
Electronic Communications Code: Impact on investment and growth.

Non-confidential

20 September 2013



Three.co.uk

Executive Summary.

DCMS has asked Hutchison 3G UK (“Three”) for economic evidence on how the operation of the Electronic Communications Code on the mobile site rental market may be adversely impacting investment in mobile communications infrastructure in the UK.

Three has already submitted detailed evidence on how mobile site rentals are materially impacting rollout of 4G services¹, in addition to responses to DCMS’s economic modelling questions on the mobile site rentals market².

Three’s evidence in this submission shows that the operation of the mobile site rental market now represents the largest barrier to investment in future mobile communications infrastructure – investment that is needed to support large forecast future demand growth in mobile communications services that will be critical to future UK economic growth.

First, the Government is increasingly recognising that mobile communications is essential to the UK economy and future economic growth.

Second, the mobile communications industry needs three critical strategic inputs to operate its business:

- backhaul services;
- mobile network sites; and
- spectrum.

Backhaul, network sites and spectrum are all critical “bottleneck” inputs for the mobile communications industry.

Third, whereas backhaul and spectrum are highly regulated and currently attract intense policy focus, the mobile sites market remains largely unregulated, and, to date, a low priority from policy makers.

The mobile site market is nevertheless not competitive. Indeed, independent expert economic evidence shows that the current Electronic Communications Code (and amendments recommended by the Law Commission) does not operate in the interest of consumers. In particular, the current and proposed Code creates a significant disincentive to investment in on-going future mobile communications infrastructure.

¹ Electronic Communications Code – Impact of site rentals on 4G rollout, Three, 26 July 2013.

² Electronic Communications Code – MNO questions for economic modelling, Three, 9 August 2013.

Fourth, users of mobile communications services increasingly expect more for less. Namely, users demand mobile internet services more and more – and this is imposing a greater and greater cost on the industry – but users are unwilling to pay any more for this.

The UK mobile network industry has nevertheless been making persistently low financial returns – and this further weakens the case for future on-going investment weak.

Fifth, adding new mobile network sites is the most efficient way to add capacity for future mobile data growth. Current UK mobile site rental levels nevertheless make such necessary future mobile network investment economically prohibitive.

Amending the Electronic Communications Code to create greater investment certainty and make future investment more economic would therefore transform industry incentives to make the necessary future investments in mobile communications infrastructure.

The alternative – where mobile site rentals stay at current levels or continue to rise – will discourage future network investment, resulting in progressively less reliable and slower, not faster, mobile communications services. UK consumers, businesses and the wider economy will be worse off.

In conclusion, the Government should reform the Electronic Communications Code in line with other infrastructure industries to support investment and economic growth.

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1. Mobile communications are critical to the UK economy.

Communications infrastructure is critical to the UK (and EU) economy, as highlighted across wide a range of UK and EU policy objectives, including:

- the Government's Plan for Growth;
- the European Union's Digital Agenda for Europe;
- the Government's Information Economy Strategy;
- the Government's Digital Platform for Growth strategy; and
- the Government's Strategic Framework for Critical Infrastructure.

Of alternative communications technologies, mobile communications is the digital communications infrastructure of the future and should be the focus of future investment, economic growth and Government policy.

The Government's Plan for Growth emphasises the need for significant investment in the UK – and that roll out of 4G mobile services, among other things, is a crucial capital investment project, helping the UK remain at the forefront of digital technology³.

The European Commission sets out in its Digital Agenda for Europe Telecommunications Single Market proposal that the communications sector is essential for Europe's strategic interests and economic progress, that effective connectivity is now essential for productivity growth in all economic sectors, but that the communications sector currently suffers from a lack of investment that needs addressing⁴.

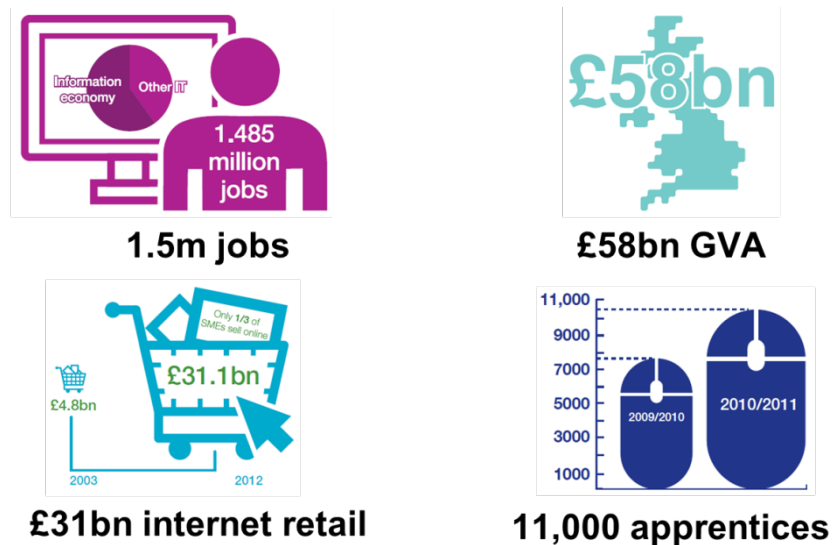
The Government's Information Economy Strategy outlines how the information economy is central to the UK economy and future economic growth⁵. Figure 1 below highlights the value of the information economy to the UK economy in terms of jobs, economic gross value added (GVA), growth in internet retailing and growth in information economy apprenticeships.

³ Plan for Growth, HM Treasury and Department for Business, Innovation & Skills (March 2011); Plan for Growth implementation update (March 2013).

⁴ A Digital Agenda for Europe, European Commission (August 2010) and Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Telecommunications Single Market (September 2013).

⁵ Information Economy Strategy, HM Government (June 2013).

Figure 1: Government Information Economy Strategy.



Source: Information Economy Strategy, BIS (2012).

Furthermore, the Government's Information Economy Strategy recognises that a thriving information economy will need to be underpinned by the necessary digital infrastructure, both physical and regulatory.

The Government's Digital Platform for Growth strategy⁶ emphasises that the telecommunications sector has a proven track record of driving economic growth, that the Government's strategic priority is to establish world-class connectivity – but that there is an ever greater demand for bandwidths and faster connection speeds, and that the UK must continue to deliver the digital infrastructure to support this.

Indeed, the Government's Digital Platform for Growth strategy highlights that fast, reliable, competitively-priced digital infrastructure (both fixed and mobile) is crucial to economic growth – and makes a commitment supporting mobile communications and making infrastructure deployment easier.

⁶ Connectivity, Content and Consumers: Britain's Digital Platform for Growth, Department for Culture Media & Sport (July 2013).

The Government’s Strategic Framework for Critical Infrastructure defines the UK national infrastructure as “those facilities, systems, sites and networks necessary for the functioning of the country and the delivery of the essential services upon which daily life in the UK depends”⁷.

Of these, there are certain critical elements, the loss or compromise of which would have a major impact on the availability or integrity of essential services leading to severe economic or social consequences (or to loss of life) in the UK. These critical elements make up the critical national infrastructure (CNI).

Communications (both fixed and mobile) is one of nine sectors that make up the critical national infrastructure.

Furthermore, Table 1 below highlights that – while mobile communications is a critical national infrastructure – it is the only national infrastructure not receiving any significant public subsidy or other comparable regulatory advantage. On the contrary, the UK mobile industry has paid over £25bn in licence fees to the Government since 2000.

