



Proposals for WBA charge control

Consultation document and draft notification of decisions on charge control in WBA Market 1

Consultation

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Section 1

Summary

Introduction

- 1.1 Broadband is increasingly central to the lives of UK consumers and the success of businesses. It allows consumers to access and interact with a wide range of content and services and allows businesses to exploit new market opportunities and more efficient operating models. Competition has driven the success of the current generation of broadband services. The result has been greater choice, innovation, lower prices and high levels of broadband adoption.
- 1.2 Competition in the provision of these retail services depends on effective competition at the wholesale level, or, where this is not occurring, effective regulation. The Wholesale Broadband Access (WBA) market sits between the Wholesale Local Access (WLA) market and the retail broadband market¹. The WBA market relates to the wholesale broadband products that communications providers (CPs) provide for themselves and sell to each other. It is important for consumers because these services are one of the building blocks of the retail broadband offers that consumers buy.
- 1.3 In our review of the WBA market (“the 2010 WBA Statement”)² we found there is effective competition in areas covering almost 80% of the UK premises. However, in just over one-fifth of the UK – what we call Market 1 and Market 2 – we concluded there is not sufficient competition and so we have imposed regulation to protect consumers.
- 1.4 The aim of these regulations is to enable CPs to purchase wholesale products from the dominant providers at prices that allow them to compete effectively in the provision of retail services. In Market 1 – made up of exchange areas in which BT is currently the only provider of wholesale broadband services – we have decided that BT³ should also be subject to a charge control. This consultation document explains Ofcom’s proposals for the WBA charge control in Market 1.

We propose to control BT’s 8Mbit/s IPStream Connect product

- 1.5 In Market 1 BT sells several WBA products, each with different speed options⁴. However, we propose to charge control only BT’s 8Mbit/s IPStream Connect product. CPs use this product to supply 86% of WBA services in Market 1. Therefore, controlling IPStream Connect directly protects most consumers in Market 1 and constrains BT from excessive charging on the other products. Also, 8Mbit/s is the maximum downstream speed available in Market 1 and the most used by end users in Market 1.

¹ The WLA market concerns access to the connection between the consumer and the telecommunications network. As such it is critical for all fixed line services. We published our conclusions on our review of the WLA market on 7 October 2010.

² http://stakeholders.ofcom.org.uk/binaries/consultations/wla/statement/WLA_statement.pdf

³ <http://stakeholders.ofcom.org.uk/binaries/consultations/wba/statement/wbastatement.pdf>

⁴ Our decision on the WBA charge control is addressed to BT plc. as a whole. It should be noted that however that the charge controlled product is supplied by BT Wholesale (“BTW”).

⁵ IPStream Connect, IPStream Central and DataStream.

- 1.6 In Market 3, where there is effective competition, BT provides services at speeds up to 24Mbit/s by using ADSL2+ technology and up to 40 Mbit/s where BT has rolled out fibre to the cabinets (and in some cases to the end user premise). These are called 21CN services. Currently BT has no 21CN deployment or plans to deploy 21CN in Market 1, although it is possible it will start to rollout 21CN in Market 1 exchanges within the charge control period. We propose the charge control should apply only to the 20CN IPStream Connect product, and not to any 21CN services BT may roll out during the charge control period. We believe that this “anchor pricing” approach will give BT the incentive to invest in new technology when it, for example, lowers costs, or provides higher quality services (or both) for which consumers are willing to pay.

We propose a three-year RPI-X charge control, with a single charge control basket

- 1.7 We propose an RPI⁵-X charge control. This approach has been widely used in the regulation of UK utilities, including those in the telecommunications sector. In addition to preventing excessive pricing, this type of charge control is intended to promote efficiency in the costs of providing wholesale services by requiring BT to reduce its charge relative to inflation each year.
- 1.8 We propose this charge control should last for three years, i.e. up to 31 March 2014. This is consistent with the new procedures and timeframes introduced by the amendments to the EU regulatory framework, which are due to be implemented in the UK by 26 May 2011. It is also consistent with the forward look period considered in the 2010 WBA Statement.
- 1.9 We propose a single charge control basket (as summarised in Table 1.1). We consider this balances the need to give BT enough price flexibility to respond to changing market conditions and manage migration from old to new services; and the need to ensure that this pricing freedom is not used in a way that might harm consumers.
- 1.10 In addition, we propose to impose a safeguard cap on certain services within the charge control basket. Details of the charge control basket and safeguard caps are set out in Table 1.1.

Cost modelling

- 1.11 We have developed our own cost model to establish the proposed WBA CC and the underlying cost base for the control period. Key elements of our proposed approach include the following:
- We have decided to use Current Cost Accounting Fully Allocated Costs (CCA FAC) as the appropriate cost standard to set the control;
 - We project that demand for bandwidth per end user will increase by 23% each year; and
 - We have made a number of adjustments to BT’s reported cost to ensure the base year data are relevant and reliable. These include:

⁵ Retail Price Index

- reflecting the new market definition boundaries, as determined in the 2010 WBA Statement;
- removing any 'one-off' costs that are outside the charge control basket;
- attributing 'non-geographic costs' between the three markets; and
- reflecting the ongoing economic value of some assets that would otherwise be treated as fully or nearly fully depreciated.

Cost of Capital

- 1.12 In deriving the values of X, our aim is to define charging constraints such that, by the end of the charge control period, BT is expected to be able to earn a level of return on the basket of services that is equal to its weighted average cost of capital ("WACC").
- 1.13 We have updated our estimates of BT's cost of capital for the purposes of setting this charge control and other charge controls which will be subject of forthcoming consultations, including the charge controls on LLU and WLR services. The derivation of the new estimates is described in Section 6.
- 1.14 In estimating the cost of capital for WBA services, we have taken into account the recent Competition Commission decisions in the Leased Lines, LLU and WLR charge control appeals, in particular regarding whether it is reasonable for Ofcom to estimate two different costs of capital within the BT Group, one for copper access services and one for the remainder of the group's activities ('rest of BT').
- 1.15 Our view is that the risk characteristics of WBA services justify the use of the 'rest of BT' rate which we estimate to be in the range of 8.5% - 10.0% (pre-tax nominal). This is lower than the previous estimate of 11%.

Value of X

- 1.16 We propose a charge control of between RPI-10.75% and RPI-14.75% for the three years to 31 March 2014, with a central estimate of RPI-12.75%. The proposed range takes account of the results of sensitivity analysis, which shows how the value X varies with variations in some of the key assumptions used in the modelling exercise.
- 1.17 In addition, we propose RPI-0% sub-caps for a number of services within the basket, to ensure that charges for these services do not increase in real terms over the charge control period.

Table 1.1 – Summary of our proposed charge control baskets⁶

Basket	Services within scope	Range of X	Value of sub-cap
IPS Connect	<p>a) IPS Connect Max and Max Premium (up to 8 Mbit/s) End User Access (EUA) – connection and rental;</p> <p>b) IPS Connect EU bandwidth charge per month;</p> <p>c) IPS Connect contracted bandwidth per Mbit/s per node rental;</p> <p>d) IPS Connect EUA cease;</p> <p>e) IPS Connect EU regrade;</p> <p>f) IPS Connect EU migration;</p> <p>g) IPS Connect EU cancellation;</p> <p>h) IPS Connect communication provider handover rental; and</p> <p>i) IPS Connect 20C Interconnect links 1Gbit/s AND 10Gbit/s rentals.</p>	RPI – 10.75% to RPI – 14.75%	<ul style="list-style-type: none"> • RPI-0% (IPS Connect contracted bandwidth per Mbit/s per node rental) • RPI-0% (IPS Connect EU regrade) • RPI-0% (IPS Connect EU migration) • RPI-0% (IPS Connect EU cancellation)

Next steps

- 1.18 The consultation period ends on 31 March 2011. Following receipt of the various stakeholder views and our analysis of these, we will inform our final view on the issues raised in this consultation document. We expect to publish our final statement in the third quarter of 2011. The new WBA charge control runs from the date which is 28 days from the issue of the WBA charge control final statement.
- 1.19 We will be publishing the charge control model in line with the principles set out in Section 2 below shortly, most likely in the first half of February.

⁶ This table refers to the services as currently being named in Part 8 (BT IPStream Connect) of BT's Service Provider Price List website ([BT Price List](#)). The description of services included in the charge control basket is in Annex 5.

Section 2

Introduction

- 2.1 In the 2010 WBA Statement published on 3 December 2010⁷, we set out the conclusions of our review of the wholesale market for broadband access in the UK. We found BT to have SMP in WBA Market 1 and Market 2 and concluded that a charge control remedy should be applied to BT in the Market 1 area. In this consultation document we put forward our proposals for the scope and form of the charge control in that market.
- 2.2 The purpose of this section is to summarise:
- The background to the WBA charge control in Market 1;
 - The current regulatory framework for charge controls; and
 - The structure of this document.

Wholesale broadband access market review 2010

- 2.3 The first step in our market review process was to identify the relevant product and geographic markets for the WBA market. We concluded that the relevant wholesale broadband access product market is:

“Asymmetric broadband access and any backhaul as necessary to allow interconnection with other communications providers which provides an always on capability, allows both voice and data services to be used simultaneously and provides data at speeds greater than a dial up connection. This market includes both business and residential customers.”⁸

- 2.4 We also concluded that there are four separate geographic markets in the UK as follows:
- Hull Area: 0.7% of the UK premises;
 - Market 1: exchanges⁹ where only BT is present (11.7% of premises);
 - Market 2: exchanges where two Principal Operators¹⁰ (POs) are present or forecast and exchanges where three POs are present or forecast but where BT's share is greater than or equal to 50% (10.0% of premises); and

⁷ <http://stakeholders.ofcom.org.uk/binaries/consultations/wba/statement/wbastatement.pdf>

⁸ Ibid, paragraph 1.17

⁹ Market 1 consists of 3,888 exchange areas.

¹⁰ POs include those operators large enough to impose a material competitive constraint and exclude those that are clearly niche operators. In the 2010 WBA review we identified those relatively large operators with a substantial presence across the UK as a whole on the basis of network coverage (along with national market shares) without a rigid market share threshold. See paragraph 3.81 of 2010 WBA Statement.

- Market 3: exchanges where four or more POs are present or forecast and exchanges where three POs are present or forecast but where BT's share is less than 50% (77.6% of premises).
- 2.5 We then examined the market position of communications providers (CPs) in each of the geographic markets defined above and concluded that:
- KCOM holds a position of Significant Market Power (SMP) in the provision of WBA services in the Hull area;
 - BT holds a position of SMP in the provision of WBA services in Market 1;
 - BT holds a position of SMP in the provision of WBA services in Market 2; and
 - No operator holds a position of SMP in Market 3.

The 2010 WBA Statement's proposals for a charge control

- 2.6 As noted above, we concluded in the 2010 WBA Statement that BT had SMP in Market 1. BT is currently the monopoly provider in this geographic market and, even when the potential for future entry is accounted for, we considered that this did not act to constrain BT's wholesale prices. As such, we concluded BT has the ability and the incentive to set prices above the competitive level and that BT's competitors at the retail level would be forced to pay these high prices in order to provide retail services on a national basis. We therefore concluded that ex ante pricing obligations would be required to address BT's SMP in Market 1.
- 2.7 In Market 1 we also thought it was unlikely that BT would have the incentive to reduce its costs and set prices at the competitive level, especially in those exchanges where there is no potential for future entry. In addition there are significant costs related to the WBA market that are not specifically allocated to the different geographic markets. BT could potentially seek to recover a disproportionate amount of these costs, as well as common costs, through its prices in Market 1. Higher wholesale charges would ultimately be passed on as higher retail prices.
- 2.8 The 2010 WBA Statement concluded that imposing a charge control would address these concerns. It would provide more certainty over the life of the control period about the maximum level of WBA charges. It would also result in prices being based on a forward-look view of the costs related to provision of service in Market 1, taking into account efficiency improvements. At the same time, the charge control would give BT incentives for future investment by BT that will benefit consumers and citizens.

BT's voluntary price commitment

- 2.9 On 10 November 2006, BT undertook a voluntary commitment to place a floor and ceiling on the average revenue per user (ARPU) for wholesale broadband access, which was set by use of a reference pricing model, which included IPStream and BT Central¹¹ price components¹². It applied to BT's IPStream and WBC wholesale broadband products. The purpose of BT's voluntary commitment was to provide price related protection for consumers in parts of the UK where wholesale broadband

¹¹ See paragraphs 3.19 – 3.38 for a description of BT's WBA products.

¹² <http://stakeholders.ofcom.org.uk/binaries/telecoms/policy/bb/ceilings.pdf>

access competition is less likely to develop in the short term. BT's ceiling commitment expired on 31 December 2010¹³.

- 2.10 As BT's voluntary price commitment has now expired, there will be an interim period from while the WBA charge control is being developed, during which BT will be required to provide WBA at cost-oriented prices in WBA Market 1.
- 2.11 In addition, BT has offered a further commitment not to increase prices of IPStream Connect Max or Max Premium in Market 1 until 1st April 2011, except to reflect changes in the prices of underlying Openreach input products. BT may extend this commitment depending on when the charge control takes effect. Given this, we do not consider that it would be proportionate to impose an interim cap prior to the commencement of the charge control.
- 2.12 The letter BT sent to Ofcom on 17 November 2010 on the voluntary commitment in Market 1 is reproduced in Annex 9.

We have set our proposals in light of our legal framework

- 2.13 This consultation follows the 2010 WBA Statement which concluded on 3 December 2010. As part of the 2010 WBA review process, on 23 March 2010 we published a consultation document (the "First Consultation")¹⁴, where at Annex 6 (entitled "Market review process") we set out an overview of the market review process, including the imposition of remedies, to provide appropriate context and understanding to the matters discussed in that review.
- 2.14 This consultation does not seek to repeat all of the information provided in that Annex, which remains relevant to understanding the context for the proposed WBA charge control in Market 1.
- 2.15 This review does, however, consider each of the relevant legal tests that apply when imposing a charge control as an SMP condition under section 87(9) of the Act. In particular, in Section 6 below we set out our reasoning as to why we consider our proposed charge control condition meets each of those relevant tests.
- 2.16 Firstly, section 88 of the Act prohibits the setting of SMP conditions under section 87(9) of the Act except where it appears, from the market analysis, that there is a relevant risk of adverse effects arising from price distortion; and it appears that the setting of the condition is appropriate for the purposes of promoting efficiency, promoting sustainable competition and conferring the greatest possible benefits on end users. We are also required to take into account the extent of BT's investment in wholesale broadband access.
- 2.17 Secondly, we consider whether the proposed condition meets the test set out at section 47 of the Act. In summary, section 47 requires that any SMP condition must not be imposed unless it is:
- Objectively justifiable in relation to the services to which it relates;
 - Not such as to discriminate unduly against particular persons;
 - Proportionate to what the condition is intended to achieve;

¹³ <http://www.ofcom.org.uk/telecoms/ioi/bbpricing/ceilings.pdf>

¹⁴ <http://stakeholders.ofcom.org.uk/binaries/consultations/wba/summary/wbacondoc.pdf>

- In relation to what it is intended to achieve, transparent.
- 2.18 Thirdly, we need to ensure that the condition proposed remains consistent with our general duties under section 3 of the Act and our duties for the purpose of fulfilling our Community obligations as set out under section 4 of the Act.
- 2.19 Under section 3, our principal duty in carrying out functions 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.
- 2.20 In so doing, we are required to secure a number of specific objectives and to have regard to a number of matters set out in section 3 of the Act. As to the prescribed specific statutory objectives in section 3(2), we considered in the First Consultation that the objective of securing the availability throughout the UK of a wide range of electronic communications services was particularly relevant to the market review, and therefore to the proposed regulation in this review.
- 2.21 In performing our duties, we are also required to have regard to a range of other considerations, as appear to us to be relevant in the circumstances. In the First Consultation, we considered that a number of such considerations were relevant to the market review, namely the desirability of promoting competition in relevant markets, the desirability of encouraging investment and innovation in relevant markets and the desirability of encouraging the availability and use of high speed data transfer services throughout the United Kingdom.
- 2.22 Section 4 of the Act requires us to act in accordance with six European Community requirements for regulation. In the First Consultation, we considered that the first, third, fourth and fifth of those requirements were of particular relevance to the market review, namely to promote competition in the provision of electronic communications networks and services, associated facilities and the supply of directories; to promote the interests of all persons who are citizens of the European Union; to take account of the desirability of Ofcom's carrying out of its functions in a manner which, so far as practicable, does not favour one form of or means of providing electronic communications networks, services or associated facilities over another, i.e. to be technologically neutral; and to encourage, to such extent as Ofcom considers appropriate for certain prescribed purposes, the provision of network access and service interoperability, namely securing efficient and sustainable competition and the maximum benefit for customers of communications providers.
- 2.23 We also considered that no conflict arose in this regard with those specific objectives in section 3 that we consider are particularly relevant in this context.

We have taken into account the ERG Remedies Position

- 2.24 In proposing the form of our charge controls, we have also taken into account the ERG Remedies Position on the approach to appropriate remedies in the regulatory framework for electronic communications networks and services¹⁵.
- 2.25 The ERG agreed a Common Position Paper on 1 April 2004 relating to appropriate remedies in the new regulatory framework for electronic communications. The ERG Paper aims to ensure a consistent and harmonised approach to the application of remedies by NRAs in line with the Community law principle of proportionality, and

¹⁵ http://www.erg.eu.int/doc/meeting/erg_06_33_remedies_common_position_june_06.pdf

with the new framework's key objectives of promoting competition, contributing to the development of the internal market and promoting the interests of EU citizens.

2.26 The ERG paper sets out four principles that should be adhered to when imposing remedies. These are:

- The need to produce reasoned decisions;
- Where infrastructure competition is not likely to be feasible, access to wholesale inputs should be made available;
- Where infrastructure competition is feasible, remedies should assist in the transition process to a sustainable competitive market; and
- Remedies should, where possible, be incentive compatible.

We have taken into account our specific policy objectives when developing our proposals

2.27 Our specific policy objectives in proposing the charge controls for WBA services in Market 1 are:

- to prevent BT from setting excessive charges for WBA services in Market 1 where it has SMP while providing incentives for it to increase its efficiency;
- to ensure that prices are subject to appropriate controls whilst still encouraging BT to maintain service quality and innovation in WBA services in Market 1;
- to promote efficient and sustainable competition in the delivery of broadband services;
- to provide regulatory certainty for BT and its customers and to avoid undue disruption;
- to encourage investment and innovation in the relevant markets; and
- to ensure that the delivery of the regulated services is sustainable, in that the prevailing prices provide BT with the opportunity to recover all of its relevant costs (where efficiently incurred), including its cost of capital.

2.28 We have adopted these policy objectives when developing the charge control proposals.

We have taken into account other relevant Ofcom projects

2.29 In addition to the WBA Charge Control, Ofcom is in the process of reviewing charge controls for other regulated services including:

- Local Loop Unbundling (LLU);
- Wholesale Line Rental (WLR); and
- ISDN30 WLR.

- 2.30 We think there are significant benefits to synchronising these charge controls as far as is practical. In particular, the WLR, LLU and WBA charge controls relate to products that are used by CPs to deliver voice, broadband or voice and broadband to end-users. For example, an LLU operator that provides voice and broadband services using MPF in Market 2 and Market 3, would use WLR and WBA services to offer the same bundle in Market 1. Setting these charge controls at a similar time and for a similar duration will provide certainty for CPs with regard to the pricing of these products as they will be able to make more informed investment decisions.
- 2.31 Furthermore, aligning the charge controls facilitates consistency between the various controls in terms of common inputs such as adoption of cost of capital value and treatment of base year costs. For these charge control reviews we commonly use BT's regulated financial statements (RFS) as a data source to verify that the base year costs fairly represent a normal and stable level of cost necessary to provide the services covered by each charge control. Where this is the case we also ensure reconciliation to the RFS from our charge control model. For each control we will also make, if necessary, adjustments to the RFS data that, for example, excludes exceptional "one-off" costs incurred in the base year. This exercise tends to require additional information from BT. Where the underlying reasons for such adjustments are common across different charge controls, it is important that we ensure the assumptions used to project costs are fully consistent.

Impact assessment

- 2.32 The analysis presented in this document represents an impact assessment, as defined in section 7 of the Act. In Sections 3, 4 and 5 we discuss all of the relevant considerations and options that we have considered, including their impact.
- 2.33 Impact assessments 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. This is reflected in section 7 of the Act, which requires Ofcom to carry out impact assessments 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. However, as a matter of policy Ofcom is committed to carrying out and publishing impact assessments in relation to the great majority of its policy decisions. For further information about Ofcom's approach to impact assessments, see the guidelines, Better policy-making: Ofcom's approach to impact assessment, which are on the Ofcom website¹⁶.
- 2.34 Specifically, pursuant to section 7 of the Act, an impact assessment must set out how, in our opinion, the performance of our general duties (within the meaning of section 3 of the Act) is secured or furthered by or in relation to what we propose.

Equality Impact Assessment

- 2.35 Ofcom is separately required by statute to assess the potential impact of all our functions, policies, projects and practices on race, disability and gender equality. Equality impact assessments (EIAs) also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity. Unless we otherwise state in this document, it is not apparent to us that the outcome of our review is likely to have any particular impact on race, disability and gender equality. Specifically, we do not envisage the impact of any outcome to be to the detriment of any group of society.

¹⁶ http://www.ofcom.org.uk/consult/policy_making/guidelines.pdf

2.36 Nor are we envisaging any need to carry out separate EIAs in relation to race or gender equality or equality schemes under the Northern Ireland and Disability Equality Schemes. This is because we anticipate that our regulatory intervention will affect all industry stakeholders equally and will not have a differential impact in relation to people of different gender or ethnicity, on consumers in Northern Ireland or on disabled consumers compared to consumers in general. Similarly, we are not envisaging making a distinction between consumers in different parts of the UK or between consumers on low incomes. Again, we believe that our intervention will not have a particular effect on one group of consumers over another.

Disclosure of data and model disclosure

2.37 In light of our statutory duties, in particular our duty to consult, and our framework for disclosure of charge control models¹⁷, we believe that we have properly and appropriately taken account of BT's position on confidentiality of data for the purpose of disclosure of data in this consultation and in the model we intend to publish in the next few weeks. We believe that the methodology we have arrived at ensures that stakeholders are able to respond effectively to this consultation.

2.38 In particular, we have aggregated certain data which is confidential to BT:

- In relation to data which relates specifically to Market 3, we have aggregated the costs and revenues allocated to Markets 2 and 3 exchanges. This allows us to publish Market 1 costs and provide a high level reconciliation of the total WBA market data to BT's regulatory accounts.
- In relation to data on an exchange-by-exchange basis, we have aggregated data BT has provided on the number of end users, existing equipment available and forecasts of future investments by market. In order to ensure stakeholders are able to undertake the main sensitivity analysis, we provide three forecast scenarios based on the range of assumptions as set out in detail in Section 5.
- In relation to details of BT's cost structure, we have aggregated data for each cost component.

2.39 In addition, we have also taken the following steps:

- We have described the relationships and assumptions underlying our model. These are discussed in detail in Annex 7;
- We have identified publicly available data. BT's current reporting requirements provide costs at an aggregate WBA market level, and revenues split by geographic market. Annex 6 discusses in detail our approach of identifying the level of base year costs and revenues relevant to this charge control.

Structure of this document

2.40 This document consists of 7 main sections setting out the proposals for the Wholesale Broadband Access (WBA) charge control in Market 1. These proposals are supported by 5 annexes which contain more detailed information and reasoning. The main body of the document is set out as follows:

¹⁷ http://stakeholders.ofcom.org.uk/binaries/consultations/784024/Charge_control.pdf

- Section 3 outlines the controlled WBA products;
- Section 4 outlines the form and duration of the charge control;
- Section 5 outlines the design of the charge control;
- Section 6 outlines the cost of capital estimate; and
- Section 7 outlines whether the charge control in Market 1 is consistent with the legal tests set out in the Act.

2.41 The associated Annexes, in addition to describing Ofcom's consultation policy and detailing how stakeholders should send us their comments, include:

- Annex 4: Consultation questions;
- Annex 5: Draft notifications;
- Annex 6: Ofcom's financial analysis;
- Annex 7: Ofcom's modelling analysis;
- Annex 8: Ofcom response to the dotecon report prepared for BT; and
- Annex 9: BT's voluntary commitments in Market 1.

Section 3

The charge controlled WBA product(s)

Introduction

- 3.1 Ofcom's standard approach to charge control is RPI-X regulation using "glidepaths", under which the controlled charges are brought into line with costs over a number of years¹⁸. However, this may not always be appropriate where investment in new services or technology is necessary, since the demand and/or costs of such services are highly uncertain. Aligning the allowed rate of return on new services at the cost of capital might not be sufficient to reward innovation and allow for optimism bias¹⁹. However, customers may still need protection from the exploitation of SMP.
- 3.2 In light of this, we have considered how best to balance the need to protect consumers in Market 1 with the need to ensure that innovation and investment are not discouraged. On the one hand, BT has entrenched market power in the supply of WBA in Market 1. To date, BT has nearly 100% of the market and even when future potential entry is accounted for, there is still a strong case for a charge control to protect customers from exploitation of BT's market power.
- 3.3 On the other hand, the economic conditions which have led to little competing investment in WBA in Market 1 (such as small exchange size and geographical remoteness) also mean that the economics of investing in new technology could be more challenging than in Markets 2 and 3. In Market 1, broadband services are currently supplied using BT's existing network (also known as 20th century network or "20CN") which has maximum download speeds of 8 Mbit/s²⁰, compared to higher speeds available in Markets 2 and 3 areas delivered by using cable or ADSL2+ technologies (for example using LLU networks or BT's 21st century network ("21CN")). BT has indicated that it will consider investing in rolling out ADSL2+ in Market 1 in the period covered by the charge control, provided that the expected return on its investment is sufficient. This could enable customers in Market 1 to enjoy the higher download speeds already available in Markets 2 and 3.
- 3.4 As we explain in this section, on balance we think that the standard approach to charge control, in which prices are brought in line with costs, including the cost of capital (but without allowance for project specific risk) gradually over the charge control, is appropriate.
- 3.5 In this section we set out our proposals for the WBA products that would be subject to the charge control and how it would be applied. In particular, we discuss:
- The elements that make up WBA services;
 - BT's range of WBA products;
 - The benefits of using an anchor product approach;
 - The defining characteristics of the controlled product(s); and

¹⁸ Please refer to Section 4 for a full explanation of RPI-X regulation.

¹⁹ See Annex 8 where this point is further elaborated.

²⁰ Megabits per second = 1024 (i.e. 2¹⁰) kilobits per second

- The appropriate products to control.

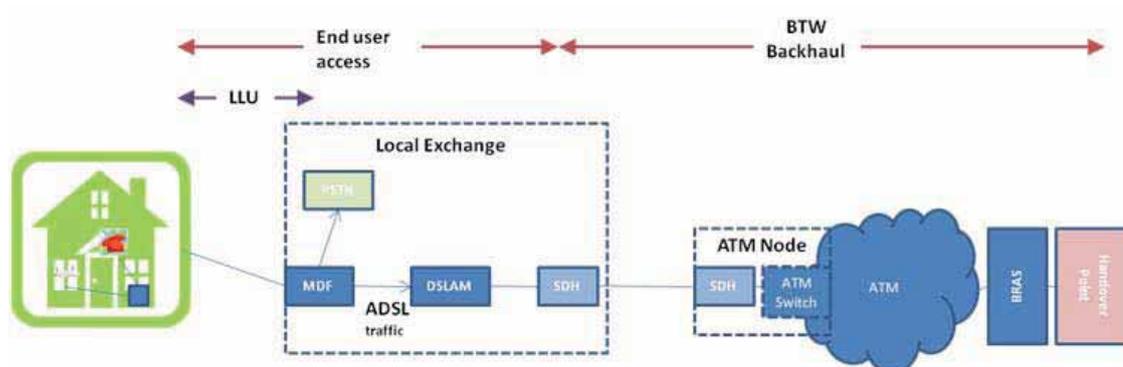
Elements of a WBA service

3.6 The WBA service can be considered as being made up of three distinct elements:

- End User Access (EUA);
- Backhaul; and
- Handover (which may include core network).

3.7 These elements are illustrated in Figure 3.1 for WBA services provided over BT's 20CN²¹ and are described in turn.

Figure 3.1: Elements that make up a WBA service



End user access (EUA)

- 3.8 The EUA part of the WBA service includes the network elements from the end user premises to the local serving exchange. This is mainly based on BT's copper access network, although BT has commenced deployment of its Next Generation Access (NGA) network which replaces some or all of the connection to the end user with fibre to allow higher access speeds. The extent to which BT will deploy NGA in Market 1 is currently uncertain though we do not discount the possibility that during the charge control period this deployment may be significant. As discussed below we do not propose to include these services in the charge control and as such do not discuss them further in this section.
- 3.9 For current generation products based on BT's copper access network, the EUA component includes BT's local copper access network, the Main Distribution Frame (MDF) in BT's local serving exchange, tie cables, racks in exchanges, power, heating, ventilation, accommodation and BT's DSLAMs. The potential speed of the WBA service is determined as a result of factors including the distance from the end user premises to BT's local serving exchange, the type of DSLAM in use (i.e. ADSL1²² or ADSL2+) and any maximum speed restrictions which may have been placed on the end user connection.

²¹ We discuss the difference in backhaul between 20CN and 21CN below in paragraph 3.14.

²² ADSL1 technology is the early ADSL standard developed with a maximum 256kit/s upload and 8Mbit/s download. The speed is limited by distance (max 5.5km) from exchange to end user premise.

- 3.10 There are two LLU products available and they are provided through Openreach on an Equivalence of Input (EOI) basis²³: Metallic Path Facility (MPF) and Shared Metallic Path Facility (SMPF). The MPF product provides the whole access connection to the LLU purchaser. MPF charges relate to the costs of providing all the relevant elements of the local copper access network, and are geographically averaged across the UK. The charges cover the costs for items from the end user premises including the local copper access network up to and including the MDF in BT's local serving exchange.
- 3.11 The SMPF product provides access to the broadband service only. It shares the line with the WLR product, which provides narrowband access. If a CP purchases LLU SMPF the geographically averaged costs of the copper access network are recovered through the WLR rental charge (which also recovers the incremental cost of providing analogue voice services). The SMPF charge provides a contribution to the overhead costs for the provision of shared access to the local loop but does not make any contribution to the loop copper costs.
- 3.12 BT consumes the SMPF product within the EUA component of the WBA service. This is directly analogous to CPs purchasing a LLU SMPF product, where they supply broadband services themselves over BT's LLU SMPF product, and BT provides voice services with its WLR product.
- 3.13 The final part of the EUA is BT's DSLAM. The individual characteristics of DSLAMs are different at each exchange, and will vary by factors including the number of end users connected, the total capacity available and DSL technology supported (and therefore the maximum downstream speed available to end users). The DSLAM aggregates the DSL traffic and provides transmission capacity at BT's local serving exchange.

Backhaul

- 3.14 WBA services require backhaul from the end user's BT local serving exchange DSLAM to the Broadband Remote Access Server (BRAS) providing handover to either BT's core network or to a point of interconnection with a CP's own network. BT provides backhaul for its IPS Central (IPS), DataStream and IPStream Connect (IPS Connect) products²⁴ using its 20CN, and provides its WBC products²⁵ using its 21CN. If the backhaul is supplied using BT's 20CN it will be provided over BT's ATM backhaul network, and for BT's 21CN it will use an Ethernet backhaul network. Each DSLAM can only support one backhaul connection and so a single DSLAM cannot be connected to both 20CN and 21CN. Once a DSLAM has been connected to either 20CN via the ATM backhaul network or to 21CN via Ethernet backhaul it is unlikely to be practical to reconfigure the DSLAM to connect to the other network. The availability of backhaul will therefore be a consideration in deciding the network to which a DSLAM will be connected and the services it supports. DSLAMs connected to 20CN will be configured to provide ADSL1 services (up to 8Mbit/s) whereas those connected to BT's 21CN backhaul network will support ADSL2+ services.
- 3.15 The backhaul connection is comprised of the connection from the DSLAM to the first ATM or Ethernet node and the backhaul across the ATM/Ethernet network to the BRAS. The connection across the ATM/Ethernet backhaul network will connect

²³ Equivalence of Input requires Openreach to provide its products and services to all CPs on the same timescales, terms and conditions and through the same systems and processes.

²⁴ See para 3.21 to 3.33 below for a description of these products.

²⁵ See para 3.34 to 3.38 below for a description of this product.

through a number of switches. Therefore, the distance between the DSLAM and the first node and then the number of hops across the ATM/Ethernet network to the BRAS will influence the cost of backhaul from each local serving exchange.

- 3.16 The backhaul connection can also be characterised by the capacity which will be affected primarily by the number of end users on the DLSAM, the average usage profile of each end user and the growth in these two parameters. For most of Market 1 exchanges, the ATM backhaul from the DSLAM at the exchange to the first ATM node usually consists of a 155Mbit/s pipe, although not all of this 155Mbit/s capacity may be in use. Some small exchanges may be subtended (or "piggy backed") to a larger exchange in a nearby town, and as such will have a smaller capacity.

Handover (including core network as necessary)

- 3.17 The handover element provides transmission and switching connectivity from BT's network to the CP at each of the BRAS sites. The handover is a necessary component to complete the end to end connection of the CP to BT's WBA products. The CP can connect at each BRAS or can purchase additional services from BT that deliver the traffic to a location closer to the CP's network.
- 3.18 The choice of handover and location is dependent on individual CP preferences and their network topology. The factors affecting the decision of where interconnection occurs include geographic network reach of the CP, the location of end users, the type of end users, and the overall scale of the CP. Larger CPs with a bigger number of end users might choose to interconnect with BT at each of the BRAS locations. However, smaller CPs with a lesser scale might choose to purchase products from BT that provide handover at fewer locations. The latter provide end to end managed solutions. We discuss the different product options below.

BT's range of WBA services

- 3.19 BT currently provides WBA through three separate product families:
- IPStream services;
 - DataStream services; and
 - Wholesale Broadband Connect services.
- 3.20 These products provide an end-to-end WBA service from the end-user premises to a CP's point of handover with BT's network. CPs are able to customise elements of BT's WBA products including upstream/downstream line speed and the switching and transmission capacity for end user connections. CPs are also able to choose whether they interconnect at each of BT's dedicated WBA interconnection locations (at the BRAS sites), or purchase other products that do not require the same level of network presence. BT is not currently able to supply each WBA product family in each geographic WBA market, as the extent of the WBA product reach is determined by the technical limitations of the equipment used to supply it. Therefore, as BT upgrades its access and core network, the available WBA product families may change.

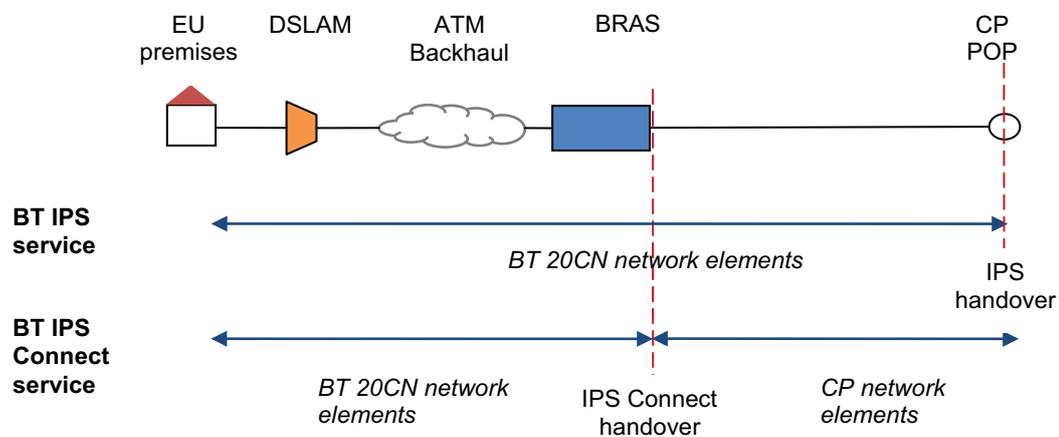
IPStream services: IPStream and IPStream Connect

- 3.21 BT supplies IPStream services in Market 1, Market 2 and Market 3 of the WBA market. Currently, BT's IPStream services are provided using ADSL1 technology,

and have a theoretical maximum downstream speed of 8Mbit/s. The actual speed and performance of the end user connection will be determined by the distance from the end user premises to BT's local serving exchange and the capacity in both BT's and the CP's backhaul and core network elements.

- 3.22 BT's IPS service provides all the network elements from the end user premises to a CP's designated point of presence (POP), and removes the need for CPs to establish a point of handover and transmission at each of BT's handover nodes.
- 3.23 The IPS Connect product gives the CP the option to interconnect at the BRAS node (via the handover component) in order to use their own network from that point²⁶.
- 3.24 IPS and IPS Connect are shown in Figure 3.2. As can be seen, BT's IPS and IPS Connect services use the same network elements of BT's 20CN network up to the BRAS.

Figure 3. 2 – IPS and IPS Connect network diagram



- 3.25 BT offers a range of downstream/upstream speed options in the end user access element of the IPStream products, as set out in the Table 3.1 below. The IPStream Max product is typically aimed at CPs offering residential retail services, with a contention ratio²⁷ of 50:1. The Max Premium product has a lower contention ratio of 20:1 with a higher upstream line speed, and therefore is targeted primarily at business customers²⁸.

²⁶ IPS Connect provides handover at the BRAS on an Equivalence of Inputs (EOI) basis as per BT's obligations under its Undertakings.

²⁷ Contention ratio relates to the sharing of a single network resource between multiple customers. In broadband service terms the single network resource may be taken to be the maximum throughput a single user could achieve using the service. A lower contention ratio indicates a higher quality of service.

²⁸ Note that IPStream 500, 1000 and 2000 also have residential and business focused options (called "Home" and "Office" respectively) but that the maximum line speed is the same for both options as shown in the Table 3.1.

Table 3.1: BT's IPStream products

IPS product name	Maximum line speed (kbit/s)	
	Downstream	Upstream
IPStream 500	576	288
IPStream 1000	1,152	288
IPStream 2000	2,272	288
IPStream Max	8,128	448
IPStream Max Premium	8,128	832

- 3.29 In addition to the EUA options above, the IPS product includes the BT Central component which provides the backhaul and handover to the CP. This allows the CP to purchase a managed end to end service rather than having to connect their network to BT BRAS sites. An end to end managed service may be more attractive to CPs with a small customer base and relatively low network traffic as it may not be economically viable to self-provide core network transmission.
- 3.30 On the other hand, larger CPs may find it less costly to provide the network transmission and switching beyond the BRAS themselves (for example, using their own core backhaul network elements) and so the IPS Connect option is more attractive.
- 3.31 Both IPS (via the Central element) and IPS Connect allow CPs to decide the amount of bandwidth they will purchase over BT's ATM network. This flexibility is a key determinant of the quality of end user connections and therefore the services or applications they will support. CPs are likely to calculate the bandwidth they need to purchase in total based on an assessment of the allocated bandwidth per end user.

DataStream

- 3.32 BT's DataStream products provide transmission and switching capacity from BT's DSLAM to the CP's point of handover, and the same network handover option as the BT Central products. They are also provided over its 20CN network and are supplied using the same network components as BT's IPS product family. In contrast to BT's IPStream products (which are IP-based services²⁹), DataStream is an ATM-based service and requires CPs to purchase fixed size virtual paths from BT's DSLAMs to the point of handover, rather than by the capacity aggregation method for the IPStream products.
- 3.33 Due to the uptake of IP-based services (IPS, IPS Connect and, recently, WBC products) DataStream volumes have been in decline for several years such that it accounts for a very small and diminishing proportion of the WBA market.

