



SPC Network

Some Economic Aspects of the Wholesale Broadband Access Market Definition

Prepared for BT plc – Non confidential version

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About SPC Network

SPC Network undertakes Strategic Policy Development for clients in networked industries by combining the knowledge of our consultants with specific and valuable skills to ensure rigorous analysis and exceptional advice. Our core consultancy team and network of partners have substantial experience in industry and consulting and so we understand the practical issues and challenges facing the market. Through advanced academic training, we have developed key skills and the rigorous approach needed to support our clients win the policy debate.



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1 INTRODUCTION

SPC Network has been asked by BT plc to consider various economic aspects of the market definition and the process of establishing Significant Market Power (SMP) in Wholesale Broadband Access (WBA) in response to Ofcom's "Call for Inputs" (CFI) dated 9 November 2012¹. In particular, we have been asked to comment on:

- i) The role of bundling in the market and its implications for market definition and the assessment of SMP. BEREK and various academic researchers have considered the effects of bundling on market definition and the assessment of market power. We have been asked to review this literature and determine its relevance to the forthcoming WBA review. We have also been asked to consider whether the leading provider of one element of a bundle may indirectly constrain the market power of a firm supplying another element.
- ii) The evolution of competition and market structures. In our 2010 paper we discussed how market concentration had changed over time and in particular how concentration in Market 2 had diverged from Market 1 and converged with Market 3. We have been asked to consider the effect of updated data on market power along with other supplier actions that may affect market power and the migration of customers away from BT at a newly unbundled exchange².
- iii) Ofcom's current geographic market definition is based on operator presence and the market share of BT in each exchange area. In our paper prepared for BT in response to the 2010 WBA market review, we referred to academic research showing that market presence was a sufficient indicator for competitive outcomes. Ofcom responded that the cited research did not refer explicitly to the broadband market and so of limited relevance. Since then further academic research has been conducted on the broadband market in the US which comes to the same conclusion: the presence of three firms is sufficient to ensure the benefits of competition for consumers and that the competitive benefits from the presence of a fourth firm are limited. BT has also asked us to review the findings of a recent paper by Nordotto et al on unbundling, in particular the claim in that paper that Local Loop Unbundling (LLU) has a negative effect on broadband diffusion, whereas BT's analysis undertaken by Professor Nankervis appeared to show the opposite effect.

¹ Ofcom (2012) 'Review of the Wholesale Broadband Access Markets: Call for Inputs' 9 November 2012

² This latter analysis however is not included in this report as the econometric analysis had not been completed at the time of writing.



2 BUNDLING, MARKET DEFINITION AND MARKET POWER

2.1 Bundling

The trend of consumers to purchase broadband as part of a bundle, including one or both of fixed line telephony and payTV, has continued upwards. Ofcom data show that in 2009 45% of consumers purchased a bundled service and by 2011 this proportion had increased to 52%³. Of those consumers who purchase a bundle, the vast majority (79%⁴) have a package that includes a landline and 41% include multi-channel TV⁵.

We have reviewed the product offerings of the four largest broadband providers in the UK⁶. None of these operators offer broadband as a standalone product: all broadband packages include line rental and landline calls, sometimes at no additional charge. They all offer a broadband bundle including TV. We have only been able to find broadband offered as part of a “double-play” package, at the retail level.

At the retail level, therefore, it appears that double-play bundling (broadband and voice) is the norm and that triple-play bundling is increasingly common. We discuss below whether this may have an effect on the economic assessment of the market at wholesale level.

2.2 Market Definition

Given the prevalence of bundled offers, and the large proportion of consumers who buy broadband as part of a bundle, we have been asked to consider the implications of bundling in the retail market for the assessment of market definition and market power in wholesale broadband.

The European regulators’ body, BEREC⁷, considers two incentives for bundling to be particularly important when considering retail market definition: economies of scope (supply side) and transaction cost savings (demand side).

³ Ofcom *The Consumer Experience 2011* Figure 64.

⁴ 10% of bundles were classed as “Others” for which we have no information about which products are included.

⁵ Ibid Figure 65.

⁶ BT, Sky, TalkTalk and Virgin Media.

⁷ BEREC (2010) *BEREC report on impact of bundled offers in retail and wholesale market definition* December 2010



- A firm may gain economies of scope when it sells two or more products (for example telephony and broadband) to the same customer, as the bundle may reduce billing and platform costs.
- Consumers may have a preference to purchase services in bundles rather than standalone, if they face lower transaction costs as a result.

As with any other market definition exercise, the appropriate methodology is the Hypothetical Monopolist Test (HMT). In the case of a bundle as the starting point for the market definition exercise, the relevant question would be whether the imposition of a SSNIP⁸ by a hypothetical monopolist would lead sufficient consumers to “unpick” the bundle and purchase the elements individually, such that the price rise would be unprofitable.

The current review concerns the wholesale market and so the interest in bundles at the retail market is of relevance if retail demand causes wholesale demand for bundles, such that a separate wholesale bundle market can be identified. BEREC considers that economies of scope and transaction cost savings are as relevant at the wholesale level as they are at the retail level.

