Equivalence of Input and Functional Separation:
A Framework for Analysis

Prepared for

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Executive Summary

1. This report has been prepared in the context of the proposal by the European Commission to introduce functional separation as an "exceptional remedy" and in the light of proposals in various other countries, for example New Zealand and Australia.

2. There has been considerable debate about the merits or otherwise of functional separation, but much of it does not put functional separation in its proper context and fails to analyse the role it plays in an overall regulatory environment designed to address competition problems.

3. This report seeks to answer three key questions:

    i) What is it about the structure of electronic communications markets that gives rise to enduring competition concerns?

    ii) Have equivalence and functional separation been well-designed and implemented in the UK to address enduring competition problems and what does this imply for other fixed communications markets?

    iii) Can we expect equivalence and functional separation to lead to improved intermediate (wholesale) and final consumer outcomes?

4. Before the liberalisation of electronic communications markets starting in the UK in 1984 and implemented throughout Europe in 1997 (as well as being adopted in other countries), the market was characterised by vertically-integrated monopolies. In Europe, National Regulatory Authorities (NRA) were granted powers to impose *ex ante* regulation on operators with Significant Market Power (SMP) in relevant markets, to prevent them from discriminating against their competitors when those competitors were buying essential inputs from the SMP operator.

5. When Ofcom conducted its Telecoms Strategic Review (TSR) in 2004 it summarised its findings by saying that those who rely on BT to provide access have experienced twenty years of:

    - slow product development;
    - inferior quality wholesale products;
    - poor transactional processes; and
    - a general lack of transparency.

6. Despite there being no finding against BT on non-discrimination grounds, Ofcom determined that non-price discrimination was the major problem facing the market. It also found that a reliance on an obligation of non-discrimination (which anyway allowed discrimination when objectively justified) and accounting separation was not sufficient to support a competitive downstream market and the consumer benefits that would flow from this.

7. Ofcom's preferred remedy was to ensure that BT offered "real equality of access", such that both internal and external downstream customers of upstream essential facilities were provided with the same product, on the same terms and using the same ordering system. Ofcom also wanted to see a re-organisation of BT to support the delivery of equality of access.

8. In lieu of a referral to the Competition Commission under the Enterprise Act, BT offered, and Ofcom accepted, a set of Undertakings whereby BT would offer Equivalence of Input for a defined set of products and would create a separate

Access Services Division (later branded Openreach). "Functional Separation", as this organisational structure became known, was introduced to support equivalence.

9. We have conducted a range of interviews with organisations involved in the telecoms market in preparing this report. There was general agreement amongst the interviewees that whilst the implementation of equivalence and functional separation has not been perfect, it has brought about considerable improvements. Most importantly, downstream competitors of BT now have more confidence to invest, and indeed are doing so.

10. Drawing on the experience in the UK, we set out a qualitative framework for the assessment of the effectiveness of equivalence and functional separation in which we examine the impact of these measures on:

    i) Investment and innovation – which can be broken down into two areas:

       in the local loop; and
       in downstream markets by all operators;

    ii) The internal efficiency of the regulated firm; and

    iii) The direct financial costs of regulation.

11. A number of authors have claimed that equivalence and functional separation will negatively affect investment because, for example, the upstream firm will not be able to earn a sufficient return and that a downstream firm will behave strategically if and when investment is made: this is often referred to as the "hold-up problem".

12. We find these arguments to be misplaced. First, a firm with SMP or dominance in an upstream market is almost certainly going to be subject to price control regulation, regardless of whether it is also subject to equivalence and functional separation. If price regulation does affect investment decisions, this is a general argument against regulation rather than against any particular form of regulation.

13. Secondly, for the hold-up problem to occur, the investment made by the upstream firm has to be specific to one downstream firm. This is simply not the case in electronic communications, where there are multiple firms competing downstream and so multiple outlets for an upstream product.

14. Looking at what has happened in the UK, we find that in 2008 both BT and Virgin Media made substantial announcements about their investment plans for the local loop. BT is to invest £1,500 million to deliver fibre to 12 million homes (mostly fibre to the cabinet), whilst Virgin Media is upgrading its HFC network to DOCSIS3, which will deliver 50 mbit/s by the end of 2009. We also see that broadband Internet Service Providers have invested in unbundling local exchanges and installing their own DSLAMs to offer higher access speeds. The UK has five million LLU lines today, compared with fewer than 200,000 when BT and Ofcom signed the Undertakings.

15. The internal efficiency of the regulated firm may be negatively affected by the specific implementation of functional separation. We found examples of efficiency losses and gains in BT. At a systemic level though, we find no reason why functional separation should lead to an efficiency loss, in particular because the firm remains integrated. It is therefore able to realise the efficiency gains of integration whilst ensuring equivalent treatment to its wholesale customers.

16. With regard to the direct cost of regulation, if equivalence delivers competition benefits downstream, then such markets should cease to be subject to SMP and so *ex ante* regulation can be withdrawn. We have already seen this in the UK, where

the growth in LLU has allowed Ofcom to withdraw regulation in the Wholesale Broadband Access Market in about 65% of the country.

17. Given that functional separation as a remedy is being considered in many countries, we have set out a framework for assessing whether equivalence and functional separation are necessary and for determining whether the proposed form of functional separation is likely to deliver benefits in both intermediate and final consumer markets. We have tested this framework using the proposals in Australia and Italy.

18. Finally we return to the three questions set out above. We find that:

    i) The economics of the local loop mean that, at least in the medium term, there are likely to be enduring competition problems at the access level, which will need to be regulated to ensure competition downstream.

    ii) The implementation of equivalence and functional separation in the UK has been largely successful in addressing enduring competition problems in local access markets that serve residential consumers. However, there was less satisfaction expressed with the level of attention paid to wholesale products for business customers. This probably represents priorities agreed with the regulator and hence a limitation of the implementation of, rather than any fundamental problem with, equivalence and functional separation.

    iii) Equivalence and functional separation are not cost-free remedies and may impose marginal costs on the regulated operator that it would otherwise not incur. However, the arguments put forward that these remedies will damage investment incentives appear to us to be erroneous. We conclude that the removal of discrimination leads to greater dynamic efficiency gains, which outweigh static efficiency losses to the extent that they occur.

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TABLE OF CONTENTS

1. Introduction

19. In September 2005 the UK regulator, Ofcom, and the incumbent operator, BT plc, signed a set of Undertakings designed to deliver equivalent inputs under equivalent terms to both BT's own downstream business units and to its competitors, and which introduced an organisational structure that has come to be known as "functional separation". Since then, there has been a great deal of interest around the world in this remedy. Australia, Italy, New Zealand and Sweden have all moved someway towards adopting similar remedies, and the European Union is considering adopting functional separation as an "exceptional remedy" if all other remedies fail to deliver the desired market outcomes. Not surprisingly, companies and their advisors have engaged in a great deal of debate, expressing arguments both in favour of and against functional separation. SPC Network has been engaged by BT Global Services to contribute to this debate.

20. Specifically, we have been asked to consider three questions:

    i) Fixed telecommunications markets have typically been open to competition for a number of years and yet concerns remain about the effectiveness of competition. What is it about the structure of these markets that gives rise to enduring competition concerns?

    ii) "Equivalence" and "functional separation" have been put forward in the UK and elsewhere as remedies to address these enduring competition concerns, even though the *ex ante* framework was supposed to deal with the issue. Have they been well-designed and implemented in the UK to address these concerns and what does this imply more generally for other fixed communications markets?

    iii) Can we expect equivalence and functional separation to lead to improved intermediate and final consumer outcomes?

21. In this paper we set out to answer these questions. Section 2 sets out the market structure and the competition problems in electronic communications markets that have prompted the debate on the role of equivalence and functional separation as remedies. In Section 3, we examine the history of equivalence and functional separation in the UK. In Section 4, we establish a framework for determining the effectiveness of functional separation and address the claims of some authors that functional separation necessarily leads to lower investment and a loss of efficiency. Finally, (Section 5) we set out a methodology for determining whether functional separation is needed and whether specific proposals are likely to deliver the desired objective of equivalence and so are likely also to deliver gains for residential and business consumers. Section 6 concludes.

22. In preparing this report, the authors have drawn on:

    i) Our own experience advising operators, regulators and other stakeholders on matters of economic regulation of the electronic communications sector and in particular our experience of the Telecoms Strategic Review in the UK.

    ii) Published material written by regulators, consultants and academics that addresses the competition issues arising in network markets, in particular telecommunications. In particular, we have reviewed articles written by academics debating the merits or otherwise of functional separation.

iii) A series of in-depth interviews with firms and personnel with first-hand experience of the implementation of equivalence and functional separation in the UK. The interviewees provided valuable insights into both the facts and perceptions of BT's performance since the implementation of equivalence and functional separation. The individuals interviewed represented : BT Retail, Cable & Wireless, The Carphone Warehouse, the Equality of Access Office, Ofcom, Openreach and Virgin Media.

23. We have also drawn on wider economic literature and theory, specifically that which addresses competition in network industries, price and non-price discrimination and transaction cost economics.

2. Market Structure and Competition Problems in Telecoms

24. Electronic communications, in common with most industries, consists of upstream businesses providing wholesale inputs to downstream retail businesses, which may be either integrated within the same firm or may be external customers. However, unlike many sectors, telecoms is characterised by monopoly or at least dominance in upstream markets. The economies of scale prevalent in the upstream market do not generally allow for development of competition to the extent necessary to challenge the dominant firm's position in that part of the market.

25. We can reasonably assume that firms in a market will form the most efficient organisational structure to minimise costs, subject to any constraints imposed by competition authorities that may result from concerns that such efficient structure may lead to damaging outcomes for consumers through monopolisation or the forming of cartels. Firms that do not organise in the most efficient manner are likely to be displaced by those that do (Davis and Williams, 2008).

26. Looking around the electronic communications industry, in most cases we see incumbent firms being vertically-integrated, with little or no sign of vertical separation being undertaken voluntarily, which we might expect if the financial markets concluded that this was the most efficient organisation. Why then would policymakers be interested in separation of incumbent operators as a remedy to competition problems if separation might lead to sub-optimal outcomes for the efficient organisation of the market?

27. We know from twenty or more years of experience of privatising and restructuring utilities that not all elements of the value chain are subject to the same cost conditions. Some parts of a utility's value chain are subject to economies of scale that might point to a "natural monopoly" being the most efficient organisation, whilst others could support a competitive structure. As competition is generally considered to lead to better consumer outcomes than monopoly, policy makers have sought to introduce competition into those areas which can support it, while leaving monopolies in place where the economics point to monopoly as the most efficient organisation. To facilitate competition, governments have required monopolies to open their essential facilities to downstream firms so that they may compete in retail markets[1].

28. In some countries, and in some industries, governments have imposed the structural separation of the monopoly and competitive parts of the business at the same time as opening the markets to competition. For example, the UK electricity supply industry was separated into generation (competitive), transmission (monopoly) and distribution (competitive) at the time of privatisation. In other sectors, notably fixed line telecommunications, the integrated monopoly was left in place at the time of liberalisation.

29. In Figure 1 we show four organisational structures of electronic communications markets, together with associated *ex ante* remedies imposed on the upstream entity. The upstream business (U) manages those parts of the operation where there are enduring competition problems, for example the local loop. The downstream businesses (D) operate where it is feasible to introduce competition. The four structures are:

    A. A vertically-integrated monopoly with no obligation to supply to rival downstream businesses.

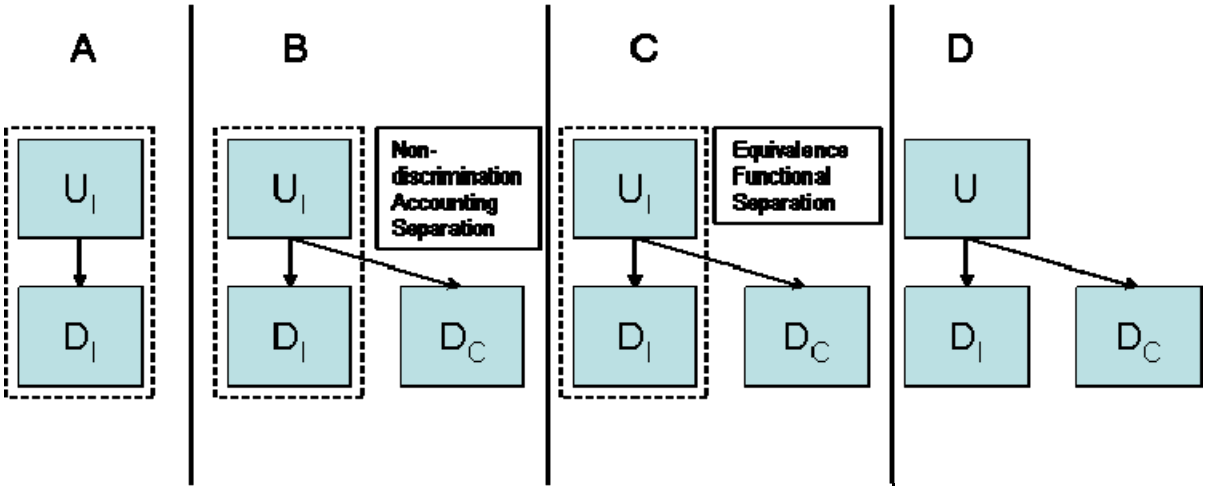
[1] See Gonenc et al (2001), Table 1, for a summary of competitive and non-competitive components of network industries.

B. A vertically-integrated firm with SMP upstream that is required to provided access to essential facilities to rival downstream firms under a non-discrimination obligation. Accounting Separation is used to provide transparency.

C. A vertically-integrated firm that is required to provide access to downstream operators under an equivalence remedy. Functional separation is used to provide transparency.

D. A structurally-separated industry where the upstream monopoly has no incentive to discriminate.

Figure 1: Alternative Market Structures



30. Prior to the reforms of electronic communications markets that started in the UK in 1984 and now effective worldwide, the market was structured as in Model A above. Reforms were introduced to move away from the vertically-integrated monopoly structure as it became apparent that competition could be introduced in at least some elements of the market and as there emerged a general acceptance that competition leads to better consumer outcomes than monopoly.

