

Consultation on a Draft Direction Setting the Margin between IPStream and ATM Interconnection Prices

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Section 1

Summary

S.1 This consultation refers to wholesale products that are used as inputs by internet service providers (ISPs) to offer broadband internet access services to consumers and businesses. Currently, BT is the main provider of these types of product and the proposals described in this consultation are designed to encourage other businesses to compete with BT in offering these types of product to ISPs.

S.2 In the *Review of the Wholesale Broadband Access ("WBA")* Market Statement document, published on 13 May 2004, Ofcom concluded that BT has Significant Market Power ("SMP") in the market for asymmetric broadband origination in the UK (excluding the Hull area) and the market for broadband conveyance in the UK. In that document Ofcom also stated its intention to consult on a proposal to set the margin between the price of 'IPStream', BT's intermediate broadband internet access service and ATM interconnection ('DataStream') in the form of a draft Direction. This proposal arose partly as a result of responses to the earlier WBA first consultation. The draft Direction which accompanies this explanatory statement sets out Ofcom's proposals in this area.

S.3 The proposal to set the margin reflects Ofcom's objective of introducing more certainty for Altnets in particular in order to facilitate competition in the provision of intermediate services. ATM interconnection has been available since August 2002 but uncertainty about the margin available to Altnets has tended to discourage market entry. By providing more certainty, Ofcom hopes to promote effective and sustainable competition by allowing Altnets to compete with BT in the provision of 'intermediate services' to ISPs offering broadband internet access to consumers.

S.4 In this context the term margin has been used to describe the 'space' available, between ATM interconnection and IPStream/BT Central, for Altnets to compete against BT in the provision of intermediate services, based on ATM Interconnect products. The costs/price of ATM interconnection and IPStream/BT Central, on a per user basis, have very different economies of scale (ATM interconnection costs are influenced by scale much more than IPStream/BT Central) and, therefore, it is not possible simply to compare prices on a like-for-like basis. The margin must therefore encapsulate both reasonable 'usage' factors, which take account of the fact that costs are a function of scale, for the ATM interconnection products and the additional cost required to convert these ATM products into intermediate services, which are comparable to BT's IPStream/BT Central services.

S.5 This document sets out Ofcom's methodology and outlines details of the model it has used to derive a margin. On the basis of this, the headline figure is that at current prices BT's Home 500 (standard) IPStream service fails the margin squeeze test by around £1.00; different figures apply for other IPStream products. In order to comply with the margin specified by Ofcom, BT will need to increase the margin between its ATM interconnection prices and IPStream by that amount. This analysis has necessarily required Ofcom to make a number of judgements and assumptions. Where these have been made, Ofcom has been as transparent as possible and is confident that its assumptions are reasonable, both at an individual level and in totality. Nonetheless should this consultation process reveal that other assumptions are to be preferred, this will feed through into the margin finally determined.

S.6 Ofcom considers that the proposals contained in this draft Direction are appropriate. They are objectively justifiable in relation to wholesale broadband access and Ofcom's aim of promoting effective competition in the market for intermediate broadband services, they do not unduly discriminate, and they are transparent and proportionate in relation to what they are intended to achieve.

Section 2

Introduction

Review of the Wholesale Broadband Access Markets – Objectives and Findings

2.1 A new regulatory framework for electronic communications networks entered into force in the UK on 25 July 2003. This framework, based on five new EU Communications Directives, is designed to create harmonised regulation of the electronic communications markets across Europe. Each market review is designed to determine what level of *ex ante* regulation should be applied to operators found to have significant market power (SMP) in the relevant markets identified by national regulatory authorities such as Ofcom (and previously the Director General of Telecommunications (the 'Director')). In its *Recommendation on relevant product and service markets within the electronic communications sector* (11 February 2003), the Commission identified the market for Wholesale Broadband Access as being a market susceptible to *ex ante* regulation. Ofcom, in fulfilling its obligations as required by the new EU regulatory framework, undertook two consultations (in April and December 2003) before completing its review of this market on 13 May 2004.

2.2 In the *Review of the Wholesale Broadband Access*, (the "WBA market review") Statement¹ Ofcom concluded that BT has SMP in the following markets:

- (i) asymmetric broadband origination market in the UK (excluding the Hull area); and
- (ii) broadband conveyance market in the UK.

Given the finding of SMP held by BT in those markets, i.e. its ability to behave to an appreciable extent independently of competitors, customers and ultimately consumers, Ofcom has imposed a number of SMP conditions on BT in order to address BT's SMP. In choosing which remedies to impose, Ofcom has considered the relative immaturity of these markets. In particular, it has considered the need to balance remedies designed to facilitate competition with the need to ensure that incentives to invest in broadband infrastructure are not adversely affected. For example, Ofcom has imposed a condition on BT which requires it to provide Network Access on reasonable request and on fair and reasonable terms, conditions and charges, SMP Condition EA1. Ofcom considered whether this Network Access should be provided on a cost-plus basis but, given the difficulties involved in setting cost-plus prices in a dynamic and relatively immature market, and the adverse effects that would arise if the charges were incorrectly determined, particularly if they were set too low, Ofcom decided against such an approach. Instead, Ofcom has imposed a retail-minus pricing approach in this market and Network Access will be provided on those terms. That is, BT must price any Network Access in such a way as to avoid a margin squeeze with its downstream intermediate products ('IPStream + BT Central'). The purpose is to avoid leverage of market power into downstream markets and to facilitate the development of greater competition in downstream markets.²

¹

http://www.ofcom.org.uk/codes_guidelines/telecoms/netw_intercon_index/wholesalebroadbandreview/

² For a further discussion of these issues see Chapter 4 of the WBA market review

2.3 The Network Access SMP condition EA1 also gives Ofcom the power to make certain directions. The Network Access obligation is framed in technology neutral terms and is defined by the scope of the relevant markets. Under that SMP condition, Ofcom has made a direction requiring BT to provide ATM interconnection in order to facilitate downstream competition. This replicates, in part, a Direction made in June 2002 (the 'June 2002 ATM Direction'), issued by Oftel in order to resolve a dispute between BT, Energis and Thus, which mandated ATM interconnection (often referred to in the industry as 'DataStream') in two forms, Service A (interconnection at the parent switch) and Service B (interconnection at the distant switch). Ofcom believes that it is important and appropriate that BT continues to have a specific obligation to provide interconnection on the terms set out in the Direction. While Ofcom has recognised in the WBA market review that future network development might mean that ATM interconnection ceases to be the most appropriate form of interconnection, it is currently the only practical way Altnets can interconnect with BT in order to offer intermediate and retail broadband internet access products further downstream.

2.4 The next section sets out a brief explanation of BT's network and the different levels of the supply chain.

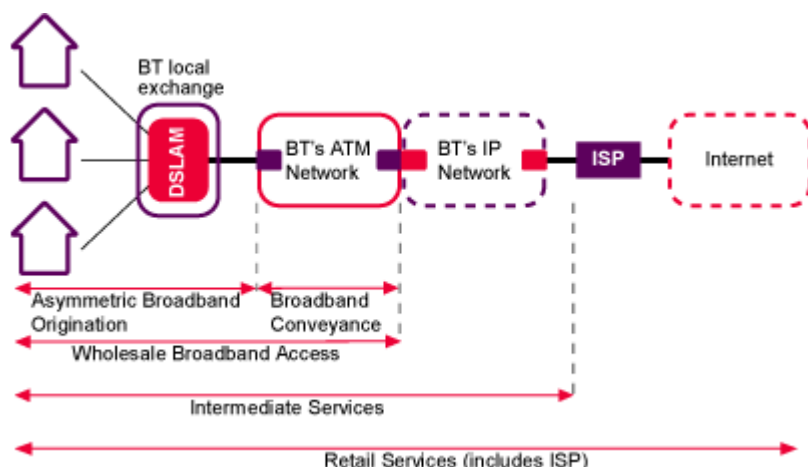
The products and levels in the vertical chain

2.5 In the WBA market review, Ofcom identified five distinct levels in the value chain. Each level includes the previous level as one of its inputs. Starting from the end-user, the levels are as follows:

- (i) the local access network;
- (ii) broadband origination;
- (iii) broadband access (origination plus conveyance);
- (iv) services delivered to service providers (resale services, e.g. IPStream and BT Central); and
- (v) services delivered to consumers (business or residential) e.g. broadband internet access.

2.6 The diagram below illustrates the services in question, focusing on the technology, namely Asymmetric Digital Subscriber Line ("ADSL"), principally used by BT to offer broadband internet access. This diagram is displayed for illustrative purpose only, as the asymmetric broadband services markets include services provided in other ways e.g. broadband cable and unbundled loops.

Figure 2.1



2.7 The diagram illustrates, in terms of BT's network, the various vertical levels in relation to broadband internet access. For the remainder of this document, services at levels (ii) and (iii) are referred to as being at the wholesale level; services at level (iv) are referred to as "intermediate services"; and services at level (v) as "retail services".

2.8 At the retail level, end-users buy retail services (such as broadband internet access) from service providers (e.g. BT Yahoo, AOL, Freeserve). In order to supply these retail services, the service providers buy intermediate services (e.g. IPStream and BT Central, hereafter referred to as "IPStream") from wholesale operators. Sometimes wholesale suppliers self-supply to their own service provider. For example, in the intermediate market, BT is a wholesale supplier selling IPStream to its own service provider as well as to other service providers. Other suppliers in the intermediate market include, for example, the cable companies. This draft Direction concerns the margin available between those Altnets using (ii) and (iii) in order to compete with BT in the provision of (iv) and (v).

ATM Direction and the 'no margin squeeze' rule

2.9 As referred to in paragraph 2.3, the ATM Direction brought into force by the WBA market review (the 'Original ATM Direction') replicates the provisions of the June 2002 ATM Direction as regards the requirement to provide the interconnection service. At that time there were no appropriate interconnection services which Altnets could purchase from BT which allowed them to interconnect with BT's ATM network and so allow them to offer wholesale DSL services for service providers or allow them to offer retail DSL services for end users. In mandating this interconnection product, Oftel decided to adopt a retail minus approach and opted to specify a pricing rule ('no margin squeeze' rule) and compliance regime to which BT would be subject. This approach was designed to enable Oftel to ascertain promptly whether the interconnection charges set by BT complied with the no margin squeeze rule.

Investigation into complaints about BT's IPStream price reductions

2.10 On 3 April 2003, BT announced some price cuts to its IPStream products which were due to become effective on 1 May 2003. In addition, it introduced a volume discount scheme for IPStream which further reduced the price for scale purchasers. No corresponding reductions were introduced for ATM interconnection prices. Oftel requested information from BT to show it was compliant with the June 2002 ATM Direction and, in addition, formal complaints were received from Energis, Tiscali, Your Communications, Thus and MediaWays alleging that BT was margin squeezing. Following a lengthy investigation and some reductions in the price of ATM interconnection, Oftel finally concluded in September 2003 that BT was not in breach of the 'no margin squeeze' rule set out in the June 2002 ATM Direction. However, the investigation highlighted the shortcomings of the margin squeeze rule set out in the June 2002 ATM Direction.³ In reviewing the wholesale broadband access market, therefore, Oftel and later Ofcom considered possible alternatives to that regime which are discussed below.

Specific proposal to set a margin

2.11 Respondents to the April 2003 WBA market review consultation highlighted two main concerns around the margin squeeze test. These were, firstly, a lack of certainty and predictability about the test and secondly, a concern as to whether economies of scale would determine the outcome of the competitive process since the margin squeeze test in the ATM Direction was based on BT's costs. Given its scale, its costs are considerably lower than those faced by smaller scale operators. Oftel/Ofcom agreed with both Altnets and BT that the previous regime which relied on lengthy ex post investigations only allowed for limited transparency in its application and did not create as much certainty regarding the rule as industry required.

2.12 Accordingly in the December consultation, having taken account of these responses, Ofcom set out its proposals to specify the level of the margin such that there was no price squeeze between BT's ATM interconnection charges and its prices for the relevant downstream services (i.e. to set the minus), in particular IPStream. Ofcom considered that this revised approach of setting the margin would address Altnets' and BT's concerns and provide greater certainty and transparency on the conditions that ATM interconnection charges should satisfy, so as to allow effective competition to develop in the provision of intermediate and retail broadband services. Ofcom is conscious that in order to make investment decisions, Altnets require stability and certainty in deciding whether or not to enter this market. The resource intensive investigation following the April 2003 price changes to IPStream and the ensuing uncertainty highlighted the 'chilling' effects of the current arrangement on Altnets, i.e. the investigation discouraged Altnets from taking investment decisions in relation to intermediate services. Furthermore this approach should provide BT with greater certainty in how it can change its IPStream prices while remaining compliant with the margin squeeze test.

2.13 Ofcom is, however, also conscious of the need to balance this desire for certainty against the need for flexibility and the need to be responsive to

³ For further details of this case please look at the case closure summary at: www.ofcom.org.uk/static/archive/oftel/publications/comp_bull/cases/closed_cases/cw_607.htm

changing market developments. On balance Ofcom has concluded that setting a specific minus in this market is imperative to foster competition with the caveat that any margin would need to be subject to periodic review and also reconsideration if there is a material change in the circumstances. This issue is discussed further at the end of Section 5. The WBA market review process consulted generally on this proposal to set the margin in this way and Ofcom's conclusions on this general approach are set out in the May statement. This document sets out for consultation Ofcom's proposals in detail to set the margin between ATM interconnection and BT's IPStream Services, both its standard services and its proposed capacity based charging services. In developing these proposals, Ofcom has considered the views of industry. As well as considering responses made to the WBA market review consultations, more detailed views have also been obtained through information requests and meetings with Altnets, ISPs and BT. In particular, BT cost information from the original margin squeeze investigation, referred to above, has been used as a starting point in deriving a margin squeeze rule.

2.14 It should be made clear that 'setting the margin' in the context of these proposals is not a simple case of specifying one figure for each of the products. This is because it is not possible to compare the prices of ATM interconnection and IPStream/BT Central on a like-for-like basis as the component parts of these products have very different pricing structures. The costs of using ATM interconnection and the costs of using BT's IPStream vary considerably with scale although ATM interconnection costs are far more sensitive to scale, i.e. there are greater economies of scale. Therefore, in setting a margin it is not enough merely to consider the additional costs incurred by Altnets wishing to compete with BT using ATM interconnection in offering intermediate services. The margin must also encapsulate reasonable usage factors for the ATM interconnection products and these usage factors must represent the average usage of the ATM interconnection products over a given time period.

Scope and legal basis for modifying the Original ATM Direction

2.15 In finalising the WBA market review Ofcom issued a Direction under SMP Conditions EA1.1 and EA1.2, which states that the provision of Network Access by the Dominant Provider in the form of ATM interconnection shall be provided on fair and reasonable charges, terms and conditions (the 'Original ATM Direction').

2.16 Ofcom is proposing to modify the Original ATM Direction under s49 of the Act to include detailed provisions specifying the appropriate basis on which the ATM interconnection products, Ofcom required BT to provide in that Direction, should be charged for to ensure that they are reasonable. The draft direction containing these proposed modifications is set out in Annex 4 and this explanatory statement explains the rationale for those proposals. As set out in Chapter 5 of the WBA market review, when Ofcom has confirmed this draft Direction it will discontinue the June 2002 ATM Direction.

2.17 In proposing the modification to the Original ATM Direction, Ofcom has considered among other things its duties under Sections 3 and 4 of the Communications Act 2003 (the 'Act'). Under Section 3 of the Act, and as set out in Section 4 of the Act, one of Ofcom's principal duties is to further the interests of consumers in relevant markets, where appropriate by promoting effective competition. Ofcom has also considered the other Community requirements detailed in Section 4 of the Communications Act. In particular, the proposed modification satisfies the Community requirements set out in Sections 4 (3), (7) and (8) of the Act. That is, it promotes competition in relation to the provision of electronic

communications networks and encourages the provision of Network Access for the purpose of securing efficiency and sustainable competition in the downstream markets for electronic communications networks and services, resulting in the maximum benefit for retail consumers of broadband internet access services.

Outline of the rest of the document

The following sections cover:

- Methodology for the margin analysis (Section 3)
- Modelling for the margin squeeze (Section 4)
- Ofcom's proposals (Section 5)
- Details of the consultation process (Section 6 and Annexes 1-3)
- Draft Direction modifying the Original ATM Direction (Annex 4)
- Glossary

Section 3

Margin Analysis Methodology

The Overall Approach

3.1 As explained in Section 1, Ofcom is proposing to specify the margin between ATM interconnection and IPStream/BT Central services. This section discusses the general methodology used by Ofcom to analyse what the appropriate margin is.

The Conceptual Framework

3.2 In specifying a particular margin, as has been proposed in relation to setting ATM interconnection charges, the basic approach involves assessing whether there is a margin squeeze in relation to BT's downstream business in the intermediate service market, i.e. its IPStream services. The question of whether there is a margin squeeze is essentially an economic issue and therefore the concept of economic costs is relevant.

Forward looking v Historical Approach

3.3 Given that the services involved are relatively new, costs and utilisation may be changing rapidly and there is a lack of time series data. This suggests that there are benefits from adopting a forward looking approach which analyses economic costs and revenues over time rather than relying on an historical approach which looks at accounting measures of costs and revenues in one specific period in which the costs and utilisation may not be representative.

3.4 This is because an historical approach is one in which standard accounting techniques are used to analyse costs and assess profits: some costs are treated as expenses and allocated only to the period in which they were incurred; other costs are capitalised in that they are allocated to more than one time period. This accounting measure of costs can lead to significant deviations from measures of the underlying economic costs - such deviations are referred to here as accounting distortions. This could be particularly acute in the early years of a new product.

3.5 If this were a mature, steady-state market, the variation between cost in a particular year and the cost path over time would be less significant. Accounting distortions would then be less significant and it might be appropriate to consider in-year profitability, e.g. what the firm's return on capital employed (ROCE) was, based on historical accounting data.

Question 1: Do respondents agree that it is reasonable to adopt a forward looking approach rather than an historical approach?

Assessment of downstream costs

3.6 There is also an issue in relation to whether the profitability of BT's downstream business should be assessed in relation to BT's own downstream costs or the costs which a competitor would incur in competing with BT in the

downstream market. This was an issue on which Ofcom consulted in the WBA market review and Altnets were in largely in support of the latter approach.

3.7 The standard competition analysis approach, for example in a Competition Act investigation, would be to set the margins that would allow an equally (or more) efficient competitor to BT in intermediate services to compete effectively. With this approach the analysis would be based on the costs which were incurred by BT. The relevant question would therefore be "If BT were to pay the same wholesale charges as its competitors, would its downstream business be profitable?"

3.8 Accordingly, as explained below, the approach Ofcom is proposing to adopt is to set a margin such that an entrant of similar efficiency, who is entering the market now, could compete with BT on a forward looking basis, i.e. there is no margin squeeze.