- BEREC gives an example where two products are sold as a bundle at the retail level and the wholesale supplier enjoys economies of scope that it passes on to the retailer. If this allows the hypothetical wholesale monopolist to impose a SSNIP without the retailer substituting individual elements for the bundle, then there may be a separate wholesale market for bundles. However, if those economies of scope are only present at the retail level, for example because the economies are in the retail/customer services costs, then there would be less evidence of a wholesale bundle market.
- BEREC says that it is unclear whether transaction cost savings at the retail level would be passed down to the wholesale level. However, other cost savings may be present that could result in a bundled wholesale definition, though BEREC does not indicate what these might be. This suggests again that the evidence of wholesale bundles would have to be taken on its merits to determine whether there is a separate relevant market.

Pereira et al⁹ undertake a formal analysis of the market definition using the HMT applied to Portugal. Using data from six Portuguese firms, which together account for 99% of

⁸ Small but Significant Non-Transitory Increase in Price

⁹ Pereira, P., Ribeiro, T., and Vareda, J., (2011) *Delineating Markets for Bundles with Consumer Level Data: The Case of Triple Play*



triple-play customers, Pereira et al use discrete choice models to examine substitution patterns. They then perform three versions of the SSNIP test and conclude that, at retail level, triple-play is in a separate relevant market in Portugal alongside markets for each component of the bundle.

Pereira et al state that the presence of bundles makes market delineation and competition analysis more complex. However, they demonstrate that, despite these difficulties, the SSNIP test can be extended to bundles.

Ultimately, any market definition exercise is empirical and must depend on the evidence in a single country. What BEREC and Pereira et al recognise, however, is that it is possible to find both a bundle market and markets for individual elements of the market. This implies that the forthcoming WBA market review should consider the effect of retail bundling on the wholesale market definition.

2.3 Market Power

Pereira et al also point out that bundling may have an impact on the assessment of market power. In another recent paper on bundling, Srinuan et al¹⁰ comment that an examination of Significant Market Power (SMP) in a bundled market may come to the opposite conclusion from an examination of SMP in component markets, specifically that no competition may be found in the bundle market where competition exists in component markets. They conclude: *“it is important for the telecommunications regulator to determine the market definition for bundling services separately”*.

Although Srinuan et al examine the position where SMP exists in a bundled market but not in individual components, the situation could, of course, be reversed if a firm with SMP in a component market were able to leverage that power into the bundle. A further variation would be if two firms were each dominant in separate components but that dominance was cancelled out in the bundled market. The extent to which this might happen may be affected by the “lead” product in the bundle, i.e. the product on which most consumers choose between bundles.

As a theoretical example, suppose firm A was dominant in component α and firm B in component β . If α and β were generally consumed together in a bundle, each firm’s dominance may be cancelled out if each could place a competitive constraint on the other. However, if consumers generally made their choice between suppliers on the quality of β , then firm B may be able to retain its dominant position within the bundle

¹⁰ Srinuan, P., Srinuan, C., and Bohlin, E. (2011) ‘Would you prefer a set menu or à la carte? An empirical study of multiple services and choices of consumer in the Swedish telecommunications market’, 22nd European Regional Conference of the International Telecommunications Society (ITS2011), Budapest, 18 - 21 September, 2011: Innovative ICT Applications - Emerging Regulatory, Economic and Policy Issues, <http://hdl.handle.net/10419/52163>



whilst firm A would lose its own dominance. An examination of the market for α without also examining the bundle, may lead to an incorrect conclusion on market power. The complex relationships between firms, components and consumer preferences essentially requires a more complex market analysis that cannot rely on a simple one-to-one relationship between wholesale input and retail output.

If we place this theoretical example into the context of the UK broadband/bundle market, and recognising that not all firms have been found to have *ex ante* SMP or *ex post* dominance, we can see the complexity of relationships and where these might affect any finding of SMP.

- BT has a national network and has been found to have SMP in the wholesale local access market and to have SMP in some geographic areas in Wholesale Broadband Access.
- BT's fibre network is expanding as it rolls out fibre to more exchanges. The nature of the fibre roll-out means that some exchanges where it was not economical to unbundle the copper network, could have unbundled fibre¹¹.
- Sky has its own national payTV service and is active in the WBA market via its unbundled exchanges.
- Virgin Media's cable network covers approx. 55% of homes and it too has some of its own payTV content.

Each of these firms has its own infrastructure that supports its position in the market for bundled voice, broadband and payTV. In a bundled market, ownership of unique and/or premium TV content may constrain a competitor that has ownership of broadband but no unique payTV content, and vice versa, whether a firm is formally dominant in the market or not. This market complexity needs to be considered in the forthcoming market review.

Suppose BT had SMP in some exchange areas but was unconstrained and sought to exploit its position by, for example, raising its prices for WBA products. A retail competitor with a strong position in payTV, e.g. Sky, but which relies on BT in those areas for broadband access, could respond in one of three ways:

- i) It could institute a tit-for-tat price rise for its wholesale premium content sold to BT to a level that effectively cancels out any profit gained by BT from its price rise, leaving both firms in the same position as before the initial price rise.

