Telzed Limited

Ofcom Strategic Review of Digital Communications

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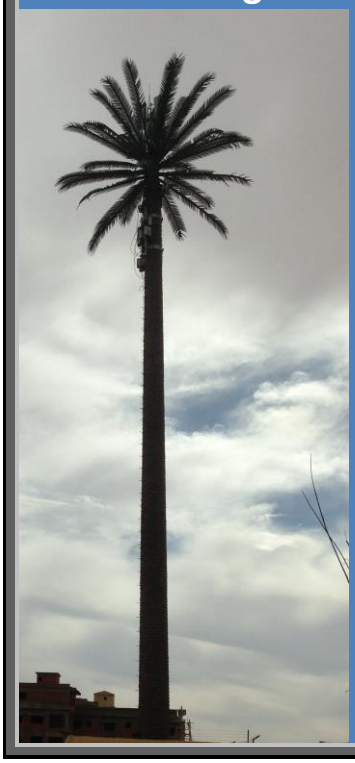
Submission from Telzed Limited



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Ofcom Strategic Review of Digital Communications

Response to the Ofcom Consulation document

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1 Introduction and Executive Summary

1.1 About the Telzed report

1. Telzed agrees with Ofcom's views on the importance of the strategic review and sees that the UK has an opportunity to develop its directions and to improve the national outcomes. This report provides contributions to these positive moves.

2. This report is independent: no payment or incentives have been received from other parties. Most operators and sponsored submissions are likely to be influenced by the impact in the bottom line and shareholder value effects, as well as corporate management strategies. The report is not biased by any one part of the industry or by operators' desires.

3. This report is based on the experiences of the author, gained from over 30 years in the telecoms industry. The work experience has covered: the underlying fibre optic technology that supports broadband; procurement of telecoms services for major corporations; a very wide range of regulatory/economic projects; broadband strategy; broadband and other telecom services' costing and pricing; work with telecom investors; and advice to both operators and regulators. The work experience has been carried out across the globe. More information on Telzed is provided in the Appendix.

1.2 Scope

4. This report initially examines the historic context and the resulting current UK market. This is provided in abbreviated form, as Ofcom has the full information in its other consultations, market reviews and in the summaries within the Consultation. The Telzed review focusses more on the background and the reasons why the outcomes are as they are. The numbers themselves are mostly not analysed further.

5. Next, the report considers the overall strategic issues and directions. These raise issues that go beyond the Consultation. The Ofcom strategic review, by necessity, has to consider Ofcom's statutory obligations and its own powers. Ofcom regulates and encourages the best outcomes, but the direction to be followed is not totally within the Consultation and within Ofcom's controls. It is a regulatory strategy consultation, and not a national policy or strategy review. This is a fundamental point, but it is not *per se* a criticism of the Consultation or of Ofcom. The national directions/policies and Ofcom are of course all related, so it is right that this key gap in the Consultation is discussed.

6. A selection of the key questions raised by Ofcom are then discussed.

7. The report includes a discussion on using a revised Universal Service Obligation (USO) definition to ensure better strategic outcomes.

8. A model or framework is provided to understand how different Next Generation Access (NGA) service providers differ from each other. This is derived from other Telzed broadband strategy work. The model enables different approaches to be compared. Each approach can then be considered; what are the relevant regulatory actions needed and the issues to address, for that position in the model. These and the pros and cons of each position of the service provider can be analysed. The model does *not* define the

best approach but it could be useful for comparing, for example, approaches in other countries and how different regional approaches within the UK might be defined, and then regulated.

9. The report's approach makes (reasonable) points and observations, but it avoids extensive background. The points can be fully supported, if further analysis is carried out. Like many reports, a number of the messages in this report might be considered obvious or even "motherhood," however these are still worth emphasising. For example it is obvious to most that broadband and the internet has boosted the economy, but some do not see this. Other "obvious" statements need to be emphasised based on the observation that, for the UK Government to only have an ***intention*** in 2015 to one day raise the USO from dial-up to 5Mbit/s[1], then some of the leading plans are too late and inadequate, but clearly someone must think this to be sensible or may even think it to be a far reaching way to shape the future. The failure of national policy and direction is inherent by inclusion of the words "from dial up" – showing that the whole thinking is far behind 2015, never mind a strategic vision for 2020 or 2025. This paper therefore includes some "statements of the obvious," even if they may be fully appreciated by Ofcom and most parties involved in this consultation.

10. The report has a recurring theme that relates to the lack of government direction that should give the policy and directions that allow Ofcom to shape the strategy review and its regulation plans. The inadequacy of the government thinking/possible intentions is further shown by the announcements made by BT in September 2015 to have a minimum 5 to 10 Mbit/s for all premises, subject to a supportive regulatory and government policy environment. ***Even*** BT (though under pressure of this Consultation and from the discussions that threaten to break up BT) has volunteered to go beyond the government's thought, albeit possibly subject to some caveats. Ofcom's strategy review is hampered by this lack of foresight, however this is certainly not a fault of Ofcom. Telzed assumes that Ofcom has been involved in the government policy discussions but failed to get the government to go further with any commitments.

1.3 Summary of key messages

1.3.1 Current outcomes

11. Telzed agrees that the UK telecoms outcomes are reasonable and UK is comparable with most other developed nations. There is however no evidence that UK is clearly a global leader and is setting the agenda. A number of other countries have: more developed broadband; more fibre in the loop; greater use of mobile; and advanced programmes to develop the national broadband.

[1] See para 1.29 of the Consultation. Statements of the obvious are also still clearly required when publications such as the Daily Telegraph can include articles such as "***The internet hasn't boosted productivity***…" http://www.telegraph.co.uk/finance/comment/11430129/The-internet-hasnt-boosted-productivity-but-robots-will.html This article suggests the internet has not provided any significant benefits. Telzed does see any need to provide analysis to counter such bizarre claims, but clearly some "obvious points" are not so obvious to some. Statements of the obvious are included in this Telzed report. These *should* be obvious to all but a few readers.

12. Ofcom's evidence shows that fixed broadband speed growth is only at the average for "any" developed country. Doing what is normal, is not a significant outcome.

13. Ofcom and UK government should compare the UK to the leading countries, as the internet economy is now global.

14. Mobile roll out of 4G is slower than it could have been and the coverage by 3G has been relatively poor. This surely reduced the ability for many to be a truly mobile worker or to use mobile as either a replacement to fixed broadband or as an addition that can be relied upon to be available when on the move.

15. Fixed line telephony is falling in volume. The demise of this is probably slower than many predicted ~10 years ago. This is probably due to mobile prices that did not aggressively target the voice market. Recently the fixed voice prices have not fallen significantly. This is a sign of the lack of competition and also of the way consumers have to buy access and calls and (more importantly) buy broadband. PSTN-only customers have probably been at a relative disadvantage (few price change benefits).

16. Business market customers still do not have many alternative suppliers who can deliver physical access to sites distributed across the country. BT remains the only supplier that has the full national presence and the scope of services. The recent changes to duct access may help to alter this, but more access to unbundled fibre seems sensible.

1.3.2 Lack of vision

17. The Consultation lacks the vision and targets that Ofcom needs in order to develop the regulatory strategy. This identifies what the strategy should achieve (speeds, coverage, performance), and the key tools that are available to get to it (more spectrum, more government funding, USO levers). This is not a criticism of Ofcom, as this overall agenda is set by UK government or EC.

1.3.3 A "new" broadband approach to attract investment

18. The Consultation and the EC identify the need for broadband investment. Changes are required to attract more private investment. It should be recognised that investors prefer to have quantified risks, and a more attractive market is one with no competition or controlled competition. The proposed approach has regulated quasi monopolies. This approach gives some protection and clarity to the investor of the periods where it is the main or only supplier of NGA. The new approach is not suggesting that encouraging competition and traditional regulatory methods should not be continued with (they are required), but the approach recognises that competitive access-network infrastructure provision will not happen in most areas and the past approaches have to be adjusted. BT of course forms an effective monopoly suppler when it builds NGA into a new area, but there are already regulations for this. The new approach aims to address the needs of other investors.

19. Depending on: the size of the investment; the amount of government assistance (if any); and how costly the investment is (i.e. does it address the marginal areas in the digital divide?), then the amount of protection can be varied. Protection would typically include some period before others can also build the same area. Obligations can also be applied such as network or even infrastructure wholesale access. These are greatest if

there is government funding but might not be enforced at all in many regions, just as they are not enforced on Virgin.

20. The approach does not use cost-based pricing from a regulatory cost-model, and pricing freedoms should be given to the investor (as is done for BT Openreach and independent investors at present). Some limits may be required on any wholesale prices or retail prices, but these are likely to be few as the market will be mostly self-limited by prices seen nationally. Some limits could follow as a *quid pro quo* for any protection of exclusive delivery of the NGA.

21. An important feature is the allowance for possible "controlled failure" of the NGA investment. This is not a company failure in the normal sense, but a planned-for take-over or asset sale to other larger players. This outcome would be at the investor's discretion. A fire-sale telco should be avoided. This approach gives some investor certainly of outcomes if the quasi-monopoly ends or when other service providers enter the same access-infrastructure market and the regulated monopoly starts to terminate.

1.3.4 USO method

22. A new USO is one way to enforce broadband roll out. If this path is chosen then a sensible high speed target must be used to avoid regulating-in a significant percentage of the country to a second class service. As broadband is an essential service for everyone (as was a basic phone 20 years ago, and roads and water are today), the approach must be inclusive and a token/pointless "5Mbit/s" type figure must not be used for the USO broadband target.

23. USO funding will always be a problem. It is possible to include OTT services as contributors, but this is unlikely (they are not *telecom service* providers). Other telecom network service providers can contribute, but will naturally resist and disputes are probable. Any calculation of the net USO cost should err on the side of caution: the costs are real and large. They should not be left to the NGA investor (in particular to BT) to recover somehow from its other services. It would be even harder for smaller private investors to recover any net cost. This approach of self-financing of the USO was deemed acceptable for a PSTN USO in UK and elsewhere. This approach would discourage investment and high speed delivery: technical solutions would naturally be for the lowest possible option that just about complies with the USO target.

24. The acid test of the USO fund level is: are many alternative investors keen to build using the fund? If not, then it is not set right.

25. USO methods could avoid some or all government funding and it forces the industry to fund the broadband. It will only be viable if both the target speed is sensible and the funding level is significant – but the higher that funding is, then the greater the resistance will be from those downstream players who contribute and do not build. The inherent tensions are clear.

1.3.5 BT breakup

26. Telzed analyses this huge issue. No best approach is recommended.

27. It is noted that "any" approach to structuring the industry just *might* work, as the many diverse approaches that are seen in the leading broadband nations are also shown to

work, at least to some degree (Japan, Korea, Australia etc.). Just about anything can *work*, but it might not be the best approach.

28. BT splits have about as many problems as possible benefits.

29. *If* functional separation is not working then a first approach is to fix the problems. This is surely achievable and avoids multi-billion pound corporate changes.

30. A corporate BT take-over is one way in which to force the break-up. His allows a New Zealand style public access business to be created. If shareholder value were enhanced then this could be easily justified. It has not happened so far and no attempt to do it is known of. So perhaps this answers the valuation question: is the sum of the separated business units worth more than the current BT market value? This approach can be studied further, even without BT's cooperation. It is reasonable to speculate this has been done.

1.3.6 The future

31. This Telzed paper does not attempt to define the future demand or what will be driving telecoms, consumer interests, entertainment, information and IT five years from now. This is mostly pointless. A number of clear *general* changes are still noted.

32. The future will require ever growing demand and 100sMbit/sGbit/s type rates are inevitable sooner or later. Demand has always exceeded the expectations of even most "expert" of planners. Data expands to exceed the capacity available. There is no reason for this not to continue and some new unexpected effect will happen (just as tablets, YouTube, smart phones etc. were unexpected game changers few years ago). Plans should be based on *expecting the unexpected*, and not on known growth from moves to TV, video and even super high definition (though even these are likely to exceed most near term network plans). These are known/mostly-predictable and set the *absolute minimum* growth requirement. The future should be centred around symmetric access speeds.

33. A future centred around FTTH to most/as-many-as-possible premises is sensible. Ideally with point to point fibre (to encourage competition, technical innovation and unbundling). It is future proof. The risk of over providing capacity is low ("data expands to fill and exceed capacity" - will always remain true), and the risk of burdening the UK with excessive costs or an unused network is low. This fibre centred approach avoids having two technologies (or at least only a minimum level of legacy copper). Further, many claim that fibre has lower operational costs anyway so the long run costs are lower, once the transition costs are completed.

34. The future regulation should combine fixed and mobile thinking as network convergence is happening and fixed access can be part of a mobile business.

35. New regulation is needed to consider "creeping market power." This is already happening. A big player that services many markets (fixed voice, broadband, mobile, TV etc.) creates a new level of concern, even if each retail sub-market may have been deemed competitive. The problems are recognised by Ofcom, but the regulatory tools and legal methods need to be refined. "Events" happen and the (correct) desire to lift regulation in some markets may be undermined when viewed later when the collective effect of events are seen.

36. Consolidation of network/telcos should generally be avoided as the longer term benefits of competition are probably better than the economies of scale claims – these do exist but such claims probably mask the unspoken underlying commercial benefit of having one less competitor. This is most clear in mobile markets.

2 Review of the telecom history and current marketplace

37. This section looks first at general issues and mobile market developments. It then moves on to look at the fixed markets, broadband and business markets. The Consultation is used as the main basis for the discussions and conclusions.

2.1 General points on the Consultation

38. The Consultation paper and other Ofcom documents such as the annual market reviews provide details of the status and some of the history. For example, Consultation Figure 3 and Consultation Section 4 in general; this shows key outcomes and generally highlights the numbers in a positive light – such as the comparisons of superfast customer percentages compared to France, Germany et al (e.g. Consultation 4.10). A more critical review[2] could look more closely at some of the weaker aspects of the outcomes. Examples of this are discussed in the following (with values taken from the Consultation):

- Superfast broadband take up significantly lags the availability (32% versus 83%). This is a concern: it hugely impacts the operator's business case (see any discount cash flow analysis) and it encourages a hold back on building out to the consumer. "Coverage" is then built only to a node that is still far from the consumer. It also implies a lack of consumer benefits. It could also mean that demand for superfast is not yet there, except for a segment of the market – this is not a reason *not* to encourage superfast. Some consumers definitely need it now. Should they be held back even if a significant percentage will not have the need for several more years? Surely not.

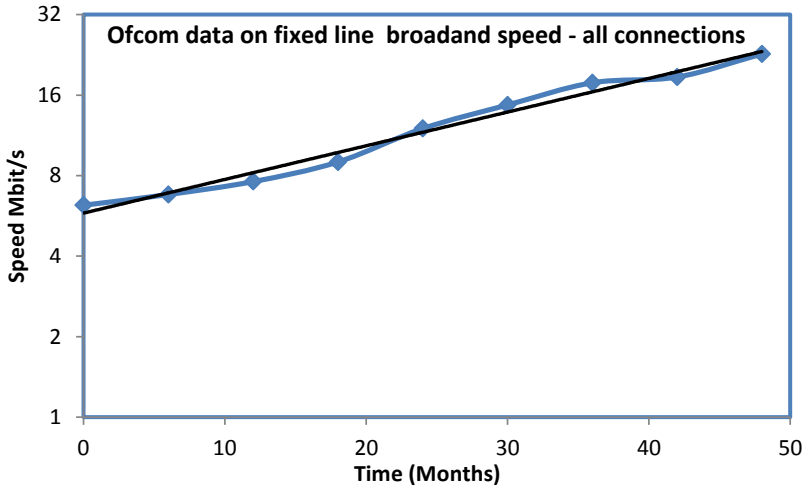
- Broadband speed changes tend to be emphasised in the UK and compared to elsewhere. It is recommended that Nielsen's law be considered as the *basic* change that is not considered as any really significant gain – it simply says growth is normal. Only if the speeds rise above this, is the UK really moving up to a more advanced level[3]. A further point is that such growth in speed is expected without increases in

[2] A general point on the Consultation is that it tends to talk up the UK outcomes and emphasises positives. It is correct that UK compares reasonably in many areas, but a stronger approach might have looked harder that what *might have* been the outcome or used more critical comparisons against world leaders. Why should the UK aim to be "just doing OK" and not taking a global lead? The Ofcom summary figures *do* show it is doing "OK." Of course many will dispute that these *are* even OK outcomes

[3] Nielsen's law (http://www.nngroup.com/articles/law-of-bandwidth/) has shown that internet speeds for high-end home users increase 50% per year, or doubles every 21 months. This is close to what is seen in Figure 1.4 "Average broadband speeds for fixed broadband connections including 'up to' 2Mbit/s and less, by technology" in the Ofcom report "*UK fixed-line broadband performance, November 2014*." http://stakeholders.ofcom.org.uk/binaries/research/broadband-research/november2014/Fixed_bb_speeds_November_2014.pdf. A key point is that the increases are largely "what is expected anywhere" and does not show UK doing anything much above the normal. Examining Figure 1.2 and suggests that UK is on average not even. The author has seen similar changes in other countries (Nielsen's law *is*

consumer prices. Nielsen's law outcomes should not be trumpeted as a splendid outcome: it simply shows the UK is doing the same as everywhere else and is doing what is normal. Broadband increases significantly faster would show that something impressive was happening, but this is not shown in the Ofcom data.

Figure 1 UK fixed broadband speed doubles about every 25 months – slightly *less* than Nielsen's law



Source: Ofcom "*UK fixed-line broadband performance, November 2014" Fig 1.4 and Telzed*

- Comparisons with a few EU countries are inherently selective. Some countries are significantly in advance of the Ofcom-chosen comparators. The comparison also ignores the global perspective and the outcomes seen in for example Korea, Singapore or Japan, and others who have had in place programmes to radically increase the broadband levels. There is limited value in showing that the UK is doing a little better than X or Y, if the real global agenda is for far faster and more widespread broadband. Korean success in IT and electronics is surely related to its long-standing global lead in broadband[4].

2.2 Comments on the mobile market outcomes

39. 4G coverage (42% May 2015[5]) is a low coverage level. Growth could have been faster and/or started earlier. Also, that value is the coverage for *all* networks. The comparison

commonly seen). An unusual outcome is for example the UAE, that had growth well above this, due the well-known Etisalat FTTH investment. The UK changes are only "about normal"

[4] There is no need to "prove" this point. It should be self-evident. When the UK was using dial up, 2Mbit/s was common in Korea [witnessed by the author of this report]. The economic synergies are clear and broadband has surely been part of a key enabler to the development of Korean society and industry. This is another "obvious" point that needs no real analysis, yet some may deny it

[5] This is another example of Ofcom figures generally "trying to up the positive message." See footnote 2. Customers have only one network that they can use and any one network has much lower coverage. This was (and remains) a major problem with 3G as the users see "not spots" all too often, yet the UK map shows 3G as widely available , but

to 3G is however worth noting: some 4G license provisions have specific coverage requirements. "If only" the mobile industry's investments had increased earlier to give 3G both the geographical coverage and the net usable speed increases that results from more/smaller cells, then the mobile industry might have delivered a viable alternative/supplement to the then slow-ish ADSL based broadband services. That opportunity was not taken up – 3G mobile was never a viable alternative to most users[6]. The reasons may be debated, but clearly the mobile strategy was not to "take on" the fixed broadband or even be a decent adjunct to it, but rather to deliver niche premium-priced products. Austria is a well-known alternative, where the service quality and prices converged enough for fixed and mobile to be considered in the same regulatory Market.

