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Assessing the UK experience functional separation in fixed telecommunications markets

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ABSTRACT

This paper focuses on functional separation. After reviewing the literature on separation in its various guises and describing the circumstances that culminated in the creation of Openreach in the UK, the paper focuses on the implementation of the undertakings. It is shown that difficulties have been encountered in the implementation of the undertakings, and that while the relationship between BT and other service providers may have improved, tensions remain.

Keywords: broadband, functional separation, Openreach, UK

1. INTRODUCTION

Over the course of the last year or so there has been considerable interest in the implementation of functional separation within fixed telecommunications markets. In these markets, which are largely but not exclusively to be found within the European Union, functional separation is seen as a way to resolve the tensions that exist between incumbent operators and those other service providers that require access to incumbents' networks to deliver their own services.

At the forefront of the implementation of functional separation is the UK. In late 2005, OFCOM and BT agreed on a series of undertakings that culminated in the creation of a new company – Openreach – to run BT's local access network. Accompanying the establishment of Openreach was the imposition of key performance indicators and penalties for non-achievement. As Openreach is clearly an important landmark in the development of the UK telecommunications market, this paper will focus on the implementation of the undertakings to date. With this in mind, the remainder of this paper is divided into five sections. A brief overview of the different types of separation possible within the telecommunications industry is provided in Section 2. Background information regarding the adoption of functional separation is detailed in Section 3, while Section 4 focuses on the implementation of the undertakings. The adoption of functional separation in the UK is appraised in Section 5, and conclusions drawn in Section 6.

2. Literature

Any assessment of functional separation within the UK raises two questions: what is functional separation and what has been the UK experience? This section will address the former of these questions, while the remainder of the paper will address the second question. A useful starting point when answering the first question is Xavier & Ypsilanti (2004). Through focusing on the separation of competitive from non-competitive services, the authors identify (*Ibid.*: 76) a range of separation measures that have been implemented within the telecommunications industry, namely:

- accounting, functional and corporate separation;
- separation into regional operators;
- separation of local from long-distance services;
- separation of local and mobile services;
- separation of local and broadband/advanced services;
- separation of an incumbent into smaller, vertically integrated, carriers.

With respect to structural separation, four different approaches are identified (*Ibid.*: 77-81). In the first of these – LoopCo – the incumbent divests its access business to form a new company while in the second – NetCo – an arms-length relationship is established between the incumbent's access and non-access networks. The establishment of an Alternative Distribution Company is the third approach suggested, and entails the collective ownership of the non-competitive assets by those operators present in the competitive parts of the market. The final approached suggested is that of voluntary suspension.[1]

Although all four approaches have been variously discussed, it is not altogether surprising that attention has focused on the LoopCo and NetCo proposals. Cave (2002), Dounoukos & Henderson (2003) and Xavier & Ypsilanti (2004) identify a range of

factors that need to be taken into consideration regarding the viability of the LoopCo option. One such factor is the network scope of LoopCo, while another is whether coordination problems between LoopCo and other operators would result as a consequence of technological advances. With respect to the restructuring of BT announced in late 2000, Sandbach (2001: 200) stated that the proposed NetCo inadequately addressed the local loop issues as it would cover both the copper and switched network. That is, the possibility remained for NetCo to favour its own services or those provided elsewhere in BT.

Cave (2002: 30) argues that with the NetCo option there is the possibility that the company will leverage the market power accruing from the monopoly part of the business into those that are competitive. In addition, he suggests that the pace of technical innovation will slow under the NetCo option as service providers would have to convince NetCo that sufficient demand existed for it to warrant making the necessary investment.

Due to the problems and uncertainties associated with both the LoopCo and NetCo proposals, it is not surprise that attention has focused on other ways of resolving the tensions that exist within the telecommunications market. Cave (2006a: 94), for example, identifies six alternatives as follows:

- creation of a wholesale division;
- virtual separation;
- business separation;
- business separation with localised incentives;
- business separation with separate governance arrangements;
- legal separation.

According to Cave (2006a: 94), accounting separation at the time of writing was more or less the modus operandi of European incumbents with the exception of BT. In terms of the six identified alternatives, BT/Openreach falls under 'business separation with local incentives' and consequently is closer to the ownership separation end than the accounting end.