Wholesale Broadband Connect services: WBC and WBMC

- 3.34 BT is in the process of deploying its 21CN using Ethernet backhaul along with ADSL2+ technology. This deployment supports the Wholesale Broadband Connect ("WBC") product across the UK. At present, BT has extended WBC coverage to 55%

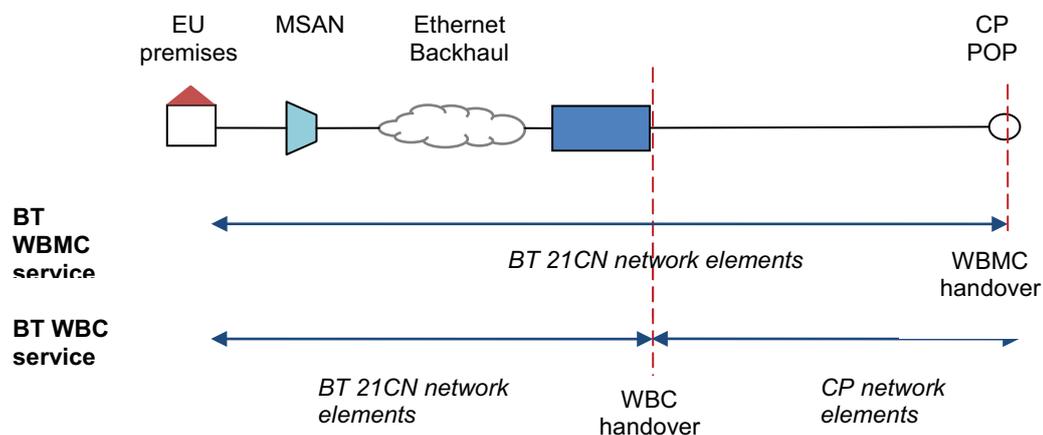
²⁹ I.e. services using the IP networks

of UK homes & businesses³⁰ and intends to extend coverage up to 75% of UK premises by spring 2011³¹. WBC is currently not provided in any Market 1 exchanges.

- 3.35 The WBC service is similar to BT's IPS Connect services in composition, with the network elements being provided over BT's 21CN network, and provides connectivity from the end user premises to BT's MSAN in the serving exchange. As with IPS Connect, WBC is comprised of several components – end user access, the backhaul and handover elements at BT's 21CN BRAS³². The end user element is provided using ADSL2+ technology, and has a theoretical maximum downstream speed of 24Mbit/s, although the actual performance of the end user connection will again be determined by the distance of the end user from the serving local exchange and the capacity of network elements in both BT's and the CP's networks. The WBC service provides backhaul across BT's Ethernet backhaul network to the BRAS. As with IPS Connect services, purchasers of WBC are able to vary the bandwidth they purchase from BT in aggregate on the WBC backhaul component. The purchaser can provide its own network from the BRAS or purchase a solution from BT which provides handover at the CP's site (or other convenient location).
- 3.36 BT also provides a Wholesale Broadband Managed Connect (WBMC) product where backhaul is entirely managed by BT and saves a CP having to build out to the BRAS sites and is essentially the 21CN variant of IPS Central. WBMC also provides connectivity to the 20CN IPS Connect product, so a CP is able to purchase WBMC nationally, including in Market 1 areas, and provide both 20CN and 21CN based services as available. Using this service, only one interconnect is required to support services on both 20CN and 21CN networks.

3.37 Figure 3.3 illustrates the WBC and WBMC network elements using 21CN.

Figure 3.3: WBC and WBMC network elements



³⁰ <http://www.btplc.com/21CN/WhatisBTSaying/QandA/GeneralQandA/general.htm>

³¹ <http://www.btplc.com/News/Articles/Showarticle.cfm?ArticleID=C73002B5-9659-419E-ACD1-2DF65A4044EE>

³² A CPs can also have IPS Connect EUA traffic handover to 21CN BRAS when it purchases the 20-21CN Interconnect link between the 20CN BRAS nodes and the nearest 21CN node. This avoids forcing CPs to build out to legacy network locations (20CN BRAS) and to help align IPS Connect product with WBC.

- 3.38 The WBC product will also utilise BT's NGA deployment as this is rolled out. WBC provides access at up to 40Mbit/s with fibre to the cabinets (FTTC) deployments. Higher speeds are likely to be supported where BT deploys fibre to the premises (FTTP).

Anchor product regulation

- 3.39 Our standard approach to setting charges is to base costs on what is believed to be the most efficient available technology that performs the same function as the old technology. This is sometimes described as the "Modern Equivalent Asset" (MEA³³) approach to pricing. In the present case, it might be argued that 21CN technology is the MEA, because it is a proven technology in Market 3 areas (and is similar to that used by some LLU operators in their networks) and it is likely to be what a new entrant would install now.
- 3.40 Often new assets are superior to old assets in terms of functionality and efficiency, so when old assets are valued by reference to the MEA, we would need to take this into account. This is likely to lead to a reduction in the value of the old assets. For example the ATM backhaul from a DSLAM currently used in the local exchanges is limited to a maximum of a 155Mbit/s pipe. As the number of end users and/or bandwidth demand increase, an additional 155Mbit/s pipe would be required to carry the traffic. This in turn requires another DSLAM even if there is still capacity for additional line cards on the old DSLAM. On the other hand, typical pipes used to carry traffic from a 21CN MSAN would be a 2.5Gbit/s or 10Gbit/s³⁴ pipe, although 622Mbit/s or 155Mbit/s pipes may also be used.
- 3.41 Indeed the reason for the ADSL2+ rollout is to enable the delivery to consumers of higher speed broadband access than is possible with ADSL technology which may in turn allow new broadband products and product features to be deployed for which consumers are willing to pay. This means that the value of the current technology might have to be abated to reflect its lower functionality, if an approach based on MEA values was adopted³⁵.
- 3.42 There are circumstances where Ofcom does not set charges on the basis of MEA costs. When faced with major shifts in technology we would consider adopting a more cautious approach and set prices based on the hypothetical continuation of the existing technology until the new one becomes well established and prices can gradually move to reflect this.
- 3.43 In practice, there are a number of significant challenges to implementing the MEA approach:

³³ For a definition of MEA, see for example paragraph 4.86 of Ofcoms' second consultation "Valuing copper access" (March 2005). Ofcom asked Analysys Consulting "to undertake a comparison between the valuation of the existing [copper access] network and a hypothetical Modern Equivalent Asset (MEA)". The definition of the MEA used was: "The MEA chosen will be the most cost efficient method, using modern technology, of providing the same services, to the same level of quality and to the same customer base as is provided by the existing copper access network".

See <http://stakeholders.ofcom.org.uk/consultations/copper/value2/statement/> for more details.

³⁴ 1Gbit/s = 1024Mbit/s

³⁵ See for example IRG (2006): "Principles of Implementation and Best Practice regarding the use of current cost accounting methodologies as applied to electronic communication activities"

- It is not always be clear what the most efficient new technology at any point in time is. For example, would it be a national copper access network using ADSL2+ technology or a national fibre to the premise network?;
 - It is be very difficult to set the prices on the basis of a new technology in the early stages of its adoption. Cost based pricing is likely to lead to high prices due to a combination of initial investment outlay and low take up. In turn this might discourage future take up of the service;
 - Valuation of existing assets requires additional assumptions to quantify the additional services and functionality provided by the new technology over and above what is currently available;
 - To enable cost recovery with this approach, it requires the regulator to allow separately for any transitional costs (e.g. migration costs) and to choose the optimal path for transition;
 - It is difficult to ensure an approach to depreciation which is consistent over time and between different charge controls and which gives a reasonable expectation of cost recovery. There would then be a strong likelihood that charges would be set incorrectly. If the regulator subsequently intervened to reset charges when new technology was in fact adopted (for example, at a different time and cost to that expected), there would be a risk of the creation of windfall losses or gains and a consequent increase in uncertainty and regulatory risk; and
 - There is significant scope for the regulator to be 'gamed' by the regulated company. This is especially the case as it may argue that prices need to rise in the short term due to transitional costs of introducing new technology, resulting in some consumers paying higher prices for exactly the same service as they received with the old technology.
- 3.44 On balance we do not believe that it would be appropriate to use an MEA approach when setting a charge control on WBA services in Market 1 areas, even though 21CN has been deployed in other parts of the market and could potentially be considered as the relevant MEA. This is partly because it is not clear whether 21CN technology will prove to be a more efficient way of delivering the services currently used by consumers in Market 1 as a result of its size and geography. While BT has rolled out 21CN in Market 3, we understand that it currently has no firm plans to extend coverage into Market 1, and the costs of doing so are largely unknown. In addition, we do not think we are well placed to make the assumptions required at each stage, and there is a potential risk of serious regulatory failures if these assumptions turn out to be incorrect.

We propose anchor pricing approach to setting the control

- 3.45 One way to deal with technological change is to adopt an approach to charge control setting which we refer to as "anchor pricing". Under this method the cost modelling would be based on the technology in use rather than any new technology which might be adopted during the control period. A detailed description of the principles of anchor product regulation was set out in Ofcom's 2007 consultation on "*Future broadband: policy approach to next generation access*"³⁶. Ofcom discussed the use

³⁶ Annex 7 of "Future broadband - Policy approach to next generation access", September 2007, http://stakeholders.ofcom.org.uk/binaries/consultations/nga/summary/future_broadband_nga.pdf

of anchor product regulation in the context of investment in next generation access in the WLA market, and key features of our policy are relevant here.

- 3.46 For example, in the context of this charge control, we propose to base cost projections on the cost of the 20CN ADSL product, and not to include estimations of investment in 21CN in Market 1 exchanges (i.e. costs of deploying ADSL2+ technology to enable higher speed services). As we explain below, we use the anchor pricing approach because of its incentive properties and because it helps address uncertainty over migration volumes and costs.
- 3.47 We have previously referred to this approach as the “technology neutral” approach. However, the term “anchor pricing” better captures one of the key features of our approach. Consumers of existing services are not made worse off by the adoption of new technology. The price (and quality) of existing services are ‘anchored’ by the legacy technology, even if the services are actually provided over new technology. The key principle of this approach is to allow the dominant provider the pricing flexibility to charge more to reflect any enhanced functionality of the new service. In turn, this creates the incentives for the investment required to advance service characteristics which are directly related to customers’ willingness to pay for improvements in quality.
- 3.48 In addition, given our assessment of the WBA market and the finding that a chain of substitution currently exists between WBA services of all speeds (e.g. those provided at up to 8Mbit/s over 20CN and those provided at up to 24Mbit/s or higher over 21CN), this approach further constrains the dominant provider from exploiting its market power by charging excessively for the new service. Potential end users always have the ability to move to the charge controlled product should the price differential between the two services become too great. The reduction in demand for the new service will diminish the returns earned by the dominant provider and reduce the incentive to set charges at an excessive level. For this reason, it is important to ensure that the charge controlled product remains relevant to end users.
- 3.49 The incentive properties associated with the anchor pricing approach are:
- **Cost minimisation.** In some cases, BT can provide a service using either its existing 20CN or 21CN without the customer being aware which is used, as is the case in Market 3 exchanges. Where BT, rather than the customer, chooses the underlying technology, this approach can then give BT appropriate incentives to use the network which minimises costs. If BT charges the same price for a particular service irrespective of the technology used to provide it, BT would have an incentive to migrate traffic to a new platform only if this is the most efficient way to provide that service.
 - **Reward for efficiency.** The charge control would reward BT when it achieved cost savings (e.g. by migrating services to the new network sooner). The anchor pricing approach means that we would allow BT to keep any efficiency gains made during the charge control period as a result of adopting new technology. Hence, if the costs of serving customers on the 21CN are lower than we have forecast (using the anchor pricing model), BT will be able to retain any additional profits associated with those cost savings. This gives BT the incentive to make this investment if it is expected to reduce costs later, as would occur in a competitive market. However, there is also the option to pass part of any expected “technology dividend” to customers, by reflecting some of the expected lower costs due to new technology in prices. This is further explained in paragraphs 3.61 to 3.65.

- **Pricing flexibility.** Where the customer takes the decision to migrate to new services, it can be efficient to set lower prices for services supplied using the lower cost (new) network and higher prices for services supplied using the old network. By reflecting cost differences in prices, customers are encouraged to make the cost-minimising choice. Where both old and new services are included in a single charge control basket, the structure of the charge control would allow BT flexibility to offer lower prices on the new service, in order to induce efficient migration.
- 3.50 The adoption of a new platform has the potential to offer significant cost savings and we want the charge control to give the right incentives for BT to undertake such an investment (where this benefits consumers in the long run). At the same time the migration of services to a new platform poses some challenges as the speed of migration and associated costs are uncertain.
- 3.51 The anchor pricing approach largely avoids these practical difficulties. It means that the risk associated with introducing new technology is borne by the regulated entity. For example, if the new technology is successful and results in lower costs, then the regulated entity can retain the benefits of such cost savings, until prices are gradually moved to reflect the new technology. Conversely, if the new technology is unsuccessful, consumers are protected from higher prices.
- 3.52 We consider that it is more appropriate that this risk is borne by the regulated entity than by consumers. The regulated entity is far better placed than Ofcom to take decisions on major technology changes. We therefore consider that our anchor pricing approach gives better incentives for productive (producing at minimum cost) and dynamic (investment and innovation) efficiency³⁷.
- 3.53 We recognise that the anchor pricing approach may not necessarily achieve allocative efficiency, because prices may not always equal costs, but we attach less weight to trying to achieve allocative efficiency at every point in time. This is because we consider that consumers' interests are best served by attaching a high weight to productive and dynamic efficiency³⁸. Over time, we consider that the anchor pricing approach should result in lower prices to consumers. In its decision on the Openreach charge control appeal, the Competition Commission found that we did not err in adopting the anchor pricing approach³⁹.
- 3.54 There are parallels to a more general comparison between rate of return regulation and incentive based regulation. As with incentive based regulation in general, the approach adopted by Ofcom in relation to new technology accepts the potential for some allocative inefficiency⁴⁰, but by doing so helps to ensure better incentives for dynamic and productive efficiency.
- 3.55 We draw a distinction between gradual ("business-as-usual") technical progress and the kind of "paradigm shift" technology change represented, for example, by BT's

³⁷ We identify three types of efficiency. "Productive efficiency" is achieved when services are provided at minimum cost. "Allocative efficiency" is achieved when the optimal combinations of goods and services are produced given the tastes and preferences of consumers and citizens. In general, allocative efficiency is enhanced by ensuring that prices reflect costs. The third type of efficiency is 'dynamic efficiency' which is enhanced by giving incentives to engage in investment, cost reduction and innovation over time. See also the discussion at paragraphs 4.40 – 4.43 in Section 4.

³⁸ See footnote 37.

³⁹ See the CC's decisions in "The Carphone Warehouse Group plc v Office of Communications", August 2010, cases 1111/3/3/09 (the "LLU decision") and 1149/3/3/09 (the "WLR decision").

⁴⁰ See footnote 37.

move from its legacy network to its 21CN. The former can straightforwardly be taken into account within an RPI-X charge control and is reflected by the assumed rate of real unit cost reduction. We apply our anchor pricing approach to major technology changes.

- 3.56 The anchor pricing approach also reduces the need to determine the costs of the 21CN network. In particular, it overcomes the problem of having to estimate, as yet, not fully known costs of the provision of “replacement” or “emulated” services over the alternative platform. Although 21CN has been rolled out in Markets 2 and Market 3 areas, the costs of rolling out to Market 1 areas are still largely unknown. 21CN investment involves both the replacement cost of legacy DSLAMs at each local exchange and the cost of any necessary upgrades from SDH based ATM backhaul used in 20CN to Ethernet. These costs will depend on the specific circumstances at each exchange and are the source of uncertainty around costs.
- 3.57 This approach means that our modelling is somewhat hypothetical, as it assumes the continued use of 20CN technology, even though BT may extend the coverage of 21CN into Market 1 during the life of the control. However, it does mean that our cost model is based on proven technology used to deliver WBA services. Furthermore, as discussed later in paragraphs 5.52 onwards our choice of using the current cost accounting standard as our cost base is consistent with the MEA principle. We make the following assumptions.
- 3.58 First, as noted previously, we assume that all traffic is carried on 20CN throughout the control period (which in later years of the control period may be transitioned on to 21CN). Related to this, our traffic forecast is strictly limited to what is possible over 20CN, and we do not assume that 21CN is required in order to deliver the underlying service.
- 3.59 Second, we assume that the capital costs (i.e. depreciation and return of capital employed) and operating costs of the network are at the efficient levels that would be expected if the network were in an ongoing environment, i.e. not heavily depreciated 20CN assets due to running down of the BT access equipment and scarcely depreciated 21CN assets due to inefficient delay in introducing 21CN services or an inefficiently long period of parallel running of the 20CN and 21CN.
- 3.60 In practice, this means that we will need to adjust BT’s reported costs in order to build forecasts of efficient ongoing WBA costs over the 2011 to 2014 period (i.e. assuming that BT had not started building its 21CN). This adjustment is referred to as a “hypothetical ongoing network” (HON) adjustment and is discussed in Section 5 and Annex 7.

Recovery of additional 21CN costs would be via the efficiency gains of the new platform

- 3.61 The anchor pricing approach means that we allow BT to benefit from any efficiency gains made during the charge control period, relative to our forecast, in the form of profits above the cost of capital. Our forecast efficiency gains are based in part on the past trends for the legacy networks. BT may be able to realise, in the long-term, much larger gains from its investment in new technology. By upgrading to 21CN in Market 1, BT may be able to benefit from increased revenues from the sale of higher bandwidth speed (up to 24Mbit/s) packages at premium prices, and from lower unit costs as average usage increases. Therefore, if BT’s 21CN investment is a success, it may well benefit from high returns under the control. This gives BT the incentive to

make this investment if it is expected to reduce costs later, as would occur in a competitive market.

- 3.62 It would be via these additional profits on higher bandwidth speed services (up to 24Mbit/s) that we would expect BT to recoup its investment. In some cases it might be able to realise savings quite quickly and BT would be rewarded immediately for these efficiency improvements.
- 3.63 However, given the potentially high initial capital expenditure associated with this investment, which is intended to satisfy expected consumer demand for higher speed broadband access, a large part of the benefits of the 21CN platform depend on sufficient customer migration from legacy products taking place.
- 3.64 If it takes some time for customers to migrate to higher speed services, efficiency savings and revenue increases may initially be small relative to the costs of 21CN investment. Indeed, initially at least, (when measured on an accounting basis, with straight-line depreciation or similar)⁴¹ the unit costs of 21CN may be higher than if BT provided these services on its legacy platform.
- 3.65 However, as take-up of higher speed broadband access services and average usage increase, BT may be able to realise higher revenues and cost savings arising, for example, from economies of scope and scale. Hence, BT would be able to keep any additional profits associated with the supply of enhanced services over the upgraded network. These benefits may extend beyond the current charge control period⁴².

We propose to adopt a moving anchor

- 3.66 We consider that a version of the anchor product regulation may be appropriate for the WBA charge control which will apply in Market 1 exchanges. Anchor product regulation can take several forms, depending on the weights given to the promotion of competition, new investment and consumer protection:
- Under the “static anchor” approach, the definition of the anchor product is fixed at the start of the control for the entire charge control period. This gives the greatest weight to incentives to invest in new technology but with the risk that the relevance of the anchor product, and the extent of the protection it provides to customers, may decline over time. That is, consumers may no longer find the anchor product a relevant substitute for the newer services available and there may be a risk of exploitation of market power because the pricing of such newer services would be outside the scope of the charge control;
 - Under the “floating (or moving) anchor” approach, the definition of the anchor product changes over time, for example to reflect expected changes in usage and improvements in quality which would have been possible with existing

⁴¹ The issue arises particular because of high initial capital expenditure costs associated with 21CN combined with accounting depreciation. Under approaches to accounting depreciation the cost of an asset is usually spread evenly over year of its life. If volumes are low in some years, unit costs will initially be high. Under economic depreciation approaches, the cost of the asset is spread according to the volume of output and unit costs do not vary with asset utilisation.

⁴² The extent to which this may be the case will depend on what, if any, regulation is imposed on WBA in Market 1 after the end of the proposed charge control. For obvious reasons, the nature of any regulation subsequent to the currently proposed control is unknown. However, if we were to impose an RPI-X charge control using a standard glidepath approach, bringing charges into line with 21CN costs by the end of that control, there would still be scope for BT to earn returns above the cost of capital for the duration of the control.

technology. This maintains the relevance of the anchor product and ensures that customers are no worse off than they would have been in the absence of new technology, albeit at the cost of some reduction in incentives to invest in new services relative to the static anchor approach;

- 3.67 Anchor product regulation is “ideally suited to the pricing of access to active network elements”⁴³, such as WBA. This is because the incentive properties of anchor product regulation rely on the maintenance of pricing differentials between services provided using the anchor product and higher quality services which might be provided over new technology. This may not be possible with a ‘passive’ remedy because passive remedies do not allow the provider to control the characteristics of the service offered over it, and so it could be difficult to set prices for a passive remedy which differ according to the quality of service provided to the final customer.
- 3.68 Ofcom is of the view that at a minimum, the control ought to allow for the organic growth in throughput possible using existing technology. This will ensure that we impose an effective constraint on BT’s ability to set its prices, in particular as volume growth will further reduce average costs even using existing technology. On the other hand, we wish to ensure that BT retains good incentives to invest in new technology. In effect, this is similar to our standard approach to volume forecasting in other charge controls. The key difference here is that we propose to limit the volume forecast to one that could be delivered using 20CN.
- 3.69 The impact of this approach is to set the value of X without taking into account potential cost reductions due to new technology, or volume growth which could only be realised if new technology were adopted. BT would then be able to retain any benefit from such further cost reductions, as well as any premium from selling enhanced higher-speed services, and this should give it good incentives to invest in new technology provided it is efficient to do so. However, the extent to which BT benefits from this is limited by the assumptions we make about the underlying growth, consistent with the principles of the moving anchor approach.

Proposed anchor product characteristics

- 3.70 Looking at the WBA service, we have identified two particular characteristics of a WBA service that are integral to the end user experience.
- 3.71 The first is the headline download speed using ADSL that forms part of the retail broadband package purchased by end users. This is commonly advertised in retail broadband offers as an “up to 8Mbit/s” or “up to 24Mbit/s” service and reflects the maximum theoretical download speed. As noted in Table 3.1, BT offers different types of IPS products depending on the maximum download speed a CP wishes to offer the retail customer. In addition, 8Mbit/s is the current maximum with 20CN technology. As discussed before, download speeds above this would require upgrades to 21CN, i.e. enabling exchanges with ADSL2+ modems and any necessary backhaul.
- 3.72 The second characteristic we have identified reflects actual user experience. CPs purchase in advance an aggregated amount of backhaul they believe is sufficient to carry the traffic generated by their retail customers. The more bandwidth purchased the more likely an end user will be able to experience actual speeds close to the headline download speed purchased. So, a CP wishing to offer higher service levels (such as a guaranteed minimum speed) would need to allocate sufficient bandwidth

⁴³ “Future broadband: policy approach to next generation access”, paragraph A7.8. Op cit.

(e.g. on a per end user basis) and apply a price premium over and above standard retail broadband packages.

EUA element

- 3.73 As discussed previously, BT currently offers a range of products in Market 1 including the “up to 8Mbit/s” downstream speed IPS Connect (Max and Premium Max) products, as well as a range of lower speed IPS Connect services (Home & Office 250/500/1000/2000kbit/s). However, as these lower speed services account for less than 9% of the overall WBA market and are legacy products with end user connection and rental prices equal to or higher than the Max/Premium Max services, we propose not to include these low speed products in the basket.
- 3.74 Given our previous finding in the 2010 WBA Statement that there exists a chain of substitution across the different speed broadband access products, we believe that it is sufficient to focus the charge control only on the IPS Connect Max and Max Premium products. These two products have maximum download speeds of 8Mbit/s and reflect what is currently possible using the 20CN. We propose to use this as the basis for defining the anchor product for the duration of the charge control period.
- 3.75 For the avoidance of doubt, this control will apply irrespective of whether the anchor product is actually supplied over the existing network or over 21CN, should that be rolled out in Market 1. This is so that customers for current generation products can be confident that they will always be able to obtain a service at least as good as their current offer, at a price no higher than they would have paid if new technology had not been rolled out.

Contracted bandwidth element

- 3.76 In assessing the amount of bandwidth that should apply to the anchor product, we believe it is necessary to think of the contracted bandwidth CPs purchase on a per end user basis. BT’s WBA revenues reflect the aggregate bandwidth its wholesale customers purchase, rather than the amount actually used by those CPs’ retail customers. This requires CPs to apply network dimensioning rules to plan how much bandwidth they should contract from BT.
- 3.77 One way of doing this is to look at what end users actually use on average, focusing on peak times when it is more likely that more people will be online at the same time. However, the danger with this approach is that where bandwidth is contracted for in an advance, the contracted bandwidth typically exceeds the actual usage (i.e. actual measured bandwidth). Therefore, we requested information from BT on contracted bandwidth for CPs using its IPS Connect product. The analysis of the September 2010 contracted bandwidth data suggests a value of allocated bandwidth per end user of 48kbit/s⁴⁴.
- 3.78 We have also collected information from a range of CPs which purchase IPS Connect about their on-net⁴⁵ (provided over the LLU platform) services. These LLU operators have deployed their networks using ADSL2+ technology with Ethernet backhaul and are therefore able to deliver higher maximum speeds than BT can

⁴⁴ Based on October 2010 volumes and contracted bandwidth as at September 2010 for both IPS Connect and WBMC over IPS Connect (i.e.20CN WBA services utilising IPS Connect as input). Both these services are relevant to the bandwidth component included in the charge control basket.

⁴⁵ The terms “on-net” and “off-net” here refer respectively to services provided within and outside an operator’s LLU footprint (using WBA in the latter case).

deliver in Market 1 using 20CN.⁴⁶ BT's ability to provide similar bandwidth at these exchanges would not be attainable without considerable investment. As noted above, in setting this charge control we propose not to include growth that is only possible with ADSL2+ deployment in Market 1. Nonetheless, these CPs expect content based applications (such as iTunes, YouTube, and iPlayer) to drive increases in end user demand and in turn allocated capacity required to meet this demand over the duration of the charge control.

- 3.79 There are two options for forecasting how bandwidth per end user will change over time for the purposes of defining our anchor product and forecasting costs to 2013/14:
- Option 1 – Assume allocated bandwidth per end user remains constant over time. This would reflect a static anchor, which would only provide protection to end users at the current average contracted bandwidth per end user. This does not allow for organic growth and provides the maximum incentive to invest in new services to drive up actual demand over and above what has been assumed in setting the charge control. This also provides significant pricing flexibility for BT.
 - Option 2 – Assume that allocated bandwidth per end user grows over time.
- 3.80 In the broadband market there has been significant growth in both demand and usage for bandwidth as a result of changing consumer use of content applications. Both BT and other CPs agree that bandwidth usage is likely to increase throughout the period covered by the charge control even with current technology. If this growth pattern continues there would be little protection for end users in Market 1 if the static anchor approach is adopted.
- 3.81 We considered average allocated bandwidth per end user of 48kbit/s obtained for September 2010 (as discussed in paragraph 3.77) as middle year of the financial year 2010/2011. To assess the annual rate of increase, we looked at BT's 2009/10 bandwidth revenues generated from 20CN services only⁴⁷. To calculate the September 2009 average allocated bandwidth (kbit/s) per end user we divided the monthly average bandwidth revenue per EU by the average price per kbit/s. This gave a figure of 39kbit/s. We do not have complete information going further because the market definition used to prepare BT's RFS was on a different basis prior to 2008/09.
- 3.82 The two results implied a growth of 23% per annum for the average allocated bandwidth per end user. We propose to use this assumption over the period of the charge control. This would suggest a starting point of 48kbit/s of the charge control rising to 89kbit/s by 2013/14. This is shown in Table 3.3.

Table 3.3 – Allocated bandwidth growth

	2010/11	2011/12	2012/13	2013/14
Allocated bandwidth per EU	48kbit/s	59kbit/s	73kbit/s	89kbit/s

⁴⁶ LLU networks have the same capabilities as those available to BT on its 21CN.

⁴⁷ The 2009/10 AFI report relates to the period April 2009 – March 2010 and reports middle year figures i.e. September 2009. We looked at the band. The AFI bandwidth revenue figures are split between 20CN and 21CN services. We ignored the revenues associated with the new services.

Question 3.1: Do respondents agree with our proposals on the allocated bandwidth growth? If not, explain why.

We propose to control IPStream Connect product

3.83 As set out above BT offers a range of 20CN and 21CN WBA products. In this section we discuss which product or products should be covered by the charge control.

20CN and/or 21CN?

3.84 There is currently no 21CN deployment in Market 1 exchanges, although the possibility is not ruled out within the charge control period. As noted above, we propose to use an anchor pricing approach, which would suggest that only the 20CN products should be considered in setting charges.

Choice of WBA product

3.85 Having provisionally decided that we will not control 21CN services, there are three options:

- Control all BT 20CN WBA products in Market 1, i.e. DataStream, IPS and IPS Connect;
- Control IPS and IPS Connect; or
- Control IPS Connect only.

3.86 Table 3.2 below sets out the volumes and shares of the different BT WBA products in Market 1.

Table 3.2 – June 2010 WBA retail volumes in WBA Market 1

	Wholesale		Retail	
	Volume	%	Volume	%
IPS	207,860	10%	207,860	10%
DataStream	67,393	3%	67,393	3%
IPS Connect	1,817,111	87%	1,817,111	86%
Others			26,772 ⁴⁸	1%
Total	2,092,364	100%	2,119,136	100%

Source: BT

3.87 We consider regulatory intervention should be to the minimum extent necessary to fulfil our objective of protecting consumers from excessive prices. Given DataStream's negligible share of Market 1 and the availability of the comparable IPS

⁴⁸ These volumes are relevant to small LLU Operators consider as not Principal Operator on the basis of the 2010 WBA Statement and Virgin Media where its exchange area coverage is below the 65% threshold adopted in the 2010 WBA Statement.

product that CPs could switch to if BT raised prices to an excessive level, we do not think that it is necessary to directly control DataStream prices in Market 1.

- 3.88 Turning to IPS and IPS Connect we need to consider whether downstream markets would be sufficiently competitive if only IPS Connect charges were controlled and whether users of IPS would have a viable alternative under this scenario.
- 3.89 CPs who use IPS Connect must interconnect at BT's 20CN handover sites (BRAS). However, for some CPs (for example, smaller CPs), the cost of building out to and connecting at BT's BRAS sites can be challenging. As such, these CPs may find the IPS product, which includes additional connectivity to a suitable point of connection other than a 20CN handover site, better suited to their needs.
- 3.90 If BT were to increase the price of IPS we believe there are three technically feasible options for small CPs:
- Migrate to IPS Connect;
 - Migrate to BT's next generation equivalent for its "Central" product (i.e. Wholesale Broadband Managed Connect); or
 - Purchase an equivalent end-to-end WBA service from another CP who uses BT's IPS Connect as input.
- 3.91 Technical feasibility alone is not sufficient: economic viability from a small CP's perspective should also be taken into account. The more limited are these alternatives, the more likely it is that a charge control on IPS will be justified. We also need to consider the impact on retail customers. That is, whether there is sufficient competition from CPs using IPS Connect such that an increase in wholesale charges would result in end users switching to those CPs. If retail customers are adequately protected by competition among larger ISPs using IPS Connect, then again a control on IPS may be unnecessary, whatever the options available to smaller CPs.
- 3.92 We discussed the above options with a number of CPs. Initial feedback suggest that it is unlikely that small CPs would be able to generate the necessary scale to justify switching to IPS Connect, regardless of the price of IPS. The fixed costs which the CP would necessarily incur in building out its network to BT's BRAS sites means that this is only likely to be economic for larger CPs. We therefore discount the option of migration to IPS Connect as an economically viable alternative for smaller ISPs.
- 3.93 BT's next generation equivalent for its "Central" product (Wholesale Broadband Managed Connect) is more attractively priced compared to IPS. Although it is a next generation product, it is available for use by CPs to supply broadband to customers located in Market 1 and does not depend on the roll-out of NGN technology in Market 1 itself. This is confirmed by one CP, whose observation of the current growth in bandwidth demand has prompted it to start migrating their customers to WBMC in May 2010.
- 3.94 In addition, a reseller of BT's interconnection capacity at the 20CN handover locations also noted that it found it difficult to compete with BT's WBMC prices. We are not aware of any other CPs that intend to expand their resale activities though some have indicated they would consider it only if WBMC price increased considerably. This suggests that BT's WBMC service is an economically viable alternative which small ISPs could use as an alternative to IPS.

- 3.95 Some CPs currently provide an end-to-end WBA service to third parties using BT's IPS Connect as an input⁴⁹. As noted above, one reason why more do not do so may be that currently BT's WBMC represents a cheaper option. We believe however that, if BT were to increase its WBMC prices, it is possible that more resellers of IPS Connect capacity might enter the market, and that small CPs might then find this an economically viable alternative.
- 3.96 We believe there may be constraints on BT's pricing of IPS. Firstly, as there are already some CPs in Market 1 providing interconnection capacity services⁵⁰, if BT were to increase the IPS price, small CPs could seek supply of wholesale capacity from the existing resellers. Secondly, small CPs could migrate to WBMC which is currently a relatively low cost option⁵¹. If this were to change, then there is the potential for entry into the supply of backhaul from other large CPs. As such, two of the three technically feasible options identified would also be economically viable. This suggests that a control on the charge of IPS Connect alone would suffice to protect users of BT's WBA products.
- 3.97 At the retail level, there are other competitive constraints from existing users of IPS Connect if small ISPs were to find themselves at a competitive disadvantage. As can be seen from Table 3.2 above, IPS Connect account for 86% of the retail market in Market 1, compared to only 10% from those using IPS. Within this 10%, we believe the share of any individual CP is likely to be very low⁵². If BT were to introduce price increases for IPS and this was passed on to retail customers, then these consumers could switch to ISPs using IPS Connect. There are currently five large ISPs using IPS Connect in Market 1⁵³. This may in itself provide sufficient protection to retail customers without the need to control the price for IPS as well.
- 3.98 Recently TalkTalk announced plans to further extend its LLU footprint and this rollout would be likely to include some Market 1 exchanges. This could further enhance the competitiveness of the retail market in Market 1, since use of LLU gives the ISP greater control over the product characteristics it can offer, compared to using WBA product.
- 3.99 In summary, we propose that the charge control should apply to IPS Connect only because:
- IPS users are likely to have economically viable alternatives to which they can switch in the event of a price rise; and
 - Retail customers have a sufficient number of alternative suppliers of broadband that they do not need to rely on the small ISPs who use IPS, who together have only 10% of the market.

⁴⁹ We refer to a WBA reseller that uses IPS Connect as input of a WBA end to end service sold in turn to small ISPs. These volumes account for approximately 1% of WBA volumes in Market 1.

⁵⁰ Some other CPs pointed out that if BT were to increase the WBMC price they would consider competing.

⁵¹ WBMC in Market 1 consumes IPS Connect as upstream input.

⁵² Across the whole WBA market there are 145 CPs purchasing IPS. Within Market 1, two CPs account for approximately 15% of total IPS volume. These CPs are Principal Operators accordingly to the definition adopted in the 2010 WBA Statement. We believe that these two CPs will eventually migrate their customer base away from IPS. The remaining volumes are scattered in small blocks and are taken up by small ISPs.

⁵³ In Market 1, other than BT, five CPs purchase IPS Connect. These are TalkTalk, Sky, Orange, Virgin Media and Entanet.

Question 3.2: Do respondents agree with our proposal to charge control IPS Connect only?

Summary of anchor product proposal

- 3.100 We propose to charge control the IPStream Connect Max and Max Premium products. Lower speed IPS Connect products and other WBA products such as IPS, DataStream and WBC are not charge controlled.
- 3.101 We propose that the anchor product used as a basis for our forecasting in the RPI-X model should have the following three characteristics for this charge control:
- a) Maximum bandwidth on the end user access component – up to 8 Mbit/s for the entire duration of the charge control period; and
 - b) Average allocated bandwidth on end user access:
 - Allocated bandwidth of 48kbit/s per end user in 2010/11; and
 - Annual growth rate of 23%.
- 3.102 Based on this anchor product, we discuss in the following sections the charges that will be included in the charge control, including charges for the main elements (such as End User Access and bandwidth charges) and charges for ancillary services.

Question 3.3: Do respondents agree with the proposed anchor product characteristics? If not, explain why.

Section 4

Form and duration of charge control

4.1 In this section we set out the relative merits of the available options for a charge control in the WBA Market 1 area.

Form of charge control

4.2 Issues under this heading include:

- Whether the control should take the form of an RPI-X price cap, cost plus (or rate of return) regulation or a retail minus rule;
- The choice of an index for use in a price cap formula; and
- The treatment of upstream inputs which themselves are subject to price regulation.

4.3 These issues are considered in turn below.

RPI-X

4.4 Under an RPI-X price cap, the price a dominant provider can charge for a regulated product/service is subject to a price cap, whereby the annual allowed increase in price is capped to the value of RPI plus or minus X%. The X is intended to reflect expected gains in efficiency in excess of the average gains across the rest of the economy⁵⁴. So, if the dominant firm faces a control of RPI minus a positive value of X, this means that in real terms the price of the regulated service will fall over the period of the charge control.

4.5 Our approach to setting the value of X is such that at the end of the charge control the dominant provider's projected revenues will be in line with projected costs. The forecasted costs typically assume that the firm will be able to achieve some efficiency savings over the period of the control. In order to maintain profitability, the dominant firm would have to make efficiency savings over and above the level assumed in setting the charge control. Any realised savings can be retained for the duration of the charge control, thus providing the dominant provider with an incentive to find the least cost solution to delivering the regulated services. At the beginning of the next charge control, the level of costs is re-assessed to determine the amount of savings that are passed on to customers in the form of lower prices⁵⁵. Conversely, however, the dominant provider also bears the risk of increasing costs leading to a reduction in profitability below that assumed in setting the charge control.

4.6 RPI-X regulation has historically been used by Ofcom (and before Oftel) to set both retail and wholesale charge controls. It has been used across other regulated sectors in the UK. Its familiarity to stakeholders means that its use enhances the transparency of the charge control. Also, once the value of X is determined, RPI-X provides an "arms length" method of regulating price increases, as regulatory

⁵⁴ This is because if we expected the dominant firms possible efficiency gains to be the same as in the rest of the economy then there would be no justification for a decrease in relative price.

⁵⁵ Indeed, if the subsequent charge control adopts a glide path then these savings can be kept beyond the initial price control period.

approval for price changes within the cap is not required. This flexibility can be enhanced by the use of baskets, under which the required price change is weighted across the price changes of the services in the basket. This means that within a basket, prices can go up and down, as long as the net price change of the overall basket meets the required cap. This flexibility is desirable because the ability to change relative prices, so that they are more reflective of costs, is consistent with promoting efficiency.

- 4.7 However, given the incentive structure of RPI-X regulation, it can also result in a significant divergence of prices from actual costs and the possibility of a period of high profits or losses for the dominant firm. This is allocatively inefficient and creates potential distributional concerns. The risk of this will increase the longer the charge control, and/or if a value of X is incorrectly set (i.e. is set too low in the case of high ex post profits or set too high in the case of losses). Correspondingly a short charge control reduces the dominant firm's investment incentives because its costs will be re-assessed, say, on an annual basis with the possibility that efficiency savings result immediately in lower prices. This may induce the dominant firm to maintain profitability by lowering costs through a reduction in service quality, an undesirable outcome for end users.

Cost-plus regulation

- 4.8 Under cost-plus regulation the rate of return that the dominant firm can earn from selling the regulated product is capped. Charges are set equal to actual costs plus a reasonable mark-up (on a forecast basis). Typically under cost-plus regulation the charges are set for each year of the control.
- 4.9 Cost-plus regulation acts to stabilise rate of return of the dominant firm. Any upside or downside impact on demand or costs are borne by customers, and the firm receives a return regardless of its operating conditions. This stability can encourage investment. The yearly rebasing of the rates also provides flexibility and should ensure that over the period of the charge control there is no wide divergence between costs and revenues.
- 4.10 There are a number of drawbacks to this approach. A key concern is that it has poor incentive properties. The setting of a guaranteed return means that the dominant firm will obtain the same level of profitability regardless of level of costs incurred, limiting the incentives for innovation and cost reduction. Since any changes in underlying costs are immediately passed on to customers, this could also result in large fluctuations in prices faced by consumers. In effect, this form of regulation places relatively less weight on consumer protection and more on ensuring service availability and delivery.
- 4.11 Cost-plus regulation can also distort the incentives and behaviour of the dominant firm in other ways. For example, if the rate of return is set higher than the firm's cost of capital, then this will encourage over-capitalisation beyond the cost-minimising level; since these investments will provide relatively high returns. A further drawback is that cost-plus regulation needs to be supported by a highly intrusive and costly regulatory account structure, as a continuous scrutiny of costs is required.
- 4.12 In practice, most charge controls can be seen as a hybrid of RPI-X and cost-plus regulation. We take into account the justifiable level of costs and assess what is a reasonable rate of return to be recovered through the charge control, but incorporate the incentive properties as set out under the RPI-X approach, by setting a price cap for a period of several years. Both approaches can also encourage inefficient cost

allocation, though less so under RPI-X than cost-plus regulation. The firm has the incentive to allocate more costs to be recovered through the charge control, particularly if the firm provides both regulated and non-regulated services. As such, it is important to define the service(s) to be charge controlled and ensure that only the costs associated with charge controlled service(s) are included.

