EES/17/3

Place Scrutiny Committee
14 March 2017

Mobile Phone Coverage in Devon

Report of the Head of Economy, Enterprise and Skills

1. Summary

As outlined in our previous Scrutiny briefing, the Economy, Enterprise and Skills Service has commissioned consultants, Broadband Access Strategies LLP (BAS), to research and develop a business case exploring the range of potential options for using public subsidy to improve mobile phone coverage across the Heart of the South West LEP (HotSW LEP).

Early market engagement has taken place with mobile network operators (MNOs) and a business case has now been finalised and submitted for approval to the HotSW LEP.

The business case concludes that despite improved coverage plans by mobile operators, by the end of 2017, there will still be around 7,280 premises in the HotSW LEP area lying in 4G not spots, 5,200 of these in Devon. This includes an estimated 1,150 business premises. This means a potential loss to HotSW businesses of £2.45m per year. The business case for investing £2.5m in supporting coverage of these not spots has been submitted to the LEP for consideration.

This report summarises business case analysis and recommendations, outlines recent market developments and summarises next steps towards addressing these not-spots.

2. Background

The benefits of public investment rest around the estimated loss of income to businesses in rural areas from lack of coverage, as described in the previous scrutiny report, is estimated to be around £100-£200 per month in not-spots.

There are also key sectors, such as Tourism which could be impacted - Devon is the third largest county in England and caters for 34m visitor trips a year – and with 3G/4G now considered ubiquitous by visitors, lack of coverage could adversely impact an industry that forms 12% of the local economy with total visitor related spend estimated around £2.25bn per year in 2013.

The indication is that investment in 4G mobile could generate 0.5% uplift in GVA, which in Devon could equate to an uplift of £94m.

Mobile coverage across Devon can be split into two types of coverage – voice and data. Whilst voice coverage is relatively consistent and extensive in Devon across mobile network operators (MNOs); data coverage varies significantly and is far short of the coverage offered by mobile voice services. However, there still remain significant gaps - areas with no voice or data services are classed as mobile not-spots (see Appendix 1 for comparison of Devon and UK coverage).

As the table in Appendix 1 illustrates, Devon has historically suffered from poor service provision across all MNOs. There are two main differences between past rollouts and current planned 4G rollouts, which should increase 4G coverage beyond 3G levels across Devon on a commercial basis, as follows:

- Firstly, lower frequency spectrum used by current 4G technology has better propagation characteristics. In other words, a 4G equipped mast should generally have greater coverage than an equivalent 3G mast.

- Secondly, mobile coverage policy is far more stringent than in the past. For example, O2's 98% indoor coverage obligation for UK premises by the end of 2017 is far higher than previous 3G coverage obligation targets. This combined with Ofcom's broader obligation for 90% geographic voice coverage by the end of 2017 for all MNOs, has led to other operators pledging and delivering on similar coverage commitments. One provider (EE) has already increased their outdoor 4G coverage extensively across Devon over the last year, and is far ahead of most other MNOs.

The pending policy change to the Electronic Communications Code (ECC) which is managed by Ofcom, and stands to treat mobile infrastructure as a utility service with potential for relaxed planning and lower site rents going forward, may help with increasing coverage in rural areas where new masts are required, addressing some of the issues experienced with the former Government funded Mobile Infrastructure Project (MIP) explained in previous briefings.

The above factors are beginning to have positive impacts on 4G rollouts. Coverage having jumped from just 8% of the UK landmass in 2015, to 40% in 2016, with similar increases expected over the course of 2017. Indoor coverage remains significantly lower than outdoor coverage - 72% of UK premises able to currently receive a 4G signal indoors, compared to 86% outdoor premises coverage across the UK. In Devon, 2016 outdoor geographic coverage of 4G from all providers had increased to 23.2%, and outdoor coverage of premises by all providers has increased significantly to 45.5%.

The significant differences between outdoor and indoor 4G coverage are having an impact on small businesses and home workers which this project aims to address.

So the 4G marketplace is very dynamic with significant increases in coverage in progress. Having consulted with MNOs, we believe that planned commercial investment will result in similar 4G coverage to current 2G services by the end of 2017. Likewise 4G not-spots should also mirror those of current 2G not-spots.

Through analysis of current outdoor 2G coverage data for Devon and Somerset, BAS has concluded that there will still be significant numbers of 4G not-spots following planned commercial investment by the end of 2017. Specifically BAS concludes that around 7,280 business and residential premises will lie within 4G not-spots by the end of 2017 including 1,150 business premises– Devon having the largest share (71.4%) at 5,200 premises, or 1.4% of total Devon premises.