3.9 It is then relevant to consider the context for the exercise of setting the margin for Wholesale Broadband Access (WBA) which is one of forward looking regulation designed to *promote competition*. That means that it may be relevant for Ofcom to take into account other costs which an entrant would incur but which BT would not. Other costs include costs which BT does not in practice incur, such as migration charges and in span handover (ISH) interconnection costs. These issues are discussed in detail below.

3.10 The starting point for the analysis is thus the costs of a similarly efficient entrant which are initially derived from BT's costs but which are then adjusted to take into account factors such as BT's forecast scale. Where Ofcom does take into account entrants' costs, Ofcom considers that it would be appropriate only to take into account the costs of a similarly efficient competitor. This is necessary to reduce the risk of setting prices in a way that would encourage inefficient entry.

3.11 The way in which Ofcom has implemented this approach in its margin squeeze analysis has been to assess the profitability of BT's downstream business, i.e. its IPStream product suite on the basis that it buys ATM interconnection at published prices. It has used BT's experience of launching IPStream services as a starting point⁴ for determining the costs which a similarly efficient entrant would face now if it were to launch the same services.

3.12 BT's financial information relates to the period from 2001/02 and 2006/7 and therefore includes a mixture of historic and forecast information. The question which therefore arises is whether it is appropriate to use this information un-adjusted to model the costs of an entrant entering the market in 2004/5. Ofcom believes that adjustments to this information are warranted. If this were not done then it would risk overstating the costs which an entrant would face and so overstate the appropriate margin required. This is because an entrant today would, for example, be able to buy assets cheaper than BT did when it launched its services. Accordingly, Ofcom considers that it is necessary to make a number of adjustments to BT's historical information in modelling the margin squeeze test to ensure it is consistent with Ofcom's conceptual approach.

⁴ This approach is consistent with the recommendation set out in the ERG Paper ERG(03) 30rev1 "*ERG Common Position on the approach to the Appropriate remedies in the new regulatory framework*". In the context of setting charges to avoid a margin squeeze, the Annex to the paper states: "... it is assumed to be impractical to obtain the actual costs of an efficient competitor ... the natural course is to take the incumbent's costs as a proxy for efficient entrant, although some adjustments may be necessary."

3.13 The key adjustments necessary are: firstly, to reflect a decline in costs over time, such as those arising from a declining modern equivalent asset (MEA) price trend; and secondly to adjust its historic virtual path (VP) utilisation given subsequent changes in the functionality of certain equipment. Both of these adjustments are discussed below.

3.14 In terms of analysing economic costs and revenues over time, there is a need to take account of the different timing patterns with which costs are incurred and revenues are realised. An economic approach for analysing profitability over time is the Discounted Cash Flow (DCF) approach: it is also commonly used in business plans. It uses an analysis of cash flows – typically on a forward-looking basis - to assess the profitability of a business or part of a business over a specified period of time. Costs and revenues are recorded when they are incurred. The relevant measure of profit is the Net Present Value (NPV) which is derived as revenues net of costs when both are discounted using the applicable cost of capital.

Implementing a DCF approach

3.15 In terms of the implementation of a DCF approach there are a number of modelling issues to be considered. The major issues are:

- The relevant time period over which to carry out the DCF analysis and whether there is a need to truncate the analysis;
- If the DCF analysis is truncated, how should an appropriate terminal value be determined;
- The appropriate cost base for the analysis;
- Whether the DCF analysis is carried out at the level of individual products or on a whole business basis;
- The relevant starting level of retail prices for the analysis; and
- The appropriate cost of capital (i.e. discount rate).

3.16 In addition to the above, there is also the need to consider making other adjustments to a forward-looking DCF approach. These include the issue of migration and ISH costs which entrants incur but which BT does not. There is also the need to ensure that the modelling approach does not build in rewards for anti-competitive behaviour, i.e. the forecasts of future revenues and costs should not depend on the success of anti-competitive behaviour for their sustainability. The main issues which are considered here are in relation to:

- The treatment of historic costs/cash-flows
- The treatment of future costs
- The treatment of historic VP sharing by BT
- The inclusion of migration charges and ATM In-Span Handover (ISH) charges
- Pricing assumptions (or assumptions around future contestability)
- Volume assumptions

3.17 The next section begins with a discussion of the issues around the treatment of historic and future costs in both conceptual and practical terms because it has important implications in relation to the other issues around the implementation of the DCF approach.

Historic Costs

3.18 Although the market for broadband services is relatively new and is still developing, broadband services have only really been available since 2000/01 in the UK, BT has been incurring costs associated with the provision of IPStream products since that time. As noted above, the relevant conceptual framework that has been adopted is to adopt a forward-looking approach to assessing the level of the margin and to use BT's costs as a starting point for the analysis of the costs of a similarly efficient entrant. Taking these two factors together would imply that these historic costs are relevant to this analysis to the extent that they would need to be recovered by the similarly efficient entrant.

3.19 The level of the initial costs that an entrant would incur will depend on the timing of the investment in that, to the extent that the modern equivalent asset (MEA⁵) cost falls over time, an entrant today would have to invest *less* than BT to achieve the same level of functionality/capacity for its downstream products.

3.20 BT has argued that Ofcom should adopt a “pure” forward-looking approach to assessing the margin and so should not take into account the costs which have been incurred since the launch of the products. Essentially BT has argued that these costs are “sunk” and as such do not have any impact on the setting of prices in the future.

3.21 If Ofcom were to adopt a rolling timeframe, i.e. one in which historic costs and revenues were written off completely, this could permit a positive return to be demonstrated after an initial period, without any initial losses associated with start-up of the service ever being fully recovered. This is important in a DCF approach because where there are start-up costs associated with the launch of a product or suite of products, cash-flows in the initial years are typically negative followed by positive cash-flows in later years. If the initial negative cash flows were ignored altogether then a false view of profitability might be obtained: BT would be deemed to pass a margin squeeze test even though its business model could not be matched by competitors who were at least as efficient as BT.

3.22 The relevant principle, even in a forward-looking modelling approach, is that historic costs should be factored into the calculation of the margin *to the extent* that they yield an on-going benefit and so would be part of the costs expected to be recovered by a sustainable price. Such costs represent an unavoidable cost in that entrants would have to incur these costs to obtain the same benefit. The key methodological issue is to determine what element of the costs which BT has incurred to date should be included.

3.23 However, even where a type of cost is such that there is an on-going benefit, that does not imply that *all* of those historic costs should be included. There is an issue as to whether these costs should be included at the actual level at which they were incurred or at an efficient level today e.g. taking into account modern equivalent asset values.

3.24 As set out above, the issue of margin squeeze is essentially an economic one and therefore the focus of the modelling approach has been on economic costs and revenues rather than accounting measures of costs and revenues.

3.25 To the extent that such falls in MEA prices have been anticipated, then the firm ought to have been able to recover these costs through charging higher prices in the initial years of the asset's life. To the extent that any technological

⁵ A Modern Equivalent Asset (MEA) is an asset that replicates assets already in existence using the most cost effective proven technology to perform the same function.

advances were unexpected, then the firm will not have been able to recover those costs but equally, in a competitive market, the firm would not be able to recover those costs going forward.

3.26 In the case of the margin calculation, if the actual costs were included then BT would be forced to recover all its costs over time, even where the present cost of those investments has fallen and therefore an entrant would face a lower cost. The most appropriate approach, one that is consistent with the overall conceptual framework used for this modelling exercise, is to try to approximate the opportunity cost to the incumbent of such investments at this point in time to reflect the costs that an entrant would incur today in order to obtain the same on-going benefits.

3.27 On that basis, the relevant approach would be to take into account changes in MEA values. In a forward-looking approach, a DCF analysis would be carried out using revenues generated by current prices and a cost path which incorporated BT's historic costs written down to their MEA values. This has necessitated adjustments to BT's historic costs and also the way in which VPs have been used historically to reflect MEA values. For consistency, it could be necessary to adjust the forecasts of new capital expenditure going forward as well.

3.28 There are certain practical constraints about implementing this conceptual framework: e.g. in relation to the reliability of forecasts of costs and prices further into the future, determining appropriate MEA values etc. For pragmatic reasons, therefore, Ofcom has adopted an approach which it believes is in line with the conceptual approach outlined above. The approach which Ofcom has adopted is: to apply a DCF analysis to BT's business model *since launch*; to incorporate BT's historic costs and revenues into the DCF analysis but to adjust these values to reflect the position of an entrant today. This has necessitated adjustments to BT's historic costs, its forecasts of MEA values for new capital expenditure and also to how VPs have been used historically. The last two adjustments are discussed in separate sections below.

3.29 In relation to historic costs Ofcom has made the assumption that BT *did* anticipate changes in MEAs over time and that its pricing (and, therefore, revenues) were higher in the past to recover anticipated changes in MEAs. Therefore historic costs have been reduced by an amount which is intended to reflect this change.

3.30 In order to implement this approach, Ofcom has calculated the revenue that BT would have received in the initial years if it had charged on the basis of BT's current prices for the IPStream suite of products to give an adjusted revenue figure. Ofcom then calculated the difference between BT's actual revenues from the IPStream suite of products and this adjusted revenue figure. This difference is then subtracted from BT's actual historic costs on the basis that it represents an estimate of changes in MEAs.

3.31 Ofcom recognises that this represents an approximation of changes in MEAs. Accordingly, Ofcom has looked at the sensitivity of this assumption and concluded that it does not materially affect the result.

Question 2: Do respondents agree with Ofcom's approach to the treatment of historic costs?

Future Costs

3.32 Since Ofcom is considering a forward-looking analysis from the current time period, i.e. 2004/05, rather than from when BT actually launched its service, it is necessary to consider making an adjustment to BT's forecast of the future costs that it would incur in the provision of its downstream products. In effect, for modelling purposes, Ofcom implicitly assumes that a competing Altnet would experience the same customer growth profile as BT has experienced at an equivalent point in the business plan: in effect this involves time-shifting the date at which certain costs are incurred. BT's forecasts of future costs are based on current asset prices which are relevant to a particular stage of the business plan, (say) year 3 of the plan. The equivalent point of a new entrant's business would be (say) three years into the future when a different set of asset prices would be relevant. If it is accepted that future prices are likely to be lower than today's prices, in real terms, due to declining MEA prices, then it will be necessary to make an adjustment to BT's forecast future costs in line with the expected trend in MEA prices. To do otherwise would be likely to overstate the costs which an entrant would incur over the relevant time period entering the market now. The details of the adjustment made are set out at in Section 4.

VP utilisation

3.33 A third adjustment has been made in respect of the way in which BT chose to utilise VPs in the initial years of the IPStream suite of products. Ofcom considers that the historic level of BT's utilisation of Virtual Paths (VPs) would not reflect the utilisation levels than an entrant could achieve today. Owing to issues around the functionality and the costs of certain equipment in the past, BT faced limitations on the number of end-users that were able to share a VP. This resulted in BT using multiple VPs whereas today it would be more efficient to use a single VP. The MEA available to an entrant today has greater functionality than the historic equivalent and as such an entrant today should be able to achieve a higher VP utilisation than BT was able to achieve historically. On that basis, Ofcom believes that it is appropriate to make an adjustment to BT's historic use of VPs. To do otherwise would be likely to understate the VP utilisation achievable by a new entrant today and consequently overstate the costs. Details about the adjustments made and the sensitivity range used are set out in the discussion on model parameters and sensitivities in Section 4.

Question 3: Do respondents agree with Ofcom's approach to make an adjustment to take into account BT's historic use of VPs ?

The appropriate cost base for the analysis

3.34 Profitability needs to be assessed relative to a particular cost floor which in turn gives rise to methodological issues around the appropriate time period for the measurement of the relevant cost floor as well as the appropriate cost floor for the analysis itself.

3.35 A long run approach is appropriate in a competition analysis of profitability in that it is based on the minimum long-run level of costs that would be consistent with a sustainable business. The long-run is the time horizon over which all costs are variable. A cost floor based on short-run measure of costs – such as short-run average variable cost (AVC) - would set a cost floor which a firm could price down to in the short-term but which would not be sustainable in the long-run where there are fixed costs. Using AVC as a (short-term) cost-floor would not provide any information about the long-term nature of competition.

3.36 In the context of promoting competition through *ex ante* regulation it is still appropriate to focus on the long-run rather than the short-run and there are two measures of long-run costs that would be relevant to consider:

- A long-run incremental costs (LRIC) approach where these are the costs arising from the provision of a defined increment of output assuming that some output is already produced.
- A measure which includes an element for the recovery of an element of common costs e.g. a CCA⁶ fully allocated cost (FAC) or LRIC plus a mark-up for the recovery of common costs (a so-called LRIC+ approach) .

3.37 In previous Competition Act analyses Ofcom has used a LRIC measure of costs for assessing margin squeeze, typically Long Run Average Incremental Costs (LRAIC) which was a per unit LRIC cost measure. The LRIC measure is the minimum level at which prices may be set to be sustainable over a long-run time horizon. It measures the costs that are specifically caused by the production of a defined increment of output (e.g. a particular set of products or services) but also assumes that any common costs which might be attributable to the additional output are in fact recovered from other products or services.

3.38 In the case of investigating competition complaints it seems appropriate to focus on the minimum measure of costs that would be consistent with sustainable competition. Any price above a LRIC measure of costs would increase the profits of the firm relative to not producing and selling the increment of output and would therefore not usually be considered irrational absent anti-competitive effects. Conversely, a price below LRIC would not be sustainable in the long-term.

3.39 However, as set out in the introduction, the context in which Ofcom is setting the margin is one of *ex ante* regulation that is intended to promote competition. In these circumstances Ofcom believes that it is appropriate not just to consider adjusting BT's business model to take into account some of the costs that would be faced by new entrants. A feature of telecommunications networks is that they can give rise to economies of scale and scope. This could provide an incumbent operator with an advantage in that they are likely to have a broad range of products and services and can spread the recovery of common costs more widely. That is not to say that such economies of scale and scope would not be available to new entrants over time but that in order to take full advantage of them they would need to replicate BT's product portfolio.

3.40 In order to allow for more '*targeted*' entry, i.e. where a competitor chooses to compete with BT across a more limited range of IPStream products, it would seem reasonable to make an adjustment at this stage in the development of the market and to factor in an allowance for the recovery of common costs in conducting a MST. On that basis the appropriate cost floor would be one that incorporates an element for the recovery of common costs: e.g. CCA FAC or LRIC+.

3.41 Ofcom recognises that a CCA FAC or LRIC+ approach sets a higher standard for BT to pass in setting the margin compared to a LRIC approach. For instance, if the margin set by BT were to pass a CCA FAC or LRIC+ based test then it would also pass a LRIC based test. Conversely, however, if BT were to fail a CCA FAC or LRIC+ based test then that does not imply that it would automatically fail a LRIC

⁶ Current Cost Accounting. An accounting measure which takes into account specific price changes affecting the assets employed by a company.

based test. Given the context of promoting competition, Ofcom considers that CCA FAC or LRIC + approach would nevertheless be appropriate.

3.42 There is also a practical dimension to the measurement of the appropriate long-term costs. As referred to above, at this stage in the development of the market, there is a degree of uncertainty about a number of key issues around the determination of costs: e.g. how BT has chosen to record cost information for these products; what an efficient level of costs in this context is; what the utilisation of assets is; what the timing of cost recovery is etc. This would tend to counsel in favour of working with the existing system of financial data reporting that BT has put in place for these products rather than requiring BT to develop a separate system of financial reporting.

3.43 The information provided by BT to Ofcom for the purposes of setting the margin is on a CCA FAC basis. Taking into account the fact that the CCA FAC measure provides a long-term measure of costs and common cost recovery and for reasons of practicality set out above, Ofcom has chosen to use CCA FAC as the appropriate cost standard in conducting the MST.

Question 4: Is the CCA FAC an appropriate cost standard to use in formulating the MST in this context?

The relevant time period

3.44 In assessing the profitability of the IPStream suite of products over time, the relevant approach is a forward-looking, long-run approach. This in itself gives rise to a number of possible approaches in relation to choosing the relevant time period for analysing the sustainability of prices. For instance, it would be possible to consider the profitability of the key current investments which would imply using the economic life of those assets or alternatively one could adopt a very long-run approach which would consider profitability over the whole lifetime of the business or at least over multiple investment cycles.

3.45 In both instances there will inevitably be trade-offs between modelling the relevant period and the generation of reliable forecasts over the relevant lifetime of the economic assets for a long-lived project. For instance, with the very-long run approach, there would be a need to try to anticipate not just the impact of future technological innovations but also to try to assess what this would mean for investment decisions and the level of investment in the future. For well established services this would be a demanding exercise; for services which are still developing any such forecasts would be subject to potentially significant margins of error.

3.46 Ofcom's starting point here is that the assessment of profitability should in general be based on the nature of the underlying investments and an appropriate period for the recovery of those investments. That would tend to suggest that the very long-run approach would not be appropriate. Ofcom considers that an appropriate methodology would be one under which the current investments were profitable, because the firm could not rely on earning super-normal profits on future investments if the market was competitive. Therefore it would be more reasonable to specify a time period that was related to the economic life of the underlying assets than the very long-run. Otherwise one of the objectives of the analysis – to avoid building in the reward for anti-competitive behaviour – might be undermined.

3.47 Therefore Ofcom focuses on the profitability of the key current investments. The basic approach is to consider the profitability of the investments over the relevant lifetime of those investments which in turn implies taking historic costs and revenues into account in the analysis

3.48 As referred to above, even with an approach which focuses on the profitability of key current investments there can still be issues around:

- generating reliable forecasts for individual aspects of the business case against the background of a developing market;
- the fact that assets (tangible and intangible) do not generally have the same economic lifespan.

3.49 This suggests that for practical reasons the future period that can be sensibly included in the DCF analysis will be constrained by the period over which it is reasonable to derive forecasts of cash flow expenditures and revenues. The longer the time period of a DCF analysis, the greater the risk of errors in the forecast.

3.50 Given the data available to it, Ofcom has considered carrying out the MST on a range of 4-6 years before truncating the analysis but considers that it is appropriate to carry out the DCF analysis over a five year period and to truncate the analysis at that point. This time period enables historic data on actual costs and revenues to be incorporated into the analysis for the early years of the modelling period. The historic cost data will supersede the initial forecast data for the early years of the modelling period that was built into BT's initial business plans. Using a five year time period then takes into account issues around the reliability of forecasts in that the analysis is able to make use of updated forecast data which takes into account BT's actual experience but at the same time does not rely on forecasts for an extended period into the future. Ofcom considers that this is a reasonable trade-off given the relevant considerations.

Question 5: Do respondents agree with this approach given the problems of modelling a MST at a relatively early stage in the lifecycle of the IPStream products?