40. 3G could have been more viable in the UK. Of course the speeds were never going to be a long term solution and it is now not a viable alternative to almost all fixed broadband (Nielsen's law makes almost anything soon seem slow). Regulatory or business strategy failings can be cited as being behind this.

41. Not unrelated to the 3G mobile history is the outcome of mobile versus fixed voice. Again the mobile industry could have attempted to deliver voice at lower prices and taken greater market share. However mobile remained a service that that has always had a premium attached - from "mobility" - that justified higher prices. This is not fundamental – many countries are mostly mobile centric. Look especially at: most developing countries; many Eastern European countries that had went faster to mobile as they also had less-well-developed fixed networks; much of the Middle East/GCC; also many other EU countries have mobile traffic >80% of total (e.g. Austria, Finland[7]). Many other industrial countries have also moved more rapidly to mobile, and so fixed voice is much more of a legacy than in the UK. Given the choice of ~50% share of the voice market at a higher price or ~80%+ share at a lower price, the choice seemingly taken was for the former.

42. The mobile industry still suffers from the issue of poor coverage and quality that makes "cutting the fixed line" a last resort for most customers. This leads to the conclusion that "Mobile saved the fixed networks[8]." Had there been a price war (mobile versus fixed)

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from one or maybe just from two networks. This was (and is) a major barrier for anyone wanting to seriously use mobile broadband. The key benefit of the services (3G and 4G) is always that of *mobility*, but the operators did not tackle this issue and for many who live outside some metropolitan areas there was/is little point in considering the services as something to rely upon. See Consultation 7.22 where even today only 71% of the UK premises have indoor 3G. This is very low – a service is not much use only outdoors (and even then the coverage is a low 84%) and service availability from another network is useless to customers, other than those pre-choosing a network that is available from pre-determined fixed location, which of course negates the benefit mobility. The 3G outcome is surely a "failure" especially after such a long time – a failure as seen by both consumers and the national economy. "Work on the move" has been clearly stifled. Few can plan on making use of a mobile service for critical work when they are traveling, with such low coverage – negating the whole point of having a premium-priced service to give the benefit of mobility. 4G is a work in progress but the coverage levels are currently low, and 3G "mistakes" should be avoided

[6] The prices were too high and the coverage was too limited outside metropolitan areas. Surely the mobiles could have made a stronger effort to take part of the mainly-fixed broadband market

[7] Such examples show that mobile voice success is not simply due to historical lack of fixed networks. UK did not see the movement to mobile voice that could/should have occurred. This is also not totally explained by significant fixed-network based businesses (trading firms, banks, call centres etc), which does certainly give the UK a stronger presence in the legacy voice market

[8] See also Telzed report: "*UK Ofcom market report 2012 Beyond the figures – implications for the*

then the outcomes might have been different. This was probably never in the financial interests of the mobile industry.

43. Observers with longer memories may recall the many claims that BT was inefficient and so cost-based prices should be lower than in BT or Ofcom calculations. *If* BT was truly very inefficient, then this would have been true in the retail business. This should have given margins for greater retail competition – but this did not happen to the degree that might have been reasonably expected. BT's market share did not collapse and fixed line prices have not fallen rapidly in recent years. Arguably higher-priced fixed calls and high margins may have contributed to the development of inefficient mobile operators, compounded by a strategy that focussed (at least initially) more on premium priced customers.

44. More recently, the net returns in mobile have fallen to around the cost of capital (Consultation 4.42, 4.43). UK Mobile is no longer a "premium business" in the same way it was ~10 years ago. With hindsight (which is of course rarely wrong), other strategies might have been more appropriate and given better outcomes for shareholders and possibly also for consumers. Cost of capital returns on a bigger business is surely better that the same return on a smaller business.

45. Voice and data are closely inter-related in the outcomes of the UK mobile industry. Higher prices for voice may have been related to having data as an add-on for many packages. Such low cost add-ons result in network investment pain as the volumes of data took off. It is fair to say almost no one predicted the impact of smart phones, tablets and mobile data. The result was a huge volume growth that now drives the mobile networks' costs, yet the pricing was initially not aligned to this. More recently retail prices are more aligned to data/voice needs, but the lower profit margins (compared to the "halcyon days[9]") are testament to the pains caused by data growth. Competition of course has also driven the margins to the lower levels and competition is, of course: good.

46. The above points on 3G and 4G outcomes are reflected in the data of the Consultation Figure 6. This may be one of the causes of the mobile industry outcome. The capex levels of fixed and mobile are shown: mobile annual capex is about £2.2 Billion compared to fixed capital expenditure that has been at least £3.6 Billion annually. Yet the mobile retail revenues (£15.6 Billion) have been consistently more than that of: fixed calls, access and internet (£12.4 Billion[10]). The relative lack of investment by mobile is clear. Arguably the outcomes show a failure: mobiles have been pushed to an industry cost of capital ROCE, despite seemingly trying to: take a smaller market share; minimise investment; keep to premium prices; and not to compete too aggressively with the fixed network business. It is speculation whether greater investment and selling more at lower prices would have been a better strategy. Ofcom's regulatory strategies cannot force operators' strategies, but the existence of some coverage obligations for 4G show a

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telecommunications industry. September 2012". Telzed web site http://www.telzed.com/id3.html

[9] High margins are good for the operators and shareholders and might be good for investment but of course are bad for consumers. The "good old days" might not really have been good – it depends on the viewpoint. This is a key point of this report – regulatory strategies have to balance the different parties and aims in order to decide on the "best" approach

[10] See "Figure 5.1 UK telecoms industry key statistics" for 2013 in Ofcom Communications market report 2014

sensible approach to avoid some of the failings that were seen with 3G coverage. Are these obligations enough? The obligations also show that Ofcom no longer believes in leaving *everything* to free market competition.

47. The conclusions of paragraph 46 above are probably still sound, even when there is allowance for the fact that mobile-retail costs are potentially a higher percentage of the total costs than retail-fixed. Mobile retail would then contribute relatively more costs to the total. This means the capital-intensive network business is a smaller percentage of the total, than in a fixed business. This should mean the mobile capital investment levels, relative to total revenue, can be justifiably lower than in fixed. Countering this argument is the fact that mobiles had until recently higher profit margins.

2.3 Mobile industry focus and direction

48. The mobile industry is now focussed on 4G and strategic consolidations. Mobiles are also strongly involved in fixed business; no longer is "the future mobile," as once claimed. Fixed businesses are also "mobile" - see the BT 4G ventures and for example BT's services that allow broadband "roaming" onto other BT customers' WiFi networks when they are in range. This emphasises that regulatory strategies must not compartmentalise fixed and mobile as truly separate. The strategies must consider them together: clearly BT is considering them together with its ventures and it is not alone. This F-M business convergence is not a new change and it has been underway for some time[11]. This point is returned to later in this report when NGA issues are discussed further.

49. Mobile consolidations have been occurring in the UK or are under consideration. They have also occurred in Europe. Free markets should be able to do this. Ofcom and EC have considered retail mobile markets to be competitive. The fact that the changes are subject to regulatory/competition-authority consideration shows that this is not a clear cut issue. Two operators are clearly better than one, and three better than two. Whether six is better than five is less obvious. Ofcom notes (Consultation 1.47) that there is some evidence of higher prices from consolidation. This simply shows what should be obvious: competition is good for consumers, less competition is bad. This is highly relevant when the number of players is in the region of 3-5 nationally. The reasonable conclusion should be to limit consolidations and maximise the number of players. The risks from less economies of scale on prices are likely to be not as severe as moving along the path to less competition.

50. The Consultation notes MVNOs as providing some market diversity. It should be emphasised that MVNOs are essentially retail-only competitors and are not totally free to compete with the host networks. Examining MVNOs supports the view that many are not actually big competitors but actually compliment the host network – by giving brand diversity or new channels to markets or address alternative customer segments. Their

[11] This does not mean that mobile broadband and fixed broadband are total substitutes or that even the voice services are totally substitutes for each other (even today). It does mean that national, regulatory and business strategies all must consider them together and both retail-service and technical convergence is happening (see for example the off-loading of mobile voice and data to "fixed WiFi etc.)

impact is good, but limited, and they are not a real substitute for more spectrum and more network operators.

51. Consolidation is partly justified by the economies of scale, which are real, but if the business is efficient then the fixed central costs should be a small fraction of the total. Network costs can still be low in small countries in Europe[12], so bigger is not hugely cheaper.

2.4 Mobile summary points

52. Summary points from the observations of the mobile industry include:

- Because of (or despite!) the past regulatory strategies, mobile markets have not been as effective as seen in other countries: UK broadband has remained fixed-network centred; mobile call take up has lagged many other countries; and fixed-mobile broadband solutions have been slower to develop than they might have done.
- The mobile industry outcomes of course have still been hugely successful: the key point is that outcomes might have been different/better.
- Service bundling and convergence *is* now more common but real technical convergence has been limited even when it has been technically possible for some time to make mobile calls over fixed/WiFi or have home broadband roam onto other WiFi networks.
- Most of the outcomes are of the mobile industry's own making. This is reasonable as Ofcom does not (and should not) regulate the industry more than necessary – mainly in the areas of call termination and licencing obligations.
- A mobile-lesson is that competitive operators may come up with outcomes that neither Ofcom, UK citizens or the operators themselves might have desired. Coverage-obligations for 4G are a limited reply to the previous lessons from 3G. Perhaps stronger 4G obligations might have been included.
- Ofcom and competition authorities should be very wary of mobile consolidation. It is recommended to err on the side of increased market competition and not on the side of "economies of scale lead to lower costs and more consumer benefits." Bigger need not be better and it is not easy to see how less competition breeds inefficiencies that counters any economies of scale[13].
- Convergence of fixed and mobile is happening and may be encouraged. As separate markets that are each competitive in their respective retail markets, it makes the

[12] This can be seen in retail prices. Also the cost-based Mobile Termination Prices show most of the EU countries having almost the same pure LRIC costs (see MTR Snapshot from BEREC). Of course this assumes that the costs used for MTR are "real" and not unofficial benchmarks to be close to 1€c per minute. Telzed believes that Bulgarian and UK costs are highly unlikely to be similar, and many MTR values are really influenced by benchmarks to give the (reasonable) MTR values of ~1€c. Sound cost modelling can show how the costs do vary with geography, customer coverage and traffic

[13] This conclusion is also inherent in some of the Consultation discussions/questions and a similar conclusion was made by the Commission (Margrethe Vestager speech October 2015) to oppose some Danish consolidation http://ec.europa.eu/commission/2014-2019/vestager/announcements/competition-telecom-markets_en

argument for restrictions seem unreasonable, at first. The very fact that BT's movements into mobile need considerations shows that there are concerns within Ofcom. This shows a key problem – markets may be competitive and separate, but any player that is "very big," starts to enter a grey area. Are the size, service-bundling, customer lock-in and market influences all too much and so the benefits are offset by other factors? These factors show how regulatory decisions at an individual level may be acceptable, such as: mobile markets are competitive, fixed retail markets are competitive, TV content markets are competitive. But if such separate businesses are combined then there *is* a concern. This creates "creeping market power." In an ideal world, the fact that there are no concerns at the individual sub-market level would allow freedom for a player (such as BT) to freely act in other markets without regulatory concern. Clearly this is not the case (shown by the very fact that Ofcom has to discuss it and competition issues have been raised). This gives a strong message, that regulatory oversights cannot be easily lifted when looking at behaviour across markets, even if the behaviour (such as consolidation or price bundling) is reasonable within any one market when it is viewed on its own.

53. The Ofcom desire to reduce regulation where possible is supported - it is sensible. But, Ofcom should still consider actions across markets, as events tend to build up and create a new problem that was not foreseen when decisions were made at the individual market or individual service level.

2.5 Fixed market outcomes and a new broadband strategy option

54. This section considers the fixed market outcomes, extending the discussions above that are mobile focussed, as they also overlap with the fixed markets. Next, some options for developing broadband are discussed with proposals provided to give a different approach in the future Ofcom strategy.

2.5.1 Historic changes

55. The regulatory strategy has changed over time since Oftel days, but the general principles to encourage competition at the lowest possible levels and hence to try and get infrastructure or network-level investment have remained. Clearly the approaches have progressively altered as outcomes were not as good as they might have been, and so additional regulatory changes were introduced. It could also be argued that some regulatory changes were because the past policy had succeeded or reached the end of the line and so a new (sometimes reversed) policy was needed.

56. Recently this evolution of regulation policy has led to unbundled dark fibre or duct access, when past philosophies were against this in order to encourage other operators to build their own ducts/fibres. No doubt some responses to the Consultation will accuse Ofcom of too little too late, as the alternative infrastructure never arose to a level that some hoped for. This is an almost pointless criticism. If fibre unbundling or ducts access were available 10 years ago, would the outcomes have been better? We are where we are. However some lessons from the past might still assist with the decisions to be made in the future.

57. Past approaches encouraged new operators to build networks and invest in infrastructure. Going back in time an aspiration seemed to be for a "BT #2" (or several

players that together provided the full service competition to BT). This BT #2 did not happen, even though BT's market share has fallen. BT remains the only provider that has full geographic coverage and full service-delivery across all layers in the service supply chain. Its dominance is greatest in the lower layers of infrastructure and access networks.

58. The Consultation and recent changes in regulatory policy (such as dark fibre and duct access) emphasise the old hopes (if they existed) for a BT #2 are long dead. Whether these changes, if done 5-15 years ago would have given a better outcome, cannot be ascertained. It is academic anyway.

2.5.2 Broadband changes

59. The fixed regulatory focus is rightly on broadband and NGA. The Consultation also considers business markets and this should not be overlooked – the subject is returned to later: see Section 2.7.

60. The UK has reasonable[14] broadband outcomes, but most are based on BT networks that are wholesaled to the other players (LLU, BSA, and superfast broadband). As more of the value of the service is increasingly in access, this inevitably means that BT Openreach provides the bulk of the service and leaves the value for the core network and retail broadband provision as a smaller percentage of the total. This trend has been seen for a long time as core IP networks, IP transit, international links, etc. have seen unit costs fall hugely over time. Fixed core voice costs have fallen (as shown by changes in interconnection prices, excluding the effect of changing the method form LRIC+ to pure LRIC). The enduring bottleneck of customer access and civil works (ducts, manholes and cables) remains and so it locks value into the wholesale provider (Openreach). This leaves retail costs and core network costs to give limited differentiation options between suppliers.

61. Virgin provides a major alternative network, yet this has neither the geographical coverage or service coverage of BT. It is unlikely to ever be a full challenger. Its history is well known. Ofcom chose not to significantly regulate the cable TV operators (later to become Virgin) with access obligations. As the prime competitive access supplier to BT, this seemed reasonable. A contrast with Korea might be considered, where a wholesale broadband access service from the main cable TV company was available. This allowed ISPs to offer broadband to almost every customer even in the early days of xDSL as either DSL or cable-TV-Broadband services could be used to give circa 2Mbit/s or more to almost all customers in the country[15]. It may have contributed to the Korean broadband success. At that time UK was using dial up or just starting xDSL. The decision remains: in the UK essentially only BT's access network has wholesale obligations.

62. Whilst two cables to a premise does not constitute full competition, it raises some concerns, as well as providing benefits. The following points are noted:

[14] Debatable, of course
[15] Would this have developed UK broadband faster or just reduced cable TV investments? The answer is not known.

- Only one is regulated. For the customer, both are equally valid suppliers.
- Two suppliers still mean that the customers' ISP choice is limited to a BT-based wholesale vendor, including BT, or else Virgin as both the retail and wholesale supplier. This is because the ISP can only use the BT access network.
- Even with duct access, two suppliers means that it even less likely that an ISP or alternative provider would put its own fibre infrastructure in place than if there were just BT in the street. So far there is little evidence of widespread deployment of alternative fibres by ISPs using BT ducts. The Ofcom Market report 2014 shows that most broadband lines are fully or partial unbundled lines – so the main source for the access portion of broadband (and also for PSTN lines) is a wholesale re-sale of BT's infrastructure.

63. The opportunity to build alternative fibre or even (bizarrely) copper, in the access network has been there for very long time, at least in principle. This has not happened nationally. There are some exceptions (Virgin, Colt and some regional players), but their build has not been national. This opens the question – did they really have the opportunity to build nationally or were the regulatory barriers or BT prices/actions acting against them? Until recently they had to do a total new build with limited access to BT infrastructure. The lack of build out may well be due to restrictions such as: not allowing access to infrastructure (partly corrected recently for ducts); not allowing enough freedom to use infrastructure in any wat desired (dark fibre or ducts for business services or for core networks); were the BT terms of supply too limited etc.

64. The UK approach has not resulted in significant alternative access infrastructure, other than the above examples. Recently there have been some trails of fibre in the loop e.g. by Sky and TalkTalk. These examples should not be taken as a sign of radical investment is about to happen. Ofcom should be wary of this these being a sign of huge future investment, "If only Ofcom adjusted its policies." There was not much build so far, when access wholesale prices were generally complained to be too high and superfast broadband has been the clear[16] destination for many years.

65. Virgin has deployed more DOCSIS 3, but the wider outcomes might not have been vastly better. Of course the areas where DOCSIS is deployed naturally benefits customers. The correlation of FTTX and DOCSIS is low (as pointed out by Analysis in its report – see Consultation Figure 14 and Analysys report Fig 1.2). Almost any outcome is possible. Simple business thinking should show that any incumbent telco will consider FTTx wherever the cable operators are active. These should be the priority areas to target. These will inevitably the more affluent/urban areas (cable TV, as in the UK, will generally avoid rural and marginal areas). Therefore they will target the same areas.

66. The evidence also shows that DOCSIS does not cause widespread FTT**H**. FTTH is (in the short term) difficult to financially justify over FTTx, the telcos will be similarly limited to the same regions as DOCSIS (hence the second Figure 14 graph in the Consultation). FTTH is therefore unlikely to exceed DOCSIS coverage, if it does ever get deployed. At

[16] Most in the telecoms industry have long known the internet demands will continue to rise and will not plateau off, so the "future has clearly been FTTx" for 10+ years. However this was not seen by some in the industry, and probably is not seen by those who still propose a future ~5Mbit/s target for the USO

least in the near term. This explains the maximum coverage reported on in the Analysys data.

67. The converse however is not true: existence of FTTx or FTTH is not a prime driver for deployment of cable TV/DOCSIS. So encouraging FTTx will not necessarily increase significantly the amount of access-infrastructure competition.