BT/Openreach is an example of functional separation. According to the European Regulators Group (2007: 2), this involves the selective separation of those parts of the network that are difficult for other operators to replicate but which they need to access in order to provide their own services. This is frequently interpreted as the separation of the incumbent's wholesale and retail businesses from one another. This is, however, slightly misleading. If the focus is solely on those parts of the incumbent's network that cannot be replicated then the scope of the functional separation may be narrower than is implied by the separation of wholesale from retail (European Regulators Group, 2007: 8).

Regardless of the extent to which functional separation is implemented, the result is to run and manage one part of the network separately from the rest. The separated part of the incumbent should be provided with local incentives so that it acts in the interests of all its customers, internal and external, and not in the interest of its parent company.[2] In addition to the use of local incentives, the European Regulators Group suggests (2007: 2f) a range of 'key elements' that need to be provided if functional separation is to be effective.[3]

3. Background

Before providing a brief overview of the events that culminated in the establishment of Openreach in late 2005, it is necessary to note that the decision to initiate the strategic review of telecommunication can be located at the confluence of three sets of drivers. The first of these drivers was the need to incorporate EU directives into the UK regulatory framework, while the second was the relatively recent establishment of OFCOM in 2003. Thus, the strategic review could be viewed as drawing a line under the old regulatory framework and providing a basis on which converged regulation could progress.

The review could also be regarded as being a reponse to a third set of drivers, namely, the failure of competition to develop as anticipated in the UK. Although some companies had invested in their own infrastructure, these networks lacked scale (OFCOM, 2004a: 53). The cable operators, which operated the most extensive networks geographically, collectively covered less than half of the population and their ability to compete was limited by their continued financial woes[4]. Service based competition had been possible since the late-1990s (OFCOM, 2004c: 53) but had enjoyed only limited success because, it was alleged, BT had abused its dominant position in the wholesale market to enhance its retail competitiveness (Wilsdon & Jones, 2002).

The results of such anti-competitive behaviour can be seen with respect to broadband and local loop unbundling. Although towards the end of the 1990s many companies expressed an interest to offer broadband services, most subsequently left the market (Turner, 2003: 6). One consequence of this was that only a handful of companies emerged to compete against BT, while another was the limited uptake of local loop unbundling in the UK.[5] With this in mind, the strategic review could also be viewed as being driven by the desire to enhance competition within the broadband telecommunications market and to encourage greater adoption of local loop unbundling.

The strategic review of telecommunications

At the end of 2003, OFCOM announced its intention to hold a review of the telecommunications market during the following year (OFCOM, 2004a). The initial consultation document was wide-ranging in nature, raising issues that were subsequently clarified in the second consultation document (OFCOM, 2004b). Central to the second consultation document was the idntification of three regulatory options, the first of which was deregulation. OFCOM concluded, however, that this was not possible, not least because sector-specific regulation was faster and more precise than the alternatives.

The second option was a reference under the Enterprise Act 2002 to the Competition Commission. Such a reference would inevitably necessitate a wide-ranging review of the telecommunications market that could result in the eventual imposition of structural remedies. The third option, the one prefered by OFCOM, was termed 'real equality of access' and would enable those companies purchasing wholesale products from BT to do so on the same term as BT's own retail operations. Thus, wholesale customers would have access to (OFCOM, 2004c: 14):

- the same or a similar set of regulated wholesale products as BT's own retail activities;
- at the same prices as BT's own retail activities; and,
- using the same or similar transactional processes as BT's own retail activities.

Two different types of equivalence were proposed – outcome and input – and a range of products identified where it could be applied (OFCOM, 2004b: 68). In the case of equivalence of outcome, wholesale customers receive products that are comparable to those offered to BT's own retail operations but the underlying processes would not be the same. In contrast, where equivalence of input is applied, wholesale customers receive the same products as BT's own retail operations using the same set of underlying processes (OFCOM, 2004c: 67f).

Recognising that a range of issues had been identified by many of BT's wholesale customers during the consultative process which these customers believed placed them at a competitive disadvantage relative to BT (*Ibid.*: 70), there was also a behavioural dimension to equivalence. While the range of issues highlighted was broad, two areas in particular – the incentives for inappropriate behaviour and transparency – were singled out as areas where action could be taken. This said, OFCOM did note that BT had, in the past, devoted considerable effort and resources to addressing the complaints raised by its competitors.