Retail minus

- 4.13 An alternative to the use of RPI-X or cost-plus regulation is the retail minus approach. This method does not set the absolute level of charges, but instead regulates the margin between the regulated charge and the relevant downstream retail price. To arrive at a wholesale charge, we would take the dominant provider's retail price (or revenue) and deduct from this a measure of retail costs including an estimate of a reasonable return. The wholesale price will be at a level which will enable other providers who are as, or more efficient than the dominant firm to compete effectively in the provision of the downstream retail product. To ensure this takes place the provision of the regulated service would be required on a non-discriminatory basis.
- 4.14 The use of retail minus should provide pricing flexibility for the dominant firm while at the same time ensuring that no price discrimination/margin squeeze takes place between the downstream arm of the firm and competing providers. This should promote efficient entry at the retail level, as in order to compete with the dominant provider and cover its costs, a competing provider would have to have lower costs for the parts of the service it provides itself. In addition, because the wholesale charge does not automatically reflect changes in cost, the regulated firm will have some incentive to minimise costs at the upstream level, as they would be able to keep any realised savings.
- 4.15 Retail minus is the preferred option when regulating a new and innovative market. This is because in emerging markets it is difficult to correctly assess the reasonable return on capital that should be included in any cost-based charges. In such circumstances if the rate of return is set too low then this may adversely affect the incentives to invest and innovate, thereby slowing the development of competition.
- 4.16 However, because retail minus does not control the absolute level of the charges in the market it is not necessarily the case that charges will be cost-orientated. Therefore, although a set of charges based on retail minus may ensure that only providers that are as, or more efficient than the dominant firm can provide a downstream product, it could also serve to protect the dominant provider's revenues rather than exposing them to competition. Moreover it is not necessarily the case that end consumers will face cost-reflective retail charges, and this is potentially allocatively inefficient.
- 4.17 Retail minus may also not be appropriate in circumstances where market power is entrenched and effective competition is unlikely to develop, as in the absence of competitive pressure there is no external restraint on the pricing and revenues of the dominant firm. In contrast, in a market where competition is likely to develop any excess profits earned in the short term would act as an entry signal. Therefore in situations with entrenched market power, retail minus and reliance on a non-discrimination obligation may not be sufficient to ensure that effective competition develops.

We propose an RPI-X charge control

- 4.18 On balance, our initial conclusion is that an RPI-X charge control is most appropriate for setting WBA charges in Market 1 areas. We have chosen to propose to use RPI-X as it is an established and transparent mechanism which will provide sustained incentives for efficiency improvement and innovation. Also, once the value of X is determined it provides an “arms length” regulatory mechanism, which provides a degree of certainty and stability for all industry participants over the period of the charge control.
- 4.19 We have also considered the use of cost-plus and retail minus regulation. A key concern with the cost-plus approach is that it has poor incentive properties; as by setting the level of returns that is deemed fair, it will mean that similar levels of profits will be earned no matter what level of costs are incurred. This significantly reduces the incentive to reduce costs towards their minimum levels. Moreover the use of cost-plus regulation can create distortions in the incentives and behaviour of the dominant firm; and it requires a highly intrusive and costly regulatory structure to maintain.
- 4.20 Our key concern over the use of the retail minus rule is that it is inappropriate to the current WBA market structure in Market 1. This is because BT’s dominant position within Market 1 is entrenched and there is a very low likelihood of competitive pressure developing to an extent which would undermine this position. In circumstances such as these, retail minus and its reliance on a non-discrimination obligation may not be sufficient to ensure the development of effective competition.

Question 4.1: Do respondents agree that an RPI-X control is the appropriate form of charge control for the regulation of wholesale broadband in Market 1?

We propose to retain RPI as the relevant inflation index

- 4.21 We propose to retain the Retail Price Index (“RPI”) as the relevant inflation index. In past charge control reviews, we have considered alternatives to RPI. These include:
- RPIX index which excludes mortgage interest payments;
 - RPIY index which excludes mortgage interest payments and indirect taxes such as VAT and excise duty;
 - Consumer Price Index (“CPI”) is an internationally comparable measure of inflation and is the basis for the UK’s government’s inflation target; and
 - Other telecommunications specific price indices, which would more accurately track telecommunications related prices.
- 4.22 We have noted in the past that whilst the RPI includes some items not relevant to BT’s costs, it nonetheless has the advantage of familiarity to stakeholders. This means that its use as a price control index enhances the transparency of the system.
- 4.23 We have also made the point that it is important that price caps have the effect of indexing price levels against a fixed measure, which is outside the control of the firm subject to the price cap. RPI and other variants of RPI all have this characteristic. We could also account for forecast differences between different measures of inflation in the setting of the cap(s). Therefore, RPI or any of its variants would in principle be an effective index for control of BT’s prices. Adjustments for mortgage interest and/or

indirect taxes would detract from this. Telecommunications specific indices have the disadvantage that BT's prices would be a major input to them and so there would be circularity in setting price controls for BT on this basis.

- 4.24 For the above reasons we believe that RPI continues to be the best index for price control in telecommunications.
- 4.25 We propose that the change in RPI should be measured as the change over the 12-month period until 31 December immediately prior to the start of the annual charge control period. This is consistent with the other BT charge controls. The approach is to enable BT to set charges with certainty at the beginning of each annual charge control period⁵⁶. The choice of the December RPI figure takes account of the timing of the publication of RPI figures (we take into account that this may take up to 1 month), the time for BT to calculate its new charges and the notice period which BT is required to give before charge changes can come into effect (under SMP condition EAA4, BT needs to give 28 days notice of any amendment to the charges, terms and conditions for network access). Given this, BT will be able to announce charge changes in time to take effect on 1st April of each year which it can be sure will meet its charge control obligations for that year⁵⁷.
- 4.26 Under the RPI-X approach, the charge applied in each year of the charge control is calculated as the previous year's charge, multiplied by $(1 + \Delta RPI - X)$, where ΔRPI is the change in the Retail Price Index and X is the specified uniform percentage reduction in the real level of the charge. This approach allows BT to work out at the beginning of each year what prices should be by the end of that year. For example, applying this to the price of IPS Connect Max, the price at the end of a particular year t would be given by:

$$\text{Price of IPS Connect Max}_t = \text{Price of IPStream Connect Max}_{t-1} * (1 + \Delta RPI - X)$$

We propose an upstream input RPI-X approach

- 4.27 As discussed in Section 3, a WBA service is made up of three elements: the end user access, backhaul and handover. In particular, the end user access part of the service requires an upstream input, i.e. the Shared Metallic Path Facility (SMPF). This input is provided via Openreach and is also subject to a charge control.
- 4.28 BT⁵⁸, in providing the WBA service, pays Openreach the SMPF charge for the broadband connection from the end user premise to the local exchange. Its charge

⁵⁶ It should be noted that the X in the RPI-X formulation will not be exactly equal to the real yearly percentage reduction. When prices are stated in nominal terms, inflation must be accounted for and is treated as a geometric term. In the RPI-X formulation inflation is treated as an arithmetic term. A geometric adjustment must be made to the real yearly percentage change. X in the RPI-X formulation is equal to the real yearly percentage change multiplied by $(1 + RPI)$. For this calculation we have assumed an average RPI of 3.6% based on our forecasts of RPI over the charge control period.

⁵⁷ We note that although the first year of the charge control will likely not start until the third quarter of 2011, we would still propose to use the change in RPI over the 12-month period until 31 December 2010. Despite the delay, we would still impose on BT the full value of X to be achieved in the remaining months of the first year of the charge control. As such, we believe the relevant RPI should also reflect the 12-month period consistent with other charge control years. We could propose to use, for example, RPI at 31 March 2011. However, we would then need to make further adjustments to reflect the overlap in the RPI used in the first and second years of the charge control. We believe this adds unnecessary complication compared to the first approach.

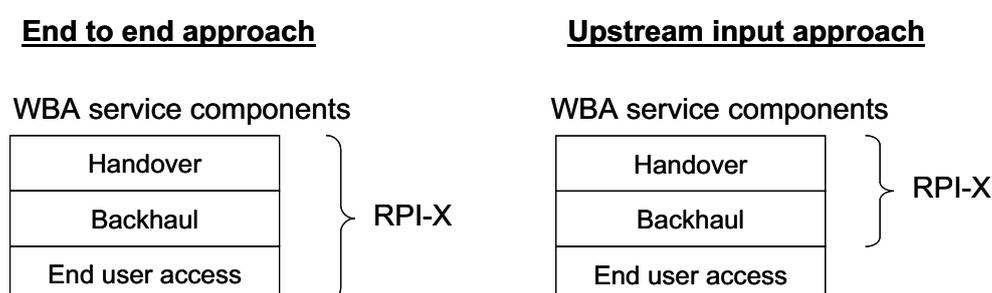
⁵⁸ As indicated above, it is BTW which provides the WBA services.

for the WBA product therefore incorporates the SMPF charge plus a mark up to recover the costs associated with backhaul plus any interconnection and handover.

4.29 We have identified two possible options for modelling costs for the WBA charge control and how we take into account upstream regulation and is illustrated in Figure 4.1:

- Option 1 – End to end approach: Model the end to end costs for the WBA cost components in Market 1;
- Option 2 – Upstream input approach: Use the charges from the upstream charge control (i.e. LLU SMPF which sets the charge for part of the WBA EUA component⁵⁹) as inputs to modelling the WBA costs in Market 1.

Figure 4.1: End to end versus upstream input approach



4.30 Under the end to end approach we would set an X based on the whole WBA cost stack in the Market 1 area, including the local access costs. This approach would require the assessment of local access costs specifically for the Market 1 exchange areas. Essentially, this results in an estimate of Market 1 specific LLU costs. We recognise that exchanges in Market 1 tend to serve relatively low numbers of end users⁶⁰ so the local access costs could conceivably be higher than the national average figures derived in the LLU charge control.

4.31 Under the upstream input approach, we would take as given our previous (or future) decisions with regard to how any geographic variation in costs are reflected in the upstream input charges. The RPI-X control would in effect only apply to the backhaul and handover cost components, and possibly any additional costs BT incur at the end user access part of the network.

4.32 Since LLU is offered on a national basis and as such the cost analysis would have already taken into account higher costs associated with Market 1 exchanges, we believe that the upstream input approach is the more appropriate option as it ensures consistency between the upstream charges and the WBA charge control. The end to end approach is likely to be cumbersome and disproportionate given the level of data required to assess Market 1 specific local access costs, In addition, this is likely to have a spillover implications on LLU prices in Markets 2 and 3 areas.

4.33 Based on our assessment above, we propose the Option 2, upstream input approach, as our preferable option for the RPI-X cost model in Market 1.

⁵⁹ In Section 3 we discussed the EUA component and showed that it comprises the SMPF LLU upstream input (along with LLU ancillary services such as Tie cables, accommodation, power and MDF) and BT’s DSLAMs. BT consumes the SMPF product within this component of the WBA service.

⁶⁰ Review of the wholesale broadband access markets, statement, 3 December 2010, paragraph 4.23 <http://stakeholders.ofcom.org.uk/binaries/consultations/wba/statement/wbastatement.pdf>

Question 4.2: Do stakeholder agree with the adoption of Option 2, the upstream input approach, as our preferred option?

Duration of charge control

We propose a three-year price control

- 4.34 We propose a three-year duration for the WBA charge control. As there is currently no WBA charge control, we propose that the new WBA charge control will run from the date which is 28 days from the issue of the WBA charge control final statement. The statement is due to be issued early in the third quarter of 2011. Allowing a 28 day period before the implementation of the charge control would give BT a notice period which is consistent with its requirement to give 28 days notice of any amendment to the charges, terms and conditions for network access (condition EAA4). We have also considered options for a shorter or longer period.
- 4.35 We consider that our proposal for a charge control period of three years would be consistent with the following factors:
- the forward look in the 2010 WBA Statement;
 - the new EU framework;
 - other Ofcom charge controls; and
 - an appropriate balance between dynamic and allocative efficiency.

Forward look of the WBA market review

- 4.36 In developing our proposal for a three-year control we have taken account of the forward look period of the 2010 WBA Statement. This review considered a period of up to four years as its forward look, i.e. up to December 2014 at the latest. However, as a final statement on the WBA charge control is unlikely to be published until the third quarter of 2011, it would not be appropriate to propose a four year control which would extend beyond the end of the 2010 WBA Statement forward look.
- 4.37 A shorter control of three years would not extend beyond the market review forward look period. It would also allow us broadly to synchronise the charge control remedies and market review periods.

European recommendation on forward looking period of market reviews

- 4.38 An additional influence on our proposal for the three-year duration is the new European regulatory framework, scheduled to be implemented in the UK by May 2011. The European Framework sets the requirements for harmonisation of communications across European member states through a series of Directives establishing rules to be enshrined in the national framework of each member state. The new framework prescribes that market reviews should normally be undertaken by national regulators every three years⁶¹.

⁶¹ Article 19(6) of the Framework Directive, as amended.

- 4.39 As SMP remedies can only be set in relation to a market review, the amendment to the Directives also implies that charge controls should normally be set for a period of no more than three years.

Efficiency incentives

- 4.40 Efficiency is not just about producing things as cheaply as possible, though that is one aspect of it and is termed 'productive efficiency'. It is also about ensuring that the right combinations of goods and services are produced given the tastes and preferences of consumers and citizens. This type of efficiency is termed 'allocative efficiency'. The third type of efficiency is 'dynamic efficiency' – this essentially means that companies are encouraged to engage in investment and innovation – doing new things or doing old things better over time. In assessing options for charge control durations for this charge control review, we have considered the balance between incentives for dynamic efficiency for the regulated firm, and the benefits of allocative efficiency.
- 4.41 Dynamic efficiency concerns the ability of firms to innovate and make efficient investments, including activities designed to reduce costs over time. Price caps generally provide strong incentives for dynamic efficiency because they allow regulated firms to earn profits in excess of the cost of capital if they are able to manage costs below the level assumed in setting the RPI-X formula which regulates prices. These incentives can drive innovation and investment. Other things being equal, incentives for dynamic efficiency will be stronger in a longer than a shorter price cap because a longer period gives the firm more opportunity to enhance its profitability through innovation and cost reduction.
- 4.42 In designing a charge control, incentives for dynamic efficiency must be considered alongside the benefits of allocative efficiency. Allocative efficiency is achieved when prices are aligned with underlying resource costs. As explained above, prices can diverge from costs over the life of a price cap if the costs of price-capped services deviate from the projections used to set the RPI-X control. However, in establishing price caps, regulators are able to ensure that allocative efficiency objectives are also met through the review mechanism and periodic setting of new controls. Hence price caps, if set correctly, have built-in safeguards for both dynamic and allocative efficiency.
- 4.43 Whilst a four-year duration has proved effective in providing a good balance between dynamic and allocative efficiency for other charge controls set by Ofcom, we have concluded that three years is more appropriate for these controls for the reasons explained above (the 2010 WBA Statement forward look period and consistency with the new European framework). We do not believe that a duration of three years will disrupt the balance between dynamic and allocative efficiency effects unduly.

Forecasting issues under longer charge controls

- 4.44 One drawback of a multi-year charge control is the possibility of inaccurate forecasting. For example, inaccurate forecasts of customer volumes or capacity forecasts would be exacerbated over time leading potentially to over or under-recovery of costs.
- 4.45 Options for dealing with this issue include mid-term reviews and error correction mechanisms. Error correction mechanisms would trigger an automatic adjustment to the control if, for example, volumes or costs varied from forecast levels by more than a predetermined amount. However, we do not propose to use either of these

approaches. We think that these would undermine the dynamic efficiency benefits that the multi-year charge controls are intended to achieve.

Summary of proposal for duration of charge control

- 4.46 Taking into account all these factors, we consider that a three-year duration is appropriate for the WBA charge control. However, we are also mindful of our obligation under Section 84 of the Communications Act 2003 to re-examine the markets at appropriate intervals. Should there be a material change within the wholesale markets that underpin the WBA CCs, Ofcom would consider whether it would be appropriate for a review of a market, and remedies imposed, to be undertaken. In making proposals under both the WBA market review and this charge control we have considered issues on a forward looking basis, taking into account relevant matters that we have sufficient clarity on during the review period. Ofcom will continue to carefully follow and evaluate developments in order to ensure that any regulation imposed as a result of the recent WBA market review remains effective in addressing problems with markets. Where a development affects the efficiency of our regulation we will seek to address any concern, noting our obligation to review markets where it is appropriate to do so. Such a statement is simply a restatement of the position set out in the Act, and is not intended to signal an intention to re-open controls during the WBA charge control period; on the contrary, the proposal for a three-year charge control period is made on the basis of providing sufficient stability within markets for both BT and other CPs.

Question 4.3: Do respondents agree that a charge control duration of three years would be appropriate for WBA Market 1?

Section 5

Charge control design

Introduction

- 5.1 Our main objective in setting a WBA charge control is to prevent BT setting excessive charges in wholesale markets where it has significant market power, while providing incentives for BT to increase its efficiency. In addition, we want to ensure that the price controls would still encourage BT to maintain service quality and innovation in WBA services.
- 5.2 In setting the level of the charge control for WBA service in Market 1, we need to balance a number of objectives. If the charge control is set too tight, it may negatively affect end users in several ways. For example, BT may choose to reduce or delay network investment in the areas covered by the charge control. This could result in end users in the charge control area receiving poor or inferior products when compared to end users outside the charge control area. In addition, a restrictive price control could reduce the incentives for other CPs to invest in these areas, thereby reducing the likelihood of increased competition in the charge control areas. If the charge control is too loose, on the other hand, the result may be excessive charges and insufficient pressure to reduce costs. Competition in downstream markets could also be harmed by excessive wholesale prices.
- 5.3 In this section we set out our proposals for:
- The appropriate basket structure;
 - The base year costs;
 - Forecasting those costs to the end of the charge control period; and
 - The need for one-off adjustments.

Approach for charge control design

- 5.4 There are five key steps we follow when designing a charge control framework:
- Step 1: Identify the appropriate charge control basket(s);
 - Step 2: Determine base year costs for the services covered by the charge control;
 - Step 3: Forecast the costs of the services for the duration of the charge control;
 - Step 4: Consider the need for one-off adjustments to starting charges; and
 - Step 5: Calculate the value of X for the proposed basket(s) of services.
- 5.5 In the sections below we discuss the charge control design principles which support each of the five steps listed above. We have also included detailed description of these steps in Annexes 6 (on the assessment of base year costs) and 7 (on our

approach to forecasting costs). The derivation of the cost of capital estimates used in developing our proposals is set out in Section 6.

Step 1: Identify appropriate charge control basket(s)

- 5.6 Consistent with Section 3 above, we propose to charge control the fixed end-user access and the variable allocated bandwidth elements of the IPStream Connect product. In this section we discuss the thinking behind the proposed design of the charge control basket(s).

We prefer wider baskets

- 5.7 Where there is a set of services we propose to control, it is generally efficient to reflect differences in demand (especially the responsiveness of demand to prices) or costs in relative prices. We think BT is generally better placed than Ofcom to do this. In particular, there may be costs which are common across a number of different services, including those that are outside the WBA market.
- 5.8 As set out in Section 3 our proposal is to include both the IPS Connect Max and Max Premium services. If we applied separate controls, we would have to decide what an efficient allocation of common costs would be. This would require extensive analysis based on detailed information on the costs and demand for individual services. This is not likely to be a practical or desirable proposition. In addition, this would reduce BT's ability to respond, for example, to unanticipated changes in relative costs or in the demand for services. This suggests that, by providing greater pricing flexibility, the use of wider baskets may lead to more efficient pricing.
- 5.9 We believe it is appropriate to apply the charge control in the least interventionist way we can, consistent with achieving our regulatory objectives. In instances where we are controlling different types of services applying separate controls is likely to result in a complex set of charge control arrangements and might disproportionately constrain BT's ability to price efficiently. This is further complicated in cases where there are different types of charge associated with each service, for example, connection and rental charges apply for both IPStream Connect Max and Max Premium products.
- 5.10 With this in mind, our general preference would be to combine services into wider baskets unless there are good reasons not to do so.

Differences in competitive conditions might suggest separately controlled services

- 5.11 If competitive conditions between services are different and the services shared the same basket, BT would be able to concentrate price cuts on the most competitive services and offset this by price increases in the least competitive services. This might lead to excessive charges for the less competitive service and might also encourage anti-competitive pricing in respect of the more competitive services. The combination of price reductions intended to restrict or harm competition in the provision of some products, compensated by raising the prices of some of the other services in the basket is sometimes referred to as "costless predation"⁶². This could be avoided by placing the two types of services in separate baskets.

⁶² So called because the ability to offset predatory price reductions with price increases on other services in the basket means there is no cost to the predating firm from making the price cuts.

- 5.12 In addition, if the regulatory regime means that BT makes use of different wholesale inputs to its competitors this might give it incentives to discriminate against its competitors. Again, if there were a number of services in the same basket, BT might have an incentive to concentrate price cuts on the services it uses more intensively at the expense of services it does not use.

Sub-caps might be an alternative option to multiple baskets

- 5.13 Applying very wide baskets where competitive conditions vary significantly could provide an SMP provider with scope to target significant price reductions to particular services. As a general rule, we would therefore propose to apply separate baskets for those services where there are likely to be significant variations in competitive conditions for that service relative to others.
- 5.14 However, where there are some differences in competitive conditions between services, but we nonetheless deem it desirable for these services to be in a single basket, the scope for anti-competitive pricing can be reduced by using sub-baskets or safeguard caps. For example, an appropriate sub-cap could be applied to the less competitive services. By limiting the maximum increase in the price of the less competitive services, the incentive to make predatory cuts in more competitive markets is reduced⁶³.

We propose a single basket

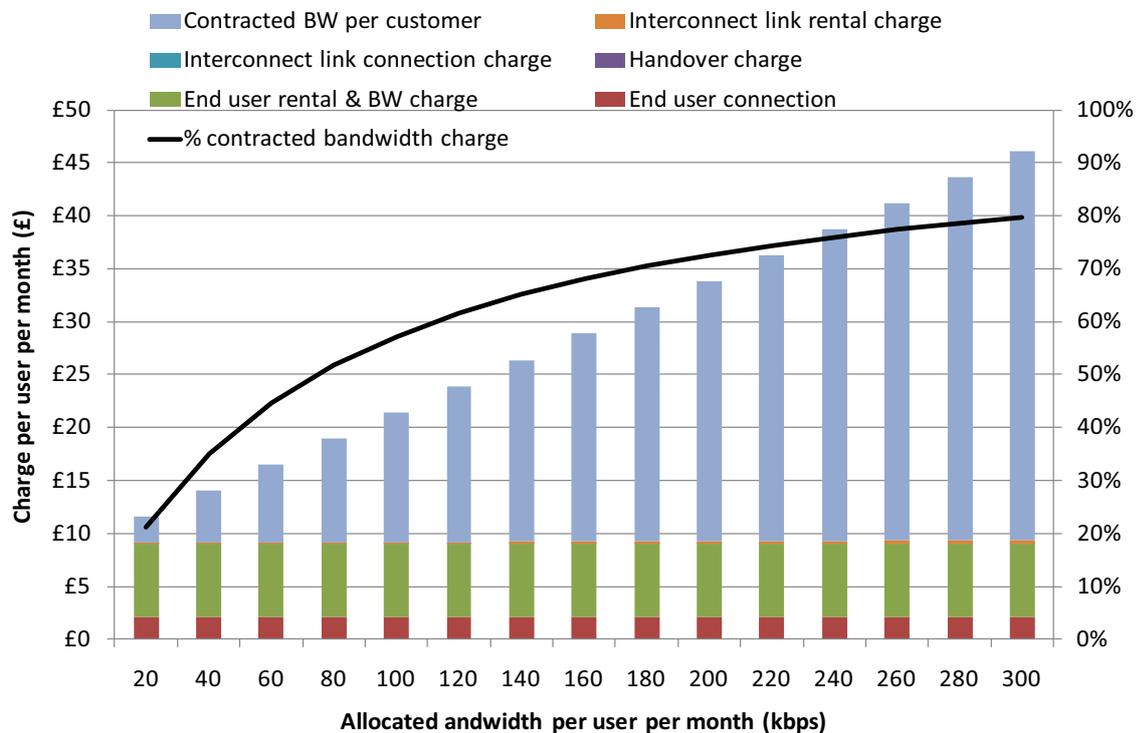
- 5.15 In light of the above, we have considered how to place services in basket controls which will best meet the objectives of this charge control. We have considered two alternatives: two separate baskets – one for the end user access service component and another for the backhaul and handover component; or a single basket covering both end user access, and backhaul and handover.
- 5.16 BT's existing pricing structure for IPStream Connect clearly shows that the end user rental charge (for the EUA service component) and the contracted bandwidth charge (for the backhaul and handover component) make up the bulk of the total charge paid by CPs. Also, the bandwidth-related charge makes an increasing contribution to the overall charge on a per end user basis as the allocated bandwidth per end user increases. For example, the charge per end user with 30kbit/s allocated capacity is £12.79 per month. If the allocated capacity per end user increases to 40kbit/s, this becomes £14.02 per month.⁶⁴ The implied price of backhaul capacity is therefore 12.3p per kbit/s, and the bandwidth related proportion of the overall charge for the service increases to as much as 50% if a CP allocates 80kbit/s per end user. As noted above, we expect that over the period of the charge control, the allocated capacity per end user will increase to 89kbit/s. Figure 5.1 illustrates how bandwidth

⁶³ Suppose services were in the same basket and the basket required BT to reduce prices by RPI-10% each year. Without a cap, BT might decrease prices for the competitive service by 30% and increase prices for the uncompetitive service by 10% and still meet its charge control obligations (as the average reduction would be -10% assuming each price change was weighted equally and RPI was 0). With an appropriate safe-guard cap on the less competitive service, BT would be unable to do this. It would still be able to respond to competition, for example by decreasing prices on the competitive service by 30% but it could not offset this with an increase in the price, in real terms, for the less competitive services, which would greatly reduce the incentive on it to make anti-competitive reductions in prices. These can be applied to individual service elements to avoid excessive rebalancing of charges. The appropriate value of the safeguard cap is likely to depend on the value of the basket X and the relative initial profitability of the difference services.

⁶⁴ See Annex 7 for a description of the current charging structure for IPStream Connect services.

charges increase as a proportion of overall charge (based on current prices), as bandwidth per end user rises.

Figure 5.1: IPS Connect charges on a per end user basis



- 5.17 Given the allocated bandwidth growth assumptions underlying the anchor product, BT's current charging structure might restrict the ability of CPs to provide higher capacity to end users. In turn, this could affect end users' ability to access newer services that require higher bandwidth in the future. At current retail broadband prices of between £12 and £17⁶⁵ per month, any allocated capacity per end user over 80kbit/s is unlikely to be profitable for other CPs. Our analysis indicates that whilst current charges do not suggest excessive returns, it is the future growth in bandwidth demand that could lead to a divergence between costs and revenues⁶⁶.
- 5.18 A single basket approach provides increased flexibility to BT over how it recovers the end user access and bandwidth charges. BT could maintain a higher contracted bandwidth charge by offsetting a large reduction in EUA charges with smaller reductions in bandwidth charges. This might benefit the average user more than the small number of very high usage customers. The average end user benefits from higher allocated throughput plus any price reductions resulting from this charge control. This would also provide BT with flexibility to set the contracted bandwidth to manage the rate of take-up of higher bandwidth services. In contrast, the two separate baskets approach would require BT to bring revenues from the individual services in line with their respective costs as projected by our analysis,
- 5.19 We do not think that there are any significant differences in competitive conditions between EUA and backhaul, both of which are required to provide retail broadband

⁶⁵ See Annex 9 of "Review of the wholesale broadband access markets. Consultation on market definition, market power determinations and remedies", published on 23 March 2010.

<http://stakeholders.ofcom.org.uk/consultations/wba/>

⁶⁶ See Annex 7 for a discussion and comparison of forecast revenues and costs in the absence of the charge control.

products. A single basket would give BT the flexibility to set relative charges within the basket and should encourage efficient pricing structures. It should also provide BT with the flexibility to respond more effectively to any unanticipated changes in the relative costs of and demand for these services.

We propose to include some ancillary charges⁶⁷ within the basket

5.20 WBA ancillary charges can be grouped into three distinct categories:⁶⁸

- BT charge: A charge set by BT where there are no associated Openreach charges;
- Pure pass through: BT charges levied on CPs that are simply a pass through of charges imposed by Openreach; and
- Additional mark-up: BT charges levied on CPs encompass an additional mark-up to the charges imposed by Openreach.

5.21 We propose to consider any BT charge specific to the WBA market without an associated Openreach charge as part of the charge control. Examples of this would be the bandwidth charge that CPs pay as part of an IPS Connect service, or a migration charge levied when a CP migrates its end user from, say one product to another both belonging to the IPStream product family, or between IPStream and DataStream family products.

5.22 The second type of charge is where BT charges CPs exactly what Openreach charges BT, i.e. direct pass through with no mark up by BT. Special Fault Investigations is an example of this type of charge. Since these charges are already considered as part of the LLU and WLR charge controls⁶⁹, we believe it is not appropriate to include them again in the WBA charge control. This is because the costs incurred by BT are exactly recovered through the revenues from CPs.

5.23 Lastly, where BT applies a mark up above the charges set by Openreach, we propose that they are also considered as part of this charge control i.e. where BT applies a mark up above the Openreach charge, we propose to include the mark up in the charge control basket. This is consistent with the upstream input approach discussed in Section 4 for the SMPF charge whereby we remove all the SMPF related costs from the basket on the basis that these costs will be met by the SMPF charge.

5.24 In cases where we consider the charge as part of this charge control, we have to decide whether they form part of the main basket or in a separate basket. The relevant charges are shown in Table 5.1:

⁶⁷ These are BTW charges.

⁶⁸ See Annex 7 for a full list of these charges.

⁶⁹ <http://stakeholders.ofcom.org.uk/binaries/consultations/openreachframework/statement/annexes.pdf>

Table 5.1 – Broadband ancillary service charges in Market 1

Ancillary service	Description
BT charge	
Administration charge	Where order details received from the Customer are illegible, materially incomplete, or incorrect, BT reserves the right to charge the Customer.
Availability checker charges	Enables the potential broadband line speed offered from BT to be estimated by inputting the telephone number or postcode onto the Wholesale line checker system. The Availability checker also details broadband products available at the serving exchange
End user migration charges	<ul style="list-style-type: none"> • EU migrates from one Customer to another w/o change of product and speed. Available to all BT IPStream ADSL end users. • EU migrates from one customer to another with change of product and speed. Available to all BT IPStream product family end users. A single charge is raised (re-grade and migration). <p>When an end user requests a change of product - this will be subject to a re-grade order, subsequent and separate to the migration order.</p>
Re-grade charges	Re-grade charges for IPS Connect are applicable when end users move from IPS Connect Max to Max Premium service (and vice versa).
Additional mark-up	
Cancellation charges for end user access	Where a customer requests cancellation of an End User Access order, as defined within the Conditions of Service, a one-off Single Payment Charge will be levied. The charge will be calculated on the number of Working Days between the date the Customer requests the cancellation and the Original Delivery Date (ODD). ODD is the initial agreed installation date.
End user cease charges	<p>Cease charges will apply when</p> <ul style="list-style-type: none"> • A BT ADSL End User service is terminated (cease); or • Replaced by a non-BT ADSL End User service (cease and re-provide). The cease and re-provide is not applicable to Market 1 by definition.

- 5.25 For the broadband availability checker charge, communication providers can use the checker free of charge up to a monthly quota of checks. There is a £0.50 charge for the use of this above the quota. The quota is set at 50% of the CP's total broadband connections with BT Wholesale. We considered the availability checker in the 2010 WBA Statement⁷⁰ and said that we expected that where CPs considered usage above this quota, which was required to allow them to use the service on a reasonable basis, they should discuss their specific requirements with BT. The intention of the quota approach is that reasonable use of the checker should be free of charge. As such usage above this, and the charge levied is outside the scope of the charge control basket.
- 5.26 For the remainder of the charges, there are two options: include them in the main service basket (i.e. with charges directly associated with IPS Connect services), or have them in a separate "ancillary services" basket.
- 5.27 In our earlier discussion regarding baskets, we stated that our general preference is for wider baskets which include a number of different services. However, we also noted that it may be undesirable for both more competitive and less competitive

⁷⁰ Review of the wholesale broadband access markets, Statement 3 December 2010, para 5.95 <http://stakeholders.ofcom.org.uk/binaries/consultations/wba/statement/wbastatement.pdf>

services to be placed in a single basket as this can encourage anti-competitive pricing. In some cases we have made ancillary services subject to separate controls for this reason⁷¹.

- 5.28 We think that, in the case of the WBA services which are the subject of this consultation, any variations in competitive conditions among them are not likely to be sufficient to require us to place them in separate baskets. However, we do recognise that the charges listed in Table 5.1 relate to services which, in some cases, are required for the promotion of downstream competition in the market (for example re-grade and migration charges). We think it could be undesirable for charges for these services to rise significantly but, as we describe below, we believe that we can reduce the risk of this by applying appropriate sub-caps within the main basket.
- 5.29 There are also practical reasons for preferring a single basket. We have analysed the level of costs and revenues associated with these services, and found that:
- Whilst it is relatively straightforward to identify the revenues generated by the different types of charges, a disaggregation of costs to the same level of detail requires additional assumptions regarding common cost allocation. This would make it significantly more difficult to apply separate controls to individual ancillary charges.
 - In some cases, there is significant under recovery of costs. For example BT has taken a commercial decision to encourage migration to higher specification products by not charging CPs for migration or re-grades. We do not consider decisions of this kind to be intrinsically unreasonable, providing they do not harm competition.
- 5.30 We believe BT should be able to recover legitimate costs associated with ancillary services. But we do not think it is a necessary for the prices of all services to be brought into line with the FAC of those services, individually. There are likely to be advantages to allowing BT to vary the way in which individual prices relate to FAC, provided this does not lead to some operators being disadvantaged relative to others. Whilst the risk of some operators gaining at the expense of others has been a relevant consideration in the design of some controls⁷², we do not currently think that this is likely to be the case for WBA services. Given this, the most practical way to allow pricing flexibility is to include the relevant services in a single overall basket subject to appropriate safeguards (notably sub-caps).
- 5.31 As shown in Table 5.1, a cease is provided when a CP requests BT to terminate a WBA service. We believe that it is desirable to keep cease charges to a minimum in order to keep down the cost of switching between operators. We are more concerned with cease charges than other switching charges because they are more likely to be passed on to retail customers than charges which are related to customers joining a CP. This is because, at the retail level, CPs themselves have an incentive to minimise the charges paid to them by new customers joining, but do not have the same incentive to reduce charges for customers who wish to terminate their service

⁷¹ In the case of the controls on the charges of MPF and SMPF, the structure of the ancillary services controls reflects the fact that there are separate controls on the MPF and SMPF core rental products. This separate basket structure is adopted because BT Openreach uses primarily SMPF whilst its competitors use MPF to a greater extent. Placing all services in a single basket could allow OR to adjust prices to favour its downstream operations by concentrating reductions on SMPF charges, offset by increases in charges for MPF services.

⁷² Notably, again, the MPF and SMPF controls.

in order to switch to another network. If passed on to retail customers, high cease charges could be an impediment to competition.

- 5.32 In addition, the service is a data only change to BTW systems which incurs minimal or no marginal activity on the part of BTW, although in some cases Openreach may be required to remove the SMPF jumpers which support the underlying SMPF service. The costs incurred by BTW, other than any charges levied by Openreach, will therefore also be minimal. Given the benefits to competition of low cease charges, and the minimal cost involved, we are proposing to set BTW's cease charge (or mark-up) to £0. Any cease costs incurred by BTW (other than charges levied by Openreach) may then be recovered through other charges within the charge control basket. Ofcom will be making proposals for future MPF and SMPF cease charges in its forthcoming consultation on controls on WLR, MPF and SMPF charges.
- 5.33 Finally, the pure pass through ancillary service charges that are outside the scope of the charge control basket are:
- Abortive visit charge;
 - Internal shift of end user line;
 - Reworking charge; and
 - Special fault investigations charge.

Question 5.1: Do respondents agree that ancillary service charges should be included in the main basket?

Question 5.2: Do respondents agree with our proposal for the BT end user cease charge?

We propose to use prior year revenue weights

- 5.34 The proposed charge controls on BT will limit the weighted average increase in BT's charges to a maximum of RPI-X. Under a basket approach it is necessary to calculate the basket weights that are used in the calculation of the values of X and to assess BT's compliance with the controls. Regulators who have applied this form of control have generally used one of two main methods of calculating these weights – "prior year revenue weights" or "current year revenue weights".
- 5.35 Under the prior-year weighting approach, basket weights are set equal to the proportions of basket revenues accruing to the relevant services in the year prior to the one in which the price change occurs. Under the current year weighting approach, the weights are set equal to the proportion of current year basket revenues accounted for by each service as a proportion of total current year revenues. A current year weighted control may take the form of a control on average revenue (total revenues divided by total service volumes).

Comparison of prior and current year weights

- 5.36 Ofcom has generally preferred prior year weighting. This is primarily because current year weights cannot be calculated with certainty until after the end of the price control year in which compliance is being assessed, because current year revenues will only be known with a significant time lag. This means that, to decide how far to reduce

prices, the firm has to make forecasts of weights, with the consequent need for retrospective adjustment for forecast errors. Some energy network services in the UK are subject to average revenue controls, which incorporate such adjustment factors. For example, where actual revenues recovered in a particular formula year exceed allowable revenues (implied by the charge control), then the charge control includes a factor for any such over-recovery (or under-recovery).

- 5.37 In addition, a second potential disadvantage may arise where a control base on current year weights is applied as a control on average revenues. In this situation, average revenue can be affected by a change in the product mix within the basket. For example, average revenue will fall if the quantity sold of a lower price product within the basket increases relative to the quantity sold of a higher priced product, even if the prices of both products are unchanged. This is sometimes referred to as the “apples and pears problem”⁷³. In some markets (for example gas or electricity markets) in which average revenue controls have been used, output can be expressed in a convenient common unit, which avoids this problem, but this is much less likely to be true in telecoms markets, particularly with the different mix of charges in the basket. For example the IPS Connect Max and IPS Connect Max Premium per end user charge has the same download speed but differ on upload speeds and contention ratios and contracted bandwidth charge is purchased on an aggregated basis and differs to the download/upload speeds at the end user access level.
- 5.38 By contrast, a prior year weighted control relies only on revenue information which is (or can be) already known when setting prices to comply with the control. In addition, it also has some theoretical advantages which mean that, under certain conditions, it can induce the regulated firm to set Ramsey prices⁷⁴, which are the most efficient way of recovering common costs. Although these conditions are unlikely to hold in practice, this approach nonetheless provides advantages in terms of the practicalities of the charge control compliance.
- 5.39 However, a feature of prior year weighting is that it does not allow for relative price or volume changes during the year in question (though these will of course be included in the weighting for the following year). This means that prior year revenue weights can have disadvantages when revenues from different products within a basket are expected to change markedly relative to each other over the period of the charge control i.e. where service growth rates differ significantly between the services in the basket.
- 5.40 We have proposed a single basket for the EUA and bandwidth related charges (alongside other charges). In our view a prior year revenue weight approach is more appropriate. This is because the baskets we have proposed are relatively simple and the prices and volumes of individual services therein are expected to change in a broadly predictable manner relative to each other during the charge control period. In short we expect growth in bandwidth per user to significantly exceed growth in the number of users. With prior year weights this would imply an incentive to make reductions primarily to the EUA charge, whose weight in the basket we expect to fall over time. Therefore we propose a subcap on the contracted bandwidth charge which will limit the ability of BT to offset such reductions with increases in the contracted bandwidth charge. We also note that reductions in the EUA charge may be more likely to benefit average users than reductions in the bandwidth related

⁷³ So called because, if apple and pears are sold at different prices, compliance with a control on the average revenue from fruit will be affected by changes in the relative quantities of apples and pears sold.