68. The above paragraphs 65 to 67 are general deductions based primarily on the Ofcom and Analysys evidence, plus simple business-thinking. Actual outcomes depend on the strategy of Virgin and the new Liberty Global owners – there *might* be changes in the future. This is important for Ofcom's strategic plans. If Ofcom were sure that Virgin was planning to invest significantly, then this would probably ensure a competitive investment in FTTx by BT – and this competitive investment is obviously good. The recent "broadband speed advertising price war" shows that this should happen. But the evidence does not show that it would necessarily lead to FTTH. Further, it does not address the major areas not being covered, unless Virgin's plans were to invest in more-marginal areas or even in the digital divide. Some such similar outcome might happen if other alternative providers were to build out soon in the addressable areas (BT would surely follow). There is weak evidence from recent fibre trials by some players that this would really happen – big alternative-builds have not happened so far. These competitive build outcomes will probably happen *to a degree*, and remedies like ducts access will help. The main problems still remain: such competitive investment is risky for the investor; the risks rise with the more marginal areas; it relies significantly on the business plans of Virgin (and *just possibly* others) being willing to take some high risks or even invest in marginal areas under the current regulatory regime approach; and digital divide areas are unlikely to be addressed. The key item in this analysis is: it works, but *only **if*** Virgin et al were willing to invest a large amount into competitive access.

69. Some fundamental points follow from the above:

- The regulatory changes (dark fibre, ducts access) imply a recent policy approach change. There is no realistic chance of alternative access ducts and totally diverse access cable infrastructure[17]. With this "admission" that there are limits to the traditional UK regulatory approach of not allowing access to infrastructure or services in order to force the alternative operators to build it themselves and so compete at the lowest possible level, the focus must now be more on *new* thinking that is needed to define new approaches. No doubt this was partly behind the Consultation in the first place.

- Customers do not buy infrastructure. They do not really care if there is one, two or even three cables outside the house. Arguably, the past aim to even try to push for this was pointless – to do this simply forces the suppliers to have, on average, 50% or 33% market share as part of their business plans. The cost increase is obvious. The change in logic should be to maximise the investment by the one (or perhaps rarely two) vendors to deliver the most outstanding infrastructure and broadband possible. And then allow downstream competition on top. Access infrastructure competition is a laudable aim, but it will not work nationally even if it had worked for the cable TV

[17] Other than Virgin and the laudable local initiatives, such as B4RN, Gigaclear et al, as well as Kingston

franchises and their predecessors. It can certainly work in a few other areas, but not nationally.

- Competing providers will almost never build, if BT has put fibre in the loop (why should they?), though it is possible that BT would build if an alternative previously had previously built NGA in a region. The business economics behind this asymmetric risk are self-evident. The decisions being made are not the same. A regional alternative provider has the probable/inevitable risk of the later-entry by BT, but the later-entry by an alternative is very unlikely, where BT FTTx already exists[18].
- Cable DOCSIS 3 encourages BT to invest in FTTx, but clearly has not encouraged much FTTH. The competitive drivers for FTTH investment from DOCIS are clearly low (Analysys report). Clearly DOCSIS has resulted in two suppliers (which is mostly a good thing), but the existence of BT to supply FTTx has not attracted a new supplier to give two networks. Arguably this is a disincentive for other smaller players, to then follow with new deployment. This shows an asymmetry in the outcomes and incentive drivers. If BT also has a cable TV offering, then this may be a further disincentive even for Virgin to follow into the same area.
- The main competition is in the downstream core network and retail levels (Virgin and Kingston et al are major exceptions). The access infrastructure remains in BT Openreach. This competition is good, of course, but as core network costs tend to fall then the access-network cost portion tends to become a larger portion of the total. This makes competition subject to key limitations:
    - The wholesale costs for bought-in access service are an increasingly large part of the service costs. Inevitably alternative providers will complain this is too high. The key focus in the Consultation on Openreach, on equivalence and on the possible changes to the BT functional separation, are all directly related to this
    - Retail costs are still a significant fraction of the total and inevitably alternative providers will complain that BT retail prices are too low. Past arguments[19] that BT was inefficient and overmanned, were aimed at getting lower wholesale fees. These might now to be “conveniently forgotten” and alternative providers will inevitably complain about the economies of scale and scope that BT has in the retail businesses
    - “Wholesale too high and retail too low” is the inevitable outcome complaint – it will always be hard to separate the facts from perfectly natural commercial driver for this claim; it goes direct to the bottom line.

[18] An obvious point but it is fundamental to the strategy and how Ofcom should encourage investment

[19] 10+ years ago this was a generally accepted line of thinking and amongst telecom consultants and investors: there was talk about how BTs total employee number should be radically less (~50%) due to inefficiencies and as a result of movements to new technology (IP core and fibre access). Such radical staffing changes did not happen but changes did happen. Furthermore, the full plans for the IP core network changes did not fully materialise, and the fibre in the loop plans have only recently become more serious. The move to fibre in the loop is certainly not “really radical:” it is FTTC and not FTTH, it is GPON and not point to point. This has further implications on staff and costs – the savings from using fibre do not happen – there are more costs when copper still exists in parallel or series with fibre. Two network cost more than one

This leads to the observation that aspirations to have competition at the lowest level possible, are certainly good but competition has not (and surely will not) be the primary driver for national NGA investment. Ofcom has "pushed the telco horses to water, but they will not drink the water of competitive access investment." For obvious commercial reasons it is potentially very dangerous for investors to duplicate BT access infrastructure.

- Competition *has* driven BT and Virgin, to a degree, to invest. The past approach has been partially successful. But much of the country does not have the dual supply and has only one supplier to domestic customers (BT or Kingston) and so the competition drivers are limited. They will not have more access-suppliers than one for NGA. The focus therefore needs to move to investment incentives and ensuring returns that are not directly linked to the competitive threat of someone else doing it first. This driver does not exist on the alternative investors and only slightly exists as a driver for BT to invest[20].

70. Incentives to operators can be both stick and carrot. Returns and risks must be considered, asset sales or wholesale/resale prices need to be fair and attractive. USO, technical requirements, re-sale obligations, coverage and roll out requirements provide "sticks" that can also drive the required changes. Leaving the approach entirely to commercial decisions (especially with limited competition in many areas) will surely give sub-optimal outcomes. Competition is certainly the preferred driver[21], but as access is never going to be a fully competitive market, Ofcom (and the UK government) need to take more radical steps: "sticks and carrots."

2.5.3 Broadband options and a "new" approach

71. Key options are:

    1. Remain with only BT having significant access obligations
    2. Have some access obligations for Virgin
    3. Also have access obligations for any other smaller regional NGA supplier
    4. Consider regulatory actions that help protect smaller/regional access-network providers and so encourage alternative access providers to invest.

72. As Ofcom has considered item 2, it seems unlikely that any arguments will cause a reversal, so option 3 is even less likely. Options 2 and 3 only help with downstream

[20] Is BT really hurrying to build FTTx because a small regional investor might build something in the next 3 years? With some exceptions, probably not. This is not true of some other countries, where small regional investments such as by local municipalities or other telco investors. When *seen in combination,* such actions are a spur to invest and so avoid the incumbent's "death by a 1000 cuts" as small players each have a collective effect. This effect is stronger if the local players might have local government subsidies or the local players start to go bankrupt. This gives the "horror" outcome of a fire-sale telco: the phoenix competitor has an asset base that is almost fully written off. This is something an incumbent telco should be rightly worried about

[21] There are few who would say competition is bad, but this may well be claimed by some respondents who might argue that more monopolist supply and a national network is a better way forward. Telzed sees no sign so far of Ofcom giving any credence to this. Telzed agrees that monopoly supply is best avoided: competition is inherently good. As discussed in this paper there is probably a need for some exceptions to this rule

competition and might further harm the infrastructure investment. The status quo option 1 follows, by default. However Item 4 needs further consideration.

73. Both options 1 and 4 give rise to a "regulated monopoly" – there is only BT or possibly a regional supplier. One access provider in much of the country is the only viable outcome. This is a key change in logic – moving from competition as the ultimate goal and the key driver for investment, towards the acceptance of a single supplier in most areas. Therefore regulation and even "protection" of the single access supplier is required. This is not a new idea[22]. It simply accepts the "obvious" reality.

74. Telzed sees that the localised single supply situation has to have both some regulatory controls and also some protection – a regional player could be easily put out of business by later moves by a larger player (BT, Virgin, Kingston). As a small player, the first mover advantage is limited and the BT roll out to the same region might be justified by need to give nation-wide services or possibly even justified by need to meet new USO obligations. New regulatory thinking is required to encourage these alternative players[23]. As the BT roll out plans were seemingly not clear, it is hard to for any alternative business plan to stand up to scrutiny. This was also cited as part of the reasons why many other applications for the BDUK monies failed. If the major competition's build-out has no certain dates (BT), then how can anyone build a good business plan?

75. This also raises a new type of business plan thinking: "*planning for failure is a success*." The author of this report has raised this before[24]. Alternative operators can build infrastructure, and the business plan should have a planned-in failure – when the bigger player(s), probably BT, come along into the region. This is not a bad outcome. The business runs for perhaps 4 years and consumers benefit from the NGA. There is nothing wrong with a plan for later asset transfer or a pre-planned sale to the later entrant. This outcome can be managed, but only if there are some certainties and predicable outcomes. Without this, the business plan has an undefined end date, no predictability of the likely loss of customers in the future, no business termination value or asset-sale value. Almost no investor can risk large monies with this uncertainty. Certainty of failure however is something that can be dealt with, especially if the exit arrangements can be defined in advance. Planned for failure, is therefore a success.

76. This predictable business termination should be contrasted with:

    - Bad business plans that fail for reasons that are not connected to BT or to other player's later entry. The South Yorkshire story is a prime example[25]

[22] See "Competition for Monopoly" by Richard Feasey. The essential idea is that once a competitor (!) builds an access network it is and should be a virtual monopoly in that region. This does not exclude fuller competition (BT and Virgin) but that type of true competition is only viable in limited areas. Telzed views the effective monopoly and need to regulate it, arises both when there is private-only investment and also when there is state aid to help in the region. Of course the controls are different when state aid exists

[23] B4ARN, Gigaclear et al

[24] Telzed: "*Dangers of fibre investment in the local loop*" originally published in 2012. http://www.telzed.com/id3.html

[25] This shows how failures can easily happen, in this case ~£100M of public money seems to have been lost. Such examples should be very much in the minds of all investors, businesses, government agencies and of course Ofcom. See e.g. http://www.telegraph.co.uk/news/politics/council-spending/9927708/Disastrous-100m-public-funded-broadband-project-faces-shutdown.html

- Business plans that were never really viable long term but simply had an "aspiration on page 11 of the business plan" that the company is bought by AT&T/DT/FT et al[26].

77. The examples of para 76 are not thought through failures. A thought through and planned-for "failure" is not really a failure and it is a good outcome for all parties (consumers, investors, the local operator and the larger player that comes along later). A number of details need to be considered for this to work. For example a local operator should not implement "odd technology" or network architectures that are of no relevance to the later/bigger player. Some compliance to standards should still be expected, even if the access is not identical to what the later entrant would have put in place. Total compliance could encumber the small player with the burden of possibly overly-expensive networks or ones that do not fit optimally with that region. It is not too difficult to see various issues, and potential solutions, that can be defined.

78. The approach combines regulation for a local monopoly with regulation and investment for "pre-planned failure[27]."

79. As the key problem is getting investment in the first place, then the issue of selecting an investor (who gets the local monopoly) is not a major issue – if there were several wanting to invest, then there is almost no need for the regulated monopoly type approach, as it implies potential competitive market entry. However some selection process or setting thresholds for applicants may well be required. If there is some exclusivity and protection, then the investor must pass some tests. A bid or auction process is not attractive as that simply puts up the costs to service the area, but some basic "beauty contest" criteria may be included.

80. This approach of a regulated monopoly is returned to in Section 3.2 page 32.

2.6 Fixed telephony outcomes

81. The Consultation places less emphasis on the legacy PSTN service. This is reasonable. However UK has remained a "fixed PSTN country" and has not migrated to mobile in the way many others have (see above Section 2.2, para 41). So the PSTN is a more significant business than it might have been. The 2014 Ofcom market report[28] notes that:

    - Retail fixed voice revenue in 2013 was £8.4 Billion
    - Retail broadband and narrowband revenue was £4 Billion
    - and, of the retail fixed revenue, £5.5 Billion is on line rental.

[26] This is of course partly facetious, but there were apocryphal stories that such thinking was effectively what went on ~10+ years ago in some telcos, or at least this *seemed to be* what might have been the thinking. It is speculation whether this thinking might have re-emerged in the UK – encouraged by other consolidations/buy-outs

[27] Of course this is not truly a failure in the normal sense, even if the business is wound up. Furthermore, there may be some enduring local network regions that the big players (BT et al) might never want to compete in and serve, other than with the existing legacy telephony and copper-broadband services

[28] See 2014 Market report figures 5.27 Retail telecoms revenue, by service and 5.32 Retail fixed voice revenues, the latter also emphasises the fact that the fixed line rental portion is an increasing fraction of the total

82. The volume and total revenue may be falling but the legacy service is still a major part of the industry. Its importance is still clear and OTT and mobile have not succeeded in being true substitutes. See also Section 14 of the Consultation.

83. The volumes of fixed line calls have been falling ~10% pa, yet the revenues have fallen more slowly. This raises a number of concerns and issues:

- Technical changes are not delivering the lower unit cost over time that has been generally true in telecoms (both now and historically)
- Increasingly the line rental revenues are a growing fixed part of the total monthly expenditure
- Line rental revenues (prices) are rising[29]
- Fixed call prices are increasing[30].

84. It is reasonable to deduce that fixed call competition effects on prices have slowed greatly. As discussed before in this report, the competitive effects of mobile voice on fixed voice have not been as significant as they could have been.

85. Technical cost changes are clearly not being transferred through to prices. Most telco costs fall with time, and the line rental is still copper-dominated. The costs fall as the legacy asset becomes more fully depreciated[31]. The net impact on the market prices paid for by consumers is not being seen. A number of factors are behind this:

- Competition effects are not as strong as it might seem to be in fixed voice: most monthly costs for subscribers are in the rentals (line rental and broadband), so call prices can rise. Customers cannot do anything about fixed line prices and the voice-call costs are a small percentage of the total monthly outgoings, and so the price effects of calls on behaviour is small. The supplier choice is made on the line rental and broadband costs, not on the call-per minute. The price elasticity is therefore low and the competition effects are low (why churn because call prices are 50% more than another supplier?).
- Operators compete “for the customers” and hence focus mostly on the monthly broadband and line rentals, and not on calls.
- Mobile has not provided a full counter competition to fixed call prices (see Section 2.2 discussion on mobile and the Ofcom data that shows call prices are static).

[29] See 2014 Market report figure 5.33 Average monthly retail revenue per fixed line

[30] See 2014 Market report 5.57 Comparison of average fixed and mobile voice call charges and 5.62 Real price of a basket of residential fixed voice services. This shows increases in fixed call prices – now greater than mobile. However the costs per fixed call includes the line rental effects, so the marginal cost per fixed call minute is lower than ~10.3p in 2013 (closer to ~2.2p/min)

[31] It is well understood that prices are based on LRIC thinking and CCA analysis of asset values. But, as old assets reach the end of their life, CCA upward revaluations of copper are on a small value, and the cost (price) increases should be small. The CCA value of a fully depreciated asset under HCA ,is still zero. “Milking the asset” if almost at the asset’s end of life, is a normal business practice. This may be happening. True long run costs should also be based on a migration to fibre (as no company should replace the copper network) but this fibre investment is still slow and non-existent for many (are they paying for it now in the notionally LRIC based price?)

- The role of pure call re-sellers provided competition ~10+ years ago, and this helped to reduce fixed call prices, but these now have little influence on most consumers as choice is dictated by the broadband and line rental.
- Technical cost reductions with time are more than compensated for by the reduction of competitive effects. The reduced-volume effects certainly exist but less effective competition is arguably the larger cause of the price increases.
- Price bundling makes the broadband, line rental and call costs opaque to consumers – making it easier to increase call prices, or not transfer cost savings to consumers. Good free market competitive outcomes are not *always* good in all ways for all customers/services. A PSTN-only customer has been disadvantaged.
- The real costs of PSTN line rental versus broadband access are highly questionable. There may be regulated wholesale prices for each, and these form costs inputs to downstream operators. But they are "all one cost" to fully unbundled players. Anyone who has looked at costing access (regulatory accounts, LRIC models) is aware that major costs are common to broadband and PSTN so "cost splits" of legacy copper, duct, civil works etc. to each service are, to a degree, arbitrary. A lesson is that the approaches to regulatory cost-orientated prices and to how commercial businesses consider costs when its own prices are set, can each be very different.

86. The last point is highly relevant for Ofcom strategic moves in the future. There is a separation of PSTN access and broadband access in regulatory decisions but the reality is that the costs overlap (many costs are common) and the real consumer effect is that there is a fixed monthly cost of access. It can be split as line rental and broadband in many ways, but the total is similar and neither can be avoided. If PSTN line rental were not bought, then the broadband prices will increase to compensate. This further makes the turn-off of PSTN harder for consumers - they have to pay for the line rental anyway so they "may as well make some calls" as the marginal costs are low. The regulatory and operators' decisions have helped to maintain the legacy fixed voice. Price bundling adds to this effect. The mobile operators' strategies (as discussed earlier) have also contributed to this outcome.

87. This analysis (static or rising fixed voice prices and relative slow progress to turn away from legacy fixed voice) has some lessons for strategic decisions:

- The outcomes are not totally shaped by competition in the ways that regulatory theory might expect. Competition need not drive everything in the way some regulators and business leaders would expect, and so give cost-oriented efficient outcomes with optimal technical innovations (such as FTTH). Maximising profits is a key driver. The type and level of competition are often not exactly in line with "full competition," even though many markets do not have SMP.
- The outcome for voice may be less optimal but just might have helped to encourage lower broadband prices. An obvious lesson is that some customers benefit more than others (voice-only customers are less well off than a broadband-only customer). This emphasises a fundamental issue for the Strategy – what is a best outcome is not best for everyone. Clearly some customers can get a better outcome than others. Some operators may do better than others. The strategy has to consider: which customers should benefit most; what services to encourage over others; short term or long term benefits; infrastructure or service based supply; investors (shareholders); employees; national economy etc. A strategic choice has to trade some of these off. The best outcome is not the best for all.

- A further lesson is that commercial decisions must be factored in. Regulatory decisions may create competition but the outcomes might not be as expected. Surely the "death of PSTN voice" was expected to be earlier/faster with mobile & VoIP but the actions of operators to not really compete as one might have reasonably expected, has helped to give a rather unexpected outcome. Of course it is virtually impossible to prove that there is any collusion to: "not compete too hard in fixed voice." Furthermore, no commercial managers would normally think this way, but the outcomes are similar to this.
- Ofcom must think how commercial business might act when the regulatory strategies are defined. Commercial imperatives mean that investment choices are strongly short term based and quite rightly shareholder driven[32]. Making it possible for competition to happen and encouraging competition[33] (key platforms of the Consultation) are only part of what the strategy must consider. Competing operators (when not in *full* competition as might exist for shoe shops) might not give the best outcomes for consumers or the national economy that a national policy should desire. The regulatory strategy has to understand the types of decisions that telco management make: "understand the telco's mind set."