31. However, the upstream business – the local loop – is widely regarded as exhibiting certain characteristics which point towards natural monopoly or enduring economic bottleneck. This leads to the problem of discrimination, as where there remains a vertically-integrated upstream monopolist facing competition downstream, there is the potential for the integrated firm to discriminate against its downstream rivals.

32. Waverman and Dasgupta (2007) state that regulators worry "with some evidence" that vertically-integrated incumbent operators have *a priori* powerful incentives to discriminate against their competitors in downstream markets. Integrated firms could discriminate in three ways. First, they could simply refuse to supply their downstream rivals, preventing them from accessing the market. Secondly, they could apply different prices externally to those "charged" internally (price discrimination). Thirdly, they could supply their competitors with a worse product (non-price discrimination).

33. Cave, Corea and Crocioni (2006) explore the incentives for an integrated operator to practice non-price discrimination. Referring to other authors[2], they say that a

[2] Economides (1998) and Beard, Kaserman and Mayo (2001)

vertically-integrated firm always has an incentive to engage in non-price discrimination by reducing the quality of inputs provided to downstream rivals (provided such quality deterioration can be done in a discriminatory way) and that this incentive is greater if the upstream monopolist is under tight price regulation.

34. To prevent such behaviour in the electronic communications market, the Common Regulatory Framework of the European Union provides National Regulatory Authorities (NRAs) with a set of remedies that can be imposed *ex ante* on firms with Significant Market Power (SMP), a term equivalent to the competition law principle of dominance, in a relevant market. One such remedy is "non-discrimination". The Access Directive[3] (one of a set of five Directives forming the Common Regulatory Framework) defines non-discrimination as:

> *Obligations of non-discrimination shall ensure, in particular, that the operator applies equivalent conditions in equivalent circumstances to other undertakings providing equivalent services, and provides services and information to others under the same conditions and of the same quality as it provides for its own services, or those of it subsidiaries or partners. (Article 10).*

35. The Access Directive also grants NRAs the power to require firms with SMP to publish a Reference Offer, which sets out the terms under which wholesale customers acquire inputs, and separated accounts that show the costs incurred and revenues earned by different parts of the business. Accounting separation in particular is designed to make the regulated business' costs and income transparent and therefore deter price discrimination. This form of regulation is represented as Model B in Figure 1.

36. In theory, the non-discrimination remedy together with the Reference Offer and separated accounts should prevent the SMP operator from discriminating. However, in practice it has proved difficult, if not impossible, to verify that the SMP operator is not discriminating.

37. For this reason some regulators have considered going further than a non-discrimination remedy coupled with accounting separation and have considered requiring full equivalence of input, whereby all wholesale customers, internal and external, receive the same inputs on the same terms and use the same order management systems. Transparency is then implemented by organisational changes, for example separate business units of the integrated SMP operator. These organisational changes are the means to the end of Equivalence and not an end in themselves. This is Model C in Figure 1.

38. To understand the difference between Models B and C, it is important to understand what we mean by equivalence and functional separation.

39. ***Equivalence*** means the provision of the same product under the same terms and using the same processes and systems to internal and external customers. It also means treating information, complaints and requests received from internal and external customers equally. This differs from non-discrimination, which allows different treatment where that treatment is objectively justifiable.

40. ***Functional Separation*** means creating a separate upstream business unit which, while integrated in the firm, provides bottleneck products to internal and external customers equivalently. An understanding of functional separation is so central to the debate that we have set out a formal definition in Box 1.

[3] DIRECTIVE 2002/19/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive)

Box 1: Definition of Functional Separation.

41. The term "functional separation" is not defined, or indeed used, in the Undertakings and is only loosely defined in the European Commission's proposal to introduce it as an exceptional remedy. Recital 43 of the Amending Act[4] states:

> *"The purpose of functional separation, whereby the vertically-integrated operator is required to establish operationally separate business entities, is to ensure the provision of fully equivalent access products to all downstream operators, including the vertically-integrated operator's own downstream divisions."*

42. The remainder of the recital discusses the effects of functional separation, but does not define it beyond the establishment of operationally separate business entities. The recital does, however, state that it is very important that the imposition of functional separation preserves the incentives of the organisation to invest in the network.

43. Perhaps the European Commission deliberately avoids being prescriptive as to what functional separation should look like, to allow Member States to determine their own definition. However, we believe it would be useful for a well-accepted definition of the key components of functional separation to exist, even if different countries that decide it is an appropriate remedy apply variations to a core definition.

44. Turning to the literature, we do not find a single definition. Cave (2006) does not use the term. The closest he gets is "Business separation with localised incentives". Waverman and Dasgupta say that functional separation refers to the establishment of operationally discrete business units of the vertically-integrated operator under control of the same group, but with separated accounts and separated compensation schemes, so that the profit-maximising decisions of the upstream managers will not take account of the profitability of the downstream arm.

45. There is universal agreement that the purpose of functional separation is to mimic the aims of structural separation to the extent that this is possible. Its purpose therefore is to reduce any incentives for the upstream business to discriminate, either through pricing or other means, in favour of its related downstream business. A parallel purpose is to improve the monitoring of the upstream business's behaviour to deter discriminatory behaviour.

46. Below is our definition of the functional separation:

- A separated upstream business with a separate identity to which employees acquire loyalty. This is likely to be reinforced by separate premises.
- A published Code of Practice, which sets out the rules under which the functionally separated firm must operate to ensure all customers of the upstream division are treated equivalently.
- Financial incentives for managers and staff based only on the performance of the upstream division.
- Rules which prevent the sharing of confidential customer information between the upstream and downstream business units
- A duty on the upstream business to treat all downstream customers equivalently. This duty extends beyond simply providing the same

[4] European Commission (2008)

product on the same terms, to the management of the relationship between the upstream business and its customers and the treatment of requests for new product developments.

47. Three further elements are required that deter the upstream arm from breaking the rules and discriminating:

- Publication of relevant performance and financial information demonstrating that all downstream customers are treated equivalently;
- An independent, external body to oversee the implementation of functional separation and reports to all stakeholders. Such a body needs to be adequately staffed with qualified employees; and
- A credible set of sanctions that can be employed by the regulator in a timely manner in the event of a breach of the equivalence conditions by the functionally separated firm.

48. One of the reasons that the European Commission and regulatory authorities in Europe and beyond are considering moving from model B to Model C in Figure 1 is the enduring nature of market power in most sectors of the electronic communications market. Figure 2[5] (overleaf) is a reproduction of a table produced by the European Commission showing the market review findings of NRAs for each of 18 relevant markets in 27 Member States.

49. Fixed telecommunications markets (Nos. 1 – 14) are nearly all subject to SMP. Only wholesale mobile access and origination (market 15) is generally deemed to be competitive. Although other countries do not define *ex ante* markets in quite the same way as the EU, we would expect similar results to be found if such analyses were conducted. Indeed, as we will see in Section 5, the authority in Australia has declared Telstra as being dominant in upstream markets.

50. It is clear from Figure 2 that the problem of enduring SMP upstream is not unique to the UK and so it may be that equivalence and functional separation are also not uniquely suited to the UK environment. However, to understand why they were introduced we now turn to an account of the circumstances in the UK that led to the introduction of equivalence and functional separation.

[5] Figure 2 is a composite of two charts provided by the European Commission showing the results of first and second round market reviews.

Figure 2: SMP Markets in the European Union

Market	AT	BE	CY	CZ	DK	EE	ES	FI	FR	DE	EL	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
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Key

- Effective Competition – no *ex ante* regulation
- No effective competition – *ex ante* regulation
- Partial competition – partial *ex ante* regulation
- Not reviewed/withdrawn

3. The UK Experience

51. This part of the paper discusses the introduction in the UK telecommunications market of equivalence and functional separation. The discussion is separated into three parts:

- First we discuss the background to the introduction of equivalence and functional separation in the UK and analyse the limitations of the approach to non-discrimination taken prior to the introduction of equivalence and functional separation
- Secondly, we provide a concise discussion of the specific elements of input equivalence and functional separation
- Finally, we assess to what extent the design and implementation of equivalence and functional separation enabled the challenge of preventing discrimination to be addressed, drawing on information collected during our interview programme.

3.1 The Challenge of Preventing Discrimination[6]

52. In discussing the details of the approach adopted in the UK following the TSR, there is a danger that the reasons for the adopted changes can be obscured or misunderstood. It is important, therefore, that we have a clear understanding of the problems that the changes were designed to address: perceived and/or actual discrimination. In this subsection we provide an analysis of the approach to discrimination that was taken by Oftel/Ofcom prior to the changes introduced following the TSR.

Ofcom's Strategic Review of Telecommunications: discrimination identified as a key issue

53. At the time of Ofcom's Telecommunications Strategic Review (the TSR), which led to the introduction of equivalence and functional separation, BT dominated the supply of telecommunications services, even though the market had been opened to competition in the 1980s. Specifically, at the time of the TSR, BT had SMP in 14 wholesale markets and 16 retail markets and was, therefore, extensively regulated. In the wholesale markets, typically BT had an obligation to supply a wholesale product at a regulated price on non-discriminatory terms[7]. It was obviously a concern that even though BT had faced competition for around 20 years and was regulated in a manner designed to facilitate the development of competition, nevertheless broad-based effective competition to BT remained an aspiration rather than a reality.

[6] Throughout Section 3.1, when we refer to discrimination and non-discrimination, it is in the context of the *exante* non-discrimination obligation imposed on BT. As the discussion in Section 3.1.X illustrates, in this context non-discrimination did not necessarily mean that there should have been no differences in treatment between undertakings, rather that any differences should have been objectively justifiable. This approach recognised that some forms of discriminatory behaviour could have been welfare-enhancing and hence should not have been prevented under the non-discrimination obligation.

[7] Non-discrimination was actually referred to as "no-undue discrimination" in UK law (see Imposing access obligations under the new EU Directives, Oftel, 13 September 2002). For ease of use we use the terms discrimination and non-discrimination throughout this paper rather than "undue discrimination" and "no-undue discrimination".

54. As Ofcom's review developed, discrimination (and how best to deal with the problem) emerged as a core issue. Many participants in the review argued that BT was still able to favour its internal businesses over its external customers and this was the prime cause of the lack of effective competition in the potentially competitive downstream markets[8].

55. The argument was made that BT had both the opportunity and the incentive to discriminate. It had the opportunity because it had control over a bottleneck asset i.e. the local loop (as evidenced by the findings of SMP in the relevant upstream markets), the result of which was that competitors had to rely on wholesale inputs from BT from these upstream markets for them to compete with BT in downstream markets. As BT faced competition in downstream markets, it had an incentive to favour its own downstream business so that it could achieve a higher market share in downstream markets. In the first instance it had a strong incentive simply to refuse to supply, but as it was mandated to supply the relevant wholesale services, it then had the incentive to supply its downstream competitors on less favourable terms (both non-price and price)[9].

56. BT's wholesale prices were typically price regulated and it was required to provide its upstream wholesale products on a non-discriminatory basis, so in theory it was prevented from discriminating in favour of its own downstream businesses. The UK thus fitted Model B of Figure 1 above. Why then was the existing approach to discrimination unable to deal adequately with the issue, and how could this understanding be applied more generally when considering the problem of discrimination in other telecommunications markets?

The introduction of wholesale products and the application of the existing non-discrimination obligation

57. In the UK, external wholesale products were introduced in a rather *ad hoc* way to reflect the particular regulatory model of the time. This is entirely understandable, as all parties improved their understanding of the market over time and the set of regulations changed to reflect the new understanding and the new challenges to be addressed.

58. BT's network was, unsurprisingly, optimised to supply internal services, while, as already suggested, BT provided external wholesale services on a more *ad hoc* basis. When BT was required to provide an external wholesale service, it had to produce that service to reflect the network architecture and coverage of its potential customers. As such, even though the services were designed to be broadly the same, for practical reasons, it is possible that there could have been material differences between the internal and external products[10]. It was also the case that the *ad hoc* nature of the development of BT's external wholesale products was reflected in the processes and systems used to provide services to its customers: internal and external customers were supported through entirely different systems. Similarly, there was no unified and comprehensive approach to measuring outcomes

[8] See, for example, the responses of C&W, Energis and UKCTA available at www.ofcom.org.uk.

[9] It must be emphasized that it is only rational to discriminate where it is financially advantageous to do so. Non-price discrimination can take a variety of forms and will typically be financially beneficial when it can be practiced at no or low internal cost. Price discrimination, however, may only be rational in certain restricted circumstances, for example where it is possible a) to "under-charge" internally but compensate for these losses through efficiency gains from scale in the downstream retail market or b) to "over-charge" external customers and hence ensure that at the minimum full recovery takes place upstream with potential gains from enhanced market share downstream.

[10] This, of course, leaves aside completely the financial incentives that BT had to deliver an external product that would put its downstream competitors at a competitive disadvantage.

to determine whether internal and external customers were receiving the same standard of service.

59. It was in this context that Oftel and Ofcom were applying the non-discrimination obligations. Rather than non-discrimination being central to the design of the set of wholesale products and relationships, it was being applied after these arrangements had been put in place.

60. One might assume that if an operator were to charge its competitors more for a wholesale service than it charged its own businesses for the equivalent service, then this would be viewed as discriminatory by the regulator. In fact, under the approach taken in the UK prior to the TSR, this need not have been the case. Oftel set out its position on the application of the non-discrimination obligation in its Guidelines for imposing access obligations[11]:

"3.8 Non-discrimination does not necessarily mean that there should be no differences in treatment between undertakings, rather that any differences should be objectively justifiable, for example by:

a) differences in underlying costs, or
b) no material adverse effect on competition."

61. Even if BT had been supplying notionally the same wholesale product internally and externally, if the costs of supplying the two services differed, then it was acceptable for these differences to be reflected in the respective prices. Such differences would not have constituted a breach of the non-discrimination obligation.