¹¹ Known as Virtual Unbundled Local Access (VULA)



- ii) It could absorb the BT price rise and rely on its position in the premium payTV offering to move the marginal customer in its favour. If before the price rise the number of subscriptions sold by each company was equal ($q_{bt} = q_{sky}$), then this response would probably lead to a position where $q_{bt} < q_{sky}$.
- iii) It could backwardly integrate into the WBA market via LLU and so self-supply in those areas affected by the price rise.

The key point is that whichever of these responses Sky chose would prevent BT from earning any extra profit. BT's freedom to set prices for WBA above the competitive level would therefore be constrained, albeit indirectly: the constraint on BT's behaviour would not come from an alternative provider of WBA, but by a firm with a strong position in a second key element of the bundle. BT's SMP in the WBA market could therefore not be leveraged into the retail bundle market, which in turn would counter its SMP at the wholesale level.

2.4 Conclusion on Bundling

No systematic analysis has been conducted to establish if there is a separate market for bundles in the UK at either retail or wholesale level. However, the fact that no analysis has been conducted does not mean that such markets do not exist, nor that they can be assumed not to exist. The implication of the BEREC report and the analysis conducted by Pereira et al suggests that there is a strong case for undertaking the relevant analysis in the UK, in particular because most consumers purchase broadband as part of a dual or triple play bundle.

The convergence of services across broadband and TV, and the increasing prevalence of bundles, has the potential to make it difficult to discern between supply platforms. Therefore, even if a separate market for bundles does not exist, it is possible that strong indirect constraints exist and that the leading firm in one bundle component can constrain the behaviour of firms owning other components, even firms that have SMP in an element taken individually.

Overall, it is our view that bundles cannot be ignored or treated cursorily when assessing either market definition or market power.



3 COMPETITION AND INDUSTRY STRUCTURE

3.1 Number of Entrants and Competitive Behaviour

In our contribution to BT's response to the 2010 WBA market review, we referred to academic research by Bresnahan and Reiss, which indicated that "most of the increase in competition comes with the entry of the second and third firms". Ofcom initially responded by stating that paper cited looked "...at very specific markets, namely professional services such as dentists in small towns. The results cannot be extrapolated directly to competition for wholesale supply in a BT local exchange"¹².

We in turn responded to Ofcom's criticism in a reply to the second consultation by referring to other work that also indicated the majority of competitive benefits were obtained once three to four firms were present in a market. Specifically we referred to a speech by William Kolansky of the US Department of Justice to the American Bar Association, a paper by the Dutch regulator, OPTA, and an informal article by Professor S. Davies of the UEA Centre for Competition Policy on the acquisition of Safeway¹³.

In the final Statement, Ofcom accepted that three firms "*can* be sufficient for effective competition" (original emphasis), but that "it would be incorrect to state that the economic literature taken as a whole establishes a presumption that competition is effective where there are three firms". Ofcom therefore includes the second criterion of service share¹⁴.

Our original argument concerned market definition and, therefore, was not whether competition was effective or otherwise, but whether competitive conditions were sufficiently homogeneous when there are three firms in an exchange area, such that the presence of three firms would form the boundary between one geographic market and another. It was our view then, and remains our view today, that competitive conditions between an exchange where there are three players are sufficiently different from exchanges with only one or two, that the service share of any individual firm is unimportant. More recent academic research, and an analysis of the development of competition in the UK, supports our view.

¹² Ofcom (2010) *'Review of wholesale broadband access markets: Second consultation on market definition, market power determination and remedies'* August 2010

¹³ Kolansky, W.J. (2002) *Coordinated Effects in Merger Review: from dead Frenchmen to Beautiful minds and mavericks* Speech to the American Bar Association, April 24th 2002, Washington D.C.: OPTA (2006) *Is two enough?* Economic Policy Note no. 6: Davies, S (2003) *How many sellers do we need for effective competition?* CCR Newsletter, Issue 5 (Note that in 2003 the CCP was then called Centre for Competition and Regulation)

¹⁴ Ofcom (2010b) *'Review of wholesale broadband access markets: Statement on market definition, market power and determinations and remedies'* December 2010 para. 4.142



3.2 Recent Academic Research on Competitive Conditions

Since the 2010 consultation, research has been conducted by Xiao and Orazem (XO) which has specifically explored entry and competitive effects in the USA broadband market. Their article¹⁵ concludes:

“Once the market has one to three firms, the fourth entrant has little effect on competitive conduct in the local broadband market. The conclusion on broadband markets is therefore in line with that of Bresnahan and Reiss’ conclusion of local service markets.”

The XO paper examines the conditions in which there is net entry and exit in local broadband markets, based on zip codes, at the time that broadband markets were growing rapidly in the USA. Their model is based on Bresnahan and Reiss, whose methodology XO describe as “enormously influential in the field of empirical industrial organisation”, but specifically considers the decision of a firm to enter the market and the presence of sunk costs¹⁶.