Terminal Value (TV)

3.51 The DCF analysis runs for five years and is then truncated at that point. Whenever a DCF analysis is truncated, it is appropriate to consider the terminal value associated with the activity at the time of truncation to reflect the fact that the business will continue beyond this time and that assets have an on-going economic value.

3.52 In a DCF analysis, where the key assets are expected to have a value and earning power for longer than the explicit period of analysis, then a terminal value is calculated. The terminal value is intended to reflect the residual economic life of the product development, physical assets and acquired customers. Ofcom has taken the size of this terminal value as being equal to the un-recovered capitalised costs of acquisition, product development and physical assets remaining to be recovered after the five year period of explicit analysis.

3.53 The approach which Ofcom has adopted has assumed zero super-normal profit beyond the explicitly modelled period of five years. This means that any un-recovered costs at this point can be recovered (along with an appropriate return on capital) but future super-normal profit is excluded. This approach has been adopted to avoid building in the rewards of anti-competitive behaviour in that in

conducting the MST Ofcom will not include profits generated beyond the explicit modelling period; such profits cannot be used to subsidise losses made during the explicitly modelled period.

3.54 In deriving terminal values, Ofcom recognised the importance of avoiding building in the rewards from anti-competitive behaviour. Therefore, Ofcom deliberately avoided the calculation methods typically used to derive terminal values in business cases or valuation exercises (e.g. using the final period margin to derive a value in perpetuity).

3.55 Instead Ofcom approached the calculation of the terminal value from the perspective of cost allocation. The purpose of the terminal value (as used by Ofcom) was to allocate asset costs between two periods of time: the explicitly-modelled period of five years from launch up to the point of truncation and the years beyond the point of truncation.

3.56 To this end Ofcom had to first allocate the acquisition cost of any asset evenly across its life time. This allocation can be performed using a number of methods. Two simple approaches are flat annuity and straight line depreciation approach. The terminal value is calculated using the annualised asset costs that have not been recovered beyond the point of truncation. The cost of the asset during the explicitly modelled period is given by the difference between the acquisition cost of the asset and its terminal value (which is, in effect, as if it were a positive cash flow at the point of truncation).

At which product level should the MST be conducted?

3.57 A margin squeeze is a particular type of cross-subsidy which can be carried out by a vertically integrated firm. In the case of a margin squeeze it is possible for the vertically integrated firm to sustain losses in relation to one part of the provision of a particular good or service but for the provision of that good or service still to be profitable on an end to end basis. Furthermore, unlike a "pure" predatory pricing strategy, a successful margin squeeze does not necessarily require competitors to exit the market. It may be sufficient simply to weaken the competition or to force them to become niche players. One of the objectives of a MST is, therefore, to identify when a firm which is dominant in an upstream market is leveraging its market power into a related downstream market in a way that would prevent, restrict or distort competition.

3.58 A margin squeeze analysis can be conducted at the whole business level, i.e. across a range of related products and also at the level of individual products and services. In the original ATM Direction, Oftel chose to carry out the margin squeeze test at the individual product level. A factor in this approach was the requirement on BT to charge for ADSL-based interconnection services on a non-discriminatory basis such that there was no margin squeeze with any of BT's services that provided or enabled the provision of Broadband Internet access.

3.59 In a similar vein to the discussion set out in the section above which discussed issues around the long-run cost floor, conducting the margin squeeze at the individual product level should avoid an entrant having to replicate BT's product mix. Conducting the margin squeeze at the level of the individual product would also prevent BT from targeting particular competitors.

3.60 It is likely that a number of entrants could well be multi-product suppliers in their own right and will choose to compete with BT across a similar product

portfolio. However, given that the market is still developing, Ofcom does not want to pre-judge this issue.

3.61 On that basis, Ofcom is proposing to conduct the MST on each of the seven "standard" IPStream products and also for the two CBC products, the details of which are set out in Section 4. In the case of the CBC products, Ofcom carried out the MST on the basis of a defined bandwidth range i.e. it is not proposing to specify that BT must pass the MST across the whole range of relevant bandwidths. Ofcom believe that the bandwidth ranges that it has used to assess the MST are a reasonable reflection of the way in which these products will be used to provide services and details are set out in Section 5.

Question 6. Do respondents agree that the MST should be conducted on the basis of individual products and a range of bandwidths for CBC?

The relevant retail price

3.62 Ofcom has considered whether BT's IPStream prices are the relevant downstream prices that should be used in the MST. In response to the WBA market review/ consultation with Altnets, a number of competitors to BT at the downstream level – who rely upon purchasing ATM interconnection from BT – have argued that they need to offer a discount on the BT IPStream prices across the board in order to induce intermediate service level customers (i.e. ISPs) to switch away from BT. They assert that they need to consider offering across the board discounts of between 10-15 per cent off the prices charged by BT as a matter of course. They go on to argue that the relevant reference price against which to conduct the margin analysis is therefore not BT's own prices for the IPStream products but the prices which they are able to charge.

3.63 The argument put forward by BT's competitors appears to presume that competition on price is the main form of competition in this area and that competition based on other attributes e.g. quality of service, additional functionality, customer support etc would not be relevant. However, one of the reasons for adopting a retail minus approach in this area is that the market is at a relatively early stage of its development and that there is uncertainty about future market developments. It is also possible that the Altnet's position reflects the view that an ISP will incur significant additional costs when multi-sourcing compared to purchasing from a single source. Ofcom has not been provided with any firm evidence on this point. In addition it notes that such costs, to the extent they exist, are likely to be one off costs for the ISP which would make the inclusion of any allowance for them in the margin difficult.

3.64 If Ofcom were to construct a reference price for conducting the MST based on the retail price for IPStream less, for example, 15 per cent, it would be building in an automatic margin at the retail level for new entrants. There is a risk that this in itself would tend to determine the way in which competition evolved in the market.

3.65 There is also the issue as to whether promoting competition in this market relies exclusively on ISPs completely switching away from BT. In a number of cases, Ofcom understands that a number of the larger ISPs have pursued a deliberate strategy of multi-sourcing i.e. they do not rely solely on one operator for the provision of these products. This is in order to stimulate competition and in doing so creating more responsive and customer focused suppliers. Against this background, it is less likely that ISPs would make decisions about different

suppliers based purely on price. This would be another reason for being cautious about building in a margin for Altnets.

3.66 As a point of principle in using the retail minus approach to determining interconnection charges Ofcom does not believe that it is appropriate to build in an automatic additional margin for BT's competitors purely to allow them to offer discounts off BT's prices.

Question 7: Do respondents agree that it is reasonable to conduct the MST on the basis of BT's retail prices?

The appropriate cost of capital

3.67 DCF analysis takes account of (or 'discounts' for) the fact that the present value of a sum of money is higher than the value of the same amount of money at some point in the future. It is the discount factor which provides for the firm to earn a reasonable return on its investment. A firm's cost of capital represents the weighted average yield that it needs to offer to investors in order to attract funds for investment – it represents a “cost” of money.

3.68 The use of a firm's cost of capital as the discount factor therefore provides a 'bright line' test in investment appraisal. If the Net Present Value (NPV) using an appropriate discount rate is positive (or even, at the margin, is zero), then the project represents a worthwhile use of the funds. If the NPV is negative then the firm should not invest in that project.

3.69 Some of competitors to BT have argued that the relevant cost of capital to be adopted in the DCF analysis is not in fact BT's own cost of capital but it should be their own cost of capital. They argue that their own cost of capital (typically around 15%) is higher than BT's regulated cost of capital and this represents a cost that they are unable to avoid. They argue that using BT's own lower cost of capital tends to reward BT for its scale – on the assumption that scale equates to lower risk - and is also a reward for the incumbent position it holds across a range of markets. In other instances, BT's competitors have argued that the cost of capital should be set to reflect the Internal Rate of Return (IRR) thresholds that are used for investment appraisal for internal purposes within companies i.e. some firms may set a target IRR above the firm's actual cost of capital to take into account projects which contain a higher element of risk.

3.70 At the conceptual level, the appropriate discount rate to be used in a DCF analysis should be the company's risk-adjusted cost of capital i.e. one which takes into account the risk at the outset of the investment. On that basis using an IRR threshold which has been developed to provide an internal mechanism for "sifting" investment projects does not have any direct relevance to the particular DCF appraisal under consideration.

3.71 In the absence of any systematic evidence of the appropriate level of the risk-adjusted cost of capital that would be applicable for the IPStream products, Ofcom believes that it is reasonable to use BT's cost of capital as estimated by Ofcom and used in relation to BT's regulated activities (i.e. currently 13.5 per cent pre-tax nominal) as the relevant discount factor in the DCF analysis. However, sensitivities at higher discount rates have also been considered to reflect the view that the IPStream project may represent higher than average risk for BT.

Question 8: Do respondents agree that it is reasonable to conduct the MST using BT's cost of capital for regulated activities as a proxy for a risk-adjusted cost of capital?

Migration charges and ISH charges

3.72 Ofcom has also considered how to treat costs which BT does not currently incur but which new entrants do. Two such costs are migration charges and ISH charges. Competing operators face a migration charge when they migrate existing end users between IPStream and ATM interconnection based services. Given the way in which the market has developed this charge/cost will mainly be incurred by new entrants since BT is currently by far the largest provider of intermediate services based on ADSL and its customer base is still growing at a fast rate.

3.73 Competing operators also face the charge for interconnecting their networks with BT's network, i.e. the ATM In span handover (ISH) charge. This is a charge which BT by definition does not have to incur.

3.74 On the basis that the adjusted business model approach that has been adopted takes as its starting point BT's costs and then considers whether adjustments need to be made to reflect categories of costs which only Altnets must pay, the issue of migration charges and ISH costs are ones that need to be taken into account. There is a trade off relating to the inclusion / exclusion of these costs in the margin. On the one hand given the objective of promoting competition, it would seem appropriate to take into account these costs which a competitor would face even if it were as efficient as BT in other respects. However, on the other hand there is a risk that in doing so it will have the effect of forcing BT to price above its own costs levels and so forcing overall price levels to be greater than they would otherwise be. In its margin analysis Ofcom has considered sensitivities relating the inclusion / exclusion of migration and ISH charges.

3.75 Ofcom considers that it is appropriate to make adjustments for ISH costs because these arise from the fact that Altnets are not vertically integrated in the same way BT is. It is less clear that adjustments should be made for migration charges since these could, in principle, equally apply to BT.

Question 9: Do respondents agree that it is reasonable to make adjustments for ISH costs but not migration charges?

Pricing Assumptions and Contestability

3.76 One potential criticism of a DCF approach is that it can build in rewards for anti-competitive behaviour. For instance, consider a predatory pricing strategy: the first stage of the pricing strategy is to set prices below cost in order to force other firms to exit the market. In the second stage of the strategy, prices are then raised in order to recoup the earlier losses and the firm is able to sustain those prices above the competitive level because there is no threat of entry. It is likely that a predatory pricing strategy of this type would pass a straight-forward DCF approach. Similar concerns can apply with respect to the way in which end-user volumes are treated in the DCF analysis which is discussed in the next section.

3.77 The purpose of a MST in this context is to establish whether the pricing policies set out in BT's business case would exclude similarly efficient

downstream competitors. That is, can competitors enter the market, incur the relevant start-up costs, initial losses etc. and still expect to recover their costs over a reasonable period of time, taking into account the likely pattern of prices going forward (which take into account the degree of competition in the market and changes in on-going costs)?

3.78 Ofcom recognises that most markets are not characterised by perfect competition and contestability where prices adjust immediately to changes in on-going costs. On the other hand it would not be reasonable to assume that firms could maintain prices above costs indefinitely in the face of competition. It is therefore reasonable to assume that prices can take a period of time to adjust to underlying changes in costs. The contestability scenarios assume that as on-going costs fall over time, competition will then force BT to reduce its retail prices as well, although not necessarily simultaneously. The speed, magnitude and timing of these reductions are all parameters which can be varied as part of the modelling approach. These contestability assumptions therefore provide a mechanism for analysing the pricing assumptions that BT uses in its business model.

3.79 The introduction of contestability scenarios is designed to address the concerns that only prices should be included in the analysis for future years that can be sustained in the absence of anti-competitive behaviour. The contestability analysis takes as its starting point the assumption that in the current market it would not be reasonable to assume that prices could be maintained indefinitely against a backdrop of reductions in on-going costs (and therefore increasing margins). If the profitability analysis can be satisfied even in the face of cost reductions which feed through into retail price reductions, then that would indicate that BT's business case does not depend upon the success of an anti-competitive course of conduct. If BT's business case were only robust on the assumption that it was able to sustain increased margins in the future i.e. to maintain retail prices while on-going costs were falling indefinitely, then that would suggest that its business case was predicated on weakening competition in the initial years of the business plan.

3.80 Contestability can be implemented in practice in a number of different ways both in terms of: calculating how much costs would reduce by and so, by implication, the effect on retail prices; and in relation to what point in the analysis over time the assumption is imposed. Ofcom has considered a number of sensitivities in relation to the implementation of contestability and these are discussed in Section 4.

Question 10: Do respondents agree that it is reasonable to include an assumption for future reductions in prices owing to competitive pressure? At which point in the life cycle of a product is it appropriate to introduce a contestability assumption?

Volume assumptions

3.81 As with the rationale for introducing contestability assumptions, there is the need to avoid building in a reward anti-competitive behaviour e.g. by allowing BT to base its cost-pricing decisions on achieving a scale of operation (and therefore lower unit costs) that would only result from anti-competitive behaviour which allowed it to corner the market. This is one element of the rationale for adjusting BT's forecast of end-user volumes.

3.82 At the same time there is the need to take into account the setting of interconnection charges in the context of promoting competition. A series of adjustments in the modelling approach have already been made to BT's costs which have sought to reflect the costs that an entrant would have to incur in order to be able to compete with BT: e.g. ISH, elements of historic costs etc. The need to consider the position of a competitor entering the market today provides another rationale for considering adjustments to the forecasts of end-user demand (or subscriber volumes) that are included in the model. At the same time, Ofcom is aware of the need to discourage inefficient entry and so there does need to be some recognition of the benefits of scale and reach. In this context Ofcom notes that BT has been able to achieve its extremely high share of the intermediate services market for a variety of reasons, some of which relate to issues of historical advantage that this regulation is intended to redress. In order to balance these different elements, Ofcom has adopted an approach of scaling back the volumes forecast by BT while retaining BT's cost function. That is, Ofcom has assumed that the new entrant is similar in efficiency to BT rather than explicitly modelling the cost function of a new entrant.

3.83 The level to which BT's volumes have been scaled back has been selected so as to allow for a modest number of scale entrants in the market in keeping with the context of setting the margin to promote competition.

Question 11: Do respondents agree with Ofcom's approach to taking scale into account in the margin squeeze test in this way?

Assumptions used to derive the margin

3.84 In summary, in deriving a margin Ofcom's methodology is based on the following conceptual framework:

- The context for analysis of the appropriate margin between BT's IPStream and ATM interconnection products is one of *ex ante* regulation that is designed to promote competition in the downstream business.
- The analysis of profitability of the downstream business should be forward-looking over a number of years and should be based on the unavoidable costs of similarly efficient entrant.
- Historic costs are taken into account to the extent that they yield an on-going benefit but are written down to their MEA value.
- The margin squeeze test (or analysis of profitability) is carried out at the level of the individual product level
- The relevant cost floor for the analysis is a long-run measure of costs which includes an element for the recovery of common costs.
- In order to avoid building in the rewards for anti-competitive conduct, a number of adjustments have been made to take account of BT's scale and also to test the sustainability of the pricing assumptions in the profitability analysis.

3.84 In practice, the practical implementation of this conceptual framework has necessitated a number of adjustments. The main adjustments are:

- The use of BT's costs from its business model as a starting point for those of a similarly efficient entrant;
- The use of historic revenues to provide a measure for cost recovery since the launch of BT's products and therefore an approximation for changes to MEAs.

Consultation on a draft direction setting the margin between IPStream and ATM interconnection prices

- The use of BT's cost of capital for its regulated activities as a proxy for a risk-adjusted cost of capital figure.
- Future capital expenditure costs are reduced in line with the trend in MEA prices.

The following chapter sets out a variety of scenarios based on these general principles.

Section 4

Margin Setting Modelling

Introduction

4.1 This Section describes the modelling work which Ofcom has undertaken to analyse the margin between ATM interconnection and BT's IPStream services. Before the models are described there is a brief discussion of these different services to provide a context.

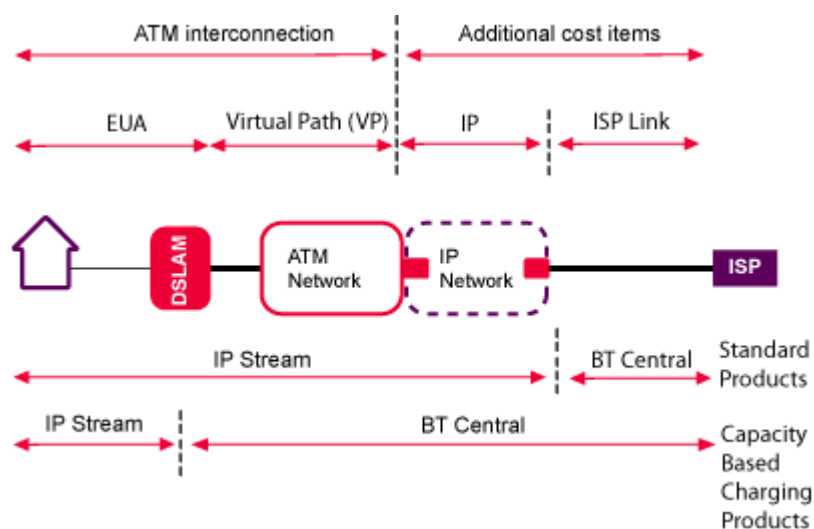
4.2 Ofcom views the current IPStream/BT Central products as being downstream to ATM interconnection product set. The "Margin" is made up to of two components:

(a) the cost of the ATM interconnection product (i.e. given BT's charges how much would an interconnecting operator (including implicitly BT) pay for the ATM interconnection services);

(b) the cost of the other inputs which are needed to make the transformation from ATM interconnection to IPStream/BT Central, such as; broadband access servers, IP conveyance, customer handover links and various operating and sales and marketing costs. In the following text the cost of these other inputs will be referred to as the additional costs.

4.3 The figure below illustrates BT's IPStream services and the ATM interconnection services.

Figure 4.1



4.4 The figure above shows the four main elements that make-up BT's end-to-end broadband DSL service. The end user access (EUA) and the virtual path (VP) are essentially the ATM interconnection products whereas the IP network and the ISP link are essentially the additional cost elements.

4.5 BT's Standard IPStream product suite offers 7 predefined products, as identified in Table 4.1. Each of these Standard products has its own unique rental price.