Table 1: Mobile a critical, but subsidised, national infrastructure.

Critical national infrastructure	Public subsidy or regulatory advantages
Communications	Minimal. £25bn licence fees paid to Government
Emergency services	100%
Energy	Regulatory financial duty. Access rights.
Financial services	Government guarantee
Food	Farming subsidies
Government	100%
Health	National Health Service
Transport	Rail, road, airport subsidies
Water	Privatisation discount. Regulatory financial duty. Access rights.

Source: Cabinet Office (2013), Three research.

⁷ Sector Resilience Plan for Critical Infrastructure 2010, Cabinet Office (March 2010).

The users of mobile communications services in the UK have also enjoyed huge growth in mobile networks, constant innovation in new services, along with continuously lower prices, now among the lowest in the European Union and OECD countries.

In contrast, the energy and water infrastructure industries, which are the most similar in characteristics to mobile communications, enjoy considerable statutory advantages, reflecting their critical infrastructure status.

Energy and water companies enjoy rights of access to public and private land that considerably assists their ability to fulfil their public licence obligations, to fund investment and to keep prices as low as possible for users. In contrast, mobile operators enjoy only minimal corresponding rights.

In addition, the UK energy and water regulators have a duty to ensure that energy and water infrastructure companies can finance their functions, namely, that a well-run company can earn an adequate return on investment. In contrast, mobile network operators enjoy no such protection or regulatory advantage.

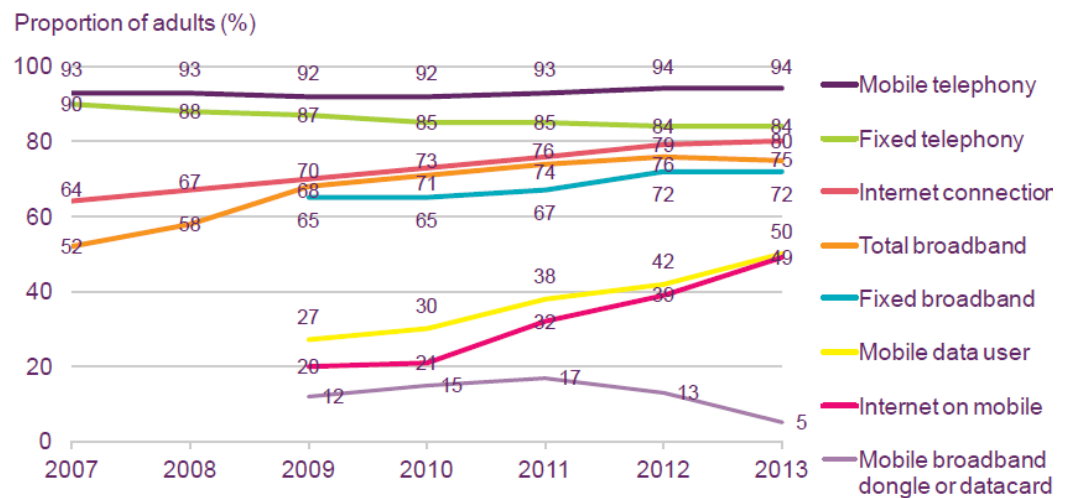
Licensed mobile network operators are nevertheless subject to licence obligations to provide near universal and always available service, and this is what the Government, regulators and consumers now expect. For example, the Government states in its Digital Platform for Growth strategy that it is important to get a mobile signal wherever you are in the UK.⁸

Of alternative communications technologies, mobile communications is the digital communications infrastructure of the future. For example, Figure 2 highlights that mobile telephony has for some time had the highest penetration of communications services among UK adults, while fixed telephony has been in steady decline.

The fastest growing communications services are mobile data and internet on mobile devices, now reaching 50% of UK adults.

⁸ Connectivity, Content and Consumers: Britain's Digital Platform for Growth, Department for Culture Media & Sport (July 2013), page 18.

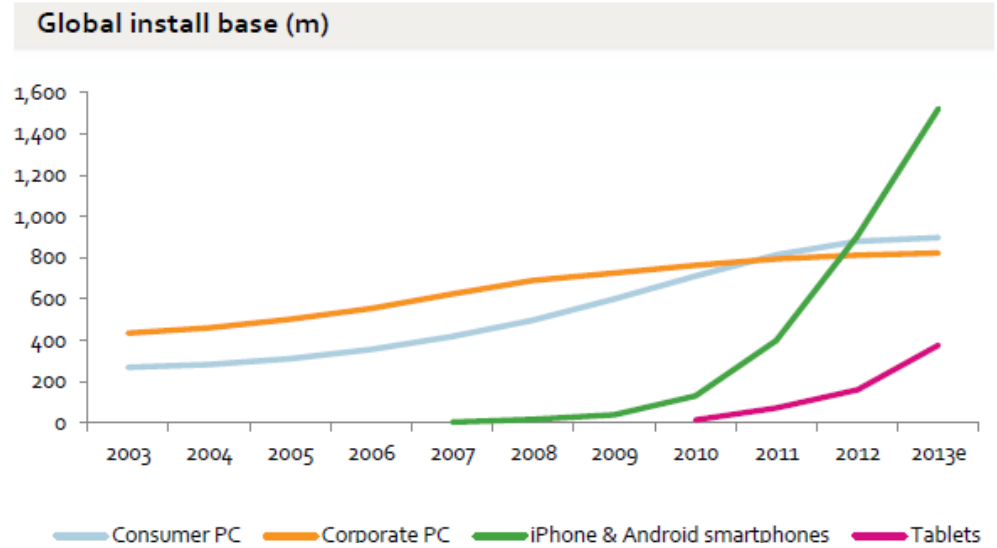
Figure 2: Mobile dominates household take-up of communications services.



Source: Ofcom Communications Market Report (2013).

Furthermore, Figure 3 below highlights that mobile devices are driving the global information economy. Namely, at a global level, there are now more mobile devices (iPhone and Android smartphones, plus tablet devices) for accessing the internet than consumer and corporate PCs combined.

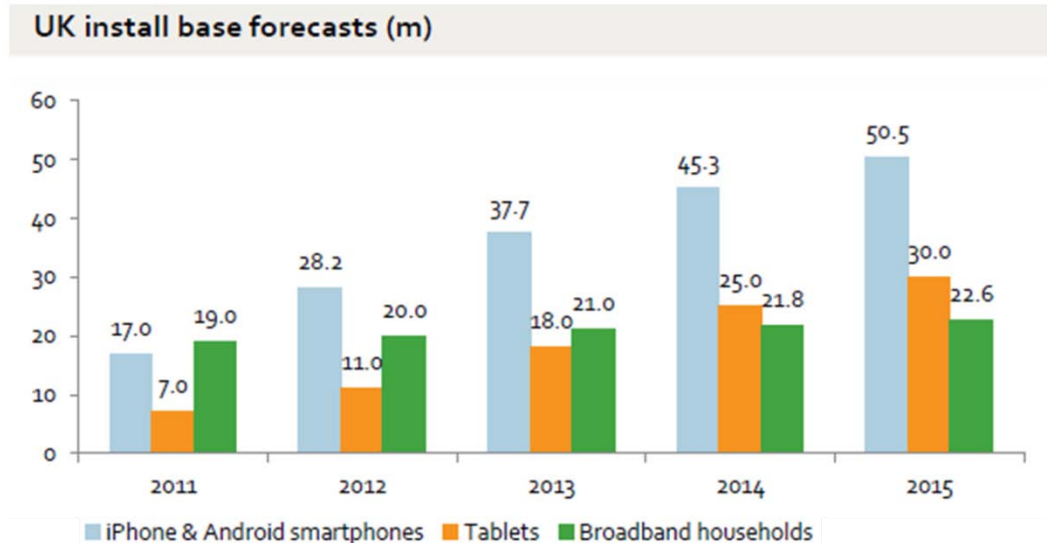
Figure 3: Mobile devices driving the global information economy.