A potential entrant enters the market when its expected discounted value of future profits exceeds its sunk costs of entry. Therefore, demand and profits have to be sufficiently high to allow the entrant to cover those sunk costs.

In the XO model, the variable s^n represents the amount by which the population of a zip code area must increase to support the entry of the n^{th} firm. It then takes an additional s^{n+1} to support entry of the $n+1^{st}$ firm. If the population increase necessary to induce the second firm to enter is four times the population necessary to induce the first firm, then firms’ variable profits and competitive conduct must have changed dramatically in moving from monopoly to duopoly. The entry threshold ratio $s^{(n+1)}/s^n$ measures the change in competitive conduct as the market changes from n firms to $n+1$ firms and is close to unity if there is no change in competitive conduct.

XO produce models when entry involves and sunk costs and when it does not involve sunk costs. In the results of both model $s^{(n+1)}/s^n$ is found to be close to unity when $s > 4$ with only a slight increase over time. However, in the sunk cost model XO find that s^4/s^3 is close to unity with small deviations over time. Sunk costs are defined as “irreversible, unrecoverable, direct investment costs for entrants to start a business”. These costs were abstracted away in the Breshehan and Reiss article and their inclusion is, therefore,

¹⁵ Xiao, M. and Orazem, P.F. (2011) ‘Does the fourth entrant make any difference: Entry and competition in the early U.S. Broadband Market’ in *International Journal of Industrial Organisation* No.29 547 - 561

¹⁶ XO point to three sunk costs: incumbents’ strategic behaviour; consumer switching costs; and surrendering of an option for later entry “under less-than-perfectly predictable market conditions.



one of the ways in which XO take forward this analysis. As sunk costs are significant for any entrant in the broadband market, then a model including sunk costs is a better approximation of reality.

Commenting on this result XO state:

“Therefore, though we are not able to infer that competitive conduct change inside the 1-to-3 firm category due to data limitations, we are safe in concluding that the fringe players from the 4th firm on have little effect on the competitive conduct of the broadband market”.

In summary, in a market where there are sunk costs of entry, a market structure in which there are just three firms is sufficient to create a competitive market. The fourth firm has little or no additional effect. As sunk costs are a feature of broadband markets, XO’s conclusion supports the various other research papers we cited previously that suggest the marginal impact of a fourth competitor on competitive conduct is limited. Specifically, these results suggest that where BT plus two other Principal Operators are present in an exchange area there is a qualitative difference with an exchange area where only BT or BT plus one operator is present, and this, we believe, is sufficient to distinguish between markets based on operator presence.

3.3 The Evolution of Market Structure in the UK

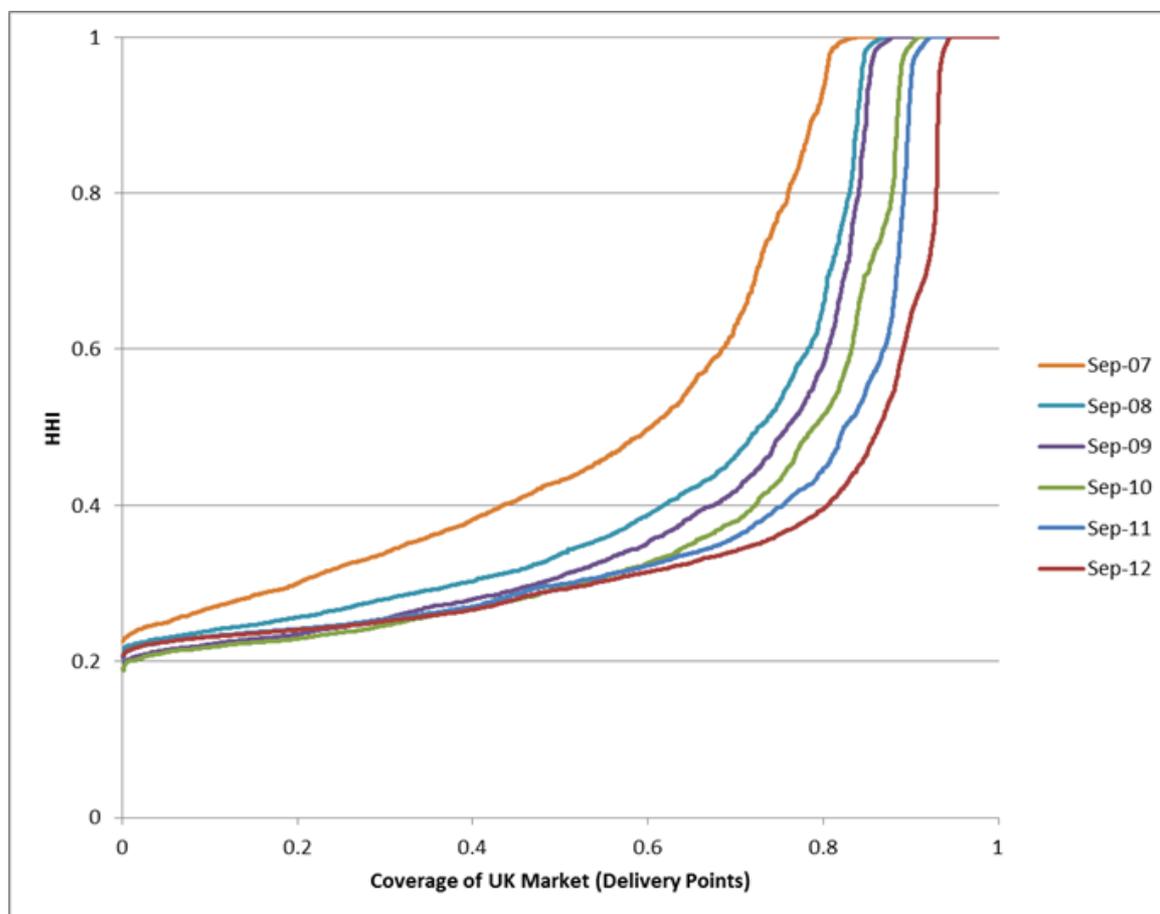
In our paper in response to the 2008 WBA market review, we presented a graph showing the evolution of the market structure of the WBA market over time from 2007 to 2010. Specifically the graph showed the Herfindahl-Hirschmann Index (HHI) at exchange level over time. We re-present that graph in Figure 1 below for the period Sept 2007 – Sept 2012 excluding fibre¹⁷.