⁷⁴ See footnote 86

charges, which would likely be of most benefit to the smaller number of very high users.

5.41 The prior year revenue weight formula is shown in Condition EAA7(A).6 in Annex 5.

Question 5.3: Do respondents agree with the use of prior year revenue weights for the WBA charge control basket?

We propose the use of sub-caps for certain charges within the basket

5.42 Our current proposal is to have one single basket containing the following types of charges:

- IPS Connect Max and Max Premium connection, rental and bandwidth charges⁷⁵;
- Contracted bandwidth charge;
- Interconnection and handover charges; and
- Ancillary service charges.

5.43 We propose that safeguard caps of RPI-0% apply to the contracted bandwidth charge and to the ancillary service charges for IPS Connect End User Regrade, Migration and Cancellation. The need for safeguard caps follows from our proposal for a single charge control basket with prior year revenue weights as we explain below.

5.44 We stated earlier that a single basket approach provides increased flexibility to BT and that this would have a number of advantages relative to two separate baskets.

5.45 At the same time we recognise that some of the ancillary services have particular significance for downstream competition in the market. We think migration, regrade and cancellation charges fall into this category. The price of migration services, in particular, can directly affect the cost to consumers of changing provider. Keeping these costs down is therefore likely to result in a more competitive market⁷⁶. We think it could be undesirable for charges for these services to rise significantly and so we propose to apply sub-caps within the main basket, as a safeguard.

5.46 As discussed above, the use of prior year revenue weights creates an incentive to concentrate price reductions on services whose weight in the basket is falling over time, and vice versa. We expect growth in bandwidth per user to significantly exceed growth in the number of users. With prior year weights this would imply an incentive to make reductions primarily to the EUA charge, whose weight in the basket we expect to fall over time. Our proposal for a sub-cap on the contracted bandwidth charge is aimed at limiting BT's ability to offset such reductions with increases in the contracted bandwidth charge. We also note that reductions in the EUA charge may be more likely to benefit average users than reductions in the bandwidth related

⁷⁵ Note that the bandwidth charge here is simply an additional monthly charge that is not related to the amount of bandwidth purchased by the CP or the amount of bandwidth used by the retail customer.

⁷⁶ Ofcom has recognised this in setting other charge controls, notably those for WLR, MPF and SMPF services, and supports Ofcom's objective of minimising early termination charges and minimum contract periods.

charges, which would likely be of most benefit to the smaller number of very high users.

Question 5.4: Do respondents agree that safeguard caps of RPI-0% should apply to ancillary service charges?

Question 5.5: Do respondents agree that a safeguard cap of RPI-0% should apply to the contracted bandwidth charge?

We propose that certain discounts should not contribute towards meeting charge control obligations

- 5.47 BT offers a number of different types of discounts on products and services it provides in other markets, including volume discounts, geographic discounts and term discounts.
- 5.48 In some other markets where charge controls have been applied, we have concluded that there should be a general presumption that ‘saw tooth’ discounts are in breach of an SMP requirement not to discriminate unduly⁷⁷. If BT were to offer volume discounts⁷⁸ for its wholesale products, the main beneficiary of those discounts would be downstream providers with the highest market shares. In many markets this is likely to be BT Retail. Volume discounts could therefore be a cause for concern due to the potential for such discounts to favour the largest downstream players, in particular BT itself, which could have a detrimental impact on competition.
- 5.49 In other regulated markets where BT provides a national service it often has the discretion of varying charges by geographic area. In these circumstances it may have an incentive to concentrate price reductions in more competitive areas and offset these against smaller reductions (or increases) in less competitive areas. In the case of this charge control, differential charging by geographic area is like to involve the application of discounts on an exchange-by-exchange basis. Given BT’s SMP obligation of no undue discrimination, we do not believe that discounts of this kind are likely to be appropriate in this market, as they could harm the development of competition.
- 5.50 The charge control requires overall reductions in the price of BT’s WBA services and BT should not be able to provide these cuts only where long-term contracts are signed. We are also concerned that BT might have an additional incentive to offer these discounts if they count towards regulatory requirements.
- 5.51 We note that BT’s current charging structure in Market 1 areas is simple and does not involve any of the discounts discussed above. Based on the considerations above, we do not believe that volume discounts, geographic discounts or term discounts should be relevant for assessing BT’s compliance with the charge control. Our provisional view is that such discounts should not contribute towards BT’s charge control obligations. Therefore, in calculating compliance with the charge control, we propose that the relevant revenues will be calculated at the undiscounted rate.

⁷⁷ See paragraph 8.125

http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr/summary/bcmr_pt4.pdf

⁷⁸ For example we referred to concerns over “saw tooth” or “all-unit” volume discount schemes, as set out in the leased lines charge control, <http://stakeholders.ofcom.org.uk/consultations/lcc/statement/>.

Question 5.6: Do respondents agree with our approach to discounts under the charge control in WBA Market 1 area?

Step 2: Determine base year costs

5.52 In this section, we first discuss the appropriate cost standard on which to calculate the base year costs and propose the use of fully allocated costs (“FAC”) determined using the current cost accounting (“CCA”) framework. We then discuss our analysis and related proposals for establishing the base year costs in the WBA Market 1.

We propose to use CCA FAC costs (2009/10)

5.53 Under BT’s SMP conditions, the charges for its regulated services are required to be reasonably derived from the Long Run Incremental Costs (“LRIC”) of providing that service allowing for an appropriate mark-up, including recovery of any common costs. In the context of determining the apportionment of common costs for this charge control, we considered the following main options:

- Current Cost Accounting with Fully Allocated Costs (“CCA FAC”); and
- LRIC + Equi-Proportional Mark-Up (“LRIC + EPMU”).

5.54 While we think that neither of the above options is necessarily superior to the other, we set out below why we propose to use CCA FAC as the basis for the RPI-X model used to set the WBA Market 1 charge control.

5.55 The LRIC+EPMU approach relies on BT’s estimates of the LRIC of providing relevant services and then marks up these amounts to take account of BT’s common costs. Using an EPMU rule, we can allocate any common costs across the different services in proportion to the LRICs of individual services⁷⁹.

5.56 For the purposes of our cost basis used for WBA services, we relied on CCA FAC because:

- The use of CCA FAC is consistent with the approach we have adopted for other recent charge controls (for example, the Network Charge Controls⁸⁰, LLU charge controls⁸¹, Wholesale Line Rental Charge Controls⁸² and Leased Line Charge Control⁸³). We think that the LRIC + EPMU would require a more time consuming exercise that would involve reviewing BT’s LRIC estimates for individual services and ensuring that they provide an appropriate basis for attributing common costs.
- Both LRIC+EPMU and CCA FAC are forward looking, unlike Historic Cost Accounting (“HCA”) approaches. Charges based on forward-looking costs provide appropriate incentives for entry and investment. Also, both LRIC+EPMU

⁷⁹ For example, if the LRIC of service X were £100 per unit and the LRIC of service £50, then (assuming the same volumes for each service) we would have a 2:1 ratio. If BT had common costs of £6m, an equi-proportional mark-up would allocate £4m to service X and £2m to service Y.

⁸⁰ http://stakeholders.ofcom.org.uk/binaries/consultations/review_bt_ncc/statement/nccstatement.pdf

⁸¹

<http://stakeholders.ofcom.org.uk/binaries/consultations/openreachframework/statement/statement.pdf>

⁸² <http://stakeholders.ofcom.org.uk/binaries/consultations/wlr/summary/wlrcondoc.pdf> and

http://stakeholders.ofcom.org.uk/binaries/consultations/wlr/statement/wlr_statement.pdf

⁸³ <http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/statement/llccstatement.pdf>

and CCA FAC include an allocation of fixed common costs to allow for full cost recovery.

- CCA FAC values assets at their current replacement cost and is consistent with the MEA principle⁸⁴, rather than their historic cost, and attributes all costs, including common costs, on a casual basis, across all of the firm's products and services. Where the CCA FAC framework is applied consistently it should prevent excessive charging while ensuring that BT will be able to recover its efficiently incurred costs in supplying wholesale broadband in Market 1.
- Monitoring BT's actual financial performance on a LRIC basis is not straightforward, as wholesale service profitability information is prepared more generally on a CCA FAC basis. CCA FAC uses data that can be reconciled to the regulatory financial statements, which are audited and are in the public domain. We also think that the CCA FAC and LRIC+EPMU should provide reasonably similar results, particularly at more aggregate levels, since the overall total of costs to be recovered is the same.

5.57 The possible downside of either option is that it does not necessarily result in the most efficient outcome. Recovery of common costs in prices, by means of mark-ups over incremental cost is usually seen as necessary but may result in allocative inefficiency⁸⁵. Approaches have been developed which minimise this inefficiency (subject to the context of cost recovery), by setting prices on the basis of willingness to pay, but they do not eliminate it. Moreover, this approach to pricing, which is called Ramsey pricing, itself has severe practical difficulties since to apply it properly a large amount of information on the elasticity of demand – a measure of how users react to a change in prices – is needed⁸⁶. We have therefore rejected this as an option due to the high information and modelling requirements. In any case, we can achieve some of the efficiency objectives through our charge control design. In particular, the use of broadly defined charge control baskets would devolve decisions over efficient relative prices to BT, which will generally be in a better position to discover efficient common cost recovery profiles. Therefore, some of the benefits of Ramsey prices can still be achieved via the use of wider baskets.

5.58 In addition, we are mindful that our use of CCA FAC to set the current controls was scrutinised by the Competition Commission ("CC") in the appeal of the current LLU

⁸⁴ We explain the circumstances in which we set prices on the basis of MEA costs, and those in which we prefer an alternative "anchor pricing" approach, above at paragraph 3.39 onwards. Asset valuations used in the anchor pricing approach are also based on CCA principles, though not necessarily on the costs of the latest available technology, particularly in circumstances of major technical change. In such circumstances it may not be clear which among available technologies is the MEA and there may be additional uncertainty over the costs of new technology, the strength of demand for any new services provided using that technology and the appropriate speed of transition to new technology.

⁸⁵ Allocative efficiency is about ensuring that resources are allocated to producing the goods and services which consumers' value most. Allocative efficiency is maximised when prices are aligned with the additional cost of producing an extra unit of output, that is, marginal cost.

⁸⁶ Under Ramsey pricing, elasticities of demand are used to allocate common costs. Services with higher elasticities of demand (demand is more sensitive to price) attract lower mark-ups than services with lower demand elasticities. Relative to spreading common cost recovery more evenly, this form of pricing rule can enhance consumer welfare as it can help increase demand from customers with a relatively lower willingness to pay. On the other hand, if charges were set so that common costs were recovered more evenly then these customers may be priced out of the market. Therefore, as the costs of providing services would more closely match customers willingness to pay, on allocative efficiency grounds, there are possible benefits to Ramsey pricing.

and WLR controls. In its determination, the CC found that we were not in error in our use of CCA FAC to check that the price differentials between MPF and SMPF+WLR were at least equal to LRIC differentials. It also found that we had given sufficient weight to allocative and dynamic efficiency factors in adopting a CCA FAC approach to cost allocation⁸⁷.

- 5.59 In summary, we propose to use CCA FAC, given the additional resource costs and time associated with LRIC+EPMU modelling. CCA FAC has had the benefit of greater transparency to enable us to map more easily BT's audited regulatory financial statements to relevant base year costs. CCA FAC is also consistent with the other charge controls currently being determined by Ofcom for other areas of BT's business such as leased lines and Openreach. This ensures that all common costs are properly accounted for.

Question 5.7: Do respondents agree that CCA FAC is the appropriate cost basis to use in setting the charge control for WBA services in Market 1?

We propose some adjustments to base year costs

- 5.60 Our approach starts with base year costs on an EOI view, i.e. it uses the charges from the upstream LLU charge control as input to the WBA costs in Market 1, as discussed in Section 4. We have removed all SMPF related costs from our base year data on the basis that these costs will be met by the SMPF charge. Similarly, the costs associated with ancillary services whereby there is a pass through of Openreach charges, these are also excluded.
- 5.61 For the purpose of reflecting the upstream LLU services in the charge control basket we need to remove costs associated with SMPF charges. As discussed in Section 4 the end user access part of the network is addressed in the LLU/WLR charge control. As such the costs we consider in the charge control basket excludes the Openreach SMPF costs.⁸⁸ Similarly, we also exclude the costs associated with ancillary services that are recovered via a pass through of Openreach charges such as some of the costs associated with Special Fault Investigations.
- 5.62 In addition, we also analyse the RFS financial data in order to determine a base year cost base suitable for modelling costs in future years. We adjust the RFS data for market definition changes and to eliminate 'one-off', non-relevant or non-recurring costs in 2009/10. If these adjustments were not made then the results of our charge control model would be distorted.
- 5.63 There are still a number of adjustments we need to make to the remaining 2009/10 costs to reflect the basket level costs and used as the basis for our cost forecasts. This is discussed in turn below, and explored in detail in Annex 6.

Redefinition of market boundaries

- 5.64 The recent market review amended the market boundaries however BT's 2009/10 RFS were prepared against the previous boundary definitions. We have adjusted the

⁸⁷ See the CC's decisions in "The Carphone Warehouse Group plc v Office of Communications", August 2010, cases 1111/3/3/09 (the "LLU decision") and 1149/3/3/09 (the "WLR decision").

⁸⁸ We note that this approach requires a similar treatment on the revenues side. BT's end user access rental and connections would have incorporated corresponding Openreach SMPF connection and rental charges. So, when calculating X, we need to compare revenues excluding Openreach SMPF costs against the charge control basket costs.

costs between markets to reflect the new market definitions using location and exchange cost data provided by BT.

Geographic allocation of costs

5.65 BT's published RFS do not attribute all costs to each of the three WBA markets. For the purpose of deriving a base year cost for modelling purposes we developed the attribution methodologies further to ensure all costs were attributed across all three WBA markets. This involved the development of smaller specialised models to attribute the costs of the ATM network and backhaul costs in addition to the use of other cost drivers such as rental and connection volumes.

Adjustments to align costs with our Hypothetical Ongoing Network (HON) modelling assumption

- 5.66 We have made a number of adjustments to the cost base to bring the FY2009/2010 RFS in line to reflect our HON assumption, consistent with our anchor pricing approach. These adjustments include:
- i) The ratio of net replacement cost to gross replacement cost (NRC/GRC) adjustment: a number of the assets used in the WBA market are fully depreciated. As a result we need to make assumptions regarding the state of a hypothetical ongoing network. This is explained fully in Annex 7.
 - ii) As discussed in Section 3, costs associated with BT's 21CN in respect of software costs and customer re-grades have been identified and excluded on the basis that they are transition costs related to 21CN activities.
 - iii) Additional ATM costs: BT have provided data to us showing that specific ATM costs were incorrectly excluded from the WBA market in the 2009/10 RFS. We have added these costs.
- 5.67 These adjustments to the WBA charge control model are summarised in Table 5.2.

Table 5.2 - Adjustments made to BT's RFS to derive the base year input cost

	£million
BT's RFS FY2009/2010*	
Market 1 attributed costs	92
Other Non-attributed costs	500
Market 2&3 attributed costs	214
Total WBA costs as per the RFS**(excluding holding (gain)/loss)	806
EOI view	
SMPF related costs	151
Openreach SMPF costs***	199
EOI view removes SMPF related costs but adds back Openreach SMPF costs	852
Ofcom Adjustments	
Exclude SFI costs recovered through pass-through of Openreach charge	-22
Include additional ATM costs	21
Exclude software depreciation	-33
Exclude 21CN re-grade costs	-38
Total adjustment	-73
Charge control basket costs***	582

* BT attributed costs in line with 2008 the market view market boundaries.

** As per BT's Current cost statements for 2010 page 76.

*** Openreach SMPF costs are calculated as Openreach SMPF charges multiplied by BT volumes.

**** Charge control basket is EOI view, excluding Openreach SMPF costs and includes Ofcom adjustments.

Question 5.8: Do respondents agree that our adjustments to BT's base year costs in Market 1 are appropriate?

Step 3: Forecast the costs of the services in scope for the duration of the charge control

We propose a bottom-up approach to volume forecasts

5.68 Our approach to volume forecasting is divided into three distinct sections:

- End user volumes, including rentals, connections and ceases. We also forecast broadband regrades and special fault investigations ("SFI").
- Allocated bandwidth required per end user.
- Backhaul, where backhaul refers to the conveyance of end user traffic from the local exchange to the handover site (i.e. at the BRAS).

5.69 As with any standard charge control, there is a need to make assumptions regarding expected volume growth. Typically, volume growth results in lower unit costs as a consequence of economies of scale. Passing this reduction on to end users in the form of lower prices would achieve allocative efficiency. On the other hand, we need to consider potential benefits for dynamic efficiency by providing incentives for innovation and investment. An aggressive volume forecast is unlikely to achieve this.

- 5.70 In addition, we need to consider volume growth that is consistent with our view of what is possible using BT's existing network and allow for this in forecasting costs, consistent with our anchor pricing approach.

End user volumes

- 5.71 In order to understand how costs are likely to change over the charge control period, we need to forecast the volume of WBA services that BT is expected to supply. We have identified two counteracting drivers of changes in the volumes over the duration for the charge control:

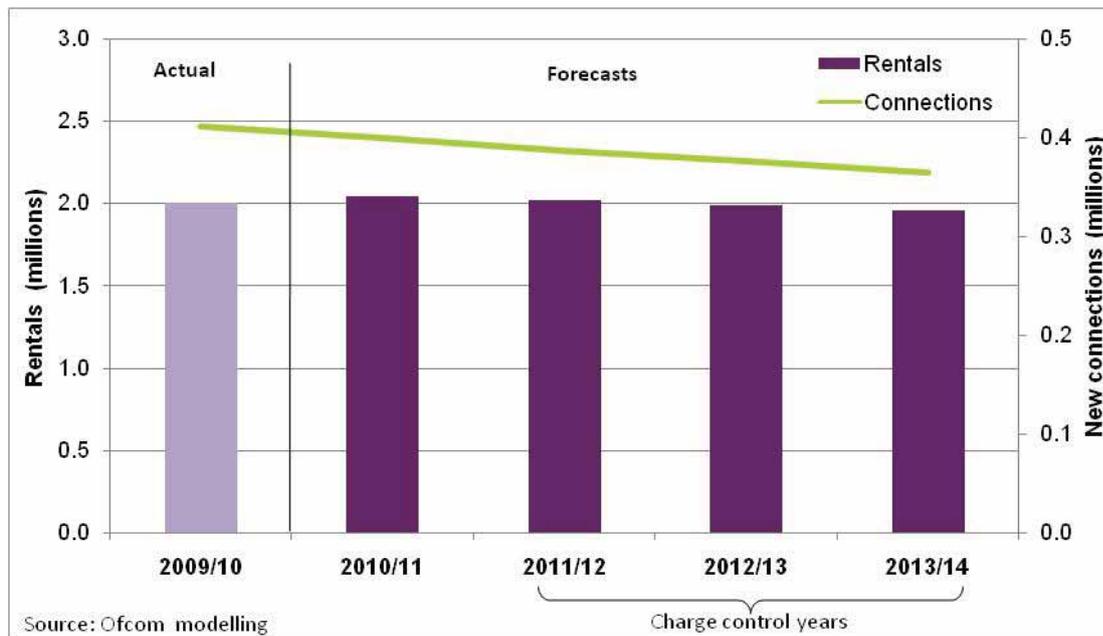
- End user volume growth; and
- The rollout of LLU in Market 1.

- 5.72 In determining the appropriate future level of end user volume growth we have considered a range of sources, including brokers' reports, forecasts by consultants and BT's own view on future development of the retail broadband market. These all point to a growing market, albeit at a steadily declining rate. For the purposes of forecasting the underlying growth of end users we have assumed an annual growth rate of 2% per annum over the charge control period.

- 5.73 Counteracting the increase in end users is the rollout of LLU in Market 1 by TalkTalk Group (TTG). This is discussed in the 2010 WBA Statement in paragraph 3.169 to 3.190, 4.36 to 4.40 and 5.91 to 5.92. This will have a negative impact on BT's volumes in Market 1, and to gain an understanding of this we have developed a simple model. This uses exchange level data on the number of customers TalkTalk currently serves using BT Wholesale products in Market 1 to forecast the impact on BT volumes over the duration of the charge control. The model assumes that the rollout will target the exchanges with the highest number of TalkTalk customers first, and we estimate that 90% of TalkTalk's customer base will have migrated off BT's network by the end of the charge control. We have taken this approach because we consider it is likely that an operator, in deploying LLU, would focus on the exchanges where it already has a customer base that it could migrate in order to achieve the scale needed to make investment in the smaller exchanges in Market 1 more viable. We have then added an increase in these customers to account for the potential to grow the base using LLU. We have also assumed that migration of customers will be not quite fully completed to align with the expectation that this rollout may take a significant proportion of the period of the charge control to complete and so migration of end users may not be completed within the period. We note that whilst these assumptions may over- or under- state the actual impact of any rollout, the impact on our model is reduced because it is offset against the underlying growth in end users we have assumed.⁸⁹

- 5.74 In the base case, the forecast annual migration of volumes in Market 1 exchanges to LLU (i.e. 3.5% per annum or 10% over three years) is greater than the increase in end users (i.e. 2% per annum). Therefore our base case assumption is that the number of WBA lines in Market 1 will fall by 1.5% per annum over the duration of the charge control. Figure 5.2 sets out our forecasts of WBA rentals and connections in our base case. Full details of our approach to volume forecasting, and the rationale behind our base year volume forecast is provided in Annex 7.

⁸⁹ For example, a reduction in migration of 1% per annum (equivalent to around 7% total migration over three years compared to our base case of 10%) would lead to an increase in the value of X by 0.3%.

Figure 5.2 - Volume forecasts for rentals and connections in Market 1

5.75 The number of end users and the level of allocated bandwidth are key drivers of backhaul. This is discussed in more detail below.

Bandwidth growth

5.76 As discussed in Section 3, we propose to assume allocated bandwidth per end user of 48kbit/s in 2010/11 and reaching 89kbit/s in 2013/14, reflecting an annual growth of 23%. See Table 5.3.

Table 5.3 – Allocated bandwidth growth

	2010/11	2011/12	2012/13	2013/14
Allocated bandwidth per EU	48kbit/s	59kbit/s	73kbit/s	89kbit/s

5.77 This assumption drives our forecasts of backhaul requirements. At each exchange we calculate the total bandwidth required at each exchange as the product of the number of end users and allocated bandwidth per end user. We compare this against the total bandwidth available at this exchange. If the backhaul requirement exceeds the available capacity, we assume that BT will add a new 155Mbit/s backhaul circuit to the exchange⁹⁰ and a new DSLAM to go with it.

5.78 We calculate the need for a new backhaul link taking two utilisation factors into account. First, we reduce the available capacity from 155Mbit/s to allow for SDH management overheads. The SDH management overhead captures the signalling and traffic management. For an STM-1 circuit this overhead traffic accounts for 6% of

⁹⁰ We note that if the increase was greater than the extra capacity provided by a 155Mbit/s circuit then we would have to add additional DSLAMs and backhaul circuits until enough capacity is provided. However, in practice the increases are all a step increase of 1; this is because the step change in end user bandwidth is small, even for the larger exchanges, relative to the size of additional backhaul.

the nominal capacity (i.e. 10Mbit/s), leaving 145Mbit/s available to carry broadband traffic.

- 5.79 Second we use data provided by BT to assess the utilisation at which network growth must occur. BT's network planning allows for end users to experience a minimum service level allowing a 2Mbit/s connection for 90% of the time. Thus, whilst the average usage per end user is shown in Table 5.2, network utilisation is driven by the statistical modelling of the capacity needed to meet this service level. Over the past year this has led to an utilisation of around 50%, that is, the actual traffic load has been approximately 50% of the provisioned ATM network capacity. BT has argued that an assumed utilisation above this would lead to a reduced level of service.
- 5.80 BT has also stated that trend might be for a lower utilisation as more bandwidth hungry, real-time services such as video streaming increase in popularity. We have used the utilisation data provided by BT, which indicates that the spare (or overhead) capacity provided is equal to 94% of used capacity so that total provisioned bandwidth is 1.9 times used bandwidth. This gives the approximately 50% utilisation discussed above. We have carried out some sensitivity analysis on this (see paragraphs 5.138-5.143).
- 5.81 Therefore, our model adds backhaul capacity on an exchange-by-exchange basis when:

$$\text{Number of end users} * \text{allocated bandwidth per end user} \\ (\text{expressed as per Mbit/s}) * 1.9 > 145\text{Mbit/s}$$

- 5.82 BT has further indicated that this approach over-estimates the utilisation of backhaul capacity. This is because it assumes the ATM Virtual Paths from the DSLAMs can be exactly mapped into the available 145Mbit/s SDH backhaul capacity whereas BT argues this is not practically in reality. However, BT has not provided information on the impact of this on utilisation and as such we have not factored it into our model.

Backhaul requirements

- 5.83 Backhaul refers to the conveyance of end user traffic from the local exchange to the handover site (i.e. at the BRAS) and is required to provide WBA services to end users. We forecast backhaul requirements based on our technical understanding of the 20CN network. Annex 7 provides the rationale and calculations used to forecast future WBA backhaul requirements. Based on the STM-1 SDH circuits and DSLAMs added at each exchange, we then forecast the corresponding requirements to carry the traffic on the ATM network.

We forecast cost requirements using asset and cost volume elasticities

- 5.84 AVEs and CVEs define how costs of providing WBA services change in response to changes in volumes. For a 1% increase in cost component volumes⁹¹, the AVE defines the percentage increase in gross replacement cost (GRC) of the assets required. Similarly, the CVE defines the percentage increase in operating costs required. Our expectation is that BT's economies of scale would mean that as volumes rise, unit costs would fall and vice versa. In our analysis we use AVE and CVE estimates produced for the 2004 PPC charge control statement to calculate the AVE and CVE for each cost component.

⁹¹ Cost components are the underlying components that make up WBA services. The relationship between service volumes and component volumes is set out in Annex 7.

- 5.85 Under certain circumstances we have adjusted the AVEs for certain cost components to 1, which means that costs will change proportionately with volumes. This is based on our forecasting of backhaul volumes, conducted on an exchange by exchange basis. That is, when capacity is exhausted at an exchange BT will add a DSLAM and a 155Mbit/s link, and this will require additional customer and network interface ports⁹². Our backhaul forecasting approach means that forecast volumes are analogous to the actual assets that would be required to provide WBA, and as such we consider that an AVE of 1 appropriate. Table 5.4 lists the cost components that have an AVE of 1.

Table 5.4 - Components with an AVE of 1

Component	Calculated AVE	New AVE
CO312 ATM customer interface > 155Mbit	0.63	1
CO313 ATM network interface	0.64	1
CO314 ATM network switching	0.64	1
CO316 Inter ATM transmissions	0.36	1
CO681 Broadband backhaul circuits	0.41	1
CR188 DSLAM (capital / maintenance)	0.26	1

- 5.86 Note, in accordance with the anchor pricing approach, we base any predicted cost changes (in response to increasing or decreasing market demand) on the costs of providing those services over the hypothetical ongoing network. We would do not therefore seek to model any unit cost changes that could arise from demand migrating to a new platform (such as BT's 21CN). A full discussion our approach to AVEs and CVEs is provided in Annex 7.

Question 5.9: Do respondents agree with our approach to AVEs and CVEs? If not, please explain why.

We propose the use of “Rest of BT” rate for the cost of capital assumption

- 5.87 As part of this consultation on the WBA charge control, we also make proposals in relation to BT's cost of capital. These proposals are set out in detail in Section 6. For the purpose of our consultation of the WBA charge control, we focus on the appropriate WACC rate for WBA services.
- 5.88 Our estimates of the cost of capital for BT Group, Openreach and the Rest of BT are set out in Table 5.5, alongside our previous estimates, which were for May 2009.

Table 5.5: Cost of capital estimates for BT – May 2009 vs. January 2011: pre-tax nominal WACC estimates

	Openreach	BT Group	Rest of BT
May 2009 ⁹³	10.1%	10.6%	11.0%

⁹² See Annex 8 for a full discussion of our approach to backhaul forecasting

⁹³ See Annex 8 of the May 2009 statement “A new pricing framework for Openreach”:

<http://stakeholders.ofcom.org.uk/binaries/consultations/openreachframework/statement/annexes.pdf>

Jan 2011 (extended range)	7.9% – 9.4%	8.2% - 9.7%	8.5% - 10.0%
Jan 2011 (mid-point)	8.6%	8.9%	9.3%

- 5.89 Our range of estimates for Openreach’s pre-tax nominal WACC, applicable to its WLR and MPF services, is 7.9% – 9.4%. Our proposed range for the pre-tax nominal WACC for the rest of BT is higher, because these services are higher risk (reflected, in the CAPM framework used, in a higher beta value). The proposed range for the WACC for the rest of BT is 8.5% – 10.0%. These ranges are consistent with a BT Group range of 8.2% – 9.7%.
- 5.90 In deciding which rate is appropriate for WBA services, we have taken into account the recent Competition Commission decisions in the Leased Lines, LLU and WLR charge control appeals, in particular regarding:
- Whether it is reasonable for Ofcom to estimate only two disaggregated costs of capital, one for copper access services and one for the rest of BT; and
 - If so, how should Ofcom decide which rate is appropriate to any particular service?
- 5.91 Section 6 explains further how we have arrived at these figure, and reasons behind the changes.
- 5.92 We have also considered BT’s arguments that an even higher rate is appropriate for WBA services to reflect the need for higher returns on new and innovative services. This argument was advanced in a paper by dotecon submitted as part of BT’s response to our consultation on the WBA market review⁹⁴. In short, we do not believe that it is relevant to the WBA market in the current stage of its development. We respond in detail to the dotecon paper in Annex 8.

We propose the use of 5-year average asset price changes

- 5.93 The price that BT has to pay for new assets will clearly impact on its costs going forward. Changes in asset prices impact on BT’s asset base valuation and give rise to holding gains and losses which are reflected in operating costs in the year in which they arise. In order to assess these costs, we forecast the likely changes in the price of assets over the duration of the charge control. Our proposed assumptions on asset price changes are discussed in greater detail in Annex 7.

We propose to assume operating cost efficiency improvement of 2% to 5% per annum

- 5.94 When analysing efficiency improvement for the purposes of setting charge controls we attribute savings to:
- The “catch-up” factor which measures the amount by which BT would need to reduce costs to be as efficient as the efficient benchmark operator, and

⁹⁴ http://stakeholders.ofcom.org.uk/binaries/consultations/wba/responses/BT_Annex_5.pdf

- “frontier shift” which is the rate at which an efficient company would be expected to reduce its real unit costs over time due to technical progress and productivity improvements.

We assume catch-up efficiency of 0%

- 5.95 We have not commissioned new research into BT’s overall efficiency for the purposes of this review. We can however use the results of some relevant research carried out for other reviews, which we already have. One such study, carried out by NERA,⁹⁵ (the “NERA efficiency study”), considered BT’s efficiency on a network basis and compared BT to US Local Exchange Carriers (LECs). This study was used to inform Ofcom’s decision in the 2009 Leased Lines Charge Control (LLCC).
- 5.96 NERA estimated BT’s efficiency at a relatively aggregated level, rather than focusing solely on the provision of leased lines. This at least partly reflected the nature of the available data and the fact that the statistical robustness of the results of these studies tends to decline as the degree of disaggregation increases. It does however give the study wide applicability to a range of BT services and its results can be applied in a consistent way across charge controls.
- 5.97 NERA’s report provided estimates of BT’s efficiency based on different model specifications. As with its previous study (carried out for then Oftel), it assumed that the relevant benchmark is the top 10% of US LECs, which we refer to as the top decile. NERA’s analysis showed that BT was around, possibly slightly above, the top decile. BT also commissioned Deloitte (“Deloitte 2009 study”) to respond to NERA’s study. As part of the 2009 LLCC consultation process, Ofcom assessed both Deloitte⁹⁶ and NERA studies and concluded that both studies consistently show that BT is above the decile.⁹⁷ This suggests that, at the time of the study, it was appropriate to assume a catch-up factor of 0% for the purposes of forecasting BT’s costs.
- 5.98 We recognise that both reports were based on data which may no longer be the most recent available. The US comparator data has been collected on a consistent basis annually by the Federal Communications Commission (FCC)⁹⁸ for around 70 LECs. This data is available with some time delay, so the 2008 study used data up to and including 2006. In 2008 the FCC implemented reporting changes, reducing the filing requirements for some LECs. Given that both studies covered data from 1996 to 2006, we did not believe that an additional year’s data would give us significantly different results than one obtained previously.
- 5.99 For the purposes of this charge control, BT commissioned Deloitte to produce an updated version of the efficiency report (“Deloitte 2010 study”), which made use of the additional data for 2007. The results showed that BT was still above the decile. Whilst we disagree with some aspects of Deloitte’s approach, as we discuss further below, the consistency in the results of the two Deloitte’s studies provides some indication that BT’s position relative to the benchmark level of efficiency has not

⁹⁵ NERA, 17 March 2008, “The comparative efficiency of BT Openreach.”

<http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/annexes/efficiency.pdf>

⁹⁶ NERA, 6 May 2008 “Comments on the Deloitte paper on “the efficiency of BT’s network operations”” <http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/annexes/operations.pdf>

⁹⁷ See Annex 7 of the 2009 Leased Lines Charge Control Statement.

<http://stakeholders.ofcom.org.uk/consultations/llcc/statement/>

⁹⁸ <http://www.fcc.gov/wcb/armis/>

changed markedly since the first study. We believe that it is unlikely that BT's relative efficiency has declined to a point below that of the benchmark operators.

- 5.100 On balance, we propose to make no 'catch-up' adjustment for efficiency in our RPI-X model. We also welcome respondents' views on further evidence regarding alternative catch-up assumptions.

We assume frontier shift of 2% to 5%

- 5.101 We build into our cost forecasts efficiency improvements that BT might reasonably be expected to achieve over the duration of the charge control. These efficiency improvements relate to expected reductions in real unit costs, which do not depend on changes in the volumes but reflect the general improvements in efficiency, which all firms seek to make. In line with our anchor pricing approach, this is based on the likely efficiency improvements of BT's continuing hypothetical network.
- 5.102 We often base our estimates of likely future efficiency improvements on the trend of reductions in real unit costs in the recent past, for a given service. In its decision on the appeal of the ORFF (the "LLU decision"), the CC indicated that significant weight should be placed on historic trends in efficiency derived in this way. In estimating likely future efficiency improvements for WBA, our preference would therefore be to take into account the trend of BT's past improvements in real unit costs. However, given that BT's reporting of the WBA market only became available from 2008/09 onwards, we would only be able to examine unit cost change between 2008/09 and 2009/10. Given the data required, i.e. costs on an end-to-end basis as well as EOI basis, we have not carried out this analysis but intend to consider this question further during the consultation period.
- 5.103 NERA's comparative efficiency analysis mentioned above also estimated a time trend, which measures the average rate of change in costs of US LECs. It concluded that costs were falling at 2.5% to 3% per annum in real terms for the period 1999 to 2006, lower if data from 1996 were included. In contrast, the Deloitte 2009 study suggested an annual rate of decline of total costs of around 2.2%. This is consistent with Deloitte's 2010 study that estimated the time trend from the comparative analysis of 2%, or 3% for the period between 2004 and 2007. We believe the comparative analysis results obtained by the Deloitte 2010 study are similar to those obtained by NERA's previous study. This supports our view that the contribution from the additional year's data to an estimate of the time trend is small.
- 5.104 We also recognise that Deloitte's 2009 and 2010 studies also considered efficiency estimates based on total factor productivity (TFP) models. The 2009 study suggested TFP growth rates of around 0% to 1.9% whilst its 2010 results indicate a range of 1% and 2.4% per annum between 1996 and 2007.
- 5.105 Deloitte's TFP models used data from US LECs as well as European telecommunication incumbent operators. As in the 2009 study, Deloitte's analysis uses the Tornqvist index for inputs and outputs and estimating what the time trend has been for the two indices. The Tornqvist index is a standard measure used in productivity analysis and takes into account the impact of changing cost weights over time. Deloitte defined the aggregate Tornqvist index at time t as the average of each output's growth rate using geometric average of the base year and current year cost weights.

- 5.106 For the reasons set out in the 2009 LLCC Statement⁹⁹, we do not think that it is appropriate to anchor the weights to a base year. We believe that Deloitte's results obtained using their specification of the Tornqvist index are likely to be biased as a result of this aspect of their method. On the balance of evidence, we believe that the likely lower bound of efficiency improvement is around 2% per annum, with a base case of 2.5%.
- 5.107 In the LLCC we were able to use past data on leased line costs to estimate trends in efficiency. This analysis suggested that, with a central frontier shift estimate of 2.5%, an upper bound of 5% was reasonable. As noted above, we have not been able to carry out a similar analysis of WBA costs for this review. However, we think it is unlikely that an assumption of real unit cost reductions in excess of 5% per annum is justified, in the absence of any strong supporting evidence and in the light of the analysis for the LLCC. We therefore propose an upper bound of 5% to allow for potentially higher efficiency savings by BT. We welcome respondents' views on the appropriateness of 2.5% as an efficiency assumption and on whether there is evidence to support a higher or lower figure within the 2% to 5% range.
- 5.108 In the light of evidence above, we propose to assume frontier shift efficiency of 2% to 5% per annum on operating costs, with an estimate of 2.5% for our base case.

Question 5.10: Do you agree with our central estimate of 2.5% for efficiency improvements? If not, please explain why.

Step 4: Consider one-off adjustments to start charges

We do not propose one-off adjustments to start charges

- 5.109 As part of our charge control assessment, we have considered whether to make any one off adjustments to prices. Our general preference is to adopt a "glide path" approach, whereby the charge control would bring about a gradual convergence of prices and unit costs over the period of the control. In some cases adjustments could be justified at the start of the control to prices which are markedly out of line with cost. However we do not believe this is the case with the WBA charges as we explain below.

Our general preference is for glide-paths

- 5.110 Often, a new charge control replaces a similar expiring control on the same set of services. In these circumstances, we have a strong preference for glidepaths rather than one-off adjustments to charges. This is largely for incentive reasons, as we explain below.
- 5.111 One of the features of price cap regulation is that profits may diverge from the level expected at the time when the control was set. Any such divergence may be taken into account when X is reset in the next price control review. In principle, one way in which this could be done is by a one-off adjustment to prices, which would bring the firm's expected rate of return to an acceptable level in the first year of the new cap. The main alternative is a "glide path" approach, which would set the control so that the expected rate of return reaches an acceptable level by the end of the price control period.

⁹⁹ See Annex 7 of the LLCC statement for a more technical treatment and fuller discussion of this issue: available at <http://stakeholders.ofcom.org.uk/consultations/llcc/statement/>

- 5.112 The benefit of the glide path approach is that it approximates more closely than one-off reductions to the workings of a competitive market in which excess profits are gradually eroded as rivals improve their own efficiency. It also avoids discontinuities in prices over time and leads to a more stable and predictable background against which investment and other decisions may be taken, by both suppliers and customers in the telecoms market. This is particularly important for telecoms as there are now many players besides BT.
- 5.113 This approach also has greater incentives for efficiency as it allows the firm to retain the benefits of cost reductions made under a previous charge control for longer. The key difference between price control and rate of return control, in terms of their incentive properties, arises from the longer regulatory lag in the former. This means that cost reductions feed into price reductions only after a period during which the firm receives the benefit of increased efficiency. One-off adjustments to prices would reduce the effective regulatory lag, and hence the incentives to reduce costs. Clearly, as WBA services have not hitherto been charge controlled, this argument is less relevant here, although it may become more so in future, if there were to be a subsequent control.
- 5.114 Whilst the above discussions relate to one-off cuts to prices, one-off increases would similarly raise concerns about incentives for efficiency. Allowing a rapid rise in charges (i.e. via one-off price adjustments) would signal to BT that cost increases would quickly be followed by price rises. Therefore, if cost increases resulted in swift price increases this could reduce the incentive to control costs. Indeed, one-off adjustments upwards could create an expectation that other one-off adjustments – up or down – will be made in future, and this could also have adverse effects on incentives.
- 5.115 Whilst the charge control incentive arguments are of less relevance to the WBA charge control, the potential impacts of one-off charge changes on regulatory certainty and stability may be more so. CPs have made investment decisions regarding their presence in Market 1 areas, the location of their interconnection with BT's network and therefore the type of WBA services purchased. Unanticipated one-off changes to WBA charges could make some of these investments appear to be "the wrong choice" and would not necessarily best reflect outcomes likely in competitive markets (whereby surplus profits are gradually eroded).