Source: Enders Analysis (2013).

Figure 4 shows that, in the UK, mobile internet devices have long overtaken fixed broadband connections. Namely, in 2013, there are two-and-a-half times more mobile internet devices than fixed broadband connections, rising to almost four times by 2015.

Figure 4: Mobile devices already long overtaken fixed in the UK.



Source: Enders Analysis (2013).

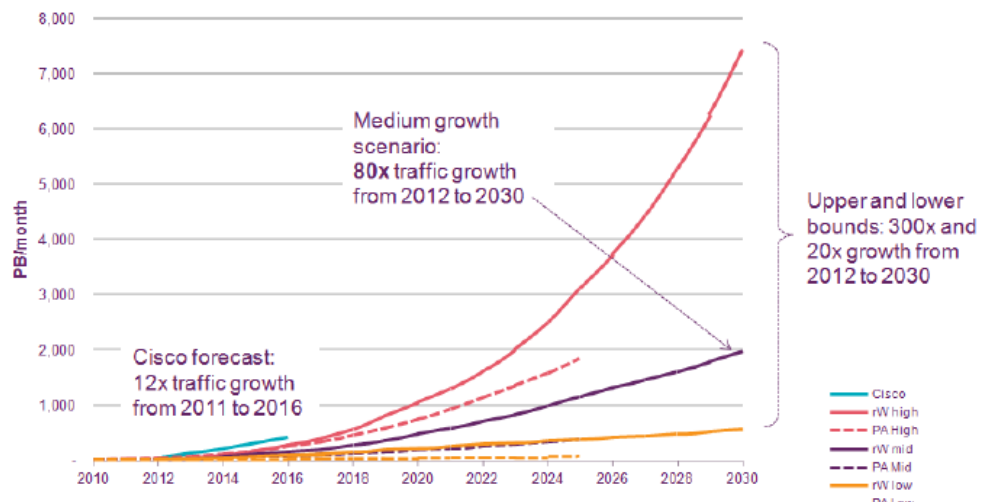
Figure 5 below shows however that the underlying explosion in mobile data use is still to come⁹. Namely, according to research for Ofcom, based on a wide range of sources, UK mobile data growth is expected to grow between 20 and 300 times by 2030, compared to 2012 levels.

These projections reflect widely cited forecasts by Cisco, PA Consulting Real Wireless and others.

⁹ Note that the scale on this figure is in petabytes (PB), equal to one million gigabytes (GB).

Figure 5: Underlying explosion in mobile data use still to come.

Projected growth in UK mobile data traffic



Source: Real Wireless for Ofcom (2012).

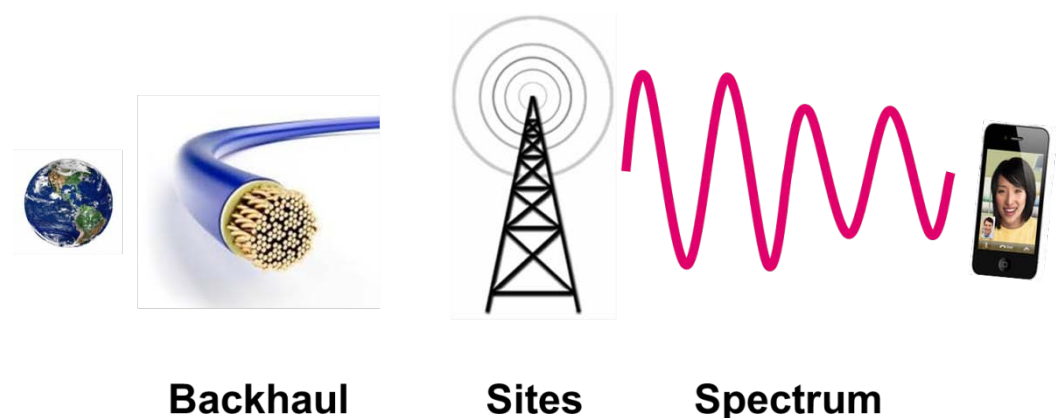
The challenge for the Government and the mobile communications industry is therefore how to make the infrastructure investment in necessary to support this huge expected future growth.

2. Mobile needs three strategic inputs: backhaul, mast sites and spectrum.

Figure 6 highlights that a mobile network needs three strategic inputs to connect mobile users to the outside world, namely:

- backhaul – to connect mobile network sites to each other and to other communications operators;
- sites – in particular, the land or building to install mobile network site on; and
- spectrum – to connect our network of mobile sites to end users.

Figure 6: Mobile network needs three strategic inputs to connect user to outside world.



Source: Three.

The mobile network industry also needs many other inputs for its business, including:

- technology – both network equipment and end-user devices;
- people – especially engineers and other mobile network experts; and
- retail distribution and customer service.

However, all these other inputs are readily available from competing suppliers or can easily be outsourced or built internally.

For example, network equipment supply and management is an extremely competitive global market, with many competing suppliers, including Ericsson, Huawei, Nokia Siemens Networks and Samsung.

Mobile needs three strategic inputs: backhaul, mast sites and spectrum. continued

Mobile devices is also a highly competitive global market, with rapidly changing market shares of the leading device makers: Apple, Blackberry, Nokia, HTC, Sony and Samsung.

Retail distribution of mobile communications services is also highly competitive, especially competition between mobile network operators (MNOs), mobile virtual network operators (MVNOs) and third-party retailers.

However, backhaul, sites and spectrum are all bottleneck inputs – they are both critical inputs to mobile networks and they are in limited choice of supply.

Table 2 below summarises how backhaul, sites and spectrum are all bottleneck inputs for mobile network operators, namely, how backhaul, sites and spectrum are all necessary inputs, but with often limited choice of suppliers.

Table 2: Backhaul, sites and spectrum all bottleneck inputs.

	Backhaul	Sites	Spectrum
Necessary input	<ul style="list-style-type: none"> Need to connect mobile sites to each other and to other communication providers 	<ul style="list-style-type: none"> Need to locate mobile sites to provide mobile network coverage 	<ul style="list-style-type: none"> Need licensed spectrum to operate mobile communications service
Choice of supply	<ul style="list-style-type: none"> Natural monopoly in most locations 	<ul style="list-style-type: none"> Limited supplier choice in most locations Locked in on existing locations 	<ul style="list-style-type: none"> Government only supplier Suitable spectrum highly scarce

Source: Three.

The next section below describes how the lack of regulation of mobile network sites is an anomaly, namely:

- how the supply of backhaul and spectrum are highly regulated, in recognition of their strategic importance to a wide range of sectors, including mobile communications; whereas

- the supply of mobile sites suffers from many of the same economic and competitive characteristics as backhaul and spectrum, but remains largely unregulated, with considerable adverse consequences on the mobile network industry, mobile communications users and the wider economy.