Undertakings in lieu of a reference under the Enterprise Act 2002

In June 2005, OFCOM (2005a) announced that it was launching a consultation to determine whether it should accept the undertakings offered by BT to bring an end to the strategic review. Rather than trigger a reference under the Enterprise Act 2002, BT agreed to a series of legally enforceable undertakings (Ibid.: 2). BT agreed to create an access service division that would (Odell, 2005: 23):

- control the 'last mile' of the telecommunications network;
- be operationally independent of BT while remaining under its ownership;
- be branded differently from BT;
- have its own five-member board, headed by a non-executive director of BT;
- incorporate 15,000 out of BT Wholesale's 28,000 employees.

In addition, BT also agreed to a schedule for equivalence for legacy products as well as stating the principles on which the company's next generation network (NGN) would be developed (OFCOM, 2005a: 2ff). For its part, OFCOM stated that it would revisit issues such as leased lines and retail price controls in the near future (*Ibid.*: 5).

In September 2005, OFCOM accepted the undertakings offered by BT (OFCOM, 2005b). In total, 236 undertakings were made by BT. These governed the operation of the access service division to ensure that those wholesale customers reliant upon access to deliver their own products and services were treated no differently from BT's own retail operations (OFCOM, 2005c). At the same time as OFCOM agreed to accept the undertakings, BT rebranded its access service division as Openreach (OFCOM, 2005b)

.4. Implementing the Undertakings

Given the magnitude of the undertakings, it is no surprise that their implementation has been carefully monitored. To date, OFCOM has published two evaluations of the impact of the telecommunications strategic review that detail the progress that BT has made in implementing the undertakings. In addition, five quarterly reviews as well as correspondence between OFCOM, BT and others have been published.[6]

A useful starting point for an understanding of how the undertakings have been implemented is the two annual evaluations that have been published by OFCOM. The

first of these, which was published in October 2006, acknowledged the effort that BT had invested into meeting the undertakings before identifying a range of areas where implementation had been less than satisfactory (OFCOM, 2006a). Eight areas where further action was required were identified. It is, perhaps, no surprise that these were broad in their scope, ranging from the need to resolve boundary issues between BT Wholesale and Openreach to agreeing how Openreach's management information systems (MIS) and operational support systems (OSS) could be separated out from the rest of BT.[7]

The second annual report suggested that further work was required to separate Openreach from the rest of BT and to develop, and subsequently deploy, equivalent products (OFCOM, 2007b). In addition, the report also stated (on p.4), somewhat vaguely, that more effort was required if the full benefits of functional separation were to be achieved.

Both annual reports highlighted the difficulties to be faced in separating Openreach from the rest of BT, noting in particular the information system-based difficulties being encountered. The three information systems in question are the MIS, OSS and the equivalence management platform (EMP). Openreach is required to separate its OSS from the rest of BT in a logical manner and to separate them physically from one another by June 2010 (OFCOM, 2007b, 48). However, OFCOM and BT placed a different interpretation on logical separation, with the consequence that clarification was required (OFCOM, 2007d). Although this inevitably resulted in some delays, it also produced a clear timetable for the migration of users to physically separate systems.

Additional time was also sought by BT to separate the MIS between Openreach and the rest of the company. While OFCOM did agree to this request, BT was required to assist users to restrict access and to define the subsequent separation process. This has largely been achieved although OFCOM does note (2007a: 48) that risks still remain with those systems that draw on BT-wide initiatives. The delivery of equivalence is supported through the use of the EMP[8], the implementation of which has been less than satisfactory since it was first introduced in early 2006. The delivery of the initial system was delayed and subsequent versions were released with reduced functionality (OTA, 2006a and 2006b). Perhaps more importantly, concerns have been raised as to the stability of the EMP (OTA, 2007a) and the extent to which the service is unavailable (OTA, 2007b and 2007c). Both of these have caused problems for the telecommunications companies using the EMP. Although these issues have been tackled with varying degrees of success, they have engendered a degree of uncertainty regarding the platform's robustness and reliability.

The correspondence published by OFCOM highlights some of the difficulties that have been encountered in the implementation of the undertakings.[9] BT has, on more than one occasion, sought more time to implement the undertakings. Although OFCOM has invariably granted these requests, it is worth noting that the extensions are temporary and not open-ended. This correspondence is relatively brief, which is in contrast to the consultations surrounding the range of exemptions and variations that BT has sought since June 2006.