Concerns arising from this approach to discrimination

62. Under this approach to discrimination, BT was able to provide different products internally and externally, at different prices, using different processes, which led to a fundamental concern about the lack of transparency in the approach. This lack of transparency made it extremely difficult for Oftel/Ofcom or industry participants first to identify whether there were any differences in treatment between operators and then secondly to determine whether any such differences were objectively justifiable.

63. This lack of transparency led to a further fundamental concern with the approach, namely that industry participants had limited confidence in the effective operation of the system. There was a strong perception that BT was discriminating in favour of its own downstream businesses and this perception alone was sufficient to undermine the confidence of suppliers to invest. If competitors expected BT to discriminate then this could have been sufficient to make them change their own behaviour and hence lead to worse outcomes for consumers.

64. There were particular concerns that BT was able to undertake non-price forms of discrimination because: a) Oftel/Ofcom would find such measures extremely difficult to detect and b) it was believed that non-price discrimination could be practised at low cost but with potentially significant gains in the downstream markets.

65. An important factor was that BT lacked the incentives to deliver external wholesale products to an equivalent standard to its internal products and hence the external products used by its downstream competitors were of an inferior standard. As BT did not use the same products as its competitors it did not have the incentive to produce a fit-for-purpose external wholesale product, which it would have done had it been

[11] Imposing access obligations under the new EU Directives, Oftel, 13 September 2002. In these Guidelines Oftel explains that its approach is based on Article 10(2) of the Access and Interconnection Directive (Directive 2002/19/EC of the European Parliament and of the Council).

required to use the same product itself. The general concern was that although an external wholesale product could theoretically have allowed a competitor to operate in downstream markets, in practice the technical differences between the internal and external products could have put the competitor at a disadvantage to BT.

66. Competitors were also concerned about the development of new wholesale products[12]. They believed that BT devoted more resources to serving its internal customers and were also concerned about confidentiality of information, in particular that the confidential information supplied to BT Wholesale about their own product development plans could leak to BT Retail and hence undermine their competitiveness. Again, the expectation that BT might behave in this way was sufficient to undermine confidence, even if there was no evidence of such behaviour.

67. Alongside the concerns about the external product features, there was also the complex set of issues relating to the general standard of service experienced by external customers, which could have had a significant impact on the effectiveness of competitors to BT. Given that service was delivered to external customers through a set of different processes, it made it very challenging for Oftel/Ofcom, and particularly for operators, to identify and then prove that discrimination was taking place. These processes covered such things as product ordering, dealing with faults and repairs, sharing network and product development information and requesting new wholesale products. For example, the time taken to order and install a wholesale product, and simply the uncertainty over the time that it would take, could have had a significant impact on an operator's ability to compete to deliver service to a retail customer.

68. The concerns with regard to potential price discrimination were more complex. BT's regulatory accounts provided a means to limit BT's ability to price discriminate; however, the perception remained that BT could still price discriminate. For example, BT could have, in theory, either: a) attempted to "over recover" the costs of providing the external wholesale product, reflecting this in an artificially higher price, or b) "under recovered" the costs of the internal product but compensated for this by achieving efficiency gains from increased market share and hence scale in the downstream market. In practice, however, BT's regulatory accounts should have provided Oftel/Ofcom with the means to prevent this type of behaviour.

69. One obvious factor to consider is that BT's regulatory accounts were so complex and voluminous that they were practically impenetrable to all but a small group of experts, and competitors to BT were concerned about the information asymmetry that existed between BT and Oftel/Ofcom. For this reason, the regulatory accounts could have been viewed as being more useful in theory than in practice and hence as not being of real value in increasing transparency of the system.

70. A further concern with regard to the pricing of internal and external wholesale products related to the fact that where the cost of supplying an external wholesale product was higher than the cost of supplying the equivalent internal product[13], it was entirely legitimate for BT to charge a different price for the external product, without this constituting a breach of the non-discrimination obligation. The concern was that although this would not have been discriminatory, nevertheless it would have had an adverse impact on competitors.

[12] See footnote 8.

[13] It could be argued that Oftel/Ofcom should have been more rigorous in challenging the differences between the internally and externally supplied products. Indeed this appears to have been recognised by Ofcom in the TSR, as the discussion of equivalence of outcomes in Section 3.3 illustrates.

71. It must also be recalled that under Oftel's approach to non-discrimination, differential treatment of undertakings that was not objectively justifiable in cost terms was still only problematic if it had a material adverse effect on competition. There was a concern that the impact of an individual instance of differential treatment might have been quite small in isolation, but actually the cumulative impact of a number of such instances could have been significant, a point recognised by Ofcom during the TSR, as the discussion below highlights.

Ofcom's comments in the TSR

72. Ofcom did not explicitly discuss evidence of discrimination by BT during the TSR. It did however discuss areas where it believed that BT's behaviour towards its external wholesale customers had put those operators at a competitive disadvantage to BT. For example, it highlighted the weaknesses generally in the products provided by BT to its external wholesale customers:

> *Competition has delivered very substantial benefits to consumers in the last twenty years; for example, in terms of much lower prices and enhanced choice. But the clear consensus of the responses to Phase 1 was that even though substantial effort has been focused on it over the last twenty years, the problem of lack of equality of access has yet to be resolved. For example, C&W argued that:*
>
> *"In the world of broadband, BT was allowed to create an LLU which was prohibitively expensive, not industrialised and not fit-for-purpose, which meant that it was entirely unsuitable for mass-market take-up. The result is that there is currently virtually no competition in broadband based on LLU."*
>
> *We believe that similar stories could be told about carrier pre-selection, wholesale line rental, partial private circuits, and indirect access in their early days. (Ofcom 2004, para 6.3)*

73. Ofcom also explained why the approach adopted by Oftel in the past had resulted in BT's competitors receiving sub-standard wholesale products:

> *Firstly, BT faces weak incentives to comply, and as a result the achievement of fit-for-purpose products which BT itself has no interest in using or selling has required a high degree of regulatory intervention. Secondly, 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. (para 6.11)*

74. In the last sentence of this quotation, Ofcom discusses what has been referred to as "cumulative materiality". This is the idea that it is possible for there to be many minor differences between an internal and an external wholesale product, which when each difference is taken alone appears relatively unimportant, but which when they have a cumulative impact can result in a significant disadvantage for the external customer.

75. Ofcom also discussed some of the other forms of unfair treatment by BT of its external wholesale customers about which it had concerns. The extract below is taken from Ofcom's TSR Phase 2 consultation document:

- ***preferential knowledge of product innovation****. For example, through group activities such as those led by the Chief Broadband Officer, or through management or board meetings, BT's retail activities could access*

earlier information on major developments such as product feature changes, technical information and price changes than wholesale customers are able to access;

- ***influencing wholesale product and process investment priorities.*** *BT's retail activities could be able to exert more influence than its other wholesale customers over product development and wholesale changes. This is magnified by what wholesale customers often perceive as an ineffective consultation process during the planning and development of new products. BT's retail activities could be able to secure faster product development as a result;*

- ***better quality processes.*** *For example, in some months this year over 40 per cent of BT engineer WLR [wholesale line rental] appointments have been missed;*

- ***more retail competitor intelligence.*** *BT's retail activities could become aware, via staff or systems common with its wholesale activities, of the activities of its retail competitors; and*

- ***cost allocation.*** *BT has the incentive to load costs at the wholesale level away from a product where BT has a high retail market share, towards products where it has a low market share. (para 6.18)*

76. What this paragraph amply demonstrates is the multi-faceted nature of discrimination. It is possible for an external wholesale customer to be disadvantaged in many different ways. In particular, it highlighted the importance of information flows within BT and the potential for BT's retail activities unduly to influence the priorities and behaviour of the wholesale business, whether or not it actually did so.

77. Ofcom summarised its concerns about the treatment that BT's wholesale customers had received in the following statement:

Those who rely on BT to provide such access have experienced twenty years of:

- *slow product development;*
- *inferior quality wholesale products;*
- *poor transactional processes; and*
- *a general lack of transparency. (para 1.19)*

Implications for telecommunications markets in other countries

78. The discussion above outlined the approach taken to preventing discrimination in the UK and the limitations of this approach. There is reason to believe, however, that this problem is likely to exist in telecommunications markets in other countries as well.

79. First, as Figure 2 above demonstrated, it is the case in Europe that former incumbent fixed network monopolists typically continue to dominate at the wholesale and retail levels. As in the UK, such a position requires further analysis and explanation. Secondly, throughout Europe, markets have been regulated within the same unified framework (albeit that regulation has been imposed at the national

level) and hence the weaknesses identified in the UK context should not be dismissed as reflecting conditions and circumstances unique to the UK.

80. It is also the case that that telecommunications markets more generally (i.e. outside the EU) have a shared history of legislatively protected monopolies being exposed to competition within the context of an *ex ante* regulatory framework, or in some cases only subject to *ex post* competition law (e.g. New Zealand). Additionally it must be remembered that as liberalisation occurred earlier in the UK than in most other countries, there has been a greater period during which effective competition could have been established and hence other countries could learn from the UK experience and avoid any further delays attributed to artificial barriers to the establishment of effective competition.

3.2 Equivalence and Functional Separation

81. This sub-section provides a discussion of equivalence and functional separation, drawing particularly on the information contained in the Undertakings offered by BT to set out the key elements of input equivalence and functional separation.

Models of equivalence

82. In the TSR Ofcom outlined two forms of equivalence: input equivalence and equivalence of outcome. The former of these has rightly received the majority of attention, as it formed a key part of the Undertakings offered by BT, but equivalence of outcome is actually interesting for the way in which it reflects the arguments made above about the limitations of the approach to discrimination taken by Oftel/Ofcom prior to the TSR.

83. Equivalence of outcome was proposed for legacy products, for which it would not make sense to invest in the platform necessary to deliver input equivalence. Ofcom explained equivalence of outcome in the following way:

> *Equivalence of outcome implies that the wholesale products that BT offers to its wholesale customers should be comparable to those that it offers to its own retail activities, but the product and processes need not be exactly the same so long as any differences are not material. This type of equivalence can be applied with different levels of rigour. (Ofcom 2004, para 6.10)*

84. Ofcom explained how it could impose equivalence of outcome using its existing set of regulations, but improving on the situation that existed at that time:

> *Oftel worked to ensure that wholesale products specifically designed by BT under regulatory pressure were as close to being fit-for-purpose as possible. But clearly this approach has not resolved the continuing problems of lack of equality of access in a number of areas. Firstly, BT faces weak incentives to comply, and as a result the achievement of fit-for-purpose products which BT itself has no interest in using or selling has required a high degree of regulatory intervention. Secondly, 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 believe that a more rigorous version of equivalence of outcome could be put in place through a combination of requiring wholesale products to be re-engineered, setting clearer definitions and enforcing SMP conditions (such as those on undue discrimination) in a way which guaranteed equivalence of outcome. (para 6.11 and 6.12)*

85. Ofcom clearly recognised then the systemic nature of the challenge that it faced. Although it pointed to the undue discrimination obligation, it also made it absolutely clear that it would also be necessary to start by re-engineering the external wholesale products to diminish the differences between the external and internal products.

86. Ofcom also clearly recognised that even though a move towards more effective equivalence of outcomes represented an improvement over the position at that time, nevertheless it still retained fundamental failings from that system, namely that BT had weak incentives to provide a fit-for-purpose product for its external wholesale customers requiring a high degree of regulatory oversight and intervention. As Ofcom noted:

> *In principle, equivalence of input delivers many advantages over equivalence of outcome. It generates better incentives to BT to improve the products it offers to its competitors, it increases transparency, it is easier to monitor compliance, and it would require less on-going intervention by Ofcom. It therefore offers greater potential to solve the problem of inequality of access in a sustainable fashion. (Para 6.13)*

87. Ofcom argued in the TSR, therefore, that input equivalence should be enforced when the cost of doing so was proportionate, such as for all new wholesale products, processes and systems.

The relationship between input equivalence and functional separation

88. There can be confusion about the changes that have been implemented in the UK, particularly the role that is played by functional separation[14]. It is worth setting out, therefore, the relationship between input equivalence and functional separation.

89. In very simple terms input equivalence was designed to bring about changes at the wholesale product level, such that BT's wholesale customers would have access to the same set of wholesale products, at the same prices, using the same transactional processes as BT's own retail activities. However, Ofcom also argued that there was a need for behavioural and organisational changes to support the changes made at the product level, which ultimately resulted in a set of changes that have gone collectively under the heading of functional separation.

90. It is essential to recognise, therefore, that functional separation plays a supporting role to equivalence, and to other *ex ante* regulation such as price controls, and that it makes little sense to try to assess functional separation in isolation and even less as a substitute for such regulation[15].

[14] See, for example, Ergas (2007) and Waverman and Dasgupta (2007)

[15] This view was expressed repeatedly in the interviews, with respondents emphasising that functional separation is best characterised as a means to an end, rather than an end in itself.

The key elements of input equivalence and functional separation

Input equivalence

91. Given the simplicity of the term input equivalence it is easy to misunderstand how comprehensive its impact has been on the way that BT supplies wholesale products. The definition included in BT's Undertakings provides a helpful starting point:

> *"Equivalence of Inputs" or "EOI" means that BT provides, in respect of a particular product or service, the same product or service to all Communications Providers (including BT) on the same timescales, terms and conditions (including price and service levels) by means of the same systems and processes, and includes the provision to all Communications Providers (including BT) of the same Commercial Information about such products, services, systems and processes. In particular, it includes the use by BT of such systems and processes in the same way as other Communications Providers and with the same degree of reliability and performance as experienced by other Communications Providers. (Ofcom 2005 p61*)

92. What stands out immediately from this definition is that BT is required to provide the same product, at the same price, through the same set of processes. This is obviously a significantly different approach to that followed by Oftel/Ofcom before the Undertakings. However, it also goes further than this in that it explicitly addresses the issue of outcomes as well. Not only must BT provide the relevant wholesale services to all of its customers using the same processes, but the products must also be of the same service levels and delivered to the same timescales and all customers must enjoy the same level of reliability and performance in the processes and systems used.