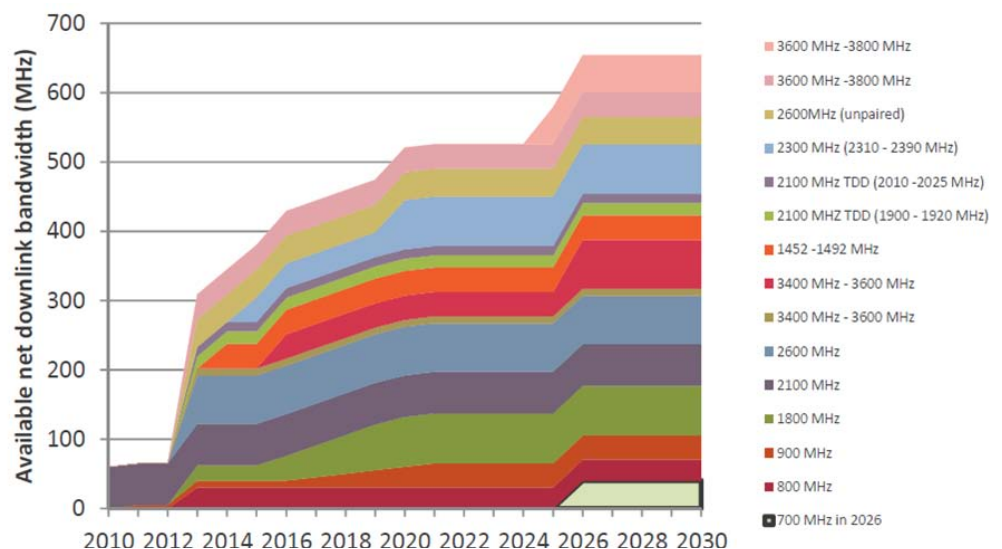
3. Backhaul and spectrum are highly regulated. Mast sites are largely unregulated.

While backhaul and spectrum are highly regulated, mast sites remain largely unregulated.

First, Figure 7 highlights how there is intense regulatory and policy focus on mobile spectrum, in the UK, EU and globally. In particular, Figure 7 shows all the possible future spectrum bands identified by Ofcom as suitable and prospectively available for mobile communications, namely, 600-700MHz in total of downlink spectrum capacity.

This represents an increase of almost ten times in the spectrum currently used for mobile internet.

Figure 7: Intense regulatory and policy focus on new mobile spectrum.



Source: Ofcom UHF Strategy Statement (2012).

Of the different mobile spectrum bands:

- 2100MHz spectrum has been in use for mobile internet since 2003 and recently liberalised for 4G use;
- 900MHz and 1800MHz former 2G spectrum are now available for mobile internet and recently launched;
- 800MHz and 2600MHz have been recently auctioned in the 4G auction and starting to be used;
- 2300MHz and 3400MHz spectrum will soon be auctioned by the MOD;

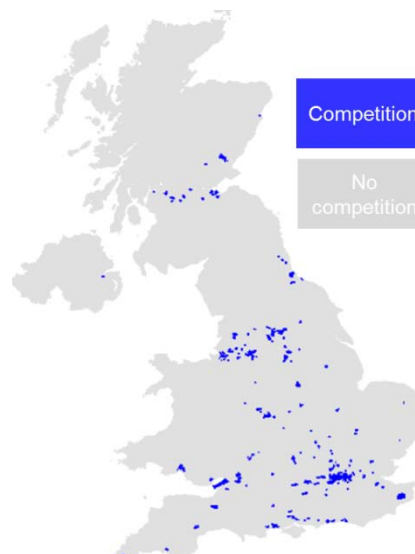
- 1400MHz spectrum may also soon become available for mobile internet; and
- 700MHz (the “second digital dividend”) is now being prioritised by Ofcom (alongside the European Union and International Telecoms Union (ITU)) to become available for mobile internet around 2020 in the UK.

This considerable policy and regulatory focus on new spectrum for mobile internet reflects the Government’s commitment to making 500MHz of public sector spectrum available for mobile internet by 2020¹⁰ and the European Commission’s even greater commitment to identify at least 1200MHz of spectrum to address increasing demand for wireless data traffic over a similar period¹¹.

This huge focus on spectrum reflects that spectrum is a critical input to mobile communications services, only available in scarce supply and only within the power of government and regulators to make available for new uses.

Second, Figure 8 below shows that in most locations in the UK, there is no competition for the supply of backhaul services, an essential strategic input for the mobile network business.

Figure 8: No competition in most locations for mobile backhaul.



Source: Ofcom Business Connectivity Market Review statement (2013).

¹⁰ Enabling UK growth – Releasing public spectrum, Department for Culture, Media & Sport (March 2011).

¹¹ Radio Spectrum Policy Programme, European Commission (March 2012).

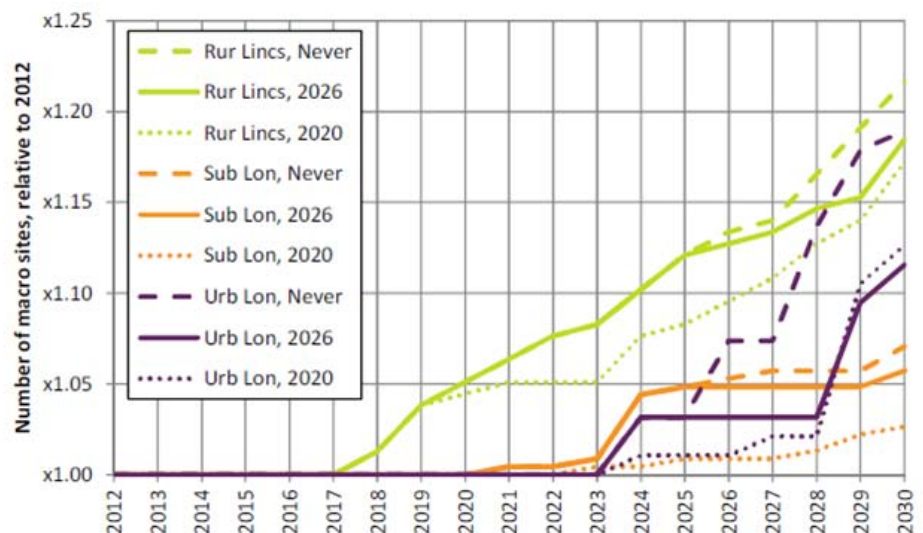
This reflects Ofcom’s recent finding that the two largest suppliers of backhaul, BT and Kcom, have significant market power (SMP) in the supply of wholesale Ethernet lines below 1Gbps in capacity across most of the UK¹².

Namely, Ofcom finds that mobile network operators have a good choice of backhaul provider in just 8% of postcode areas in the UK, mostly in London.

This situation reflects the ubiquity of the incumbent suppliers’ networks, plus the high cost of for an alternative supplier of laying alternative backhaul connections or accessing BT’s ducts to provide a competing service.

Third, Figure 9 shows that Ofcom (among others) recognise that there is a large need additional mobile network sites – in addition to future new spectrum – in order to support future growth in mobile data demand.

Figure 9: Need recognised for many more mobile sites.



Source: Real Wireless for Ofcom UHF Strategy consultation (2012).

There is nevertheless an absence of regulatory or policy focus on how such increase in mobile network sites will be achieved or whether there are any regulatory or policy measures needed to facilitate such growth.

