



7. Broadband and Mobile Technology

Overview

7.1 The speed of technological advances can at times seem daunting which makes consideration of infrastructure planning extremely challenging. This chapter tends to focus upon big messages and directions – particularly around broadband / fibre, and mobile telecommunications.

A Snapshot of Change

- 7.2 Each year Deloitte Global produce a set of global technology predictions, which for 2018 focused upon¹:
- a. Augmented Reality (AR) - the continued expansion of augmented reality linked to apps development and mobile phone technology particularly focused around photorealistic AR and camera features;
 - b. smartphones – the full potential of smartphones has yet to be fully realised with multiple functionality and artificial intelligence features – smartphones connectivity is also about to undergo a further step change in evolution with the upcoming deployment of 5G services;
 - c. better understanding of the negative impacts of technology – particularly smartphone on the behaviour and activity of users;
 - d. machine learning and artificial intelligence – chips are at the heart of much technology - allowing for the use of less power at less cost and faster speeds of data processing with integrated learning;
 - e. live broadcasting continues to thrive in an online world – video now accounts for 75% of internet traffic;

¹ <http://www.deloitte.co.uk/tmtpredictions/>

- f. media subscriptions – further growth predicted in number of average number of online subscriptions per individual and household;
 - g. advertising – reaching customers within a growing culture of ad blocking – particularly within the context of social media;
 - h. television – continued decline in traditional viewing for 18-24 year olds but the proportion of same age group viewing live and time-shifted television not moving significantly over time;
 - i. supplying services to mobile only customers without access to wired home internet and using restricted broadband speeds if available, and
 - j. in flight connectivity for airlines alongside train / rail based connectivity trends for both surface and underground.
- 7.3 It is obvious from the above snapshot, that technology plays a multi-layered role in how we live, work and play, with access to technology differentiated by age, culture, location and social standing. Getting the right technological infrastructure in place at the right time is fundamental to well-planned and successful communities.

National Planning Policy Framework

- 7.4 The NPPF is explicit in the support for high quality communications, stating that:

‘Advanced, high quality and reliable communications infrastructure is essential for economic growth and social well-being. Planning policies and decisions should support the expansion of electronic communications networks, including next generation mobile technology (such as 5G) and full fibre broadband connections. Policies should set out how high quality digital infrastructure, providing access to services from a range of providers, is expected to be delivered and upgraded over time; and should prioritise full fibre connections to existing and new developments (as these connections will, in almost all cases, provide the optimum solution)’. (para 112).

- 7.5 Para 20 b) of the NPPF also indicates that strategic policies should make sufficient provision for telecommunications.
- 7.6 Published in March 2017, the UK Digital Strategy², builds upon the Government’s Digital Communications Strategy (DCIS 2015)³ and National Broadband Strategy (2010), as well as the post-Brexit Britain Industrial Strategy (Green Paper) to set out a forward plan for the UK’s digital economy.

² Department for Culture, Media & Sport – Policy Paper – UK Digital Strategy 2017 (Published 1st March 2017) - <https://www.gov.uk/government/publications/uk-digital-strategy>

³ The Government’s ‘Digital Communications Infrastructure Strategy’ (DCIS) builds upon the goal for the UK to have the best superfast broadband network in Europe³ with a challenging focus upon making available ultrafast broadband of at least 100Mbps to nearly all UK premises. It is estimated that improvements in digital connectivity have supported a strong digital economy within the UK, currently worth more than £120 billion each year. The digital sector³ has grown over seven times faster than the economy as a whole between 2008 and 2013. [In 2013, the digital sector contributed 7.5% (£113 billion)].

