

Open Digital® Policy Organisation

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Headline

Fed up of waiting for a web page to download or an email to send whilst on the go? It's frustrating for everyone, but since in the business world, *time is money*, we've analysed a mountain of official reports to estimate the cost to the UK economy of time wasted waiting for slow mobile downloads.

More precisely, we've looked at the speed, capacity and coverage improvements next generation mobile broadband – known as 4G or LTE – is likely to bring, and estimate over **37 million business hours** per year could be saved from faster mobile data downloads if 4G mobile technology was to be deployed sooner than is currently planned.

Ofcom, the UK regulatory authority tasked with allocating the necessary radio spectrum, does not anticipate the first commercial 4G services to come online before 2013¹, and nationwide roll-out won't be complete before 2017². We estimate if Ofcom were to adopt more ambitious roll-out targets, the time saved by UK businesses will be worth **£732 million per year**.

The plan to start UK deployment in 2013 is 4 years behind the world's first LTE deployments in Oslo and Stockholm³ and 3 years behind the first commercial service in the United States⁴.

Our findings also put the cost to the UK economy from the **recently announced delay of 3-6 months** in holding the auction to allocate the licenses necessary to run 4G services in the UK **will cost the economy £183m - £366m**.

Summary and background

LTE (Long Term Evolution) is a mobile data transmission technology that will bring significant improvements to mobile internet access in the UK. Peak download speeds will increase, as will overall capacity through more efficient use of the radio spectrum⁵. Also latency – the time taken for remote services to respond – will be decreased, improving the overall user experience.

In addition, it will be possible to cover a larger geographic area without building new base stations, since LTE does not have the steep performance drop-off seen with existing 3G and 3.5G (HSPA) technologies. Ofcom has signalled it will require 4G license holders to provide coverage for 95% of the population⁶, an increase of 8% from current coverage by population⁷.

¹ [UK's largest ever spectrum auction delayed](#), Guardian, 5th September 2011

² [Assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues](#), Ofcom, 22nd March 2011

³ [Stockholm, Oslo First to Get Commercial LTE](#), Gigaom, 14th December 2009

⁴ [MetroPCS Launches First 4G LTE Services in the United States and Unveils World's First Commercially Available 4G LTE Phone](#), metroPCS, 21st September 2010

⁵ [4G Capacity Gains](#) (version 1.5), Ofcom/Real Wireless, 27th January 2011

⁶ [Ofcom launches next-generation 4G consultation](#), BBC News, 22nd March 2011

⁷ Mobile Not Spots, An Update on Our Research [[pdf](#)], Ofcom, 5th November 2010

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Average download speeds should be over 3 times faster⁸, and that's without the benefit of additional radio spectrum due to be made available for mobile data services or increased coverage, bringing high speed internet to areas currently stuck with very slow 2G services.

Whilst the technology already exists to build a 4G mobile data network, there are practical and regulatory considerations. Most handsets in use today aren't compatible with the new technology; therefore additional radio spectrum is required to run new services alongside existing 2G and 3G networks until the transition is complete.

Whilst it's fair to say technology adoption curves are not linear, therefore early delays in adoption won't necessarily result in a significant impact to UK businesses; a roll-out starting at the end of 2013⁹ is significantly behind many other countries, which will have nationwide 4G systems a full year before UK deployments starts.

Three operators in Germany have been expanding their LTE networks over 2011¹⁰. Two US operators currently provide 4G services, with a third due to launch this year¹¹. South Korea started LTE deployment in 2011, with nationwide coverage planned for 2012¹².

As well as Germany, South Korea and the United States; Australia, Japan, Russia, Sri Lanka, Saudi Arabia, United Arab Emirates, Norway, Sweden, Spain, Kenya and Canada is a non-exhaustive list of countries with existing or planned 4G networks to be operational by the end of 2012.

In our estimation, maturity of 4G technology will be driven by major deployments in other countries and the UK risks missing out on the direct benefits of faster mobile broadband. Every month's delay will come at a price to the economy.

Additionally, as mobile operators have seen revenues for data services plateau despite significant growth in data volumes¹³, there is limited market incentive for operators to continue expanding 3G data services when the lifetime of the technology is limited by the arrival of 4G services. This could lead to a period of under-investment in UK mobile data services.