2.7 Business market outcomes

88. The consultation discusses the business market, although less emphasis is given than to residential broadband. Some more information on the outcomes exists in the Ofcom Market reports, such as the 2014 report.

89. The general approach has been to not allow alternative operators to have access to BT at lower levels. This was to encourage the other players to build access infrastructure. This has recently been partly reversed. Duct access is now allowed for business markets, but dark fibre is not fully allowed (a contrast to its use for residential customers). This was after a long period of the previous regime that only allowed alternative service providers to buy BT services such as wholesale leased lines or "half circuits" to enable the connectivity to customers to be done. Such connections can supplement the operator's own access cables, where these were built.

90. Business services tend to have more value for one premise's access, than for a single domestic premise. Therefore it was reasonable to expect operators to dig and install fibres to a business customer and so deliver many services (voice and data). The access fibre is the bearer for the many value added services that can be added on top.

91. The Ofcom 2014 market report shows:

[32] Any reader can of course wonder if senior managers of the many telcos are really shareholder value driven. This opens up a debate that is well beyond this paper. The many telco project failures and spectacular bankruptcies give a clear message: many fail to do it or try and simply do it badly

[33] A simple example is that of greenfield competitive market entry for FTTH (surely no new build out would consider FTTC). This has been open for all alternative players yet there has been limited new-entrant competition to BT. In the brownfield (copper) areas, the alternative market entry has been limited, even if the regulatory barriers were low or negligible. It was encouraged (and even had BDUK monies), but it did not happen

- Corporate data service revenues of £2.7 Billion – a figure that has held steady, in contrast to other telecom sectors.
- Businesses make greater use of mobile relative to fixed calls than residential – to be expected as the premium price of mobile calls is better justified, plus there is a business imperative to be mobile for many employees.
- The average revenue per line[34] is not much more than for a residential customer. More use of mobile is one reason and the lower cost (and price) of ISDN based lines is surely another. Price discounts for business customers are surely another. This is worth appreciating as some believe that business customers must be more profitable than residential ones, and so prices are discounted. Yet the basic calls and lines cost the same (unless using primary rate ISDN or new VoIP alternatives). With more customer/service management and the almost inevitable bespoke service features and additional service management, the net profits may be worse. The failures or financial woes of a number of value added service providers or outsourced network businesses give testament to this[35].

92. Corporate services have a number of features that may help to explain the need for the Ofcom change in policy and give arguments for further changes to possibly include dark fibre unbundling:

- Outside some metropolitan centres (such a City of London) many business are scattered across town and are often on business parks. These are often located far from the central exchange sites, that are usually centrally located.
- Companies usually have many sites, but desire one supplier (hence the emergence of outsource service suppliers for both UK and international supply).
- The access infrastructure costs to get to many sites and locations are high. This is due to distance and the fact that the likely take up of businesses in a business park might be low – so a high percentage of costs are stranded. This adds to the business risk.
- Alternative access networks do get built, but these may only be centred within regions. The most attractive business market is that of large corporations and these will often have many sites nationally. This makes it hard for a single provider to service them using multiple local-access-network businesses. They may end up using BT. Corporations desire a single supplier for most or all of their services.
- Major national prizes such as a retail bank or other businesses with 10,000 premises, creates a huge investment issue. Therefore most access links have to be over wholesale services (inevitably from BT).
- Without building the alternative infrastructure, the other operator cannot easily offer diversity of infrastructure access, which is a key requirement of many businesses.

[34] 2014 Market report Figure 5.33 Average monthly retail revenue per fixed line (residential) and Figure 5.50 Average monthly retail revenue per business fixed line

[35] Their problems were however not all voice-based. Value added data services also can have problems since the underlying wholesale cost of accessing business customers using leased lines etc is such a large part of the total cost – making competitive price pressures on the value added portion difficult to manage

Two diverse access links and two suppliers is important for key business sites to give resilience, but if the alternative supplier is still using BT then this diversity cannot be offered: why bother moving supplier or adding another, if the reliability of the underlying layer for most sites is still going to be the same?

- A large percentage of business services' costs are locked up within the access link to the premises. The competitive pressures are then mostly on the value added portion, which may make the overall margins very small. With this pressure it becomes yet harder to justify building new access cables/ducts to many sites, especially as the take-up percentage might be low.

93. These factors have combined to give a generally low level of alternative access build to businesses –when viewed nationally or if compared to what it *might* have been. Even the core network markets have not seen the build-out that might have been expected – this is demonstrated by the lack of competition in many of the business connectivity markets (see Ofcom market reviews).

94. It is interesting to note that recent disputes have addressed overcharging by BT for its wholesale leased line services. High prices should have encouraged alternative operators to build the networks themselves. It is a moot point whether these high prices really encouraged network investment or else alternative players were still content to, or even preferred, to buy-in from BT rather than building a network[36] even with known high prices.

95. It is generally true to deduce that Ofcom believes that the outcomes have not been as good as they might have been or else have worked their course and delivered whatever could have been done. This is behind the recent change in approach. Clearly the changes could have gone further and included dark fibre or even obligations to install new additional fibre and unbundle this. Duct access is only a partial step towards a more radical approach. A counter argument might be that further changes in policy are tantamount to rewarding the non-investment by alternative providers in physical access links. For whatever historical reasons, the current outcomes are what they are. The forward looking strategy has to consider "where we are," and not worry too much about "how we got here." A perfect world may have diverse business access infrastructure, but this has, and surely will, only exist for a faction of the total premises. Certainly the coverage by alternative physical infrastructure suppliers *should* be far higher than seen in domestic premises.

96. Certainly a move forward a more integrated approach should be considered. All NGA investments (BT and other operators) could be used equally for business markets or residential services. A fibre in a duct can be used for anything. "Business data packets" are not different to "consumer packets" – a point that has been discussed much in the past where regulations or telco management tries to differentiate bits. Such "bit policing" is inherently moving to dangerous grounds as technically the service (bit transport or

[36] This emphasises a key strategic point. High wholesale prices are good and bad. The choice depends on perspective. If investment is desired then high wholesale prices are good [see the Oftel era when leased lines were only available at retail prices to encourage the new Mobiles to build their own backbone networks]. But high prices are bad for the other providers in the short term, and bad for consumers who ultimately have higher prices, at least in the short term. All parties and outcomes cannot be optimised in every regulatory-strategic decision

lighting of a dark fibre) is the same, no matter the consumer or the nature of the traffic. At the very least NGA investment (even if primarily aimed at residential consumers) should surely be considered a useful platform for business and data services. The same fibres can be used for:

- Business services. Ethernet, leased lines, voice services etc. can be multiplexed over the same fibre
- Wholesale use by mobiles to create backhaul for cell sites and WiFi service
- Anything an alternative service provider wants/needs. Why restrict the usage[37]?

97. This can be taken further: why should ducts be restricted for one purpose: business, domestic customers, core networks, leased lines broadband etc.? The space is the same in each case. As the need is now to maximise infrastructure investment then this is maximised by allowing re-use of existing infrastructure, with a few restrictions. This allows for example a new fibre in a duct rather than no new fibre in no new duct. Past restrictions did not create many second networks (with some exceptions like Virgin). Sharing also gives lower overall costs as duplicate infrastructure is avoided (with resulting consumer benefits). Certainly this reduces the competition at the lowest level. But that approach has been done. A new approach is required. The Consultation's very existence is tantamount to agreeing that the past approach was perhaps reasonable, but maybe not as good as it might have been.

98. It is arguable whether the outcomes for the business markets are success or failure. Submissions from parties will argue for both (with of course most aligned against BT). As with all submissions on all parts of the Consultation, Ofcom will need to be careful over what to believe and accept. "Well they would say that, wouldn't they," is true in almost all submissions and not just on business market issues.

2.8 Summary points from this review of the markets and outcomes

99. This section has started with the review in the Consultation and it considered the outcomes seen in mobile, broadband, PSTN and business services. It has also looked in brief at how the UK arrived at where it is. Although this history is of questionable value as the Consultation is about moving forward, it is still useful to appreciate how past thinking worked and how decisions led to the current outcomes. Some lessons from this include:

- The market outcomes are not totally shaped by regulation. Operator's strategies are the ultimate driver and these can conflict with Ofcom's aspirations and so lead to

[37] This is a general point that occurs globally, in the author's experience. Regulators tend to regulate (and so restrict) things then slowly lift the restrictions and when often a good starting point is to "let anything happen" – such as wholesale access without limits, and *then* consider the counter-issues and perhaps introduce some controls, but only if needed. Generally Ofcom's thinking, as shown by the Consultation's desire to lift regulation, is correctly along the lines of the latter but lifting regulation may also restrict use in other areas because obligations to supply, might then lifted. Carefully assessed decisions are still required

unexpected outcomes. The Ofcom strategy must try to understand the operators' thinking, to help shape the way ahead.

- Operators make mistakes and fail. Regulation does not protect the industry from stupidity and the resultant impact on consumers and markets. Large corporate failures in NGA could lead to fire-sale telcos that could distort the market and harm the successful businesses.
- A corporate failure need not always be a bad thing, especially if this is planned for. This is different to a normal company failure. This is highly relevant to regulation of NGA and alternative providers, along with regulation of the "localised monopoly" of the first NGA suppler in a region. Failures can also lead to fire-sale assets[38].
- Regulation needs to consider more the investment incentives as competition-driven incentives to invest in NGA are limited. The recent Ofcom changes (duct and dark fibre access) imply that this is recognised. Competition is of course a good thing and must be encouraged, but the practical limitations are clear – they cannot be two or three access cables other than in selected areas. More recognition of this is required in the new approach.
- Mobile outcomes could have been better. Take up of voice is lower than in many countries, prices are higher than they could have been and 3G coverage never reached the potential it should have. Lessons for 4G and future 5G should be taken on.
- Mobile operators' data strategies should be considered when regulations and obligations are defined. It is not hard to realise that mobile data should be more integrated with what is notionally fixed access (WiFi and FTTx to small cells). Fixed and mobile thinking need to be combined in the regulatory strategy. This is of course in line with, for example, Consultation para 8.18 that defines the different types of convergence.
- Ofcom should compare the UK with global leaders and not just try to show the UK is a bit ahead of some selected EU countries. The changes are global and rapid. What is happening in Korea, Singapore, Japan or California et al are *at least* as valid as France.
- Fixed voice outcomes are still relevant to the UK and these are perhaps not as good as they could have been, for reasons discussed earlier. Ofcom should not ignore the importance of this market.
- New ways are required to consider the access costs – "heroic cost splits" of broadband and PSTN line rental are increasingly irrelevant due to common costs and pricing/market overlaps.
- Business markets have not been considered as much in the Consultation as they might have been. The outcomes here are probably not as good as they could have

[38] This can be good or bad of course – bad for the investor but the buyer might pay only 10p for every £ book value. It is good for the buyer, if they can make a business, but of course this can distort the market prices. See the international carrier failures around ~Y2000 for some obvious lessons

been and there is good reason to consider further changes in the new regulatory strategy.

- The new strategy should link fixed, mobile, business-connectivity and wholesale-connectivity strategies. The regulatory focus on NGA investment is correct, but the other items have to be part of the integrated approach. Mobile is not inherently divorced from fixed as a business and certainly should not be separate in a future regulatory strategy.
- The Nielsen's law discussion emphasises a need to be radical in the broadband access speeds – with exponential changes in access speed being normal, short term solutions will not be long lasting. Short term economic solutions are encouraged by investor returns (fast payback) but the longer term costs from a small upgrade in speed or technology are likely to be higher because of the repeated upgrades and incremental gain. These only keep the UK moving along "just like most of the other countries." The Ofcom evidence of Figure 1 above shows that UK speed increases are at best only in line with the rest of the developed world – it is not outstanding. This does not give the UK an economic lead over the global leaders. The obvious message is: a radical step change is likely to be better *in the long run* than piecemeal increases in broadband speed and penetration levels. Management and investors' drivers (in the short term: minimise expenses) are not naturally in line with desired national economic outcomes (step up and have a global lead) and so Ofcom has to balance these in its final decisions.

100. A key summary point relates to competition and investment. Certainly making a market attractive to competitive forces and competitive market entry, is good. This has been a central approach to Ofcom's regulation. More attractive to an investor is to have a market with **no competition**. More attractive still is a market with no competition and government funding assistance (assuming that the funding more than offsets the additional costs for addressing the region). This simple observation shows the need for alternative approaches, where the priority need is to get investment. Competitive service supply is a secondary requirement, that can be added in later. Of course no one[39] should imagine that a total monopoly supply is inherently desirable – this is certainly not being suggested in this report. "Competition is good" remains a sound mantra. The simple facts are that in some areas, and *to attract investment*, some of this thinking has to be adjusted in the new Ofcom strategy. This may be for short periods or for localised regions, but clearly new rules are required.

[39] Strictly this is not true, as there will probably be submissions supporting nationalisation of networks, or the introduction of a single suppler. The Australian NBNCo type approaches show that exclusive supply *is* accepted in some developed markets. This is discussed in this report, but it is not considered an approach that is likely in the UK for obvious political reasons, plus there is already some significant competition in NGA: which would be both difficult to reverse and such changes or buy-outs or controls of the other players are counter to accepted UK regulation and free market principles

3 Discussion of the Consultation questions

101. This section considers only some of the questions. Some of the background to the replies is summarised in the previous Section 2's discourse that reviews the history and outcomes. A full discussion of the reasoning would require a much longer submission, but the main points and reasons are considered self-evident or at least they should be obvious to most observers.

102. The section begins with a short discussion of the Consultation and key items that are not covered. The section them moves on to the questions.

3.1 The missing factors

103. Consultation Section 1 makes clear the aims to promote competition, innovation and investment to give choice and affordable services so *"…that the UK's citizens and businesses are served by high-quality, widely available telecoms, both fixed and mobile*" (Consultation 1.14). Critical to the Consultation is the lack of a clear goal – what are the key services, service metrics, coverage levels, speeds to be met? How are these to be achieved? These are policy directions that are of course not totally under Ofcom's remit. However the regulatory strategy is significantly weakened if the goals are missing. In effect the strategy defines how regulation will be applied to give whatever outcomes the industry moves towards, with some additional external goals being set by UK government or the Digital Agenda Europe (DAE). Some goals such as DAE provide targets, but a target is not a strategy or a policy (it can just be a number that could be nice to achieve). Is the policy goal aimed to meet or significantly exceed the DAE values for broadband? The Consultation or policy does not define how the goals will be achieved in the first place (all free market competitive investment, more or less intervention such as BDUK, more spectrum, etc.) but the Consultation focusses "only" on how the regulation will be applied to whatever path is taken. This quite reasonably concentrates on promotion of competition and investment etc., but it lacks the vision of where the UK needs to get to.

104. At the meeting of the 11th May 2015 when Ofcom presented and discussed the Consultation, it was correctly made clear that the job of the strategy and Ofcom is not to predict the future outcomes. No one knows the future in telecoms with any certainty. However there should still be policy goals in place to give a focus to the regulatory strategy. What is the vision for the UK?

105. The Policy paper "*The digital communications infrastructure strategy*[40]",18 March 2015, gives some limited directions. Limitations include the USO (see footnote 1) and items such as "*The government is assessing the steps it needs to take to implement the EU Directive on measures to reduce the cost of deploying high-speed electronic communications…*" or "*We… are considering options for introducing a connectivity rating*

[40] See https://www.gov.uk/government/publications/the-digital-communications-infrastructure-strategy Consultation Para 1.29

for new and existing buildings." Emphasis added to emphasise [*sic*] the weaknesses. This is short on clear directions and specific outcomes. .

106. The Infrastructure Directive[41] for example gives some more direction and other EU papers give further inputs. It is not clear in the Consultation how these are to be applied in the UK. Other items that are not clear include: if or how the strategy will support, or not, other plans such as the Commission's 16 initiatives to make the Digital Single Market (see announcement of 06 May 2015[42]).

107. Clarity would be sensible in a number of areas:

- Targets need to be defined (broadband coverage, minimum speeds, by when). By how much should these exceed the DAE? Of course a strategy for 10 years hence will also cover other (totally unpredictable and ill defined) items, but at least it should cover the generally known need to have a broadband based economy. Some goals and numbers should be defined.
- A vision of the country is required. Should this be based on x% availability of broadband greater than 100M/200M/1G, and by what date? This should be supported by >Y% coverage of mobile broadband across X% premises. It should (or not?) be the aim to have an integrated approach that combines fixed broadband delivery with WiFi and mobile backhaul to give a rich platform of fixed, wireless and mobile as the critical minimum outcomes that the country needs. A number of such visions can and should be defined. The very best might be unachievable, but practical approaches can then be defined perhaps to get to a second-best outcome. Is the vision for FTTH or FTTC? The strategy really should be more specific on such aims – after these are defined then some numbers and options[43] can be defined to get the outcomes. Then the more detailed regulatory approaches can then be defined.
- Government intervention exists and whatever goals are defined it is unlikely that any visionary targets might be achieved without this. The UK lacks government clarity on what such interventions might be. This is central to regulation plans, as any intervention changes the picture and altered rules are needed.
- It is very clear that competition will not give all of the national outcomes that should be desired. If free market decisions would do this in an optimal manner then Ofcom would not be needed!
- Intervention is clearly relevant to many countries (look at Australia NBNCo or the split of Chorus in New Zealand and the effect of regulation on it, or Ireland's Broadband Intervention Strategy of July 2015, or BDUK). This is a government policy issue, and so outside the Ofcom strategy, but that lack of clarity makes the regulatory strategy unclear. Without clarity on money it is impossible to say if any visionary broadband level is achievable or not. Money is finite of course and uncertain, but minimum commitments are required. At least it then becomes clear if the digital divide can ever

[41] Directive 2014/61/EU of The European Parliament and of The Council of 15 May 2014
on measures to reduce the cost of deploying high-speed electronic communications networks
[42] A Digital Single Market for Europe: Commission sets out 16 initiatives to make it happen.
[43] Government monies, licensing, USO definitions & obligations, changes to obligations on other (non BT) providers etc

be addressed fully and some rules for regulatory controls are then possible (e.g. how to deal with NGA when full or part-publically funded, and/or mobile/radio licenses can have sensible obligations to give a fill-in to rural areas if the funding gap is quantified).

108. Government policy and national aims are probably the main gap in the Consultation (it is accepted that this is part of other consultations, but they are related joined). This requires government clarity and direction – into which Ofcom would be expected to have inputs. The high speed rail investment HS2 is one big decision that sets an example direction for discussion – large government investments are possible. National broadband is arguably a more important issue and could provide far more economic benefits. The worst case outcome [highly unlikely] that a very ambitious superfast network is not heavily used or needed until perhaps 2025 is unlikely to give major risks to the national economy. Infrastructure such as good roads communications, water, airports are central to any economy - good infrastructure in Germany and Japan are often cited as part of their success.