Table 4.1

Standard Products⁷	Max Speed	Contention Ratio
Home 250	250 kbit/s	50
Home 500	500 kbit/s	50
Home 1000	1 Mbit/s	50
Home 2000	2 Mbit/s	50
Office 500	500 kbit/s	20
Office 1000	1 Mbit/s	20
Office 2000	2 Mbit/s	20

4.6 BT's proposed capacity based charging IPStream products ("CBC"), due to go live on 28 May 2004 come in two basic forms: Home EUA and Office EUA. Each has a separate rental price. In addition to that an ISP purchases capacity in the form of a BT Central which includes both the core network conveyance and the ISP link.

4.7 BT's Central product comes in a large range of bandwidths with different prices for Standard and CBC. The bandwidths range from 0.5Mbit/s to 622Mbit/s.

4.8 Although on the face of it BT's standard and capacity based charging products appear to be structurally very different, they do in fact perform very similar functions. In fact the different demarcation point between IPStream and BT Central, for standard and capacity based charging, is purely a pricing distinction.

4.9 With the standard product BT is in effect offering an end-to-end service where a large proportion of the price (per end user) is fixed, with the remaining portion being variable with bandwidth. Whereas with the capacity based charging product the fixed portion is less and consequently the variable portion is larger - compared to standard. The price of capacity based charging (per end user) is therefore more dynamic than the standard product.

4.10 However, from the point of view of cost, both ATM interconnection charges and additional costs, standard and capacity based charging must be identical when the end-to-end service has been dimensioned to be the same because the network components are the same. Because the capacity based charging product is more dynamic than the standard product it can be viewed as the over arching product, with the standard products being a more restricted, pre-dimensioned, sub-set. This has been the conceptual approach taken by Ofcom when determining the ATM interconnection charges and additional costs.

4.11 The standard products and the CBC are constructed from exactly the same network elements. With the standard products BT specifies the technical characteristics of the services and is then required to ensure that this specification is maintained, whereas with CBC, the customer, usually an ISP has some control over the specification of the service. This control is in relation to how much capacity (bandwidth) is allocated to each end user, on average. Standard charging can therefore be considered as a pre-dimensioned form of CBC.

⁷ The Home 250 and Home 2000 products are due for launch at the end of May 2004 as set out in BT's press release of 14 April 2004.

Overall methodology applied

4.12 Ofcom has formulated its own spreadsheet models for the margin squeeze test and to determine the usage factors and to specify the additional costs. To this end Ofcom has formulated two models:

The top down margin model: This model calculates the margin between the unit price charged by BT for IPStream/BTCentral products and the unit costs incurred in provisioning such products (i.e. the ATM interconnection costs and additional costs).

The usage factors model: This model determines the usage factors (as described in paragraph 4.24) and the balancing factors based on the output of the top down model.

4.13 The methodology and approach adopted in both models is explained in the below paragraphs.

Methodology and approach adopted in the top down model

4.14 The top down model determines whether or not BT is passing a margin squeeze test and this is achieved by comparing the unit price charged for standard and CBC IPStream/BTCentral products and the unit cost incurred by BT to provide each of these services, if BT were to purchase the ATM Interconnect products on the same basis as Altnets.

4.15 Based on information provided by BT, Ofcom has modelled a 6 year period. However, it is possible to assess whether BT is margin squeezing over any period up to 6 years by truncating the modelled period. The year at which the modelled period is truncated is the terminal year and as such terminal values for the appropriate assets are introduced in this year.

4.16 The model calculates, for the terminal year, the average unit costs associated with provisioning the IPStream products over the explicitly modelled period. The average unit costs are driven by bandwidth and/or number of end users and both the costs and the cost drivers are expressed in present value (PV) terms. The average unit costs are then allocated to the various IPStream products. Ofcom is of the view that this methodology is more appropriate, in this instance, than an unadjusted cash flow approach. This is because it removes phasing distortions between the various downstream products and this is particularly important when new products and/or pricing structures are introduced at different points within the modelled period. The removal of phasing distortions ensures that the ATM interconnection usage factors can be specified in a consistent way.

4.17 In modelling capital costs (and connection charges) in the periods in which they arise, it has been necessary to take account of opening and terminal values of assets. This is both in terms of assets (and connections) whose useful economic life has not been exhausted by the end of the explicitly modelled period, as well as assets that are utilised during this period but acquired in earlier years. Both opening and terminal values have been calculated on the basis of the residual value of the asset (or connection) using a flat annuity at the assumed discount rate.

4.18 A number of costs incurred in provisioning the end-to-end products, in particular the core IP network costs and Virtual Path (VP) rental charges, are shared across the entire portfolio. These shared unit costs are allocated to the various downstream products mainly in proportion to the bandwidth demanded by the products.

4.19 The total unit costs for a particular product are then determined by adding the unit costs that can be identified directly with the specific IPStream product (such as end-user-access (EUA) connection and rental charges) to the above allocation of shared unit costs.

4.20 In a similar way, the average unit revenues for a particular product are calculated taking into account of the end-user demand figures and the current unit charges. These are then expressed in PV terms. Finally, these total unit costs, and the margin resulting from comparison with the associated unit revenues, are presented on a per end-user per month basis.

4.21 The modelled elements constituting the cost stack are summarised in Figure 4.1 below and can be categorised into:

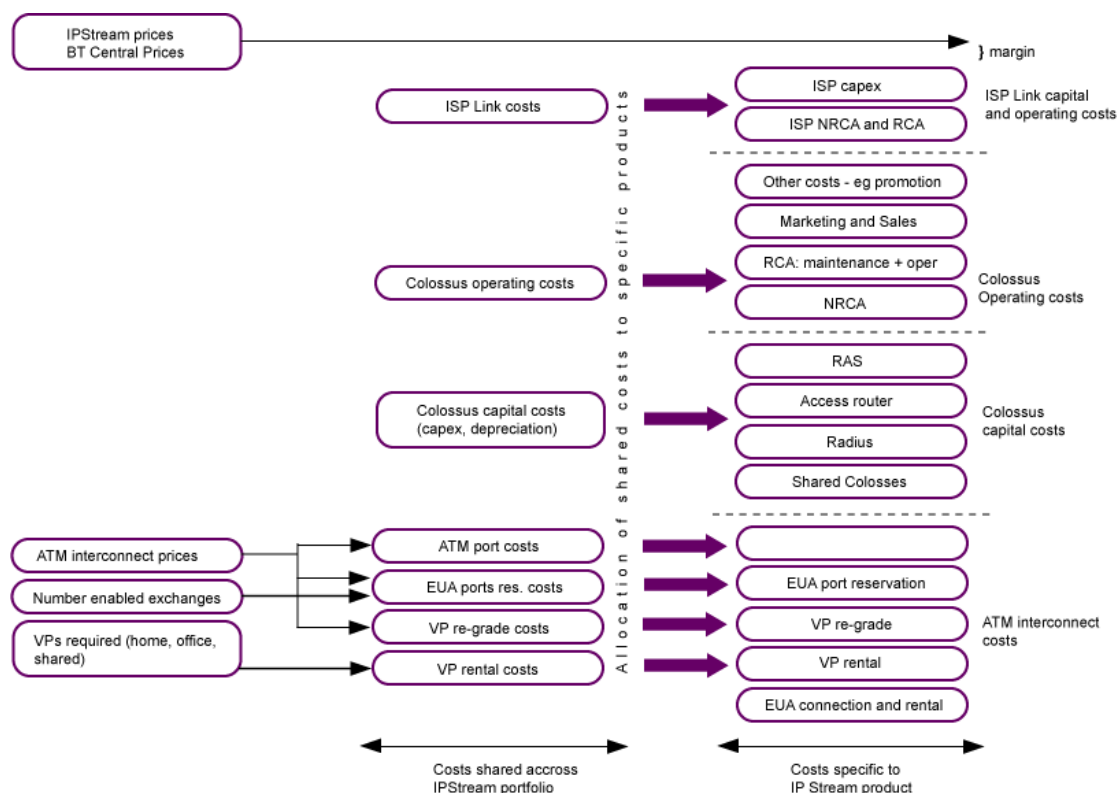
- a. upstream ATM interconnect unit costs,
- b. IP capital and operating costs,
- c. ISP Link capital and operating costs, and
- d. Sales and marketing

Migration costs are excluded from the diagram below as this is a side calculation based on the volume of migrations forecast by BT in the context of Ofcom's case for resolving the dispute on migration.

http://www.ofcom.org.uk/consultations/current/broadband_access/?a=87101

This is more fully discussed in the tables below. All abbreviations used in Figure 4.2 are explained in the following tables.

Figure 4.2 : Overview of modelling approach



The following tables set out the modelled elements of the cost stack.

ATM interconnect costs

The model derives the ATM interconnection costs on the basis of BT's current charges. They are also based on BT's architecture which has 9 points of interconnection. We believe this is appropriate since a new entrant could be expected to interconnect at this number of or possibly more points during the relevant period. For a description of these costs see BT's price list Section 44, Part 2⁸.

<p>EUA connection and rental costs</p>	<p>Average unit EUA connection costs are calculated as the product of connection charges and gross additions (incremental end-users and churned users) divided by the total number of end users (both Standard and Capacity). The total EUA connection costs include a terminal value calculation.</p> <p>Average unit EUA rental costs are calculated as the product of rental charges and in-year average end-users divided by the total number of end users (both Standard and Capacity).</p>
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http://www.serviceview.bt.com/list/current/docs/Wholesale_Broadband_Services.boocotoc.htm

<p>VP rental costs</p>	<p>The total number of VPs required in each year, by bandwidth, is used to determine the total VP rental costs to support the complete IPStream/BT Central (CBC) portfolio. A certain distribution of VP category (handover, local, regional and national) is assumed. The proportion of handover VPs assumed is in effect the amount of Service A which an interconnecting operator purchases.</p> <p>The average unit VP rental costs are calculated by dividing the total VP rental costs by the average VP capacity. The average unit VP rental costs are then allocated to each product based on the relative bandwidth demanded.</p>
<p>VP re-grade costs and VP re-arrangement costs</p>	<p>The total VP re-grade costs are calculated as the product of the average number of VP in use, within each year, the VP re-grade price and a variable that represents the typical number of VP re-grades per VP per annum.</p> <p>VP re-arrangement has not been explicitly modelled, however to ensure that a non-zero value is carried forward into the usage factors model the total VP re-grade costs are shared between VP-re-grades and VP re-arrangements. This has been done on the basis of an 80:20 split between VP-re-grades and VP re-arrangements respectively. This is considered to result in an appropriate allocation.</p> <p>The average unit VP re-grade and re-arrangement costs (per Mbit/s) are calculated by dividing the respective total costs by the average VP capacity. The average unit costs are then allocated to each product.</p>
<p>EUA port reservation costs and EUA port reservation adjustment costs</p>	<p>The total EUA port reservation costs are calculated as the product of the port reservation charge and the total number of reserved ports, both used and unused.</p> <p>The total number of used port is simply the average number of end users. The total number of unused ports is calculated as the product of the number of enabled exchanges and a variable that represents the target number of end users per VP, divided by 2.</p> <p>EUA port reservation adjustment has not been explicitly modelled, however to ensure that a non-zero value is carried forward into the usage factors model the total EUA port reservation cost are shared between EUA port reservation and EUA port reservation adjustment. This has been done on the basis of a 99:1 split between EUA port reservation and EUA port reservation adjustment respectively. This is considered to result in an appropriate allocation.</p> <p>The average unit EUA port reservation and adjustment costs are calculated by dividing the respective costs by the total number of in-year (average) end users.</p>

<p>ATM port connection and rental costs</p>	<p>Average unit ATM port connection costs are calculated as the product of connection charges and the net addition of STM-1 ATM ports (155 Mbit/s) divided by the total average VP capacity. The total ATM connection costs include a terminal value calculation.</p> <p>Average unit ATM rental costs are calculated as the product of rental charges and in-year average end-users divided by the total average VP capacity. Unit ATM port connection and rental costs are then allocated to each IPStream product.</p>
<p>ATM ISH costs</p>	<p>Average unit ISH connection costs are calculated as the product of connection charges and the net additions of ATM-1 ATM ports (155 Mbit/s) divided by average VP capacity. The total ISH connection costs include a terminal value calculation.</p> <p>ISH average unit rental costs are calculated as the product of rental charges and in-year average end-users divided by average VP capacity. Unit ISH port connection and rental costs are then allocated to each IPStream product.</p>

Additional capital costs

<p>IP Network</p>	
<p>Remote Access Server (RAS) costs</p>	<p>Total IP RAS capital expenditure attributable to the IPStream products has been provided by BT for the years 1999/00 to 2007/08. Capital expenditure in the first two years is used as set out above to determine an opening or “starting value” to add to the expenditure in the first explicitly modelled year, 2001/02. Terminal values are calculated for capital expenditure in subsequent years to subtract from the expenditure in the terminal year. Average unit costs are calculated by dividing a proportion of the incremental capital expenditure by the in-year average end users and the remainder by the average BT Central capacity.</p> <p>BT has also provided depreciation figures so that the capital expenditure calculation can be substituted by annualised costs (depreciation plus cost of capital) for the explicitly modelled years.</p>
<p>Access Router and related equipment costs</p>	<p>Average unit IP access router and related equipment costs are calculated and allocated in a similar way to RAS costs.</p>
<p>RADIUS costs</p>	<p>Average unit IP RADIUS costs are calculated and allocated in a similar way to RAS costs.</p>
<p>IP core network conveyance costs</p>	<p>Average unit IP core costs are calculated and allocated in a similar way to RAS costs and relate to the cost of transmission across the core IP network.</p>

ISP Link	
ISP Link capex	Total ISP link capital expenditure attributable to the IPStream products has been provided by BT for the years 2001/02 to 2008/09. Terminal values are calculated for capital expenditure in these years to subtract from the expenditure in the terminal year. Average unit costs are calculated by dividing the total capital expenditure by the average BT Central capacity.

Additional operating costs

Non-recurring current account (NRCA) IP costs	Total NRCA costs attributable to the IPStream products have been provided by BT for the explicitly modelled period. These costs represent the costs of product development. Average unit costs are calculated by dividing a proportion of the incremental expenditure by the in-year average end users and the remainder by the average BT Central capacity. The latter costs are then apportioned to each IPStream product.
Recurring current account (RCA) IP costs	Total RCA costs attributable to the IPStream products have been provided by BT for the explicitly modelled period. These costs represent costs incurred in maintaining and operating the IP network. Average unit costs are calculated by dividing a proportion of the resulting capital expenditure by the in-year average end users and the remainder by the average BT Central capacity. The latter costs are then apportioned to each IPStream product.
ISP Link NRCA costs	Total ISP Link NRCA costs attributable to the IPStream products have been provided by BT for the explicitly modelled period. Average unit costs are calculated by dividing total capital expenditure by the average BT Central capacity. The unit costs are then apportioned to each IPStream product.
ISP Link RCA costs	Total ISP Link RCA costs attributable to the IPStream products have been provided by BT for the explicitly modelled period. Average unit costs are calculated by dividing total capital expenditure by average BT Central capacity. The latter costs are then apportioned to each IPStream product.
Marketing and sales costs	Marketing and sales costs are estimated for each IPStream product as a percentage of total revenue.
Other costs – e.g. promotional costs	The Other cost category enables inclusion of BT's half-price connection offer that was available to new end-user connections between 10 January 2003 and 31 March 2003. For each IPStream product, the cost of the offer is calculated as half the connection charge multiplied by the estimated number of gross additions during the special offer period.

Migration	<p>Although the calculation for migration has been performed within the top-down model it is in reality a side calculation as it relates to the volume of migrations forecast by BT in the context of Ofcom's case for resolving the dispute about migration ⁹</p> <p>The forecast volume of migrations was then used in conjunction with BT's forecast of DataStream end users volumes. It is important to use these sets of information together as they are related to one another (i.e. if there were to be a different volume of DataStream end users then the volume of migrations will change).</p> <p>The average migration charge (per end user) was calculated as the product of the migration charge and the number of migrations divided by the average number of forecast DataStream end users.</p> <p>The average migration charge includes a terminal value calculation to reflect the fact that the migration charge will have a value over a number of years (equal to 1/churn).</p>
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Model parameters and sensitivities

4.22 The resulting margin between unit costs and unit prices for each of the IPStream products depends on a number of key model parameters. Reasonable ranges for these key parameters as well as sensitivities undertaken are set out in the table below.

Parameter	Range	Comment
Period of model	4 to 6 years from initial product launch	Ofcom has chosen a 5 year modelling period as its base case scenario. For more discussions on this point see Section 3.
Adjustment to the volumes	The volumes have been decreased to 20% (1.7m subs) 25% (2.1 subs) and 30% (2.5m subs) of the total number of ADSL end users, as forecast by BT	Forecast volumes for BT have been decreased to remove rewards for anticompetitive behaviour and to reflect the levels of demand that a similarly efficient new entrant is more likely to face. For more discussions on this point see Section 3 and 5.
Discount rate	12.5%, 13.5% and 15%	The currently determined cost of capital for BT estimated by Ofcom for regulatory purposes (13.5% nominal) has been used in the model. Sensitivities at higher discount rates have been considered in

⁹ http://www.ofcom.org.uk/consultations/current/broadband_access/?a=87101

		line with what a new entrant may face. Sensitivities at lower discount rates have been considered in line with Ofcom's current review of BT's cost of capital.
Distribution of VP categories	Distribution of VPs: 10%, 10%, 70%, 10% of handover, local, regional and national respectively.	BT has previously provided its estimate of the distribution of VP categories ¹⁰ . Ofcom has also received estimates from a number of Altnets and these are broadly consistent with BT's estimate. Ofcom has therefore used BT's estimate within the model.
Target number of end users per VP (EUA Port reservation sensitivity)	180-230	Sensitivities have been undertaken with this parameter which determines the ratio of unused to used ports. Ofcom has adjusted this parameter in conjunction with volume adjustments, i.e. lower volumes = lower target number of end users per VP
VP utilisation	The number of VPs in use for the period up to and including year 2 has been decreased by between 10% and 20%	In order to run sensitivities around increased VP utilisation, the number of VPs in use for the period up to and including year 2 has been decreased by between 10% and 20%. This sensitivity reflects the likely level of inefficient usage of VPs by BT in the historic years, which is believed to be mainly due to the available functionality of historic equipment, such as Broadband Access Servers, at a given costs, compared to the MEA. For more discussions on this point see Section 3.
Historic capex cost adjustments	+/- 10% around the starting cost adjustment of 58%	BT's actual historic capex costs between year 0 and year 1 have been decreased by the difference between the revenue that BT would have received in these years if it had charged on the basis of its current price of IPStream products, and BT's actual revenue. This adjustment is in the order of a 58% reduction in BT's actual costs. Ofcom has undertaken sensitivity analysis by varying this initial level of cost reduction by +/- 10%. For more discussion on this point see Section 3.
Modern equivalent asset (MEA)	5-10%	BT's total capex costs between year 3 and year 5 (inclusive) have been decreased in line with an assumed MEA

¹⁰ In information provided in the investigation described in the case closure document, "Investigation of complaints about BT's IPStream Price Reductions", 3 April 2003, CW/00607/04/03.

trend on future capex		trend to reflect falling asset prices. The assumed MEA trend was 5-10% year on year. For more discussions on this point see Section 3.
Modern equivalent asset (MEA) trend on terminal value (TV) calculations	5-10%	Residual asset values, calculated between year 0 and year 5, have been decreased in line with an assumed MEA trend to reflect the effect of falling asset prices on the calculation of the terminal value at the point of truncation.
Contestability assumptions – start year	IPStream forecast prices started to be reduced between year 2 and year 4	In a contestable market it would be unreasonable to assume that prices could be maintained indefinitely with falling costs (and so increasing margins). On this basis Ofcom has considered the sensitivity of varying the start year for the contestability assumptions between year 2 and year 4. For more discussions on this point see Section 3.
Contestability assumption – calculation methodology	True cash flows v cumulative cash flows	As explained the methodology applied does not rely on true cash flows, but on the average unit costs calculated over the explicitly modelled period and expressed in PV terms. Therefore contestability has not been applied to true cash flows, but on the average costs calculated consistent with the structure of the model.
Marketing and sales costs	2%-3% of revenues	BT has previously provided information which showed sales and marketing overheads as 2.8% of revenue in 2002/03 ¹¹ . Ofcom has considered marketing and sales costs in the range from 2%-3% of revenues.
Volume discount for IPStream	1.5%-2.0%	Whilst the volume of ATM interconnection EUAs that an Altnet with the scale assumed in this model, would need to purchase means that it would qualify for a 2% discount, the fragmentation of demand from different customers means that BT does not necessarily incur a corresponding full 2% discount on the IPStream revenues received. Information provided by BT suggests that a 1.5% volume discount applicable to IPStream would be more appropriate.