¹² Business Connectivity Market Review, Ofcom (March 2013).

Indeed, there are considerable barriers to the expansion of mobile network sites, chiefly the operation of the mobile network site market.

A recent independent expert economic opinion by Professor David Myatt and Professor Jean-Pierre Benoit of London Business School on the operation of mobile site network market Electronic Communications Code, commissioned by EE, concludes that under the current and proposed amended Electronic Communications Code, mobile operators will have a strong incentive to under-invest in mobile network sites¹³.

Professors Myatt and Benoit characterise the mobile network market as a situation of “bilateral monopoly” between site owners and mobile network operators. Namely, on a given site, the mobile operator has no alternative choice of site owner and the site owner has limited alternative choice of mobile operator.

Under the current and proposed amended Electronic Communications Code, mobile site rentals are reached by commercial agreement between site owner and mobile network operator.

However, there is a need for large site-specific investments by mobile operators (namely, in gaining planning permission, construction, deployment of mobile sites and extension of mobile coverage), whereas no such or limited investments are made by site owners. Namely, there is a considerable asymmetry in the investment made in a site between the mobile operator and the site owner¹⁴.

This means that once on a site, mobile network operators are in a weak bargaining position in agreeing new terms, such as lease extension or rights to add new equipment. This is because, having made such a large investment in a site (which cannot be transferred to another site), mobile operators will have little credibility in threatening to leave a site to secure better terms.

Mobile operators could seek to mitigate this situation by agreeing future terms upfront. However, given the likely length of occupancy (which for the majority of sites is indefinite), mobile operators will not be in a position to anticipate all such future needs at the outset of signing a new lease.

¹³ Opinion on the Electronic Communications Code, Professor David Myatt and Professor Jean-Pierre Benoit, London Business School (March 2013).

¹⁴ In the case of wholesale infrastructure providers, which act as intermediaries between underlying site owners and mobile network operators, there still tends to be a greater level of investment by mobile operators than wholesale infrastructure providers. In addition, wholesale infrastructure providers have a considerable advantage over mobile operators in already owning many of the best existing prospective mobile network sites.

On the contrary, Professor Myatt and Benoit's analysis highlights that mobile operators will anticipate being in a future weak bargaining position, and this will create a strong disincentive to invest in new sites at the outset.

We note that Professor Myatt and Benoit's analysis reflects a much wider economic literature on sunk costs and investment hold-up, whereby the existence of relationship-specific sunk costs can considerably deter (i.e. hold-up) efficient investment decisions¹⁵. This includes the Noble-prize winning work by Professor Ronald Coase.

Professors Myatt and Benoit recommend that the Government should amend Electronic Communications Code to give much greater investment certainty to mobile operators.

In particular, Professors Myatt and Benoit suggest that setting mobile site rentals on the basis of a compulsory purchase price plus a modest profit uplift represents a desirable compromise between the interests of economic efficiency – namely the interests of consumers and the wider economy – and the interests of site owners. Three strongly agrees with this recommendation¹⁶.

There are also additional competition problems with the mobile site rental market not directly addressed by Professors Myatt and Benoit, namely:

1. Even for new sites, there is often limited choice of alternative location or site owner, owing to combinations of technical, geographic and planning constraints, or of multiple site owners already occupying the best available sites. This further weakens the bargaining power of mobile network operators. This is especially a problem with wholesale infrastructure providers, such as Arqiva, which already occupy many of the best possible sites for mobile networks.
2. The current and proposed amended Electronic Communications Code encourages site rentals to be set on the basis of "comparable" sites. This directly undermines competition between site owners. Namely, it may indirectly facilitate collusion between site owners, rather than promoting competition between alternative site providers.

¹⁵ For example, see en.wikipedia.org/wiki/Hold-up_problem and en.wikipedia.org/wiki/Coase_theorem.

¹⁶ This recommendation is broadly equivalent to the approach for determining consideration in the energy distribution industry and with the approach proposed by the Mobile Operators Association (MOA) in its proposed revision of the Electronic Communications Code.

We note that the Law Commission recognised many of these issues with the mobile site rental market in its 2012 consultation¹⁷, namely that:

- mobile communications services now deliver a large public benefit, not dissimilar to traditional utilities, such as energy and water distribution;
- the current Electronic Communications Code has been ineffective at regulating the mobile site rental market;
- mobile network operators often find considerable difficulty in reaching commercial agreement with site owners;
- mobile network operators face high risk of ransom demands from site owners, where site owners are in a unique position over mobile network operators; and
- site rentals should be set on a compulsory purchase basis, as in the electricity, gas and water distribution industries.

The Law Commission nevertheless reversed its consultation findings¹⁸ following intensive lobbying by site owners eager to maintain the status quo situation that benefits site owners at the expense of mobile communications users and the wider UK economy.

Three strongly agrees with the Law Commission's original consultation proposals, which are endorsed by the independent expert economic opinion of Professors Myatt and Benoit.

Indeed, Professor Myatt and Benoit's recommendation of setting mobile site rentals on the basis of a compulsory purchase price plus a modest profit uplift represents a workable solution, in line with other infrastructure industries, such as energy and airports¹⁹.

Three also considers that Professor Myatt and Benoit's approach would apply equally to wholesale infrastructure providers as independent site owners.

First, in many cases, wholesale infrastructure providers offer little more than access to undeveloped site.

Second, in cases where wholesale infrastructure providers offer additional services, Three would suggest a requirement that these services are charged for separately from the site rental element. This could operate in the same way that Arqiva charges a service and

¹⁷ Law Commission Electronic Communications Code consultation (2012).

¹⁸ Law Commission Electronic Communications Code recommendations (2013).

¹⁹ Airport operators can apply to the Secretary of State for compulsory purchase powers to build essential new facilities. This right is rarely exercised, but we understand typically results in airport operators agreeing to purchase new land on the basis of compulsory purchase valuation plus a goodwill profit uplift to help avoid undue litigation or other transaction costs.

maintenance fee on the Mobile Infrastructure Project (MIP), separate from the site rental charge.

4. Users want more for less: future mobile investment is becoming uneconomic.

The Government's Information Economy Strategy highlights that "Business and consumer expectations on the availability, cost, speed, security and reliability of the internet, including on mobile and wireless access, are increasing all the time. Meeting these demands is crucial in reinforcing the UK's position as a leading digital economy and driving jobs, investment, productivity and growth."²⁰

Three strongly agrees with this finding. It is nevertheless becoming increasingly difficult for the mobile communications industry to meet these demands from business and consumers while, at the same time, the industry is unable to make an adequate financial return on investment.

Figure 10 below shows the UK mobile network industry has not been making adequate financial returns for at least the last 14 years.