109. This Telzed paper does not include a vision for the outcomes that Ofcom should regulate towards. This is left to others or to future work. Some general points about the need for high speed and significant levels fibre roll outs are made. In addition this paper does not speculate on what the future services are. This is in line with the Ofcom discussions at the May meeting. However a number of key points should be considered:

- Leading countries in broadband and NGA almost all had a plan and a strong lead. They may each have different approaches and may not all be optimal, but they had a plan and vision.
- The demand expands to exceed the capacity available. Almost everyone in telecoms has seen this happen.
- Exponential growth is normal.
- Currently video is the primary driver for NGA. This demand will grow. There are many other services and ways in which the internet is used. These can be critical to some customers and they should not be held back too much by lesser-needs for the average consumer. Those in the lead (especially home workers and small businesses) will be providing the greater national economic gain – they should not be given only the same capacity needed by most who just do basic internet surfing.
- Major growth is likely to be in the uplink speed. Many NGA solutions are currently based on asymmetric speeds. Most future services are likely to be symmetric. Currently we are dominated by asymmetric video. Ofcom should plan to include pressures to encourage this symmetric-speed outcome. The need is already there and will rise. There is no need to quantify or study if/when symmetric services will grow, in order to make this decision.
- Expect the unexpected. There will be other new services and demands.

110. Other items that are not fully covered include:

- The broadband based economy. IT and businesses “simply” use the internet. The economic gains from this are more than the GDP gains of the telecoms market itself. This is out of the scope of Ofcom’s remit, but broadband without businesses able to exploit the platform has less value. Education is another aspect of this – creating the skills to develop the economy that runs on the broadband, but again this is not

directly part of Ofcom's remit, but it may be something that Ofcom can inform the policy makers about.

- Security. There are other UK initiatives on this, but possibly Ofcom (or some other body) can help to impose rules. Major assistance is required for the UK industry as the big cyber threats are from major companies and even governments. Any business needs to have protection for its intellectual property. Recent scandals demonstrate how businesses are vulnerable even to hackers. Consumer data must be protected and some UK body must have rules and advice to ensure this[44]. The potential for more professional bodies than "hackers" to do far more thefts of intellectual property from UK business is obvious. Regulations are required and assistance is required; mostly from specialists but government may need to play a role as the issue drifts into the realms of cyber warfare, encryption, intercepts, secrecy etc.

3.2 Key questions Q1 & Q2: should competition remain at the core of good outcomes?

Q1: Do stakeholders agree that promoting effective and sustainable competition remains an appropriate strategy to deliver efficient investment and widespread availability of services for the majority of consumers, whilst noting the need for complementary public policy action for harder to reach areas across the UK?

Q2: Would alternative models deliver better outcomes for consumers in terms of investment, availability and price?

Telzed reply

111. Promotion of competition is naturally the best way of getting the best outcomes. However, full competition only exists in some areas – generally in the downstream markets. Most areas progressively have less competition with the move to lower levels in the supply chain, and so regulation has to increase. As discussed in this report, there is likely to be only a single supplier or just possibly two suppliers at the network access levels. The required regulations should be adjusted to consider "regulated local access monopolies" to encourage investment (see Section 2.5.3 para 71 onward). Traditional regulation supplies remedies that try to simulate the outcomes, as if the market were competitive. This is a good principle. However this clearly might not be optimal for investment incentives and this is the key requirement for NGA.

112. Extending this to non-economic areas (the digital divide) then clearly competitive market entry is unlikely: who competes to invest in loss making areas? The number of customers that are loss making are reduced if there is less competition. Funding assistance is still required in some places.

[44] There are rules on how phones are used and call centres are therefore indirectly regulated by Ofcom

113. Even in areas where competition exists and should give good outcomes (say mobile retail) the outcomes might not be as good as is possible. This is recognised in the Consultation and for example in its reference to the BEREC report on Oligopoly analysis.

114. The key approaches to consider are:

- Non-regulation in competitive markets. This is obviously the right approach, but still needs reiterated. If OTT services really are substitutes for telecoms then regulation for the telecoms services could be lifted (though perhaps some USO obligations would remain). Clearly most OTT services do not fully substitute for a telco service. It is also clear that Ofcom sensibly has no intention applying telco regulation to the OTT service, just because that service might be similar or even a true substitute within the same market. This application of telco regulation to OTT *is* sometimes seen elsewhere in the world, and so it is mentioned here.
- Pro-competition regulation in areas where competition is less, using remedies such as cost orientation to simulate the outcome of competitive markets. This follows "normal practice." The fundamentals of telco regulation should remain:
    - Market testing, then apply an appropriate remedy, if there is a problem. The remedy is usually to encourage an outcome that meets defined strategic aims.
    - This is done using clear processes that balance the conflicting definitions of a "good outcome".
- Some new approaches are required to consider the quasi local monopoly of the supplier that installs NGA infrastructure (ducts and fibre in particular). A mixture of access obligations (for duct or other infrastructure[45]) and some protection for investors is needed particularly when it is not BT or a big national player. The first mover issues must be considered versus a big player's late market entry and its wider business objectives to supply standard services across larger regions or even to every premise. This is an essential issue that Ofcom has to address in the regulatory strategy.
- The above item will need to be linked to USO obligations, if introduced, as a major player with USO obligations should not simply duplicate the existing or prospective NGA services of the local investor, just to meet its USO directives without considering the local investor. USO directives must be appropriate. Also the initial entrant *ought* to have been able to access the USO fund.
- The approach should consider ways in which the eventual business take-over or transition to larger players, are accepted norms. Fire-sales with huge asset write-downs must be avoided. Pre-planned take overs or "failures" are good for investors,

[45] Ducts other than BTs may exist and other infrastructure access options might exist and should be considered. See EC infrastructure directive. Every niche option for every location is worth pursuing to reduce costs and increase fibre-access investment. However the majority of premises can only be via normal ducts, cabling, poles and digging to the termination point in the premises

customers and eventual buyers. This has to be balanced and should not protect stupid business plans[46].

- The approach has to be modified along with the amount of public investment. Asset values and exclusivity rights to use or to supply, will then vary. If the local investment were mostly from government funds then a local initiative might reasonably have to supply all downstream business. If it is has all private monies, then such obligations might be different. For example obligations on Virgin are not the same as on BT, so clearly asymmetry of regulation is already normal.

115. Q1 notes the public policy issue: "*the need for complementary public policy action for harder to reach areas across the UK*." This is, as discussed in this report, a key area that needs to be developed. The public policy and direction should not be separate to the regulatory strategy. However the lack of public policy and direction obviously makes the Ofcom strategy harder.

116. A different regulatory approach is needed that considers *investment* to give the defined policy outcomes is a more important objective than "just" competition at the lower levels of service supply chain. Investment covers both private and government sources. Carrots and sticks will surely be needed to get this outcome.

3.3 Telzed "model" to analyse different approaches

117. The latter points in the above discussion bring in the possible use of a "Telzed model" that was developed in its other national broadband strategy and regulation work. This does not define the regulation or the strategy, but helps to understand the different situations. For each situation, a regulatory plan and approach can be developed. The first step is to define what the local NGA option is.

118. The main three factors to consider are:

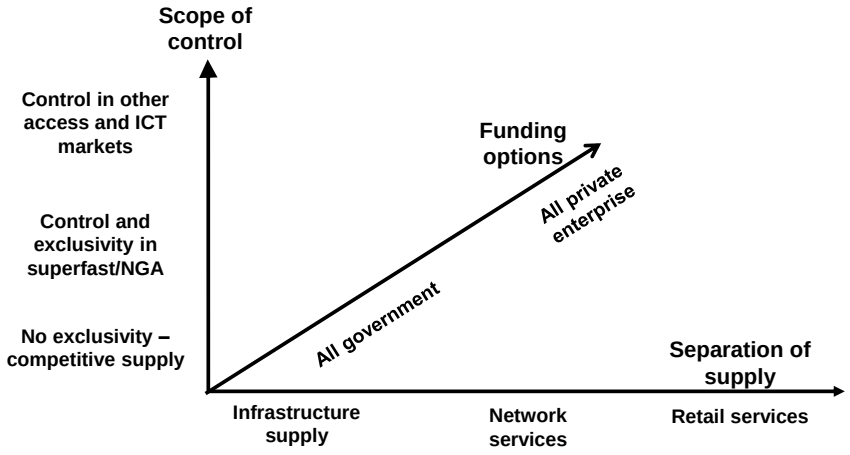
- Funding. Is this all private or all public monies. In many cases it will be a combination. Many options exist
- The separation of supply. The supplier can deliver infrastructure only or else also network services or even retail services
- Degree of exclusivity and control.

These factors[47] identify the key factors that differentiate the supply situation.

[46] The many failures in telecoms seen over the last ~20 years shows that there is a lot of what could be termed stupidity out there. Many failures were surely predictable. *Heroic f*ailures however are still to be applauded, where good intentions simply did not work out. No one knows if every plan or every technology will work – free markets winnow out the bad ones: hence the risk premium in cost of capital calculations

[47] Of course there are many other factors, but things start to get too complex to analyse and easily assimilate. Three factors are complex enough

Figure 1 The local service supply can be evaluated by three factors to clarify their differences



Source: Telzed

119. A service supplier can be positioned in the above framework. For example:

- The Australian NBNCo has government funding and exclusive supply in more than just superfast, but not to the retail level. Only in the infrastructure and network service layers.
- Chorus in New Zealand is a publicly listed company and so is not exclusively government funded (it is now a private enterprise). It does not supply retail services.
- A local municipality could invest in fibre in the locality, so this gives an all government funded infrastructure-only provider, but it probably has no exclusivity. It may have de-facto exclusivity as no other party might want to then deploy fibre, which is clearly not the same. The incumbent would still deliver legacy broadband of course. This might be termed a "Swedish approach."
- Stokab in Sweden shows an approach centred in Stockholm. It has infrastructure and network service supply, without exclusivity.
- Cable operators might have control in some other markets (TV delivery or retail TV), but not exclusivity in NGA.
- The Mexican national government-owned LTE (4G) network delivers network services with some exclusivity of supply in rural areas (where the operators do not have coverage), but not in city areas. Here the NGA/superfast definition is stretched to include LTE.

120. The WIK and Analysys reports show a very wide range of approaches. Telzed has also noted this in its other work and even a short investigation shows "almost anything" has been tried somewhere and might work. However there is no strong evidence that analysing these with some econometric approach will give a clear direction to the UK. This is a message from the WIK study. Each country has its own issues and most are very different to the UK (look at "interesting" countries like Australia, New Zealand, Singapore, Japan, Korea, USA Google fibre, Etisalat in AUE, Sweden, the nationally-owned 4G network in Mexico and so on). They do not directly translate to the UK as a solution that is clearly best and must be followed. Each can be understood as covering a

position in the above framework. But there is no optimal position in the model framework that jumps out as a solution that must be adopted either in the UK or elsewhere.

121. Once an option is positioned in the model above, then the differences are clearer and *then* the regulatory requirements to tackle the issues that arise in that position, can be considered. This helps to understand what might be needed in each position and the regulations that will be required.

122. It should also be noted that even within a country there will be various options. Rural UK might one approach but urban areas (ignoring the competitive/duopoly areas that are already a relative/partial success) could have another set of approaches.

3.4 Key question Q3: public policy for availability

Q3: We are interested in stakeholders' views on the likely future challenges for fixed and mobile service availability. Can a 'good' level of availability for particular services be defined? What options are there for policy makers to do more to extend availability to areas that may otherwise not be commercially viable or take longer to cover?

Telzed reply

123. The challenges have not changed from five year ago or even longer. Mobile operators naturally focus on the more profitable areas and this has led to a lack of coverage. This commercial driver is at odds with regulatory or public policy that should seek close to universal national coverage. In the longer term this has probably harmed the mobile industry – the lack of mobile services has probably held back the use of mobile services (they cannot be relied upon to be available). The obligations for coverage in the 4G licences are a counter measure. Such obligations are reasonable and should be enforced for existing and new spectrum. The mobiles can factor the costs into the license bid. The costs of marginal areas are then factored into service prices – all customers help pay for what is in effect a type of USO.

124. The availability gap for fixed is a bigger problem. There is no new license to bid for and so there is no simple commercial recovery of the costs for addressing the digital divide. Ofcom could force the coverage in an enhanced USO, but the cost to cover the marginal areas is large and the USO costs would be significant. With most of the national market being competitive, the USO business cannot recover the deficit to cover the digital divide from its own customers. A USO fund therefore would need to be considered: something that is fraught with problems:

    - How to define the USO?
    - How to measure the net costs?
    - Who pays for it? Other access-network provider operators, government, downstream ISPs, or even OTT providers.
    - How to decide who gets the funds? Many operators might argue they they are covering part of the digital divide.

125. These are major issues. These are discussed further in Section 5. Certainly if a USO based approach for fixed is taken then it is vital that no "false economics" is used to show that the total cost is small and so the main incumbent(s) that have the obligations

have to bear the burden with little or no support. This was done in some countries in the past when the PSTN type USO was a major issue.

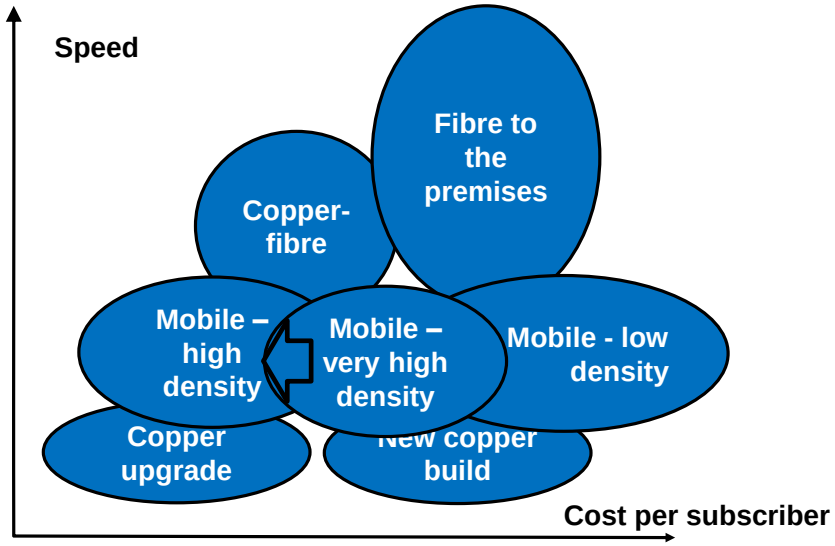
126. Availability measures certainly can be defined. These measures should include:

- % premises served (i.e. service is available on request) by more than one infrastructure provider. This is arguably ideal, but it might not be optimal (less efficient)
- % or premises served by one provider
- Availability of competitive downstream service supply. This may seem self-evident, if there is one physical superfast access network provider. But such competition only exists if there are regulatory access obligations. This does not exist in the UK on all access network providers. Furthermore, it is possible that, to ensure investment, some exclusivity of downstream supply may be allowed in some regions, or else the wholesale obligations might be favourable to the investor (allowing downstream competition but at favourable prices and/or no access infrastructure duplication for a period). The approach must consider the balance of attracting investment versus allowing fuller competition – in effect the strategy has to consider regulating a localised monopoly. But the solution for other providers is not the same approach as used for BT with its access-network-market-power.

127. The question links mobile and fixed availability. Ofcom is correct to combine the two. In the past the two were separated. A more integrated approach is required. Fixed access infrastructure or network communications should be available as part of the mobile base station backhaul. The fixed and mobile operators will need to consider both as complimentary approaches, as is already seen:

- Mobiles seek offloading of mobile data onto WiFi (which is nominally seen as “fixed”).
- Mobiles need to develop more small/cheap base station solutions to cope with the cost increase that is inherent in high density areas. Mobile costs fall as customer numbers rise, but as the customer numbers or traffic levels become too large then the base station density increases too much and cost per customer becomes worse. See Figure 2 below.
- Fixed players start to allow “fixed network service” roaming onto other premises and WiFi hot spots.
- Fixed players such as BT (or others using MVNO or mobile licences) will cover marginal areas with 4G or wireless options to give service coverage – even if it is not the fastest NGA infrastructure. This approach is worth noting as customers buy a service and not “an infrastructure.” 20Mbit/s (or more if possible) over wireless or over fibre-copper, are all the same to the customer, if it works. In any event, almost every usage is ultimately over wireless (it is rare to ever have a LAN cable into a device).

Figure 2 Cost and speed – the cost of very dense wireless solutions increases, but cheaper small cells move the point of increase upward



Source: derived from the Telzed paper for ITU[48]

128. The options open to Ofcom to increase the availability include:

- USO-like and coverage-type obligations on spectrum. Ofcom should continue and enhance this.
- Obligations on fixed providers – a new USO is a possibility. This has inherent problems. These can be addressed. USO is returned to in Section 5 page 59.
- Funding – with inherent limitations of finite monies from government sources and the inherent problems of making access to the funds fair, and not to distort the more competitive areas without funding assistance.
- New regulations for localised quasi monopolies to encourage investment.
- Understand more the commercial approaches of the mobile and fixed operators. Their actions are rightly biased and will not cover risky/low margin areas without some incentives or coercion.
- Look at integrated regulations that ensure "fixed" regulations are not separated from mobile outcomes – for example enforcing easy/cheap access for base-station backhaul, onto NGA network providers.
- Continue to allow more mobile infrastructure sharing. Infrastructure investment was a key Ofcom (and Oftel aim) and site/mast sharing was once not encouraged. The real competition is at the network and service layers. Allowing sharing is sensible (recall

[48] ITU paper: Strategies for the deployment of NGN in a broadband environment Regulatory and Economic Aspects. This paper was aimed at developing countries, but almost all of the strategic discussions are equally valid for the UK and other developed economies

again that customers do not buy *infrastructure*, but buy services), with some obvious provisos such that sharing deals do not limit service competition and downstream operations. This is a parallel of the recent allowing of the shared use of ducts and access fibres.

129. The integrated approach is clearly already in the Ofcom plans. This is shown in the Consultation Section 8. Telzed agrees that technical, business service convergences are clearly happening and will continue so that regulation must be more integrated and not "mobile versus fixed."

3.5 Key questions Q4 & Q5: convergence and competition

Q4: Do different types of convergence and their effect on overall market structures suggest the need for changes in overarching regulatory strategy or specific policies? Are there new competition or wider policy challenges that will emerge as a result? What evidence is available today on such challenges?

Q5: Do you think that current regulatory and competition tools are suitable to address competition concerns in concentrated markets with no single firm dominance? If not, what changes do you think should be considered in this regard and why?