We might consider one-off reductions under some circumstances

- 5.116 While the above suggests a general preference for the "glide path" approach in the context of RPI-X controls, this does not mean we should rule out one-off reductions where there are good reasons to introduce them. In the context of the WBA charge control, it is useful to understand the circumstances under which we might consider one-off reductions. This might include, for example, situations in which:
- There are strong allocative efficiency arguments for bringing prices into line with cost sooner (such as where BT's prices of particular services are out of line with cost-orientation requirements); and/or
 - The previous charges were unregulated or are not subject to charge control and where BT's charges are high relative to costs.
- 5.117 Therefore, if prices of individual services are materially out of line with costs we may need to address this through one-off reductions. However, in assessing possible one-off reductions, we need to balance this against alternative (and potentially more

proportionate) regulatory approaches. We also need to consider the materiality of the issue (particularly given the risk of damage to incentives associated with one-off adjustments). It may also be possible for BT to make acceptable voluntary adjustments in prices without us having to mandate this through detailed one-off reductions.

The CC has accepted our approach in the LLCC Appeal

- 5.118 We required some limited one-off price adjustments at the start of the 2009 Leased Lines Charge Control (“LLCC”) because of the extent to which certain prices were then out of line with cost¹⁰⁰. We used DLRIC and DSAC to identify the strongest cases for one-off changes to charges at the start of the charge control, since we regard charges outside these benchmarks as giving rise to the greatest risk of harm. The LLCC precedent is particularly relevant to WBA because the rental charge for 2Mbit/s trunk services was reduced by a one-off cut to the level of DSAC (only, not to FAC for example), even though the charge had not previously been subject to RPI-X control.
- 5.119 DLRIC and DSAC are used as a “first-order test” for the “cost orientation”¹⁰¹ of charges (the test is “first order” because, although an important consideration in itself, other factors are also taken into account before reaching a conclusive view on cost-orientation). We did not consider whether BT had in fact complied with its cost orientation obligation, as this was outside the scope of the LLCC¹⁰². However, we took the view that DLRIC and DSAC met the much lesser test we set out, namely, that they were reasonable benchmarks to inform our judgement of the appropriate balance between one-off adjustments at the start of the control and glidepaths.
- 5.120 In its decision on the appeal, the CC accepted the validity of the one-off adjustments to bring charges within the DLRIC and DSAC benchmarks. Indeed it stated that BT should have expected such adjustments (paragraph 3.135 of the CC’s determination). Even the appellant (C&W) accepted that one-off adjustments could be reasonably justified where these were necessary to bring prices within the DLRIC floor and the DSAC ceiling. This is discussed in paragraph 3.224 of the Competition Commission’s (CC) determination¹⁰³ where it is noted that “C&W agreed that when the prices of services were outside the DLRIC-DSAC range, it was right to bring them back in”. However, the CC found that Ofcom erred in accepting another one off increase to a charge which was already within these bounds.
- 5.121 In the light of this, we believe that, where a charge is out of line with costs to an extent which could cause material distortion, a one-off adjustment should be made at the start of a charge control in order to correct this. In addition, we believe that DLRIC and DSAC are reasonable benchmarks to use in order to identify those charges giving rise to the greatest risk of distortion, and that it is appropriate to bring charges within these bounds.
- 5.122 This does not however mean that we will conduct a test for cost orientation as part of charge control reviews. We did not do so in the LLCC review and indeed stated explicitly that such a test was out of scope. Moreover, provided the necessary data

¹⁰⁰ op cit fn 86

¹⁰¹ BT’s WBA charges in Markets 1 and 2 are required to be cost oriented following Ofcom’s 2010 WBA Statement.

¹⁰² See LLCC Statement at paragraphs 3.227 and 4.190

<http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/statement/llccstatement.pdf>

¹⁰³ op cit fn 86

can be obtained it is not necessary for a service to have been subject to a cost orientation obligation for DLRIC and DSAC to be used as benchmarks in this way. For example where a hitherto unregulated service in which BT has been found to have SMP is made subject to a charge control for the first time, and charges appear to be at a level which risks distortion, it may be appropriate to make one-off adjustments. As in the LLCC, we take the view that DLRIC and DSAC are reasonable benchmarks to inform our judgement of the appropriate balance between one-off adjustments at the start of the control on BT's WBA charges and the RPI-X glidepath.

- 5.123 We therefore asked BT to provide the data necessary to compare BT's WBA charges with the relevant DSACs in order to identify any possible need for one-off reductions. However, BT was unable to provide the relevant information on DSAC. In the absence of DSAC data we have therefore considered the level of BT's WBA prices relative to FAC and BT's rate of return (ROCE) on WBA services on an FAC basis. For a given service, DSAC will almost always be significantly above FAC, often between 50% above and double the FAC figure. To make a strong case for a one-off cut on the basis of FAC data, a price significantly above FAC is therefore likely to be required.
- 5.124 In addition, assessing prices on the basis of their relationship to FAC must be done with caution. Placing too much weight on an observation that prices are above the cost of capital could risk imposing rate of return regulation and unduly limit BT's pricing flexibility. BT does not operate under conditions of perfect certainty and if demand for the service increases unexpectedly, a temporary increase in profitability may result. Alternatively, if consumer demand declines due to a slowing of economic growth then profitability may also decline. Accounting information may not always accurately reflect "true" or underlying profitability for a variety of possible reasons.
- 5.125 A snapshot of one year's ROCE would therefore not be a very good indicator of whether prices were excessive. Evidence that rates of return were persistently high could however suggest more strongly that some one-off adjustment to prices might be appropriate.
- 5.126 In our first WBAMR consultative document we presented an analysis of trends in ROCE between 2003/04 and 2008/09¹⁰⁴. These data were not disaggregated by geographic market but at a national level, the data showed that accounting rates of return (ROCE) were initially negative but had increased over time and were significantly above the cost of capital by the end of the period. However, we did not consider that the high returns on capital towards the end of the period were excessive because a pattern of early accounting losses offset by later profits might be appropriate where a new product is introduced and prices are initially low in order to develop the market.
- 5.127 The more recent data which we have obtained as part of this consultation suggest that, at a national level, accounting ROCE has fallen since 2008/09. Table 5.6 shows the changes to the ROCE figures for WBA in Market 1 in year 2009/10 following the base year cost adjustments discussed above. Given this and our view, set out in the market review, that ROCE and prices were not clearly excessive, we do not propose to make one-off cuts to WBA charges in Market 1.

¹⁰⁴ See "Review of the wholesale broadband access markets", 23 March 2010, table 4.3 on page 72.

Table 5.6 – ROCE analysis year 2009/10

	RFS FY 2009/2010	Ofcom adjusted total WBA market view	Percentage allocated to Market 1	WBA Market 1 (after cost adjustments)
<i>Number of rentals</i>	8,022,996	8,022,996	25%	2,004,320
Total Turnover (£m)	975	945	32%	304
Openreach SMPF cost (£m)	199	199	23%	46
Turnover less SMPF (£m)	776	746		258
Total Costs (£m)	653	582	26%	153
Margin (£m)	123	194		101
Capital Employed (£m)	1242	1,496	29%	406
ROCE (%)	10%	13%		25%

Question 5.11: Do you agree with our proposal not to make one off adjustments to WBA prices at the start of the control? If not, please explain why.

Step 5: Calculate the value of X for the proposed basket of services

In the base case the basket X is –12.75%

5.128 The base case is our central estimate of the likely developments in the WBA market over the duration of the charge control. Table 5.7 presents the key assumptions used to generate the base case.

Table 5.7 – Base case assumptions

Assumption	Base case value
Allocated bandwidth	48 kbit/s in 2010/11, growth rate of 23%
Asset prices	5 year average from 2005/06 – 2009/10*
AVE/CVE values	2004 PPC values
Base year cost adjustments	Applied
Capacity overhead assumption	94%
Efficiency	0% Capex, 2.5% Opex
End user volume growth	Market 1, -1.5% Markets 2 & 3, 2%
Inflation	Based on independent forecasts
NRC/GRC adjustment	Applied for ATM assets only
Pay & Non-pay nominal price trend	Pay, 3.5%, Non-pay, 2.5%
WACC (per-nominal tax)	9.3%

* For cable and duct the five year average from 2004/05 – 2008/09 is used due to discrepancies in the 2009/10 data

Costs in the base case

- 5.129 To understand the changes in total cost over the duration of the charge control it is conceptually useful to consider how the cost of services changes in relation to allocated bandwidth. For example, connection and rentals costs will not change with a change in allocated bandwidth. In comparison, backhaul costs, where backhaul captures the conveyance of end user traffic from the local exchange to the handover site will be increasing in allocated bandwidth.
- 5.130 This is because, other things remaining equal, the number of users that can be supported on a given capacity will be decreasing in the level of allocated bandwidth. For example, theoretically an exchange with one DSLAM and a 155Mbit/s backhaul link would in 2010/11 be able to support 1,594 end users. By the end of the charge control the same exchange would only be able to support 859 end users, a fall of nearly 50%¹⁰⁵. Therefore, the increase in allocated bandwidth, from 48kbit/s in 2010/11 to 89kbit/s in 2013/14 will increase backhaul costs
- 5.131 We capture this in the WBA model by the use of exchange level analysis on the total level of available and required bandwidth. If the bandwidth requirement exceeds the available capacity we assume that BT will add a new 155Mbit/s backhaul link to the exchange and a new DSLAM to go with it. Based on this we then forecast the corresponding requirements to carry the traffic on the ATM platform. For Market 1 in 2011/12 94 new DSLAMs are installed, in 2012/13 146, and in 2013/14 284. Correspondingly the number of 155Mbit/s circuits crossing the ATM network increases by 338, 526 and 1022 in 2011/12, 2012/13 and 2013/14 respectively. The installation of additional backhaul to support bandwidth growth over the duration of the charge control increases backhaul costs.
- 5.132 In contrast, the forecast costs associated with connections and rentals will fall over the duration of the charge control in line with the 10% fall in end users over the same period. However, this is offset by the increase in backhaul costs, as the total level of traffic being carried on the network increases year on year driven by the increase in allocated bandwidth. Table 5.8 presents the forecast administration-related costs (such as selling, general & administrative expenses), capital costs and operating costs for each year of the charge control.

Table 5.8– Market 1 Costs, by year

Forecasts	2010/11	2011/12	2012/13	2013/14
Admin-related costs (£m)	8.0	8.0	8.0	7.9
Capital costs (£m)	131.8	133.4	139.5	154.0
Operating costs (£m)	74.5	73.6	74.2	76.5
Total (£m)	214.4	215.0	221.6	238.4

¹⁰⁵ After taking into account the fill factor and the overhead assumption the real capacity of a 155Mbit/s link is 74.7Mbit/s, this is divided by the allocated bandwidth per end user (in Mbit/s) to estimate the maximum number of end users that can be supported.

Revenues in the base case

- 5.133 Revenues in the WBA market can be split into three categories, end user access, bandwidth, and other revenues. Where end user access captures revenues from connections and rentals, bandwidth captures revenues from the bandwidth charge, while other, includes revenue from interconnect links and the handover charge. From this in line with our modelling approach we have to exclude SMPF revenues, as these are passed through to Openreach.
- 5.134 The increase in allocated bandwidth during the charge control has a significant impact on bandwidth charge revenue. In 2010/11 the bandwidth charge is £122.64 per Mbit/s per month, this is equivalent to an annual charge of £1,471.68 per Mbit/s¹⁰⁶. A CP with one hundred customers in Market 1 would in 2010/11 have to allocate 4.7Mbit/s of bandwidth, at an annual charge of £6,917. With the increases in allocated bandwidth by the end of the charge control, to support the same end user base the CP would have to allocate 8.7Mbit/s of bandwidth, at a charge of £12,804. For BT this would be an increase in bandwidth revenue of nearly 50%.
- 5.135 In contrast, end user access revenues steadily fall over the duration of the charge control, in line with the fall in end users. But this is more than offset by the significant increase in bandwidth revenue, which increases from £135m in 2010/11 to £241m in 2013/14. Corresponding to this the percentage of total revenue accounted for by the bandwidth charge increases from 43% in 2010/11 to 58% in 2013/14. Table 5.9 shows forecast Market 1 revenues in the absence of the charge control.

Table 5.9 – Market 1 Revenues, by revenue category and year

Forecasts	2010/11	2011/12	2012/13	2013/14
Bandwidth (£m)	135.1	163.7	198.5	240.6
End user (£m)	168.6	166.0	163.3	160.7
Other (£m)	12.9	13.1	13.2	13.4
SMPF pass through (£m)	-44.4	-43.5	-42.7	-41.8
Total (£m)	272.3	299.3	332.4	372.9

Costs, Revenues and the base case X

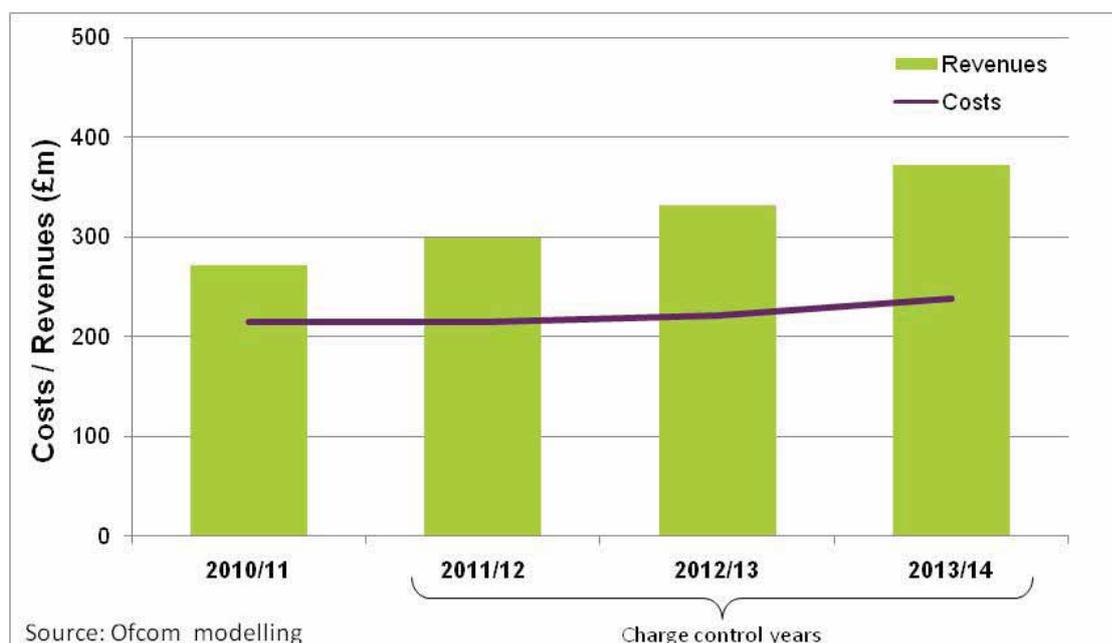
- 5.136 In 2013/14 Market 1 costs are estimated to be around £238m. This can be compared to total revenues in the absence of a charge control of around £373m. Figure 5.3 provides a comparison of costs and revenues over the duration of the charge control. It is clear that without the charge control there is the potential for BT to make

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http://www.btwholesale.com/pages/static/service_and_support/service_support_hub/online_pricing_hub/SPPL_Page/part_8_ipstream_connect.html

excessive returns. The X is set so that total revenues in the basket will be equal to the total costs in the final year of the charge control¹⁰⁷.

Figure 5.3 – Market 1: Costs and revenues over the duration of the charge control



5.137 As discussed above in paragraphs 5.76 and 5.82 costs and revenues for rentals and connections will fall over the duration of the charge control, in line with the forecast fall in the number of end users owing to the rollout of LLU. In contrast, backhaul revenues increase dramatically, reflecting the 23% year on year increase in allocated bandwidth. And, although we forecast that backhaul costs will also increase to support this additional bandwidth; this is overshadowed by the increase in backhaul revenues. As a result our basket X of -12.75% is primarily required to bring bandwidth revenues down to costs.

We forecast a low and high growth scenario for allocated bandwidth and end user volume growth; this corresponds to a range of -10.75% to -14.75%

5.138 With any forecasting there is inherent uncertainty, expected developments may not occur, while unforeseen changes can radically alter the shape and profile of demand. To assess the potential sensitivity of the model to changes in our growth assumptions, we forecast a low and a high growth scenario for end user and allocated bandwidth growth. These reflect our best estimate of the lower and upper bound of the potential growth rates.

5.139 Our low estimate of end user growth is -2.5% per annum, while our high estimate is +0.5%. In the low growth scenario by the end of the charge control, BT volumes in Market 1 will be 4.0% (4.1%) lower (higher) than in base case. For allocated bandwidth, forecast growth in the low scenario is 10% per annum, while our high

¹⁰⁷ For Xs that are applied equally for all services within a basket, the value of X can be calculated as

$$X = 1 - \left(\frac{C_T - P_{SMPF} V_{SMPF}}{V_T P_0} \right)^{\frac{1}{T}}$$
 where costs at the final year of the price control is C_T , $P_{SMPF} V_{SMPF}$ is the total Openreach cost, final year revenues calculated as final year volumes V_T multiplied by final year price $P_T = P_0(1-X)^T$. If a different level of X is applied for each of the services, an iterative method is required to determine the level of X to be applied to the basket.

estimate is 35%. By the end of the charge control allocated bandwidth in the low scenario will be 64kbit/s, and 118kbit/s in the higher scenario, this can be compared to our base year value of 89kbit/s. Table 5.10 below presents a snapshot for 2013/14 of the impact of the growth sensitivities. The base case is included for comparison.

Table 5.10 – High and Low growth: Allocated bandwidth and end user growth

	Forecasts	Allocated bandwidth			End user	
		Low	High	Base case	Low	High
Growth parameters	Market 1 end user growth rate (%)	-1.5%	-1.5%	-1.5%	-2.5%	0.5%
	Market 1 volumes: 2013/14 (m)	1.96	1.96	1.96	1.88	2.04
	Allocated bandwidth growth rate (%)	10%	35%	23%	23%	23%
	Allocated bandwidth: 2013/14 (kbps)	64	118	89	89	89
Backhaul	Cumulative number of DSLAMs installed in Market 1, 2013/14	286	1187	680	603	739
	Cumulative number of 155Mbit/s links across ATM network, 2013/14	1030	4273	2448	2171	2660
Costs	Administration costs, 2013/14 (£m)	7.9	7.9	7.9	7.9	8.0
	Capex, 2013/14 (£m)	127.7	188.5	154.0	148.7	158.1
	Opex, 2013 (£m)	70.7	83.9	76.5	75.3	77.4
	Total, 2013/14 (£m)	206.4	280.3	238.4	231.9	243.4
Revenues	Bandwidth revenues, 2013/14 (£m)	172.1	318.1	240.6	231.1	250.4
	End user access revenues, 2013/14 (£m)	160.7	160.7	160.7	154.9	166.8
	Other revenues, 2013/14 (£m)	12.9	13.9	13.4	12.9	13.9
	SMPF pass through (£m)	-41.8	-41.8	-41.8	-40.7	-43.0
	Total, 2013/14 (£m)	303.9	450.9	372.9	358.2	388.1
Basket X		-10.75%	-13.75%	-12.75%	-12.25%	-13.25%

- 5.140 The results of the low and high growth scenarios reinforce the importance of bandwidth revenues in determining the value of X, as the high and low growth bandwidth scenarios provide an indication of the lower and upper bound of our results.
- 5.141 For end user volumes, in the low growth scenario, the fall in end user volumes contributes to a steady, but relatively small decline in end user and bandwidth revenue relative to the base case. The opposite is true in the high growth scenario.

Table 5.10 shows that the low and high growth end user scenarios have a smaller impact on costs and revenues, and the subsequent value of X than the bandwidth scenarios. This is because our X is primarily required to bring bandwidth revenues down to costs. And, in both scenarios, the level of bandwidth growth, the key driver of bandwidth revenues remains unchanged.

5.142 The impact of allocated bandwidth growth on the level of additional backhaul required, backhaul costs, and bandwidth revenues is highlighted in Table 5.10. For example, in the high growth scenario, by the end of the charge control total costs are approximately £42m higher than in the base case. But this is more than offset by the increase in bandwidth revenues of £78m over the same period. In the low growth scenario, the opposite pattern emerges as both backhaul costs and bandwidth revenues will be lower. In both scenarios, as in the base case, it is the bandwidth revenue and not costs, that drive the value of X.

5.143 Therefore, our range for the value of X is from –10.75% and –14.75%.

We have analysed the impact of changing the capacity overhead assumption

5.144 As explained above in paragraphs 5.76 to 5.82 there are two factors to consider when calculating the backhaul capacity requirements. While a STM-1 backhaul circuit has a nominal capacity of 155Mbit/s, the actual capacity must take account of two factors, the management overhead, and the capacity overhead assumption (which reflects utilisation). The management overhead captures the signalling and traffic management, which along with restrictions on the virtual path sizes mean that the maximum capacity available for broadband is lower than the nominal capacity. For an STM-1 circuit this traffic accounts for 10Mbits/s of the nominal capacity, leaving 145Mbit/s available to carry broadband traffic.

5.145 In calculating how much backhaul capacity is needed based on our forecasts of end users and the growth in average end user traffic, we also need to take into account the stochastic nature of the traffic generated by end users. This will lead to more bandwidth being provided in order to ensure that end users receive an acceptable level of quality of service, especially at peak times. We account for this by using a capacity overhead figure which is applied to allocated bandwidth. The overhead is derived from data provided by BT, and shows that, based on BT's planning practices; spare "overhead" capacity is equal to 94% of utilised capacity in its WBA network. We therefore adopt this in the base case so that, in effect, a 155Mbit/s link is considered fully utilised when offered traffic calculated as number of end users multiplied by average throughput per end user equals 75Mbit/s¹⁰⁸.

5.146 Other things remaining equal, an increase in the overhead will for a given level of allocated bandwidth increase backhaul costs. This is because available capacity for broadband traffic will be decreasing with the overhead, and vice versa. We recognise that over the duration of the charge control the overhead could change. This could be driven by content innovation, which could lead to higher levels of downloads and streaming. Other things remaining equal, this will increase the level of peak demand, and a higher overhead would be required to provide the same quality of service.

5.147 To assess the sensitivity of the model to changes in the utilisation (e.g. the capacity overhead discussed above), we have assessed the impact of varying our assumptions (whilst maintaining the management overhead figure so that the total available capacity on an STM-1 link is 145Mbit/s). We have considered a lower

¹⁰⁸ This is calculated as the capacity available for broadband divided by (1+Capacity overhead).

estimate of the capacity overhead of 85%, and a higher estimate of 100%. Under these assumptions the available capacity for broadband on a 155Mbit/s circuit will be 78Mbit/s, and 73Mbit/s respectively. Table 5.11 shows the number of additional DSLAMs, a key driver of backhaul costs, and total costs in Market 1 for each year of the charge control charge control with the low and high overhead assumption. The results in the base case are included for comparison.

Table 5.11 – Market 1, Additional DSLAMs and backhaul costs

Forecasts		2010/11	2011/12	2012/13	2013/14
DSLAMs	Additional DSLAMs, with 85% overhead	134	85	134	241
	Additional DSLAMs, with 94% overhead	156	94	146	284
	Additional DSLAMs, with 100% overhead	165	111	157	288
Total costs	Total costs, with 85% overhead (£m)	212.5	212.4	218.1	231.5
	Total costs, with 94% overhead (£m)	214.4	215.0	221.6	238.4
	Total costs, with 100% overhead (£m)	215.1	217.2	224.7	241.7

5.148 The lower level of the capacity overhead reduces the number of additional DSLAMs that need to be installed to support the same level of capacity, this results in lower costs. The higher level of capacity overhead has the opposite effect. With an 85% overhead assumption, by the end of the charge control total costs are 3% lower than in the base case, while in the high scenario the corresponding costs are 1% higher. As the change in costs is relatively small, and as the change in the overhead assumption does not affect revenue, which drives the results, it only has a limited impact on X. With an 85% overhead the X is -13.50%, and with a 100% overhead the X is -12.25%, these can be compared to our central estimate of -12.75%. The difference between the results is driven by backhaul costs and we note that both these results are within our range.

We have tested a wide range of sensitivities around our cost forecast assumptions

5.149 Table 5.12 below reports the results of sensitivity analysis conducted on the cost forecast assumptions. In each scenario, a discrete change was made from the base case to one of our cost forecast assumptions. The changes have only a limited impact on results; this is because as discussed above the key driver of the X is the growth in bandwidth revenue. A full table of all the scenarios analysed in this section is provided in Annex 7.

Table 5.12 – Cost forecast assumptions: Sensitivity analysis

Scenario	Description	basket
Central estimate		-12.75%
<i>Asset price change sensitivities</i>		
Use 2005/06 – 2009/10 average for all assets	A higher five year average for cable and duct will increase costs, and therefore there is a lower X.	-12.25%
<i>AVE and CVE sensitivities*</i>		
AVEs 25% higher 2004 PPC values*	Higher AVEs will mean that capital costs are higher. This will result in a lower value of X.	-12.75%
Pay CVE 0.5, Non-pay CVE 0.5*	Higher CVEs will mean that operating costs are higher. This will result in a lower value of X.	-12.75%
<i>Base year cost sensitivities</i>		
No NRC/GRC adjustment	With no adjustment in the base year, base year costs will be lower. This will result in a higher value of X.	-13.00%
Target NRC/GRC ratio = 31.3% for all assets	If the adjustment is applied to all assets base year costs will be higher. This only has a limited impact as the target ratio is derived from the average of the backhaul and DSLAM ratio. This will result in a lower value of X.	-12.75%*
Target NRC/GRC ratio = 50% for ATM assets	Base year costs will be higher, driven by higher ATM costs. In the base case the ratio is only uplifted to 31.3%. This will result in a lower value of X.	-12.25%
Target NRC/GRC ratio = 50% for all assets	With the adjustment applied to applied assets with a target of 50% base year costs will be significantly higher. This will result in a lower value of X.	-11.75%
<i>Capacity overhead sensitivities</i>		
Overhead = 85%	A lower overhead increases the capacity available for broadband traffic, this reduces backhaul costs. This will result in a higher value of X.	-13.50%
Overhead = 100%	A higher overhead reduces the capacity available for broadband traffic, this increases backhaul costs. This will result in a lower value of X.	-12.25%
<i>Efficiency sensitivities</i>		
Opex efficiency = 2%	Lower efficiency means higher costs and a lower value of X.	-12.50%
Opex efficiency = 5%	Higher efficiency means lower costs and a higher value of X.	-13.25%
<i>WACC sensitivities</i>		
WACC = 8.5%	A lower WACC means a lower return on capital and therefore lower costs. This will result in a higher value of X.	-13.00%
WACC = 10.0%	A higher WACC means a higher return on capital and therefore higher costs. This will result in a lower value of X.	-12.25%
*Note these values are lower than the base case as expected, but the impact is very small.		

Section 6

Cost of capital

Introduction

- 6.1 The cost of capital is important for setting charge controls – it makes up a significant proportion of the cost for most regulated telecommunications services.
- 6.2 We have used an established method for estimating the cost of capital for a number of years. Our method closely reflects that adopted by other regulators.
- 6.3 Estimating the cost of capital is difficult following the period of unusual capital market instability of late 2008. This has been recognised by Ofcom and by other regulators, including the Competition Commission.
- 6.4 Notwithstanding this, certain aspects of our 2009 estimates of the cost of capital for BT were reviewed by the CC in two separate appeals and we were found not to have erred on the points raised. Thus we believe that our assessment framework remains appropriate, and that the approach we take to the estimation of the various parameters that drive our estimates of the cost of capital is generally reasonable.
- 6.5 For this reason – along with a desire for consistency - we propose to use the same framework to estimate the cost of capital as we have done in the recent past.
- 6.6 Our estimates of the cost of capital for BT Group, Openreach and the Rest of BT are set out in Table 6.1, alongside our previous estimates in May 2009.

Table 6.1: Cost of capital estimates for BT – May 2009 vs. January 2011: pre-tax nominal WACC estimates

	Openreach	BT Group	Rest of BT
May 2009 ¹⁰⁹	10.1%	10.6%	11.0%
Jan 2011	7.9% – 9.4%	8.2% - 9.7%	8.5% - 10.0%
Jan 2011 (mid-point)	8.6%	8.9%	9.3%

- 6.7 Having developed initial updated estimates of the cost of capital, the headline figures for the cost of capital for BT Group (and its constituent businesses) appear to show a marked reduction (between 1% and 2.5%, pre-tax, nominal) as compared with our 2009 estimates.
- 6.8 This reduction is (in roughly equal parts) attributable to:
- Macroeconomic changes (lower interest rates, and reduced corporate taxes); and
 - BT specific changes (an apparent reduction in the perceived risk of BT's business when compared to the general market).

¹⁰⁹ See Annex 8 of the May 2009 statement "A new pricing framework for Openreach": <http://stakeholders.ofcom.org.uk/binaries/consultations/openreachframework/statement/annexes.pdf>

- 6.9 However, the scale of the change in our estimate of BT's cost of capital is significant, and greater than the changes we have seen over similar periods in the recent past.
- 6.10 That said, we have undertaken a comparison of the overall "premium" above the prevailing risk free rate afforded to BT's investors in our estimates. The premium captured in our revised cost of capital estimates is similar to that reflected in our 2009 LLU decisions, and higher than that reflected in earlier (2005) cost of capital estimates (see paragraphs 6.159 – 6.165 for more detail). This would suggest that BT's overall risk premium has gone up over time, even though the headline cost of capital for BT has fallen.
- 6.11 We anticipate that the cost of capital estimates set out in this annex will be applicable in a number of BT charge controls being determined in 2010/11, including our WBA charge control, and the LLU/WLR and ISDN30 controls, and may be used for other controls where applicable.
- 6.12 To summarise:
- The headline (pre-tax, nominal) cost of capital for BT does appear to have fallen significantly, although in our view this masks an increased risk premium captured in our estimates for BT.
 - Given the apparent scale of change we are cautious in adopting the new lower rate, and welcome stakeholders' views on this issue.
- 6.13 We are confident that the range of values on which we are consulting is reasonable, although we recognise the unusual recent capital market volatility and uncertainty that prevails around certain key parameters. Therefore, given our desire for caution, we have elected to consult on a broad range for our cost of capital estimates at this stage. The range, of around 1.5%, is similar in magnitude to the range we adopted when we published our final consultation to the LLU charge control in September 2008, also at a time of uncertainty.
- 6.14 As noted earlier, this review of BT's cost of capital will also inform the determination of other charge controls, which will be set over the next few months. It is important to note, however, that the outcome of those reviews will be determined by a range of factors and not simply potential changes in BT's cost of capital.
- 6.15 In this section we cover the following areas:
- a) How do we estimate and use the cost of capital? ;
 - b) Updated estimates (and how they compare with previous estimates);
 - c) Why our new estimates are lower;
 - d) Key parameter values¹¹⁰:
 - i) The risk-free rate,
 - ii) Gearing,
 - iii) Equity Risk Premium (ERP)

¹¹⁰ For each parameter required to estimate BT's cost of capital, we will explain what the parameter represents, how it affects our overall cost of capital estimates, what we have said previously, what the latest evidence says, and what estimate we propose to adopt.

- iv) BT's equity/asset beta,
 - v) Cost of debt/debt premium
 - vi) Corporate tax rates
 - vii) Ofcom's Pensions Review.
- e) The trend in our overall cost of capital estimates; and
- f) Detailed calculations.

How do we estimate and use the cost of capital?

- 6.16 When we refer to the cost of capital we mean the rate of return required by investors that a firm must generate in order to raise money in the capital markets.
- 6.17 We usually mean a weighted average cost of capital (WACC). The WACC is often used as an input in a number of areas of our work, including charge controls, market reviews and licence valuations.
- 6.18 Companies have two basic ways of obtaining funding, through debt or equity. By knowing the proportion of each type of funding, and estimating the cost of each, we can estimate the WACC.
- 6.19 The model we have consistently used for estimating the cost of capital is the Capital Asset Pricing Model (CAPM), which the Competition Commission¹¹¹ found to be the most robust way for a regulator to measure the returns required by shareholders.

The Capital Asset Pricing Model

- 6.20 In its simplest form, the weighted average cost of capital for a firm is derived as follows:

$$WACC = K_e * (1 - g) + K_d * g$$

[1. K_e = the cost of equity, which is given by reference to the risk-free rate (r_f), the expected return on a basket of equities (the equity risk premium, or ERP), and the perceived riskiness of the asset in question (β), such that $K_e = r_f + \beta$ (ERP).

2. K_d = the cost of debt, which is given by reference to the risk-free rate and the debt premium of the firm, d_p , such that $K_d = r_f + d_p$

3. g = gearing, which is defined as net debt divided by enterprise value. Enterprise value is defined as net debt plus market capitalisation.]

- 6.21 In addition to the equations set out above, which are a simplified version of our CAPM calculations, we need to take into account the relative tax treatment of debt and equity, and define a WACC that can be applied at a pre-tax level.

¹¹¹ Indeed, in its Bristol Water determination in September 2010, the CC said the following: "In our 2007 report on Heathrow and Gatwick, we looked at alternatives to CAPM and found that: (a) CAPM remains the tool with the strongest theoretical underpinnings; (b) it is not at all clear from the academic literature that other models have better predictive power, particularly when applied to UK companies; and (c) none of the alternative models helps to overcome the problems that CAPM has in dealing with limited market data.

We believe that these points remain valid. Hence, we also continue to believe that although the CAPM has its limitations, it is the most robust way for a regulator to measure the returns required by shareholders. Moreover, we have placed considerable weight on the CAPM in previous regulatory inquiries and we see benefits in consistency."

- 6.22 When we set charge controls for BT Group, we estimate the return that investors require on their invested capital by multiplying the estimated cost of capital (as set out by the CAPM calculations above) by the asset base.
- 6.23 In this charge control, we are estimating the cost of capital for a 3 year charge control period. The methodology that we use to calculate such charge controls typically means that we estimate the efficiently-incurred costs in the final year of the control, and then calculate a glidepath towards that level of costs in the first and second years of the control.
- 6.24 In this section we set out calculations that are relevant for the period April 2013 to March 2014. This is the final year of the charge controls being set at this time.

Frequency of Ofcom's reviews of the cost of capital

- 6.25 We last estimated the cost of capital for BT in May 2009. The charge controls we are currently reviewing will come into effect in 2011. We consider it is appropriate to review the cost of capital as part of these reviews. In doing so we need to balance:
- a) The need to ensure that cost of capital estimates are not out of date by the end of the period, by using the best available data on a relatively frequent basis; and
 - b) The desire for continuity and certainty for investors and stakeholders, which would suggest that longer periods between reviews is appropriate.

Our methodology remains consistent

- 6.26 In general we believe that estimates of the WACC based on current and historic data will remain relevant and valid for the periods during which the different charge controls will apply.
- 6.27 However, it may not always be appropriate to rely solely on current market data. For example, we know that the rate of corporation tax will fall over the next few years, to 25% during the final year of the control. So it may be appropriate to recognise this in our estimates.
- 6.28 In addition, our observations of market data suggest that some parameters have moved significantly in recent months, or currently imply values which may not be reliable indicators of their value for our purposes.
- 6.29 One such parameter is the risk-free rate, which we observe to be at a historically low level. In this instance, we need to be careful in selecting values to ensure that they are appropriate and not unduly influenced/distorted by very particular short term events.
- 6.30 For example, in the past, in relation to the risk-free rate, we have given significant weight to an observed tendency for mean reversion¹¹². We do not feel it is appropriate to depart from this well-understood methodology.

¹¹² Mean reversion describes a general tendency by certain parameters (such as the risk-free rate) to fluctuate around observed average levels. If the parameter value is above or below the average for a period of time, mean reversion suggests that it will trend back towards the average in time.

Estimating different costs of capital for Openreach¹¹³ and Rest of BT

- 6.31 In addition, in the past we have estimated and applied different cost of capital estimates for different parts of BT Group (Openreach and Rest of BT), on the grounds that they have different systematic risk profiles.
- 6.32 This approach involves consideration of the BT Group asset beta, as well as a range of utility asset betas. We assume that Openreach (which accounts for around half of BT Group's capital employed) has some utility-like characteristics, so has less systematic risk than BT Group, but more than a pure network utility, such as a power or water transmission network company.
- 6.33 Therefore to estimate the Openreach asset beta we have in the past adjusted the BT Group asset beta downwards somewhat, but not by so much that it had a lower asset beta than a network utility. Given this we then derived the implied asset beta of the Rest of BT. We have adopted a similar approach here in reaching our revised estimates, and the resulting asset beta estimates can be seen in Table 6.2. and are explained in paragraphs 6.139 – 6.142.

Question 6.1: We welcome stakeholders' views on Ofcom's approach to estimating two different costs of capital for Openreach and Rest of BT.

Our updated estimates

- 6.34 We last estimated BT's cost of capital in May 2009, in the final statement of "A new pricing framework for Openreach". We estimated the pre-tax nominal cost of capital for Openreach to be 10.1% and for the Rest of BT to be 11.0% (this is shown in Table 6.2).

Table 6.2: BT Cost of Capital estimates May 2009¹¹⁴

	Openreach	BT Group	Rest of BT
Equity Risk Premium	5%	5%	5%
Asset beta	0.55	0.61	0.68
<i>Equity beta at 35% gearing</i>	<i>0.76</i>	<i>0.86</i>	<i>0.96</i>
Real risk-free rate	2%	2%	2%
Inflation ¹¹⁵	2.5%	2.5%	2.5%
Debt premium	3%	3%	3%
Tax rate	28%	28%	28%
<i>Post-tax real WACC</i>	<i>4.8%</i>	<i>5.1%</i>	<i>5.4%</i>
Pre-tax nominal WACC	10.1%	10.6%	11.0%

- 6.35 Our latest estimates are shown in Table 6.3.

¹¹³ Note that the cost of capital for Openreach is more specifically a rate for BT's copper access services business.

¹¹⁴ We made these estimates in May 2009, and they were reviewed by the Competition Commission in the 2009 Appeal of LLU Charges. The CC determined that we had not erred in our assessment of the cost of capital, on the grounds raised by Carphone Warehouse.

¹¹⁵ We assumed inflation of 2.5% for year 2 of our charge control, and 0% in year 1.

Table 6.3: BT Cost of Capital estimates January 2011

	Openreach	BT Group	Rest of BT
Equity Risk Premium	5%	5%	5%
Asset beta ¹¹⁶	0.4 – 0.55	0.45 – 0.60	0.5 – 0.65
<i>Equity Beta at 50% gearing</i>	<i>0.68 – 0.98</i>	<i>0.78 – 1.08</i>	<i>0.88 – 1.18</i>
Real risk-free rate*	1.5%	1.5%	1.5%
Inflation	2.5%	2.5%	2.5%
Debt premium	2% - 2.5%	2% - 2.5%	2% - 2.5%
Tax rate*	25%	25%	25%
<i>Post-tax real WACC (mid-point)</i>	<i>3.9%</i>	<i>4.2%</i>	<i>4.4%</i>
Pre-tax nominal WACC	8.0% - 9.2%	8.3% - 9.5%	8.6% - 9.9%
Pre-tax nominal¹¹⁷ (extended range)	7.9% – 9.4%	8.2% - 9.7%	8.5% - 10.0%
Pre-tax nominal (mid-point)	8.6%	8.9%	9.3%

* These are prospective estimates for 2013/4, the final year of the current round of charge control consultations. If we were to estimate BT's WACC for different periods we may use different rates.