- 7.7 The UK Digital Strategy sets out seven key themes for a post-Brexit digital economy in the UK, which are summarised below:
- a. Building world-class digital infrastructure for the UK – continue to complete the roll-out of 4G and superfast broadband by 2020, but also implement a Universal Service Obligation, giving every individual, business and public premise across the country the right to request an affordable high-speed broadband connection. Also invest over £1 billion to accelerate the development and uptake of next generation digital infrastructure - including full fibre and 5G.
 - b. Giving everyone access to the digital skills they need – ensure all adults in England have access to the basic digital skills training and establish a new Digital Skills Partnership to tackle the digital skills gap and coordinate activity on job promotion. The strategy also focuses upon delivering coding in the National Curriculum, and other areas of skills development.
 - c. Making the UK the best place to start and grow a digital business – creating the right conditions for growth, to encourage innovation-friendly regulation that creates a positive context for the adoption of new technologies and an investment of an additional £4.7 billion by 2020-21 in R&D funding. Priority challenges include helping the UK capitalise on its strengths in science and innovation such as robotics, clean energy and biotechnology.
 - d. Helping every British business become a digital business – ensure businesses have the knowledge and means to access technology, working on existing initiatives, and plug gaps where there are specific challenges. Funding of £13m to be set aside for the development of a private sector led Productivity Council to drive engagement to improve productivity across the economy, including through appropriate use of digital technologies.
 - e. Making the UK the safest place in the world to live and work online – continue to support the National Cyber Security Centre to provide a single point of contact for companies for cyber threats and attacks and introduce a new approach of Active Cyber Defence, using the skills, knowledge and technical expertise of GCHQ working with the country's ISPs (internet service providers) to provide a new level of protection for British cyberspace. Focus also upon national after-school programmes, apprenticeships and adult retraining cyber security and improve security / safety for children using online content.
 - f. Maintaining the UK government as a world leader in serving its citizens online – working towards 25 million GOV.UK Verify users by 2020 and adopting new services onto the government's GOV.UK Pay and GOV.UK Notify platforms and continue work, across government and the public sector, to harness the potential of digital to radically improve the efficiency of our public services - enabling us to provide a better service to citizens and service users at a lower cost.
 - g. Unlocking the power of data in the UK economy and improving public confidence in its use – continue to ensure that UK businesses can compete and communicate effectively around the world and implement the General Data Protection Regulation by May 2018.

Planning for Growth

7.8 Although seen by some as a new thing, research on fibre optic infrastructure has indicated that fibre has been in common usage with carriers and service providers since as long ago as the 1980s. Within such organisations fibre communication speeds in the 1 Terabit per second range have been achieved and lower speeds in the 10s and 100s of Gigabits per second are commonplace, as are fibre distances in the 10s, 100s and even 1000s of miles. Fibre as a public resource is however less well understood as it is only recently appeared as an end user service in the form of Full Fibre Broadband and so called 'dark fibre', where end users connect directly using their own equipment. Particular sectors with high demands for broadband and fibre include:

- corporates - frequently require symmetrical (same speed upload and download) and uncontended (dedicated not shared with other users) and much higher speed connections 'Pipes' due either to high demand processing or due to many users within an office. Enhanced security is also increasingly very important in some sectors;
- carriers & ISPs - 4/5G Mobile Cell Tower/ Pico/FemtoCell backhaul and Public Wifi Backhaul connections;
- financial traders – algorithmic Platforms need very low latency (delay on server response times) and many banks need encryption due to regulatory and corporate requirements;
- media production facilities – using extremely large data files, unusual protocols, with high reliability and ultra-high speeds;
- next generation medical drug treatments tailored to the individual, requiring industrial scale genetic sequencing in order to address large populations and
- data centres – where specialist protocols, ultra-high capacities and low latency connections are a common requirement.⁴

Existing Infrastructure, Gaps and Programmes

Broadband

7.9 Superfast Essex (SFE) is the county's broadband improvement programme co-ordinated by Essex County Council, and part of the Government's national Superfast Britain programme. Across Essex, the programme is enabling as many homes and businesses as possible to

⁴ Information from Stephen Pegrum 'Technology Change, Growth & Planning' presentation for Brentwood Borough Council

access superfast broadband to enable economic growth and improve residents' quality of life.

- 7.10 Figure 7.1 below shows the current position in Brentwood: of the 34,853 premises in the Borough, 31,585 or 90.7% have a Superfast broadband service. A further 1,364 premises are planned to be upgraded using public funds. 1,904 do not have superfast and are not currently in plans to receive a publicly funded upgraded. Any new development over 30 premises can get a Gigabit capable/full fibre from Openreach, if the builder registers with their new sites team.