Telzed reply

130. These questions are partly answered in the replies to the Q3, and earlier discussions that indicate the need for more integrated approaches. This is also spelt out in the Consultation section 8 discussions. Services converge in several ways: network level, service level and retail levels plus business convergence is underway with consolidation and the combining of services in packages (as discussed in Consultation such as 8.18 onward). A challenge will probably remain in that formal market testing and regulatory actions based on this, are likely to have problems. This follows from the facts that even today, mobile voice and fixed voice are not total substitutes. Mobile broadband and fixed broadband are similarly not totally substitutes for each other[49]. This will need to be addressed when actions are taken, if this strict market testing has to be the basis for subsequent actions. On their own each market may be competitive (or not) and as they are separate it is not easy to have remedies in other markets or to have integrated regulation that combines actions in more than one area[50].

[49] Mobile voice has never had the reliability and quality of fixed nor of the similar price, though the differences are much less. The Ofcom market reports show mobile and fixed call costs being similar, however this is distorted as line rental is part of the fixed costs – a notional assignment as the cost are really part of "access" as access is mainly needed for broadband. The marginal cost of fixed call is much less (hence the enduring survival of fixed). Of course fixed voice or broadband is not yet truly mobile. The mobile broadband costs and speeds are not a substitute for most fixed broadband – but it might be in some areas. This is likely to remain the case, as fixed broadband should tend to gigabit rates with FTTx or FTTH and mobile type technology will struggle to ever approach that speed (due to Shannon's law plus the limitations of transmitter power and base station density). The price and performances still mean that mobile and fixed are not total substitutes

[50] Of course this *can* be done – as shown by the EC approach to roaming that combined retail and wholesale market actions and markets in different countries

131. Key points for regulatory strategies include the following:

- Do not think purely mobile or fixed when assessing services and competition levels
- Partial substitution and convergence will increase
- "Creeping market power" should be looked at carefully where a supplier is active in many parts of the supply chain and covers mobile and fixed solutions and may also have OTT, content and TV services. In principle this is OK, as each individual sub-market may be competitive or not give a concern. Collectively a concern should arise at some point – as other smaller players cannot realistically match the volume and degree of converged service supply, even if in theory there are no fundamental barriers in any one sub-market. Ofcom should look carefully at this and apply very strict analysis on how services are combined and sold. It is likely that some limits might be better set which restrict the service-level convergence or business convergence. This might possibly give some higher prices and reduces some consumer benefits from the integration, but it avoids the risks from integrated trans-market players having unreasonable advantages. Having more competition is probably better than having a multi-market-dominating player.

132. This line of thinking is not easy to justify as formal market tests might be passed, but collectively a regulator should be uneasy about too much of all markets ending up under one operator's control. The Ofcom concerns about BT's actions in TV, premium content, mobile and broadband markets are a clear reflection of this obvious conclusion. Individually each might pass tests to show the respective retail markets are competitive. Very robust approaches to analysis are needed that consider if there really are any synergies and cost reductions to justify a reduced cross-market bundled price. If there is any doubt, then the converged offering should be simply the sum of the separate prices and Ofcom restricts the lower priced combination. This is however moving to retail price controls: an uneasy direction, but it may be justified in the "creeping market power" scenario. Going further, some additional rules may be required to actually stop a big player covering too many markets.

133. Additionally a very critical view should be taken of new ventures and "free" inclusions – at least when this is done by a player that is gaining "creeping market power" across markets. This issue will become more critical in the near future. It should be quite obvious that a BT venture into TV content is *not* as separate as it selling clothing (where any other service supplier could either enter the market or duplicate a similar service with a partner clothing retailer). Bundling of such a service has obvious concerns. In addition the real cost of profit (if any) of such services must be looked at very carefully and if in doubt it should not be allowed. The concerns get even higher when "free" items are bundled in. There is nothing new in this, and recent investigations mean that the key issues should be fully understood and provide the obvious evidence. However the problems go the heart of Q5 where the regulatory controls and tools might not be adequate. Some new controls and rules may be needed.

134. The need for new controls/rules is also at the heart of this Telzed paper that identifies the need for controls and even protection of "localised monopolies" to encourage NGA broadband investment. This is a subtle counter to the traditional approach that seeks to always encourage competition at the lowest level possible or to apply remedies that mirror what a competitive market outcome might have been. Certainly these principles are not considered wrong – they can and must remain in place, but in some key areas such as local NGA investment plans then they need to be modified and considered along

with some restrictions on the big players. This might seem retrograde, but investment is more of an issue (getting the NGA built) and competition in its use can be brought in later. This is also so obvious that the EC has also seen there is a need for new approaches[51].

3.6 Key question Q6: end to end competition

Q6: What do you think is the scope for sustainable end-to-end competition in the provision of fixed communications services? Do you think that the potential for competition to vary by geography will change? What might this imply in terms of available regulatory approaches to deliver effective and sustainable competition in future?

Telzed reply

135. Ofcom has in the past promoted competition and investment at the lowest levels in order to give the end to end competition. Of course in the downstream markets the competition is greatest and regulation is small or even non-existent. Cleary end to end competition has developed in the key areas that includes NGA broadband, but inherently this has not been seen nationally and huge gaps remain: a few areas have end to end competition, some have competition in the network layers, and others have competition only in the retail layers.

136. Further gaps exist due the digital divide. For many there is not even a decent broadband service, never mind a NGA superfast broadband service or end to end competition in its supply.

137. The examples raised by Ofcom such a Gigaclear and B4RN emphasise there are regional possibilities and investments can be made. These are limited and it is highly unlikely such initiatives will create full end to end competition across the UK. The obvious conclusions are:

- Competition at the lower levels (physical infrastructure and generic broadband access communications) will not exist in many areas
- Even remedies such as duct access or dark fibre (though useful) will not completely help as a) this accepts the infrastructure is not competitive and b) the local investment of fibre in the wholesale duct has huge investor risks as it might "simply" duplicate the incumbent wholesale supplier's own fibre investments that might come along later.

138. Certainly fibre access and duct access have a role to play, but other incentives are required to ensure the investment is made and protected. The attraction of investment has to be linked to how well it is protected or opened to access and competition and

[51] While this Telzed report was being drafted the EC issued its consultation "Public consultation on the evaluation and the review of the regulatory framework for electronic communications networks and services" https://ec.europa.eu/digital-agenda/en/news/public-consultation-evaluation-and-review-regulatory-framework-electronic-communications. The background to that EC consultation also notes the challenges of vertically integrated players (akin to the "Creeping market power" discussed above), bundling, plus the investment gap. These factors are central to the Ofcom consultation and this Telzed report

these are directly linked to the risks. There are degrees of protection and control, as well as degrees of competition. These will need to vary by region. Almost no controls or protections are needed in some urban areas, especially those with two infrastructure providers. But in some rural areas a NGA investor might need a period of guaranteed exclusivity either in the infrastructure layer, the network layer or possibly even in the service supply layers. The time and the degree of protection will depend on the location and size of the investment. These can give the "carrots" to help the investment take place. A further factor on the level of protection and degree of access to the investor's network will be the level of government investment. More government investment in the local NGA, should mean less protection and more open access, but if all privately funded then more protection and/or longer protection is reasonable. A simple example is Virgin which has been "protected" by no access obligations. The new approach extends this.

3.7 Key question Q7: is access regulation required? An example of applying the Telzed approach

Q7: Do you think that some form of access regulation is likely to continue to be needed in the future? If so, do you think we should continue to assess the appropriate form on a case by case basis or is it possible to set out a clear strategic preference for a particular approach (for example, a focus on passive remedies)?

139. Access regulation must remain in place as obviously the access [*sic*] network market is a bottleneck with few areas being fully competitive. The history of Ofcom's regulation has led the UK to the current situation with access remedies even at the lowest layers. One of the few additional areas that has not been addressed is unbundled fibre for business access markets and any remaining restrictions on how access services are used.

140. The next line of thinking should be: could any of these access obligations be lifted? Except for a few access-network fully-competitive areas, there seems no near term chance of this being reasonable or viable. The past approaches remain sensible. This is probably also true for higher level access obligations (say for leased lines). It remains a "goal for the future" that these services become competitive enough for the removal of the obligations.

141. A second approach might be: should any of these access obligations be extended onto others (beyond BT and Kingston)? This is more controversial and is counter the Ofcom historical thinking. If the other is competing 1:1 with BT, then a reasonable protection to help encourage the investment is the non-imposition of access remedies. Virgin has benefited from this and local NGA providers similarly have not had remedies imposed. Of course a NGA provider might voluntarily see the benefits from supplying wholesale infrastructure (dark fibre), wholesale network services, possibly instead of, or in combination with, retail services. This non-imposition of access remedies has clearly not been a sufficient incentive to entice much alternative NGA investment[52]. Additional or alternative incentives are required. These may include (continuing on from Section 2.5.3

[52] Some recent trials and investments in fibre do not show major investment is about to happen nationally, though they are good outcomes. Fibre in the loop technology has been *possible* for perhaps 20 years and major investments alternatives have been few

"Broadband options and a "new" approach", and the reply to Section 3.2 Key questions Q1 & Q2: should competition remain at the core of good outcomes?):

- Protection from other (usually large players) entering the same regional market
- Periods of exclusivity being defined in advance (lack of clarity is a huge investor problem for risk management)
- Some access requirements to be also imposed. This at first seems to be counter intuitive to the first two points above. If the local investment has government assistance then more clearly some opening up is more justifiable. If the investment is large, then some downstream competition should be allowed. After all, the consumer should have the rights to approach the UK-leading retail providers for its service. Restricting supply to only the local retail service provider (the NGA investor) is likely to be poor for customers. It also creates an anomalous situation, but it might be acceptable in a few locations
- Complementary to the above access requirements, will be some price controls. If the extreme retail exclusivity were to be considered (in few areas), the retail price limits would need to be set (probably based on national or regional averages).
- A more normal approach would be to allow some access obligations, especially with government funding, and the wholesale prices would then need to be controlled. This needs to be done with some care as prices for (say) BT might not be equally applicable to a regional (high cost) local NGA investor that works around the digital divide areas. The prices are likely to vary by levels of government investment or assistance, the size of the investment and the levels of exclusive supply protection (time and the "layer of supply" – infrastructure or network layer). The cost-to-serve is obviously a factor (rural/urban). Within limits, the prices should normally be set by the investor (just as Openreach is able to do).
- A new area that has to be considered is the termination of any exclusive rights and protection. This has to be considered along with the "controlled failure" of the local initiative. Asset transfer values might be protected (possibly using pre-defined principles).

142. The approach has some trade-offs – more protection also requires some more controls. The larger the investment and larger the areas covered, then the less protection. The approach is illustrated by two examples:

- Expensive rural/remote NGA investment (FTTH) with no government financial assistance. Such a laudable business should of course be encouraged. This might require:
    - Network level-only resale to other downstream providers or *in extremis* no re-sale
    - No obligation to give dark fibre
    - Attractive wholesale prices. Possibly greater than BT's standard equivalent prices. This is due the higher costs and inherent risks that result
    - Guarantee of no other NGA fibre investor for perhaps four or even more years. More for the most remote and expensive regions

  - Some limits on retail prices (but this probably self-limiting anyway by consumer awareness of national rates and legacy bitstream alternatives) and with network-level access this is likely to be not required
  - Minimum asset values if/when the business faces a later entrant that builds its own NGA or takes over the local business. This would be subject to the assets being built to some standards. Some network structures could be completely useless to anyone else other than the regional business – this is not desirable for longer term economic gains. This gives the "controlled failure."

- A larger NGA investment (FTTH) with some government financial assistance. This might require:
  - Dark fibre as well as network level access. Major government monies should open up the consideration of lower level access
  - Wholesale prices that are attractive for the investor
  - Exclusive rights of supply for a pre-defined period
  - More strict standards for service provision – re-usable fibre assets and network level interfaces that have some more adherence to commonly used standards and processes. A known issue with most downstream service suppliers is the investment in IT and OSS (Operations Support Systems). "Odd" solutions from a regional network provider add significant costs, but conversely this could add to much cost to the investor's network, if it is made too complex or if it must strictly comply with BT's IT standards. Note that a downstream provider probably prefers avoid any bespoke service or IT developments so it prefers the same interfaces as it has to use for BT in the rest of the UK
  - Again, controlled failure methods and asset prices might need to be defined.

143. This type of approach is not simple, but it should be quite possible to define. It also means that there is not one solution, which is quite reasonable as the costs and risks vary significantly from probably-profitable areas, that BT is simply slow to address, through to areas that are more expensive and are clearly part of the digital divide. Also the amount of government funding has an obvious impact: a 10% assistance in capital investment or a loan is quite different to a local municipality paying for all of the local fibre investment. See: the solution's position in the Telzed Framework.

144. Clearly the required solutions could have a degree of case by case assessment, but it is likely that a set of standard categories can be identified and the approaches for each can be defined.

3.8 Key questions Q8 & Q9: mobile competition

Q8: Do you agree that full end-to-end infrastructure competition in mobile, where viable, is the best means to secure good consumer outcomes? Would alternatives to our current strategy improve consumer outcomes, and if so, how?

Q9: In future, might new mobile competition issues arise that could affect consumer outcomes? If so, what are these concerns, and what might give rise to them?

145. At the risk of stating the totally obvious, end to end competing networks provides the best competition and (probably) the best outcomes for consumers. Consolidation therefore should be discouraged. See earlier discussions in this Telzed paper. With competition clearly far from full-competition levels, Ofcom must continue to be wary about any consolidations.

146. Ofcom should also be wary about tacit collusion or unconscious behaviour that is not giving the competitive outcomes that consumers or Ofcom actually desires. *If* the competition were so extensive then it is reasonable to expect all niche consumer markets and service supply options to be filled (cheap and cheerful basic services plus premium priced services etc. at the other end of the consumer income scale). This situation does not exist, so profit and shareholder pressures will naturally push all players to compete in the more profitable niches and to "Not compete too hard" if 30% market share with higher prices is better than 60% share at a low margin. This is normal business management. Ofcom should remain aware of this when its plans are made as the best laid regulatory plans might not happen as desired/predicted.

147. Economies of scale certainly exist, but these are a law of diminishing returns. Once a business is "big" then the unit costs do not drop much faster when it is even bigger. This should be clear from the cost-modelling done by Ofcom. This modelling covers the network layers, but there are similar effects in the retail sides of the business. More customers simply means more help desk staff and more bills (on a roughly linear basis), and once a reasonable volume is reached then the unit costs do not drop very much more.

148. Some obvious changes could be made. Physical infrastructure sharing is now no longer totally discouraged. Telzed re-iterates that is sensible as consumers do not buy infrastructure. Sites/masts, if built separately, do not really give much differentiation to the mobile operators. Mobiles can (and should) still build additional unique ones to increase coverage performance. So competition based on this lowest level of investment (the traditional Ofcom approach) gains relatively little in many central areas, and the increased costs of duplicated masts etc. probably decreases the consumer welfare as a result of higher net prices (costs). Of course sharing deals have to be watched for other less attractive aspects: "Use my mast so long as you let me do X or do not let operator Y use your mast site Z."

149. MVNOs have been able to provide retail level competition and to a partial degree gave the downward price pressures that the fixed telecoms resellers did 10+ years ago. These fixed players are the re-filling type operators and those with only small core switch networks that used BT call terminations and call originations to build the business, probably also with international simple resale. The benefits of re-selling are known to be limited (little service differentiation or ability to develop new services). This is particularly true of mobile MVNOs. They may be a "good idea" but Ofcom should not hope they that allow much retail competition or act as a substitute for more spectrum and more end to end network operators:

    - Many MVNO deals are controlled by the Mobile
    - They are often chosen to be *complimentary* to the Mobile's own strategy and not to ultimately threaten the Mobiles' own channels to market or customer segments.

150. There is no substitute from more spectrum and more masts. Further, mobile strategies to make use of micro cells, offload onto "fixed WiFi hotspots" and to make use of NGA-based broadband access infrastructure to supplement the networks, are all inherently

part of the mobile ***network*** technology. It is less likely that an MVNO can do much in these areas without the Mobile host network being in the lead. Similarly if service integration is planned (combined fixed broadband plus mobile services) then again this is likely to be only within the control of the Mobile network. A simple retail packaging of discrete fixed and mobile is possible for an MVNO, but of course the welfare gains of this, to consumers, are limited.

151. What is less clear is how (or even if) Ofcom can encourage mobiles to do service innovations and combine notionally fixed and mobile services and build out the mast density to give the levels of service needed by consumers. This might not be the optimum from profit or shareholder value perspectives. It is recommended that the strategic plans consider more severe directions on the license targets for coverage and performance. Simply giving a lot of spectrum and creating four or six networks will *not* guarantee a build out to all areas/customers.

152. A further key point is that the coverage must be assessed by each network, not: "There is a 4G or 5G signal in the region." Consumers only have the one suppler. This limitation could be overcome by national roaming requirements. This has been considered in the past. Customers do not care or even know whose mast and antennae is being used; they do not buy *an infrastructure* but they buy *a service*. Stronger requirements to force coverage and performance levels (which are related to mast density) should be considered to avoid the failures[53] seen in 3G and the slow 4G roll-out outcomes seen so far. If this happens again, then 4G or 5G might also give similar sub-optimal outcomes.

153. In the future the likely issues that Ofcom will need to address include:

- As already mentioned; consolidation and convergence. Fixed and mobile are becoming less rigidly defined. Consolidation should be avoided or discouraged where possible
- "Creeping market dominance" if a player is large in both fixed, content and mobile markets
- Spectrum. This will almost always be an issue as it is a finite resource. Slow issue of licenses and release of spectrum will inevitably hold the UK back (as seen in 4G)
- Micro cells and cheap "fixed" connectivity to such cells will help. This moves the "cost curve" of mobile. See Figure 2 page 38. As mobile customers and traffic density increases, costs fall, but if this demand becomes too high then the costs start to increase again (i*n extremis*: one mast per street). The point at which the cost increase moves upward with cheaper cells, and mobiles can then economically take on more customers/traffic.

[53] The coverage levels are surely a failure from consumer perspectives and anyone planning to do business while traveling cannot rely on mobile data. The mobile industry failure nationally is compounded by the international data roaming prices. The two are arguably self-defeating: many consumers simply never use mobile data while roaming at all – even if the prices have now fallen. Similarly, voice roaming is often never used because of the excessive prices in the past. Both are surely operator-strategic failures where focussing on premium prices for business customers in the shorter term means that many customers now simply do not use the data and voice services at all. Short term gains lost the long term benefits

3.9 Key questions Q10: bundling

Q10: Does the bundling of a range of digital communications services, including some which may demonstrate enduring competition problems individually, present new competition challenges? If so, how might these issues be resolved through regulation, and does Ofcom have the necessary tools available?

154. This subject has also been covered in the earlier discussions and replies to the other questions. The existence of the question implies that Ofcom agrees that there are competition issues. From a consumer perspective the benefits and downsides are clear. Some gains exist from one stop shops and ease of management, but against this are the real problems of churning to another supplier, comparing services, and having to buy extras items when they are not really needed. The supplier has related gains and may have some reduced costs. However the cost reductions are limited if the bundling is just at the billing/retail/marketing level. If taken too far a bundle can be so comprehensive that very few customers will have the simultaneous need for new phone, broadband, TV, content et al services at the same time. Then, the take up is low. These issues are well known.