6.36 Note that we have extended our consultation ranges slightly in order to reflect inherent uncertainty caused by some of the data being affected by the credit crisis. This does not, however, affect the mid-point estimates shown at the bottom of Table 6.3. We adopted a similar range of around 1.5% when we published our final consultation in September 2008 ahead of publishing final estimates in May 2009.

Why our new estimates are lower

6.37 Our approach in this consultation, when estimating the cost of capital, is the same as it has been in the past: we observe and take account of relevant market data and exercise our judgement in interpreting that data.

6.38 The changes we propose to our estimates of BT's cost of capital can be considered to be of two types: market-wide changes that affect all companies, and changes that are specific to BT.

6.39 Our observations highlight two significant changes since 2009:

- a) A significant reduction in the risk-free rate; and
- b) A significant reduction in BT Group's asset beta.

6.40 In addition there have been smaller changes to other parameters, such as the corporate tax rate and the debt premium.

6.41 Table 6.4 sets out how these changes impact our overall BT Group estimates:

¹¹⁶ These asset betas are calculated based on gearing of 50% and a debt beta of 0.125.

¹¹⁷ We have extended our consultation ranges at both the upper and lower ends, to give a range of 1.5% in line with our September 2008 LLU consultation range.

Table 6.4: Changes to BT Group WACC estimates

	2009	2011 (mid-point)	Change to WACC estimate
Nominal risk-free rate	4.5%	4.0%	(0.6%)
Tax rate	28%	25%	(0.3%)
ERP	5.0%	5.0%	-
<i>Market-wide changes</i>			<i>(0.9%)</i>
Asset beta	0.61	0.525	(0.5%)
Debt premium	3%	2.25%	(0.3%)
<i>Company-specific</i>			<i>(0.8%)</i>
Pre-tax nominal WACC	10.6%	8.9%	(1.7%)

- 6.42 Market-wide changes to our proposed WACC parameters account for 0.9% of the reduction in the cost of capital, while company-specific changes (estimated based on the mid-points of our ranges for betas and debt premiums) account for a slightly smaller reduction.
- 6.43 However, we may need to exercise caution in interpreting and allowing for these changes, particularly when we conclude on our estimates in mid 2011. For reasons explained below (in our discussion of BT's asset beta), it is possible that the removal from our asset beta evidence of some data relating to the credit crisis, will move our asset beta estimate towards the higher end of our range.

Key parameter values

- 6.44 There are a number of parameters that we have to estimate in order to estimate an overall cost of capital for BT, some of which are more material than others. For example, the risk-free rate is the one parameter which affects both the cost of debt and the cost of equity, and therefore our estimation of it is a particularly important part of this process.
- 6.45 The following sections of this annex will look at the parameters in turn, and set out the evidence that we rely on in reaching our preliminary view set out here.

The risk-free rate

What are we trying to estimate?

- 6.46 The risk-free rate is perhaps the most important parameter when estimating the WACC, since it influences both the cost of equity and the cost of debt. It is also a very useful reference point to assess required rates of return against (as we do in paragraphs 6.159 – 6.165 below).
- 6.47 We need to be mindful that this charge control is for a 3 year period, and therefore our rate needs to be relevant for that period, and in particular for the final year of the charge control, which is the year in which we estimate BT's costs.
- 6.48 Our approach is to estimate a rate that is based on historic and current data, but which should be relevant for the period covered by the control.

What we have said previously

- 6.49 In our last statement on BT's cost of capital in May 2009, we estimated the real risk-free rate to be 2.0%. This estimate was informed primarily by reference to the average yields on 5 year gilts in the years leading up to our decision.
- 6.50 In our statement prior to that in 2005, we did not explicitly state what our real risk-free estimate was, but our nominal risk-free rate estimate of 4.6% and inflation assumption of 2.8% would have been consistent with a real risk-free rate of around 1.8%.

Recent movement in the risk-free rate

- 6.51 The real risk-free rate (as measured by yields on UK 5 year gilts) has been falling since November 2008, when it peaked at over 4%. In the last year the real rate has been between 0.5% and -0.5%, although we do not believe this to be a sustainable long-term level, certainly not at the lower end of the range.
- 6.52 Gilt yields appear to have fallen as a result of the UK government's programme of quantitative easing as well as from strong investor demand for UK government debt, which is seen as relatively low-risk compared to some other European countries' sovereign debt.
- 6.53 The currently high levels of demand for UK gilts look unusual when viewed against long-term data, and we are cautious about attaching too much weight to current very low real rates.

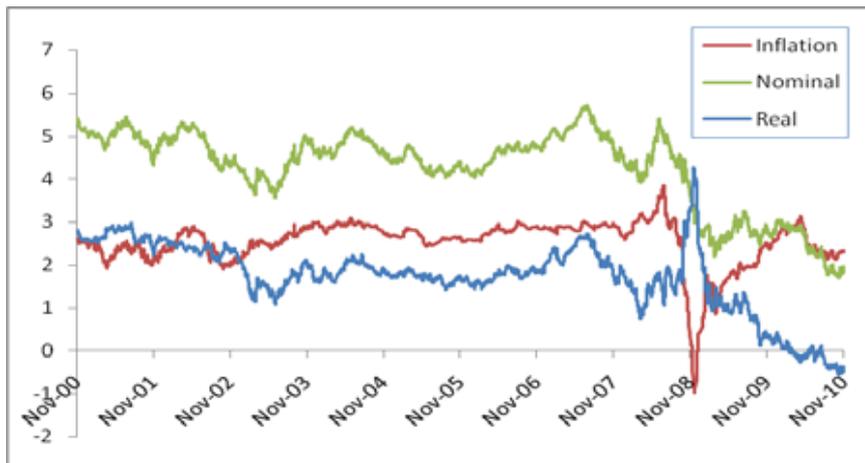
- 6.54 We note with interest that in its recent determination on Bristol Water¹¹⁸, the CC used a real risk-free rate range of 1% – 2%, and chose a point estimate at the very top of the range, despite the very low rates observed in the market.
- 6.55 We would also note that this decision was based on data up to and including July 2010. We have had the benefit of more recent data, during which time real risk-free rates have persisted at historically low levels.
- 6.56 A proxy for the nominal risk-free rate is the yield to maturity on gilts, or government strips¹¹⁹, while the real risk-free rate can be proxied by the yield on index-linked gilts of appropriate maturity. The difference between the two provides an estimate of forecast inflation.
- 6.57 We can track nominal, real and implied forecast inflation rates over time, using Bank of England data on 5-year duration gilts, as shown below. In the past we have tended to rely purely on 5-year gilts, since these most closely matched the period of the charge controls we were reviewing. However, we note the recent “Notification by Water Services Regulation Authority of determination of determination of adjustment factors and standard infrastructure charges for Bristol Water plc” from the CC where it states that:
- “In previous reports in the last ten years, the CC has paid less attention to longer-dated yields because of distortions and more attention to shorter-dated index-linked yields. At present, shorter-dated index-linked yields are affected by action by the authorities to address the credit crunch and recession and are less relevant to estimating the RFR¹²⁰.”
- 6.58 While we continue to favour the use of 5 year gilt yields when estimating the risk-free rate, we have also considered 10 year gilt yields.
- 6.59 From the Figure 6.1 we can see that the nominal and real yields have been falling consistently since the beginning of 2009, and are now at historically low levels.

¹¹⁸ http://www.competition-commission.org.uk/rep_pub/reports/2010/fulltext/558_appendices.pdf

¹¹⁹ STRIPS = Separate trading of registered interest and principal securities - fixed-income securities sold at a significant discount to face value which offer no interest payments because they mature at par.

¹²⁰ See Page 17 of http://www.competition-commission.org.uk/rep_pub/reports/2010/fulltext/558_appendices.pdf

Figure 6.1: 5 year gilt yields since 2000 - Nominal, Real & Inflation



Source: Bank of England

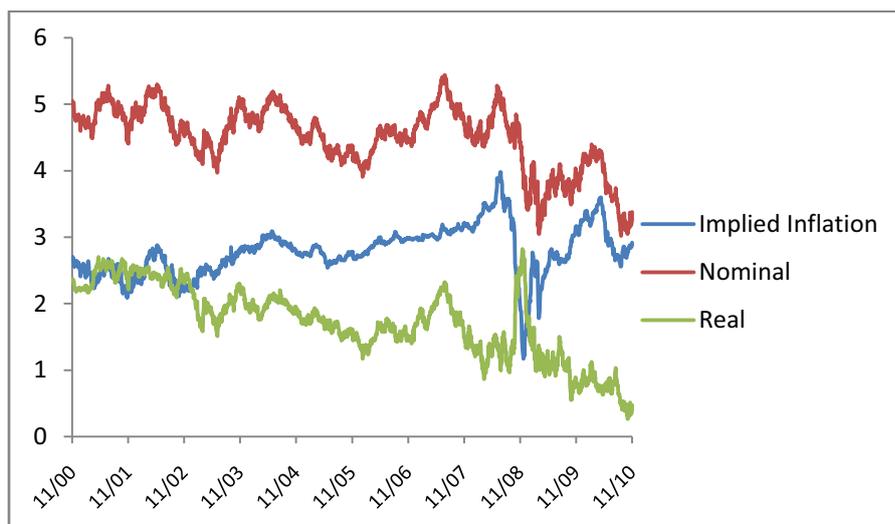
- 6.60 The average real yield for 5-year zero coupon gilts has fallen over the last year. While we would generally tend to give more weight to more recent rates than averages over past years, we are mindful (as in past charge controls) that we do not wish to give too much weight to a rate based on a period of unusual market activity. Therefore we tend to give more weight to longer term averages than more recent rates.
- 6.61 Given the likelihood of increasing yields in later years, we give more weight to the 1, 2, 3 and 5 year averages than recent very low rates. We note that the 5 year average for 5 year real gilts is 1.4%, and the 10 year average is 1.7%.

Table 6.5: Historic averages of Nominal, Real and Inflation 5 year rates (10 November 2010)

Averaging period	Nominal	Real	Implied Inflation
1 day	2.0	-0.4	2.3
1 month	1.8	-0.5	2.3
3 months	2.0	-0.3	2.3
6 months	2.1	-0.2	2.3
1 yr	2.5	-0.1	2.5
2 yrs	2.6	0.6	2.0
3 yrs	3.3	1.0	2.3
5 yrs	3.9	1.4	2.5
10 yrs	4.3	1.7	2.5

Source: Bank of England

Figure 6.2: 10 year gilt yields 2000 – 2010



Source: Bank of England

- 6.62 10 year gilts tend to give higher yields than the 5 year equivalents, and are also less volatile. However, even the 10 year gilt yield is at historically low levels.
- 6.63 The average yield on the 10 year government gilt over the last 5 years is also 1.4%, the same as that on the 5 year gilt (See Table 6.6).

Table 6.6: 10 year gilt yield average rates (10 November 2010)

Averaging period	Nominal	Real	Implied Inflation
1 day	3.4	0.5	2.9
1 month	3.2	0.4	2.8
3 months	3.3	0.6	2.8
6 months	3.4	0.6	2.8
1 yr	3.8	0.7	3.1
2 yrs	3.8	1.0	2.8
3 yrs	4.1	1.1	2.9
5 yrs	4.3	1.4	2.9
10 yrs	4.5	1.7	2.8

Source: Bank of England

What has the CC said?

- 6.64 As noted earlier, in its recent Bristol Water decision, the CC used a range of 1% - 2% for the risk-free rate, from which it chose a point estimate of 1.5%. This was based on evidence gathered up to and including July 2010.
- 6.65 We view the CC's estimated risk-free rate as a useful reference point, but are also aware that we have at least 4 months more data at this stage, and will have close to a year's additional data by the time we reach a decision in this charge control.

Our estimate is 1.5%

- 6.66 Taking into account the 5 year and 10 year gilt data, the CC's data, and considering that current yields look unsustainably low, we estimate the real risk-free rate for the purposes of this 3 year charge control to be 1.5%.
- 6.67 This is a 0.5% reduction from our previous estimate in May 2009 of 2.0%, and will impact both the cost of equity and the cost of debt materially.
- 6.68 We are obviously aware that an estimate of 1.5% is some way above current real risk-free rates, although we consider that this is reasonable for the following reasons:
- a) The CC's range of 1% - 2% in the Bristol Water appeal.
 - b) The 5 year and 10 year average yields on 5 year gilts are around 1.5% (1.4% and 1.7% respectively).
 - c) When estimating regulatory cost of capital rates, we are mindful of the potential negative effects of making sudden very large changes, which could create regulatory uncertainty. We are particularly mindful that current low rates reflect very specific conditions (including the Bank of England's Quantitative Easing programme) and take this into account when making estimates.
- 6.69 Stakeholders will note that, in line with previous cost of capital consultations, we do not give a range for the risk-free rate, but instead choose a point estimate. However, this should not be taken to mean that our point estimate is a final number. We have a range on the overall WACC estimates of 1.5%, which allows for a degree of

movement in parameters such as this, where we have shown point estimates but where our final values may move.

- 6.70 This is obviously a consultation, and we welcome stakeholders' responses on this estimate. We will make a final decision that takes into account respondents' views alongside all available evidence.

Implied forward rates

- 6.71 It may also be instructive for us to look at forecasts of forward gilt yields. The implied real forward yield curve for UK gilts suggests a predicted yield of around 1% in 3 years time.
- 6.72 Given that this rate is likely to be affected by the Bank of England's quantitative easing programme, we need to exercise caution when interpreting this data.
- 6.73 However, given a 1% yield in 3 years time, our 1.5% estimate seems reasonable.

Inflation in our risk-free rate assumption

- 6.74 We have in the past used a general long-term inflation assumption of 2.5%.
- 6.75 For ease of comparison with other modelling assumptions, we use an assumption here that aligns with that long-term figure. We note that the most recent implied inflation on 5 year gilts is 2.3% (see Table 6.5 above), although we also note that this figure is highly volatile. Therefore we regard this rate as a useful sense-check of our inflation assumption, but we would exercise caution about using such a volatile 'spot' reading as the basis for our decision.
- 6.76 In addition, there are a great many inflation forecasts that we could use for the purposes of these charge controls. We believe that 2.5% is within that range of forecasts and is reasonable at this stage. Note that when we publish our final determinations on these BT charge controls, we will review this estimate in the light of the latest forecasts.
- 6.77 When taken in conjunction with our real risk-free rate assumption of 1.5%, an inflation assumption of 2.5% implies a nominal risk-free rate estimate of 4.0%.
- 6.78 Note also that, when incorporated into our pricing models, we will define the WACC such that it consistently reflects the inflation assumptions in these models, and the implied real WACC estimate.

Gearing

- 6.79 Debt funding has a lower cost than equity, because debt-holders investment is less risky. In addition, debt funding is also more tax-efficient than equity funding. So a higher gearing tends to slightly lower the cost of capital. But companies need to balance debt and equity financing, since if the debt level is too high, the risk of default (insolvency) grows.
- 6.80 Within the framework of the CAPM, gearing is the way we measure the level of debt funding. It is defined as a company's net debt divided by its enterprise value, where the enterprise value is the sum of the net debt and the market capitalisation.
- 6.81 In the mechanics of the CAPM calculation, we use the gearing level, in conjunction with the observed equity beta, to determine a company's asset beta.

What we have done previously

- 6.82 In the past our approach to gearing has been to assume an optimal level of gearing, which we took to be 35% for BT Group¹²¹. We re-levered the asset beta to this optimal gearing rate, and calculated what equity beta would be implied at 35% gearing.
- 6.83 This approach was appropriate when BT's observed gearing was below the optimal gearing, and it was clear that the capital structure was not optimal for BT Group. However, an optimal gearing approach is less appropriate when observed gearing is above the optimal level.

We now propose to use actual gearing levels

- 6.84 Since BT's gearing has been between 35% and 60% in the last 2 years, we are minded to base our calculations on actual gearing, which is a reasonable estimate of BT's desired level of gearing. We use a 50% gearing assumption, which broadly reflects the average gearing over the last few years.
- 6.85 This makes our calculations simpler than in the past, and further ensures that our debt premium calculations are consistent with the level of gearing observed during the period in question. Note however that this does not have any material effect on the overall WACC, because the asset beta is estimated after taking account of gearing.
- 6.86 We also considered how a gearing assumption of around 40% (i.e. the current level) would impact our estimates. However, this wouldn't change our WACC estimate due to the assumption of a constant asset beta, other than to the extent that there are tax benefits associated with higher gearing. We consider such tax benefits to be small.

¹²¹ An optimal gearing rate of 35% was used because the observed gearing during the period from 2001 – 2007 was in a broad range of around 30% - 40%.

Equity Risk Premium (“ERP”)

Key parameter in CAPM

- 6.87 The ERP is a key component of the estimate of a company’s WACC.
- 6.88 Under the CAPM the ERP represents the extra return that investors require as a reward for investing in equities rather than a risk-free asset. It is market-specific, not company-specific.
- 6.89 Academics and other users of the CAPM have conducted a large number of investigations into the value of the ERP, using quantitative techniques and surveys. These have produced a range of widely differing estimates, which means that we (and other economic regulators) have to choose a value from within the plausible range implied by these studies.
- 6.90 Our approach to estimating the ERP is as set out in our 2005 statement entitled “Ofcom’s approach to risk in the assessment of the cost of capital¹²²”.

What we have said previously

- 6.91 In May 2009 we estimated the ERP to be 5.0%, up from an estimate of 4.5% in 2005. Our estimate was informed in particular by the work of Professors Dimson, Marsh and Staunton (“DMS”)¹²³ from the London Business School, which tracks the average premium that investors have earned from equities (as opposed to bonds or gilts) over time.
- 6.92 In addition, we believed that the volatility we observed in equity markets at the time suggested that investors required a higher level of return in exchange for holding risky equity assets, and an increase of 0.5% in our ERP estimate did not seem unreasonable in this context.

Recent data – extrapolating historical risk premia

- 6.93 In the past, we have relied heavily on work carried out by DMS¹²⁴, which is regarded as being one of the most authoritative sources of historical estimates. DMS measure total returns over a relatively long period, include a large sample of countries and make adjustments for survivorship bias. We continue to believe this is a robust source of data.
- 6.94 DMS have suggested an arithmetic mean premium¹²⁵ for the world index of around 4.5 – 5.0%.¹²⁶ They state that “this is our best estimate of the equity risk premium for use in asset allocation, stock valuation, and corporate capital budgeting applications.”

¹²² http://stakeholders.ofcom.org.uk/binaries/consultations/cost_capital2/statement/final.pdf

¹²³ Dimson, Marsh and Staunton, “Credit Suisse Global Investment Returns Sourcebook 2009”, Credit Suisse Research Institute

¹²⁴ Dimson, Marsh and Staunton, “Credit Suisse Global Investment Returns Sourcebook 2010”, Credit Suisse Research Institute

¹²⁵ These estimates are calculated using arithmetic means from historic data. Arithmetic means are our preferred measure of the historic premia, and we give more weight to arithmetic means than to geometric means from the same data.

¹²⁶ DMS 2010, p34.

In addition, for the UK, DMS's estimated premium of equities over bonds (as measured by the arithmetic mean in the period 1900 – 2009) is 5.2%¹²⁷.

Ex-ante estimation: academic/user surveys

- 6.95 In the past we considered surveys of the ERP carried out amongst academics and users of the CAPM. The first consultation that we published in January 2005¹²⁸, in relation to BT's cost of capital, set out the range of views of academics as being from 3 to 7%, while the views of practitioners ranged from 2 to 4%.
- 6.96 A study from 2008 by Pablo Fernandez¹²⁹ suggests that UK finance professors used ERP estimates with an arithmetic mean of 5.5%.
- 6.97 As in the past, we afford this analysis relatively little weight since participant surveys do not provide the same quality of evidence as market-based measures.

Market commentary

- 6.98 We are aware of evidence from some market commentators which suggests that, during periods when equity prices are depressed and average corporate gearing is higher than anticipated, the ERP may be increased, in large part due to the technical effects of leverage. However, to the extent that this is an effect driven by lower equity values we consider that this effect will no longer be relevant once gearing levels revert to longer term norms.
- 6.99 This may happen through the recovery of equity prices, or corporate financial management.
- 6.100 We need to ensure that we take this effect into account when we estimate asset betas, in order to be consistent between betas and ERP estimates.

Question 6.2: We welcome stakeholders' views on Ofcom's approach to ERP estimates.

Regulatory benchmarks

- 6.101 Recent ERP estimates adopted by the UK's economic regulators and competition authorities are in a range of 5% - 5.5% (See Table 6.7).

Table 6.7: Regulatory benchmarks of ERP

Source/Year	ERP	Comment
Ofcom, 2009	5.0%	LLU Charge control in May 2009. Unchanged after subsequent review by the CC, determination dated August 2010.

¹²⁷ DMS 2010, p158

¹²⁸ http://www.ofcom.org.uk/consult/condocs/cost_capital/cost_capital.pdf

¹²⁹ Fernandez, Pablo: Market Risk Premium Used in 2008 by Professors: A Survey with 1,400 Answers (April 16, 2009). Available at SSRN: <http://ssrn.com/abstract=1344209>

CC, Bristol Water 2010	5.0%	CC determination, published September 2010, reversing Ofwat's determination of 5.4% in November 2009
CAA, NATS 2010	5.5%	May 2010 determination

6.102 We consider the CC's determinations of 5% in the Bristol Water and LLU Appeal to be a relevant consideration in our determination of the ERP. Given how recent these determinations are, and also given the generic, market-wide nature of an ERP assumption, we view this as useful evidence.

6.103 We would find it difficult to diverge from such a determination without compelling evidence to demonstrate that this value has changed. We are not aware of any such evidence.

Our objectives in determining the ERP

6.104 While setting the ERP value too low could lead to discretionary investment by BT being discouraged, setting the value too high could lead to consumers paying prices that are too high (or BT investments that are not fully justified by demand), or lower levels of investment by BT's competitors.

Our point estimate for the ERP is 5%

6.105 We have reviewed evidence from market commentators and the Bank of England, and believe that the prolonged downturn in equity markets and high levels of volatility suggest that the equity risk premium may have increased in recent years.

6.106 We maintain our belief that the downside of setting an ERP too low is worse than the downside of setting the ERP too high. We therefore tend to favour setting the ERP towards the upper end of a 4.5% to 5% range.

6.107 Specifically, our point estimate for the ERP is 5.0%.

Competition Commission ("CC") view on the market return and ERP

6.108 In its most recent determination where it discusses cost of capital, Bristol Water¹³⁰, the CC discusses the market return (i.e. investors' expected return from holding equities, which is given by the ERP plus the risk-free rate) and the implied range for the ERP:

"We therefore confirm, for our determination, our provisional findings of a range of 5 to 7 per cent for the market return, and implied range of 4 to 5 per cent for the ERP."

6.109 The CC's point estimate of the risk-free rate is 2%, and combined with their ERP point estimate at the very top of the range of 4 – 5% they estimate a market return of 7%, again at the very top of their stated range.

¹³⁰ http://www.competition-commission.org.uk/rep_pub/reports/2010/fulltext/558_appendices.pdf

6.110 Our current point estimate of the risk-free rate is 1.5%, which, when combined with our estimate of 5% for the ERP, gives a current estimate of the market return of 6.5%.

BT Group Beta

What does the equity beta represent?

6.111 The value of a company's equity beta reflects movements in returns to shareholders relative to movements in the return from the equity market as a whole.

What we said previously

6.112 We estimated the BT Group equity beta to be 0.9 in our 2009 Final Statement. This was based on a number of data points, with particular reference to the 2-year daily estimate of BT's beta measured against the FTSE Allshare index.

6.113 Based on observed gearing of 38%, this equity beta equated to an asset beta of 0.61 for BT Group.

6.114 Our approach in the past has been to look at both 1 year and 2 year equity betas, but to give greater weight to the 2 year data, and then by looking at the average gearing, to estimate the asset beta accordingly. We then used the estimated asset beta to determine an equity beta at our assumed level of optimal gearing of 35%.

The recent evidence - why is 1 year data particularly relevant now?

6.115 Our approach in this consultation is broadly the same as it has been in the past, although we are mindful of the fact that the 2 year data statistics include a period of the credit crisis during late 2008 and early 2009. When we publish our final statements on BT's charge controls in Spring or Summer 2011, this data will no longer be in the 2 year dataset. To the extent that this unusually volatile data may have significantly influenced our analysis, we propose giving greater consideration to the 1 year data in this consultation, with an expectation that we will revert to a 2 year basis at the time of publication of our final decision.

6.116 We observe that during the credit crisis, as market capitalisations of companies fell, gearing levels rose. This meant that estimated asset betas declined even though equity betas were stable. It may be that during the period of the crisis, the market premium was inflated – a similar level of market risk being spread across a smaller total value of equity. This may account for a materially increased ERP during a period of depressed equity prices.

6.117 If this is the case, we need to be cautious about using an ERP assumption evidenced from data relating to "non-crisis" periods with betas derived from datasets which include such crisis periods (after equity prices had fallen).

6.118 We need to use asset beta data which takes account of the crisis, and use a normal ERP assumption. At this stage we propose to rely on an ERP estimate that is not adjusted for such short-term crisis effects and to adopt a similarly defined beta (as explained above).

6.119 Therefore when estimating the cost of capital, we propose to use the observed actual levels of gearing alongside the observed equity beta levels in order to derive an asset beta for BT Group. We then adjust this asset beta for estimating the Openreach and Rest of BT WACCs.

Question 6.3: We would welcome stakeholders' views on Ofcom's approach to BT's Beta calculation.

How has BT's Group beta moved since 2009?

- 6.120 As in previous consultations, we have asked the Brattle Group ("Brattle") to prepare an updated report on the range of equity betas for BT Group¹³¹.
- 6.121 Brattle has concluded from its analysis of BT's equity and asset beta, as well as a range of comparator data, that a reasonable estimate of BT's asset beta, based on an equity beta calculated using 2 years worth of daily data, and a debt beta of 0.15, would be 0.47¹³².
- 6.122 We recognise that this represents a very significant reduction.
- 6.123 Brattle's analysis¹³³ estimates BT's 1 year and 2 year daily equity betas, as measured against the FTSE All-Share index (our preferred comparator index), to be 0.96 and 0.84 respectively.
- 6.124 Brattle's analysis reflects the relative stability of BT's 2 year equity beta since the beginning of 2009. The equity beta has been at or around 0.9, despite BT's gearing level fluctuating during the period from around 60% to the current level of around 40%.
- 6.125 We note that the 2 year estimation period includes a period during which there were some unusual price movements, characterised by very high volatility of prices during 2008 and the early part of 2009.
- 6.126 Our BT charge control determinations will be published during Spring or Summer 2011. At that point, the relevant 2 year dataset would not include this period of the credit crisis, and should, in principle, give us a 'cleaner' estimate of the equity and asset beta for BT Group, consistent with a "post-crisis" ERP, as set out earlier.
- 6.127 With this in mind, we show below what the data based on the last 18 months would suggest for BT Group beta estimates, as well as the 2 year and 1 year data. As with the Brattle report, the final date for the data was 27th October 2010.

¹³¹ See separate report entitled "Estimate of BT's Equity Beta October 2010" published along this consultation document.

¹³² This is equivalent to an asset beta of 0.46 assuming a debt beta of 0.125, which is the assumption we adopt here.

¹³³ The Brattle report uses data up to and including 27th October 2010. When estimating cost of capital rates, we try to use the best, most up to date information possible. However, due to the lead times between receiving external reports such as this, and analysing and writing up our own position, the data can be a few months old by the time of publication. For this reason, we have supplemented Brattle's analysis with our own data taken from Bloomberg in mid-January 2011. This data can be seen in figure x below. This does not mean that we can dismiss the Brattle report, as it contains important analysis, particularly in relation to utility comparators.

Table 6.8: Equity and asset betas for BT Group vs. FTSE All-share

Data period	2009 estimates	2 yrs to 27/10/10	18m to 27/10/10	1yr to 27/10/10
Equity beta	0.9	0.84	0.95	0.96
Average gearing	38%	53%	52%	50%
Asset beta ¹³⁴	0.61	0.46	0.52	0.54

Source: Bloomberg 18/11/10

6.128 We note that the 18 month data gives an asset beta for BT Group of 0.52, which may be seen as illustrative rather than indicative. As we set out above, our intention is to give most weight to the 2 year data in our final statement in Spring/Summer 2011.

6.129 In addition to the data above (and as explained in footnote 133 above), we have updated our own asset beta data for BT as close as possible to the publication date. The figure below shows the movement in BT's asset betas, based on:

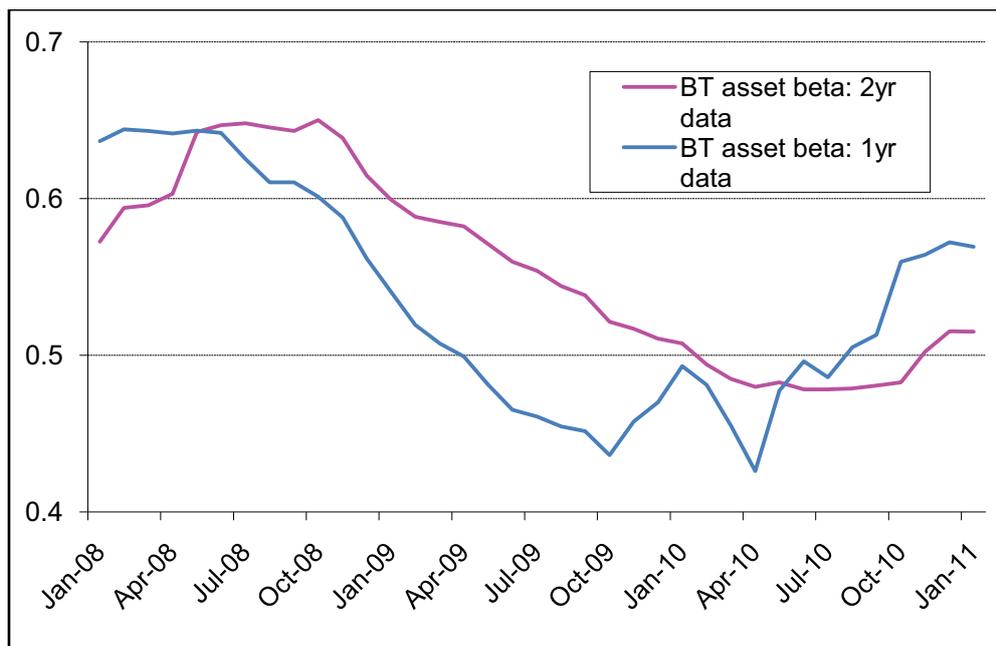
- a) 2 year equity betas alongside average gearing for the previous 2 years, and
- b) 1 year equity betas alongside average gearing for the previous year.

6.130 The figure below is based on equity betas calculated using daily data, average gearing calculated using daily market capitalisation data¹³⁵, and net debt data shown on Bloomberg. The net debt figures may be slightly different to the net debt reported by BT, although the differences are likely to be relatively minor and are unlikely to materially impact our asset beta calculations.

6.131 We welcome stakeholders' views on whether it is most appropriate to use reported net debt or Bloomberg's adjusted net debt. When estimating BT's gearing, some investors are likely to use BT's reported net debt while others may use the Bloomberg adjusted figure, and therefore it is not obvious that either figure is unequivocally 'correct'.

¹³⁴ Assuming a debt beta range of 0.1 – 0.15 (or 0.125 mid-point), compared to our estimated debt premium of 0.15 in May 2009. This is above the CC's estimated debt beta for Bristol Water of 0.10, but we consider that it is consistent with our estimated debt premium of 2% - 2.5% (compared to the 1.9% that the CC implied for Bristol Water). Note that a 0.025 change to our debt beta assumption has a negligible impact on our overall cost of capital estimates.

¹³⁵ However, stakeholders should note that the datapoints are month-end figures, and therefore do not tie in exactly with Table 6.8 above. For example, the 2 year asset beta for BT Group as at 27th October 2010 was 0.46, while at the 31st October, the datapoint on the chart, it was 0.48.

Figure 6.3: 1 yr and 2 yr asset betas for BT Group, January 2008 - 2011

Source: Bloomberg, Ofcom

- 6.132 As at the 11th January 2011, the 2yr asset beta for BT Group was 0.53, while the 1 yr asset beta was 0.58. When considered alongside the Brattle evidence from 27 October 2010 (as set out in Table 6.8), we propose a range for the BT Group asset beta of 0.45 – 0.60¹³⁶.
- 6.133 When combined with our earlier ERP estimate of 5%, we consider this provides a reasonable assessment of the overall risk premium.

Is it appropriate to reflect project-specific variations in risk in our financial analysis?

- 6.134 As we set out in the 2005 Final Statement, it is sometimes appropriate to view some large companies such as BT as being a group that consists of a number of firms, or projects, each with its own unique risk profile, that operate together under common ownership.
- 6.135 Since the conclusion of Ofcom's Strategic Review of Telecommunications in 2005, the creation of Openreach has given greater clarity over the access services part of BT Group's business.

What does BT's Group beta imply for the estimate of Openreach's beta?

- 6.136 In our 2009 Final Statement, we estimated an appropriate notional equity beta for Openreach which was 0.1 lower than BT Group's. While we recognise that the

¹³⁶ Given the current upward trend of BT's asset beta, which is a function of the general market recovery, BT's debt reduction plans, and a stable or rising equity beta, the likelihood seems to be that when we finalise our estimates in Spring/Summer 2011, the 2 yr asset beta will be towards the upper end of this range. But we cannot predict what will happen in the financial markets in the next few months.

process of disaggregation of equity betas is not an exact science, we remain of the view that Openreach's beta is below that of the BT Group¹³⁷.

- 6.137 In order to inform our decision over how much lower we might expect Openreach's equity beta to be than that of BT Group, we asked Brattle to prepare a comparative analysis of network utilities and their equity betas alongside their analysis of BT's equity beta.
- 6.138 As we have stated in previous consultations, we consider Openreach to have many characteristics of a network utility, and therefore to carry less specific risk than the rest of BT Group. Brattle's analysis suggests that comparable UK network utilities would have asset betas in a range of 0.3 – 0.4 (assuming a debt beta of 0.15).

Our asset beta ranges in this consultation

- 6.139 As we stated above, we estimate a range for the BT Group asset beta of 0.45 – 0.60.
- 6.140 We believe that a reasonable estimate of Openreach's asset beta, taking into account that of BT Group and of the comparable UK network utilities, would be 0.05 lower than for BT Group, so that at the bottom end of the range (i.e. 0.40) our estimate is at the very top of the utility asset beta range.
- 6.141 We assume an asset beta range for Openreach of 0.4 - 0.55, still above the top end of the network utility range of asset betas, and consistent with our belief that Openreach is more risky than a pure network utility. This asset beta range translates to an equity beta range (assuming 50% gearing) for Openreach of 0.68 – 0.98.
- 6.142 Our asset beta range for the Rest of BT is 0.50 – 0.65, with an equity beta range of 0.88 – 1.18.

What has the CC said about our BT and Openreach beta estimates?

- 6.143 The estimate of the beta for Openreach was one of the issues considered in the recent appeal of our 2009 LLU determination. During that appeal, both BT and the appellant (Carphone Warehouse) accepted that the systematic risk of Openreach lay somewhere between that of BT Group and a conventional regulated utility.
- 6.144 The CC accepted that there was a degree of regulatory judgement involved in estimating the equity beta for an unlisted division of a listed company, but that our approach was reasonable¹³⁸.

¹³⁷ See 2005 Final Statement sections 6 and 7 for a full explanation of the magnitude of our reduction in BT Group's equity beta for BT's access services division (i.e. Openreach).

¹³⁸ See para 2.363 of

http://www.catribunal.org.uk/files/1.1111_Carphone_Warehouse_CC_Determination_310810.pdf.

Debt premium

Introduction

6.145 In estimating BT's cost of debt we require two inputs.

- a) The risk-free rate; and
- b) BT's debt premium.

6.146 We set out above our views on the risk-free rate.

What we said previously

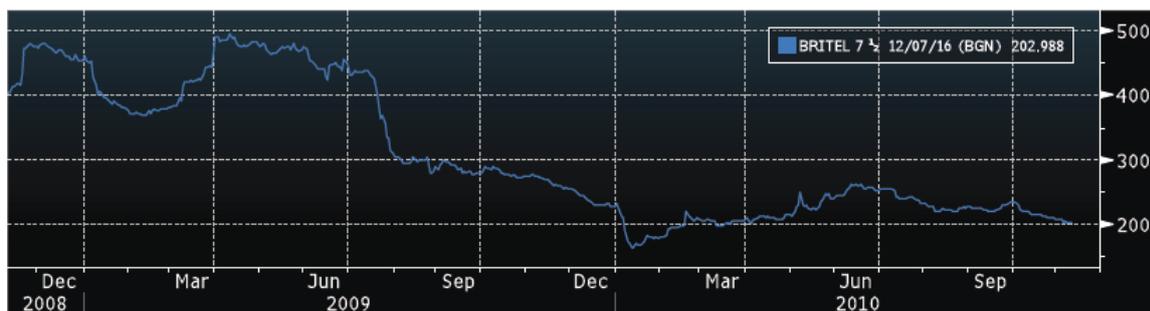
6.147 When we last estimated BT's cost of capital in 2009, it was a time of great volatility and uncertainty in credit markets, and this uncertainty was reflected in elevated corporate bond yields. As a result we estimated BT's debt premium to be materially higher than in previous charge controls, at 3%.

The recent evidence suggests a lower estimate

6.148 Since 2009 credit markets have normalised and BT's debt now offers debt investors yields of 2% - 2.5% above benchmark gilt levels. We believe this is a reasonable medium-term assumption for BT, which has a credit rating of BBB- with S&P.

6.149 The figure below shows the yield available on BT's 2016 sterling-denominated bond, over and above benchmark gilt yields. During the past 12 months the spread has been broadly between 2% and 2.5%, with a brief dip below 2% during January 2010, and a brief peak above 2.5% in June 2010.

Figure 6.3: BT 2016 debt spread over gilt rates



Source: Bloomberg

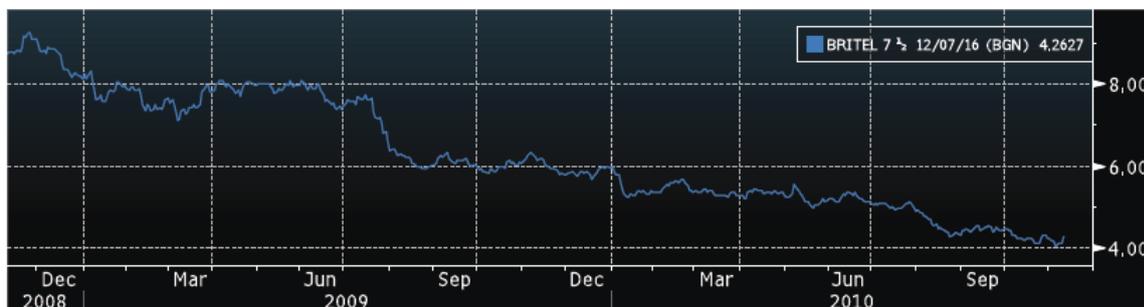
6.150 We propose a debt premium of 2% - 2.5%, which would be consistent with our average gearing level assumption of 50% set out above.

Overall cost of debt

6.151 A real risk-free rate estimate of 1.5%, and a debt premium of 2% - 2.5%, combine to give a range for BT Group's real pre-tax cost of debt of 3.5% - 4%, or in nominal terms 6% - 6.5%. This compares with an observed yield on BT's 2016 bond of 4% - 6% during the last year (see Figure 6.4).

6.152 So we may be affording BT a slightly higher cost of debt than that which is currently observed in the market, but our expectation of a degree of mean reversion in the gilt market suggests that a range of 6% - 6.5% is not unreasonable.

Figure 6.4: Yield on BT 2016 Bond



Source: Bloomberg

6.153 We are also mindful of Note 32 from BT's 2010 Annual Report, which states that:

“During 2010, debt amounting to £1bn matured consisting of £0.7bn of commercial paper and £0.3bn of long-term debt. This was offset by new issuance of a €600m bond at 6.125% repayable in 2014 which was swapped into £520m at a fixed semi-annual rate of 6.8%.¹³⁹”

6.154 This €600m commercial paper was issued during June 2009, when the yields on BT's debt were a good deal higher than today, and we are comfortable that a range of 6% - 6.5% is not unreasonable.