The market has continued to become less concentrated after the 2010 WBA market review. In 2007, approx. 43% of delivery points were in exchange areas with an HHI of less than 0.4. By September 2012 this proportion had nearly doubled to around 81%. At the other end of the scale, in September 2007, approx. 20% of delivery points were in an exchange area with an HHI of 1.0 and by September 2010 only about 6% of delivery points were in monopoly exchange areas.

¹⁷ There is almost no difference in the position of the curves if fibre is included.



Figure 1: Evolution of HHI in the UK WBA Market



The curve at September 2007, whilst concave, has a much less pronounced inflexion point compared with September 2012. In 2007, it takes about 37 percentage points to move from an HHI of 0.4 to 1.0. By 2012 it takes only 13 percentage points to move from 0.4 to 1.0. This shows that (i) more network delivery points are served by competitive exchanges and (ii) the transformation from a competitive market to a monopolistic market is faster. We conclude from this that Market 2 is being squeezed to a position where it may cease to be relevant, i.e. exchange areas are either competitive or not and the middle ground of Market 2 no longer exists to any meaningful extent.

Figure 1 shows how competitive conditions, at the wholesale level, across the 5,000 UK exchange areas has become more homogeneous over time. The HHI does not show the number of operators at each exchange, nevertheless, taking an HHI 0.4 as a purely arbitrary indicator of one level of market concentration, the figure shows a reduction in the size of the “middle ground” between an HHI below 0.4 and an HHI of 1.0.



In our 2010 paper, we also presented a table of the mean HHI over time for each of the three geographic markets identified by Ofcom using the previous (2008) definition of the three markets. We used that table to demonstrate how concentration in Market 2 had diverged from Market 1 and converged with Market 3. Specifically we pointed out that the mean HHI for Market 2 in March 2010 was then less than the mean HHI for Market 3 in January 2007, and that whilst the mean HHI for Market 3 had stabilised, it was still falling in Market 2. That table is re-presented below:

Table 1: Development of Market Concentration

	Market 1		Market 2		Market 3	
	Mean HHI	Standard Deviation	Mean HHI	Standard Deviation	Mean HHI	Standard Deviation
Jan 2007	0.99	0.06	0.83	0.22	0.55	0.22
Jan 2008	0.99	0.06	0.70	0.20	0.35	0.13
Oct 2008	0.99	0.05	0.63	0.17	0.31	0.08
June 2009	0.99	0.06	0.55	0.15	0.31	0.07
March 2010	0.99	0.06	0.53	0.14	0.31	0.06

Source: BT

BT has prepared provided us with an updated version of Table 1, but with two important methodological differences. First, the revised version is based on the 2010 definition of the three geographic markets whereas Table 1 is based on the 2008 definition. Secondly, the HHI values in Table 1 were calculated before the mergers of AOL and Tiscali with TalkTalk. The new version counts all three as one operator. Nevertheless the same overall trend is visible.