155. Moving forward Ofcom should look very closely at the bundling and the creeping effect that a large player might have on the overall levels of competition. It is proposed that some new assessment tool is required that takes into account some wider concerns and does not "simply" segment the analysis by individual markets (each of the retail markets might be considered competitive).

156. It is further emphasised that adding in content to a telco service is including a totally separate service that has limited synergies or overlap. The cost or profits of it must be assessed on its own basis and a loss making content provision should not be accepted as an incentive to buy broadband – in particular if the content is not really available to other service providers. The dangers of BT bundling of TV are obvious and Ofcom should take a robust view. Other examples may arise in the future[54].

157. The converse approach of content and OTT service providers moving into the telecoms arena presents less risks – there are no major barriers to entry and the telco services have wholesale interfaces available to all. Google fibre causes no concerns. Of course the business objectives of Google are open to debate, but if a version of this were done in the UK by any provider, then Ofcom probably has no real concerns even if the business was not commercially viable. It should have more worries if it then failed and became a "fire-sale telco" that eroded the asset values of all NGA operators. This is a real risk there are significant NGA operator(s) who fail. The parallel of the international and backbone carriers' failures of ~15 years ago is clear. This is a possible problem, but

[54] As an aside, many will recall the adage that "no incumbent telco can survive without a telco play." This was in vogue ~10+ years ago. This is now largely irrelevant as OTT video and TV are the current primary drivers for superfast take up. The *telco* company benefits can be obtained by "simply advertising Netflix et al!" A new venture into content is a new, but separate venture. The inherent synergies are questionable. More recently this conclusion moved further with the recent Apple statements: "We believe the future of TV is apps," said Apple CEO Tim Cook. Telcos should not consider control of Apps, any more than they tried to control access to the internet with web-portals. Some readers may have forgotten these. Moves to OTT and Apps is questionable for a telco – is there any real benefit from such a move?

clearly it is not Ofcom's role to protect operators from their own mistakes. It might consider actions if this has longer term negative impacts on consumers and national welfare. There is no clear way that Ofcom can act, but this area is worth further study.

158. Of course these failures are not the same as the "planned failure" discussed earlier.

3.10 Key question Q11: risky investments and bottlenecks

Q11: What might be the most appropriate regulatory approaches to the pricing of wholesale access to new and risky investments in enduring bottlenecks in future?

159. Initially the fourth option in Consultation figure 28 is considered – that of cost-based prices. This is developed to consider how investment might be made more attractive.

160. The past approaches have been reasonable and sensible – efficient cost based analysis based on LRIC approaches, with the inclusion of an appropriate mark-up for common costs. This has been used for access remedies and was used for call termination. Of course the call termination approach changed to a value close to 1€c, but this is a "special case" and full costs, bill and keep, pure LRIC or do not have a *huge* impact. Mobile network success happens anyway. There must be an optimum price approach but the evidence for what it is, is limited. The graph of benefits versus termination price is unclear and the "turning point" in the curve is certainly not sharp. A 1€c value for UK mobile with a lower values for fixed and changes to fixed call origination prices are reasonable outcomes.

161. Access services are very different to termination as there is no significant reverse procurement of equivalent services. There is only one seller and one buyer. A logical start is a proper full cost based price. This follows past practices. However there are some obvious concern with the methods and the practical implementations:

- The principle is to encourage competitive type outcomes. Efficient LRIC+ is the outcome of a competitive market and the aim is to replicate such as outcome. This should encourage investment (to get the regulated WACC) and downstream competition.
- But the actual investment is unlikely to form competing infrastructure networks – it is only viable to have one NGA supplier in most locations.
- The main gap in the UK (and elsewhere) is in investment. Cost calculations using many LRIC type approaches may replicate a theoretical competitive market outcome, but this is not how an investor thinks when entering as a second supplier onto a market. They are not entering a competitive market, but one that has a regulated price that is pre-defined and a demand that is uncertain[55]. Pricing for investment may bias the approach, differently to that used today.

[55] Nobody knows the future of telecoms. Almost everyone can look back and can see outcomes were not expected. The only sure future is ever increasing traffic demand – it will be big or very big, but the exact rate of increase is not certain but it will almost certainly exceed the plans of the telcos and the vision of the UK national policy. Demand has always exceeded the available capacity and the planners' predictions – Telzed sees no reason for this outcome not be continue, even if the source of the traffic is not known. We can expect the unexpected

162. Pricing is related to the risks and uncertainties. These need to be clearer and in some special cases risks can be reduced by protecting the investor from competitive market entry or low-level wholesale access that might undermine the investors business. This is the "local regulated monopoly issue" that this paper has discussed previously. Controls are required and a mixture of incentives are needed. The risks are reduced, of course, by funding assistance. Lack of investment is the primary obstacle, not competition.

163. Excluding situations with funding assistance, the problems of attracting investment are related to the prices and how these are set. The cost-based methods (discount cash flow or LRIC type models) used do not reflect the investor's view: assets might have 10 or even 30 year useful lifetimes, but a cost recovery over that period is hardly attractive.

164. Tying prices to the underlying cost trends is a good theoretical approach, but where investment is not forthcoming, then the investor's view, including the points of para 100, might be more realistic:

- Shorter return periods. Who is willing to wait 20/30 years? With enormous uncertainties, this is clearly not an approach that smaller investors could contemplate.
- Commercial price setting tends to bias much higher prices at the beginning and then, after addressing the premium-paying customers, prices fall and eventually tend to cost based. If there are very high returns up front then, with hindsight these could be used to offset the prices later on when prices tend towards cost.
- The biggest risk is the take up rate. Ofcom and EU evidence is that the take up rate of superfast is slower than anticipated. The discount cash flow effect of slower take up is clearly large. This creates large "error bars" on the business plan. Take up is something that can be modelled in the plan, and its risks accounted for. Certainly any plan has to choose some numbers, but if these are the "best guess average" then this means that there is a 50% chance of less return. This is not a good risk, if the expected return is only a regulated WACC.
- Some variations of outcomes are inherent in any business plan and some ventures succeed and some do not. This is part of the WACC. This is good when there is an ensemble of ventures – each business venture has its own risks and each is analysed to (hopefully) pass the deemed rate of return and so *on average* the business should achieve its WACC. An NGA venture is rather different to most product ventures in a large company – the NGA venture is possibly the entire business. A failure in the one venture does not, on average, get balanced by an over recovery elsewhere. This would require the NGA investor to cover many diverse regions and businesses – so only very large investors could cope with such a strict cost-based approach. The very real risk of failure could mean total company failure. This is very different from perhaps a loss on some new datacom service as part of a portfolio of ten such services. The author of this Telzed paper has long warned about this possibility such as footnote 24.

165. This line of thinking leads to a modification of price setting approaches. These should:

- Err on the side of caution to encourage investment – even at the risk of higher prices
- Change to a cost-recovery approach that biased returns to the near term, and not "cost-trend oriented over 20 years" except possibly for larger players such as BT

- Reduce the risks by some (carefully thought through) protection for the investor – at the expense of limiting competition. Naturally this has concerns, but it is probably necessary
- Revise the modelling method and consider the huge uncertainties and not define cost-based prices based simply on an average. There is a logic, that *if* there are to be regulated cost oriented prices,[56] then some new view of the distribution of outcomes is required; should a regulated define a price based on a 50% probability of not achieving the WACC return? Perhaps a conservative "80% confidence factor" might be used so that most outcomes will probably achieve at least the WACC return. This would increase prices but as market volumes rise then the uncertainties in take up and demand then reduce the variances. This reduces the reliance on "heroic assumptions in a consultant's spreadsheet" and on the implicit assumption that the key factors are accurate.

166. The other approaches in Consultation figure 28 do not fully reflect the new investors' thinking. The approaches are more suitable as approaches to dealing with BT. At present these key approaches are centred on:

- Access regulation, an obligation to supply including rules to prevent undue discrimination. This is the Openreach approach where the supply is on the equivalent basis to BT and to others
- Access regulation, obligation to supply, no undue discrimination rules and prices set on a retail minus basis. This is second requirement related to the recent BEREC and EC work.

167. The second approach in para 166 somewhat undermines the freedoms inherent in the first approach that allows Openreach to set the prices, where if the price is too high it hurts downstream BT as much as the other operators. Using retail minus starts to cause retail price controls "by the back door" and further complicates the issues as models of retail costs are needed – an area that regulators should generally avoid (this is meant to be the most competitive market). However the two have been combined as the retail minus approach (with a £25 margin per month[57]) forces up the retail price on top of the wholesale price and it provides additional pressures to reduce the wholesale price which rather reduces the freedom to set prices inherent in the functional separation approach[58].

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[56] This might not be required of course. BT Openreach has freedoms to set prices due the separation structures and this avoids Ofcom having to make the heroic assumptions in a cost-based model. BT has to deal with this. The BT prices would set some "anchor prices" for most other regional investments *to base* their prices on (they need not be set exactly at these levels). In the regions that are more removed from normal BT costs then there may be more of a need to consider what the local investor thinks is reasonable or else test it against some cost models that reflect the digital divide's true cost. This allows the investor to set the prices or within some limits based on some anchor prices plus accounting for the remote or low density factors. The key in the approach is to ensure the real costs can be recovered –without this, there will be no investment. This also means that an Ofcom cost model is not required – the prices are not strictly cost-based, but should still cost-oriented

[57] See 1.13 of: Fixed Access Market Reviews: Approach to the VULA margin. http://stakeholders.ofcom.org.uk/binaries/consultations/VULA-margin/statement/VULA_margin_final_statement.pdf

[58] It should always be noted that the key desire of downstream operators is to have low wholesale prices and high BT-retail prices. The retail minus approach can result in problems of wholesale prices below cost (but there will be few complaints from the downstream-only players). This is bad for alternative investors in NGA – undermining the key need in the UK to get investment. It might be merely "slightly bad" for BT – it gets low returns or even a slight

168. The first method in Consultation figure 28, has no regulation and has clear risks, but if used for other (smaller) investors then this type of approach is in line with the above Telzed discussions. The investor has to recover its costs and make its own business plan and this investor-type of thinking can lead to higher prices. The extreme of no price control and no supply obligations is probably too extreme for other than a few situations. In reality there are indirect controls on the investor from the standard national retail and wholesale prices. But little or no regulatory price control and only limited supply obligations (perhaps at only the network only layer) and even some protection from competition are surely ways to improve the investor's willingness to build in the first place. Later, as the supply of NGA is more widespread and part of the investment is already recovered then the obligations to supply could be increased and almost certainly the prices will then tend to normal regulated prices (as for BT). However some price variations for geography and digital divide factors are reasonable. The country is not all the same. The digital divide is real and it is mainly due to the cost differences, and to a lesser degree due to the consumers' ability to pay.

169. Not discussed significantly in the Consultation is the issue of government funding. This is less of a regulation issue but a national strategy and policy issue. If there is money available then the investment concerns almost all go away. As it is unlikely that huge amounts will be available (if ever there is a clear approach declared), then investment will be a problem and new approaches will be required. Of course these need to be modified as the amounts of funding increase.

3.11 Key question Q12: pricing longer term

Q12: How might such pricing approaches need to evolve over the longer term? For example, when and how should regulated pricing move from pricing freedom towards more traditional charge controls without undermining incentives for further future investment?

170. Q12 is more focussed at the price freedoms on BT and the Openreach flexibility that it introduces for price setting (though tempered by the retail minus additional requirements). In the longer term some cost-based pricing might be introduced, as has been done for other existing wholesale services.

171. When the NGA markets are more developed and BT has rolled out a network, then the demands and costs will be measureable and then existing LRIC+ approaches can of course be used. This can be derived from regulatory accounts (hence the need for a more mature market). The "bottom up" (BU) and discount cash flow (DCF) models can also be used for LRIC+ costing. But these can involve "heroic" assumptions of costs and especially on the volume take up over time. This introduces modelling risks and uncertainties.

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loss, but this is recoverable across the business and it ensures there are no other access networks built (and an incumbent's worst nightmare is alternative physical networks). This possibility was raised at a costing conference that the author of this paper chaired many years ago where NTT Japan's wholesale access prices for fibre were presented. The author termed this "Fairy godmother economics" as the wholesale prices seemed too low – but it would ensure limited other local loop fibre competition and it would surely helped to give a high take up of superfast broadband. Probably few downstream providers complained, consumers were probably happy and Japan is a leader in broadband speed.

172. Good BU and DCF models use a lot of “top down” costs derived from actual business data and accounts –the model becomes more robust when there are real costs from a network roll out to derive optimal costs into the future. These models can, and are used, but the risks are significant (what if some of the key assumptions are wrong?). The risks are much greater than for call termination. By allowing the price freedoms for Openreach, with some limits, Ofcom has avoided the risks and dangers of such a model for price controls. This is surely a good thing.

173. The functional separation approach can be used in the interim. However this is clearly the major discussion point in the industry – to continue with or to modify the functional separation or to move to structural separation.

4 Functional or structural separation and Q13-Q16

Q13: Are there any actual or potential sources of discrimination that may undermine effective competition under the current model of functional separation? What is the evidence for such concerns?

Q14. Are there wider concerns relating to good consumer outcomes that may suggest the need for a new regulatory approach to Openreach?

Q15. Are there specific areas of the current Undertakings and functional separation that require amending in light of market developments since 2005?

Q16. Could structural separation address any concerns identified more effectively than functional separation? What are the advantages and challenges associated with such an approach

4.1 Outcomes and technology options

174. This separation was the "elephant in the room" at the Ofcom meeting of May 11th (it was not mentioned by anyone until the author of this paper raised it). The press has extensively covered the matter and it has caused BT to make pronouncements in September 2015 about increasing its investment and increasing voluntarily an effective broadband USO. Ofcom should be well able to analyse the arguments and take into account the fact that submissions could have a modicum of self-interest.

175. Telzed has no comment here on Q13. Q14 has the self-evident outcome of the situation today that shows consumer outcomes are not as good as they could be:

- The broadband speeds are only moving up as per the rest of the world
- Coverage by fixed and mobile is poorer than it should be
- The BT investment and broadband coverage/speeds are lower than desired by many
- Other countries are in advance of the UK and measures used by Ofcom seem show UK is on a par with a few peers but they are not aimed at being comparisons with the global leaders
- The current technical methods and incremental approaches (progressive technical updates of FTTC, add in some GFAST, maybe a few places with FTTH, use GPON and not point to point, keep using the copper etc.) are surely more costly in the long term. A visionary approach would build for the longer term future – we can be sure Gbit/s type services will be required by many or most, sooner or later (see even BT's recent announcements for up to 500Mbit/s for many premises). A vision is not available from the government and such a vision is not in BT's plans – which, in fairness, have to be shorter term and limited by shareholder interests. However a lack of vision is clear.

176. Incremental updates in speed will, in the long term, cost more.

177. Having a copper legacy and a fibre network in parallel is obviously more expensive than having just one. A bold plan to do the change-over has not emerged. But the examples of other countries cited in the Consultation show that bolder plans are being done (Singapore, NBNCo Australia, UAE etc).

178. What is notable in the leading countries is the existence of a vision. They may be each very different but at least there is a vision to build using Chorus or NBNCo type approaches or to have major government involvement etc.

179. Ofcom has normally tried to be technology neutral. In almost all cases this is reasonable. It has led however to the less than satisfactory outcome. Fibre to the premises has been left to the operators and no great incentives have been given to use point to point fibre. Certainly point to point has some higher costs than GPON, but PONs also have some inherent longer term problems:

    - No unbundling other than VULA. This is good for the incumbent but clearly a restriction on competitive use of the network
    - Upgrades are harder due to compatibility issues. One premise cannot always be easily changed to a special speed or service or to another equipment vendor. The operator has to upgrade all at the same time and has vendor lock in. Point to point can be upgraded individually depending on the customer. This also helps with unbundled competition
    - Probably higher OSS costs
    - Not so easy to upgrade to Gbit/s speeds, though it is possible.

180. The technical neutrality approach has probably also encouraged copper to remain in place.

181. With hind sight a more robust approach could have forced point to point fibre. This could have increased costs, but the longer term benefits and possible unbundled competition might well have negated the cost differences. “More competition is almost always good!” The choice of GPON or point to point fibre may have been made on a cost basis, but this could be a short term cost. As one choice certainly reduces the competitors’ options it may well explain why PONs have been chosen. FTTC solutions have related restrictions.

182. A message for future strategies is that an investor in point to point fibre should be given preferential regulatory treatment than a PON or PON-copper approach. The longer term benefits from easier unbundled competition, lower costs from no legacy copper and ultimate speeds that have no major migration path barriers, should allow better protections and preferential regulatory obligations, than other technical solutions. This is an example of encouraging the right investment and taking a longer term view of the benefits. However it *does* mean that Ofcom changes it stance on technical neutrality. If Ofcom thinks that the all technology and copper/fibre migration decisions are purely for the operators and not to be ever government-led or Ofcom-influenced, then there will even more problems in the next review in another 10 years.

183. Q15 and 16 relate to the big separation issue. This will be heavily covered by other parties, especially given the press coverage in seen recently. An abbreviated reply is given in the following.

4.2 Separation discussions

4.2.1 Define the problems and fix them if required

184. A start point is the question – what does Ofcom (or the government for ultimate policy directions) want to achieve and how should this be best achieved? As noted in this Telzed paper there is lack of such direction in the Consultation, though that is not the fault of Ofcom as policy is not totally in its control.

185. A follow on from this is the question – does the existing functional separation fit with this goal? If not, can it be adjusted to be a better fit or to perform better?

186. The benefits of functional separation are well known and need not be re-iterated here. If it is not working properly then this first stage would be to fix the problems. Poor services to other operators or discrimination are curable problems. New service inputs to the other service providers are also achievable.

187. If the problems are a lack of fibre investment or BT not using point to point fibre suitable for others to unbundle, then this is not a problem that is directly addressed by functional/structural separation choices. The digital divide exists and does not go away with either approach. The willingness to invest could be more or less under structural separation – the outcome is certainly not clear. Certainly the lack of UK NGA fibre is clear enough. This is surely more due to BT strategic failings, lack of UK vision, BT business plans, no ability/willingness of Ofcom or UK government to force it to happen, the lack of UK monies (BDUK) to incentivise it to happen, and are not directly not due to regulation of wholesale services or to the equivalence of Openreach. The more serious reasons are not fundamentally altered by separation.

188. No government money and no visionary lead in a separate access business will still result in the digital divide not being addressed and FTTH not being built.

189. Ofcom mentions in the Consultation several counties with separation and Telzed has also looked at these, and others, in its own studies for broadband strategic advice. Of course they are solutions for those countries just as the UK function separation fitted well to the UK national situation, but might not be transferable to other countries. Some obvious take away messages can be gleaned from even a short study of other countries. The first is the role of government and government funding – at the very least the moves are so fundament to the national economy that a government lead ought to exist. This does not yet exist to a suitable level in the UK. A government direction to split BT or to have major government involvement (ownership or operational involvement) are not likely for a UK access business.