Functional separation

93. Functional separation is the broad term that is used to reflect the set of organisational arrangements that BT proposed in its Undertakings that were designed to address the behavioural concerns raised by Ofcom in the TSR. Although BT made a significant number of commitments the three most important and relevant were, to establish:

- *a separate Access Services business unit with a separate brand name:* One of the first deliverables from BT was the establishment of Openreach, a new business unit separated from the rest of BT with responsibility for providing the majority of the input equivalent wholesale products. Although not explicit within the Undertakings, it was a perceived aim of BT, through establishing Openreach, to develop a different culture focused on treating all of its customers in an equivalent manner. The introduction of Openreach ensured that there was a "clean" interface with all the operators competing in the downstream markets and greater transparency for monitoring compliance with the Undertakings.

- *a Code of Practice for employees:* it was obviously essential that the detailed set of commitments made in the Undertakings was understood clearly by the employees affected and so a simple code of practice was needed, backed up by training and support services for employees.

- *an Equality of Access Board (EAB):* this body provided an independent means to monitor the implementation and administration of the Undertakings, to ensure that BT remains compliant with its commitments. Although it is a body internal to BT, its independence comes from the fact that three of its five directors are required to be independent of BT.

3.3 Assessing the design and implementation of equivalence and functional separation

94. An important objective of this paper is to assess the effectiveness of input equivalence and functional separation in dealing with the problem of discrimination. In this sub-section, therefore, we provide an analysis of the effectiveness of these changes, drawing particularly on the information collected during the interviews with key industry players.

95. We present the analysis as a set of responses to questions, a number of which focus on the key high-level issues, and others that delve into the detail highlighting some of the specific lessons that have emerged over time.

1. Do the new arrangements reflect the need for a systemic approach to controlling discrimination?

96. Under the previous approach, non-discrimination had not been a central consideration in the design of the wholesale product arrangements. By contrast it is clear that input equivalence addresses the systemic nature of the challenge of controlling discrimination. It puts equivalence (and hence non-discrimination) at the centre of the design of the system of wholesale arrangements. Where input equivalence applies, BT provides the same product, at the same price, using the same processes.

97. This represents a significant change in approach to discrimination as, by making equivalence a key principle in the design of wholesale product arrangements, it removes the possibility of "objectively justifiable" differences between internal and external products. It can be seen not just as a more rigorous approach to preventing discrimination, but also as a redefinition of what is meant by discrimination.

98. This is important, as the requirement for internal products to be provided on the same basis as external products raises the possibility that internal efficiencies could be "designed out" of the system, which ultimately would be a cost borne by the retail consumer. However, the extent to which this is a genuine concern and whether any losses would be offset by other gains to consumers is dealt with in Section 4 of the paper.

2. Do the new arrangements deal effectively with the full range of non-price and price factors?

99. The responses to the question above highlighted that input equivalence addresses a comprehensive range of non-price and price factors that affect the experience of BT's wholesale customers. It was a key theme of the interviews that the new arrangements were far superior to the previous approach, as they dealt explicitly with non-price factors. This includes obvious points such as products being provided to the same timescale and on the same terms and conditions (including service levels), but it also deals with the crucial issue of controlling flows of commercial information. As the discussion in Section 3.1.4 highlighted, this was recognised by Ofcom as a real area of concern for BT's competitors.

100. There is now far greater confidence about sharing confidential information with Openreach, which has generated benefits for both sides of the relationship. The downstream operator can work more closely with Openreach to ensure the end-to-end effectiveness of its own existing retail products, as well as working to develop new products, and Openreach has a much better understanding of the developments that are taking place in the downstream markets, making it more able to anticipate and respond to the needs of its customers.

101. There are, of course, two aspects to addressing these concerns: i) devising a set of comprehensive rules, and ii) ensuring that the rules are then followed. The latter issue is discussed below in terms of the changes in incentives and monitoring arrangements.

3. Do they improve the incentives for dealing with external customers on the same basis as internal customers?

102. A crucial change in incentives has taken place on the product side: under input equivalence, BT has to use the same wholesale product as its competitors and so it has a very strong incentive to produce a wholesale product that is fit-for-purpose. Again this addresses a concern that was recognised by Ofcom in the TSR (as the discussion in Section 3.1.4 highlighted).

103. As discussed earlier in Section 3.1, Ofcom argued that behavioural and organisational changes were needed to support the changes made at the product level through the introduction of equivalence. The basic problem recognised by Ofcom was that, even with the introduction of equivalence, BT would still have the same incentives to discriminate, albeit equivalence would constrain the opportunity to do so.

104. It was also recognised that it was only with a full financial ownership separation that incentives could be truly changed, so that meant that the organisational measures were more focused on improving the monitoring for compliance with the Undertakings. Additionally some subtle, but important, changes to the incentives within BT.

105. One of the aims of setting up the Access Services Division, with the brand name Openreach, was to try to create a new identity and a separate business culture, such that employees would feel separate from the rest of BT and empowered to deal with all wholesale customers on an equivalent basis. Openreach was required to offer relevant employees a long-term incentive plan that reflected the goals of Openreach rather than the goals of BT generally. These measures obviously aimed to change the incentives within Openreach, though it must be recognised that with Openreach still being part of BT, the fundamental, underlying economic incentives remain in place.

106. Nevertheless, a number of interviewees argued that functional separation had resulted in important changes in the behaviour of BT. In particular, it was felt that Openreach represented a significant improvement in terms of the “soft” relationship issues, which are very important in terms of non-price factors. Generally, it was believed that Openreach was able to take a more commercial approach to dealing with its customers, than had been the case in the past.

107. Although not strictly speaking a change of incentives, an important factor in changing employees’ behaviour is first making them aware of what commitments BT made through the Undertakings. It was obviously the case that BT’s ability to implement the Undertakings and prevent any breaches of the Undertakings was dependent on its employees behaving appropriately, and an obvious essential first step was to make employees aware of their responsibilities.

4. Do the arrangements provide an effective means for monitoring compliance with the obligations?

108. Given that functional separation could only go so far in changing incentives, the organisational changes were also designed with the issue of effectiveness of monitoring in mind.

109. Establishing Openreach as a separate business unit, with responsibility for all of the input equivalent wholesale products (with the exception of IPStream[16]), provided a greater level of transparency for monitoring than existed under a unified organisational structure. A number of interviewees also told us that having a separate organisational unit led to greater confidence about the flows of commercial information between Openreach and all its customers.

110. Although input equivalence as a system is designed to constrain the potential for discrimination at the source, nevertheless it is still essential to monitor outcomes to ensure that customers are indeed being treated equivalently. For this reason, Openreach has been required to produce relevant key performance data and BT has been required to produce regulatory financial reports that separately present the financial results of Openreach.

111. During the interviews, the importance of Openreach being required to report separately was highlighted, particularly with reference to giving greater confidence about financial flows between the different parts of BT. It was felt that this gives greater transparency than is available from the regulatory accounts and hence makes it more viable to track financial flows between the separate parts of the BT organisation.

112. The establishment of the EAB and its operational arm the Equality of Access Office (EAO) have been welcomed almost universally by those parties interviewed. Although these bodies are internal to BT, it is accepted that they operate with a clear degree of independence. A key virtue is seen to be the fact that the EAB can work at a level of detail that is essential for monitoring the implementation and administration of the Undertakings. The EAO is crucial in this as it provides the operational resource and support to the EAB that is essential for monitoring BT and investigating complaints against BT. Most respondents believe that there is a continuing need for the EAB, although some respondents argued that its role could diminish over time.

5. Has input equivalence been applied to the correct wholesale products?

113. For input equivalence to be an effective mechanism to control discrimination, it was obviously vital that it was applied in a way that accurately reflected the extent of the economic bottleneck and also that it was imposed on the full set of products that were important to competitors.

114. BT's Undertakings established which products would be offered on an input equivalence basis:

- Wholesale line rental (WLR)
- Wholesale extension service (WES)
- Shared metallic path facility (SMPF)
- Metallic path facility (MPF)

[16] BT Wholesale's bitstream product.

- Backhaul extension service (BES)
- IPStream.

Crucially provisions were also made for successor and other new products to be provided on an input equivalence basis in the future.

115. Although it was generally accepted at the time of the TSR that these products represented the key products for operators and that they accurately reflected the extent of the economic bottleneck, two issues in particular were the subject of debate: 1) whether partial private circuits (PPCs) should have been provided on an input equivalence basis; and 2) whether both LLU (through SMPF and MPF) and bitstream (through IPStream) products should have been available on an input equivalence basis. Both of these issues were also raised during the interview programme, illustrating that they still provoke debate.

116. At the time of the TSR, PPCs were the key wholesale products used by BT's competitors for providing services to business customers. As such it was argued that they should be made available on an input equivalence basis. However, Ofcom argued that PPCs were legacy products and that in the near- to medium-term, operators would move to providing service using Ethernet-based products such as WES and BES. Ofcom had made clear the importance of ensuring that the costs of implementing input equivalence were proportionate and that this would have been unlikely to be the case for products that would face declining demand in the future.

117. A number of interviewees argued that not requiring PPCs to be provided on an input equivalence basis is perhaps the major failing of the new arrangements. In fact, it is part of a broader problem noted by many of the interviewees (discussed further below), namely that there have been insufficient gains in terms of the products used to provide services to business customers. It is the case, however, that WES and BES are provided on an input equivalence basis and that these products will become increasingly important over time, as all operators move towards providing Ethernet-based services. It is likely, therefore, that the PPC issue will become less important in future, although that is not to underestimate its importance today.

118. Another product that the interviewees now believe should have been made available on an input equivalence basis is Accommodation. The importance of this issue was perhaps not sufficiently recognised at the time of the TSR.

119. Different views were expressed during the TSR about whether it was appropriate for two products forming part of the same value chain to be made available on an input equivalence basis. If equivalence were to be imposed to reflect the extent of the bottleneck, then it would seem incorrect to impose it at more than one point on the same value chain. However, as reflected in the set of principles Ofcom set out in the TSR, the extent of the economic bottleneck was likely to have differed by product and geography. It was argued at the time of the TSR that even with SMPF, MPF and BES available on an input equivalence basis, LLU would still only be economically viable in certain geographical areas. Outside these areas, it was argued that a bitstream product (IPStream) would be the only basis on which competition in downstream markets would be viable. Hence BT's Undertakings committed to providing both products on an input equivalence basis, although it was clear at that time that changes in these arrangements could be expected in the future when Ofcom undertook reviews of the relevant markets.

120. That has indeed been the case and following a review of the relevant market[17] BT was found not to have SMP in a specific geographic market (reflecting the effectiveness of LLU-based competition in that area). Accordingly in that geographic market, BT no longer has any regulatory obligations with regard to IPStream, though, of course, it still has obligations with regard to the provision of MPF, SMPF and BES.

6. Have there been any particular issues with individual products?

121. As suggested above, a general concern about the new arrangements is that there have been insufficient improvements in the wholesale products used to serve business customers. A big part of this, as already discussed, is that PPCs were not provided on an input equivalence basis. However, it was also highlighted by some interviewees that they had expected that Openreach would have been more focused on developing specific business grade products and that this has not been the case so far.

122. This latter point, however, fits in with a general view expressed in the interviews, namely that resource constraints within Openreach have meant that it has actually taken quite a long time for product improvements to be established. Basically, it has not been straightforward to get products that are truly fit-for-purpose. SMPF is viewed as the most successful product in this respect and this is believed to reflect the fact that it is a product of which BT itself is a large user. For those products not used significantly by BT, such as MPF and Ethernet-based products, the improvements are felt to be fewer, though it is also the case that these are more complex products and hence more challenging to deliver to the required standard.

123. This links into a very important more general point that it is very important actually to capture a detailed product specification for the products to be made available on an input equivalence basis. Where there is a strict timetable for implementing input equivalence, there is a danger that the specification of the product will be downgraded to meet the deadline unless this is well defined in advance.

[17] Review of the wholesale broadband access markets, Ofcom, 21 May 2008.

4. Market Outcomes from Equivalence and Functional Separation

124. When a NRA introduces a change to existing regulation, that change should be judged by both its ability to affect the problem that it is designed to address, and the broader impact it has in the market. A regulation or set of regulations is imposed ultimately because it is believed that it will lead to enhanced outcomes for consumers. Regulation is only a means to an end.

125. In Section 3 we discussed input equivalence and functional separation to attempt to determine the effectiveness of their design as a means to address the problem of discrimination. In this section we consider the broader question of whether these remedies can be expected to lead to better market outcomes

126. Three factors stand out - the impact they would have on:

- Investment and innovation – which can be broken down into two areas:
  - in the local loop; and
  - in downstream markets by all operators;
- The internal efficiency of the regulated firm;
- The direct financial costs of regulation

127. We discuss each of these factors and suggest whether equivalence and functional separation could be expected to have positive or negative effects in terms of static and dynamic efficiency.

4.1 Investment and Innovation

128. Many authors have criticised functional separation, claiming that it will have a negative effect on investment and innovation. In this section we review some of these concerns about investment in general and then demonstrate why such concerns are misplaced. We go on to look at investments in the local access network and by operators downstream.

Price Regulation

129. Waverman and Dasgupta (2007) claim that a regulated firm considering investment in Next Generation Access (NGA) will be required by regulation to offer such access at cost-reflective prices which, in their view, do not reflect all the true economic costs that an incumbent firm faces. Few incumbents would find such an investment attractive if they have to share the returns on that investment with their downstream competitors.

130. Entrants too will have less incentive to invest as they will always have the option to buy the same infrastructure as the incumbent. They would not make investments in their own networks unless the pay-offs were very high.

131. Overall, according to Waverman and Dasgupta, functional separation will create an environment in which entrants and incumbents alike will have lower incentives to invest. As a result, functional separation could be a technological “cul-de-sac” in which Europe is left with competition at the retail level, but within technological constraints imposed mainly by the existing copper-wire infrastructure.