¹¹ibid

ISH costs	Included/Excluded	This is a cost that a new entrant would face, but one that BT would not need to incur. Ofcom has considered the sensitivity of including and excluding this parameter from the cost stack.
Migration costs	Included/Excluded	This is a cost that it is likely that a new entrant would face, but one that BT would incur to a much lesser extent over the next few years. Ofcom has considered the sensitivity of from including and excluding this parameter from the cost stack.

Methodology and approach adopted in the usage factor model

4.23 This model determines the parameters for the rule that Ofcom is proposing to introduce. These parameters are the usage factors for the ATM interconnection products and the balancing factors which define the relationship between the ATM interconnection costs and IPStream/BT Central prices. The general equation that Ofcom is proposing to introduce is as follows:

$$\sum_{i=1}^{i=n} A_i \times p_i(BW) \leq p_{IPStream} + p_{BTCentral}(BW) - X(BW)$$

where:

- A_i = usage factors
- p_i = reference ATM interconnection charges
- n = number of relevant ATM interconnection charges
- $p_{IPStream}$ = reference price of the IPStream service
- $p_{BTCentral}$ = reference price of the BT Central service
- X = balancing factor

Note: not all of the ATM interconnection charges are a function of bandwidth

The modelled elements are:

The usage factors	The usage factors are calculated by comparing the unit costs for the ATM interconnection input as calculated in the top down model with the current BT price list. (For more detail see paragraph 4.24.)
Balancing Factor	The balancing factor is calculated, for each product, with reference to the margin pass/fail level, calculated in the top down model, and the total ATM interconnection costs and BT's IPStream and BT Central prices. The balancing factor is expressed in terms of a fixed component per end user and a variable component per Mbit/s. (For more detail see paragraph 5.43.)

The main inputs to the usage factor model are:

- i) ATM Price List
- ii) IPStream & BT Central Price List (both standard and CBC)
- iii) Unit cost information generated by the top-down model
- iv) Unit revenue information generated by the top-down model
- v) The pass/fail level as determined in the top-down model
- vi) Assumptions about the relative weights of the VP sizes

The usage factor model determines a value for the IPStream/BT Central revenue for a given end user service, as a function of allocated BT Central bandwidth. The method used to determine this revenue is described in the section on implementing the rule.

Determining the Usage Factors

4.24 In simple terms the usage factor for a given ATM input is calculated by dividing the unit cost, as generated by the top-down model, by the 'today's' input price, as currently defined in BT's price list, Section 44, Part 2. The actual unit price reference used is described in Section 5 on implementing the rule. For example, if the unit cost for a certain input was determined as being £1.20 and the input price was, say, £1, then the usage factor for this input would be 1.2

4.25 However, when calculating the usage factors for the VPs there is an added complexity, as there are 48 unique VPs in total (4 categories × 12 sizes). The top-down model produces the total cost associated with the VPs. It does not however produce a complete set of relative weights between the different categories and sizes. It is therefore necessary to make an assumption about these relative weights.

Relative VP Weights

4.26 As described above the top-down model assumes a VP category distribution of 10%, 10%, 70% and 10% for Handover, Local, Regional and National respectively. This distribution is believed to broadly represent that faced by an interconnecting Altnet with about 9 points of interconnection. Ofcom therefore elected to adopt this category distribution when calculating the VP usage factors.

Question 12: Is Ofcom's assumption about the distribution of VP categories appropriate?

4.27 The distribution of VP sizes in the top-down model is incomplete (i.e. not all sizes are used) and this is due to a combination of simplifying the model and BT's choice of sizes to use. If the top-down model VP size distribution was used it would therefore yield an incomplete matrix. It is therefore necessary to make assumptions about the future use of different VP sizes in order to produce a complete and reflective VP usage factor matrix.

4.28 It is Ofcom's assumption that an Altnet entering the market will initially tend to use smaller VPs. However, as the Altnet grows its end user base it is likely to migrate to larger VPs. Thus, the distribution of VP sizes is assumed to initially be concentrated around the smaller sizes with the concentration moving to larger VP sizes through time. Given this expected general trend Ofcom has chosen to use

equal weights for each VP size. That is, each VP size is given a relative weight of 1/12.

Question 13: Is Ofcom's assumption about the distribution of VP sizes appropriate?

4.29 Having determined the IPStream/BT Central revenue and the ATM usage factors it is now possible to establish the balancing factor. As described in Section 5 on implementing the rule (in particular, paragraph 5.43) the balancing factor, for each product, consists of an offset and a part that grows linearly with allocated bandwidth. It thus follows the basic equation; $X = m \times BW + c$, where: X is the total balancing factor, m is the variable part per Mbit/s, BW is the allocated bandwidth and c is the fixed part.

4.30 The approach taken when calculation m and c is based on the fact that the following equation must be satisfied:

$$Revenue_{IPStream+BTCentral} - (ATM Cost_{total} + BalancingFactor) = Pass / Fail Level$$

where

$Revenue_{IPStream+BTCentral}$	= Calculated revenue as described in paragraphs 5.37 – 5.41
$ATM Cost_{total}$	= Calculated costs using usage factors
$Balancing Factor$	= Total Balancing Factor
$Pass/Fail Level$	= Pass/Fail Level from the top-down model

The Pass/Fail Level is positive if BT has passed the margin squeeze test and negative if it has not, see tables 5.2 and 5.3 for pass/fail results. In order to calculate that balancing factor the Pass/Fail Level had to be determined at two points; (i) where the allocated bandwidth is set to zero and (ii) where the allocated bandwidth is set to a non-zero value. The zero allocated bandwidth result can then be used to calculate the fixed part of the balancing factor (c) and the difference between the zero bandwidth result and the non-zero result can be used to calculate the variable part of the balancing factor per Mbit/s (m).

Section 5

Proposals

Introduction

5.1 Ofcom has set out above the methodology it proposes to use to assess the margin squeeze test and specify the usage factors and how it has modelled the costs if it were to regulate the wholesale broadband access ("WBA margin"). In this Section, Ofcom considers the various options for regulation and suggests what it considers is the most appropriate.

5.2 Ofcom's principal duty in carrying out its functions, as set out in Section 3 of the Communications Act 2003 (the "Act"), is to further the interests of citizens in relation to communications matters, and to further the interests of consumers in relevant markets, where appropriate by promoting competition. Section 4 of the Act sets out Ofcom's duties for the purposes of fulfilling Community obligations. In regard to Ofcom's proposals for setting the WBA margin as set out below, Ofcom has considered all the requirements in those sections, in particular, the requirement for Ofcom to promote competition in relation to the provision of electronic communications networks and electronic communications services.

5.3 As explained in Section 1, Ofcom has determined that BT has SMP in the market for asymmetric broadband origination market in the UK (excluding the Hull area) and the broadband conveyance market in the UK. It has imposed a set of regulatory requirements in those markets whose objective, amongst others, is to promote effective competition in the intermediate services market and ultimately the retail market for broadband internet access. In accordance with this, Ofcom's aim in its proposal to set the wholesale broadband access margin as set out in this Section is to promote effective competition in downstream services, in particular in the provision of intermediate services. As at March 2004 in respect of the ADSL segment of that market BT has approximately a 92%¹² share and in the market as a whole (i.e. including the in-house sales for cable operators) BT has approximately a 60 % share. Accordingly, Ofcom considers that the proposed additional regulation is appropriate to promote effective competition in the provision of these services.

5.4 In deciding what the most appropriate way to discharge its duties under section 3 and 4 of the Act is, in relation to setting the WBA margin, Ofcom recognises that there is a trade off between facilitating entry into the market for intermediate services, which should bring consumers the benefits of competition, and encouraging inefficient entry into that market which is likely to raise costs unnecessarily and unduly restrict BT's ability to compete, neither of which would further the interests of consumers. In assessing the different options for setting WBA margin Ofcom has considered how best to resolve this trade off and this is discussed further below.

Options

Regulatory Impact Assessment

¹² Based on operator information provided to Ofcom. Note includes all Datastream volumes so arguably underestimates BT's share since not all Datastream purchases would be used to provide intermediate services.

5.5 The analysis presented in this Section when read also with the previous Sections as indicated, represents a Regulatory Impact Assessment (RIA), as defined by s7 of the Communications Act 2003. Any comments on this RIA should be sent to Ofcom by the closing date for this consultation. All comments will be considered in deciding whether to implement these proposals.

5.6 RIAs provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making and are commonly used by other regulators. This is reflected in section 7 of the Act, which means that generally Ofcom has to carry out RIAs where its proposals would be likely to have a significant effect on businesses or the general public, or when there is a major change in Ofcom's activities. In accordance with section 7 of the Act, in producing the RIA in this document Ofcom has had regard to such general guidance as it considers appropriate, including related Cabinet Office guidance.

Option 1 – No additional regulatory intervention (i.e. the WBA margin is not set *ex ante* but subject to regulation via the requirement in BT's SMP Condition EA1 for Network Access charges in the WBA markets to be fair and reasonable)

5.7 Under Section 6 of the Act, Ofcom has a duty to ensure that it does not impose or maintain unnecessary regulatory burdens. Ofcom has considered the option of not intervening *ex ante* to set a specific WBA margin. In Section 2 (in particular, at paragraphs 2.12 and 2.13) Ofcom has set out the reasons why it is proposing to move away from relying solely on SMP Condition EA1. The key consideration is that it seems likely that such an approach would not provide sufficient certainty for operators considering whether to enter the downstream broadband markets, in particular for the provision of intermediate services. Certainty is needed to facilitate investment by Altnets. Ofcom considers that unless Altnets can plan on the basis that any reductions in BT's IPStream prices will be accompanied by corresponding reductions in ATM interconnection prices such that the margin is not eroded, they will not have sufficient certainty to enter the market on a significant scale. Therefore it is necessary to establish an *ex ante* rule which links those two sets of prices such that there is no margin squeeze, rather than investigating possible margin squeeze cases *ex post*.

5.8 Accordingly, under Section 3 of the Act, and as set out in Section 4 of the Act, one of Ofcom's principal duties is to further the interests of consumers in relevant markets, where appropriate by promoting effective competition. By taking this option, Ofcom considers that it would not, amongst other things, have adequately discharged its duty to further the interests of consumers by the promotion of effective competition.

Option 2 - Specify the WBA margin in advance

5.9 Under this option Ofcom would specify in advance the WBA margin such that the difference between BT's IPStream prices and the price which an Altnet would have to pay for ATM interconnection would not result in a margin squeeze. This would be implemented through a formula in accordance with which BT would be required to set its ATM interconnection charges.

5.10 As explained in Section 4, there are a large number of variables used in the margin squeeze assessment. The most important variables are the following:

- Subscriber Volumes

- Contestability assumption - start year used
- Migration costs inclusion / exclusion
- Contestability assumption - cumulative vs pure cash flow approach
- End user port reservation assumption
- Time period
- Cost of capital
- ISH costs inclusion / exclusion
- VP utilisation - adjustment to reflect historic inefficiencies
- MEA asset trend on Capital Expenditure
- Sales & marketing costs

Different assumptions for these variables will result in a different assessment of the margin squeeze and so lead to setting a different WBA margin. Accordingly, Ofcom has considered a range of assumptions for all these variables in its assessment of what would constitute a reasonable WBA margin. However, in order to narrow down the range of options for setting a reasonable WBA margin it is necessary to reduce the number of variables considered to generate options for Ofcom's consideration. Ofcom has considered 9 variants for setting the WBA margin based upon three different assumptions for the first two variables set out above i.e. volumes and start year for contestability since Ofcom considers these to be the two most significant. It has also varied the inclusion or exclusion of migration charges. But to avoid setting out 18 variants and so simplify the presentation of the variants and results, migration is assumed to be excluded in variants set out below. For the other variables reasonable assumptions have been adopted to generate these 9 variants as set out in paragraph 4.22.

Table 5.1 below sets out the 9 different variants of Option 2 which Ofcom has considered.

Variant	Volume assumption (% share of DSL market at end of 5 years from 2004/5)	Year Contestability Assumption starts in
1	30% (i.e. approx 2.5 m subscribers)	2
2	30%(i.e. approx 2.5 m subscribers)	3
3	30% (i.e. approx 2.5 m subscribers)	4
4	25% (i.e. approx 2.1 m subscribers)	2
5	25% (i.e. approx 2.1 m subscribers)	3
6	25% (i.e. approx 2.1 m subscribers)	4
7	20% (i.e. approx 1.7 m subscribers)	2
8	20% (i.e. approx 1.7 m subscribers)	3
9	20% (i.e. approx 1.7 m subscribers)	4

5.11 As explained earlier in Section 3 the volume assumption used in the margin squeeze assessment is dependent on two considerations. The first is the need to avoid building in rewards for anti-competitive behaviour into the analysis. If too high a forecast volume is used there is a risk that a margin squeeze test is only passed on the assumption that BT has a high market share in the future and therefore lower unit costs possibly as a result of anti-competitive behaviour. This would suggest reducing BT's forecast volumes used. The second consideration is whether, in order to promote competition, it is necessary to adjust further those forecasts in order to reflect the fact that entrants will not be able to benefit from economies of scale in the same way as BT. However, Ofcom recognises that such approaches run the risk of encouraging inefficient entry. Therefore, in deciding upon what is an appropriate volume assumption to use, it is necessary to trade off that consideration (i.e. the risk of inefficient entry) against the need to avoid

an outcome which would defeat the purpose of the regulation, namely the promotion of competition.

5.12 The second assumption which distinguishes the 9 variants relates to the issue of contestability. This has been discussed in detail in Sections 3 and 4 above (in particular in paragraphs 3.75-3.79 and 4.22). The particular assumption in question is the year at which it is assumed that falls in cost flow through into falls in prices. Three different starting years for the introduction of contestability are considered. Deciding what would be the most appropriate starting year requires Ofcom to balance the recognition that there are valid reasons why a new service may not be able to earn a positive margin at the outset against allowing ever increasing margins which risks building in the rewards of anti-competitive behaviour.

5.13 The third assumption considered in this option analysis concerns whether the migration charge should be included. This issue was discussed in Section 3 (in particular in paragraphs 3.71-3.74). In deciding whether or not to include the migration charge Ofcom is required to balance the same two conflicting considerations outlined above in relation to the volume assumption, namely the need to facilitate entry versus the risks of encouraging inefficient entry and requiring BT to price above its cost floor and so limiting its ability to compete and possibly raise prices overall.

5.14 In order to conduct the margin squeeze test, it is necessary to assume a figure for the bandwidth allocated (in the BT Central circuit) to an end user. As discussed in paragraphs 5.43 to 5.49 Ofcom proposes to use a range of bandwidths for each standard product and CBC.

5.15 Ofcom has considered the results of the margin squeeze assessment (using the top-down margin model set out in Section 4), given current prices for ATM interconnection and IPStream products, for the 9 variants discussed above and these are set out in Table 5.2, Table 5.3 and Chart 5.1 below. Table 5.2 shows the results when the lower end of the proposed bandwidth range is applied and Table 5.3 shows the results when the higher end of the proposed bandwidth range is applied. Chart 5.1 includes both sets of results for the standard Home 500 and the Home CBC products. All the results presented assume that migration charges are excluded. The inclusion of migration would increase the failure by approximately 10p for all products and in each variant.