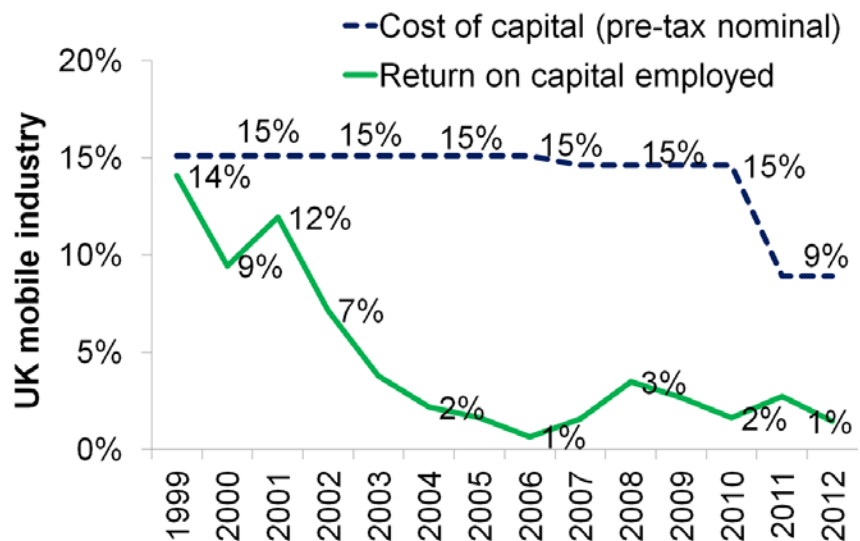
Namely, the industry's return on capital employed²¹, as calculated from mobile network operators' statutory financial reports, has been persistently lower than the industry's cost of capital²² (as estimated by Ofcom for successive reviews of mobile termination rates).

²⁰ Information Economy Strategy, HM Government (June 2013).

²¹ Return on capital employed (ROCE) is the ratio of operating profit (i.e. earnings before interest and tax (EBIT)) to the average of year-end and year-beginning total assets net of current liabilities.

²² Cost of capital also known as the weighted-average cost of capital (WACC), including the weighted-average cost of equity and debt financing.

Figure 10: UK mobile network industry not making adequate financial returns.



Source: Mobile network operator financial reports, Ofcom Mobile Call Termination statements (2004, 2007, 2011).

At the beginning of 2013, the UK mobile operators have made a net total investment²³ of over £40bn in mobile networks, yet the industry's total annual operating profit is less than £1bn, a return on investment of just 1%.

In other words, investors could be earning far higher returns investing their money in other industries.

This situation contrasts with the energy and water distribution industries, where the industry sector regulators (Ofgem and Ofwat) have a statutory duty to ensure that efficient firms can finance their activities. This means that well-run firms will be able to earn a return on capital employed equal to the industry cost of capital. For the mobile industry, this would mean four to five times greater industry profitability than currently.

The financial situation in the UK mobile network industry reflects a combination of factors, in particular, the level of industry costs, such as

²³ Gross capital investment net of depreciation and amortisation.

mobile network costs, relative to the prices that customers are willing to pay.²⁴

Moreover, the current financial situation of the UK mobile network industry is unsustainable, as investors will rather invest in other industries with higher returns, than continue to invest at the same rate in the UK mobile network industry without prospect of better returns. Namely, costs will need to fall, quality of service will fall or revenues will need to rise to change this position.

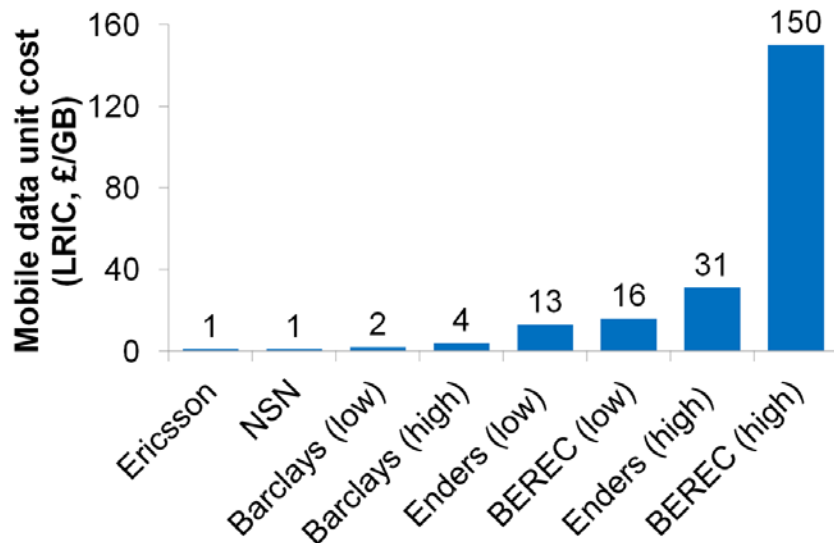
Most industry commentators see little prospect for rising industry revenues. Indeed, industry revenues have recently been static and predicted to decline through combination of greater regulation of retail mobile services and continuing intense competition.

Industry commentators, including Ofcom, nevertheless predict the industry to face greatly rising costs, driven by forecasts of future demand for mobile data, as highlighted in Figure 5 above. Forecasts of rising mobile data demand can only lead to greater costs for mobile network operators, in particular, in requirements for additional spectrum, sites and backhaul.

Figure 11 below shows that there a wide range of mobile data unit cost estimates. Namely, estimates of the “long-run incremental cost” (LRIC) to mobile network operators of additional mobile data demand vary between £1/GB and £150/GB.

²⁴ The financial situation in the UK mobile network industry also reflects intense competitive and regulatory pressures, such as regulation of mobile termination rates, non-geographic numbers and international roaming.

Figure 11: Wide range of mobile data unit cost estimates.



Source: Barclays (2010), BEREC (2010), Enders Analysis (2010), Ericsson (2010), NSN (2010).

Three's internal estimates of the unit cost of mobile data (based on Ofcom's mobile call termination cost model²⁵), [Confidential...].

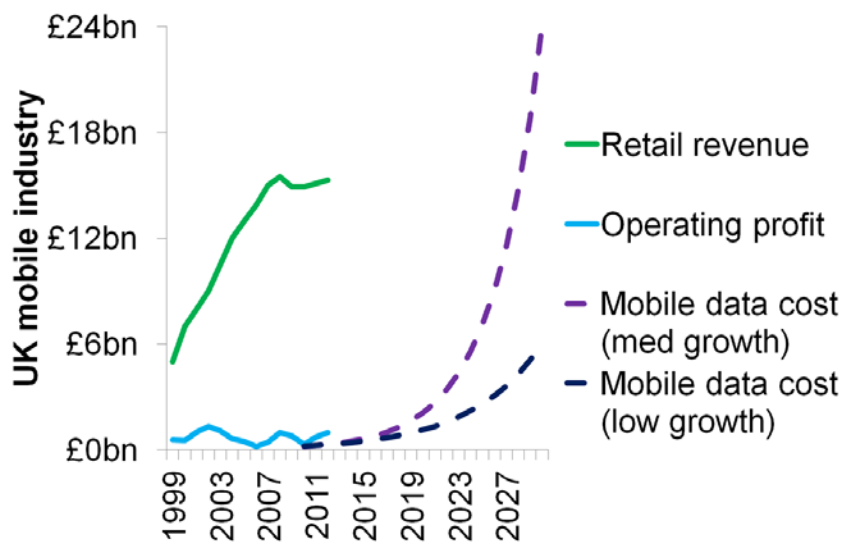
In any event, Figure 12 below shows that even the lowest data unit cost estimate implies an infeasible forecast level of industry cost for the industry.

Namely, multiplying the mobile data unit cost estimate of £1/GB by the industry mobile data forecasts in Figure 5 above shows that:

- the (Real Wireless) low growth forecast scenario, where mobile data demand grows by 20x from 2012 levels, to 500PB/month demand, implies a total industry cost of £6bn a year by 2030 (in current prices);
- the medium growth forecast scenario, where mobile data demand grows by 80x from 2012 levels, to 2,000 PB/month, implies a total industry cost of £24bn a year by 2030; and
- the high growth forecast scenario, where mobile data demand grows by 300x from 2012 levels, to 7,500 PB/month, implies a total industry cost of £90bn a year by 2030 (not shown in the figure).