Noting this lack of incentive to invest in data services, it is reasonable to assume that the delay in the rollout of LTE services benefits some incumbent operators who currently make decent revenues from existing voice and mobile services.

⁸ [4G set to deliver capacity gains of more than 200% over 3G](#), Ofcom, 12th May 2011

⁹ [UK's largest ever spectrum auction delayed](#), Guardian, 5th September 2011

¹⁰ [Vodafone announces 4G roll-out for Germany](#), The Register, 6th September 2010

¹¹ [Leaked FCC document details AT&T's 4G LTE rollout plans, talks up T-Mobile merger](#), engadget.com, 16th August 2011

¹² [SK Telecom and LG U+ launch LTE in Seoul, fellow South Koreans seethe with envy](#), engadget.com, 5th July 2011

¹³ [Communications Market Report](#), Ofcom, August 2011

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Analysing the cost of slow mobile data

Many who currently use a mobile internet connection for business will be familiar with the scenarios. You need to check your email, but there's only 2G data coverage – at a maximum of 0.08Mbps data rate¹⁴ the connection is 75 times slower than the best 3G services¹⁵.

Often, business users are faced with a choice of driving around for a quicker connection, or persevering with a slow connection.

Even with the best data connection available (HSPA – High Speed Packet Access) at certain times in some locations – as we've noted ourselves in central London – the sheer volume of people connecting to the internet brings services to a crawl.

Not only is there a cost associated with slower download speeds, without fast and reliable mobile internet access, UK businesses will be wary about adopting new business tools such as cloud-based office and productivity software¹⁶, tying certain tasks to the office when it could be quicker and cheaper to perform them from remote locations.

Cloud computing provides a huge opportunity for consumers and businesses alike. Better access to services, new products, and ways to manage and store data can already be achieved *in the cloud*, and the uptake of such services will continue. Also, advancements like Google's self-driving car experiments in 2010 were only achieved by off-loading data processing to the Google cloud¹⁷.

Delivering the cloud through mobile services will require faster access speeds. This can only be achieved in the long term by the deployment of 4G and LTE services.

Unambitious delivery targets spanning four years from 2013 to 2017 before 4G coverage will match today's 2G network will limit the ability to access, use, and innovate around cloud services and even prevent users and business from getting near a cloud offering.

There is also an opportunity to extend 4G data coverage targets beyond today's offering to help those in rural locations currently with neither acceptable fixed-line broadband speeds nor mobile data coverage. Extending coverage beyond the planned 95% target will also give businesses the confidence to adopt cloud services knowing their employees and customers are highly likely to have access anytime, from anywhere.

Whilst many of the benefits of faster mobile data speeds and increased coverage are hard to put a price on, one thing is measurable and has discernible value: time.

¹⁴ [General Packet Radio Service](#), Wikipedia, accessed 27th September 2011

¹⁵ [Measuring Mobile Broadband in the UK](#), Ofcom, May 2011

¹⁶ [Just one in ten firms have embraced the cloud](#) (plus research report), Virgin Media Business, July 2011

¹⁷ Based on the author's exclusive access to Google's cloud engineers in November 2010.

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Aim, methodology and calculation

Our aim is to estimate the cost to UK business of delayed 4G mobile data roll-out in the UK.

Essentially we calculate the time saved through quicker download times should the UK's current mobile data burden be transferred onto a 4G network, taking into account the additional coverage gains.

We acknowledge that such a change will not happen overnight, with Ofcom proposing a target date of 2017 to reach the 95% 4G coverage target¹⁸, however our aim is to estimate the cost of delays; or, looking at it another way, the saving to the UK economy if 4G roll-out could be achieved earlier.

We aim for estimation accuracy of +/- 25%. Given the relative uncertainty in the input values and required degree of accuracy we rejected an enhanced model taking into account traffic growth and deployment curves in favour of a linear model.

We opted to use a traffic estimate based on the likely volume of business mobile data by the end of 2011. This is a conservative estimate, as it is likely to grow considerably over the roll-out window, however it would not be correct to take into account traffic growth without also modelling deployment curves and the relationship between capacity and download speeds.