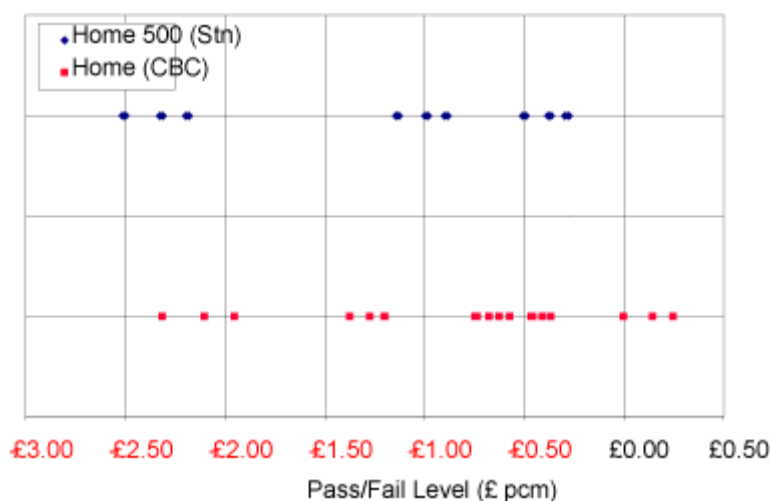
Table 5.2: Pass/Fail Margin (pcm), i.e. Revenue - Cost for each service for the 9 variants considered by Ofcom at lowest proposed BW

	Home 250	Home 500	Home 1000	Home 2000	Office 500	Office 1000	Office 2000	Home CBC	Office CBC
BT Central BW Allocated (Mbit/s)	0.0094	0.0188	0.0375	0.0750	0.0469	0.0938	0.1875	0.0050	0.0250
Variant 1	-£0.10	-£2.19	£1.95	£5.34	-£5.87	-£10.21	-£23.79	-£1.20	£2.03
Variant 2	£0.74	-£0.90	£4.15	£9.35	-£3.21	-£5.29	-£14.34	-£0.62	£3.34
Variant 3	£1.13	-£0.29	£5.19	£11.26	-£1.96	-£2.94	-£9.82	-£0.36	£3.96
Variant 4	-£0.20	-£2.33	£1.75	£4.99	-£6.11	-£10.63	-£24.57	-£1.27	£1.90
Variant 5	£0.67	-£1.00	£3.99	£9.06	-£3.41	-£5.64	-£15.00	-£0.67	£3.24
Variant 6	£1.07	-£0.38	£5.05	£11.00	-£2.13	-£3.26	-£10.43	-£0.41	£3.87
Variant 7	-£0.33	-£2.51	£1.45	£4.48	-£6.45	-£11.24	-£25.72	-£1.37	£1.71
Variant 8	£0.58	-£1.14	£3.75	£8.64	-£3.69	-£6.16	-£15.99	-£0.74	£3.09
Variant 9	£0.99	-£0.51	£4.83	£10.61	-£2.39	-£3.73	-£11.33	-£0.46	£3.74

Table 5.3: Pass/Fail Margin (pcm), i.e. Revenue - Cost for each service for the 9 variants considered by Ofcom at highest proposed BW

	Home 250	Home 500	Home 1000	Home 2000	Office 500	Office 1000	Office 2000	Home CBC	Office CBC
BT Central BW Allocated (Mbit/s)	0.0156	0.0313	0.0625	0.1250	0.0781	0.1563	0.3125	0.0300	0.1500
Variant 1	-£0.09	-£2.18	£1.98	£5.39	-£5.83	-£10.14	-£23.65	-£1.95	-£1.75
Variant 2	£0.75	-£0.88	£4.18	£9.41	-£3.18	-£5.21	-£14.19	-£0.46	£4.18
Variant 3	£1.14	-£0.28	£5.22	£11.32	-£1.92	-£2.87	-£9.68	£0.25	£7.00
Variant 4	-£0.19	-£2.31	£1.77	£5.05	-£6.07	-£10.55	-£24.42	-£2.10	-£2.25
Variant 5	£0.68	-£0.98	£4.02	£9.12	-£3.37	-£5.57	-£14.86	-£0.57	£3.76
Variant 6	£1.08	-£0.37	£5.08	£11.06	-£2.09	-£3.19	-£10.28	£0.15	£6.62
Variant 7	-£0.32	-£2.50	£1.48	£4.54	-£6.42	-£11.17	-£25.58	-£2.31	-£2.99
Variant 8	£0.58	-£1.13	£3.78	£8.69	-£3.66	-£6.09	-£15.85	-£0.74	£3.13
Variant 9	£0.99	-£0.49	£4.86	£10.67	-£2.35	-£3.66	-£11.19	-£0.00	£6.05

Figure 5.1: Pass/Fail Margin (pcm) for 9 variants for Home 500 and Home CBC



5.16 It can be seen from the range of results that there is a relatively wide range of possible options for deriving the WBA margin. Under the different variants the costs change (because of changes to the volume assumption) and the revenues change (because of changes to the contestability assumption). The result is that the slope of cost and revenue lines for each variant plotted against bandwidth will or is likely to vary.

5.17 In deciding which variant represents the most appropriate option for setting the WBA margin, Ofcom has to find an appropriate balance between two conflicting objectives. The first objective is to set a margin which is more likely to facilitate entry and so bring the benefits of competition. This would suggest making lower volume assumptions, adopting a tougher approach to contestability (i.e. requiring more costs to be recovered sooner rather than later) and including an allowance for migration charges. Absent other considerations this would suggest setting a higher margin so at the extreme the upper bound of the variants would be appropriate, namely variant 7 (with migration included). However, Ofcom has a second important objective. This is to set the WBA margin such that it avoids inducing inefficient entry and so artificially increasing the costs to consumers of the provision of broadband services and unduly restricts BT's ability to compete by preventing it from pricing down to its genuine cost floor. This would suggest making higher volume assumptions, adopting a softer approach to contestability (i.e. allowing more costs to be recovered later rather than sooner) and excluding the migration charge. Hypothetically, if this were Ofcom's only concern then it would suggest setting a lower margin and so at the extreme, the lower bound of the variants, namely variant 3 would be appropriate.

5.18 There is clearly a certain degree of judgement required to identify which variant would be most appropriate. Having considered all the evidence, Ofcom considers that variant 5 with migration costs excluded represents a reasonable approach which balances these conflicting objectives and so would most effectively discharge its duties under Sections 3 and 4 of the Act. Variants which would result in a higher margin (i.e. variants 1, 4, 7 & 8 plus migration included), while promoting competition would not be proportionate since there are less intrusive ways on BT of achieving the same result i.e. the promotion of competition. By contrast, variants which would result in a lower margin (i.e. variants 2, 3, 6 and 9 plus migration excluded) would not fulfil Ofcom's Sections 3

and 4 duties since it is doubtful they would promote competition sufficiently as they would be unlikely to encourage investment in the intermediate services market.

5.19 In arriving at this proposal, Ofcom has also considered the way in which it has modelled contestability in the analysis. It is clear from the results presented above that the contestability assumption used has a big impact on the results. Ofcom notes that these results reflect a contestability calculation (as described in Section 4, in particular paragraph 4.22) which has been done in a way which is consistent with the overall modelling approach. Since that approach is not a pure DCF analysis the contestability has not been modelled on a pure cash flow basis. As a consequence, the contestability assumption used is harsher than that which would arise if a pure cash flow approach were used. Finally, Ofcom has also considered the other variables which Ofcom has fixed to generate these variants in Section 4, in particular in paragraph 4.22. It believes that the approach used in each case is reasonable and in addition it notes that it is likely that changes to some variables would tend to increase the failure while others would have the opposite effect. Therefore, on balance it considers that the methodology which underpins variant 5 represents the most appropriate basis on which it is proposing to set the WBA margin.

Conclusion

5.20 Accordingly, Ofcom is proposing to make a Direction which sets the WBA margin on the basis of the methodology which underlies variant 5. Details of how this will be implemented are set out below at paragraphs 5.24 to 5.52. Ofcom considers that the proposals contained in this draft Direction meet the tests set out in Section 49 of the Act.

5.21 Ofcom considers that the proposals are objectively justifiable in relation to wholesale broadband access and Ofcom's aim of promoting effective competition in the market for intermediate broadband services, as they would potentially allow other operators to compete with BT in offering intermediate services.

5.22 Ofcom also considers that the proposals do not unduly discriminate against particular persons, as the same WBA margin will apply to all purchasers of ATM interconnection. In addition, the proposals do not unduly discriminate against BT in that although they only apply to BT, they are intended to address BT's ability to margin squeeze in the light of its SMP in the markets to which the draft Direction applies. As explained in the WBA market review statement, Ofcom has not imposed a specific requirement on Kingston Communications¹³ to provide ATM interconnection because to date there has been no demand for such a service.

5.23 The draft Direction sets out clearly the requirements to be imposed on BT and therefore it meets the requirements of transparency. Ofcom also considers that the proposals are transparent in relation to what they are intended to achieve (effective competition in intermediate broadband services). Ofcom considers that for the reasons set out above (in particular paragraphs 5.18 and 5.19), the proposals are the least intrusive way of achieving Ofcom's aim of promoting competition in intermediate services and other downstream services, compared to the other options and therefore they are proportionate to what Ofcom intends to achieve.

¹³ which has been designated as having SMP in the market for asymmetric broadband origination in the Hull area. See the market review statement for further details.

Question 14: Is Ofcom's choice of variant 5 on which to base its rule specifying the margin the most appropriate?

Implementation

5.24 Since Ofcom proposes not simply to determine whether or not BT passes the margin squeeze test but to set the WBA margin, it has been necessary for Ofcom to set out in this document a set of formulae which it proposes to fix BT's ATM interconnection charges in relation to its IPStream and BT Central prices on the basis of the reasonable variant, as discussed above. It has been necessary to do this whilst taking into account each of the standard and CBC IPStream and BT Central products.

5.25 The general rule that Ofcom is proposing to introduce has been discussed above in section 4. How the usage factors have been calculated has also been discussed in section 4. The paragraphs below explain how the usage factors and ATM/IPStream/BT Central prices are applied in the rule that Ofcom is proposing to introduce. The basic relationship between ATM interconnection charges and IPStream/BT Central charges, that BT must satisfy is specified in the following formula:

$$\sum_{i=1}^{i=n} A_i \times p_i(BW) \leq p_{IPStream} + p_{BTCentral}(BW) - X(BW)$$

where:

- A_i = usage factors
- p_i = reference ATM interconnection charges
- n = number of relevant ATM interconnection charges
- $p_{IPStream}$ = reference price of the IPStream service
- $p_{BT\ Central}$ = reference price of the BT Central service
- X = balancing factor

NB: not all of the ATM interconnection charges are a function of BW

5.26 As explained in sections 3 and 4, Ofcom has made a number of adjustments to actual costs and revenues in specifying the MST such as the contestability assumption. When specifying the rule (i.e. the above formula) which implements those results on a forward looking basis it should be noted that this has been done through the creation of a relationship between ATM Price and IPStream/BT Central prices which is purely a mathematical construct. This means that the values for some of the terms in the equation, in particular the ATM cost stack and the balancing factor (i.e.X(BW) which includes the Additional Costs) do not represent an accurate value of those items in their own right. Rather the rule must be considered as a whole. A full description of the adjustments made in the balancing factor is set out below. Ofcom has adopted this approach due to the difficulty of specifying the rule in a way that each individual term reflects its real value in its own right. Such an approach would add significant additional complexity to an already complex rule since it would be necessary to specify adjustment factors for each term, including Prices of IPStream and BT Central.

5.27 In addition to the usage factors associated with the ATM interconnection products Ofcom has been required to specify the relationship between the contended bandwidth of the standard IPStream products and the average bandwidth used in the core network in the provision of these products. This is a single value which can be applied to all the standard IPStream products and will

be referred to as the '*Contended BW Adjustment Factor*'. In taking this approach it has been possible to specify a single set of usage factors which can be applied to all the products.

5.28 Each of the three elements in this relationship, ATM interconnection costs, IPStream/BT Central revenue and the balancing factor, will be explained in turn, along with how to apply the usage factors and what items are driven by bandwidth.

$$\text{DataStream (ATM) Costs} - \left(\sum_{i=1}^{i=n} A_i \times p_i(BW) \right)$$

5.29 In order to define the total ATM interconnection cost Ofcom has been required to determine and set a usage factor for each and every ATM interconnection product. There are currently 60 individual ATM interconnection products and these are listed in the table below, along with the driver (end user or bandwidth) that Ofcom believes is most appropriate. As set out in paragraph 5.18 Ofcom does not propose to include end user migration in the margin squeeze test and is therefore not proposing to set a usage factor. In any event the charge for migration is separately specified as explained in paragraph 4. 21. The pricing and terms and conditions for the ATM interconnection (DataStream) products are available in BT's Retail price list, Section 44, Part 2.

Table 5.3

Product	Driver
EUA Connection	EU
EUA Rental	EU
EUA Port Reservation	EU
EUA Port Reservation adjustment	EU
VP Rental (4 categories × 12 sizes = 48 in total)	(BW)
VP Regrade	(BW)
VP Rearrange (same serving centre)	(BW)
VP Rearrange (different serving centre)	(BW)
ATM Access Port Connection (2 sizes)	(BW)
ATM Access Port Rental (2 sizes)	(BW)
End User Migration	EU

5.30 In addition to these 60 ATM interconnection products an Altnet who wishes to interconnect with BT must also pay the ATM In-Span Handover (ISH) charges as defined in Section B9, Part 9.01 of the BT Carrier Price List. There are in fact 22 individual ATM ISH items listed. However, given that the total ATM ISH charge is relatively small (approximately 7 pence pcm for the Home 500 Standard product, Ofcom is proposing to simplify this area by representing the ATM ISH charge as a single value (£ per Mbit/s pa) rather than specify another 22 usage factors.

Question 15: Do respondents agree that it is appropriate to represent the ISH charge by a single value (£ per Mbit/s pa)?

5.31 In order to determine the cost associated with each ATM input, for a given product, it is necessary to multiply the price by the relevant usage factor and where appropriate also by the bandwidth allocated to the end user. For the ATM ISH cost it is necessary to multiple the Ofcom determined value (£ per Mbit/s pa) by the bandwidth allocated to the end user.

5.32 For both the standard and CBC BT Central products the (average) bandwidth allocated to an end user is determined by the customer (i.e. the ISP). For CBC this

is the only bandwidth necessary to determine the ATM costs, as the CBC BT Central covers both the core network and the ISP link and the CBC IPStream is not affected by bandwidth, as it is in fact just the EUA elements of the ATM interconnection products.

5.33 However, the standard products are slightly more complex, as the standard BT Central is simply the ISP link whereas the standard IPStream covers the core network and has been pre-dimensioned by BT. As explained above, the IPStream standard products can be considered as pre-dimensioned forms of the CBC product. The Contended BW Adjustment Factor, explained above, represents Ofcom's view of how to dimension the CBC products so as to replicate the standard products. Thus, when determining the ATM cost for IPStream standard it is necessary to multiple each ATM product, which is driven by BW, by its contended BW and the Contended BW Adjustment Factor, rather than the BT Central allocated BW. The contended BW for the standard IPStream products can be determined by dividing the peak BW by the specified contention (peak BW/contention), see table in Annex 4, Part 4.

5.34 Ofcom has therefore determined a *contended bandwidth adjustment factor* which when multiplied by the contended bandwidth produces the allocated bandwidth that needs to be used to determine the ATM costs associated with the standard IPStream products.

5.35 The entire ATM cost stack, for a given product, can then be determined by summing each of these products ($A \times p$) together.

5.36 The reference ATM price that needs to be used when making this assessment is the published price after deducting the maximum published spend discount. Currently the maximum published spend discount is 2% and this is applicable to the end user access (EUA) rental and the EUA port reservation charges only.

IPStream and BT Central Revenue – $(p_{IPStream} + p_{BTCentral}(BW))$

5.37 In order to assess whether the specified relationship has been met it is clearly necessary to determine the amount of revenue that BT's downstream products yield. The starting point in determining the IPStream and BT Central revenue is obviously BT's published price list. However, there are a total of 14 IPStream products, 7 standard and 7 CBC¹⁴, and each attracts a separate connection and rental charge. Then there is a total of 44 BT Central products, 22 standard and 22 CBC, and again each attracts a separate connection and rental charge. This means that there are potentially 116 $((14 \times 2) + (44 \times 2))$ unique prices within the IPStream/BT Central product range. Further, BT operates a spend discount scheme in relation to IPStream and currently discounts of 1.5%, 1.75% and 2% are available depending on the customers level of spend. Ofcom therefore believes it is appropriate to devise a simplified approach to determining the IPStream and BT Central revenue.

5.38 The way in which Ofcom determines the revenue must be consistent with the way in which the ATM interconnection and additional costs have been specified. In all cases Ofcom has chosen to use a per end user per annum basis.

5.39 The reference price that Ofcom is proposing to use, for any product, is the lowest price that BT sells at. Assuming that BT only sells off the published price list

¹⁴ Although BT specifies 7 CBC IPStream products, 4 Home and 3 Office, there are currently only 2 different prices - one for the Home products and one for the Office products.

the lowest price will be the published price less the maximum discount available. If BT did sell 'off list' at a lower price than Ofcom would use this off list price as the reference.

5.40 For the IPStream products, which are dedicated to a single end user, this approach for deriving the reference price is relatively straightforward. However, for the BT Central products, which are likely to be shared between multiple end users and which are available in many different sizes/forms, some additional simplification is necessary.

5.41 The reference price Ofcom is proposing to use for the BT Central products is the lowest per Mbit/s price that BT sells at. In determining the price per Mbit/s for the BT Central products Ofcom divides the selling price by the net capacity¹⁵ for each product and this is done for both the connection and the rental. For example the 155Mbit/s L2TP standard BT Central product currently attracts a connection charge of £50k and a rental charge of £45k (pa) and these equate to £442.48 and £398.23 per Mbit/s respectively, given a net capacity of 113Mbit/s.

Question 16: Do respondents agree that it is appropriate to use the lowest price, both by end user and by bandwidth, in this way, as the reference price in the rule?

5.42 Although there are a multitude of prices, there are in fact only 4 general line items to the IPStream and BT Central revenue. These are:

- i) IPStream connection,
- ii) IPStream rental,
- iii) BT Central connection; and
- iv) BT Central rental.

i) IPStream connection – The IPStream connection charge is dedicated to a single end user and as such can be directly included in the rule

ii) IPStream rental – The IPStream rental charge is dedicated to a single end user and as such can be used directly included in the rule.

iii) BT Central connection – The BT Central connection charge is expressed in terms of per Mbit/s for the purpose of this rule. However, the rule is applied on a per end user basis. It is therefore necessary to multiply this charge by the bandwidth allocated to the end user. Thus, the BT Central connection revenue is determined using the following equation.

$$BTC_{\text{connection revenue}} = \text{Min BTC connection charge per Mbit / s} \times BW$$

iv) BT Central rental – The BT Central rental charge is expressed in terms of per Mbit/s for the purpose of this rule. However, the rule is applied on a per end user basis. It is therefore necessary to multiply this charge by the bandwidth allocated to the end user. Thus, the BT Central rental revenue is determined using the following equation.

$$BTC_{\text{rental revenue}} = \text{Min BTC rental charge per Mbit / s} \times BW$$

¹⁵ Net capacity refers to the typical maximum IP throughput downstream as specified in BT's Suppliers' Information Notes (SINs).

Balancing Factors – ($X(BW)$)

5.43 The balancing factor represents three general areas, as follows:

- i) Additional costs necessary to convert the ATM interconnection products into the intermediate services, IPStream and BT Central. This will therefore include things like: broadband access servers, IP conveyance, customer handover links and various operating and sales and marketing costs.
- ii) Adjustments to the IPStream and BT Central revenue used in the rule (see above). When assessing the connection revenue for IPStream and BT Central Ofcom has chosen to simplify matters and so use the full charge. However the test is performed for a single year. Clearly, these connection charges will have an economic life which is longer than 1 year. By using the full charge Ofcom is thus overstating the revenue and an adjustment for this is made in the balancing factor. When assessing the revenue associated with BT Central, both connection and rental, Ofcom has chosen to use the lowest per Mbit/s price that BT sells at. Given that this is the lowest price it is apparent that BT's average revenue (per Mbit/s) will be higher. In this instance Ofcom is therefore understating the revenue and an adjustment for this is also made in the balancing factor.
- iii) Contestability assumptions. When assessing whether BT passed or failed a margin squeeze test Ofcom used certain contestability assumptions to avoid building in the rewards of anti-competitive behaviour. This is achieved by reducing the future revenue in line with falling costs. This contestability assumption is reflected in the balancing factor.