To bring the strategic review to a swift conclusion, it was agreed that OFCOM and BT could consider at a later date the equivalence of inputs needs of some products (OFCOM, 2006e). In June 2006, BT sought exemptions and variations in 15 different areas, with 13 requiring consultation due to their complexity (OFCOM, 2006f). As a result of this consultation, OFCOM agreed to nine of the requests. The remaining four

requests required additional consultation as they involved products relying on fibre (OFCOM, 2006e).

Table 1: Variations to the undertakings

Variation	Scope	Date
1	Products & services supplied by Access Services (Openreach); share schemes and BT Group Deferred Bonus Plan; EAB report to OFCOM; EAB Summary Annual Report	Mar 2006
2	Equipment location	Apr 2006
3	Products & services supplied by Access Services (Openreach)	Aug 2006
4	OSS separation	Sep 2006
5	OSS separation	Oct 2006
6	Products & services supplied by Access Services (Openreach)	Dec 2006
7	Information flows & system separation	Dec 2006
8	Products & services supplied by Access Services (Openreach)	Apr 2007
9	OSS separation	Jun 2007
10	Incident management processes	Oct 2007
11	Extensions to OSS and EOI timetables	Nov 2007
12	Changes to sections 2.1 (definitions), 5 (access services) and 6 (management & structure of BT Wholesale)	Dec 2007
13	Products & services supplied by Access Services (Openreach)	Dec 2007
14	Provision of equivalent products and services – changes to section 3.1.1, section 3.1.2 and annex 1 of the undertakings	Dec 2007
15	Products & services supplied by Access Services, changes to section 5.46.2	May 2008

Source: www.ofcom.org.uk/telecoms/btundertakings/exemptionsandvariations, accessed 7 June 2008

In turn, this additional consultation resulted in three out of the four requests being granted. OFCOM granted a temporary extension until December 2007 in the case of the fourth request while further consultation was undertaken (OFCOM, 2007e: 2). Another set of exemptions and variations granted to BT was published in October 2007 and was once again the outcome of a consultation process that began in July of the same year (OFCOM, 2007f). The most recent variation request occurred in May 2008, and granted BT and OFCOM more time to implement the undertakings (OFCOM, 2008a). All fifteen granted variations are shown in Table 1.

The published correspondence, as well as the exemptions and variations consultations published by OFCOM, draw attention to boundary issues. Boundary issues arise where the distinction between Openreach and the rest of BT is blurred. One area where boundary issues have arisen was noted above, namely to ensure that the information systems that linked Openreach with the rest of BT were altered so that the two were separate from one another.

A second area where boundary issues have emerged is that of access to engineering resources. BT has sought to move engineers between Openreach and BT Wholesale as circumstances dictate (OFCOM, 2006b: 3). For example, BT requested permission from OFCOM to move engineers between the two divisions in the aftermath of the floods that swept the south of England during 2007. This was, however, a temporary measure that addressed a particular series of events.

The quarterly reports published by OFCOM draw attention to the need to ensure that the 'Chinese Walls' between Openreach and the rest of BT are maintained (OFCOM, 2006b and 2006d). A separate Openreach head office has been established, and some of the earlier concerns that the 'Chinese Walls' were unsatisfactory due to organisational changes within BT Wholesale have been addressed.[10] The second report on the implementation of the undertakings notes that Openreach is reliant on other parts of BT for access to space and power within exchanges (OFCOM, 2007b: 46ff). As a consequence of this, it was felt that Openreach does not have adequate control over the products that it delivers.

Also highlighted by the quarterly reports are the concerns expressed by other telecommunication operators as well as by OFCOM regarding product development. The former have noted that a gap existed early on between what BT announced and what was delivered (OFCOM, 2006b: 11), while more recently their interaction with BT has become an issue (OFCOM, 2006c: 9ff; OFCOM, 2006d: 10). It was alleged that this interaction was insufficient, and that in some cases the ability of other telecommunication operators to influence product specifications was limited. To this, OFCOM (2007b) adds that the pace of product development has been slow before acknowledging that this may be due to developments elsewhere in BT.[11]