Figure 7.1: Existing and Planned Broadband Service in Brentwood

Broadband Service	Superfast		Gigabit		Total	
	Premis	%	Premis	%	Premis	%
Superfast: SFE Available	7,228	20,74%	342	0.98%	7,570	21.72 %
Superfast: Commercial Operator Available/Planned	24,001	68.86%	14	0.04 %	24,015	68.90 %
Superfast: SFE Planned	988	2.83%	376	1.08%	1,364	3.91%
Superfast: Not Available	1,904	5.46%	0	0.00%	1,904	5.46%
	34,121		732		34,853	

- 7.11 Figure 7.2 below provides a snapshot of broadband coverage across the Brentwood Borough as at Autumn 2016, with at the time funding / improvement options. It provides an overview of Broadband at a particular point in time. Further individual property information is available through an interactive mapping system⁵. The map indicates potential deficits in broadband coverage towards the north and south of the Borough.

- 7.12 It should also be strongly emphasised that while so called Fibre Broadband is available in the Borough via BT Openreach, in reality this is Fibre to the Cabinet (FTTC) broadband where the fibre is connected to the Green Cabinets seen at many street corners, with the rest of the connection to homes and businesses being made on the old fashioned Copper wires originally intended for traditional phone lines. Fibre to the Premises (FTTP) services offer dramatically higher speeds than FTTC, currently well into the Gigabit per Second range. BT and its affiliates do not offer FTTP services in the Borough and none are known to be planned at this time. Specialist FTTP providers such as Gigaclear also do not operate in the area due to the prevalence of FTTC services that even so tend only to address urban areas.

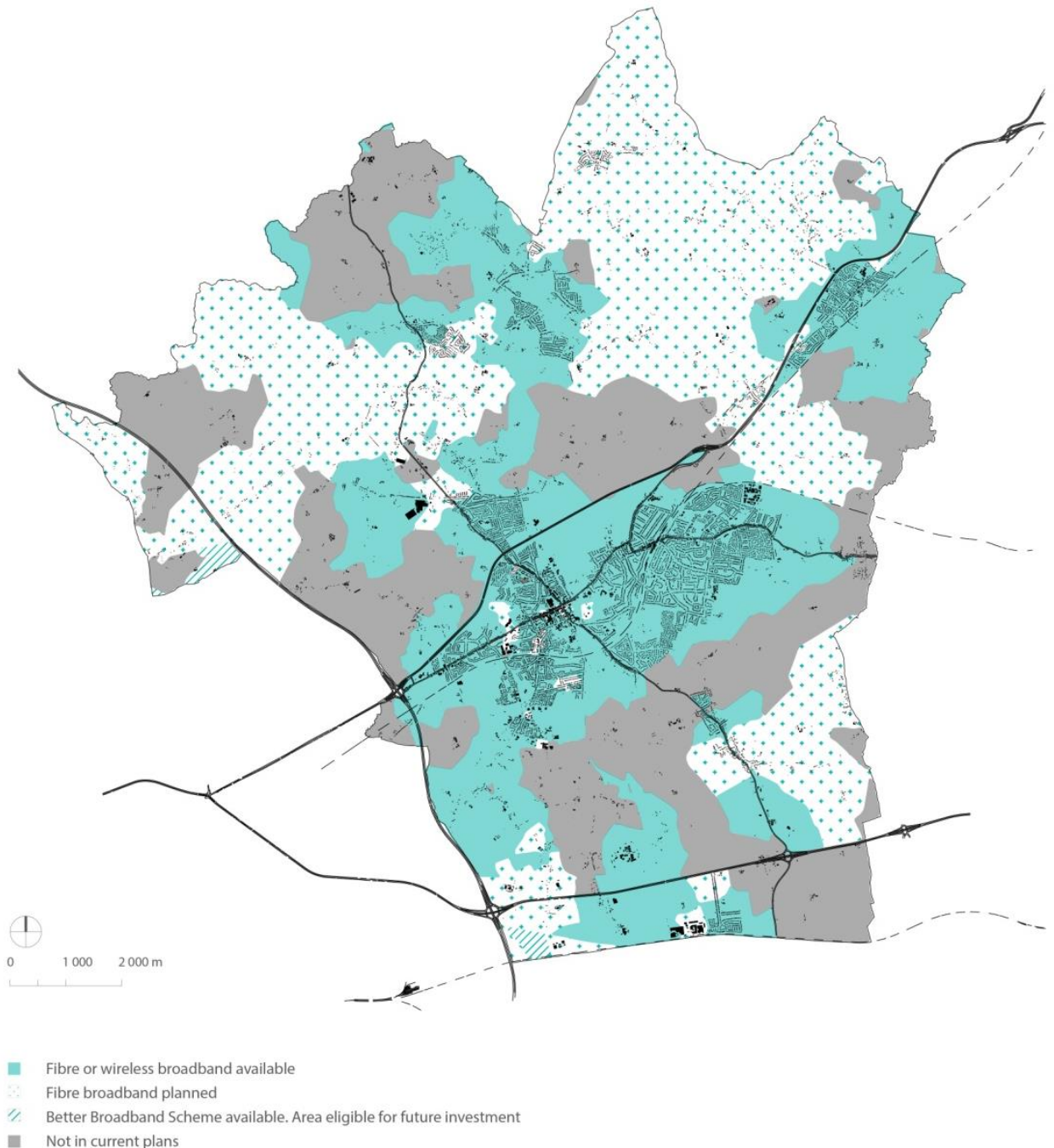
- 7.13 Figure 7.3 provides information on fibre optic cabling (excluding BT and Virgin Media) in relation to the Brentwood area. It shows cabling running through Borough from north to south and a loop of cabling towards the south of the Borough.⁶ However this fibre tends not