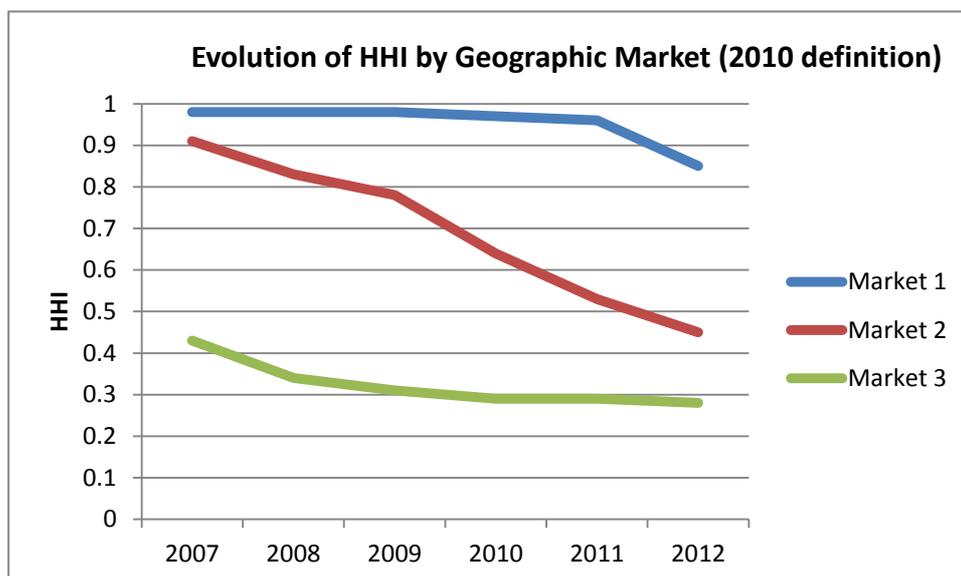
Table 2: Revised Development of Market Concentration

Period	Market 1		Market 2		Market 3	
	Mean HHI	SD	Mean HHI	SD	Mean HHI	SD
Sept 2007	0.98	0.07	0.91	0.13	0.43	0.23
Sept 2008	0.98	0.07	0.83	0.18	0.34	0.14
Sept 2009	0.98	0.06	0.78	0.20	0.31	0.12
Sept 2010	0.97	0.06	0.64	0.17	0.29	0.09
Sept 2011	0.96	0.08	0.53	0.15	0.29	0.06
Sept 2012	0.85	0.17	0.45	0.12	0.28	0.05

Source: BT



Figure 2: Evolution of HHI by Geographic Market



The table and chart shows that the market concentration in Market 1 has remained constant until the period from Sept. 2011 to 2012 when there was a substantial decrease. We understand from BT that this is a result of market entry by TalkTalk, which is now present in over 500 Market 1 exchanges.

In the period since the last WBA Statement, the concentration level in Market 3 has remained constant and has become more homogeneous across the exchanges, as shown by the decrease in standard deviation. In Market 2 the HHI has fallen by 30% from 0.64 to 0.45 and conditions have also become more homogenous.

Looking at the standard deviations, we can see that there is some overlap between Markets 2 and 3, i.e. some Market 2 exchanges have an HHI that is lower than some Market 3 exchanges.

Taking a forward look, given the entry by ISPs into Market 2 there is no reason to expect that market concentration will not continue to fall towards the level found in Market 3 today.

3.4 The Development of Competition over Time

In our comments on Ofcom's first statement in 2010 we made the point that an incumbent's market share is not eroded immediately on entry by a competitor, but that there are a variety of reasons (including contract periods and consumer awareness of competition) that would cause an incumbent's share to be "sticky". In its response, Ofcom stated (para 3.137): "We would also note that if the effects of common retail



pricing on market share only show up over an extended period of time (as argued by SPC Networks [sic]) it suggests the strength of the competitive effects they create is relatively modest.”

This statement by Ofcom suggests that cumulative competitive effects are “modest” because they show up over an extended period of time. We would like to make two points in response to this claim by Ofcom.

First, Ofcom itself recognised in the Telecoms Strategic Review in 2004 that, whilst the effect of any one action may be modest, the cumulative effect of many small actions can be material¹⁸. Referring to the “no-undue discrimination” approach adopted by its predecessor, Oftel, Ofcom wrote: “..., *the process permits differences between the treatment of BT’s wholesale customers and its own retail activities which, while relatively insignificant in isolation, constitute significant disadvantage when taken in combination*”. We would consider that the same applies in competitive effects: whilst any one effect may appear “insignificant in isolation” the cumulative effects are significant “when taken in combination”.

Secondly, the effects of competition over time are unlikely to be linear. Consumers switching away from an incumbent face both search and switch costs and, as de Bijl and Peitz note: “... gaining market share from a well-known established firm, with a large installed base requires great marketing efforts and substantially better price-quality combinations by a new competitor”¹⁹. In the immediate post entry period a combination of consumer ignorance and high switching costs may slow down retail switching. Only once awareness has risen and search and switch costs have reduced will consumers be able to change from the incumbent to the entry. These “modest” effects at any one period of time, therefore, become substantial over time. We understand that Prof. Nankervis is investigating the speed of migration on behalf of BT and we will be able to investigate this analysis when complete.

3.5 Comparison of Competitive Conditions in Broadband with Mobile

It is interesting to compare the competition conditions in the WBA market with mobile access and call origination, where there is no regulation. Figure 3 shows the HHI for

¹⁸ Ofcom (2004) *Strategic Review of Telecommunications: Phase 2 Consultation Document* para. **6.11**

¹⁹ de Bijl, P., and Peitz, M. (2002) *Regulation and Entry in Telecommunications Markets* Cambridge University Press, P. 42



WBA markets 2 and 3 along side the Mobile Network Operator²⁰ HHI for the 27 EU Member States. Two points can be made about this chart:

- i) ✂
- ii) ✂

Figure 3: Comparison of EU Mobile and UK WBA HHI

[✂Figure 4 redacted]

²⁰ We have used the MNO HHI rather than a retail HHI including MVNOs as it provides a closer comparison with WBA.