According to a report by DEFRA commissioned in 2014, UK rural businesses nationally suffer losses of approximately £150-£200 per month in mobile not spots. Based on this information, a rural business could be said to be losing around £2,100 per annum (£175/month x 12 months). Based on the 1,150 business premises BAS has identified as currently lying within not spots across the HotSW LEP, this amounts to a £2.45m loss to not spot businesses across the HotSW LEP over a 12 month period.

An accepted conservative estimate of job creation for businesses gaining superfast connectivity is 0.2 FTE for every business connected. If we assume mobile connectivity would generate a similar boost to employment, connecting 1,150 businesses to 4G services could generate an addition 230 FTE jobs. Taking the average GVA per FTE for the HotSW

area in 2014 of £42,184, the investment could generate an average additional GVA of £9.7m.

The Economy, Enterprise and Skills team are continuing to engage with MNOs about their forthcoming plans, in order to gain a more accurate picture of future 4G coverage areas and related not-spots. Unfortunately we cannot provide maps of not spots as the analysis is being carried out under Non-Disclosure Agreements with Mobile Network Operators. However Scrutiny Committee received a presentation on the mobile data analysis at the Masterclass session on 20th September 2016.

3. Options to address not-spots

Four options have been outlined in the business case as below. Appendix 2 contains photographs of the technologies being referred to.

Option 1 - Do Nothing

If no public investment takes place, the following is set to happen, given various coverage obligations and commitments from MNOs:

- All operators will deploy at all commercial and MIP macro sites, reducing the current estimated number of premises within not-spot areas in the HotSW LEP by between 500 and 700 premises (to approx. 6,500).
- Telefónica O2 has a coverage obligation to provide 98% indoor coverage of premises with a minimum of 2Mbps under its licence from Ofcom by the end of 2017.
- Other UK mobile operators have expressed similar commitments to O2's coverage obligation for the end of 2017, and following initial engagement with MNOs, it would seem providers are on track to deliver on these ambitions. Changes to the ECC would also aid all providers in increasing 4G coverage.
- The EE Emergency Services Network (ESN) rollout and the extended area services will increase MNOs shared coverage of major and minor roads, primarily using 4G technology.

However this option does not address the 7,280 premises estimated to remain in not-spots following this commercial investment.

Option 2 – Femtocell Investment

A femtocell is a very small mobile phone base station which plugs into a domestic three pin electric wall socket. The device only covers a range of about 20 meters and is intended for providing mobile reception within the rooms of a house (although some will cover a whole house).

This option can address issues with indoor coverage in not-spots where there is suitable broadband access.

The device uses a domestic broadband connection to gain access to the provider's mobile network, and can provide both voice and data functionality. A minimum broadband speed of 3Mbps is usually required for 3G comparable data transfers. For this reason, such solutions will only work in areas with reasonable, stable fixed line broadband. The delivery body will therefore need to work closely with Connecting Devon and Somerset (CDS) to determine which not-spot premises are suited to the technology.

Vodafone, Three and EE currently provide this solution, as does O2, but to business customers only. Femtocells may be the best solution for the most isolated premises which will be out of range of small cells or macro cells.

This option provides good quality indoor voice and reasonable data coverage to individuals in regions which likely to remain in mobile not spots for the foreseeable future. For example, it will allow a person working from home to receive a call in their office, from someone who chooses to phone their work mobile number, rather than their home landline. This will assist small businesses working from home.

Option 3 – Small Cell Investment

A 4G small cell solution would serve anywhere between 20 and 30 premises, constructed using a wooden pole with a height of approximately 15 feet. Small cells can also be installed on the side of buildings or church towers to provide coverage to communities, or parts of communities in not-spots.

In terms of total capital outlay and ongoing running costs, this is a comparatively inexpensive deployment option and would deliver 4G technology to small pockets of premises in a relatively unobtrusive way, with low power consumption and reduced running costs compared to macro cell type infrastructure.

The benefits of this option are that it is has a low visual impact, there are far less stringent planning constraints; and it is relatively quick to install with low power consumption and site rents. The technology is also well suited to the density of premises projected to lie in the vast majority of HotSW LEP not-spots, so is the main element of the proposed solution.

Option 4 – Macro Cell Investment

The final option is to build a traditional 4G macro cell, installed on a single mast ranging between 15 and 30 meters in height and able to provide coverage to between 50 and 150 premises.

In terms of total capital outlay and on-going running costs, this is the most expensive solution. However, in terms of construction costs, the per-premises figure could be broadly similar to that of a small cell.

The main challenges will be higher running costs, increased planning and power constraints, in addition to potential issues with residents objecting to the installation of a large mast. However, such masts can be single pole installations, rather than large lattice masts. In addition, there are similar solutions currently being rolled out on a large scale across Exmoor and Dartmoor, as part of the CDS contract with Airband Wholesale Internet, meaning there may be the potential to share infrastructure.