⁵ <http://essex.astuntechnology.com/atuperfastsolophase2.html>

⁶ Information from Stephen Pegrum 'Technology Change, Growth & Planning' presentation for Brentwood Borough Council

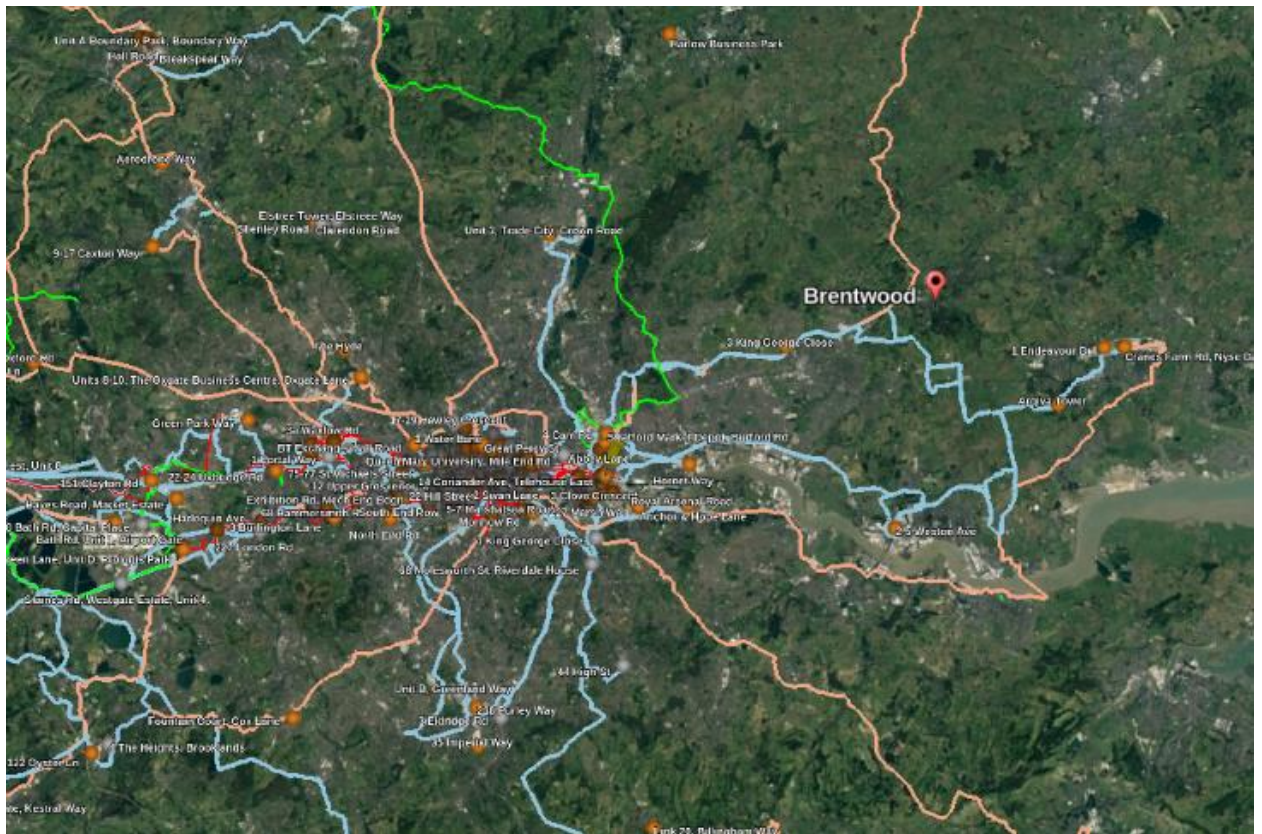
to be available directly to end users because it belongs to various network operators who sell it to particular customers. For end users and SMEs therefore this indicates both a problem and an opportunity should things change in the way fibre based services are sold. It is also notable that locations as close as Southend are now deploying FTTP services through an arrangement with the council.