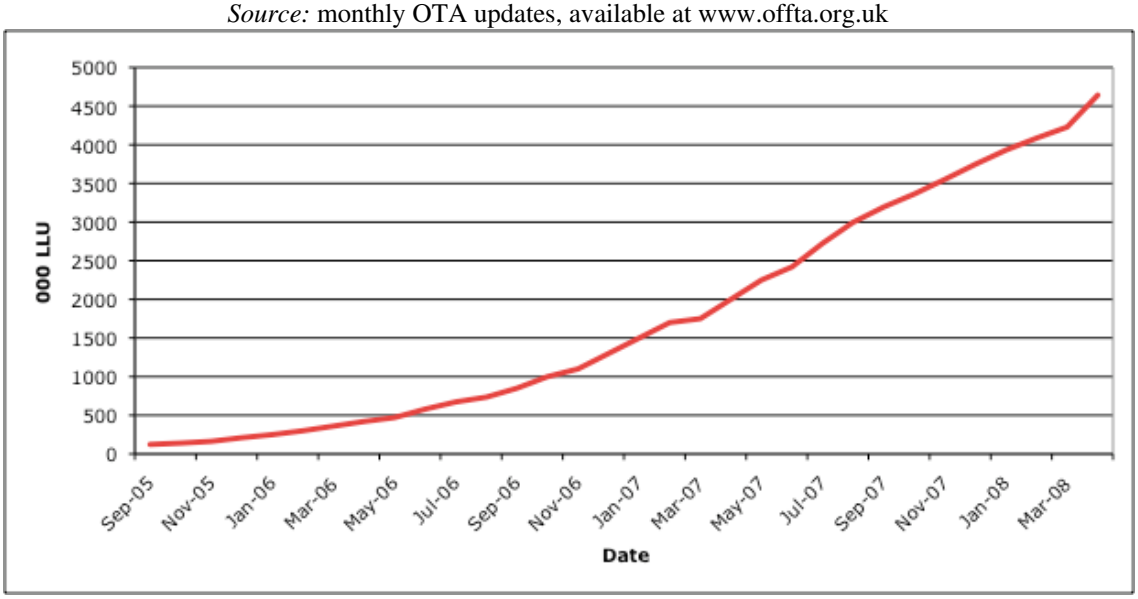
5. Discussion

The previous section has demonstrated that the separation of Openreach from the rest of BT has not been straightforward. While Openreach was established relatively swiftly in the aftermath of the undertakings being agreed, the actual separation of Openreach and BT has been more problematic in terms of both products and processes. As the implementation of the undertakings has progressed, BT has sought exemptions, variations and extensions. Such requests were perhaps inevitable given the unprecedented nature of the undertakings and thus may simply reflect the inherent difficulties of separating Openreach from the rest of BT.

Notwithstanding the difficulties that have been experienced, the Openreach model of functional separation has been praised. In a speech to the European Regulators Group, Commissioner Reding argued that functional separation had contributed to the rapid rise of unbundled lines and increased network investment (Reding, 2007). When the undertakings were announced in September 2005, the number of unbundled lines stood at 123,000 (OTA, 2005). In contrast, the most recent figure published in May 2008 shows that there are now 4.462 million unbundled lines (OTA, 2008d). Although this growth is undoubtedly impressive, it has not been without its problems as we have shown above. Recent monthly updates from OTA show that although progress has been made in implementing the undertakings, with many key performance indicators improving after initial disappointments, problems continue to emerge such as the delays in publishing the WLR3 roadmap and providing the necessary functionality to other service providers (OTA, 2008a, 2008b and 2008c).

Figure 1: Unbundled local loops, September 2005 – May 2008

Source: monthly OTA updates, available at www.offta.org.uk



There can be no doubt that BT has invested to deliver the undertakings. According to its most recent annual report, BT invested £35 million in a 'proactive maintenance programme' that reduced the number of faults experienced (BT, 2008: 21). The total amount invested by BT in financial year ending 31 March 2008 was £53 million, which was an increase on the corresponding figure for 2007 (£30 million) but less than n 2006 (£70 million) (*Ibid.*: 105). This is, however, slightly misleading as these figures relate to the costs of establishing Openreach and meeting the undertakings.[12] In other words, they do not include capital expenditure. Over the last two years, capital expenditure has remained steady at more or less £1.1 billion per annum.[13] It is not clear, of course, how much of this would have occurred regardless of whether Openreach was established and how much is specifically due to the implementation of the undertakings.