²⁵ Ofcom Wholesale mobile voice call termination statement (2011).

Figure 12: Even lowest unit data cost estimate implies infeasible forecast industry cost.



Source: Ofcom Communications Market Report, operator financial reports, Ofcom/ Real Wireless.

These mobile data cost forecasts compare to current industry retail revenue of £15bn and industry operating profit of £1bn. Hence, even the lowest mobile data growth forecast combined with lowest unit data cost estimate implies a level of industry cost by 2030 of six times current industry profits. This situation is clearly infeasible without other dramatic industry changes, as otherwise the industry would soon become bankrupt.

Without large reductions in the cost of delivering mobile data, the only feasible scenarios are:

- rising user prices (to the extent that users are willing to pay higher prices); and
- worse user experience, as mobile networks become progressively more congested.

The section below highlights why reduction in mobile site rental costs would make the biggest difference in lowering the cost of delivering future mobile data demand.

5. Mobile sites are now the largest barrier to future investment: reform is needed.

Figure 13 shows that adding new mobile network sites is the most efficient way to meet user demand growth. Namely, Figure 13 shows that demand varies considerably across our network, from high demand sites, typically in dense urban areas, through to low demand sites, usually in the remote rural locations.

Figure 13 also shows that a proportionate increase in demand across our network (in Figure 13, an illustrative 50% demand increase across our network) only impacts the busiest locations in our network, whereas the remainder of our network remains uncongested, with plenty of spare capacity.

Figure 13: Adding sites is the most efficient way to meet demand growth.

[Confidential]

Source: Three.

The highly skewed distribution of demand on our network means that we are not always able to meet all demand from all consumers at all times. Namely, on the busiest sites at peak times, consumer experience may suffer, especially in terms of lower internet speeds.

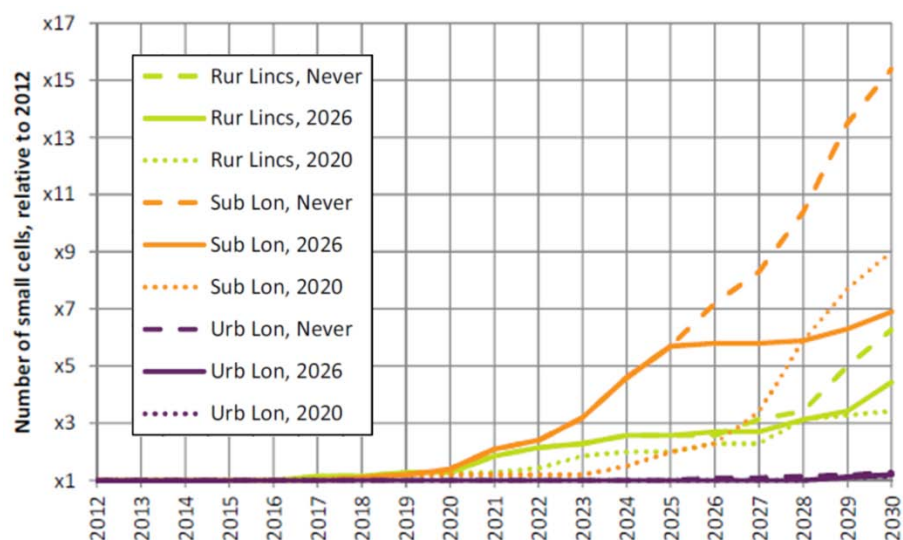
The mobile network industry therefore focuses additional network capacity on the busiest locations, rather than network wide. This explains why adding additional sites (or upgrading existing sites) tends to be the most efficient way to address mobile network capacity growth, rather than network-wide capacity additions, such as adding new spectrum. In contrast, spectrum tends to be more valuable for increasing mobile network coverage, rather than capacity.

Moreover, this explains why Ofcom forecasts the need for large number of additional mobile network sites to support predicted mobile data growth. In particular, Ofcom’s research highlights the need for large numbers of “small cell” sites.

A “small cell” means a mobile network site with typical coverage radius less than 200 metres. Small cells are the best way to increase localised mobile network capacity, i.e. dense urban locations, as they allow re-use of finite spectrum capacity many times with a small geographic area.

Figure 14, from Ofcom’s UHF Strategy consultation, shows that small cells are the best to meet localised mobile network demand²⁶. Namely, Ofcom’s research shows that up to 15x more small cells are needed in urban areas than current levels. This reflects the same underlying need to increase mobile network capacity dramatically in the busiest urban locations.

Figure 14: Small cells the best way to meet localised mobile network demand.



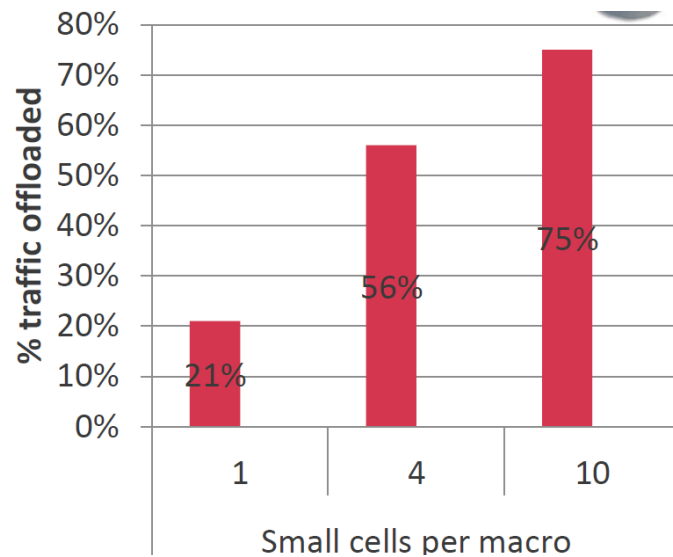
Source: Real Wireless for Ofcom UHF Strategy consultation (2012).

However, small cells are only viable with much lower costs than macro cells. Figure 15 below highlights that several small cells are needed to provide the same capacity as an equivalent macro cell. For example, 10

²⁶ Note that the legend on this chart (copied from Ofcom’s UHF Strategy consultation) is incorrect and should show highest demand for small cells in urban London (orange), followed by suburban London (green, then rural Lincolnshire (purple).

small cells could offload 75% of the mobile traffic from a macro cell in the same location. This means that small cells need to have much lower costs than corresponding macro cells to be economic.

Figure 15: Need much lower costs for small cells to be economic.



Source: Small Cell Forum (2013).

However, small cells are currently not proving economic for the mobile industry to deploy. There are currently various different technical and commercial models on offer for deploying small cells. There is nevertheless an expectation among prospective small cell site providers that small cells will be a highly lucrative source of revenue from mobile network operators. This expectation is set by rental levels across the overall UK mobile network site market.

The mobile network industry therefore faces a situation where it is widely recognised that large numbers new mobile network sites are needed to meet future demand, especially small cell sites, but the cost is prohibitive, as would greatly increase mobile operators' costs with limited potential revenue benefits. This dilemma is reflected in wide-ranging industry events on this topic²⁷.

²⁷ For example "Small Cell SIG: 'Aligning Small Cell Incentives'", Cambridge Wireless event, 19 September 2013.