Figure 7.2: Broadband Coverage



Source: Reproduced from www.superfastessex.org/maps as of November 2016

Figure 7.3: Fibre Optic Cabling (excluding BT and Virgin Media)



7.14 Although not detailed on any plans it is understood that there is dark fibre⁷ or at least duct space into which fibre could easily be deployed within Brentwood, linked to the Council’s CCTV infrastructure. There may also be other infrastructure across the Borough such as buildings (for antennas and ducts) and public land across which the borough could if it chose, facilitate the use of for such deployments, as has been done in nearby towns such as Southend as well as Physical Infrastructure Access service from Openreach.

Fibre Projects

7.15 Cross local authority work has been progressing to look at strategy and funding options for enhancing fibre optic cable infrastructure connecting potential high-volume users, including employment sites. There are particular implications for this project linked to the A127 corridor sites.

Mobile Communications

7.16 Mobile phone network provision is an important component of a modern economy and has a vital social function. With development in smart phone technology and mobile internet services, mobile phones are increasing important for e-commerce and access to services such as on-line banking. Figures released by IMRG and Capgemini indicate that mobiles

⁷ Dark fibre - unused optical fibre potentially available for use in fibre-optic communication – often laid alongside other cabling as part of infrastructure / communications works.

and tablets now account for more than half of all online sales in the UK.⁸ As indicated at the beginning of the chapter, the full potential of smart phones has yet to be fully realised with increasing functions and features.

7.17 Figure 7.4 below outlines the range of IT, mobile and media activities by device, showing the strong and increasing performance and increasing dominance of smartphones.⁹

Figure 7.4: Activities by Device

	Total	Male	Female	18-24	25-34	35-44	45-54	55-64	65+
Browse shopping websites									
Make online purchases									
Online search									
Watch short videos									
Check bank balances									
Video calls									
Check social networks									
Read the news									
Play games									
Voice calls using the Internet (VoIP)									
Take photos									
Record videos									
Stream films and/or TV series									
Watch TV programs via catch-up services									
Watch live TV									

7.18 The infrastructure required for mobile communication includes plant and equipment, including communication masts. If accessing mobile coverage, mobile phones, dongles and tablet computers cannot work without a network of base stations (masts). If the base stations are too far apart, the service can be interrupted. Base stations are usually built about 200 to 500m apart in towns and 2 to 5km apart in rural areas. Base stations can only support a maximum of 120 calls at any one time.

7.19 The Mobile Operators Association Annual Rollout Plan has historically provided up to date information on the mobile signal / broadband infrastructure and was last issued for the Brentwood Borough in 2015/16. The Association is no longer operational.

7.20 Information has been taken from the MOAARP and the Open Signal¹⁰ mobile data to provide an indication of mobile network signal strength across the Brentwood Borough. Figure 7.5

⁸ During the period of November 2015 to January 2016, 51 per cent of UK online retail sales happened via mobile, a significant increase on the 45 per cent share recorded during Q3 2015. Desktop and laptop accounted for 49 per cent of ecommerce sales, 33 per cent of sales came via tablets and 18 per cent via smartphones. Source – E-commerce News and www.thedrum.com.