There are other service providers in the marketplace. One such operator is Cable & Wireless (C&W). Prior to the undertakings being agreed, C&W stated its intention to invest in LLU (Cable & Wireless, 2004) and acquired Bulldog, a broadband provider, to strengthen its position in the marketplace. After failing to control costs, C&W announced in June 2006 that it would stop offering retail products (Stafford, 2006: 22) although it has continued to use LLU to deliver services to business clients (Cable & Wireless, 2008).[14]

Another operator providing broadband services is BSkyB. As of 31 March 2008, BSkyB had 1.428 million broadband subscribers, an increase of 229,000 subscribers over the quarter (BSkyB, 2008: 2). In addition to acquiring Easynet at the end of 2005 for £211 million (Wray and Milmo, 2005), BSkyB has also made subsequent investments in infrastructure. In the nine months ending 30 April 2008, BSkyB invested £127 million in its residential broadband and telephony business (BSkyB, 2008: 1). While it is not clear how much of this investment was targeted towards broadband, it is worth noting that it has been claimed that this represents the peak of its broadband-related investment cycle (Edgecliffe-Johnson and Fenton, 2008: 20).

A third operator in the marketplace is Carphone Warehouse. Since announcing its intention to use LLU in November 2005, Carphone Warehouse has grown to become a significant player in the market. The company's growth has been driven by innovative new products such as 'Talk Talk Free Broadband', launched in April 2006, which gave

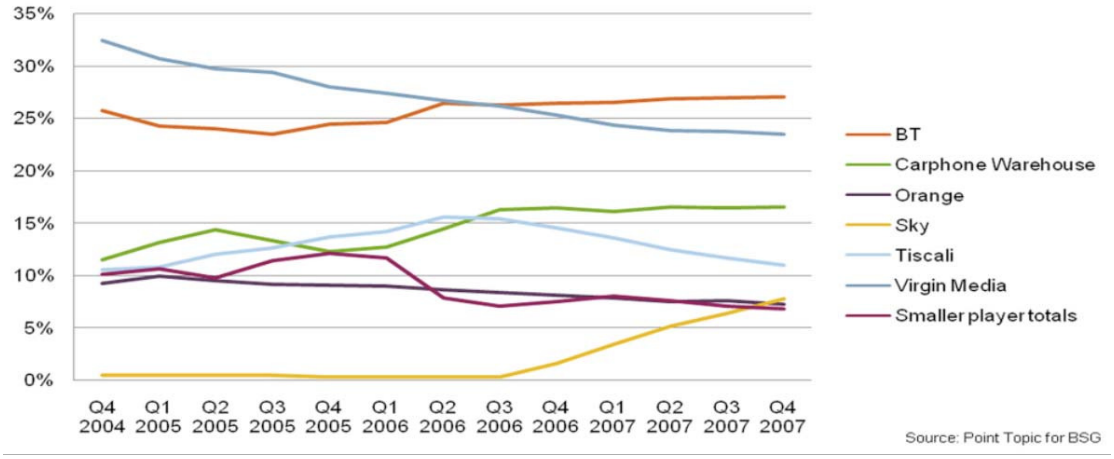
free broadband to those customers purchasing voice and line rental (Carphone Warehouse, 2007: 6). Although this was highly successful, attracting more than 500,000 customers, losses associated with the product widened from £20 million in April to £70 million in October 2006 (Parker & Braithwaite, 2006: 23). Accompanying the launch of 'Talk Talk Free Broadband' was the intention to invest in 1,000 unbundled exchanges by July 2007 (Carphone Warehouse, 2007: 6). One motive for investing in LLU was that delivering services to customers this way was profitable, unlike the situation when wholesale products were used (Pratley, 2006).[15]

The acquisition of AOL UK from Time Warner in December 2006 further expanded the company's customer base.[16] This not only served to increase the number of subscribers but would make the economics of LLU more attractive to Carphone Warehouse (Parker and Braithwaite, 2006: 23). As a consequence, it is perhaps no surprise that Carphone Warehouse has switched the bulk of its subscriber base on to LLU and expanded the number of exchanges in which it has invested (Carphone Warehouse, 2008: 5).[17] Although the expansion of the business would not be possible without infrastructure investment of one sort or another, it is not clear how much the company has actually invested as the relevant figures are consolidated with other investments in its annual report.[18] This said, Charles Dunstone, the chief executive of Carphone Warehouse, has recently been quoted as saying that the company has made "large expenditure commitments towards unbundling" (Parker, 2008a: 19).