190. Funding is central – if money were available then there would not be many problems. NGA can be built. Any shortfall is made up with government funding. This is again not likely to happen. HS2 might be funded but broadband might not be, other than to a limited degree, but the choice is for the UK government and perhaps partly for the European Parliament. It is worth noting that some countries funded the NGA using essentially private monies e.g. Etisalat in UAE. This example is not easy to replicate as the UK is so different and BT does not have the levels of cash. Any major NGA investment in the UK will surely need to raise equity or debt especially if government monies are not available. The risks are then rather different.

191. Useful insights to the choices for further separation can be gained from NBNCo and Chorus (Australia and New Zealand).

4.2.2 Australian type of approach

192. NBNCo inevitably has the problems of political involvement in any commercial business. How can a government owned or run business be efficient? The approach is also subject to party political differences. Despite protestations against BT separation made by BT, the Australian example shows these can be overcome. It is "simply" a matter of whether the price is right. If BT is properly run on managing for shareholder value principles, then if the sum of the parts is worth more than the whole, it should welcome the split. Any assets and staff can be transferred, at the right price. The second "price is right" issue is the wholesale prices then charged by the NBNCo. As residual Telstra is then the downstream business it thinks like any other such business – low wholesale prices are good. The prices, it seems, were acceptable. The net result is that all parties seem to be happy.

193. Of course the government then has the financial responsibility of doing the NGA build. The investment risks are then not normal commercial risks and any losses are not as catastrophic as if the NBNCo were a purely commercial operation. Cost of capital is lower for the government business. Lower wholesale prices and investment losses are problems that the government ultimately has to cope with.

194. It should then be pointed out that the ultimate cost/risk then falls on tax payers. However with such a government owned solution, the government should indirectly obtain the benefits in tax revenues from the better national economy especially in downstream OTT services and (larger still) from every other business that benefits from using the internet and OTT & IT services. These revenues are not really accessible to a telecoms regulator or to the telecoms industry.

195. The NBNCo situation is interesting but likely to be academic unless UK politics change and favoured national government intervention in building or owning network infrastructure. Such investment is limited enough in roads, water, power generation (where UK is dangerously close to power cuts), and rail, so a major change is unlikely.

4.2.3 New Zealand Chorus type approach

196. The Chorus example is more plausible for the UK. It is a listed company. Again a sale or buy out to create an equivalent is possible, if the price is right.

197. A key difference in the UK is that the new ex-BT access business would be unlikely to have the exclusivity of supply seen in either Chorus or NBNCo. It is very unlikely[59] that other competing access networks (Virgin and Kingston) would go into the new business. This creates a fundamental difference that alters the dynamics.

[59] It is not known if even the new Labour party leader would contemplate such a take-over of private industry. In any event Telzed views the possibility of such any government, that plans for national controls of telecom networks, ever gaining power to be remote

198. A publically listed access business could certainly exist. Equivalents exist in the UK such as utilities such as United Utilities (water) or National Grid (power). A regulated provider could thrive. But the problems are clear:

- Like Chorus, the key revenues depend on the regulated prices. These are not totally in the control of the business. Chorus suspended its dividends partly over the concerns of regulated prices being too low.
- The utility businesses in the UK are noted for being "dividend" companies that are likely to be regulated to give a fair return for investors so that dividends are reasonable assured. Of course other targets such as investment or efficiency are typically going to be part of the regulation.
- It is unlikely that a complex access business could be regulated on a simple overall-return basis. This would set overall ranges for the return on capital and amounts to invest. This would undermine many years of *individual* service price controls, so many services will need to be price regulated. The need to regulate each price then pushes Ofcom into detailed price controls – and this brings back the "heroic" cost modelling assumptions required to set FTTx and NGA prices. As a totally separate wholesale business there is no retail minus option and there is no countervailing internal pressure from the BT downstream business to limit the upper price levels. The price-cost model dangers lie ultimately with Ofcom as the access business has obvious market power and no countervailing effects exist from the functional separation.
- Investment is going to be a problem. Unless government funding was also included. Private investment can be forthcoming but could commercial debt or equity investors put up money for the marginal areas? The digital divide is not directly addressed by the split. Arguably the investor risk is less in the integrated BT situation – a bad access investment is less likely to be catastrophic, but it would of course hit profits and dividends but overall viability would be maintained by the other profitable units.
- The structure also has concerns for the existing access network competition (Virgin et al). Unlike Chorus or NBNCo there will surely not be anything remotely close to total exclusivity of supply.
- Vodafone has stated that it would invest in a separate UK access business and noted the Metroweb approach in Italy (which notably has government funding). This creates a strange situation of partial ownership of the upstream supplier. This could result in some direct shareholder governance of the upstream supplier. There are inevitable tensions and questions over this, as it is a partial move back to functional separation where the downstream buyer owns the supplier.
- Would private investment in the access business cause higher-risk investments to be stopped? No shareholder-driven business knowingly puts money into a likely loss maker. Like so many situations, if there were government monies to take up the riskier aspects, then the tensions are likely to subside. There is no clear sign of multi £ billions coming from this government.
- There will surely be ever-ending battles as the downstream providers insist the access provider is charging too much and is inefficient. There is no commercial reason for the other operators to ever say otherwise – even if the prices were low.
- Assuming all downstream buyers are notionally equal then there will be tensions over the service portfolio. Who decides which technology and service-feature-variations

are to be deployed and sold? If a service is bespoke for one downstream operator, is this fair or should it be provided for everyone? What if the service was developed and tested by just one downstream provider – does this allow it to get it on a preferential basis?

199. The problems are addressable, but will create complex governance and a large "rule book" for the access network business.

4.3 Summary on separation and the buy-out option

200. It is certainly possible that a separate access business could work. It is more complex to regulate than other existing utilities but technically it is possible. If it is really viable and really enhances values then BT should do it anyway. This is not being suggested by BT.

201. Telzed sees pros and cons, and has set out here a short assessment. This has naturally focussed more on the problems.

202. The separation approach does not force a fibre-centred national investment or create a new vision and strategy for deployment. Such a direction *could* equally be created by BT. What the downstream buyers want and what the new business is able/wants to supply are unlikely to be the same. How can the buyers direct and force a new strategy and who takes responsibility for funding it?

203. If it is really viable and really enhances values it is also quite possible to make it happen. A BT buy out is possible as the market capitalisation is "only" £35 Billion. BT cannot avoid an offer. No doubt studies have been done on this and the sum of parts value. It remains open for operators or other investors to do it and force the creation of the access business. Would the residual downstream business (with limited regulation) be worth more? Would the access business be so attractive that it is an easy flotation and be worth more than as Openreach within BT? Where to "cut the cake?"

204. This BT buy out is not a totally remote idea. This surely has been talked about many times (even the author of this report was once asked about the idea, in previous work). It also avoids some of the likely challenges for any party (Ofcom, CMA, industry or even government) to force the issue.

5 Using the USO approach for directing the development of broadband and NGA networks

5.1 Introduction

205. A USO definition and enforcing the obligation will surely be discussed at length in other submissions. It has been discussed in this report, such as in Section 3.4. A new USO definition could be created and then this can force operators to build out and supply a minimum standard to all premises. This covers the digital divide and enables Ofcom or the government to set a direction. Some USO requirements exist already and this was a major regulatory issue 15+ years ago both in the UK and elsewhere.

206. The key issues are:

- Setting the strategic vision in the first place, that subsequently defines the USO
- Defining the USO
- Funding the USO.

5.2 Strategic vision

207. As discussed in earlier sections of this paper the UK government has not set a useful strategic vision. A limited possible USO broadband performance has been mentioned ("5Mbit/s") but BT has already proposed a faster version. If there was a defined vision for UK broadband that had visionary performance levels that advanced the UK to a leading position, then a minimum USO target could be defined. This target might also have an inbuilt increase in speed over time (influenced by Nielsen's law). It might also specify some technical approaches, such as the use of fibre based technologies that would allow unbundling.

208. The strategic vision ought to be based around Gbit/s type performances and 100Mbit/s rates in the near future. Not: *possibly 5Mit/s* (see footnote 1). A gulf in thinking clearly exists. Even BT's aims are for ~100Mbit/s as a normal service (though not for everyone[60]), but government is possibly thinking about 5Mbit/s.

209. If the real UK future is 100Mbit/s+ (or more ideally 1Gbit/s) then what is the point of any discussions of such slow speeds? Past USO discussions/definitions were around having

[60] BT in September 2015 announced 300 to 500Mbit/s for ~10 Million homes. See for example: http://www.theguardian.com/business/2015/sep/22/bt-gavin-patterson-promises-ultrafast-internet-criticism. This makes other plans/ideas for much slower speeds to be clearly deficient, if "even" BT intends to exceed the target speeds. See para 211 and the low figures in the Digital Communications Infrastructure Strategy Consultation 6 August 2014

a basic phone or payphone service for everyone. This had a logic and it was required. Specifying a close to useless broadband speed as a target is not a strategic approach that has any useful basis and an approach of *thinking* about such a possible speed is clearly worse.

5.3 Defining the USO

210. Two main approaches could be taken, once there was a clear national direction:

    1. Define the USO to be a real high speed target that means digital inclusion for every one

    2. Define a slow speed backstop that might be adequate for some basic services (the "5Mbit/s or 10Mbit/s type thinking"). A real option 2 USO value would surely specify a higher value, but still not a truly high speed value as per option 1.

211. As current broadband levels and predictions of required speeds are all far beyond the "5M" thinking a type 2 approach is surely pointless. The 2014 government consultation[61] para 2.19 had predictions of: *"… the average household requirements will range from a (median) 19Mbps to a high end 35Mbps (looking out to 2023) or between 15Mbps and 52Mbps (looking ahead to 2018*)." NB Telzed believes these figures are too low for many consumers and so the actual physical speeds should be higher. These demonstrate that the 5Mbit/s figure is clearly out of line. An option 1 approach is required (if USO methods are used to enforce roll out). This Telzed report does not address the real requirements and the figures for required broadband speeds. It is reiterated that demand will rise and exceed general expectations. These 2014 government figures are probably lower than the likely demand (see footnote 60). Building just for an average demand does not provide for consumer leaders: some households and small businesses are already far more intensive in their usage. Transferring 500Mbyte of data is already not unusual for some customers. A more visionary level of capacity should be built for. The USO target figures should reflect this vision even if it does not enforce exactly the same performance as is available in the city/affluent areas.

212. Many may accept some areas will get a bit less performance or maybe even a significantly less performance. Even this is worth questioning, as it ensures an enduring economic divide: why should some customers not be able to do the same as a city dweller? Everyone has electricity and roads etc., just the same as in the city (or with fairly close to the same performance). The past USO meant that everyone could converse at the same telephony level. Australia had aimed the NBNCo to give the give a similar (good) broadband coverage with high performance to most areas.

213. With this line of thinking the USO should enforce a high speed service and it then forcibly addresses the digital divide. This moves the USO far from the government thoughts and the BT announcements. National welfare benefits are clear – everyone has a good service and all regions can benefit on an equal basis. The problem of course is funding such a target.

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[61] Digital Communications Infrastructure Strategy Consultation 6 August 2014

5.4 Funding the USO

214. It is accepted that costs of superfast rise in some areas and these will not be economic to address. The cost-gap amount and the number of premises is debatable, plus the numbers change over time and with the target speeds. Whatever the figures are, there is a cost to supply the USO. This could be very small if a "5Mbit/s type thinking" were allowed – but there may still be a cost. A meaningful superfast broadband target (which is surely a more sensible target) will cost a significant amount.

215. Government funding and ownership of such as NBNCo effectively places the burden on the government taxpayers, as would government funding of private investments (similar to BDUK). This addresses the funding gap. For this to happen in the UK there would have to be a policy and vision that sets the targets and the funding levels. This is currently lacking.

216. An approach used in the past is when the USO is funded by the industry. A central fund might be open to any investor who builds the NGA. The problems are well known – reluctance to contribute and what parts of the industry to target for the contributions to the fund? Wholesale downstream operators are the obvious targets to contribute but OTT suppliers could also be used, but clear problems would arise - for example because they are not really part of the telecoms industry. Downstream operators will naturally resist - the business interest is of course for a minimum wholesale price input to the business. As other service providers will hate paying the incumbent providers (or possibly a few others who build the NGA) for building the USO coverage network, there are inevitable disputes. These problems can be overcome, but the pressures will be strong.

217. The key problem will be to measure the cost and so ensure fair fund levels are distributed. The "USO costs net of benefits" was used in the past. This opens up arguments about "soft benefits" such as "marketing for the operator" who built the USO network. In extremis this can be used to give a low or even zero net cost (as seen for telephony). This might be used for a very slow speed 5Mbit/s target. The incumbent has to bear the true net costs.

218. There should be no arguments that, if the USO were for a superfast target speed, then there *is* a real cost and significant monies are at stake. The key principles for contributions are distribution should be set assuming £X Billion costs.

219. If the key principles of who pays and how the monies are distributed are sorted then the actual net costs can be calculated. This opens up major difficulties: how to model the costs. Alternatives include: retrospective payments based on actual costs or funds that include part ownership of the new assets. There are more than simple cash payments as possible ways for the USO to be distributed (more analysis is required). A central problem remains the calculation of costs. The amounts are in ~£billions, so past PSTN approaches that could ignore the real amount or assume a small amount, so it did not really matter. It does matter with NGA.

5.5 Summary of USO issues

220. This short paper does address this subject fully. It is part of the national strategy/policy as this defines the government funding directions. A lot of government funding means USO or other NGA investment options all become easier. This government funding has

not been defined. Neither have the target for the levels of service for the country become clear.

221. If the bigger strategic issues can be settled then USO definitions and funding approaches can be considered. The USO method is one way to address the investment needs and to cover the digital divide. It is not the only way. It is recommended that, if a USO-centred approach to force NGA build-out is considered, then:

- The service target should be visionary and based on superfast speeds. A paltry target of 5Mbit/s or so will be soon further out of date, will not give the welfare to all parts of the country and will build in a national split. Such a split is not tolerable for roads, water and electricity, so why should it be tolerable for broadband?
- The cost calculations must be realistic and the funding amounts are large. Ofcom should not attempt to ignore the costs and leave the burden on BT or the few investors in the "digital divide areas." Leaving it to them to "recover it through their own downstream services" is going to be a strong disincentive for investment, in addition this is not possible with structural separation (there is no downstream business to recover the cost from). It would also distort competition in wholesale and retail markets.
- The pressures will inevitably be strong from the downstream service providers and from those not addressing the digital divide – they will not want to contribute. Ofcom must be robust and take the approach that encourages the most investment in the first place, as unlike the old PSTN type USOs, it will not happen anyway and the service is not already provided.
- Consider what would happen if the obligation is made and the funding gap is large. This could result legal challenges. It would also stop alternative market entrants building the NGA.
- Does the USO fund and its payments really encourage alternative builders of NGA? If not, then it is probably not adequate and therefore not fair on a party that is forced to deliver the USO.

222. The USO approach is valid, but should have realistic (high!) target speeds and realistic (large) funds. A USO to only give a backstop slow speed target is not addressing the real problems. Rural citizens should not be treated in such a way. The UK, and all other countries, are moving to be broadband-centred, so a national economic split is not acceptable. A government or regulatory policy that has, especially after a strategic review, a major fraction of the country being at a significant disadvantage is obviously a failure.

6 Conclusions and further work

223. The Strategy review provides a way for Ofcom to adjust its approach and to reflect the current issues in that approach. This report provides a range of comments on the industry and how the outcomes are as seen today. The report also provides proposals on the directions to move forward with.

224. The report is not intended to be a comprehensive study and does not try to have solutions specified in detail. This would make the paper too long and anyway the details require more detailed analysis before they are finalised. For setting out the overall strategic directions, the detailed solutions are not required at this stage.

225. Telzed is aware that alternative approaches exist and some of these just might work. This paper has "only" concentrated on a limited set of proposals. Other parties may submit other proposals that can be then all be subject to comparative SWOT et al (Strengths, Weaknesses, Opportunities, and Threats) type analyses. The other approaches include; hoping for and encouraging more competitive-access investment (led probably by Virgin and a few others). See para 68 above. There are a number of "if" issues to be addressed for this to work. This will happen, but probably it will not create sufficient investment in the right areas. Other approaches include using the current status quo regulations, without change; positively encouraging BT to build as the "only provider" and not worry about competitive access (justified on the grounds that BT is best placed technically geographically and financially, plus it will be the main provider in most areas anyway); rely more on USO; BT separation; more government interventions and monies; wireless broadband to take a bigger role (it *has* been used more in other countries); taking an approach that puts NGA access alongside electricity and water etc. and treat it as a national utility. Ofcom (and Telzed) can examine these and suggest others in later work, if required.

226. Telzed believes that the new Ofcom strategic directions are implicit in the Consultation questions and the issues discussed in this report are probably in line of Ofcom thinking. The proposals of this report are not considered as "the only possible approach and must be followed." Other solutions are possible and much of the report does not try to give a definitive approach, for example USO or BT break up are neither recommended nor totally discouraged. The report provides insights to the issues and to the balances needed to define the final Ofcom approach.

227. Part of the reason for the lack of a definitive "best way," is that the policy and overall national direction are not clear. This still needs to be defined, although of course such work should not attempt to predict the future demand 10 years hence. Government aims and funding need to be spelt out before Ofcom can properly define its approach.

228. Telzed is available for discussions of this report and for additional work to develop and analyse the best ways forward.

Appendix A Background to Telzed and the author

Roger Steele, PhD, BSc, MIEE ,CEng is owner and CEO of Telzed Limited, a consulting business that provides regulatory, strategy, costing, economic, business, pricing analysis and advice. Roger has over 30 years of experience in telecommunications starting with technology research and development, where he pioneered optical communications methods – some of which are in common use today. He then worked extensively with major businesses, initially defining and testing services before being sold and then procuring large (£100 million) telecom contracts from value added network providers.

For the last 10-15 years he has worked increasingly in telecom regulation. The work has included:

- Wholesale pricing
- Cost modelling (bottom up, top down, regulatory accounts)
- Reference offers
- Submissions to regulators
- Public consultations
- Regulatory strategy
- Economics analysis
- Broadband pricing/costing
- Disputes
- Telco business analysis for banks and venture capital firms
- Training.

Roger has been an expert witness in a number of legal cases and arbitrations. This recent work has included analysis of the history of telecoms competition and wholesale prices, and alternative approaches to costing of bottleneck services. Recent work has included broadband strategy work for the ITU with subsequent international presentations and a national broadband strategy review. He has authored many conference papers and chaired costing/regulation conferences.

Roger's work has been on conducted across the globe, giving an unusually high level of international experience to backup this report. He has worked with major consulting firms at Director and Practice Leader levels, before starting his own business.

More information is available from the Telzed web site or on request from the author.