5.44 For all products the balancing factor will be made up of two parts, a fixed part and a part that varies in a linear fashion with bandwidth. Thus, the balancing factor for each product will follow the basic equation: $X = m \times BW + c$, where: X is the total balancing factor, m is the variable part per Mbit/s, BW is the allocated bandwidth and c is the fixed part.

5.45 Ofcom has therefore been required to specify the fixed and variable parts of the balancing factor for each IPStream product, 14 in total - 7 standard and 7 CBC. On the face of it this would imply that there are a total of 28 values, 14 fixed and 14 variable. However, due to the nature of the relationship between the various products there is a single variable value for the standard products and a single variable value for the CBC products. Further, for the CBC products there is a single fixed value for IPStream Home and a single fixed value for IPStream Office. There are thus only 11 unique values in total, 8 for the standard products (7 fixed and 1 variable) and 3 for the CBC products (2 fixed and 1 variable).

BT Central Bandwidth Allocation for Applying the Rule

5.46 From the sections above it is apparent that the amount of BT Central bandwidth allocated to an end user, on average, is an integral part of the relationship and thus the rule that Ofcom is proposing to introduce. It is clearly necessary for Ofcom to therefore specify the bandwidth at which the rule needs to be satisfied.

5.47 The extremes to the range of bandwidths that could be used in the rule are: zero to the peak EUA speed (ie 500kbit/s for the Home 500 product). However, the wider the specified bandwidth range, the more onerous the rule and the greater the likelihood that Ofcom would be requiring BT to pass the rule for unrealistic scenarios. Ofcom therefore needs to specify what it believes are representative bandwidth ranges over which to apply the rule.

Standard Products

5.48 It is worth noting the cost and revenue associated with the standard products will be affected to a lesser extent by BT Central bandwidth variations than those associated with the CBC products. This is due to the fact that a greater proportion of the standard product is fixed and this is reflected in the balancing factors.

5.49 As discussed above Ofcom has determined a Contended BW Adjustment Factor and this represents the typical amount of BT Central bandwidth allocated on a per end user basis for these products. The Contended BW Adjustment Factor determined by Ofcom is about 2.45 and this means that the typical BT Central bandwidth allocated to a standard IPStream Home 500 end user is 24.5kbit/s.

5.50 For the standard products Ofcom therefore proposes to apply the rule over a bandwidth range of: $2.5 \times \text{contended bandwidth} (\pm 25\%)$. A table specifying the actual bandwidth range being proposed for each standard product is given below:

Table 5.4: Proposed Range of Bandwidths to apply rule - Standard Products

Product	Min BW (Mbit/s)	Max BW (Mbit/s)
Home 250	0.0094	0.0156
Home 500	0.0188	0.0313
Home 1000	0.0375	0.0625
Home 2000	0.0750	0.1250
Office 500	0.0469	0.0781
Office 1000	0.0938	0.1563
Office 2000	0.1875	0.3125

Question 17: Do respondents agree that Ofcom's proposed range of bandwidths over which to apply the rule for the Standard products is appropriate?

Capacity Products

5.51 The CBC products are intended to provide a much more dynamic product, compared with the standard product, both in terms of cost and revenue. It therefore seems reasonable to specify a wider bandwidth over which to apply the rule.

5.52 It is apparent to Ofcom, from information provided by BT and various ISPs, that CBC products will predominantly be used at lower bandwidths than the standard products, as this represents a lower per user price. The CBC IPStream Office products are currently being sold at a premium over the CBC IPStream Home products. It is therefore reasonable to assume that purchasers of the Office product want a higher specification product and accordingly will be more likely to allocate more bandwidth per end user. With these points in mind Ofcom is

proposing to apply the rule over a bandwidth range of: 5kbit/s to 30kbit/s for the CBC Home products and 25kbit/s to 150kbit/s for the CBC Office products.

Question 18: Do respondents agree that Ofcom's proposed range of bandwidths over which to apply the rule for the CBC product is appropriate?

Summary of the various Factors

5.53 In order to assist the industry in understanding the proposed rule, a full list of all the factors discussed above is given in Part 4 of the draft Direction at Annex 4. Ofcom has also produced an excel workbook that contains all the factors and all the current prices. This workbook also calculates all the costs stacks, revenues and balance factors as described above. This is available for download on the Ofcom website (see Annex 6).

Revised Direction

5.54 As mentioned in Section 2, the Original ATM Direction will need to be revised if these proposals are to be implemented. Accordingly, a draft Direction is attached at Annex 4. This sets out the proposed new margin squeeze rule which BT must comply with. Other revisions have also been proposed to the Original ATM Direction in order to ensure that the rule is enforceable. The definition of the Basic Services has been revised to take into account the specific ATM interconnection products now offered by BT, and the current terminology used to describe them, to ensure that the margin squeeze rule can be implemented.

5.55 It is proposed that for this draft Direction, if confirmed, the date on which it will take effect is the day on which the final direction is published.

Forward look

Revising the Direction

5.56 The purpose of proposing this draft Direction is to give BT and the Altnets more certainty regarding the WBA margin. Therefore ideally Ofcom would not wish to review the margin set until the next WBA market review, currently proposed for completion by the end of 2005. In revisiting the issues of market definition and market power assessment Ofcom will have the opportunity to assess whether the remedies imposed as a result of the first market review have been effective and proportionate in addressing BT's SMP in the markets identified. In particular, Ofcom will look at the level and nature of market entry. Promoting competition is not just about increasing the number of players in the market, but about guaranteeing that the efficient players are competing on a level playing field. Ofcom is keen to ensure that the margin, which is set as part of this consultation exercise, encourages *efficient* entry. A margin which is set too wide and which encourages inefficient entry would be as undesirable as a margin which was not set wide enough to facilitate any entry since inefficient entry would not be good for consumers in the long run. In handling the trade-off between certainty and flexibility as outlined above, Ofcom expects to review the margin at the same time as it reviews the wholesale broadband access markets in 2005.

5.57 Ofcom will also have regard to the impact of other regulatory interventions, particularly the development of Local Loop Unbundling in the local access market, in assessing the regulation in the wholesale broadband access market and this retail minus margin in particular. Ofcom recognises that the market is in a period

of rapid technological change, as networks move away from ATM interconnect towards end-to-end IP based technologies. Ofcom will have regard to these changes as well when it comes to consider the appropriate remedies again.

5.58 It should, however, be noted that it may be necessary to review the modified Direction (or parts of it) prior to the next market review if there is a material change to the structure of either the ATM interconnection charges or the IPStream charges. For example, BT's proposals to introduce usage based charging may prompt Ofcom to revisit this issue before the next market review.

Question 19: Do respondents agree that this approach balances Ofcom's wish to provide the industry with certainty with the need to ensure that its approach is flexible enough to deal with a dynamic market environment?

Other ATM Interconnection pricing issues

5.59 Altnets have raised concerns about other issues in relation to the structure of BTs ATM interconnection prices and Ofcom is continuing to examine these. Ofcom is keen to ensure that BT's prices are not structured so as to disincentivise investment in networks. For example, in the "Review of the Wholesale Broadband Access Market" Statement, Ofcom said

"A cost reflective tariff structure for broadband interconnection may be important in encouraging Altnets with scale and reach to invest to interconnect efficiently at more points and make it more economically viable for them to use their own core networks to supply broadband conveyance."

5.60 These issues fall into two broad categories: first those related to the relative balance of charges within the existing structure and second those more fundamental issues related to the overall structure of charges. The first category includes issues such as how connection and rental charges should be balanced and the relativities between the EUA charges and VP charges. The proposed rule set out in this consultation document allows this form of rebalancing to take place without a need for a change to the rule.

5.61 The issues in the second category are of a different nature. They include issues such as the VP pricing gradient by distance and the introduction of VPs at capacities greater than or different to those which are currently offered. Changes of that type would require Ofcom to modify the usage factors set out in this consultation document. For example, if BT decided to vary the VP pricing gradient by distance, this would require that Ofcom modified the usage factors set out in this draft direction in relation the current VP categories (handover, local, regional & national). Similarly, if BT introduced a larger VP, this would require modification of the proposed usage factors in relation to the current VP bandwidths.

Section 6

Responding to this consultation

How to respond

Ofcom invites written views and comments on the issues raised in this document, to be made by **5pm on Monday 28 June 2004**. This consultation period is less than Ofcom's standard consultation period of 10 weeks. This is because in reviewing the WBA market Ofcom consulted on, amongst other things, the issue of how to ensure that there was no margin squeeze between the ATM interconnection charges and BT's IPStream products. While this consultation includes complex and detailed issues for consideration, many of the parties that might be affected by these proposals, if they are implemented, have been involved in their development through the earlier consultation process. Furthermore, given that one of the objectives of these proposals is to introduce certainty in this market, a 10 week consultation period would not be appropriate.

Ofcom strongly prefers to receive responses as e-mail attachments, in Microsoft Word format, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 2) to indicate whether or not there are confidentiality issues. The cover sheet can be downloaded from the 'Consultations' section of our website.

Please can you send your response to naaz.rashid@ofcom.org.uk.

Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.

Naaz Rashid
Competition & Markets
4th Floor
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA

Fax: 020 7783 4109

Note that we do not need a hard copy in addition to an electronic version. Also note that Ofcom will not routinely acknowledge receipt of responses.

It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex 3. It would also help if you can explain why you hold your views, and how Ofcom's proposals would impact on you.

Further information

If you have any questions about the issues raised in this consultation, or need advice on the appropriate form of response, please contact Naaz Rashid on 020 7783 4156.

Confidentiality

Ofcom thinks it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, www.ofcom.org.uk, as soon as possible after the consultation period has ended.

All comments will be treated as non-confidential unless respondents specify that part or all of the response is confidential and should not be disclosed. Please place any confidential parts of a response in a separate annex, so that non-confidential parts may be published along with the respondent's identity.

Ofcom reserves its power to disclose certain confidential information where this is necessary to fulfil its functions, although in practice it would do so only in limited circumstances.

Please also note that copyright in responses will be assumed to be assigned to Ofcom unless specifically retained.

Next steps

Following the end of the consultation period, Ofcom intends to determine the dispute and finalise the draft Direction

Please note that you can register to get automatic notifications of when Ofcom documents are published, at http://www.ofcom.org.uk/static/subscribe/select_list.htm.

Ofcom's consultation processes

Ofcom is keen to make responding to consultations easy, and has published some consultation principles (see Annex 1) which it seeks to follow, including on the length of consultations.

If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at consult@ofcom.org.uk. We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, whose views are less likely to be obtained in a formal consultation.

If you would like to discuss these issues, or Ofcom's consultation processes more generally, you can alternatively contact Philip Rutnam, Partner, Competition and Strategic Resources, who is Ofcom's consultation champion:

Philip Rutnam
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA
Tel: 020 7981 3585
Fax: 020 7981 3333
E-mail: philip.rutnam@ofcom.org.uk

Annex 1

Ofcom's consultation principles

Ofcom has published the following seven principles that it will follow for each written consultation:

Before the consultation

1. Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

During the consultation

2. We will be clear about who we are consulting, why, on what questions and for how long.

3. We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened version for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

4. We will normally allow ten weeks for responses, other than on dispute resolution.

5. There will be a person within Ofcom who will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. This individual (who we call the consultation champion) will also be the main person to contact with views on the way we run our consultations.

6. If we are not able to follow one of these principles, we will explain why. This may be because a particular issue is urgent. If we need to reduce the amount of time we have set aside for a consultation, we will let those concerned know beforehand that this is a 'red flag consultation' which needs their urgent attention.

After the consultation

7. We will look at each response carefully and with an open mind. We will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

Annex 2

Consultation response cover sheet

1. In the interests of transparency, we will publish all consultation responses in full on our website, www.ofcom.org.uk, as soon as possible after the consultation period has ended, unless a respondent specifies that all or part of their response is confidential. We will also refer to the contents of a response when explaining our decision, unless we are asked not to.

2. We have produced a cover sheet for responses (see below) and would be very grateful if you could send one with your response. This will speed up our processing of responses, and help to maintain confidentiality by allowing you to state very clearly what you don't want to be published. We will keep your completed cover sheets confidential.

3. We strongly prefer to receive responses in the form of a Microsoft Word attachment to an email. Our website therefore includes an electronic copy of this cover sheet, which you can download from the 'Consultations' section of our website.

4. Please put any confidential parts of your response in a separate annex to your response, so that they are clearly identified. This can include information such as your personal background and experience. If you want your name, contact details, or job title to remain confidential, please provide them in your cover sheet only so that we don't have to edit your response.

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

What do you want Ofcom to keep confidential?

Nothing

Name/contact details/
job title

Whole response

Organisation

Part of the response

If there is no separate annex, which parts?

If you want part of your response, your name or your organisation to be confidential, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

Yes

No

DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response. It can be published in full on Ofcom's website, unless otherwise specified on this cover sheet. If I have sent my response by email, Ofcom can disregard any standard email text about not disclosing email contents and attachments.

Name

Signed (if hard copy)

Annex 3

Consultation questions

Ofcom invites written views and comments on the issues raised in this document, and in particular:

Question 1: Do respondents agree that it is reasonable to adopt a forward looking approach rather than an historical approach?

Question 2: Do respondents agree with Ofcom's approach to the treatment of historic costs?

Question 3: Do respondents agree with Ofcom's approach to make an adjustment to take into account BT's historic use of VPs ?

Question 4 : Is the CCA FAC an appropriate cost standard to use in formulating the MST in this context?

Question 5: Do respondents agree with this approach given the problems of modelling a MST at a relatively early stage in the lifecycle of the IPStream products?

Question 6. Do respondents agree that the MST should be conducted on the basis of individual products and a range of bandwidths for CBC?

Question 7: Do respondents agree that it is reasonable to conduct the MST on the basis of BT's retail prices?

Question 8: Do respondents agree that it is reasonable to conduct the MST using BT's cost of capital for regulated activities as a proxy for a risk-adjusted cost of capital?

Question 9: Do respondents agree that it is reasonable to make adjustments for ISH costs but not migration charges?

Question 10: Do respondents agree that it is reasonable to include an assumption for future reductions in prices owing to competitive pressure? At which point in the life cycle of a product is it appropriate to introduce a contestability assumption?

Question 11: Do respondents agree with Ofcom's approach to taking scale into account in the margin squeeze test in this way?

Question 12: Is Ofcom's assumption about the distribution of VP categories appropriate?

Question 13: Is Ofcom's assumption about the distribution of VP sizes appropriate?

Question 14: Is Ofcom's choice of variant 5 on which to base its rule specifying the margin the most appropriate?

Question 15: Do respondents agree that it is appropriate to represent the ISH charge by a single value (£ per Mbit/s pa)?

Question 16: Do respondents agree that it is appropriate to use the lowest price, both by end user and by bandwidth, in this way, as the reference price in the rule?

Question 17: Do respondents agree that Ofcom's proposed range of bandwidths over which to apply the rule for the Standard products is appropriate?

Question 18: Do respondents agree that Ofcom's proposed range of bandwidths over which to apply the rule for the CBC product is appropriate?

Question 19: Do respondents agree that this approach balances Ofcom's wish to provide the industry with certainty with the need to ensure that its approach is flexible enough to deal with a dynamic market environment?

Annex 4

Notification of a proposal under section 49 of the Communications Act 2003

Proposal for modifying a Direction made under Condition EA1 in Schedule 1 to the Notification at Annex E to the explanatory statement of the wholesale broadband access market review statement published on 13 May 2004 imposed on British Telecommunications plc ('BT') as a result of the market power determinations made by Ofcom that BT has significant market power in the asymmetric broadband origination in the United Kingdom (excluding the Hull Area) and broadband conveyance markets in the United Kingdom

1. Ofcom hereby makes, in accordance with section 49 of the Communications Act 2003 ('the Act'), the following proposal to modify a Direction given under Condition EA1, in Schedule 1 to the Notification at Annex E to the explanatory statement of the wholesale broadband access market review statement published on 13 May 2004.
2. The draft modification of the Direction is set out in the Schedule to this notification.
3. The effect of the draft modification of the Direction, and the reasons for making the proposal, are set out in the accompanying explanatory statement.
4. Representation may be made to Ofcom about the proposed draft modification of the Direction by 5.00pm on 28 June 2004.
5. In accordance with section 50 of the Act, copies of this notification have been sent to the Secretary of State, the European Commission and to the regulatory authorities of every other Member State.

Sean Williams

**A person authorised by Ofcom under paragraph 18 of the Schedule to the Office of Communications Act 2002
26 May 2004**

Schedule 1

[Draft] Direction modifying a Direction made under section 49 of the Communications Act 2003 and Condition EA1 imposed on British Telecommunications plc ('BT') as a result of the market power determinations made by Ofcom that BT has significant market power in the asymmetric broadband origination in the United Kingdom (excluding the Hull Area) and broadband conveyance markets in the United Kingdom

WHEREAS:

- (A) As a result of a market analysis carried out by Ofcom, they proposed on 16 December 2003 (the "First Notification") in accordance with sections 48(2) and 80 of the Act that British Telecommunications plc ('BT') has significant market power in the asymmetric broadband origination (excluding the Hull Area) and broadband conveyance markets in the United Kingdom;
- (B) Ofcom having considered every representation duly made and thereafter on 13 May 2004 pursuant to sections 48(1) and 79 of the Act by way of publication of a Notification identified the relevant services markets, made market power determinations to the effect referred to in recital (A) above and set certain SMP conditions on BT to take effect on 13 May 2004, such as Condition EA1, imposing obligations concerning the provision of Network Access;
- (C) On 13 May 2004 Ofcom also gave a direction under SMP Condition EA1 pursuant to section 49 of the Act which obliged BT to provide the Basic Services to any Third Party on reasonable request and at reasonable terms, conditions and charges (the 'Original Direction');
- (D) this modified Direction concerns matters to which Condition EA1.1 and EA1.2 relates, and modifies the Original Direction;
- (E) for the reasons set out in Section 5 of the explanatory statement accompanying this modified Direction, Ofcom is satisfied that, in accordance with section 49(2) of the Act, this modified Direction is:
 - (i) objectively justifiable in relation to the networks, services, facilities, apparatus or directories to which it relates;
 - (ii) not such as to discriminate unduly against particular persons or against a particular description of persons;
 - (iii) proportionate to what it is intended to achieve; and
 - (iv) in relation to what it is intended to achieve, transparent.