Charles Dunstone has also raised the issue of the fees that Carphone Warehouse pays Openreach. Charge ceilings for WLR and LLU services were set by OFCOM between December 2004 and January 2006.[19] Since then, Openreach has failed to achieve the 10 per cent return that it is permitted with the consequence that BT would like to raise these charges (Parker, 2008e: 18). BT has argued that the aforementioned charge ceilings do not reflect the underlying costs of providing services and that they need to be amended to reflect the changing nature of the product portfolio being delivered.[20] Unsurprisingly Carphone Warehouse has a different view, stating that it would unfair to 'change the game' (Parker, 2008a: 19). Notwithstanding the complexities of determining rates of return and charges that the consultation document – OFCOM (2008a) – highlights, the implications are clear: if OFCM agrees with BT, the costs for other service providers of using Openreach's network will increase.[21]

In the process of assessing the costs and benefits of functional separation, Amendola *et al* (2007) state that functional separation enhances competition. One measure of this is market share while another is the price and speed of broadband products. As can be seen from Figure 2, BT remains the largest ISP whereas the market shares of Orange, Tiscali, Virgin Media and smaller ISPs have all fallen. In contrast, the market shares of Carphone Warehouse and BSkyB have both risen since the undertakings were agreed.

Figure 2: Market share of ISPs



Source: www.broadbanduk.org

OFCOM (2008a: 14) states that broadband prices have fallen whereas speeds have increased. While there is clear evidence that prices have fallen[22], there has been much discussion of late regarding broadband speeds. Average download speeds vary considerably across the UK, from 4.5 Mbps in London to 2.3 Mbps in Northern Ireland (BBC, 2008). In addition, the relationship between the advertised and the actual broadband speeds has been questioned, with a discrepancy being noted between the two. According to Point Topic (2008), as advertised speeds increase the proportion of subscribers receiving such speeds declines. The discrepancy between advertised and actual broadband speeds has prompted OFCOM to issue a voluntary code of conduct containing eight principles.[23]

6. Conclusion

This paper has focused on functional separation in the UK. The September 2005 decision to opt for functional separation represents a milestone in the regulation of the UK telecommunications market, and in the process imposed a range of undertakings on BT. The process of unravelling the numerous undertakings that bound Openreach to the rest of BT has proved to be more difficult and protracted than anticipated. Not only were extensions, variations and exemptions sought, but Openreach also took longer than anticipated to meet several key performance indicators. If nothing else, these difficulties suggest that implementing functional separation is by no means straightforward.

Nevertheless, the period subsequent to the adoption of functional separation has seen significant broadband competitors emerge in the form of Carphone Warehouse and, to a lesser extent, BSkyB. For both Carphone Warehouse and BSkyB, LLU plays a central role in their strategies, not least because LLU is a more profitable way to service their customers than WLR. While LLU does not appear to have spurred other service providers into investing in other parts of the 'ladder of investment' as suggested by Cave (2006b), they do appear to have invested relatively large sums to deliver LLU-underpinned broadband services. With the emergence of LLU as a vehicle for the deployment of broadband services, not only has the importance of BT in the market place been elevated but so too has the necessity of ensuring that the relationship between BT and those companies using its network is functioning as intended.

Functional separation was adopted to resolve the tensions that existed between BT and those companies wishing to access its network to provide their own services, with the undertakings providing a framework for assessing the state of this relationship. As the third anniversary of the undertakings nears, it could be argued that the relationship between BT and other service providers has improved over time as LLU uptake has improved although relations may sour if BT successfully argues for charge ceilings to be raised. If the relationship between BT and other operators does sour and undertakings are breached, OFCOM could refer the matter to the Competition Commission. The unpredictable outcome of such a referral may mean that OFCOM is unwilling to make such a reference and will adopt a more pragmatic approach to implementing and monitoring the undertakings.