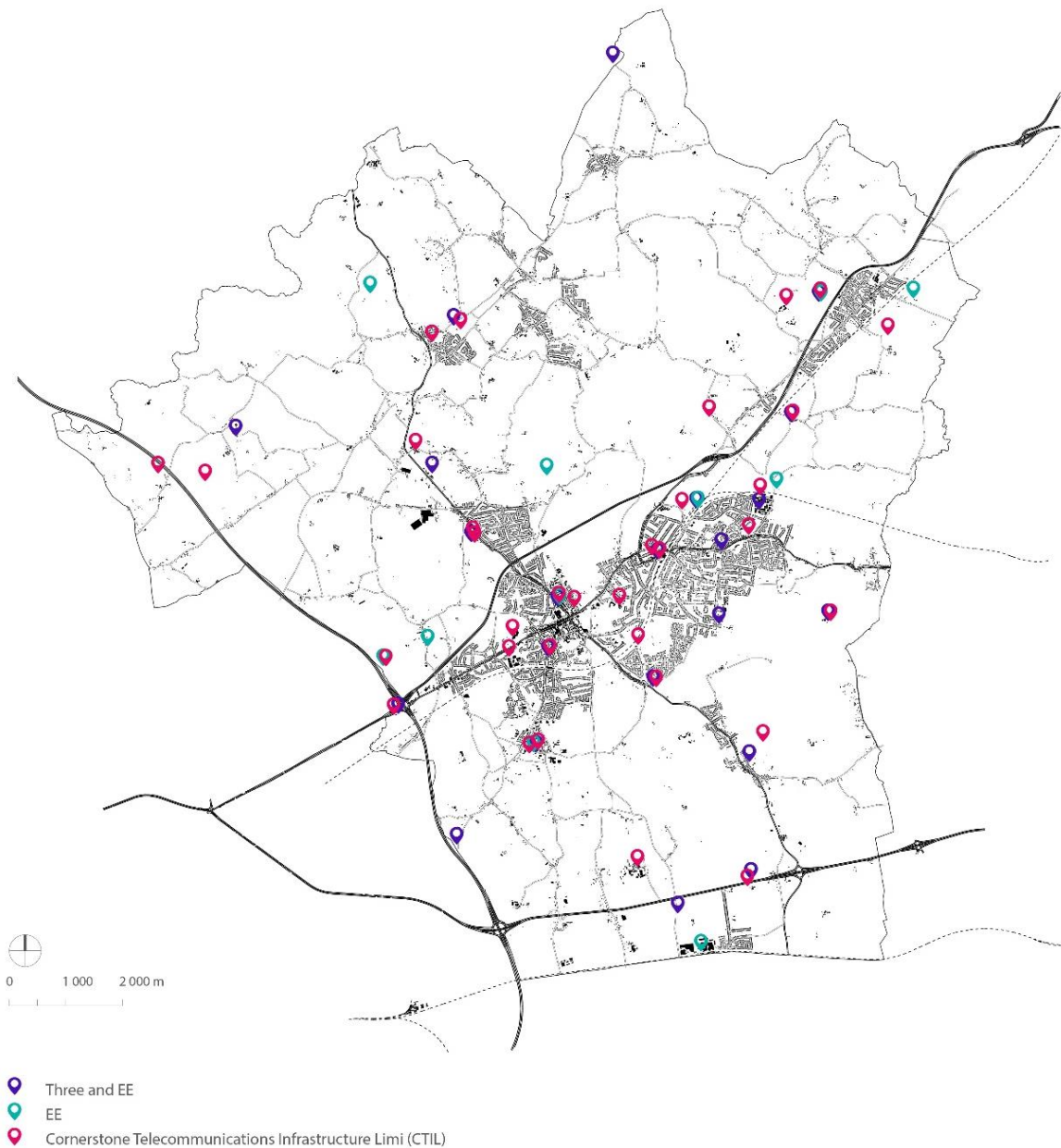
⁹ Information reproduced from Deloitte Global 2018 TMT Predictions Report.

¹⁰ <https://opensignal.com/> - OpenSignal is a company that specializes in wireless coverage mapping. The company crowdsources data on carrier signal quality from users who have its consumer mobile application installed

provides information on mobile masts while Figure 7.6 indicates signal strength using Open Signal mobile data. Weaker mobile coverage is concentrated within the Borough's rural or green field areas. This feature is particularly noticeable to the north of the Borough.