Figure 16 below highlights that site rental dominates the cost of mobile network sites. Namely, site rental costs represent almost half of total mobile network site costs, including depreciation of capital expenditure.

Figure 16: Rental dominates the cost of mobile network sites.

[Confidential]

Source: Three/MBNL.

A change in the basis for setting mobile site rentals from the Law Commission's current recommended approach (namely, commercially negotiated site rentals) to an approach comparable to the energy industry (namely, compulsory purchase principles plus an additional profit uplift) would therefore have two large beneficial impacts for investment and thereby for consumers and the economy.

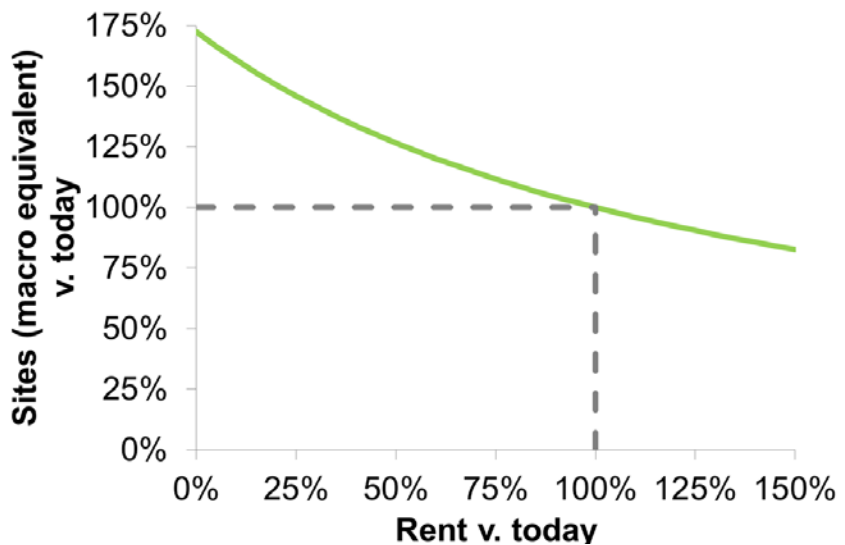
First, it would give investment certainty to mobile network operators in making new investment on new and existing mobile sites, thereby removing the strong disincentive to invest – highlighted in the expert economic opinion of Professors Myatt and Benoit – created by the current Electronic Communications Code and approach recommended by the Law Commission.

Second, it could greatly reduce the cost of rolling out new mobile sites and upgrading existing sites, thereby making new network investment now economic that would otherwise be prohibitive.

Figure 17 below illustrates how a change in the basis for setting mobile site rentals would enable mobile network growth. Namely, a reduction in average mobile site rentals relative to today, while keeping total rental income to UK mobile site owners the same, would allow a dramatic increase in mobile network investment.

In particular, Figure 17 shows how a change in the average level of rental per site relative to today's level would impact the total number of UK mobile sites (in macro-site equivalent terms) relative to today's mobile network size. Namely, further increases in average rentals will create increasing pressure to reduce total site numbers, whereas reductions in site rentals will lead to proportionate growth in mobile site network size.

Figure 17: Lower rentals will enable mobile network growth.



Source: Three.

While it is understandable that site owners oppose any reduction in current rental levels, site owners in aggregate can still enjoy a similar total level of mobile site income, while at the same time seeing a large growth in mobile network investment, benefiting consumers and businesses, local economies, and the wider UK economy. Namely, reduction in average rentals per site will translate directly into greater site numbers.

It is also important to recognise that the rental income mobile network site owners currently enjoy would be absent were it not for the social and

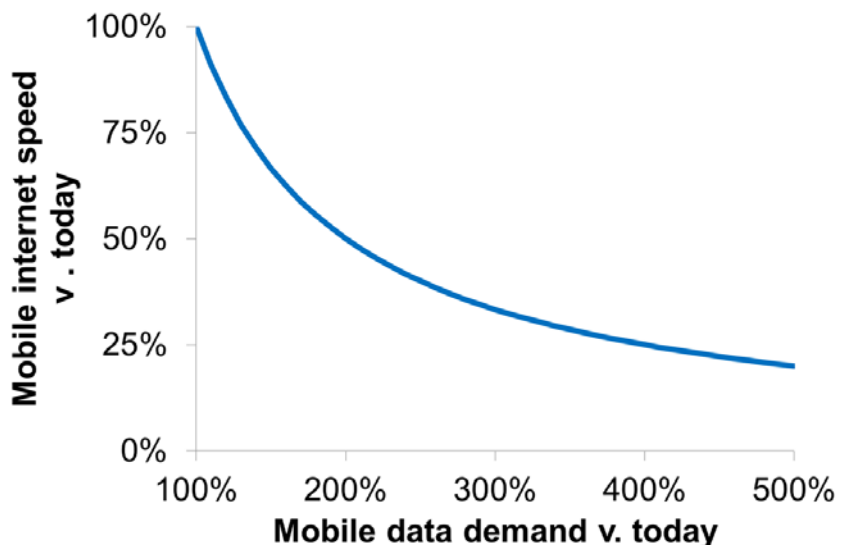
economic benefits that mobile communications services bring to the UK, especially as the majority of mobile network sites have low alternative use value²⁸.

In contrast, absence of satisfactory reform to regulation of the mobile network site market will bring potentially large adverse consequences to users of mobile communications services and the wider economy. In particular, it will bring a combination of falling mobile network reliability and speed, and rising prices for mobile communications services.

If consumers are unwilling to pay a large premium for predicted growth in mobile data use, then network quality and reliability will fall with rising mobile data demand, as it will rapidly become unsustainable for mobile operators to continue investing to support future demand growth.

Figure 18 illustrates how, without reform to the mobile site market, the UK will see slower, not faster, mobile internet as underlying demand for mobile data grows.

Figure 18: Without reform, the mobile internet will be slower, not faster, than today.



Source: Three.

²⁸ If mobile network sites had an equal alternative use value, then site owners would be much less resistant to reductions in rentals.

Namely, as current mobile networks are a finite resource, especially in urban locations, as demand grows, the fixed available capacity must be shared among an increasing number of users and increasing demand per user, resulting primarily in a reduction in average mobile internet speeds and associated reliability and access.

6. Conclusion: the Government should amend the Code in line with the energy sector.

The Government's Digital Platform for Growth strategy makes a commitment to making infrastructure deployment easier – in particular, in looking at ways the Government can support the significant private investment by operators. The Government specifically commits to amend the Electronic Communications Code to allow easier deployment of broadband infrastructure.

In response, Three considers the best way that the Government could support the significant private investment that mobile operators will need to make to meet future mobile data demand growth is to amend the Electronic Communications Code in line with the statutory regime present in other infrastructure sectors, primarily the energy sector.

First, this would recognise that mobile communications is now equally necessary and important as other national infrastructures for the functioning of the country and delivery of essential services upon which the UK depends.

Second, this would remove the large economic disincentive that currently exists for ongoing and future investment in mobile network infrastructure. This disincentive is well-established in economic analysis of the site rental market and readily apparent in the weak business case for new mobile network investment.

Third, this reform of the Electronic Communications Code would directly promote the large future investment in mobile network infrastructure that is needed to meet forecast mobile data demand growth – and the large future benefits to consumers, businesses and the wider economy of mobile communications services that this will bring.