4 CONCLUSIONS

In the 2010 market review, Ofcom defined markets on the basis of the number of competitors and BT's market share where there were only three Principal Operators present, including BT. We consider here whether the market share threshold of 50% applied by Ofcom is relevant. The existence of a service share threshold is, we believe, the only substantive area of disagreement between Ofcom and ourselves.

To address this point, we have (i) reviewed recent literature on the effect of entry on competitive behaviour and (ii) examined the development of competition in the UK market.

Recent Literature

The XO paper discussed above, finds that competitive conduct is a function of the number of firms present only and the share of any one firm is not considered. It can be reasonably assumed, however, that in the 14,357 zip code areas the market share of the largest firm in each area was heterogeneous and, in at least some cases, would have exceeded the 50% threshold set by Ofcom in its market definition.

However, with respect to market definition, as opposed to a finding of market power, what matters is whether the competitive conditions are homogeneous across the exchange areas. The evidence in XO is that once there are three firms in a market place, the marginal impact of the fourth on competitive conduct is limited. This finding suggests that market share does not have a material impact on competitive conditions and that therefore a simple count of presence is enough to conclude that there is a break in competitive conditions between the presence of two and three firms. The market share, therefore, of the largest operator appears not to be relevant to the *definition* of the market.

Market Developments

Competition in Market 2, as measured by the HHI, has developed at a faster rate than in either or the other two markets. A simple extrapolation of the current trend would suggest that Market 2 will have the same low level of concentration as found in Market 1 within the period of the next WBA market review. This would bring concentration down to the same level as found in the (unregulated) mobile access and call origination market in most EU states.



Constraints on BT

This leads to the question of whether a high market share in an exchange area could be considered to be a source of market power such that there is a break in competitive conditions when BT has a market share about 50%. We do not consider that this is the case for the following reasons:

- There are strong indirect constraints on BT through bundling. Owners of premium PayTV content are able to constrain BT's pricing behaviour of the broadband component.
- The presence of sunk costs for the PO mean that it has a strong incentive to transfer existing bitstream based customers on to its own platform early and to acquire new customers (in particular in exchange areas where it did not have bitstream based customers).
- There are no discernable barriers to expansion once a PO has entered the market.
- Prices are set nationally and not exchange-by-exchange. There is, therefore, a strong spill-over effect into unbundled exchanges meaning that a 50% market share does not afford BT any ability to behave independently of customers and competitors and to price above the competitive level in these exchanges.

Proposal

It is our view, therefore, that the definition of geographic markets can be retained at three or simplified and reduced to two:

Market 1: Those exchange areas where there is only BT or BT plus one other Principal Operator²¹; and

Market 2: Those exchanges where BT plus two or more Principal Operators are present.

We expect to give this question further consideration once the WBA consultation document is published and Ofcom's proposed market definitions are known.

²¹ Given current market shares, we would define the Principal Operators as BT, Sky, TalkTalk and Virgin.



5 REVIEW OF THE NARDOTTO PAPER

We have been asked to comment on a recent paper by Nardotto, Valletti and Verboven²² (NVV) that, *inter alia*, examines the effect of unbundling on the total penetration of broadband in the UK.

Section 4 of NVV presents an empirical model of the effect of LLU entry on total broadband penetration. Their model uses a rich dataset covering 4,265 local exchanges over 17 quarters from 2006 – 2009. The basic equation NVV use is:

$$y_{i,t} = \eta_i + \tau_i + \beta LLU_{i,t} + \gamma x_{i,t} + \epsilon_{i,t}$$

The variable $LLU_{i,t}$ is their main variable of interest and refers to the presence or otherwise of at least one LLU operator. The vector $x_{i,t}$ contains time varying control variables, including a dummy to indicate cable coverage at exchange i at period t .

In three of NVV's five models, they find that LLU has a small *negative* effect on LLU penetration, one model finds no significant effect and in the most sophisticated, dynamic, model LLU has a significant, though "modest" positive effect. NVV also find that cable has a stronger, positive effect. They conclude: "... intra-platform competition through LLU entry has not significantly raised total broadband penetration. In contrast, inter-platform competition through cable has had a more significant effect".

Analysis of the diffusion of retail broadband and the adoption of LLU does not find any significant difference in the rate of diffusion before and after the rapid increase in the penetration of LLU²³. This can be seen in Figure 4. However, there are number of concerns we have with the NVV paper that lead us to question to strength of their findings.