132. Although presented as such, Waverman and Dasgupta's concerns are not in fact specific to equivalence and functional separation, but are pertinent to any form of price regulation in any market structure where there is dominance in the upstream input.

133. In the absence of any effective competition in upstream markets and/or the likely emergence of such competition, the dominant upstream firm is always likely to be subject to price regulation to prevent it earning monopoly rents and to prevent it price discriminating against its downstream competitors.

134. Cave, who has argued against functional separation, recognises that efficient investment incentives are a challenge regardless of industry structure:

> *Creating incentives for efficient investment is a major problem under existing systems of sectoral regulation. These well-known difficulties are independent of the vertical structure of the industry and should not be attributed to it. (Cave & Doyle 2007) (our emphasis)*

135. Just as the problem of creating incentives for efficient investment is independent of vertical structure, so too are the *ex ante* remedies which seek to prevent discrimination. Indeed, equivalence and functional separation are not substitutes for price and other regulation, but rather a more effective way of implementing such regulation.

136. Waverman and Dasgupta's argument here should not therefore be taken as one against equivalence and functional separation, but as one against any regulation. The implication of their argument, if taken to the extreme, is to allow the re-monopolisation of markets which, through effective regulation, are now open to competition. They propose a US model in which cable- and copper-based NGAs would compete against each other. Such a model has not emerged in most of Europe (where the average broadband market share of cable operators is 20%) nor in many other parts of the world. For the foreseeable future, independent operators of alternative access technologies are unlikely to place a constraint on the incumbent access operator, meaning that its access network will continue to need regulating, whatever the form of that regulation.

The "hold-up" problem

137. We now turn to a second alleged problem which some authors have identified: the "hold-up" problem. Writing in the context of the Australian proposal for a functionally-separate high speed broadband network, Ergas (2007) reviews four externalities which arise from separation, one of which is investment[18]. He argues that an investment by an upstream electronic communications firm is "relationship-specific", that is to say that the investment is tailored to meet the needs of another party and cannot be used by a third party. This places the investor at a disadvantage, as the party for whom the investment is made can behave opportunistically based on the fact that the investor has limited possibilities to utilise the investment for alternative purposes. This situation is usually referred to as the "hold-up" problem.

138. Vertical integration between the parties would internalise the gains to be made from the investment and so remove the incentive for opportunism between the parties.

139. Cave (2008) also identifies co-ordination problems between the upstream and the downstream entity as potentially damaging to investment, in particular in NGNs. He

[18] The others are pricing, service quality and "on-going adaptation to change". The fact that we do not comment on these other externalities should not be taken as evidence that we agree with Ergas. Rather, the focus of our argument is investment and so we concentrate on this one externality identified by Ergas.

suggests that if the upstream firm accrues a large investment in sunk costs, the downstream firm has the option to neglect new services made available to it, in effect to "hold up" the upstream entity's investment.

140. For the "hold-up" problem to occur, it requires that the investment made by the upstream business is specific to the downstream customer. Once the investment has been made, the upstream provider has no other outlet for the product if the downstream customer decides not to take it. The downstream customer is then in a position to refuse to take the product on the original terms, leaving the provider with little choice but to accept the new terms or write off the investment[19].

141. In our view, concern about the "hold-up" problem is misplaced for three reasons: first, the functionally separated firm remains integrated and the firm's Board has a fiduciary duty to shareholders; secondly, in the presence of a competitive market downstream, investments by the upstream operator would not be relationship-specific; and third, internal and external contracting would be sufficient to overcome any "hold-up" problem that might exist. We address each of these points below.

142. We can deal with the first point briefly. Functional separation is not the same as structural separation. The firm remains an integrated unit and although the upstream business may have delegated authority to make investment decisions up to a given level, significant investment decisions are made at Board level across the group. We can say that the firm may be separated for operational purposes, but remains integrated for investment purposes. We cannot envisage a situation where, if the upstream entity made an investment, the downstream entity would be allowed by the Group Board to hold up the upstream business. Cave's (2008) assertion that functional and structural separation can be "lumped together" for investment purposes is therefore incorrect.

143. Secondly, the "hold-up" problem requires that the investment made by the upstream firm is specific to an individual buyer who can, *ex post*, demand a lower price. However, the presence of a competitive downstream market means that investments made by the owner of the bottleneck facility are unlikely to be specific to any individual customer who cannot then hold up the upstream firm and so demand quasi-rents. Williamson (1979) writes:

144. The crucial investment distinction is this: to what degree are transaction-specific (non-marketable) expenses incurred. Items that are unspecialised among users pose few hazards, since buyers in these circumstances can easily turn to alternative sources, and suppliers can sell output intended for one order to other buyers without difficulty. Non-marketability problems arise when the specific identity of the parties has important cost-bearing consequences. Transactions of this kind will be referred to as idiosyncratic.

145. Alternative buyers of idiosyncratic investments are few, meaning that the buyer can hold up the seller once the seller has made the investment. This is clearly not the case in telecoms markets where there are many downstream buyers of the bottleneck asset.

146. Suppose that a downstream firm requests an upgraded service from the upstream firm and that after making the investment the downstream firm decides not to take the product at the price offered. Under equivalence, the upstream firm is required to offer the product under equivalent terms to competing Communications Providers (CPs). If the service is seen as something necessary for competitiveness by the downstream business, then it is unlikely to allow its competitors to have access to

[19] See Tirole (1988, p25) and Church and Ware (2000, p 70 – 72) for a more formal definition of the hold-up problem.

the service while it sits on its hands waiting for the price to fall. In other words, the asset in which the upstream firm invests is not relationship-specific and can be sold to other operators.

147. Even in the absence of equivalence, sensible managers are unlikely to make a major relationship-specific investment where they could be held up, when they could develop the service in a way that could be used by other firms in the downstream market.

148. For example, suppose that the upstream firm invests in NGA. It is highly unlikely to do so in a way in which only one downstream customer could make use of the NGA network. It is far more likely to build its NGA in a way in which any of its customers could use it to compete for retail business. Indeed, under the equivalence remedy, it would be required to make the investment available to all its customers.

Contracts

149. The expectation that the integrated firm's Board would not allow its own downstream arm to hold up its upstream arm and the lack of asset specificity are both factors that point to the unlikelihood of the hold-up problem emerging as a disincentive to investment. However, even if the hold-up problem were to occur, it is probable that contracts between parties could overcome any such concerns.

150. Contracts are agreements which govern the terms of trade between parties. It has long been recognised that, despite the difficulties of drawing up a complete contract, effective contracts between independent firms can mitigate the hold-up problem by ensuring that each party, *ex ante*, commits to keep its side of the bargain.

151. Cave and Doyle (2007) review network separation and the role that contracting can play in mitigating against any investment disincentives that separation might bring about, as well as the role that regulation can play in preventing abusive behaviour by the upstream firm with market power. After a discussion on some of the literature, Cave and Doyle conclude that the theoretical arguments against separation assume that contracts cannot be written that will deter opportunistic behaviour (the hold-up problem) and that regulation will be unable to prevent the exercise of market power. Each of these assumptions they describe as "contentious" and explore them empirically through a series of case studies in regulated and unregulated sectors.

152. Cave and Doyle conclude that their case studies show that contracting can be developed to deal with problems arising from opportunistic behaviour by downstream firms, by such means as long-term or risk-sharing contracts. In a competitive market, firms will be forced to seek the market structure that minimises cost. If market power is introduced at one or more stages of production, the least-cost organisational form will still be chosen. If access is the only economic bottleneck, then there will be competition downstream with all firms taking make or buy decisions efficiently. Only if there is monopoly both up- and downstream will integration be more efficient.

153. Cave and Doyle take the optimistic view that, based on the evidence they present in that paper, "... contracting can, in most cases, take the strain. Given that structural separation has one clear advantage in a regulated context – its ability to drive out anti-competitive conduct - there is no justification for prohibiting it on the basis of theoretical and unsupported conjectures about contracting failures".

154. Elsewhere, Cave (2008) was somewhat less of an optimist. He suggests that risk-sharing contracts could align the interests of the upstream and downstream parties; that a "contracting optimist" would expect such problems to be resolved; and that a "contracting pessimist" would emphasise difficulties. He concludes that in the

absence of clear evidence from the sector it is difficult to discriminate between these views.

155. Ergas also recognises that contracts between parties could prevent them from expropriating each other's investment returns, but says that such contractual means are often an incomplete remedy to the hold-up problem. He then says that vertical integration internalises the gains from the investment and removes the incentive for opportunistic behaviour.

Information Transfer

156. A second problem Cave (2008) points to is information transfer. He suggests that ,in a separated environment, the upstream entity will have no direct contact with end-users and so information about demand is only available at one remove. He also claims that in a functionally separated environment there is a systemic problem. Properly to mimic a structurally separated environment, there should be no more contact between the upstream and downstream arms than there would be between the upstream arm and an external customer. However, as the Group Board holds a fiduciary duty covering the whole company, it must have ultimate decision- making responsibility over large investments.

157. The UK model specifically caters for this dilemma. The Undertakings explicitly allow communication of information between named functions within BT so that information may be shared within the rules. The roles and functional areas are set out in Annex 2 Parts A & B to the Undertakings and the circumstances under which information may be shared are set out in paragraphs 6.14 and 8.6. Section 11 sets out the terms under which BT is to offer access to its Next Generation Network (NGN) if it is determined by Ofcom to have Significant Market Power (SMP) in the relevant market.

158. So, in our view, functional separation, at least as implemented in the UK, specifically allows for internal co-ordination for investment purposes and therefore resembles a fully-integrated firm more than a structurally separate industry organisation.

159. Functional separation has also led, according to our interviewees, to better information transfer between external customers and Openreach. The increased confidence that downstream customers have that their information will be treated confidentially has allowed them to share demand expectations to a level of detail not previously achieved.

160. It is our view that these assessments of the investment incentives of functional separation are unduly pessimistic and are rooted in a view of the world which is disconnected from reality. In contrast, we perceive that both the empirical evidence and a more realistic assessment of the industry structure point to functional separation having at least no worse, and possibly, a greater impact on investment and innovation in the market. We consider first investment in the local loop and then investment in downstream markets by all Communications Providers (CPs).

Investment and innovation in the local loop

161. At this critical stage in the development of the electronic communications industry, when firms are starting to invest in NGA, it would certainly be a fatal flaw of equivalence and functional separation if they discouraged investment in the access network.

162. If a functionally separated firm considering making an investment in the local access network expects that its ability to make returns on that network will be regulated

away, then it is likely that it will refrain from making such an investment[20]. A form of price regulation that expropriates profit from dynamic efficiency gains may therefore be counter-productive. While it might prevent the upstream arm from earning monopoly profits, it might also discourage investment.

163. This regulatory constraint, however, will exist regardless of whether the integrated firm is subject to non-discrimination/accounting separation (Model B) or equivalence/functional separation (Model C). Provided that there is SMP in upstream markets, the dominant firm will always be constrained by regulation to offer their service to downstream customers on regulated terms. Waverman and Dasgupta's view that incumbents would not find such investments attractive therefore apply to all forms of regulated structure. Only by withdrawing all forms of regulation and permitting monopoly supply would their concern be addressed.

164. Further, the evidence in UK suggests that concerns that equivalence and functional separation discourage investment in the local loop are misplaced.

165. In July 2008, BT announced a £1,500 million investment in next-generation access[21]. It said that it will invest in fibre to the cabinet to cover about 10 million homes, and fibre to the home for about two million. More recently BT announced the first two sites that will go operational in the summer of 2009[22]. Meanwhile, the first users of its Fibre to the Home network at Ebbsfleet Valley, a large building development in South East England, went live in September 2008. These users are able to access the Internet at 100 mbit/s. The development is in the early stages of construction, but as the estimated 10,000 homes are built, all will be connected by fibre. Other fibre developments are under way in Belfast and elsewhere.

166. On 15th December 2008, Virgin Media, the UK's cable company, announced the start of its 50 mbit/s roll-out with the intention of covering 40% of its network (which passes 55% of homes) by the end of 2008 and the whole Virgin Media network by the summer of 2009[23].

167. These developments may be later than in some other countries, such as Sweden and France, but they are now under way, and are ahead of some other EU countries. This fact undermines concerns that functional separation damages investment incentives.

Investment and innovation in downstream markets

168. Demand expectations of firms are likely to have the most important influence on investment decisions, whether the firm is a monopoly or facing perfect competition. The most significant unknown faced by any firm making an investment decision is the likely state of demand after the investment and whether consumers will pay a premium for the new service. For example, at this stage in the development of the broadband market, the demand uncertainty lies in how customers will make use of NGA and the extent to which they will regard it as substitute for alternative means of receiving content, such as satellite TV. This state of demand uncertainty exists regardless of the industry structure. A monopoly or a firm facing perfect competition both face the same level of uncertainty of overall market demand.