¹³⁹ See page 140, <http://www.btplc.com/Sharesandperformance/Annualreportandreview/pdf/BTGroupAnnualReportSmart2010.pdf>

Corporate tax rate

- 6.155 In the Budget of June 2010, the UK government announced its intention to reduce the corporate tax rate from the current 28%, down to 24% by 2014/15.
- 6.156 This represents a real saving for businesses that pay tax, and will reduce the cost of capital accordingly.
- 6.157 In the case of our current round of BT charge controls, where those controls incorporate a 3 year glidepath to a cost-oriented price, we need to incorporate the tax rate in year 3 of the charge control, which in this case is 2013/14. The tax rate in this year, according to the 2010 Budget, will be 25%.

Ofcom's Pensions Review

- 6.158 We have recently concluded a consultation in regard to how we treat BT's pension costs in charge controls. This included an analysis of whether the regulatory cost of capital should be adjusted to take account of BT's large defined benefit (DB) pension scheme.
- 6.159 The pension guidelines developed as part of the Pensions Review state that cost of capital of BT Group (or Openreach and the Rest of BT) should not be adjusted to reflect the existence of a DB scheme.¹⁴⁰

¹⁴⁰ This statement was published on 15th January 2011
<http://stakeholders.ofcom.org.uk/binaries/consultations/btpensions/statement/statement.pdf>.

BT Group WACC – premium over real risk-free rates is stable

- 6.160 As we set out above, our approach to estimating the cost of capital has been to consider observations of market rates, while being mindful of mean reversion in certain parameters. But we consider that we also have a duty to sense-check the overall estimates that this approach leads us to, particularly when considering how our estimates have moved over time, and whether any movements in the overall estimates look reasonable.
- 6.161 We believe that a useful basis for comparison over time is a consideration of the implied “WACC premium” in our various determinations over recent years. This WACC premium shows what additional rate of return our regulatory cost of capital affords BT over and above a risk-free rate.
- 6.162 We estimate the premium by comparing our post-tax real WACC estimate with the real risk-free rate at the time. The spot real yield on 5 year gilts is a reasonable estimate of the rate at which investors will provide funds on a risk-free basis.

2005 – Premium of ~3.5%

- 6.163 In our 2005 charge control, we estimated a post-tax real WACC for BT Group of just under 5%, compared to a real risk-free rate of around 1.5%. Therefore the premium we afforded above the spot risk-free rate was around 3.5% in 2005.

2009 – Premium of ~4%

- 6.164 The spot real risk-free rate at the time of our decision in 2009 was around 1%. Therefore the premium implied in our WACC estimate, against the prevailing gilt spot rate at this time was just over 4% (i.e. 5.1% - 1%).

2010/11 – Premium of 4.4%

- 6.165 UK 5 year real gilts currently yield around -0.2%, so the premium that our latest BT Group post-tax real WACC estimate (of 4.0%) implies is around 4.4%, slightly above those afforded in 2005 and 2009.
- 6.166 In the context of the credit crisis in 2008/9, during which time many investors lost money and may subsequently have reduced their risk appetite, a higher premium in recent years than in 2005 does not appear unreasonable.

Cost of Capital Calculations

- 6.167 Table 6.8 and 6.9 sets out our cost of capital estimates respectively for BT Openreach and the Rest of BT based on the estimates outlined in the sections above.

Table 6.8: Pre-tax nominal WACC for Openreach

WACC Component	May 09	Jan 11
Real risk-free rate	2%	1.5%
Nominal risk-free rate	4.5%	4%
Equity Risk Premium	5%	5%
Equity Beta	0.76	0.68 – 0.98
Asset beta	0.55	0.4 – 0.55
Cost of equity (post tax)	8.3%	7.4% - 8.9%
Debt premium	3%	2% – 2.5%
Corporate tax rate	28%	25%
Cost of debt (post tax)	5.4%	4.5% - 4.9%
Gearing	35%	50%
WACC (post tax)	7.3%	6.0% - 6.9%
WACC (pre-tax nominal)	10.1%	8.0% - 9.2%
Extended range for pre-tax nominal WACC		7.9% - 9.4%

Table 6.9: Pre-tax nominal WACC for rest of BT

WACC Component	May 09	Jan 11
Real risk-free rate	2%	1.5%
Nominal risk-free rate	4.5%	4%
Equity Risk Premium	5%	5%
Equity Beta	0.96	0.88 - 1.18
Asset beta	0.68	0.5 – 0.65
Cost of equity (post tax)	9.3%	8.4% - 9.9%
Debt premium	3	2% - 2.5%
Corporate tax rate	28%	25%
Cost of debt (post tax)	5.4%	4.5% - 4.9%

Gearing	35%	50%
WACC (post tax)	7.9%	6.5% - 7.4%
WACC (pre-tax)	11.0%	8.6% - 9.9%
Extended range for pre-tax nominal WACC		8.5% - 10.0%

Which rate is appropriate for WBA?

6.168 In deciding which rate is appropriate for WBA services, we have taken into account the recent CC decisions in the LLCC and ORFF appeals, in particular regarding:

- Whether it is reasonable for Ofcom to estimate only two disaggregated costs of capital, one for copper access services and one for the rest of BT; and
- If so, how should Ofcom decide which rate is appropriate to any particular service?

6.169 We have also considered BT's arguments that an even higher rate is appropriate for WBA services to reflect the need for higher returns on new and innovative services. This argument was advanced in a paper by dotecon submitted as part of BT's response to our consultation on the WBA market review. In short, we do not believe that it is relevant to the WBA market in the current stage of its development. We respond in detail to the dotecon paper in Annex 8.

Should Ofcom estimate more than two distinct rates?

6.170 The CC concluded that an approach based on disaggregating BT's beta is likely to be preferable to one based on identifying a set of (inevitably imperfectly) comparable companies¹⁴¹.

6.171 The CC agreed that we should only estimate more than two distinct rates if the necessary conditions for estimating a service-specific rate are satisfied. These conditions were set out in our 2005 statement "Ofcom's approach to risk in the assessment of the cost of capital"¹⁴².

6.172 Our view is that the case for assessing risk on a service-specific basis is likely to be stronger under the following circumstances:

- There are strong a priori reasons for thinking that the systematic risk faced by the project is significantly different from that faced by the overall company (e.g. different income elasticities of demand and/or stability of cash flows);
- There is evidence which can be used to assess variations in risk e.g.:

¹⁴¹ See for example para 2.361 of the ORFF decision.

¹⁴² Summarised at para 4.243 of the LLCC decision

http://www.catribunal.org.uk/files/1112_Cable_Wireless_Determination_300610.pdf

- i) There are benchmark firms that are close to “pure play” comparators in terms of having similar risk characteristics to individual projects within the firm;
- ii) Other quantitative analysis can be used to assess variations in risk;
- iii) Data on the firm is supplied at a disaggregated level (accounting separation); and
- iv) Correctly identifying variations in risk, and reflecting this in an adjusted rate of return, is likely to bring about significant gains for consumers.

6.173 In our view they are unlikely to be satisfied for anything other than copper access.

How should Ofcom decide which rate is appropriate?

6.174 In the LLCC decision, the CC agreed with Ofcom that the most important factor in determining which of the “copper access” and “rest of BT” rates is appropriate is the sensitivity of demand to the economic cycle. The stability of demand for copper access services over the cycle, and hence their low systematic risk, is the key feature which distinguishes copper access services from the rest of BT’s services. The extent to which a service shares assets with copper access services is much less important¹⁴³.

6.175 Higher demand cyclicalities may be associated with services which are primarily bought by business customers (such as leased lines). However, at paragraphs 4.309 – 4.310 of the LLCC decision, the CC concluded that it is not simply the fact that a service may be predominantly used by business customers that is relevant to the cost of capital. The CC stated:

“However, we were persuaded by Ofcom’s evidence that it had not merely formed its judgment based on the identity of the customer, but had also considered the extent to which the nature of the product that was being sold led to variations in BT’s sales volumes and revenue over the economic cycle. We thought that Ofcom and BT both made strong arguments when pointing to differences in the ways that business and residential customers adjusted demand in the face of a downturn, specifically the fact that:

(a) businesses purchasing leased lines services could reduce their consumption of bandwidth and could rationalize the number of circuits that they purchased and in doing so reduce the charges they paid to BT; whereas

(b) the way that residential products were sold meant that it was only if households chose to disconnect their line that BT suffered a loss of revenue.

The arguments presented by Ofcom and BT tended to support the view that demand for leased lines services was more sensitive to economic conditions than demand for Openreach services. Empirical data submitted to us by BT seemed to demonstrate that this had been borne out by recent experience in that it showed a sharp drop

¹⁴³ The CC’s assessment is set out in the LLCC decision paras 4.308 – 4.332
http://www.catribunal.org.uk/files/1112_Cable_Wireless_Determination_300610.pdf

in high bandwidth leased lines services at the end of 2008 whereas demand for copper lines fell only marginally. We note that evidence of this type has to be treated with some caution, but in our view it supports Ofcom's approach".

6.176 In the above, the CC sets out its view of the evidence which could support the use of the rest of BT cost of capital. It is not necessary to undertake complex analysis in order to determine the appropriate rate but a priori reasoning should be supported by empirical evidence where available. We have therefore applied this approach to WBA services.

Application to WBA

6.177 A key point in the LLCC decision was the ability of business customers to vary the quantity of the service purchased in response to changes in economic conditions, rather than the simple binary connect or disconnect choice facing the residential customer for copper access. Thus in the case of leased lines, a firm can vary the number of circuits taken. It could also vary the bandwidth of those circuits or close some business sites.

6.178 Similarly, in the case of WBA, a business or residential customer can switch to a cheaper (lower bandwidth) package whilst retaining a broadband connection. It could also switch to a narrowband or a voice only service, all while retaining the copper access connection. The fact that broadband take-up is still considerably less than fixed line penetration may also suggest that it is less of a "necessity" for most customers. We therefore believe there are good a priori reasons for expecting WBA demand to be more cyclical than the demand for copper access.

6.179 In addition, we have considered whether there is relevant empirical evidence. We are aware of studies which have considered variation in broadband demand between countries or groups of consumers with different income levels¹⁴⁴ (rather than variability over time). We also note that econometric studies which have estimated price elasticities of demand for broadband services have tended to find that these are higher than for narrowband access services. For example, evidence from econometric studies of price elasticities submitted by CPW to the ORFF appeal tended to support the view that "the available evidence suggests that the own-price elasticity of demand for broadband is relatively elastic, while the own-price elasticity of demand for fixed line access is relatively inelastic"¹⁴⁵.

6.180 We have also considered evidence from BT data on volumes of WBA, leased lines and copper access services since 2004/05. We note that the CC considered evidence submitted by BT¹⁴⁶ to the LLCC appeal showing that demand for high bandwidth leased lines fell more sharply than demand for copper lines at the end of 2008. BT argued that the demand for copper access is both more stable and more

¹⁴⁴ Ofcom is aware of a study by Cadman and Dineen (2008) which estimated income elasticities of demand for broadband from cross-sectional data for OECD countries. This used data at a single point in time (October 2007), rather than a time-series of observations over the economic cycle. It may not therefore capture cyclical effects. We note that, in relation to price elasticity, it was found that "elasticity is towards the top end of the typical price elasticity of demand for telephone line rental and local and long distance calling found in developed countries". http://www.spcnetwork.co.uk/uploads/Broadband_Elasticity_Paper_2008.pdf. US studies have also found that broadband take-up is sensitive to income and that the price-elasticity itself also varies with price and income levels. See for example http://www.gcbpp.org/files/Academic_Papers/AP_Hassett_Shapiro_Towards.pdf

¹⁴⁵ <http://stakeholders.ofcom.org.uk/binaries/consultations/openreach/responses/CarphoneWarehouseplc.pdf>

¹⁴⁶ In its submission of 9 March 2010

predictable than that for leased lines. We agree with the CC that this evidence is helpful and therefore we have carried out a similar analysis for WBA. This may indicate the extent to which customers vary their usage of broadband over the cycle.

- 6.181 We therefore asked BT to provide the data to enable us to carry out an analysis of the variability of demand for WBA similar to the one it had produced for the CC, as evidence in the LLCC appeal. This comprised two separate analyses. The first compares the accuracy of BT's volume forecasts for copper access lines, leased lines and WBA. Relatively low forecasting accuracy is likely to be associated with higher variability of demand and hence a higher level of risk.
- 6.182 For this purpose, we have analysed BT's group volume forecasts (GVF) which are used internally for budgeting and planning purposes. Before the start of each financial year BT agrees a volume forecast with each line of business that will be used to assess its revenue forecasts. This process generates a 12 month forward-looking forecast that can be compared with actual volumes at the end of the year.
- 6.183 Table 6.10 shows the percentage difference (in absolute terms) between the GVF 12 month forecast and the actual volumes for each year since 2004/05. It shows by how much the GVF has erred (forecasting errors as % of forecast) in estimating the future demand for the wholesale services included in the table below.

Table 6.10 Absolute percentage difference between BT's 12 month forecast and actual volumes for year – rentals

Rentals	04/05	05/06	06/07	07/08	08/09	09/10	Average
Copper lines	0.03%	0.20%	3.31%	3.76%	1.68%	0.07%	1.51%
Leased Lines – Below 2 Mbit/s	0.22%	2.11%	5.97%	1.54%	11.51%	3.07%	4.07%
Leased Lines – 2 Mbit/s	16.63%	11.30%	4.87%	1.18%	1.91%	2.63%	6.42%
Leased Lines – Greater than 2 Mbit/s	1.69%	23.83%	13.22%	5.73%	58.26%	7.83%	18.43%
IPStream	46.77%	2.90%	4.12%	8.88%	6.74%	7.86%	12.88%
DataStream	19.65%	30.60%	30.70%	8.73%	13.48%	18.40%	20.26%
WBC					100.00%	22.61%	61.30%

Source: BT submission of 8 October 2010, from GVF.

- 6.184 The evidence above shows that the error in forecasting the volumes of WBA rental services (IPStream¹⁴⁷, DataStream and WBC) was on average comparable to or greater than that of high bandwidth leased lines and significantly larger than in the case of copper lines. This can be interpreted as meaning that it is more difficult to predict future demand for WBA than for copper lines and, therefore, demand for WBA is subject to higher risk than copper lines.
- 6.185 Table 6.11 looks at evidence from the same source for connection services. Again, the average error in predicting (forecasting errors as % of forecast) WBA connection volumes was larger than for copper lines and more similar to that of leased lines.

¹⁴⁷ Until the 2008 WBA market review, IPStream was regarded as an "intermediate" wholesale service, in a market downstream of the WBA market.

Table 6.11: Absolute percentage difference between BT's 12 month forecast and actual volumes for year - connections

Rentals	04/05	05/06	06/07	07/08	08/09	09/10	Average
Copper lines	2.23%	3.62%	1.95%	30.73%	25.26%	14.68%	13.08%
Leased Lines – Below 2 Mbit/s	8.82%	25.93%	19.16%	28.84%	9.34%	70.57%	27.11%
Leased Lines – 2 Mbit/s	51.27%	28.01%	19.63%	7.81%	16.27%	21.12%	24.02%
Leased Lines – Greater then 2 Mbit/s	9.27%	352.01%	11.17%	16.42%	67.26%	84.28%	90.07%
IPStream	111.65%	0.79%	31.90%	19.46%	15.75%	15.95%	32.58%
DataStream	4.50%	83.28%	53.07%	38.55%	27.05%	41.78%	41.37%
WBC					100.00%	16.77%	58.38%

Source: Openreach's submission of 8 October 2010.

6.186 In light of the above, it can be concluded that there is a higher degree of uncertainty in forecasting demand for WBA than copper lines. However, by itself, this evidence does not imply that WBA should necessarily be subject to a higher WACC rate. Under the CAPM, which we use to determine BT's WACC, only risk that is not diversifiable (that is, systematic risk) is rewarded. When a risk is only specific to a particular service, it is assumed that investors will be able to diversify away from these risks. The above analysis does not indicate the extent to which the higher variability of WBA is diversifiable or instead is correlated with movements in the economy as a whole.¹⁴⁸ The second analysis is therefore intended to explore the demand cyclicity of WBA relative to copper access and other wholesale services.

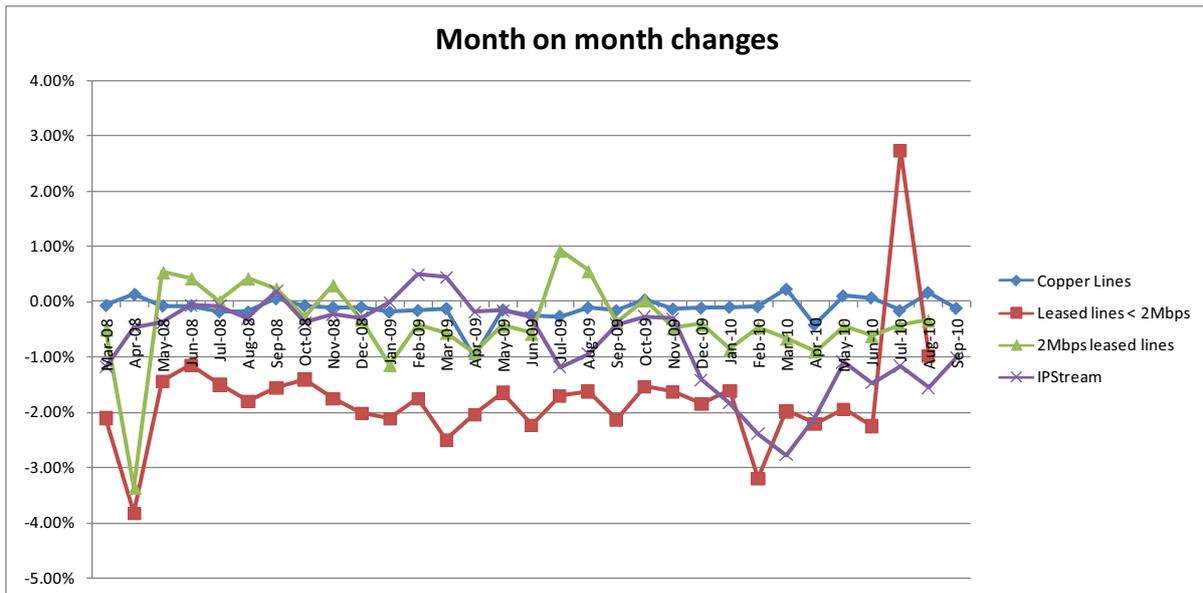
The demand cyclicity of WBA services

6.187 The analysis below looks at the percentage change in demand for copper lines, leased lines and WBA services. Its aim is to understand how the different services have been impacted by the economic downturn and, consequently, the extent to which it can be said that they are affected by systematic risk.

6.188 Figure 6.5 below shows the percentage change from month to month in volumes of copper lines, leased lines and IPStream.

¹⁴⁸ Paragraphs 3.6 – 3.11 of Cost of Capital Statement
http://stakeholders.ofcom.org.uk/binaries/consultations/cost_capital2/final.pdf

Figure 6.5: percentage change from month to month in volumes of copper lines, leased lines and IPStream.



Source: BT submission of 8/10/10, from GVF

6.189 The chart indicates that the volume of copper access lines has been particularly stable over time. IPStream has experienced higher variability in demand than copper lines since the start of 2009 and, particularly, towards the end of the period considered. DataStream and WBC volumes show significantly greater variability and are not shown on the chart for ease of presentation.

6.190 This analysis is suggestive and tends to corroborate the analysis of forecast error above. However, it is difficult to ascertain the extent to which WBA may be more correlated to the economic cycle than copper lines from the above analysis.

6.191 Therefore, finally, we compare the change in volumes of copper lines, leased lines and WBA on an annual basis. See Table 6.12. This is again based on data from the GVF because of limitations on the data for WBA services reported in the RFS.

Table 6.12: Change in annual volumes of copper lines, leased lines and WBA

Year on year % change ¹⁴⁹	Copper access lines	Leased lines < 2Mbps	2Mbps leased lines	Leased lines > 2Mbps	IPStream	DataStream
2008-09	-2.3%	-20.3%	-3.3%	-5.9%	-2.6%	-31.2%
2009-10	-1.1%	-16.6%	-3.9%	-7.6%	-12.7%	-38.1%

Source: BT submission of 8/10/01 from GVF.

6.192 These data show declines in the volumes of all the services since 2008. This is likely to reflect a combination of longer-term changes (for example substitution to mobiles in the case of copper access), increasing competition (for example from growth in LLU in the case of IPStream and DataStream) and the effects of the economic downturn. It is notable that the smallest declines by some margin are in copper access, whilst for other services, the declines are both larger and appear to be accelerating. Whilst clearly data limitations preclude a very firm conclusion, this analysis appears to be consistent with the forecasting error data and our a priori

¹⁴⁹ Data are averages for Feb 2008 – Jan 2009, Feb 2009 – Jan 2010 and Feb 2010 – Sept 2010

reasoning in suggesting that demand for WBA is likely to be more uncertain and more cyclical than demand for copper access.

- 6.193 This supports the argument that cash flows of WBA will be more variable and result in a higher cost of capital than copper lines services. For this reason we believe WBA should not be classified within BT's copper access business for the purposes of an assessment of risk levels. We expect that their future demand will be more closely correlated with the economy-wide level of economic activity than other access services.
- 6.194 Finally we note that, even if the results of the analysis were not clear cut, it could still, on balance be appropriate to apply the higher "rest of BT" cost of capital. When assessing BT's cost of capital we have normally adopted a cautious approach, preferring to accept some risk of setting it too high over a risk of setting it too low. This is the appropriate approach because the costs of error are asymmetric and we would tend to be more concerned with the lack of investment which could result if the cost of capital were set too low than with the risk of slightly higher prices which could result if the cost of capital were set too high. In light of the above, we believe WBA services should be subject to the 'rest of BT' rate (8.5% - 10.0% with a mid-point of 9.3%).

Question 6.4: Do respondents agree with the proposal that the 'rest of BT' rate should be used for the WBA charge control in Market 1?

Section 7

Legal Tests

- 7.1 In the 2010 WBA Statement, we considered whether the imposition of a charge control would be consistent with the relevant tests set out in the Act¹⁵⁰. For the purpose of this consultation, we have reviewed whether our reasoning remains applicable. We have also considered whether the specific form of the charge control meets the relevant tests.
- 7.2 We consider that the charge control meets the criteria set out in section 47(2) of the Act, since it is objectively justifiable, non-discriminatory, proportionate and transparent.
- 7.3 The charge control is objectively justifiable in order to restrict BT's ability to charge excessive prices to CPs that would ultimately be passed on to consumers in a market where BT currently faces no competitive or pricing constraints and where its pricing is unlikely to be constrained throughout the period of this review. The charge control does not unduly discriminate against BT as it is imposed only in a market where BT has been found to have SMP. The charge control is proportionate as we have taken account of the need for BT to be able to make a return on its investment in Market 1 whilst acting to constrain BT's ability to set wholesale prices above the competitive level which may result in consumers paying higher retail prices¹⁵¹. The charge control is transparent since its aims and effects are detailed in this document.
- 7.4 We also consider that the charge control fulfils the conditions set out in section 88 of the Act.
- 7.5 As set out above, we consider there is a risk of adverse effects arising if BT sets some or all of its prices at an excessively high level, reducing benefits for end-users of WBA services.
- 7.6 The charge control will work in conjunction with the basis of charges condition which we imposed on BT in the 2010 WBA Statement. The basis of charges condition requires BT to set each price based on its costs in Market 1. However, the basis of charges condition is unlikely to incentivise BT to reduce its costs. In the absence of a charge control BT would be likely to be able to recover higher costs through higher prices charged at the wholesale level, which would ultimately be passed on in higher retail charges.
- 7.7 The charge control addresses this as it is structured to incentivise efficiency improvements and/or investment by BT, which will be of benefit to all purchasers of WBA products (and, ultimately, could result in better products and lower prices for consumers).
- 7.8 We are of the view that the charge control will promote efficiency by requiring BT to price at the level of an efficient firm in the absence of competitive constraints in this market. The charge control will aim to promote sustainable competition by only encouraging equally or more efficient CPs to compete based on LLU. It will also aim to promote sustainable competition at the retail level by restricting BT's ability to price

¹⁵⁰ Paragraphs 5.294 – 5.301 of the WBA Statement.

¹⁵¹ This is further addressed in sections 3, 4 and 5 above.

excessively with the aim of making it more difficult for other providers to compete. We expect that the benefits of this pricing will eventually flow through to end-users of WBA services.

- 7.9 For the reasons set out above, we consider that the charge control will in particular further the interests of citizens and of consumers in relevant markets by the promotion of competition in line with section 3 of the Act. In particular, the charge control seeks to ensure the availability throughout the UK of a wide range of electronic communications services. In imposing the charge control, we have had regard to the desirability of promoting competition in relevant markets, the desirability of encouraging investment and innovation in relevant markets and the desirability of encouraging the availability and use of high speed data transfer services throughout the United Kingdom.
- 7.10 Further, we consider that, in line with section 4 of the Act, the charge control will, in particular, promote competition in relation to the provision of electronic communications networks and will encourage the provision of Network Access for the purpose of securing efficiency and sustainable competition in downstream markets for electronic communications networks and services, resulting in the maximum benefit for retail consumers of broadband internet access services.

Annex 1

Responding to this consultation

How to respond

- A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 31 March 2011**.
- A1.2 Ofcom strongly prefers to receive responses using the online web form at <https://stakeholders.ofcom.org.uk/consultations/wba-charge-control/howtorespond/form>, 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 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.
- A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email WBAMarket1CCconsultationresponses@ofcom.org.uk attaching your response in Microsoft Word format, together with a consultation response coversheet.
- A1.4 Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.
- Filomena Ciccarelli
Floor 4
Competition and Markets
Riverside House
2A Southwark Bridge Road
London SE1 9HA
- Fax: 020 77834109
- A1.5 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex X. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

Further information

- A1.7 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact Filomena Ciccarelli on 020 77834177.

Confidentiality

- A1.8 We believe 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, ideally on receipt. If you think your response should be kept confidential, can you please specify what part or whether all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

- A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at <http://www.ofcom.org.uk/about/accoun/disclaimer/>

Next steps

- A1.11 Following the end of the consultation period, Ofcom intends to publish a statement in the third quarter of 2011.
- A1.12 Please note that you can register to receive free mail Updates alerting you to the publications of relevant Ofcom documents. For more details please see: http://www.ofcom.org.uk/static/subscribe/select_list.htm

Ofcom's consultation processes

- A1.13 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.
- A1.14 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, who are less likely to give their opinions through a formal consultation.
- A1.15 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Vicki Nash, Director Scotland, who is Ofcom's consultation champion:

Vicki Nash
Ofcom
Sutherland House
149 St. Vincent Street
Glasgow G2 5NW

Tel: 0141 229 7401
Fax: 0141 229 7433

Email vicki.nash@ofcom.org.uk

Annex 2

Ofcom's consultation principles

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

Before the consultation

A2.2 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

A2.3 We will be clear about who we are consulting, why, on what questions and for how long.

A2.4 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 Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.

A2.6 A person within Ofcom 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. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why.

After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We would usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

Annex 3

Consultation response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, www.ofcom.org.uk.
- A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at www.ofcom.org.uk/consult/.
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other 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

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing	<input type="checkbox"/>	Name/contact details/job title	<input type="checkbox"/>
Whole response	<input type="checkbox"/>	Organisation	<input type="checkbox"/>
Part of the response	<input type="checkbox"/>	If there is no separate annex, which parts?	

If you want part of your response, your name or your organisation not to be published, 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)?

DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name

Signed (if hard copy)

Annex 4

Consultation questions

The WBA CC consultation questions

A4.1 The questions set out in the consultation are listed below:

Question 3.1: Do respondents agree with our proposals on the allocated bandwidth growth? If not, explain why.

Question 3.2: Do respondents agree with our proposal to charge control IPS Connect only?

Question 3.3: Do respondents agree with the proposed anchor product characteristics? If not, explain why.

Question 4.1: Do respondents agree that an RPI-X control is the appropriate form of charge control for the regulation of wholesale broadband in Market 1?

Question 4.2: Do stakeholder agree with the adoption Option 2 upstream input approach as our preferred option?

Question 4.3: Do respondents agree that a charge control duration of three years would be appropriate for WBA Market 1?

Question 5.1: Do respondents agree that ancillary service charges should be included in the main basket?

Question 5.2: Do respondents agree with our proposal for the BT end user cease charge?

Question 5.3: Do respondents agree with the use of prior year revenue weights for the WBA charge control basket?

Question 5.4: Do respondents agree that safeguard caps of RPI-0% should apply to ancillary service charges?

Question 5.5: Do respondents agree that a safeguard cap of RPI-0% should apply to the contracted bandwidth charge?

Question 5.6: Do respondents agree with our approach to discounts under the charge control in WBA Market 1 area?

Question 5.7: Do respondents agree that CCA FAC is the appropriate cost basis to use in setting the charge control for WBA services in Market 1?

Question 5.8: Do respondents agree that our adjustments to BT's base year costs in Market 1 are appropriate?

Question 5.9: Do respondents agree with our approach to AVEs and CVEs? If not, please explain why.

Question 5.10: Do you agree with our central estimate of 2.5% for efficiency improvements? If not, please explain why.

Question 5.11: Do you agree with our proposal not to make one off adjustments to WBA prices at the start of the control? If not, please explain why.

Question 6.1: We welcome stakeholders' views on Ofcom's approach to estimating two different costs of capital for Openreach and Rest of BT.

Question 6.2: We welcome stakeholders' views on Ofcom's approach to ERP estimates.

Question 6.3: We would welcome stakeholders' views on Ofcom's approach to BT's Beta calculation.

Question 6.4: Do respondents agree with the proposal that the 'rest of BT' rate should be used for the WBA charge control in Market 1?

Annex 5

Draft Notifications

Notification under section 48(2) and 86 of the Communications Act 2003 Proposal for setting of SMP services conditions on BT

Background

1. On 2 December 2010, the Office of Communications (“OFCOM”) published a statement entitled Review of the wholesale broadband access markets - Statement on market definition, market power determinations and remedies (the “2010 WBA Statement”) identifying a number of markets for the purpose of making market power determinations and setting SMP services conditions.
2. At Annex 1 of the 2010 WBA Statement OFCOM published a notification identifying, in accordance with section 79 of the Communications Act (the “Act”), certain services markets including “wholesale broadband access provided in Market 1” and “wholesale broadband access provided in Market 2” in relation to both of which OFCOM determined that BT has significant market power, and “wholesale broadband access provided in the Hull area” in relation to which OFCOM determined that KCOM has significant market power.
3. As a result of these market power determinations, in accordance with section 48(1) of the Act, OFCOM set on BT and KCOM the SMP services conditions set out in Schedules 1 to 3 to Annex 1 of the 2010 WBA Statement.
4. In the 2010 WBA Statement, OFCOM also decided to impose a charge control on BT in relation to the market “wholesale broadband access provided in Market 1”, and set out the reasons for doing so. OFCOM explained that it would consult separately on the detailed implementation of the charge control, and would separately notify the relevant legal instrument for imposing the charge control in a consultation to be published shortly after.

Proposals

5. OFCOM hereby makes, in accordance with section 48(2) of the Act the following proposal to set SMP services conditions implementing charge controls in relation to the market “wholesale broadband access provided in Market 1” as identified in the 2010 WBA Statement.
6. The proposed SMP services condition is set out in Schedule 1 to this Notification.
7. The proposed SMP services condition shall have effect from [x]¹⁵².
8. By proposing the SMP services condition in paragraph 6 above, OFCOM is proposing to set SMP services conditions on BT by a notification which does not also make the market power determination by reference to which the condition is set. In accordance with section 86(1) of the Act, OFCOM is satisfied that there has been no material change in the markets referred to in paragraph 2 since the market power determinations referred to in the same paragraph were made.

¹⁵² The date which is 28 days from the day of the Notification under Section 48(1) of the Act

9. The effect of the proposals, and the reasons for making the proposals, are set out in the consultation document accompanying this notification and in the 2010 WBA Statement.

Ofcom's duties and tests

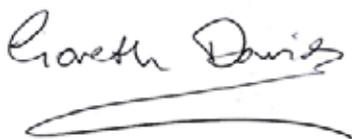
10. OFCOM considers that the proposed SMP services condition referred to in paragraph 6 above complies with the requirements of sections 45 to 50 and sections 78 to 92 of the Act, as appropriate and relevant to such SMP services condition.
11. In making the proposal set out in this Notification OFCOM has considered and acted in accordance with their general duties in section 3 of the Act and the six Community requirements in section 4 of the Act.

Making representations

12. Representations may be made to OFCOM about the proposal set out in this Notification and the consultation document accompanying this notification by 5pm on 31 March 2011.
13. 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.

Interpretation

14. Except for references made to the identified services markets in this Notification as set out in the 2010 WBA Statement and except as otherwise defined in paragraph 15 of this Notification, words or expressions used in this Notification shall have the same meaning as they have been ascribed in the Act.
15. In this Notification:
 - a) "BT" means British Telecommunications plc whose registered company number is 1800000, and any British Telecommunications plc subsidiary or holding company, or any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined by section 1159 of the Companies Act 2006
16. For the purpose of interpreting this Notification –
 - a) Headings and titles shall be disregarded; and
 - b) The Interpretation Act 1978 (c.30) shall apply as if this Notification were an Act of Parliament.
17. Schedule 1 to this Notification shall form part of this Notification.



Gareth Davies

Competition Policy Director

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

20 January 2011

SCHEDULE 1

Setting of SMP services condition EAA7(A) as a result of the market power determination made by OFCOM in the 2010 WBA Statement in respect of the market “wholesale broadband access provided in Market 1” in which OFCOM has determined that BT has significant market power.

In Schedule 1 to Annex 1 of the 2010 WBA Statement, there shall be set the following SMP services condition EAA7(A), inserting it after condition EAA7.

“Condition EAA7(A) – Charge control

EAA7(A).1 Without prejudice to the generality of Condition EAA7, and subject to paragraphs EAA7(A).3 to EAA7(A).9, the Dominant Provider shall take all reasonable steps to secure that, at the end of each Relevant Year, the Percentage Change (determined in accordance with paragraphs EAA7(A).4, EAA7(A).5 and EAA7(A).6) in:

- a) the aggregate of charges for all of the services listed in the Annex to this condition;
- b) the charge for the service listed in point 4 of the Annex to this condition;
- c) the charge for the service listed in point 5 of the Annex to this condition;
- d) the charge for the service listed in point 6 of the Annex to this condition; and
- e) the charge for the service listed in point 8 of the Annex to this condition,

is not more than the Controlling Percentage (determined in accordance with paragraph EAA7(A).9).

EAA7(A).2 The Dominant Provider shall not charge more than:

- a) for the service listed in point 7 of the Annex to this condition, the charge for the Input Service.

EAA7(A).3 For the purpose of complying with paragraph EAA7(A).1, the Dominant Provider shall take all reasonable steps to secure that the revenue it accrues as a result of all individual Charge Changes during any Relevant Year shall be no more than that which it would have accrued had all Charge Changes been made:

- a) for the First Relevant Year, on [x]¹⁵³ of that year; and
- b) for each of the Second Relevant Year and the Third Relevant Year, on 1 April of that year.

The Dominant Provider shall be deemed to have satisfied this obligation where, in the case of a single Charge Change in the Relevant Year, the following formula is satisfied:

$$RC(1 - D) \leq TRC$$

where:

¹⁵³ The date of coming into effect of the condition, as set out at paragraph 7 above

RC is the revenue change associated with the single Charge Change made in the Relevant Year, calculated as the relevant Percentage Change immediately following the Charge Change multiplied by the revenue accrued during the Prior Financial Year;

TRC is the target revenue change required in the Relevant Year to achieve compliance with paragraph EAA7(A).1, calculated by the Percentage Change required in the Relevant Year to achieve compliance with paragraph EAA7(A).1 multiplied by the revenue accrued during the Prior Financial Year; and

D is the elapsed proportion of the Relevant Year in question, calculated as:

- a) for the First Relevant Year, the date on which the Charge Change takes effect, expressed as a numeric entity on a scale ranging from $[x]^{154} = 0$ to 31 March = $[x]^{155}$, divided by $[x]^{156}$; and
- b) for each of the Second Relevant Year and the Third Relevant Year, the date on which the Charge Change takes effect, expressed as a numeric entity on a scale ranging from 1 April = 0 to 31 March = 364, divided by 365;

EAA7(A).4 The Percentage Change for the purpose of each of the categories of services specified (each of which is referred to in this paragraph as a “single charge category”) in paragraphs EAA7(A).1(b), EAA7(A).1(c) and EAA7(A).1(e) shall be calculated for the purposes of complying with paragraph EAA7(A).1 by employing the following formula:

$$C_{t,i} = \frac{p_{t,i} - p_{0,i}}{p_{0,i}}$$

Where

$C_{t,i}$ is the Percentage Change in charges for the specific service i in the single charge category in question at a particular time t during the Relevant Year;

$p_{0,i}$ is the published charge made by the Dominant Provider for the specific service i in the single charge category in question immediately preceding the Relevant Year excluding any discounts offered by the Dominant Provider; and

$p_{t,i}$ is the published charge made by the Dominant Provider for the specific service in the single charge category in question at the time t during the Relevant Year excluding any discounts offered by the Dominant Provider.

EAA7(A).5 The Percentage Change for the purpose of the category of services specified (which is referred to in this paragraph as a “single charge category”) in paragraph EAA7(A).1(d) shall be calculated for the purposes of complying with paragraph EAA7(A).1 by employing the following formula:

$$C_{t,i} = \frac{\{p_{t,i-q_{t,i}}\} - \{p_{0,i-q_{0,i}}\}}{p_{0,i-q_{0,i}}}$$

¹⁵⁴ The date of coming into effect of the condition, as set out at paragraph 7 above

¹⁵⁵ The number of days between start date of the charge control and 31 March 2012, minus 1

¹⁵⁶ The number of days between start date of the charge control and 31 March 2012

Where

$C_{t,i}$ is the Percentage Change in charges for the specific service i in the single charge category at a particular time t during the Relevant Year;

$p_{0,i}$ is the published charge made by the Dominant Provider for the specific service i in the single charge category immediately preceding the Relevant Year excluding any discounts offered by the Dominant Provider;

$p_{t,i}$ is the published charge made by the Dominant Provider for the specific service i in the single charge category at the time t during the Relevant Year excluding any discounts offered by the Dominant Provider;

$q_{0,i}$ is the published charge made by the Dominant Provider to itself for the Input Service immediately preceding the Relevant Year excluding any discounts offered by the Dominant Provider; and

$q_{t,i}$ is the published charge made by the Dominant Provider to itself for the Input Service at the time t during the Relevant Year excluding any discounts offered by the Dominant Provider.

EAA7(A).6 The Percentage Change for the purpose of the category of services specified in paragraph EAA7(A).1(a) (which is referred to in this paragraph as a “basket”) shall be calculated by employing the following formula:

$$C_t = \frac{\sum_{i=1}^n \left[(R_i - S_i) \frac{\{p_{t,i} - q_{t,i}\} - \{p_{0,i} - q_{0,i}\}}{p_{0,i} - q_{0,i}} \right]}{\sum_{i=1}^n [R_i - S_i]}$$

where:

C_t is the Percentage Change in the aggregate of charges for the services in the basket at a particular time t during the Relevant Year;

n is the number of individual services in the basket;

i is a number from 1 to n for each of the n individual services in the basket;

R_i is the revenue accrued during the Prior Financial Year in respect of the individual service i that forms part of the basket, calculated to exclude any discounts offered by the Dominant Provider;

S_i is the amount of the payments made by the Dominant Provider to itself for the Input Service during the Prior Financial Year, calculated to exclude any discounts provided by the Dominant Provider to itself;

$p_{0,i}$ is the published charge made by the Dominant Provider for the individual service i that forms part of the basket immediately preceding the Relevant Year, excluding any discounts offered by the Dominant Provider;

$p_{t,i}$ is the published charge made by the Dominant Provider for the individual service i that forms part of the basket at the time t during the Relevant Year excluding any discounts offered by the Dominant Provider.