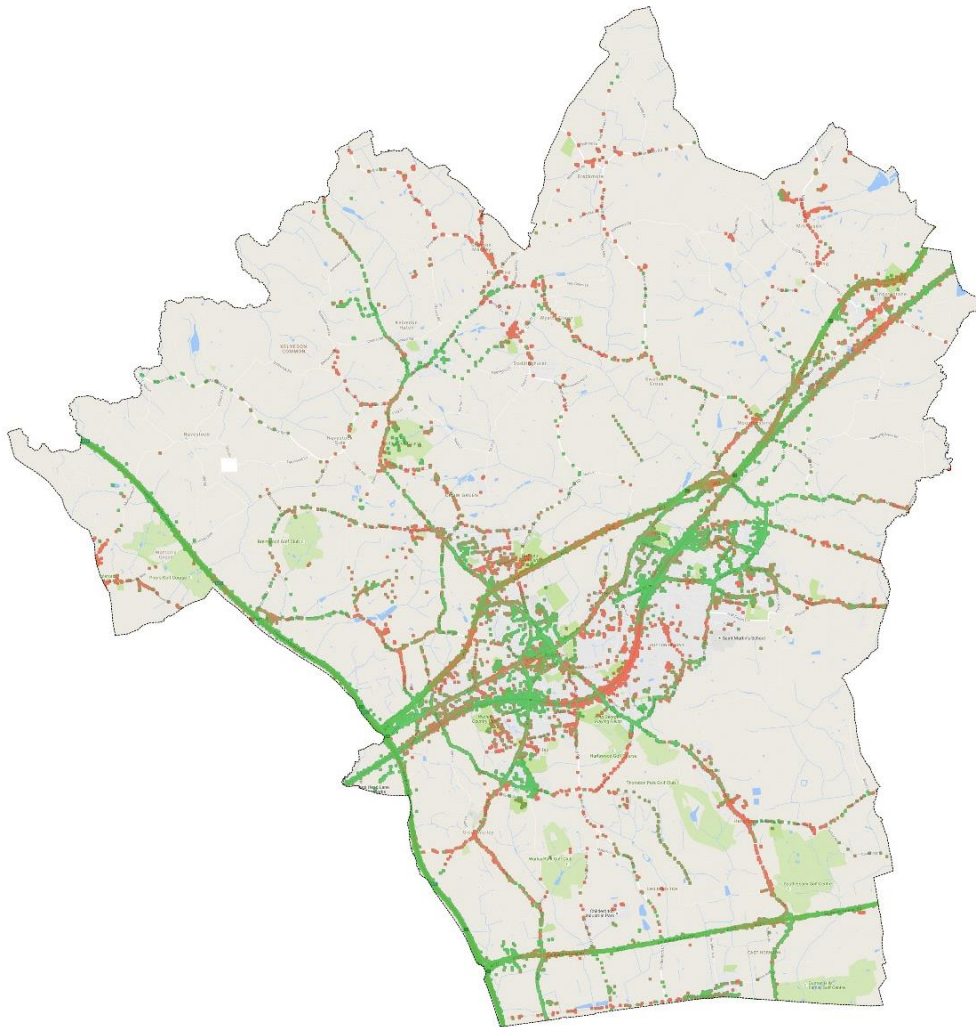
7.21 It should be noted that there is likely to be a dramatic increase in the need for mobile radio masts across all regions with the deployment of 5G networks that are necessary to support the smaller cell sizes required to support higher data rates. In turn this will also drive an increase in the need for fibre based backhaul connections between such cell sites and their central nodes.

Figure 7.5: Mobile Masts

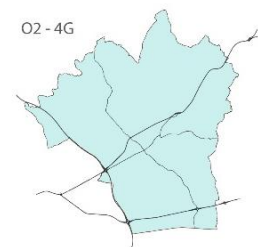
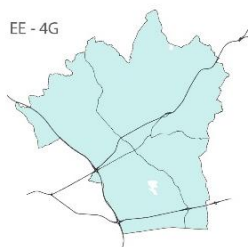
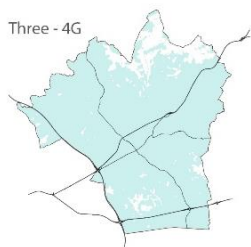


A copy of the last version of the Mobile Operators Association Annual Rollout Plan (MOARP) 2015/16 for the Brentwood Borough is included with the IDP as Appendix x. This Appendix also includes 5 additional Vodafone sites built within 2016. Information has been taken from the MOARP and the Open Signal [1] mobile data to provide an indication of mobile network signal strength across Brentwood Borough.