169. In an environment where there is downstream competition and an upstream monopolist, it is vital that downstream firms have the confidence to invest and that if they request an input from the upstream firm, that request will be treated in a non-

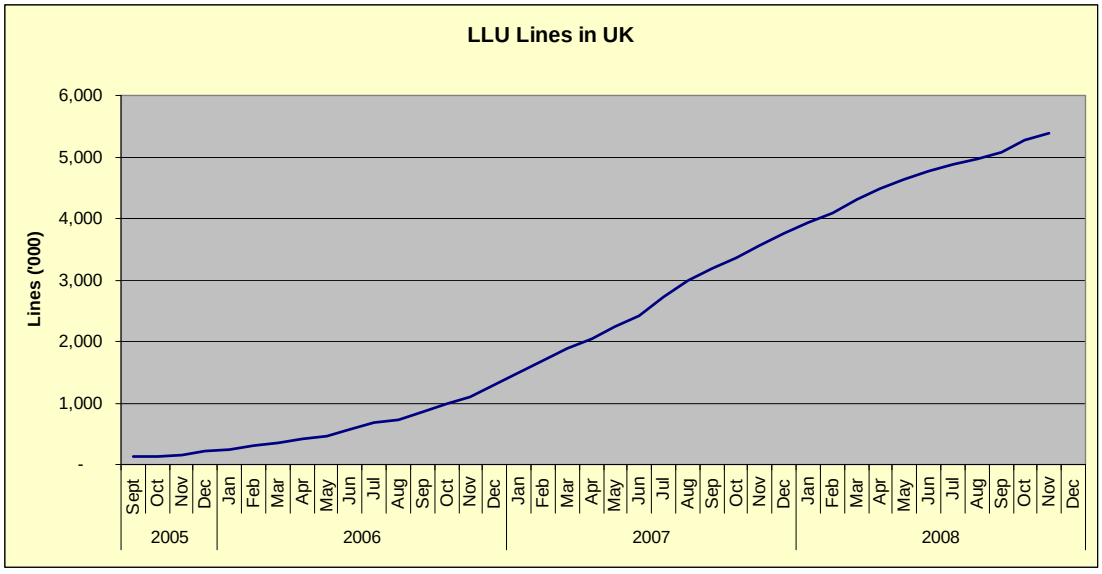
[20] See Newberry (2001, p30 – 38 and references) for a game theoretic explanation of this point.
[21] BT Press Release 15th July 2008
[22] BT Press Release 13th October 2008
[23] Virgin Media Press Release 15th December 2008.

discriminatory manner. Specifically, if a downstream competitor were concerned that there was a significant risk that a request for an upgrade from the upstream supplier would mean that the integrated downstream competitor would gain advance knowledge of competitors' activities, it may not have the confidence to make such a request, so reducing investment in competitive downstream markets.

170. Both the available data and the qualitative information we obtained from interviews conducted for this report indicate that there has been a significant increase in confidence by all downstream operators to invest.

171. Although we do not have hard data on the actual level of investment by Communications Providers, we can see effects in the marketplace. Since the introduction of equivalence and functional separation, the number of broadband connections based on LLU in the UK has grown from just 123,000 to 5,385,000[24] (Figure 3). Over a slightly shorter period, the average advertised speed has increased from a little over 512 kbit/s to 4.6 mbit/s[25] as broadband service providers have invested in ADSL2 and ADSL2+ where they have unbundled exchanges (Figure 4, overleaf).

Figure 3: LLU Lines in the UK



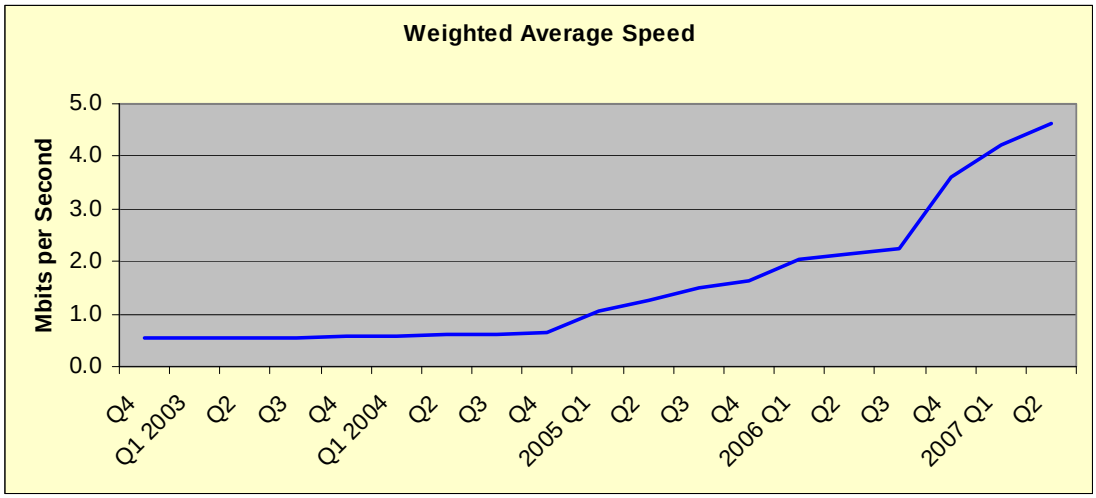
172. During interviews for this project, it became clear that a number of complementary forces were at play. First, the signing of the Undertakings by BT and Ofcom had given downstream firms the confidence they needed that their requests would be treated fairly and that BT would not be able unfairly to exploit such requires for the benefit of its own retail division. The lower LLU prices introduced at the same time as the Undertakings, together with the introduction of the Office of the Telecoms Adjudicator that addresses operational issues of LLU, also encouraged investment and gave competitors confidence.

173. As each competitor invested in downstream services, so others had to respond by improving their own services offered to retail customers. We were told by several interviewees that the chief spur for investment was increased competition and the need to respond to this to maintain market position.

[24] Source: Office of Telecoms Adjudicator
[25] Source: Ofcom

174. Would such investment have happened anyway in the absence of equivalence and functional separation? The previous remedy was non-discrimination with accounting separation as the principal method for ensuring transparency. We were told almost unanimously by our interviewees that accounting separation provided no basis for confidence that non-price discrimination would not be practised and that therefore firms were reluctant to invest.

Figure 4: Weighted Average Headline Speed



175. Far from discouraging investment by other downstream operators, the imposition of equivalence of Input with functional separation as the means for ensuring proper implementation seems to have led to increased investment by all downstream operators.

176. However, at the time that the Undertakings were signed, two other significant regulatory changes were made. First, Ofcom reviewed the Wholesale Local Access Market (WLAM). BT was found to have Significant Market Power in this market and was required to offer LLU as a remedy. While this finding and remedy continued with the status quo, Ofcom also imposed a substantial price reduction on LLU, partly as a result of its review of BT's cost of capital. The prices (in Euros) in 2004 and 2005 are shown in Table 1.

Table 1: UK LLU Prices 2004 and 2005

		August 2004	October 2005
Full LLU	Connection	129.00	51.00
	Monthly Rental	12.90	9.80
Shared LLU	Connection	123.00	51.00
	Monthly Rental	3.30	1.90

Source: European Commission (2006)

177. At the same time, the Office of the Telecoms Adjudicator[26] (OTA) was formed. The purpose of the OTA is "to facilitate swift implementation of the processes necessary to enable competitors to gain access to BT's local loop on an equivalent basis to that enjoyed by BT's own businesses". The OTA has generally been regarded as a successful body which has been able to ensure that previous difficulties with processes have been overcome.

[26] www.offta.org.uk

4.2 Internal Efficiency

178. The second key factor in assessing the efficacy of equivalence and functional separation as remedies is the internal efficiency of the operator subject to these remedies. Critics of functional separation have indicated that it is a less efficient form of organisation than integration, due largely to the loss of co-ordination between upstream and downstream divisions.

179. In undertaking research for this project, we found examples of both efficiency gains and losses. We were told, for example, that bringing BT's network operating and capital expenditure within the scope of Openreach had led to increased efficiency compared with the previous arrangements, where capex and opex lay in different parts of the business. The new arrangement meant that capex decisions were being made specifically to reduce opex, which had not been the case previously. In contrast, we were also told that to maintain the separation between Openreach and BT Operate, it was often the case that an engineer from each division was required on site when certain tasks were performed, although each individual was qualified and capable of doing the entire job on their own.

180. These points are detail and specific to the challenges BT faced in implementing equivalence. The bigger question is whether are there systemic inefficiencies of equivalence and functional separation that would apply regardless of the details of implementation. These costs are most likely to be seen in functional separation.

181. Economic theory tells us that firms vertically integrate because it is a more efficient organisational structure for them than separation. If this were the case, then equivalence could only be implemented with full structural separation and it is therefore possible that inefficiencies would arise. Given that no telecommunications firm has voluntarily separated, it is possible that vertical integration is the most efficient organisational form of the firm in the telecoms sector, in which case *structural separation* may lead to productive inefficiencies.

182. There is a substantial body of literature that analyses the circumstances in which vertical integration is more efficient than ownership separation and, as discussed earlier, the role that contracting can play in overcoming any potential inefficiencies, which we do not have space to review here.

183. The key point for the purposes of this article is that functional separation is not ownership separation. Rather it leaves the incumbent firm as an integrated entity with all the efficiency gains of an integrated firm. If functional separation is implemented well, and there are lessons from the UK that could improve its implementation elsewhere, there is no reason why the firm should not continue to benefit from continuing to gain most of the efficiencies of being an integrated entity.

184. What functional separation does is to make transparent the behaviour of the firm and change the incentives of staff so as to ensure that rivals in the downstream markets are not discriminated against. In the UK model, systems have been put in place to allow BT to capture the efficiencies of integration while removing incentives to discriminate. It is of course possible that the Undertakings are not perfect and that BT will lose some efficiency due to functional separation.

4.3 Direct financial costs of regulation

185. The direct costs of regulation are incurred through the costs of setting up systems and processes to implement equivalence and functional separation. Equivalence, as we have seen, ensures that both internal and external customers of the upstream entity have access to the same products on the same terms. It is beyond doubt that

there are costs associated with creating wholesale products and processes to deliver equivalence. For example, in the UK, BT had to create the equivalence Management Platform (EMP) through which both BT Retail and external downstream firms place and manage orders. The costs of setting up the EMP would not have been incurred if equivalence had not been required. We were also told by our interviewees that the physical separation of systems required by the Undertakings was unnecessary, excessive and expensive. Logical separation would have been adequate. These costs could therefore also have been avoided.

186. Again referring to the UK, BT incurs costs through running the Equality of Access Board (EAB) and Office, producing detailed accounts for Openreach and producing full Key Performance Indicators. These are also costs of functional separation that would not occur in an integrated or even a fully-separated model.

187. However, it is the monopoly characteristics of the upstream market and the incentives for discrimination that lead to the need to regulation in general. Therefore, whether the upstream business exists within a fully-integrated, functionally-separated or structurally-separated model, it would still be subject to *ex ante* regulation and so face costs of regulation. The only question with regard to equivalence and functional separation is therefore whether there are any *marginal costs* of regulation that would not occur in a fully integrated model. These costs need to be offset against both the reduced level of regulation that equivalence and functional separation can introduce and against the dynamic efficiency gains in downstream markets.

188. Starting with the EAB, its role is to monitor BT's behaviour in detail and to deter behaviour that goes against the Undertakings. There was unanimous agreement that the EAB plays a vital role in deterring BT from straying from both the letter and the spirit of the Undertakings. The EAB was regarded by interviewees as better-placed than Ofcom to monitor the details of BT's behaviour as it has the expertise, the resources and the access needed to pick up on the multitude of minor infringements that could occur but against which the EAB is an effective deterrent.

189. The EAB was also seen as giving downstream competitors a level of confidence that they would not otherwise have. Some felt that this job had largely been done and so there may be an argument that it is no longer needed. However, others felt that EAB would always be required as a symbol to the outside world that they could have the confidence needed to invest downstream, subject of course to demand uncertainties.

190. The costs of running the EAB, though no doubt significant, are in all probability displacement costs. That is to say that in any effective non-discrimination regime, the behaviour of the regulated firm needs tight monitoring. Whether this is conducted by an EAB-type body or by the NRA, the function still needs to be performed and the costs will still be incurred.

191. Over and above the dynamic efficiency benefits in downstream markets recognised by most authors, there are also benefits from reduced regulatory actions. One of the benefits of competitive downstream markets should be that regulation can be withdrawn once no firm is in a position to act independently of competitors, customers and consumers. The increased confidence of firms to invest in LLU has led to a more competitive Wholesale Broadband Access Market (WBAM) and Ofcom was therefore able to withdraw regulation from a geographic region covering around 65% of households. Assuming that Ofcom is correct in its assessment, this is without doubt a reduction in the direct cost of regulation.

192. In paragraph 74 we referred to a statement by Ofcom to the effect that because BT did not use the same wholesale inputs as competitors, it had little or no incentive to

provide fit-for-purpose wholesale products for use by competitors. There was therefore a need for a "high degree of regulatory intervention". It is perhaps self-evident that if the regulated firm's downstream business uses the same wholesale inputs under the same terms as its competitors, then the regulated firm has strong incentives to ensure such products are fit-for-purpose, reducing or maybe eliminating the need for regulatory intervention.

193. In conclusion, some commentators have suggested that the cost of implementing equivalence and functional separation have been excessive. For example, Telstra refers to set-up costs of Openreach as £100 million[27]. In the above we have argued that (i) there are not only costs but also savings which can accrue to operators and (ii) such costs should be set against consumer gains from dynamic efficiency. A further point is that any organisation that reorganises itself faces a cost. As reorganisation is a normal process within any large business, only the marginal cost of reorganisation for the purposes of functional separation should be considered when calculating the cost of implementation. We do not know what these marginal costs are, but we believe that commentators who argue that the set up costs of functional separation are excessive should also consider how much a firm the size of BT is likely to spend on re-organisation irrespective of regulatory requirements.

Case Study – Next Generation Access

194. In this "case study" we bring together some of the arguments above and see how they would affect an incumbent subject to equivalence and functional separation, in addition to the set of *ex ante* remedies a regulator may impose on markets where the firm has SMP.

195. To recap the key points made in this paper so far:

196. A firm with SMP in an upstream market but that faces competition downstream has the incentive and often the opportunity to discriminate against its downstream competitors. To prevent such discrimination national regulators impose a number of *ex ante* remedies on firms with SMP, including both a non-discrimination obligation and price controls.

197. Equivalence and functional separation are complements to, and not substitutes for, price and other regulation applied *ex ante* to firms with Significant Market Power.

198. Equivalence and functional separation have been agreed in the UK, and are under consideration elsewhere, because the previously existing regulatory tools have not proved sufficient to prevent price and non-price discrimination and so have left the incumbent in a position of SMP to the detriment of the consumer.

199. Functional separation is a means of making behaviour transparent and changing management incentives to support the delivery of equivalence of input. Functional separation is not an end in itself, but a means to the end of equivalence, which itself is a means to the end of dynamic competition in downstream markets where duplication of upstream inputs is uneconomic.