- (F) for the reasons set out in Section 5 of the explanatory statement accompanying this modified Direction, Ofcom have considered and acted in accordance with the six Community requirements set out in section 4 of the Act and their duties in section 3 of the Act.
- (G) on 27 May 2004 Ofcom published a notification of the proposed modified Direction in accordance with section 49 of the Act;
- (H) Ofcom has considered every representation about the proposed modified Direction duly made to them; and

Therefore, pursuant to section 49 of the Act and Condition EA1 in Schedule 1 to the Notification, Ofcom gives the following Direction:

1. The Dominant Provider shall provide Basic Services as specified in Part 1 to this Direction to every Third Party who reasonably requests in writing such Basic Services.
2. The Dominant Provider shall provide Additional Functionality as specified in Part 2 to this Direction to every Third Party who reasonably requests in writing such Additional Functionality.
3. Without prejudice to paragraph 4 below, the provision of Basic Services and Additional Functionality covered by paragraphs 1 and 2 above shall occur as soon as reasonably practicable and shall be provided on fair and reasonable charges, terms and conditions.
4. The Dominant Provider shall make a charge for the provision of the Basic Services covered by paragraph 1 above to every Third Party who reasonably requests such in writing which is no greater than the charge resulting from the application of the formula set out at Part 3.
5. BT shall not impose any sharing constraints on the number of End Users on a virtual path (VP).
6. The Parts to this modified Direction form part of the modified Direction.
7. For the purpose of interpreting this modified Direction the following definitions shall apply:

“Act” means the Communications Act 2003;

“Additional Functionality” means Alternative ATM Service Catalogues (VBR-rt, CBR);

“ADSL Enabled EUA” means an EUA which uses asymmetric DSL, where the bit rate of transmission differs for traffic sent from the End User (upstream) and for traffic sent to the End User (downstream);

“ATM Backhaul” means that part of the Virtual Path between the DSLAM and the first ATM Switch to which that DSLAM is connected within the network;

“ATM Conveyance” means that part of the Virtual Path between two or more ATM switches;

“ATM Interconnection” means interconnection at the Asynchronous Transfer Mode ("ATM") switch;

"ATM Interconnection Charges" means charges for the Basic Services;

“Basic Services” means an ADSL Enabled EUA and ATM Backhaul (Service A); and/or an ADSL Enabled EUA, ATM Backhaul and ATM Conveyance (Service B) as required by a Third Party;

"Balancing Factors" means an adjustment factor as specified in Part 4;

"Bandwidth" means transmission capacity measured in Mbit/s;

“BT” means British Telecommunications plc, whose registered company number is 1800000, and any British Telecommunications plc subsidiary or holding company, or any subsidiary of that holding company, all as defined by Section 736 of the Companies Act 1985 as amended by the Companies Act 1989;

"BT Central" means the service as defined at Part 5;

“BT Central Plus” means the service as defined at Part 5;

“CBR” means Constant Bit Rate;

“Director” means Director General of Telecommunications as appointed under section 1 of the Telecommunications Act 1984;

“Dominant Provider” means British Telecommunications plc, whose registered company number is 1800000, and any British Telecommunications plc subsidiary or holding company, or any subsidiary of that holding company, all as defined by Section 736 of the Companies Act 1985 as amended by the Companies Act 1989;

“DSL” means Digital Subscriber Line;

“DSLAM” means Digital Subscriber Line Access Multiplexer;

"EUA" means End User Access - that part of the network which is the DSL connection between the End User and the DSLAM. This includes the situation: where the Dominant Provider supplies and installs the End User modem; and where the supply and installation of the End User modem is not carried out by the Dominant Provider;

“Hull Area” means the area defined as the 'Licensed Area' in the licence granted on 30 November 1987 by the Secretary of State under section 7 of the Telecommunications Act 1984 to Kingston upon Hull City Council and Kingston Communications (Hull) plc;

"IPStream " means the service as defined at Part 5.

“The Notification” means the notification of confirmation of proposals under sections 49 (2) and 80 of the Communications Act 2003 for identifying inter alia the markets for asymmetric broadband origination in the United Kingdom (except the Hull Area) and broadband conveyance in the United Kingdom for the purpose of making proposed market power determinations that the Dominant Provider has significant market power in relation to those markets as annexed to the consultation document accompanying this Direction;

“Third Party” means either:

- a. a person providing a Public Electronic Communications Network; or
- b. a person providing a Public Electronic Communications Service.

“Usage Factors” means an adjustment factor as specified in Part 4;

“VBR-nrt” means Variable Bite Rate – non-real time;

“VBR-rt” means Variable Bite Rate – real time;

“Virtual Channel, VC” means an established data channel from the End User to the point of Network Access with a Communications Provider’s network;

“Virtual Path, VP” means an established path from the DSLAM through the network to the point of Network Access with a Communications Provider’s network;

8. Except insofar as the context otherwise requires, words or expressions shall have the meaning assigned to them in this Notification (including in the Parts) and otherwise any word or expression shall have the same meaning it has in The Notification (including in the Annexes) and otherwise any word or expression shall have the same meaning as it has in the Act.
9. For the purpose of interpreting this modified Direction:
 - (a) headings and titles shall be disregarded; and
 - (b) the Interpretation Act 1978 shall apply as if this Direction were an Act of Parliament.

10. This modified Direction shall take effect on the day it is published

[...]

A person authorised by Ofcom under paragraph 18 of the Schedule to the Office of Communications Act 2002

[...]

Part 1

Basic Services

Basic Services shall be composed of

- An ADSL Enabled EUA and ATM Backhaul (Service A); and/or
- An ADSL Enabled EUA, ATM Backhaul and ATM Conveyance (Service B),

as required by the Third Party.

ADSL Enabled EUA

ADSL Enabled EUAs shall be available with the data rates identified in Table 1. The data rates listed in Table 1 are the ATM cell rate, including headers.

Table 1: ADSL Enabled EUA data rate options

EUA Option	Upstream speed (kbit/s)	Downstream speed (kbit/s)
500	64-288 (rate adaptive)	576
1000	288	1152
2000	288	2272

ATM Backhaul

ATM Backhaul shall be available in the following capacities: 0.25, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 Mbit/s and with a VBR-nrt class of service

ATM Conveyance

ATM Conveyance shall be available in the following capacities: 0.25, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 Mbit/s and with a VBR-nrt class of service

Part 2

Additional Functionality - Alternative ATM Service Categories

In addition to the ATM service category provided with the basic services (VBR-nrt), VBR-rt and CBR service categories shall also be made available. The ATM service categories are applicable to both the virtual channel (VC) and virtual path (VP).

Part 3

Formula to determine the charges for the Basic Services

$$\sum_{i=1}^{i=n} A_i \times p_i(BW) \leq p_{IPStream} + p_{BTCentral}(BW) - X(BW)$$

where:

" A_i " means Usage Factors;

" BW " means the allocated BT Central Bandwidth for the Provided IPStream service as specified in Part 6;

" n " means the number of relevant ATM Interconnection Charges;

" p_i " means the lowest price for ATM Interconnection as set out in BT's Reference Offer;

" $p_{BT\ Central}$ " means the lowest per Mbit/s price of any BT Central service excluding BT Central Plus for both rental and connection, or its equivalent;

" $p_{IPStream}$ " means the lowest IPStream price at which BT sells the Provided IPStream service for both rental and connection, or its equivalent;

"Provided IPStream" means either the Home 250, Home 500, Home 1000, Home 2000, Office 500, Office 1000 or the Office 2000, for both the standard and CBC services; and

" X " means the Balancing Factor.

Note - not all p_i charges are a function of BW .
In addition, for the purposes of clarity, this formula is set out in a spreadsheet model which has been made available.

Part 4

Adjustment factors

Usage Factors

Contended BW Adjustment Factor (IPStream standard)	2.4538E+00
--	------------

EUA	Driver	
EUA connection	EU	2.5356E-01
EUA rental	EU	1.0000E+00
EUA port reservation	EU	1.3135E+00
EUA port reservation adjustment	EU	1.0835E-02

VP rental (per Mbit/s)		Handover	Local	Regional	National
0.25Mbit/s	BW	3.6902E-02	3.6902E-02	2.5832E-01	3.6902E-02
0.5Mbit/s	BW	1.8451E-02	1.8451E-02	1.2916E-01	1.8451E-02
1Mbit/s	BW	9.2256E-03	9.2256E-03	6.4579E-02	9.2256E-03
2Mbit/s	BW	4.6128E-03	4.6128E-03	3.2290E-02	4.6128E-03
3Mbit/s	BW	3.0752E-03	3.0752E-03	2.1526E-02	3.0752E-03
4Mbit/s	BW	2.3064E-03	2.3064E-03	1.6145E-02	2.3064E-03
5Mbit/s	BW	1.8451E-03	1.8451E-03	1.2916E-02	1.8451E-03
6Mbit/s	BW	1.5376E-03	1.5376E-03	1.0763E-02	1.5376E-03
7Mbit/s	BW	1.3179E-03	1.3179E-03	9.2256E-03	1.3179E-03
8Mbit/s	BW	1.1532E-03	1.1532E-03	8.0724E-03	1.1532E-03
9Mbit/s	BW	1.0251E-03	1.0251E-03	7.1755E-03	1.0251E-03
10Mbit/s	BW	9.2256E-04	9.2256E-04	6.4579E-03	9.2256E-04

VP re-grades (per Mbit/s)	BW	5.1000E-01
VP re-arrangements same centre (per Mbit/s)	BW	4.6164E-02
VP re-arrangements different centre(per Mbit/s)	BW	4.6164E-02

ATM Port (per Mbit/s)		
ATM Access Port_155 - connection	BW	4.9435E-04
ATM Access Port_155 - rental	BW	1.8242E-03
ATM Access Port_622 - connection	BW	5.6679E-04
ATM Access Port_622 - rental	BW	2.0915E-03

ATM ISH costs (total per Mbit/s)	BW	£35.82
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Balancing Factors

Standard Service Set	Fixed (pa)	Variable per Mbit/s (pa)
Home 250	£61.74	£524.60
Home 500	£76.91	£524.60
Home 1000	£107.25	£524.60
Home 2000	£167.93	£524.60
Office 500	£123.48	£524.60
Office 1000	£199.33	£524.60
Office 2000	£351.03	£524.60

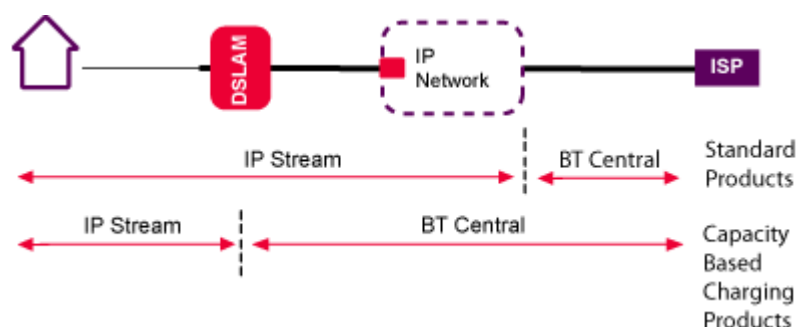
CBC Service Set	Fixed (pa)	Variable per Mbit/s (pa)
Home 250	£46.57	£1,761.10
Home 500	£46.57	£1,761.10
Home 1000	£46.57	£1,761.10
Home 2000	£46.57	£1,761.10
Office 500	£47.63	£1,761.10
Office 1000	£47.63	£1,761.10
Office 2000	£47.63	£1,761.10

Part 5

IPStream and BT Central Service

IPStream and BT Central, when used in tandem, provide a fixed communications connection between end users and the IPStream/BT Central customer, typically an internet service provider ("ISP"). BT currently offers what it refers to as standard IPStream and BT Central services. However, BT intends to introduce an alternative charging structure for these services on 28 May 2004. This alternative charging structure has been referred to as Capacity Based Charging (CBC). The figure below shows the conceptual difference between the standard and CBC IPStream and BT Central services.

Figure A.1



BT offers 7 different IPStream options for both standard and CBC. For the standard IPStream services BT pre-specifies the typical maximum contention that the service should experience and this in conjunction with the peak bandwidth allows a contended bandwidth to be assumed (contended BW = Peak BW/contention). The table below lists the 7 standard IPStream services along with the peak bandwidth, contention and contended bandwidth.

Table A.1

IPStream (Stn) Services	Pk BW Mbit/s	Contention	Cont BW
Home 250	0.25	50	0.0050
Home 500	0.50	50	0.0100
Home 1000	1.00	50	0.0200
Home 2000	2.00	50	0.0400
Office 500	0.50	20	0.0250
Office 1000	1.00	20	0.0500
Office 2000	2.00	20	0.1000

For the CBC services BT only specifies the maximum peak bandwidth of the services. The contention can, to some extent, be determined by the customer. The table below lists the 7 CBC IPStream services along with the peak bandwidth.

Table A.2

IPStream (CBC) Services	Pk BW Mbit/s
Home 250	0.25
Home 500	0.50
Home 1000	1.00

Home 2000	2.00
Office 500	0.50
Office 1000	1.00
Office 2000	2.00

BT offers a range of BT Central services for both standard and CBC. This range includes various bandwidths, various flex options and various resilience options. The table below lists all of the BT Central service that BT currently offers, although not all of these are available for new supply. Also listed in the table below is the gross and net bandwidth for each BT central service. The BT Central Plus products listed in Table A.3 differ from the other BT Central products in that they do not deliver the IPStream products directly to the customer (ie ISP). Instead BT Central Plus (Internet only for standard products and Access + Internet for CBC products) connect the IPStream products directly to the Internet. Further information on these services is available on BT's Web site.

Table A.3: BT Central Services (standard and CBC)

BT Central Services	BW bit/s (gross)	BW Mbit/s (net) ¹⁶
0.5M	0.5	0.37
1M	1	0.73
2M	2	1.4
4M	4	3.1
4M (SDH Resilience)	4	3.1
10M	10	7.6
10M (SDH Resilience)	10	7.6
34M	34	25
34M (SDH Resilience)	34	25
100M	100	85
155M	155	126
155M L2TP	155	113
622M	622	622
622M/465 flexed	465	465
622M/310 flexed	310	310
622M/155 flexed	155	155
622M L2TP	622	557
622M L2TP/465 flexed	465	417
622M L2TP/310 flexed	310	278
622M L2TP/155 flexed	155	139
BT Central Plus (Access) ¹⁷ - 100M	100	100
BT Central Plus (Internet) - 100M	100	100

¹⁶ net bandwidth refers to the typical maximum IP throughput down stream as specified in BT's Suppliers' Information Notes 329 and 412.

¹⁷ Only applicable to the Capacity Based Charging service set

Part 6

Allocated BT Central Bandwidth (per End User);

For each IPStream service BT is required to satisfy the formula set out in Part 3 across a range of allocated BT Central bandwidth. Table A.4 lists the bandwidth range, for each IPStream service, for the standard services and Table A.5 lists the bandwidth range, for each IPStream service, for the CBC services.

Table A.4: Allocated BT Central Bandwidth Range for the Standard IPStream Services

Service	Min BW (Mbit/s)	Max BW (Mbit/s)
Home 250	0.0094	0.0156
Home 500	0.0188	0.0313
Home 1000	0.0375	0.0625
Home 2000	0.0750	0.1250
Office 500	0.0469	0.0781
Office 1000	0.0938	0.1563
Office 2000	0.1875	0.3125

Table A.5: Allocated BT Central Bandwidth Range for the CBC IPStream Services

Service	Min BW (Mbit/s)	Max BW (Mbit/s)
Home 250	0.0050	0.0300
Home 500	0.0050	0.0300
Home 1000	0.0050	0.0300
Home 2000	0.0050	0.0300
Office 500	0.0250	0.1500
Office 1000	0.0250	0.1500
Office 2000	0.0250	0.1500

Glossary

ADSL (Asymmetric Digital Subscriber Line): a digital technology that allows the use of a copper line to send a large quantity of data in one direction and a lesser quantity in the other.

Allocated Bandwidth: where multiple end users share a fixed amount of bandwidth the allocated bandwidth is the average bandwidth that is assumed to be allocated to each end user. As an example, if 10 end users were sharing 1Mbit/s then each end user would be assumed to have 0.1Mbit/s allocated to them if they were treated as being equal. This is particularly relevant to the BT Central products, where a fixed amount of capacity can be shared between different numbers of end users.

ATM (Asynchronous Transfer Mode): a cell oriented switching technology that uses fixed-length packets.

Altnets: Alternative network providers.

BT Central: part of BT's intermediate broadband services, which when used in conjunction with IPStream provides the complete end-to-end intermediate service. BT Central is at the customer (ie ISP) delivery end of the service.

Contended Bandwidth: the minimum average bandwidth that must be available to a service with a pre-specified peak speed and contention ratio. Contended bandwidth can be calculated in the following way: (contended BW = Peak speed/contention).

DataStream: wholesale interconnection product, based on ATM interconnection, offered by BT to operators allowing them to utilise more of their own networks and compete with it in the provision of intermediate services such as IPStream.

Digital Subscriber Line Access Multiplexer (DSLAM) – it is located in the co-location space of an operator at an exchange site. It is composed of a multiplex and the ADSL modems necessary to operate ADSL services over the loops served by the operator from the exchange.

EUA (End User Access): the term used by BT to describe a DSL enabled telephone line (i.e. the twisted metallic connection between the end user premises and the local serving exchange).

Internet Service Provider (ISP): for the purposes of this document, the term 'ISP' refers to Internet Service Providers who purchase intermediate services and sell retail services to end-users.

IPStream: part of BT's intermediate broadband services, which when used in conjunction with BT Central provides the complete end-to-end intermediate service. IPStream is at the end user access end of the service.

ISH (In-Span Handover): the term used by BT to describe the situation where Altnets interconnect with BT's network using In-Span Interconnection (ISI) as opposed to Customer Sited Interconnection (CSI).

Operator: for the purposes of this document, the term ‘operator’ refers to providers of intermediate services who purchase (explicitly, or implicitly in the case of self provision) wholesale broadband access, specifically DataStream / ATM interconnection.

VP (Virtual Path): is a path that is assigned to an operator, which goes across the ATM network, between the DSLAM and the point of hand-over.

WBA (Wholesale Broadband Access): a wholesale service providing access from the end-user to the point of connection with a supplier of intermediate services’ network for the purpose of providing asymmetric broadband services.

Annex 6

Terms and conditions - Model

This annex sets out the terms and conditions on which Ofcom is making available the model which sets out a full list of the usage factors.

Except to the extent where it is owned by a third party, all right, title and interest in the provided model (the 'Model') constructed in Excel to set the margin between ATM interconnection service and IPStream services charges are owned by Ofcom. Such title and interest is protected by United Kingdom intellectual property laws and international treaty provisions. While you may freely use the Model for the purposes for which it is provided, as set out in this document, it is not to be modified in any way or used for commercial gain or otherwise without the prior written permission of Ofcom.

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