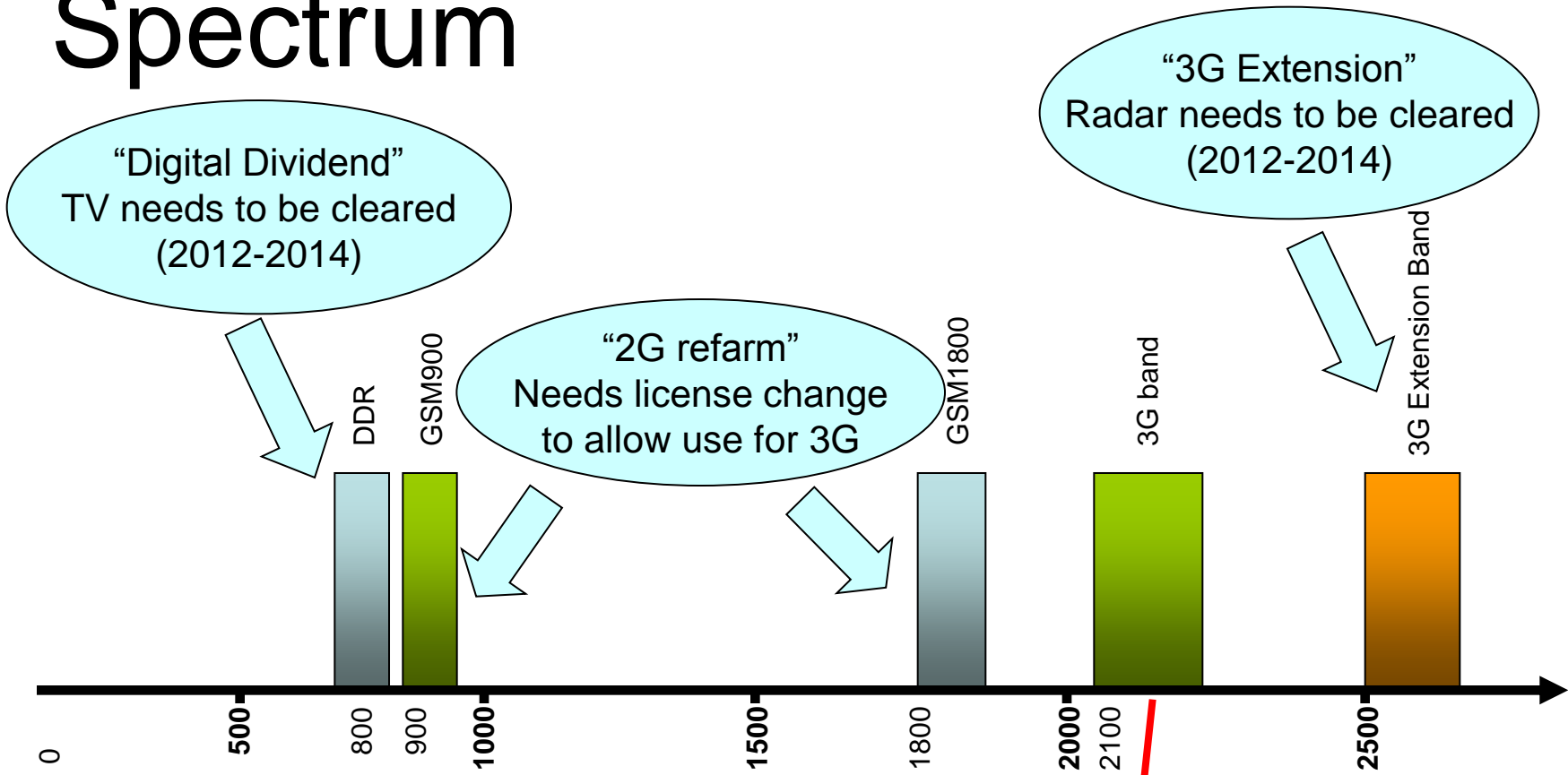


>3000 additional sites

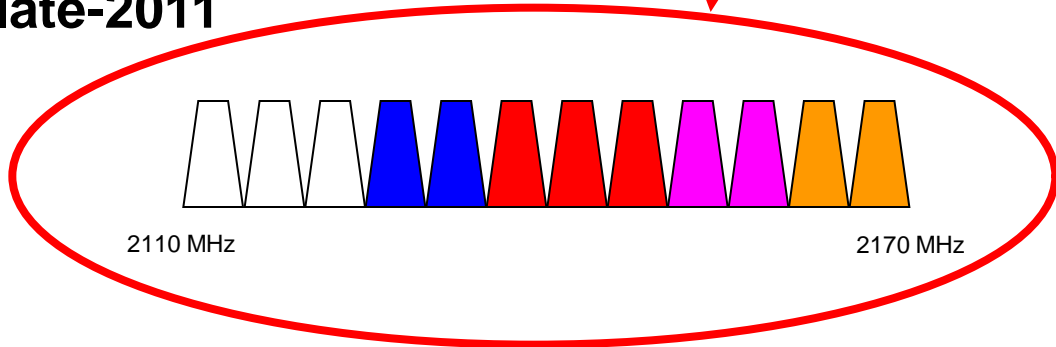


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Spectrum



- Auction expected late-2011



Thank you.



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