200. Functional separation is not ownership separation. Many of the problems some commentators have suggested apply to functional separation are misplaced, in particular the "hold-up" problem that could hamper investment. A functionally separated firm has the same incentives to invest as an integrated firm.

201. Suppose that a SMP operator, which was under an obligation to deliver equivalence

[27] http://www.nowwearetalking.com.au/news/separation-the-facts

and was functionally separated, was considering making an investment in Next Generation Access. The question we need to address is whether its investment decision will be different because it is subject to equivalence/functional separation than if it were subject only to non-discrimination and accounting separation.

202. Put crudely, a firm will invest in a new product or service if it has a reasonable expectation that it will make profits at least equal to its cost of capital. Its profits are likely to be affected by three things: price, volume and costs. We consider how equivalence/functional separation will affect price, volume and costs of NGA below.

203. ***Price*** The firm is subject to price controls in markets where it already has SMP, which are likely to be access markets, and so could have a reasonable expectation that it would continue to have a price control in NGA. This will be the case regardless of whether the firm is subject to equivalence or not. Article 13 of the Access Directive provides NRAs with the power to *"impose obligations relating to cost recovery and price controls, including obligations for cost orientation of prices and obligations concerning cost accounting systems, for the provision of specific types of interconnection and/or access, in situations where a market analysis indicates that a lack of effective competition means that the operator concerned might sustain prices at an excessively high level, or apply a price squeeze, to the detriment of end-users."*

204. The firm's decision may well be affected by price controls and it may argue strongly that price controls are inappropriate in an emerging market. However, it would probably also expect, or at least plan for, price controls to be in place. Regulators have the means of linking price controls to the stage of development of the market. Ofcom, for example, is considering introducing "anchor pricing" and risk-related charge controls. The former requires the regulated operator to provide current regulated services on NGA at current prices while leaving the operator free to charge higher prices for genuinely new services. The latter applies a different Weighted Average Cost of Capital (WACC) to higher risk investments.

205. The extent to which price controls affect the investment decision of the firm is unrelated to equivalence and functional separation. It is a function of regulation that applies regardless of the means of applying it.

206. ***Demand*** Most firms making an investment do so in an environment of demand uncertainty, even though the level of uncertainty may vary. A monopolist may know it will win 100% of the market, but even a monopoly cannot know with certainty what the size of the market will be. Again, demand uncertainty is independent of the market structure and so is not a function of functional separation.

207. However, where several firms are competing for business their marketing activities may well raise the overall level of demand and they have a better chance of producing products and services customer want.

208. Suppose that the integrated operator was a monopoly both upstream and downstream. It could create a new product and put it in the marketplace. Consumers would have a choice to buy or not buy, but could not go to a competing supplier whose offering may be better suited to their needs. Where several firms are competing for business each will seek a competitive edge through product features or price and each will want to gain maximum awareness of its products among its target market. Each consumer would therefore have a better chance of finding a product variant that suits his or her needs and budget and there may be a greater level of awareness of the products on offer. These actions are likely to increase the overall size of the market. While the incumbent might lose some potential market share at retail level, as it is the only supplier of the upstream input, it will gain at the

wholesale level.

209. The above is not necessarily a function of equivalence and functional separation. It would be the case under any regulatory structure where there is competition downstream. However, we have seen that functional separation and equivalence are more likely to support a competitive downstream market that non-discrimination and accounting separation.

210. It is also the case that, in the UK at least, downstream firms have greater confidence that they will be treated fairly and so the information flow between Openreach and downstream operators has improved, giving Openreach a better understanding of the likely demand.

211. ***Costs*** We discussed above the fact that in the UK BT had to provide wholesale access to a network that was not designed with such access in mind. This problem is likely to be similar in most other countries with a legacy network. Incumbents therefore face costs in re-engineering their legacy networks to allow wholesale access. Under the non-discrimination obligation, the different costs of providing internal and external products could legitimately be recovered through different prices to internal and external customers.

212. The development of new Next Generation Networks, both access and core, allows the opportunity for equivalence of input to be built into the network from the beginning. Indeed the architecture of a NGN/A is such that equivalence is almost inherently part of the design. Interfaces to the network are open and externally-defined, which facilitates the provision of equivalent services to different wholesale customers.

213. The costs that a firm might face in applying equivalence to legacy networks retrospectively need not therefore be applicable to NGN/A both because networks can have equivalence designed in and because the architecture facilitates equivalence.

214. In summary, then, we do not see why equivalence and functional separation should discourage investment in NGN/A.

- The price that the owner of an enduring economic bottleneck can charge will influenced by regulation, regardless of the form of regulation;
- All firms face demand uncertainty. A competitive downstream market may help to increase demand through the provision of a range of offerings suiting different market segments; and
- Equivalence is built into to NGN/A design.

5. Proposals in Other Countries

215. From what we have seen in the preceding sections of this report, certain market conditions need to be in place for equivalence and functional separation to be considered as effective and efficient remedies. These conditions are: first, that the market should be characterised by the presence of an integrated operator with dominance (or Significant Market Power) in the upstream market that is able to exercise that dominance by discriminating against its downstream competitors.

216. Secondly, for equivalence to be appropriate, it should be demonstrated that the current set of remedies – essentially a non-discrimination obligation and accounting separation – have not proved sufficiently robust and effective at preventing discrimination. As was the case in the UK, these need not require the integrated firm to have been found in material breach. A series of minor breaches with a cumulative effect, what Ofcom termed "cumulative materiality", would be just as effective at leveraging dominance in upstream markets into the downstream markets.

217. In the presence of these conditions, then equivalence, if properly implemented, can be an effective remedy. In Section 2 we set out what we believe are the essential ingredients of functional separation to ensure the proper working of equivalence. Figure 5 (overleaf) puts forward a flowchart that can be used to determine whether equivalence is needed as a remedy and whether the proposal of functional separation contains the right ingredients. In this section we "road test" this schematic, using Australia and Italy as examples.

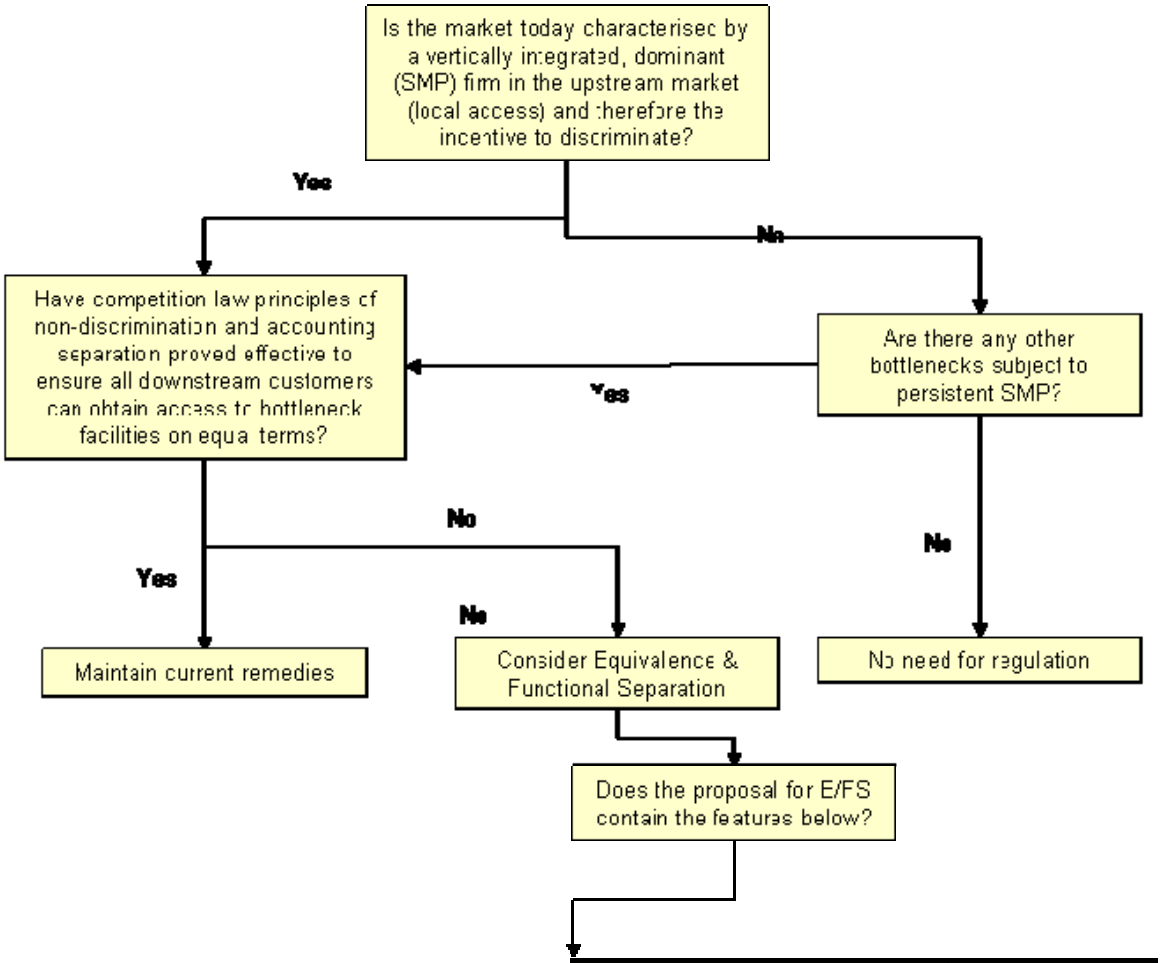
5.1 Australia

218. The Australian government has committed A$4.7 billion (€2.3 billion) of public funding towards the creation of a National Broadband Network (NBN) connected to 98% of homes and businesses. The government wants the NBN to deliver speeds of a minimum of 12 mbit/s using fibre to the node or fibre to the premises architecture. In April 2008, the government issued a Request for Proposals (RFP) for enterprises to bid to build the NBN.

219. Clause 2.5 of the RFP (reproduced below) called for bidders to set forth plans for separation:

> **2.5 Ownership and Operational structure of the NBN**
>
> (a) Proponents should describe the proposed ownership and operational structure of the NBN. This should include:
> - identifying each entity to be involved in the investment, establishment, and management of the NBN, including the Government's role;
> - any functional or structural separation of network ownership from wholesale and retail businesses; and
> - exit arrangements for the Commonwealth and the Proponent from the NBN.

Figure 5: Equivalence Flowchart



Feature	Yes	No
Separate upstream unit		
Published code of practice		
Upstream unit with separate financial incentives		
Confidentiality Rules		
Equivalence Obligation		
Published KPIs and Financial Accounts		
Independent scrutiny		

220. The launch of the process sparked off much debate between Telstra, which saw no need for structural or functional separation, and other market players who supported it. Some of the debate has been referred to already in this paper, for example Cave (2008). Other authors who contributed include Doyle (2008 a and b), Davis and Williams (2008) and Meek (2008). With the exception of Davis and Williams, all the above papers were sponsored by one or other side of the debate.

221. Specific proposals similar to the Undertakings signed by Ofcom and BT have not been put forward in Australia and the debate does not seem settled as to the desirability of separation. We therefore use this example to test the first two questions in the flowchart.

Is the market today characterised by a vertically-integrated, dominant (SMP) firm in the upstream market (local access)?

222. The Australian incumbent, Telstra, is unquestionably a vertically-integrated operator. It owns a local access network, a core transmission network and is involved in retail activities in both business and residential markets. The subsidiary question therefore is whether Telstra is dominant in the local access market.

223. The Australian Competition and Consumer Commission (ACCC) produces annual reports on the telecommunications industry. The most recent report on competitive safeguards covers the period 2006 – 2007. This report shows that at the level of local access infrastructure "Telstra remains the dominant supplier of fixed voice and both wholesale and retail level" (ACCC 2008, p19).

224. The same report shows that take up of LSS[28] and ULLS[29] more than doubled over the period to over 500,000 lines. We can presume that this has increased since the report was completed. However, LLS and ULLS are regulated services provided over Telstra's access lines, further indicating that Telstra is the dominant firm in the access market.

225. Under Part XIC of the Trade Practices Act, the ACCC "declares" services where a firm has a dominant position and is able to place various obligations on that firm. Nearly all the declared services are local access, including PSTN origination and termination, LSS and ULLS[30].

226. *Prima facie*, therefore, it appears that Telstra is dominant in local access markets. As it is also active in downstream markets, it has a powerful incentive to discriminate against its downstream competitors in the supply of essential inputs. That such an incentive exists is not disputed by any of the authors reviewed in this report and we demonstrate its existence in Section 2.

227. We therefore turn to the second question in our flowchart:

Have competition law principles of non-discrimination and accounting separation proved effective to ensure all downstream customers can obtain access to bottleneck facilities on equal terms?

228. Part XIB of the Trade Practices Act sets out the ACCC's powers to investigate anti-competitive conduct by firms with market power. A carrier or carriage service provider engages in anti-competitive conduct if it takes advantage of a substantial degree of market power with the purpose, effect or likely effect of substantially lessening competition. Where the ACCC finds *prima facie* evidence of anti-competitive behaviour it issues a Competition Notice and begins its investigation. If the investigation ultimately finds that the firm under investigation has behaved anti-competitively then relevant penalties start from the date of the issue of the Competition Notice. Penalties for breaching the competition rule are severe: up to Aus$10 million (€4.9m) for each contravention and Aus$1 million (€490,000) for

[28] Line Sharing Service – equivalent to shared LLU
[29] Unconditioned Local Loop Service – equivalent to full LLU
[30] A list of currently declared services can be found at http://www.accc.gov.au/content/index.phtml/itemId/777921

each day the contravention continues for the first 21 days, and then Aus$3 million (€1.47m) per day if contravention continues for more than 21 days.

229. There is substantial debate among the writers on the situation in Australia as to whether these powers have proved effective at preventing Telstra from behaving in an anti-competitive manner.

230. Meek (2008) seeks to address the question "in the circumstances applying in Australia, is a more extreme form of separation, such as that adopted in the UK, a sensible approach from the perspective of the long term interest of Australian consumers?".