The main benefit of this solution is that it has a far greater geographic coverage footprint (up-to 10km, compared to 0.2-1km offered by small cells).

4. Key business case recommendation

Based on this options analysis, the business case recommends the adoption of a range of options, rather than focus on a sole technology solution. This provides a flexible approach for the following reasons:

- Investment in femtocell technology is to be targeted purely at the most isolated of premises with suitable broadband provision to provide indoor coverage. Whilst many premises may not have access to suitable broadband to support a femtocell, many will, especially as we move into Phase 2 of the CDS programme, and we believe femtocells offer an ideal solution for such premises.
- Small cell pilots are to be targeted at not-spots consisting of 20 to 30 premises. Most predicted 4G not-spots will only consist of groups of between 20-30 premises, with very few not-spots containing groups of premises in excess of 30 premises.
- Based on not-spot analysis there will be very few not-spot areas containing 40+ premises. Macro cell technology is ideally suited to covering areas with 50 or more

premises. Based on this analysis, we have concluded that 3 macro sites is a sensible number to pilot.

5. Next steps

Subject to business case approval, procurement for suppliers to pilot three different technologies is proposed to start in June 2017, concluding in October 2017. The procurement will be split into two lots – a femtocell and small cell proposal for Lot 1, and a macro cell proposal for Lot 2. By splitting the procurement into two different lots a higher level of interest is expected from the market, with suppliers focussing on their areas of expertise.

Lot 1 will focus on running two schemes in parallel – the first will be an ongoing voucher based scheme, allowing any resident within an eligible area access to a voucher to cover the cost of a femtocell for their property. It is envisaged that this scheme will support around 360 femtocell pilots, and will be run in a similar fashion to the CDS broadband voucher scheme.

The second scheme will initially involve construction of 20 4G small cell pilots across the HotSW LEP. These pilots will explore the range of options available, in terms of mounting and power sources, as well as the various community ownership models which might be required, if such investments are to remain sustainable in the long run. They will also attempt to address any perceived issues with regards to infrastructure sharing on behalf of MNOs, and flag any issues, such as planning or infrastructure capacity issues.

Following these pilots it is envisaged that a larger investment in small cells infrastructure will take place, using the valuable information gained.

Lot 2 will focus purely on delivery of three macro sites across the HotSW LEP for the small number of not-spot areas across the LEP, which have a high enough density of premises to support a macro type cell.

Both lots will include an element of demand stimulation and marketing activity, to ensure residents are aware of the new infrastructure and understand the benefits of the technology. This will be funded with a small allocation from the Economy, Enterprise and Skills budget in Devon and there would be a similar budget from Somerset County Council towards engagement in Somerset, however this is yet to be agreed. It is envisaged that such engagement will start with Parish Councils and appropriate community groups. A dedicated webpage will be setup (potentially on the CDS website), providing information on the programme, and potential for residents within known not-spots to register their interest in the scheme. There may also be significant potential for combining forces with the larger CDS demand stimulation programme, for areas which are set to be beneficiaries of both programmes, and linkages between the two projects are being explored.

We are currently working with all MNOs to determine the areas throughout the HotSW LEP are likely to remain 4G not spots, following planned commercial investment. Pilot areas will decided based on the outcomes of these discussions and the suitability of areas to the proposed technology solutions.

6. Financial Considerations

The HotSW LEP has allocated £2.5 million of capital funding (minus 2%) from their Growth Deal funding package intended to explore suitable approaches for expanding mobile 4G coverage across the region. Subject to approval of the business case submitted, this represents £676,200 for three pilot studies delivering 364 femtocells, 20 small cells and 3

macro cells. The remaining £1,823,800 capital is intended to be invested in further small cell infrastructure, using the knowledge gained from the small cell pilots.

In addition, the County Council with Somerset County Council submitted a business case to the LEP for additional capital funding to support both mobile coverage and superfast broadband coverage under the Growth Deal 3 funding opportunity. This has been successful and whilst the amount of funding is still to be confirmed by the LEP it is anticipated that this will be close to the bid of £10m. The split between broadband and mobile also still needs to be agreed by partners, but this additional investment would support an extension of the mobile coverage pilots to support further communities across the Heart of the South West.

7. Legal Considerations

There are no state aid issues regarding Option 2 (the femtocell solution) as the subsidy is small (£50 approx.) and received directly by individuals. However, where option 3 (small cells) is concerned, there may be issues with the state aid de minimis threshold being breached if ownership models involve special purpose vehicles or similar models. When it comes to community models it is expected that state aid levels will not be an issue. This area will need further investigation by legal advisors during procurement development.

Option 4, the macro cell solution, will likely breach the de-minimis threshold, and as such will have a State Aid component, which will need to be reviewed as part of the procurement process development. This may be further impacted by challenges in getting MNOs to share infrastructure, as potentially required under State Aid regulations.