Figure 7.6: Mobile Coverage



- Weak signal
 - Strong signal
 - No data collected
- Source: <https://opensignal.com/>



- Areas likely to have sufficient signal to use 4G data services reliably
 - Areas unlikely to have sufficient signal to use 4G data services reliably
- Source: www.ofcom.org.uk

Other Telephone Infrastructure

7.22 No specific information was available at the time of publication, regarding the range of locations of BT public phone boxes across Brentwood. In line with BT's strategy in other parts of the UK, the company indicated in 2016 that it would like to disconnect a significant quantity of telephone boxes across Essex County - around 300 in total.¹¹ BT has indicated that it has seen a 90% decline in pay phone usage over the last decade. However, Ofcom has indicated that phone boxes can provide a useful service for people who don't have any kind of phone or for people who find that their mobile phone isn't working.¹² BT now offers an 'Adopt a Kiosk' programme for local communities to take ownership of local phone boxes for a variety of uses and as part of the valued local heritage.

Implications and Opportunities of Growth

7.23 There are clear opportunities available to improve current broadband and mobile technology across the Borough – particularly in poorer served areas to the north and south of Brentwood. In line with NPPF priority needs to be placed in the Local Plan to supporting where possible full fibre connections to existing and new developments. There are also opportunities with fibre optics in particular as part of a sector driven approach to economic growth and opportunities along the A127 corridor and within Brentwood town.

7.24 The provision of new and enhanced broadband and mobile coverage is also a clear business opportunity. There is strong market demand amongst residents and prospective new residents for effective broadband and mobile technology to not only provide 'the basics' of reliable mobile phone coverage and fast broadband connections but also increasing smart house technology for assisting in the running of properties. Estate agents also report that an increasing number of buyers are willing to pull out of a deal if broadband is not available in that area. The property search website rightmove.co.uk has added a broadband speed checker to every one of its listings, alongside details of transport links and schools. Given the market demand for broadband, and the fact that costs per unit for larger sites are usually cost neutral (except for fibre to the door / curb infrastructure), it makes good business sense to ensure that new developments include high speed broadband infrastructure as a matter of course.

7.25 If broadband installation is integrated into the planning of developments as early as possible, it may be possible to mitigate costs of installation through electricity and broadband cables

¹¹ <http://www.itv.com/news/anglia/2016-10-26/people-see-red-over-plans-to-remove-1-000-public-phone-boxes/>

¹² https://www.ofcom.org.uk/__data/assets/pdf_file/0035/47879/removing_callboxes.pdf

sharing the same infrastructure assets, routes or networks. Potential savings of 16-26% could be achieved where existing infrastructure is used to rollout broadband.¹³

- 7.26 It is recommended that further auditing / review work is undertaken on broadband / mobile technology improvements as part of a refresh on the IDP.
- 7.27 It has been noted that the increased prevalence of high quality network infrastructure can be a driver for general economic growth. According to a study by Deloitte and GSMA summarised in the following statement:
- 'For a given level of total mobile penetration, a 10% substitution from 2G to 3G penetration increases GDP per capita growth by 0.15 percentage points.'*
- 7.28 It has been anticipated that similar growth can be anticipated by each technology generational change e.g. 3G to 4G to 5G mobile and DSL to FTTC to Full Fibre fixed networks.

Financial Implications

- 7.29 Part B of the IDP includes calculations on the cost of supplying fibre to the door / curb, which equate to circa £880 per dwelling based upon European Research. Although it is likely that innovation in this area could later such estimates considerably.
- 7.30 Funding should also be set aside to support local fibre adoption strategies where commercial interest is more limited. Further up to date information is also required on mobile and fibre optic capacity and opportunities across the Borough. It should be noted that planning and highways regulations can have a highly beneficial effect on the cost of deploying new fibre services, such as mandating the provision of duct infrastructure while roads are opened for other works such as gas, electricity or water, where the low incremental cost of such work could have a very minor effect. Although it may be difficult to provide a contiguous duct connection from end to end, where such infrastructure is available it can have a significant effect on the overall cost once such sections are joined.

¹³ Information on the benefits of installing high speed broadband taken from Colchester Borough Council – 'Planning for Broadband' February 2016.