231. Telstra is already under an obligation of operational separation which, according to Meek, gives access seekers the ability directly to manage provisioning, churn, fault management and billing. The introduction of systems arising from Competition Notices issued by ACCC in the late 1990s "addresses many areas for non-price discrimination that were an issue in the UK".

232. The effects of the operational separation regime, Meek says, are:

- to support the equivalence regime by better systems;
- to record and document how equivalence was delivered; and
- to establish governance procedures associated with the above.

233. Meek himself points that that his report should be read in the context of a week-long, evidence-gathering trip to Australia, reading certain key documents and interviews with Telstra executives and no discussion with Telstra's wholesale customers. Nevertheless, he was still as reassured as he could be that non-price discrimination was markedly less of an issue in Australia in 2008 than it was in the UK in 2004/5.

234. Cave (2008) is also confident that the problem of non-price discrimination is less prevalent tin Australia than it was in the UK. He says that the ACCC has consistently found a lack of material non-price discrimination by Telstra over a four-year period. Therefore, the problem that functional separation was designed to solve in the UK has largely been addressed in Australia through a combination of other forms of regulation and the incumbent's own non-price behaviour.

235. In the UK, it should be pointed out, there was no evidence that BT was in material breach of its non-discrimination obligation. However, Ofcom found that there was a "cumulative materiality" based on a series of minor breaches that in themselves were not material.

236. Doyle (2008 b) takes a very different view. He claims that the powers of the ACCC are not strong enough to cope with potential anti-competitive discriminatory conduct applied by an NBN operator. He points to seven cases before the ACCC where access seekers have claimed discriminatory practices by Telstra, though in most of these cases the ACCC has yet to reach a conclusion as whether such discrimination actually took place.

237. Doyle refers to a letter from the Chairman of the ACCC to the Minister for Broadband, Communications and the Digital Economy which accompanied the ACCC's 2008 report on the telecoms market. The relevant paragraph is reproduced below:

> *The emerging competitive environment is encouraging carriers to invest, innovate and compete for customers. Yet this emerging state of competition has not occurred without pressure on regulatory mechanisms. Industry has been progressively forced to rely more on ACCC processes to resolve*

impasses in commercial negotiations for access to regulated services. 2006–07 saw the highest number of access disputes notified in a single year, and continues the increasing trend for arbitration as a mechanism for resolving industry disputes. (our emphasis)

238. From this evidence, Doyle concludes that discrimination problems are not solved in Australia.

239. We are not in a position to judge between those who claim discrimination problems in Australia are solved and those who believe they are not. However, the fact that this discussion is taking place demonstrates that addressing the question of whether existing remedies are sufficient to prevent price and non-price discrimination that might lead to market failures downstream is important. As such, it deserves to be a critical part of the decision-making regarding the need for equivalence and functional separation.

5.2 Italy

240. We now turn to the lower part of our flowchart which we will test using the proposed Undertakings put forward by Telecom Italia (TI) for functional separation in Italy[31]. In this case we can safely assume that TI is vertically-integrated and has SMP in upstream markets, as is indeed the case (see Figure 2). We can also assume that there is at least prima facie evidence that existing behavioural remedies have proved insufficient to prevent price and non-price discrimination, though we have no direct evidence one way or the other.

241. We now turn to test the Undertakings to determine the extent to which they fit our definition set out above.

Feature	Comment
A separated upstream business, with a separate identity, to which employees acquire loyalty. This is likely to be reinforced by separate premises.	TI proposes to create a business unit call Open Access which will be responsible for: i) development and maintenance of the infrastructures in the fixed access network; (ii) the production processes associated with delivery of the services that provide access to this network; (iii) technical support for the aforementioned services, for Operators and Telecom's end customers. Open Access will operate in an autonomous and independent manner. It is not known whether Open Access will be separately branded and whether it will be located in separate premises to the remainder of TI. The organisational structure described by TI, including the creation of Open Access, is stated as being a result of an autonomous decision taken by TI and does not form part of the Undertakings. This suggests that TI would be free to change the organisational structure at any time without reference to the Undertakings.
A published Code of Practice that sets out the rules under which the functionally separated firm must	Group 2 of the Undertakings states that TI will approve a specific code of conduct for Open Access staff that will establish rules and procedures designed to ensure compliance with the Undertakings. The content of the code of conduct is not presented in the

[31] We are grateful to BT Global Services who provided an English translation of the proposed Undertakings. The original Italian text can be found at http://www2.agcom.it/default.aspx?message=viewdocument&DocID=2688

operate to ensure all customers of the upstream division are treated equivalently.	Undertakings, so we are unable to make a judgement as to whether it is likely to be effective. There is also no mention as to whether this code of conduct will be published.
Financial incentives for managers and staff based only on the performance of the upstream division	Group 2 of the Undertakings also creates a new system of incentives for Open Access personnel. Targets are included in Article 2.1 and are all non-financial and are largely qualitative, for example “satisfaction of TI’s end customers and Operators purchasing wholesale access services”. In our view, equivalence will only be properly implemented if managers in the upstream business make profit-maximising decisions only in relation to the business unit for which they are responsible. This requires that the incentives for management are related to the financial performance of the upstream business only. The omission of financial incentives could result in Open Access management making decisions taking into account the profit of TI as a whole, which would undermine their incentive not to discriminate against downstream competitors.
Rules which prevent the sharing of confidential customer information between the upstream and downstream business units	As mentioned above, the proposed code of conduct does not form part of the Undertakings. We are therefore unaware of any rules in that code that require the strict maintenance of customer confidentiality. However, we would regard the fact that the Undertakings omit this requirement as a serious weakness
A duty on the upstream business to treat all downstream customers equivalently. This duty extends beyond simply providing the same product on the same terms, to the management of the relationship between the upstream business and its customers and the treatment of requests for new product developments.	In Group 1 of the Undertakings, TI commits to create “a new standardised delivery process” to ensure greater equality of treatment for internal and external parties in the production and provision of SMP services. The delivery process will be supported by a “single queue” system, such that all orders are processed on a first come, first served basis. The products covered by this commitment are Wholesale Line Rental (WLR), LLU, naked asymmetrical (SDSL) bitstream, symmetrical (SHDSL) bitstream and terminating circuits. A standardised customer relationship management for the wholesale market will also be set up. The single queue management system appears to ensure that TI will treat its own downstream business on an equivalent basis to Operators. However, from the Undertakings, we are unable to determine whether TI’s retail businesses in fact use the same wholesale inputs as other Operators and therefore whether this commitment has any meaning. It can be seen from the Undertakings that Open Access will not have a direct customer relationship with Operators, except for operational matters. Instead Operators will have their commercial relationship with TI Wholesale who will then contract with Open Access. The Undertakings are silent on the question of treatment of requests of service upgrades.

Publication of relevant performance and financial information demonstrating that all downstream customers are treated equivalently	Groups 3 and 4 of the Undertakings deal with the creation of a performance monitoring system. This group sets out the Key Performance Indicator (KPI) "families" and the timeframe for their publication. No reference is made to the publication of separate accounts for Open Access. TI currently publishes separated accounts, but these are usually some years old by the time they are published. For example, the most recent set of separated accounts available is for 2004 (ECTA, 2009).
An independent, external body that oversees the implementation of functional separation and reports to all stakeholders. Such a body needs to be adequately staffed with qualified employees	Group 7 of the Undertakings refers to the creation of a Supervisory Body. The body will consist of five independent members, i.e. not employees of TI. Three will be appointed by TI and two by AGCOM, the Italian regulator. Decisions requiring a vote will be by simple majority, provided that at least one of the AGCOM appointed members votes with the majority. The Supervisory Body's role is to ensure TI conforms with the Undertakings. Failure to comply will be reported first to the management of TI and only to AGCOM if TI does not remedy an alleged violation within a reasonable time. The Undertakings give no information about whether the Supervisory Body will have its own staff.

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242. Reviewing the above table, it is clear that the proposed Undertakings in Italy fall somewhat short of what we would expect to see to implement equivalence effectively. They do not create a structure that mimics the best aspects of structural separation while leaving in place the efficiency gains from integration. We are concerned therefore that they do not provide sufficiently robust protection against discrimination as they stand.

6. Conclusions

243. In this paper we have examined the generality of discrimination problems that arise when a vertically-integrated firm is dominant in the upstream market and faces competition downstream. Such a firm would be subject to regulation to ensure that it allows downstream competitors access to its facilities, but it still has powerful incentives to discriminate. We have put forward the idea that a stronger remedy than non-discrimination is required and this remedy is "equivalence" and that the problems of discrimination can be deterred by requiring the functional separation of the upstream business from the downstream operation. We have set forward a general definition of functional separation and the elements needed to ensure its effective implementation.

244. We have then examined in some detail the history of regulation in the United Kingdom and the market conditions that Ofcom found in its Telecoms Strategic Review that led it to accept a set of Undertakings offered by BT to deliver equivalence, including organisational and behavioural changes, which have become known as "functional separation".

245. Some authors have criticised functional separation on the basis that it damages investment incentives. We have shown that these concerns are misplaced in theory and how practical experience in the UK shows that investment is taking place in the local loop by BT and how downstream firms have invested heavily in their own equipment in unbundled exchanges. However, we accept that other regulatory measures introduced at the same time as equivalence, notably lower LLU prices and the OTA, may also have had an effect on investment and uptake of LLU.

246. Finally, we set forward a flowchart for determining whether equivalence is required to overcome discrimination problems and whether proposals for functional separation are likely to be effective. We have tested this flowchart using the examples of Australia and Italy.

247. In the introduction we set out three questions that this paper has sought to answer, to which we now offer responses.

248. Fixed telecommunications markets have typically been open to competition for a number of years and yet concerns remain about the effectiveness of competition. What is it about the structure of these markets that gives rise to enduring competition concerns?

249. The access bottleneck in the fixed telecommunications market has proved resilient to competitive entry. Despite ten years of liberalisation across Europe, most telecoms markets in most countries are subject to SMP. The owner of the bottleneck, if not subject to effective regulation, is able to discriminate against downstream competitors and such discrimination is often difficult to detect. Even the expectation of discrimination by downstream competitors is enough to change behaviour to the detriment of consumers.

250. "Equivalence" and "functional separation" have been put forward in the UK and elsewhere as remedies to address these enduring competition concerns, even though the ex ante framework was supposed to deal with the issue. Have they been well-designed and implemented in the UK to address these concerns and what does this imply more generally for other fixed communications markets?

251. The introduction of equivalence and functional separation in the UK, through a set of voluntary undertakings signed by BT and Ofcom, has largely proved successful, at least in broadband markets. Since the signing of the undertakings, the number of unbundled local loops has grown rapidly and the average access speed available to

consumers has also increased with the greater market share of LLU. Our research among downstream competitors to BT also shows that their confidence in BT as a wholesale supplier has improved. In 2008 we have also seen announcements from both BT and Virgin Media about investment in Next Generation Access, much of which will be in place during 2009.

252. However, it would be incorrect to say everything has been perfect. The implementation was also criticised for being overly focussed on LLU and residential products and for not including Partial Private Circuits and other key inputs used by business customers.

253. The implication for other countries is that functional separation can be a successful means of implementing equivalence to support the set of *ex ante* remedies available to NRAs. Successful implementation leads to dynamic efficiency gains in downstream markets, improving the product variants available to consumers, which helps stimulate demand.

254. Can we expect equivalence and functional separation to lead to improved intermediate and final consumer outcomes?

255. We find that the arguments put forward by some authors suggesting that functional separation will inevitably lead to lower levels of investment and therefore worse outcomes in both intermediate and final markets to be misplaced. All providers of wholesale inputs with SMP in the relevant wholesale markets will be subject to price controls, regardless of whether functional separation is imposed or not. Incentivising investment in regulated markets is always a difficult challenge, and regulators need the flexibility to introduce price controls that still allow the investor to earn economic rents on its investment.

256. The argument put forward by some authors that there is a hold-up problem when a firm is subject to functional separation is incorrect. For the hold-up problem to damage investment, there needs to be a high degree of asset specificity, i.e. the upstream firm must invest in an asset for a single downstream customer that it, and only it, can use. Investments made by the upstream operator, such as in NGA, are not specific to a single customer and can be used by any downstream firm, removing the downstream firm's opportunity to behave strategically. There is simply no hold-up problem.

257. Competition is generally accepted as leading to better outcomes for consumers, who are likely to have a wider choice of product variants and will benefit from lower prices. The effective implementation of *ex ante* regulation through a requirement for equivalence and functional separation is likely to support greater competition in downstream markets and the dynamic efficiency gains that such competition will bring. We can already see in the UK increased competition between broadband providers offering different product specifications and lower prices.

258. We conclude therefore that equivalence and functional separation are likely to lead to improved intermediate and consumer outcomes.

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Annex A: Research Format

259. We conducted seven interviews each lasting approximately one hour with appropriate staff in BT Retail, Cable & Wireless, The Carphone Warehouse, Equality of Access Board, Ofcom, Openreach and Virgin Media. The interviews were semi-structured and scope was given to interviewees to raise any issues they felt important but which we had not asked about. In some cases the interview was followed up by a brief phone call or email exchange if further matters arose in later interviews.

260. The areas covered in the interviews were as follows:

i) Did the interviewee regard functional separation as an end in itself, or as the means to an end?

ii) How would the interviewee define functional separation?

iii) In the implementation of equivalence and functional separation in the UK what has worked well and what needs improvement?

iv) Why was accounting separation not sufficient to address competition problems in the market?

v) Why would full structural separation have been an excessive remedy?

vi) How has BT's investment behaviour been affected by the adoption of the Undertakings?

vii) How has other Communications Providers' investment behaviour been affected by the adoption of the Undertakings?

viii) In final markets,.have business customers benefited as much as residential customers?

ix) If the Undertakings were being negotiated now with the knowledge gained since, what would the interviewee like to see done differently?

x) How important is the Equality of Access Board in ensuring the proper implementation of functional separation and equivalence?

xi) Will the EAB be a permanent requirement or might it one day be redundant?