Notes

1. This is not to suggest that this is the only feasible categorization of structural separation. Dounoukos & Henderson (2003: 44f), for example, distinguish between 'actual' structural separation and 'internal' separation. With respect to the former, they identify four alternatives – club or joint ownership, operational separation, separation into several vertically integrated companies and separation of the non-competitive components into several parts – while three 'internal' separation alternatives – accounting, functional and corporate – are suggested.
2. While referring to wholesale and retail, OECD (2006: 23) states that incentives may be given t wholesale managers that conflict with those provided to retail managers. This reinforces the suggestion that incentives should be localised and not tied to the overall profitability of the operator.
3. European Regulators Group (2007: 4) provides a summary of the measures undertaken in countries where functional separation has been implemented under the three headings of functional, employee and information separation. Interestingly, not all measures have been implemented in all cases, and some are only feasible in conjunction with others.
4. In 2004 just 46% of UK homes were passed by broadband-enabled cable (OFCOM, 2004c: 38). Subsequent communication market reviews have shown that in 2005 and 2006, digital cable was available to 45% of the UK population (OFCOM, 2007a: 15). For a discussion of the financial woes of cable operators see, for example, Curwen (2004).
5. See, for example, de Bijl and Peitz (2005) for a discussion of unbundling that highlights the relatively slow uptake of local loop unbundling in the UK compared to other European Union member states.
6. These reports, as well as the other material published by OFCOM relating to the telecommunications strategic review and the implementation of the undertakings, can be found at www.ofcom.org.uk/telecoms/btundertakings.
7. See OFCOM (2006a: 2) for a full list of the eight areas identified that require further action.
8. The EMP is an information system that supports the delivery of the products offered by Openreach. Given the anticipated large volumes of some of these products, the system is designed to be automated to ensure that services are provided as demanded.
9. See www.ofcom.org.uk/telecoms/btundertakings/exemptionsandvariations for a full list of the correspondence between BT and OFCOM that has been published.
10. BT Wholesale has been reorganized with two management units – BT Wholesale Core Network Services and BT Wholesale Value-added Network Services – being

established (OFCOM, 2006b: 5). The concern expressed by some telecommunications operators was that this would complicate the implementation of the 'Chinese Walls' that were established. However, OFCOM stated that more time should be given before making a judgement as to whether the 'Chinese Walls' were being breached.

11. Two developments are noted, namely, the implementation of the undertakings as well as the development of the company's 21st century network.

12. It is worth noting that the annual report states that these figures are estimates of the incremental and directly attributable costs incurred as a consequence of establishing Openreach on the one hand and meeting the undertakings on the other (BT, 2008: 105).

13. For the year ended 31 March 2007, capital expenditure was £1,108 million while the figure for the following year, albeit an estimate on the part of BT, was £1,100 million (OFCOM, 2008a: 20). Although capital expenditure has remained more or less steady since Openreach was established, the 2007 figure did represent a slight increase on the previous year's level of £1,038 million (OFCOM, 2008a: 20).

14. Cable & Wireless does not break up capital expenditure by its European, Asian and US businesses by geography or product. Thus, it is unclear how much the company has invested in LLU in the UK. Having said this, capital expenditure by this business did decrease from £235 million in 2006/07 to £221 million in 2007/08 (Cable & Wireless, 2008: 21).

15. According to Pratley (2006), Carphone Warehouse would make a profit of £7 per month per customer when using LLU whilst it would lose £5 per month when using wholesale products.

16. With the acquisition of AOL UK, Carphone Warehouse controlled 16% of the broadband market (Carphone Warehouse, 2007: 6). Carphone Warehouse sought to expand its presence in the UK broadband market by bidding to acquire the UK operations of Tiscali, which had 1.8 million broadband subscribers at the time. Although Parker (2008d: 17) reports that C&W is no longer in contention, subsequent reports contest this.

17. At the end of 2006, 19% of the company's broadband subscribers were located in unbundled exchanges (Carphone Warehouse, 2008: 5). This figure had increased to 61% by the end of the following year. Over the same period, the number of unbundled exchanges increased from 569 to 2,457. Only part of this increase – 924 – was due to the acquisition of AOL UK.

18. Total investment increased from £351.1 million in 2006 to £562.2 million in 2007 (Carphone Warehouse, 2007: 15), with 'acquisition of property, plant and equipment' increasing from £89.4 million to £161.4 million over the same period (Carphone Warehouse, 2007: 36). Some, but not all, of this presumably relates to LLU.

19. See OFCOM (2008a: 1f) for details. The charge ceilings were as follows: £100.68 for residential WLR, £110.00 for business WLR, £81.69 for MPF and £15.60 for SMPF.

20. The move away from WLR has, for example, contributed to a decline in Openreach's rate of return (OFCOM, 2008a: 18).

21. The consultation documents ask 25 questions in all, with submissions being possible until 8 August 2008.

22. See, for example, OFCOM (2006g: 120), OFCOM (2007a: 298) or OFCOM (2008a: 15).

23. See OFCOM (2008c) for further details.

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