We didn't attempt to estimate what proportion of mobile operations leave the user waiting for a data response (e.g. web browsing, document or map data download). Clearly some data transfers do not leave the user waiting (e.g. background email synchronisation). Conversely, mobile connection problems cause secondary costs and delays which are difficult to estimate; on balance we feel the gross value of data transfer time is a valid indicator of cost.

Ofcom's annual report¹⁹ puts the volume of mobile internet traffic at 6 *petabytes* (million gigabytes) a month in 2009. A later report²⁰ puts annual growth in mobile data volumes at 67% per year, which means UK mobile data volumes are expected to hit 16.7 petabytes per month by the end of 2011.

In 2009, business use accounted for 22.3% of IP traffic¹⁹ and there's no evidence to suggest this will have altered significantly by the end of 2011.

We have assumed only 1.3% of all data is downloaded over a 2G network, based on Ofcom's assertion that 87% of the population have 3G coverage and the far slower data rates available being a strong deterrent against using mobile data services when connecting to 3G.

¹⁸ [Assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues](#), Ofcom, 22nd March 2011

¹⁹ [UK Communications Market Report](#), Ofcom, 19th August 2010

²⁰ [Communications Market Report](#), Ofcom, August 2011

Average 3G daytime (9-5) data rate	2.0Mbps ²¹	
Maximum 2G data rate	0.2Mbps	
Current 3G coverage by population	87% ²¹	
Planned 4G coverage by population	95% ²²	
Est 4G average data rate	6.6Mbps ²³	<i>Combined link speed & capacity gains from spectral efficiency</i>
Est monthly business mobile data by end 2011	3.7PB	
Time downloading over 3G per month (2011)	4.1m hrs	
Time downloading over 2G per month (2011)	0.5m hrs	
3G->4G time saving, at 3.3X average speed	2.8m hrs	
2G->4G time saving at 33X speed for 8/13 of 2G bytes	0.3m hrs	
Estimated hourly cost of labour after all tax (employer's NI), sick and holiday provisions	£19.60/hr	Based on 2011 average salary of £25,534/yr
Estimated cost of business of LTE roll-out delays	£61m/month £730m/year	

Conclusion

As demonstrated above, the potential risk of the delay to the rollout of 4G across the UK is £730m a year at a conservative estimate. The spectrum auction delay coupled with Ofcom's rollout target of 95% population penetration by 2017 sets the bar low on UK mobile broadband rollout.

Delays in the auction don't just delay improvement of existing services from 3G to 4G; it also delays coverage improvements giving 8% of UK residents mobile broadband for the first time.

By ensuring a swift mobile spectrum auction, Ofcom will allow the UK's first LTE data services to be deployed quicker. By requiring a more ambitious roll-out schedule from operators, nationwide coverage will be completed quicker, bringing real cost savings to UK businesses and enabling deployment of new business technology.

In conclusion, the best way forward for the UK now to catch up with the rest of the 4G capable nations is to go ahead with the mobile spectrum auction as soon as possible. Any delay will not only cost businesses money in wasted time, but will risk a loss of income if we start to lose ground to other nations because UK businesses aren't able to deploy the mobile technology and working practices to compete with other nations; this then risks a knock-on effect in a loss of capital for new investment that will then in turn impact future infrastructure investment, as well as economic growth.

²¹ [Measuring Mobile Broadband in the UK](#), Ofcom, May 2011

²² [Assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues](#), Ofcom, 22nd March 2011

²³ [4G set to deliver capacity gains of more than 200% over 3G](#), Ofcom, 12th May 2011

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The report was funded by private independent UK technology businesses. The research is objective and unbiased. The researchers did not receive funding from any mobile network operator, internet service provider or manufacturer of 4G mobile data equipment or related technology.

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Digital businesses of all sizes have a keen interest in policy direction. Many want to capitalise, some want to protect existing business models in an era of change, others are concerned about data security and data protection in an increasingly complex area.

We believe the long term interests of all internet users are actually rather closely aligned. The internet gives consumers a powerful voice. Given open platforms, open networks, and regulation only where regulation is truly needed, consumers will reward businesses who act with their interests at heart, and similarly avoid corporations who persistently break consumer trust; whilst consumers continue to enjoy new and innovative products.

We develop digital policy in an open manner, bringing together recognised experts to participate in public discussion and consultations; publishing all our research for free, under a Creative Commons license, so that others are free to study, dissect and build on our work.