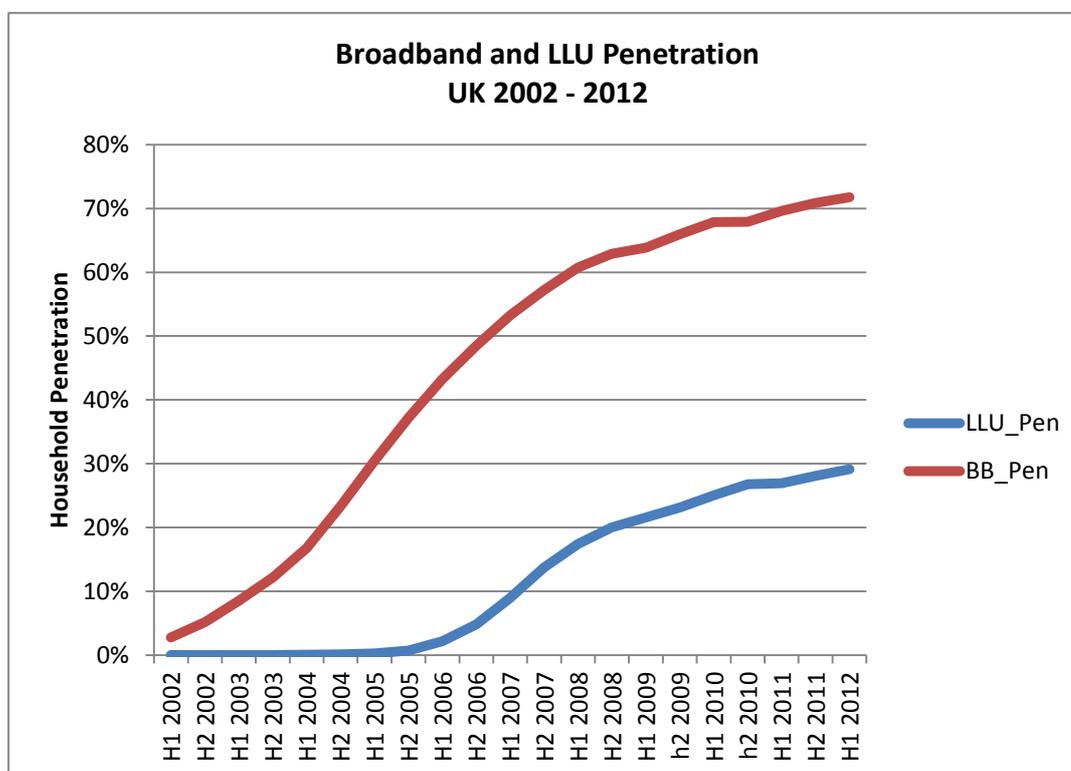
First, it is probable that there is a strong correlation between exchanges where at least one LLU operator is present and exchange areas where cable is present. LLU operators tend to target urban areas first to benefit from economies of scale and it is these same areas where cable is present. NVV do not explain how they uncouple the effect of LLU and the effect of cable in these areas. It would be interesting to see the results if there was an interaction between the LLU and cable dummies and what effect that would have on the results in exchanges where only one or the other is present.

²² Nardotto, M., Valletti, T., and Verboven, F., (2012) 'Unbundling the incumbent: Evidence from UK broadband' Centre for Economic Policy Research Discussion Paper 9194. Available at www.cepr.org/pubs/dps/DP9194.asp

²³ Cadman, R., (2012) 'Invention, Innovation and Diffusion of Local Loop Unbundling in the UK' University of East Anglia, ESRC Centre for Competition Policy, Working Paper 12-,8



Figure 5: Penetration of LLU and Broadband



Data source: Ofcom, our calculation

Secondly, at the start of NVV’s time series (2005), cable was already rolled-out to approx. 55% of households; broadband had been adopted by 37% of households; and LLU was just beginning to be used by ISPs. With the exception of the dynamic model (which produces the strongest positive effects for both LLU and cable), the existing stock of broadband and cable is not captured in the NVV models. It is clear from Figure 3, that the penetration of both broadband and LLU are non-stationary time series, but we are unclear how this is accounted for in the NVV models.

Thirdly, NVV state: “... because of economies of density, LLU investment in the [Local Exchange] LE will be correlated with LLU investment in neighbouring areas...”. We are not aware of, and NVV do not provide evidence of, such economies of density. To the best of our knowledge, each LE is a discrete entity and ISPs cannot gain economies of density by investing in neighbouring exchanges. It will be true that exchanges in urban areas will be contiguous with exchanges in other urban areas, and rural areas with rural areas. However, this is a simple fact of geography rather than an economic effect. We therefore question NVV’s assumption behind their second model, which shows the largest negative effect of LLU on broadband penetration.



Section 5 of NVV examines the effect of LLU on quality of service and finds that LLU entry has a positive effect on access speeds and that LLU operators offer higher access speeds than BT, which in turn offers higher speeds than bitstream based customers.

These results are hardly surprising. LLU operators were able to install the most recent technology (ADSL2+), whereas BT had legacy equipment, which could not be replaced overnight. Further the physical conditions, in particular average line length are substantially different between LLU exchanges and BT and bitstream exchanges, as is acknowledged by NVV.