It will also be beneficial to investigate thoroughly the pending changes to the Electronic Communication Code (ECC), and the associated legal context behind the proposed changes. The revised ECC is set to have large scale changes to planning and caps on site rental amounts. As such the delivery body will require a firm understanding of the legal boundaries of the changes, to avoid a repeat of the Mobile Infrastructure Project (MIP) delivery issues.

8. Risk Management Considerations

There are 3 main risks to this pilot study:

1. It becomes very difficult to implement a technical solution in the smallest of not-spots (less than 20 premises). Its success will depend on the buy-in of the local community. Lessons learned from other UK projects will be used to help mitigate this risk.

2. Technology moves on before the pilot has been implemented. This risk is mitigated by our pre-procurement consultation with the industry, knowing what the challenges are at the start, and maintaining a risk log and actions to address them if they develop. Lessons learned from each pilot need to be transferred to the following pilot not-spots where similar circumstances exist. One such technology advance is potentially 5G. However, initial discussions with providers would suggest that commercial rollouts of 5G are not expected for at least a few years – the priority right now being to extend 4G networks and build capacity, reducing contention constraints and boosting 4G speeds. It is worth recognising that current 4G average speeds are comparatively low compared to the potential of 4G as a technology. With the above in mind, it would seem providers are viewing 5G more as a way of increasing network capacity in urban areas, and ensuring consistency of speeds and the ability to increase monthly data allowances. It does not necessarily follow therefore, that even

with the public subsidy outlined within the Autumn Statement, that 5G investments will be rural in focus, certainly in the short to medium term.

3. The market fails to bid for the macro cell pilots, or that the macro cells pilots fail to deliver due to similar issues experienced by the MIP. These risks are mitigated by extensive research into the reasons for underperformance of the MIP rollout, as well as forthcoming changes to the ECC. Splitting the procurement into 2 separate lots will also help develop a more flexible approach to the rollout, as well as stand to maximise interest from bidders in the scheme. If no bidders respond for the macro cell pilots, this can be accommodated using small cell infrastructure where appropriate.

4. Gaining planning permission may be a formidable hurdle for macro cell sites. However, proposed changes to the ECC may be in place in time to mitigate these risks. By focusing on small cell infrastructure, and only focusing on 3 macro cell sites, we should significantly reduce this risk, providing ample time for delivery of 3 macro sites. Small cells are far less obtrusive and can be installed on the side of buildings or existing telegraph poles.

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Local Government Act 1972: List of Background Papers

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Background Paper	Date	File Reference
1. Place Scrutiny Committee Report	14 June 2016	http://democracy.devon.gov.uk/documents/g277/Public%20reports%20pack%2014th-Jun-2016%2014.00%20Place%20Scrutiny%20Committee.pdf?T=10

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Appendix 1
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Definitions

- **1G networks** are among the first analogue cellular systems, starting in the 1980s.They were designed for voice calls with limited data coverage.
- **2G networks** were the first digital cellular systems and offered voice and data, with theoretical data rates up to 144 kbps.
- **3G networks** offer improved data - The UN's International Telecommunications Union IMT-2000 standard requires stationary speeds of 2Mbps and mobile speeds of 384kbps for a "true" 3G.
- **4G technology** refers to the fourth generation of mobile phone communication standards. No commercial networks meet the ambitious downlink speeds of 1Gbps when stationary and 100Mbps when mobile. However they are very different to 3G and the term 4G is used.
- A "**not-spot**" area is an area where there is no effective coverage by any of the mobile operators, usually because it is uneconomic to do so.

Mobile Coverage in Devon

The table below shows Devon has made significant progress increasing 4G coverage across all providers since 2015. However, Devon is still far behind the UK average in 2016 across all mobile technologies, and a lot of the coverage is concentrated in urban areas.

4G, 3G & 2G coverage	Devon (2012 figures)	Local authority average across UK (2012)	Devon (2015 figures)	Devon (2016 figures)	Local authority average across UK (2016)
4G	-	-			
Outdoor premises coverage: all operators	-	-	2.6%	45.47%	80.21%
Outdoor geographic coverage: all operators	-	-	0.25%	29.75%	70.20%
3G					
Outdoor premises coverage: all operators	46%	67.9%	57.27%	67.34%	88.23%
Outdoor geographic coverage: all operators	12%	49.3%	26.48%	47.15%	77.17%
2G					
Outdoor premises coverage: all operators	82%	90.8%	80.29%	81.27%	91.32%
Outdoor geographic coverage: all operators	60%	78.6%	55.06%	55.86%	78.48%

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Figure 1: Two types of femtocell.

Figure 2: Example of a small cell installation.

Figure 3: Example of a macro cell installation (this mast is 15 meters – masts can be as high as 30 meters).