$q_{0,i}$ is the published charge made by the Dominant Provider to itself for the Input Service immediately preceding the Relevant Year excluding any discounts offered by the Dominant Provider; and

$q_{t,i}$ is the published charge made by the Dominant Provider to itself for the Input Service at the time t during the Relevant Year excluding any discounts offered by the Dominant Provider.

EAA7(A).7 Where the Percentage Change in the Relevant Year is less than the Controlling Percentage (the “Excess”) then the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph EAA7(A).4, EAA7(A).5 or EAA7(A).6, as applicable, but increased by the absolute value of the Excess.

EAA7(A).8 Where the Percentage Change in the Relevant Year is more than the Controlling Percentage (the “Deficiency”) then the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph EAA7(A).4, EAA7(A).5 or EAA7(A).6, as applicable, but decreased by the absolute value of the Deficiency.

EAA7(A).9 Subject to paragraphs EAA7(A).7 and EAA7(A).8, the Controlling Percentage is the amount of the change in the Retail Prices Index in the period of 12 months ending on 31 December immediately before the beginning of that Year expressed as a percentage (rounded to two decimal places) of that Index as at the beginning of that period:

- 1) for the First Relevant Year,
 - b) for the basket of services specified in paragraph EAA7(A).1 (a), decreased by $[X_1]^{157}$ percentage points;
 - c) for the service specified in paragraph EAA7(A).1 (b), decreased by zero percentage points;
 - d) for the service specified in paragraph EAA7(A).1 (c), decreased by zero percentage points;
 - e) for the service specified in paragraph EAA7(A).1(d), decreased by zero percentage points;
 - f) for the service specified in paragraph EAA7(A).1(e), decreased by zero percentage points
- 2) for each of the Second Relevant Year and the Third Relevant Year,
 - g) for the basket of services specified in paragraph EAA7(A).1 (a), decreased by $[X]^{158}$ percentage points;

¹⁵⁷ Value of $X_1 = (1 + \text{change in RPI}) - [\text{Sum}\{w_i * P_{m,i}\} / \text{Sum}\{w_i * P_{0,i}\}] * (1 + \text{change in RPI} - X)$, where w_i is the weight of the service in the basket as calculated in paragraph EAA7(A).6; $P_{0,i}$ is the published charge made by the Dominant Provider for the individual service i that forms part of the basket immediately preceding the Relevant Year, excluding any discounts offered by the Dominant Provider; $P_{m,i}$ is the published charge made by the Dominant Provider for the individual service i that forms part of the basket on 1 April 2011, excluding any discounts offered by the Dominant Provider; change in RPI is the change in the Retail Prices Index in the period of 12 months ending on 31 December 2010 expressed as a percentage (rounded to two decimal places) of that Index as at the beginning of that period; and X is value set out in paragraph EAA7(A).9 (2)(a).

- h) for the service specified in paragraph EAA7(A).1 (b), decreased by zero percentage points;
- i) for the service specified in paragraph EAA7(A).1 (c), decreased by zero percentage points;
- j) for the service specified in paragraph EAA7(A).1(d), decreased by zero percentage points;
- k) for the service specified in paragraph EAA7(A).1(e), decreased by zero percentage points

EAA7(A).10 Where:

- l) the Dominant Provider makes a material change (other than to a Charge) to any Charge Controlled Service for which a Charge is charged;
- m) the Dominant Provider makes a change to the date on which its financial year ends; or
- n) there is a material change in the basis of the Retail Prices Index,

paragraphs EAA7(A).1 to EAA7(A).9 shall have effect subject to such reasonable adjustment to take account of the change as Ofcom may direct to be appropriate in the circumstances. For the purposes of this paragraph, a material change to the Charge Controlled Service includes (but is not limited to) the introduction of a new product and/or service wholly or substantially in substitution for an existing Charge Controlled Service.

EAA7(A).11 The Dominant Provider shall record, maintain and supply to Ofcom in writing, no later than three months after the end of each Relevant Year, the data necessary for Ofcom to monitor compliance of the Dominant Provider with the price control. The data shall include:

- o) pursuant to Condition EAA7(A).4, EAA7(A).5 or EAA7(A).6, as applicable, the calculated Percentage Change relating to the services as listed in EAA7(A).1(a) to EAA7(A).1(e);
- p) pursuant to Condition EAA7(A).3, calculation of the revenue change as a result of all individual Charge Changes during any Relevant Year compared to the target revenue change;
- q) All relevant data the Dominant Provider used in the calculation of the Percentage Change pursuant to Conditions EAA7(A).4, EAA7(A).5 or EAA7(A).6, as applicable, and the revenue change and target revenue change pursuant to Condition EAA7(A).3;
- r) Other data necessary for monitoring compliance with the charge control.

EAA7(A).12 If it appears to Ofcom that the Dominant Provider is likely to fail to secure that the Percentage Change does not exceed the Controlling Percentage for the Third Relevant Year, the Dominant Provider shall make such adjustment to any of its charges for the provision of the services listed in EAA7(A).1(a) to EAA7(A).1(e) and by such day in that

¹⁵⁸ Ofcom is seeking views on the appropriate value of X within the range of -10.75% and -14.75% as discussed in Section 5 of the explanatory statement attached to this notification.

Relevant Year (or if appropriate in Ofcom's opinion, by such day that falls after the end of that Relevant Year) as Ofcom may direct for the purpose of avoiding such a failure;

EAA7(A).13 Paragraphs EAA7(A).1 to EAA7(A).9 shall not apply to such extent as Ofcom may direct.

EAA7(A).14 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

EAA7(A).15 In this Condition:

- s) "Charge" means for the purposes of paragraph EAA7(A).10, the charge (being in all cases the amounts offered or charged by the Dominant Provider) to a Communications Provider for the Charge Controlled Service;
- t) "Charge Change" means a change to any of the charges for the provision of the services as listed in EAA7(A).1(a) to EAA7(A).1(e);
- u) "Charge Controlled Service" means a service or basket of services listed in EAA7(A).1(a) to EAA7(A).1(e);
- v) "Charge Controlled Product" means any wholesale broadband access product supplied by the Dominant Provider to communications providers (including itself) based on IP connectivity that allows those communications providers to connect at a number of handover points to the Dominant Provider's network in order to provide a service to end users with an access connection capable of supporting downstream speeds of up to 8Mb/s, such product being currently known as IPStream Connect Max and IPStream Connect Max Premium..
- w) "Controlling Percentage" is to be determined in accordance with paragraph EAA7(A).9;
- x) "Input Service" means, in relation to each service listed in the Annex to this condition, the service provided by the Dominant Provider to itself and made available to other parties, which the Dominant Provider uses as a specific input for each such service listed in the Annex to this condition;
- y) "Ofcom" means the Office of Communications;
- z) "Percentage Change" has the meaning given to it in paragraph EAA7(A).4, EAA7(A).5 or EAA7(A).6, as applicable;
- aa) "Prior Financial Year" means the period of 12 months ending on 31 March immediately preceding the Relevant Year in question;
- bb) "Relevant Year" means each of the following three periods:
 - (1) the period beginning on [X] 2011 and ending on 31 March 2012 (the "First Relevant Year");
 - (2) the period beginning on 1 April 2012 and ending on 31 March 2013 (the "Second Relevant Year"); and
 - (3) the period beginning on 1 April 2013 and ending on 31 March 2014 (the "Third Relevant Year").

- cc) "Retail Prices Index" means the index of retail prices compiled by an agency or a public body on behalf of Her Majesty's Government or a governmental department (which is the Office of National Statistics at the time of publication of this Notification) from time to time in respect of all items.

Annex to condition EAA7(A)

Services subject to the charge control pursuant to paragraphs EAA7(A).1 (a) to EAA7(A).1 (e).

1. End User Access Connection Services, i.e. any service required in order to provide the initial connection of an end user to the Dominant Provider's broadband network for the purposes of providing the Charge Controlled Product, such service currently being known as IPstream Connect Max and Max Premium End User Access connection.
2. End User Access Rental Services, i.e. any service related to the ongoing provision of a connection of an end user to the Dominant Provider's broadband network for the purposes of providing the Charge Controlled Product, such service currently being known as IPstream Connect Max and Max Premium End User Access rental.
3. End User Bandwidth Rental Services, i.e. any service in addition to End User Access Rental Services provided on an End User basis and related to the ongoing provision of End User bandwidth by the Dominant Provider to a communications provider, for the purposes of providing the Charge Controlled Product, such service currently being known as IPstream Connect Max and Max Premium EU bandwidth.
4. End User Migration Services, i.e. any service required to migrate an end user of a product provided using the Charge Controlled Product from one communications provider to another (including to or from a retail division or subsidiary of the Dominant Provider) or between a product provided using the Charge Controlled Product and a product provided using other wholesale broadband access services provided by the Dominant Provider, such service currently being known as BT IPstream Connect End User Transfer.
5. End User Regrade Services, i.e. any service required to change the upstream or downstream speed of the connection provided to the end user, where the end user continues to be connected to the same communications provider, where all other features of the service provided by the Dominant Provider to the communications provider stay the same, and where the effect of the change of upstream or downstream speed is such that the service provided by the Dominant Provider is the Charge Controlled Product either prior to or after the regrade. This would include, for example, regrading from a lower speed to achieve a downstream speed of up to 8Mbit/s or by regrading between products that provide a downstream speed of up to 8Mbit/s in order to achieve a different maximum theoretical upstream speed, such service currently being known as BT IPstream Connect End User Regrade Charges.
6. End User Cancellation Services, i.e. any service required to cancel an order for an End User Access Connection service during the course of connecting that service but prior to the service connection being completed, such service currently being known as IPstream Connect ADSL cancellation.
7. End User Cease Services, i.e. any service required to disconnect an end user from a product provided using the Charge Controlled Product, such service currently being known as IPstream Connect Max and Max Premium End User Access cease.
8. Contracted Bandwidth Rental Services, i.e. any service related to the provision of bandwidth purchased by a communications provider at each of the handover points for the purpose of providing a product to end users which uses the Charge Controlled Product (either individually or in aggregate across handover points), irrespective of the actual

bandwidth used, such service currently being known as IPstream Connect Contracted bandwidth per Mbit/s per node.

9. Communications Provider Handover Rental Services, i.e. any service related to the connection by the communications provider at each of the handover locations required to connect to the Charge Controlled Product, such service currently being known as IPstream Connect Communications Provider (CP) Handover.

10. Interconnect Links, i.e. any service provided by the Dominant Provider to connect between any of the handover points of the Charge Controlled Product and the communications provider's network, such service currently being known as IPstream Connect Interconnect Links.

Annex 6

Determination of base year costs (2009/10)

Introduction

- A6.1 Our charge control model forecasts all costs relevant to providing charge-controlled services from the base year through to the end of the charge control period. This Annex describes how we have determined the relevant cost base from the most reliable and recent information sources available. Annex 7 describes in detail the charge control model and the key assumptions used to forecast changes in the base year costs reflecting for example our assumption on volume growth and efficiency gains.
- A6.2 In summary the main steps we took to establish the base year input costs for the WBA geographic Market 1 were to:
- Determine the most appropriate sources and financial year cost data to use ensuring this reflects the geographic market boundaries as set out in the 2010 WBA Statement;
 - Adjust the costs to correct for any 'one-off' or non-recurring costs;
 - Adjust the costs to match the services captured in the WBA charge control basket view; and
 - Attribute the costs for the national provision of WBA services into the three geographic markets thus deriving a cost base for Market 1.
- A6.3 The main sources of the financial cost information for the WBA market are BT's Regulatory Financial Statements (RFS) for the financial year ending 31 March 2010 and additional regulatory financial information. BT's RFS are audited and published on BT's website¹⁵⁹ and the additional information is provided for Ofcom's use only.
- A6.4 However, the 2009/2010 RFS reflect the 2008 WBA Statement¹⁶⁰ geographic market boundaries which were updated in the recent 2010 WBA Statement. Additionally the RFS does not fully attribute all the WBA costs and revenues into the three geographic markets.
- A6.5 Therefore, using analysis provided by BT, it is necessary to make a number of adjustments to the RFS data to ensure they reflect the latest market definitions and to derive geographic allocation base for costs which have not been allocated into the three geographic markets in order to arrive at a base year cost for Market 1.
- A6.6 In determining base year costs we also adjust by eliminating or normalising for 'one-off', non-relevant and non-recurring costs within the selected base. Also there may be other costs which are omitted or understated which should be reinstated or normalised. If these adjustments were not made then the basis used to forecast costs throughout the charge control period will be distorted.

¹⁵⁹ (<http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/index.htm>)

¹⁶⁰ <http://stakeholders.ofcom.org.uk/binaries/consultations/wba/statement/wbastatement.pdf>

- A6.7 In arriving at the base year cost input for the WBA charge control we need to take out any revenue and costs that relate to products and services that are not included within the charge control basket.
- A6.8 BT's 2009/10 RFS show only limited attribution (47%) of costs across the three geographic WBA markets with an aggregation of Market 3 costs with non-geographic (national) costs. As our charge control relates only to Market 1, the base year financial information therefore has been fully attributed across the three geographic markets to identify the base year costs for Market 1.

Source of financial data for setting base year costs

- A6.9 We have used BT's audited and published 2009/10 RFS as the primary source of financial data to determine the base year costs.
- A6.10 Our approach consists of using base year RFS costs on an EOI view i.e. it uses the charges from the upstream LLU charge control as input to the costs in the WBA market. We have removed all SMPF related costs from our base year data on the basis that these costs will be met by the SMPF charge. The cost adjustment across the three geographic markets is shown below.

Table A6.1: RFS 2009/2010 to RFI EOI view 2009/2010

RFS 2009/2010 to RFS EOI view 2009/2010	RFS 2009/2010	Replace the SMPF related costs with the EOI costs	RFS 2009/2010
Total Turnover	975	-	975
Less Openreach SMPF costs	0	199	199
Net revenue	975		776
Total Costs	806	-153	653
Margin	169	-46	123
Margin (as % of turnover)	17%	-	13%
Capital Employed	1,304	-62	1,242
ROCE	13%		10%

- A6.11 We also compared the 2009/10 RFS against the prior year information. The table below shows a summary of the aggregated revenue and costs for all three WBA markets for financial years 2008/2009 and financial years 2009/2010 based on BT's RFS but adjusted to reflect the assumption that SMPF services are purchased on an EOI basis. We have taken the most recent year (2009/2010) as the base year however as the table below shows there are some variances from the previous year. Further analysis showed that, in part, some of these variances between the two financial years are due to 'one-off', irrelevant and non recurring costs resulting in the need to make adjustments to the 2009/2010 costs in order to establish the relevant base year costs. For example costs associated with upgrading customers from the existing technology network to their new 21CN network were excluded as our WBA charge control model modelled the existing network.

Table A6.2: RFS EOI view 2008/09 vs. 2009/10

	FY 2008/2009	FY 2009/2010	Comparison
Number of rentals	8,183,148	8,022,996	(160,152)
Total Turnover (£m)	1,049	975	(74)
Less Openreach SMPF costs (£m)	204	199	(5)
Net revenue (£m)	845	776	(69)
Other Costs (£m)	488	653	165
Margin (£m)	357	123	(234)
Margin (as % of turnover)	34%	13%	

Data reliability

- A6.12 It is important that we use the most robust sources of data available which should be sufficiently reliable and relevant to be used as the base year cost input to our charge control model. In paragraph A6.10 we explained that we carry out comparability checks on the data provided by BT to test for reliability and consistency. This is in addition to the internal checks and controls carried out by BT and the work of BT's independent auditor.
- A6.13 BT's RFS are subject to independent audit. In the case of the WBA markets the audit opinion (to the "...fairly presents in accordance with..." standard) was unqualified. BT's RFS are also supplemented by extensive documentation that explains the basis of preparation and, for example, the cost attribution methodologies.
- A6.14 To derive a full geographic market split of the WBA market costs we have used additional data sourced from BT. This is necessary because the RFS only geographically allocate 47% of the total WBA costs, and the boundaries which the RFS are based on (allocation of exchanges to Markets 1, Market 2, and Market 3) have changed since the RFS were produced.

Adjustments made to the base year costs (FY 2009/2010)

Redefined market boundaries

- A6.15 BT's 2009/10 RFS are prepared against the geographic market boundaries of the May 2008 WBA Statement. The 2010 WBA Statement changed the boundaries of the WBA geographic markets. In Market 1 this change reduced the size of the market from 3720 to 3388 exchanges; Market 1 coverage is now 11.7% of the UK delivery points compared to 16.5% under the May 2008 WBA Statement¹⁶¹.
- A6.16 Using data from BT on the location and costs associated with each of the exchanges we have adjusted the geographic allocation of the costs to produce an RFS view that reflects the revised geographic market boundaries.

'One-off' cost adjustments to base year

¹⁶¹ <http://stakeholders.ofcom.org.uk/binaries/consultations/wbamr07/statement/statement.pdf>

- A6.17 When using BT's 2009/2010 regulated financial statements as the base input for the WBA charge control model we need to ensure they represent a 'normal' steady state level of costs. Therefore we exclude 'one-off' or non-recurring costs and conversely add in any costs which may not be included in the 2009/2010 RFS but which should be included in order to provide steady state WBA services.
- A6.18 We made the following adjustments to the costs in financial year 2009/2010 to derive the base year costs being taken into the WBA charge control model:

21CN software costs.

- A6.19 The WBA RFS include software depreciation costs relating to software development projects and licences. We have explained that the cost base of our charge control model is based on a hypothetical ongoing network using 20CN technology and it is therefore necessary to exclude 21CN software costs from this heading. BT provided a list of all the software projects relating to the WBA market which incurred a total annual depreciation charge of £112 million supplemented by analysis which identified the projects related specifically to 21CN projects and the projects related to 20CN. This showed £33m of the £112m annual depreciation charge related to 21CN projects. We have therefore excluded £33m from the 2009/10 base year cost base in respect of 21CN software costs.

Network customer re-grade costs (20CN to 21CN)

- A6.20 The RFS for the WBA market include costs relating to moving customers from the existing 20CN network to their new 21CN. Under our HON approach, the costs of re-grades to 21CN are not relevant and should be excluded. BT provided a list of all the migrations and re-grades carried out in 2009/10. BT identified which migrations and re-grades were associated with steady state 20CN activities and which were specifically associated with network upgrades and migrations from 20CN to 21CN. BT's analysis showed that of the total £45 million of re-grade costs £7m related to steady state 20CN activities. The remaining £38 million related to 20CN to 21CN re-grade and migration activities and has been excluded from the base year cost base.

Correction to cost attribution error in BT's 2009/10 RFS

- A6.21 BT brought to our attention an error in the 2009/2010 RFS which related to the allocation of ATM network costs into the WBA market. BT provided details of the circuits and bandwidth for the different services using the ATM network, together with analysis to show the allocation to the WBA market used at the time of compiling the RFS was incorrect. This analysis provided by BT showed that of the total ATM costs (£87m), the proportion used by WBA services was understated by 25% (£21m). We have included this understatement in our base year cost base.

Adjustments to produce a WBA charge control basket view

Special fault investigation costs

- A6.22 After further analysis of the costs and revenues relating to the special fault investigations we have taken out costs which are recovered against revenues outside the main basket of this charge control. £22 million was excluded across all three geographic markets of which £5 million related to Market 1.

Attribution of non-geographic costs

A6.23 BT's published RFS do not attribute fully all costs on a geographic basis. When the RFS reporting requirement was imposed on BT in 2009¹⁶², we explained BT's position at that time which was:

"This is the first time that the RFS will include markets defined on a geographic basis and has raised many new cost attribution questions for BT.

BT needs to report on a geographic basis for Markets 1 and Market 2, allocating revenues and costs across the three markets on a causal and objective basis. However, BT explained that certain revenues and costs cannot currently be attributed geographically using an appropriate and robust attribution methodology.

They demonstrated that the majority of services' revenues can be split geographically using billing data. However they are unable to robustly split the following on a geographic basis:

- internal and external virtual path handover;
- internal and external broadband conveyance in the UK; and
- ancillary charges (migration, cessation, re-grades).

With regards to costs BT have indicated to that certain depreciation and maintenance costs can be allocated to markets using the allocation bases such as number of DSLAMs located at exchange sites. This however leaves numerous other overhead type costs that cannot be allocated on a robust geographic basis."

A6.24 For the purposes of setting base year costs for the charge control model we therefore have developed the cost attribution methodologies to cover all costs resulting in a full FAC base for 2009/10. These methodologies considered the attribution of existing non-geographic costs (as reported in the RFS) as well as providing an alternative view of current geographic cost attributions in the RFS. The updated costing methodologies follow the regulatory accounting principles set out in BT's Primary Accounting Documents¹⁶³ of which consistency with the cost causality principle is a key factor.

A6.25 In developing the attribution methods for the cost and revenue elements we have used additional information from BT and analysed the details underlying the cost elements.

A6.26 The attribution basis developed so that all costs are attributed to each of the three markets are:

ATM network model

A6.27 Approximately 10% of the cost base is associated with the costs of the ATM network transmission platform. BT has constructed a model that allocates the ATM

¹⁶² <http://rhprod-webstg01:8080/consult/condocs/btkcom09/btkcom.pdf>

¹⁶³ (<http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/index.htm>)

costs across the three markets using exchange specific circuit and bandwidth data for each market. BT's ATM model is explained in more detail below.

Rentals

- The number of WBA rentals in a market is used as a cost driver for the costs of broadband ports, ancillary charges, and special fault investigations.

Connections

- The number of connections in a market is used to attribute connection activity costs.

Number of DSLAMs

- The number of DSLAMs in each market is used to allocate cost associated with DSLAM's.

Ceases

- The number of rental ceases in each market is used to attribute line termination and associated costs.

Backhaul circuit model

A6.28 Backhaul and other associated costs are allocated to each market using a model developed by BT which identifies the backhaul circuits by each exchange and then allocates backhaul and circuit costs to each market based on the location of the exchange. BT's backhaul circuit model is explained in more detail below.

A6.29 Table A6.3 shows the allocation methods used to derive a fully allocated geographic market view

Table A6.3: Allocation methods for WBA Markets

Allocation basis	Market 1	Market 2 + 3
Number. of Rentals	25%	75%
Number of connections	20%	80%
ATM model	27%	73%
Backhaul circuit model	44%	56%
21 CN components	0%	100%
Revenue	32%	68%

Conclusion

- A6.30 The base year input costs for WBA Market 1 are £46 million of costs relating to the SMPF EOI charge and £149 million of other incurred costs.
- A6.31 Table A6.4 shows the reconciliation from RFS EOI costs for the WBA market in 2009/2010 to the base year input costs for Market 1 which are used in the WBA charge control modelling.

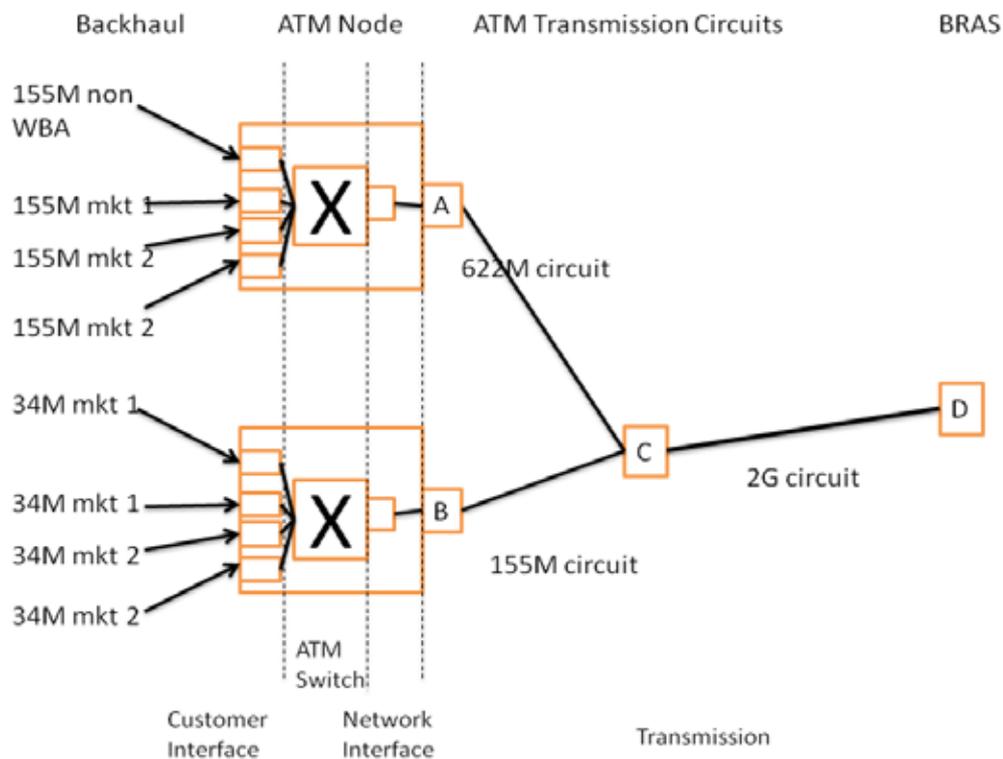
Table A6.4: Reconciliation from the regulated financial statement costs (on an EOI basis) to the input base year costs used in the WBA charge control model

	EOI 2009/10	Cost adjustments					Ofcom WBA market view	Market 1
		software depreciation	ATM costs	21CN re- grade costs	SFI costs	NRC uplift		
Turnover	975				-30		945	304
Openreach SMPF costs	199						199	46
Net revenue	776						746	258
Other costs	653	-33	21	-38	-22		582	153
Margin	123						164	79
Capital Employed	1,242	-	58	-10	- 3	129	1,416	406
ROCE	10%						12%	26%

BT ATM model description

A6.32 As part of the WBA charge control consultation, we learnt that BT holds an inventory data base which has details of each of the circuits across the ATM network, and the origin of each of the bearers on these circuits. Data is also available showing the origin of traffic entering each line card at the ATM nodes. For example, which DSLAM has a backhaul circuit terminated at the ATM node. Consequently it is possible to associate the line cards with traffic from a specific DSLAM and hence a geographic WBA market. This is explored in more detail below. Figure A6.1 shows schematically BT's ATM model.

Figure A6.1: BT ATM model



A6.33 In the schematic, each ATM Node takes as inputs various backhaul circuits from DSLAMs in each of the WBA markets plus, on occasion, inputs from other services. It is therefore possible to identify at each site the number of cards associated with each market. In practice there is a database of the backhaul circuits, with “A” ends at the DSLAMs which can be associated with a specific market by cross-referencing the “A” ends with the broadband market associated with the exchange at each “A” end.

ATM Transmission

A6.34 The ATM transmission costs relate to the circuits connecting the ATM nodes.

A6.35 The physical infrastructure database captures each of the transmission circuits across the ATM and also has details of the location of the A and B ends of the circuit. It is therefore possible to identify the bandwidth and radial distance of each circuit. The approach outlined below can be used to identify the proportion of each circuit that is used to carry traffic from each of the three geographic markets (and also the percentage of non-WBA traffic)

Identification of the proportion of ATM transmission circuits with traffic from geographic WBA markets

A6.36 In the above schematic, ATM node B has 50% of its input attributable to Market 1 and 50% attributable to Market 2. (There are 2 backhaul circuits at 34M from each of these two markets.)

A6.37 The situation in ATM node A is more complex, with one 155M input from a non-Broadband market, one 155M input from market 1, and two 155M inputs from Market 2.

A6.38 The schematic also shows three circuits across the ATM network:

- From point A to point C, a 622Mbt circuit (Circuit AC)
- From point B to point C, a 155Mbt circuit (Circuit BC)
- From point C to point D, a 2Gbt circuit (Circuit CD)

A6.39 Circuit CD is carrying 622M of traffic from Circuit AC and 155M of traffic from Circuit BC. This means that 80% of the capacity ($622/(622+155)$) on CD originates from ATM node A and 20% of traffic on CD originates from ATM node B.

A6.40 We also know the proportion of bandwidth entering node A from each of the market. Consequently it is possible to identify the proportion of traffic carried over each circuit in the ATM that is attributable to each of the markets. For example, 25% of the bandwidth entering node A originates from Market 1 and 50% from Market 2. This means that 25% of the cost of circuit AC relates to Market 1.

A6.41 A similar approach can be taken for circuit BC, where 50% of traffic arriving at node B originates from Market 1. It is consequently possible to identify the proportion of traffic carried on CD that originates from Market 1. This is given by:

- 80% multiplied by the % of traffic on AC relating to Market 1 plus
- 20% multiplied by the % of traffic on BC relating to Market 1

A6.42 In the example this is $80\% * 25\%$ plus $20\% * 50\% = 30\%$ of the cost of CD relates to Market 1 traffic.

A6.43 By examining the proportion of bandwidth delivered across each circuit that originates from each of the WBA geographic markets, it is possible to identify the proportion of the cost of each circuit that is attributable to each Market.

ATM Customer Interface cards

A6.44 The volume of input cards at each bandwidth from each market can be used to identify the percentage of line cards at each bandwidth that are attributable to each market.

A6.45 The customer interface components can therefore be allocated to markets by examining the proportion of line cards at each bandwidth that originate from DSLAMs in each geographic market.

ATM Network Interface

A6.46 The network interface component links the ATM switch to the circuits. Each ATM switch needs to be linked to the transmission circuits, so these costs are, in part, site specific.

ATM Switch Costs

A6.47 The switch costs are primarily site specific. The size of the switch required at the site is dependent on the input bandwidth and the number of circuits connecting to the site. The switch costs are primarily driven by the bandwidth at each node.

Annex 7

Ofcom's modelling analysis

Introduction

A7.1 This annex outlines Ofcom's cost modelling methodology. The Ofcom model ("the WBA model") is used to calculate a value of X for the charge control basket for 2011/12 – 2013/14. Where the X is the average amount by which BT will be required to reduce charges in each year of the charge control. This annex:

- Sets out our methodology;
- Provides an overview of the model;
- Provides details of the construction of the model and the model's calculations;
- Examines a number of key quantitative issues; and
- Provides results based on different assumptions of key inputs.

Anchor Pricing

A7.2 The wholesale broadband market is in a state of flux. BT has begun the roll out of 21CN in Market 3 areas. In the future this could be rolled out to other parts of the UK.

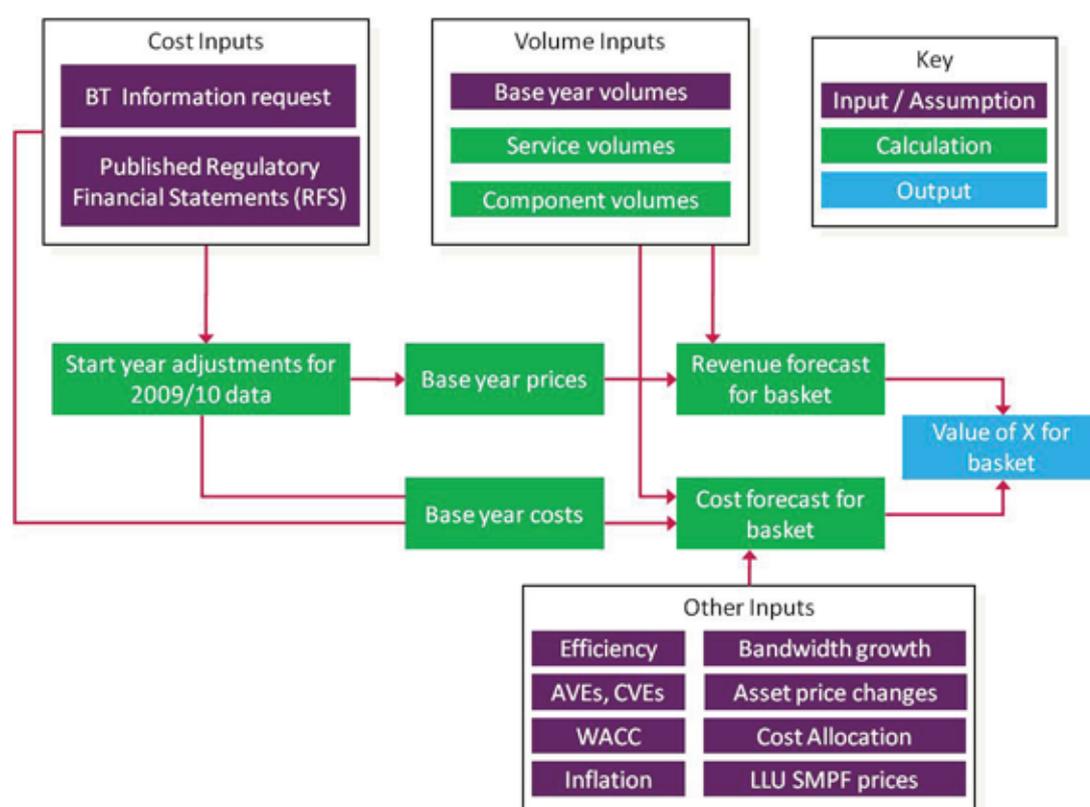
A7.3 As discussed in Section 3 we have proposed an "anchor pricing" approach. In terms of cost forecasting for WBA services this has a number of implications:

- The WBA model is based on 20CN costs. This is the current technology in use at the present time to provide broadband services to Market 1 areas, and we do not consider the costs of any new technology which might be adopted during the control period. For cost modelling purposes we exclude the costs associated with 21CN investment as well as any transition costs.
- As we are assuming that the current technology in use will be used for the duration of the charge control we are modelling a hypothetical ongoing network. The model is hypothetical because we assume that all traffic will be carried on the 20CN network for the duration of the charge control, and that the level of capital and operating costs are at the efficient levels that would be expected if the network were in an ongoing environment. Also, because we exclude 21CN investment, for consistency we also have to exclude any spillover from 21CN investment that has already taken place on the 20CN network.
- 21CN services are excluded from the scope of this control. If 21CN is rolled out in the period of the charge control then the price (and quality) of existing services are 'anchored' by the legacy technology, even if the services are actually provided over new technology. This incentivises BT to invest in new technology only when it lowers costs, or provides higher quality services (or both) for which consumers are willing to pay.

Overview of model structure

- A7.4 The main objective of the WBA model is to forecast the costs to BT of providing the relevant WBA services over the period of the charge control. We will explain how the model achieves this with reference to the data inputs, modelling assumptions and outputs.
- A7.5 The structure of the model is illustrated in Figure A7.1. The input data and assumptions are used to determine the cost and revenue forecasts for each service in the basket. The basket X is set so that total revenues in the basket are equal to the costs in the final year of the charge control.

Figure A7.1 - The WBA CC model structure



- A7.6 The basket X is determined by:
- Total costs for each of the services included in the basket. This is determined by the unit costs of the underlying inputs used by these services, service volume forecasts in Market 1 areas, and a number of other assumptions. This includes the rate of change in operating costs at constant volumes (i.e. BT's Opex efficiency) and the cost of capital;
 - Service prices at the start of the charge control; and
 - Revenues for each service in the basket, calculated as the product of service volumes and service prices.

Volume forecasts

A7.7 We use as our starting point the 2009/10 service volumes; these are split by internal and external volumes. Each service is provided using underlying components. The majority of services use a wide range of different components, and the same components are used to provide a range of services. The relationship between service and component volumes is defined by usage factors; these show how much of each underlying component is used per unit of each service. To derive estimates of these we adopt the following approach:

- i) For each cost component we determine the maximum unit cost across the services that use the component
- ii) We then divide each service-level unit cost by the maximum unit cost determined in Step 1.

A7.8 In the WBA model we forecast service volumes, we then use the usage factors to generate the component volumes required to provide the forecast services. We use the component volumes in our cost forecasts.

A7.9 Our approach to forecasting service volumes is divided into three distinct sections:

- End user volumes, including rentals, connections and ceases. We also forecast broadband regrades.
- Allocated bandwidth required per end user.
- Backhaul, which we define as the conveyance of end user traffic from the local exchange to the handover site (i.e. at the BRAS).

End user volumes

A7.10 The number of end users is a key driver of costs and revenues. We have identified two counteracting drivers of growth in WBA volumes:

- Increases in fixed broadband penetration; and
- The rollout of LLU in Market 1

Increases in fixed broadband penetration

A7.11 The 2010 Communications Market Report (CMR) reported that in 2009 fixed broadband growth slowed to 5.5%, compared to 11% in 2008 and 20% in 2007. This slowing reflects the high penetration of fixed broadband services, with 65% of UK households having a fixed-line broadband connection in Q1 2010. In determining the appropriate future growth in fixed broadband in Market 1 we have considered a wide range of sources:

- The “UK telecoms market: trends and forecasts 2010–2015” study published in June 2010 by Analysys Mason¹⁶⁴. This provides forecasts for residential

¹⁶⁴ This was published as an annex to Analysys Mason's report ‘The Western European telecoms market: trends and forecasts 2010–2015’, published in June 2010.

broadband up to 2015. A growth of 4.3% is forecast in 2010/11 slowing to 2.6% by 2013/14.

- Enders Analysis research titled: “UK Residential Broadband Market Trends and projections to 2014” presented in November 2009. This forecasts a growth of 4.7% in fixed broadband end users in 2010/11, slowing to 2.1% by 2013/14.
- Forecasts provided by BT for the 2010 WBA Statement on expected growth in retail broadband, this forecast an increase in end users over the duration of the charge control.

A7.12 These forecasts suggest the fixed broadband market will continue to grow over the duration of the charge control, albeit at a steadily declining rate. As a conservative assumption in our base case we assume a steady level of growth of 2% in end user volumes over the duration of the charge control.

The rollout of LLU in Market 1

A7.13 However, TalkTalk has recently announced that it plans to unbundle 700 additional exchanges¹⁶⁵. This deployment is likely to occur during this charge control period. This is discussed in the 2010 WBA Statement, in particular in paragraphs 3.169 to 3.190 and, in paragraph 5.91 to 5.92. In considering the impact of TalkTalk’s announcement on the WBA we said that it would not be appropriate to review the market definition, but that we would take into account the impact of the rollout of LLU on volumes in the Market 1 charge control.

A7.14 To gain an understanding of the impact the roll out of LLU could have on BT’s volumes in Market 1 we have developed a simple model. We map the exchanges that TalkTalk are planning to unbundle against data provided by BTW on TalkTalk WBA volumes, by exchange. The exchanges are ranked by volume, and we select the top 70%, which we assume will be unbundled over the duration of the charge control (note this includes some exchanges in Market 2).

A7.15 Our analysis assumes that TalkTalk will unbundle the exchanges with the highest number of customers first, this will mean that over the duration of the charge control they will be able to migrate a higher proportion of their customer base. In our analysis we assume that 90% of their existing customer base in Market 1 will be migrated from BT’s network by the end of the charge control. This is based on a 3 phase migration, with the same number of exchanges unbundled in each phase.

A7.16 For the unbundled exchanges we assume that there will be a 10% increase on TalkTalk’s existing customer base over 3 years. This implies an annual migration rate of 3.5% of WBA volumes. We assume the increase in customer base will be driven by the increased attractiveness of the products TalkTalk will be able to offer in unbundled exchanges. These assumptions imply that TalkTalk will have somewhere around 200k – 210k customers in its unbundled exchanges in Market 1 by the end of the charge control, this is 10-10.5% of BT’s current volumes.

A7.17 We have taken this approach because we consider it is likely that an operator, in deploying LLU, would focus on the exchanges where it already has a customer base. The migration of these customers would help the operator to achieve the scale needed to make investment in the smaller exchanges in Market 1 more viable. We added an increase in customers in unbundled exchanges to account for

¹⁶⁵ <http://www.talktalkgroup.com/ttg-events/16-11-10.html>

the potential to grow the base using LLU. We have also assumed that migration of customers will be not quite fully completed to align with the expectation that this rollout may take a significant proportion of the period of the charge control to complete and so the migration of end users may not be completed within the period. We note that whilst these assumptions may over- or under-state the impact of any rollout, the sensitivity to these assumptions on the overall end user volumes is relatively small. We illustrate the sensitivity of our X with respect to different volume assumptions in Table A7.21.

End user volumes in the base case

A7.18 The forecast 2% increase in end users in each year of the charge control is counteracted by an estimated annual migration of 3.5% of Market 1 volumes off the WBA network to LLU. Because the forecast annual migration of volumes in Market 1 exchanges to LLU is greater than the increase in end users, our base case assumption is that the number of WBA lines in Market 1 will fall by 1.5% per annum over the duration of the charge control. This will lead to a fall in connections in each year of the charge control of 3% in our base case.

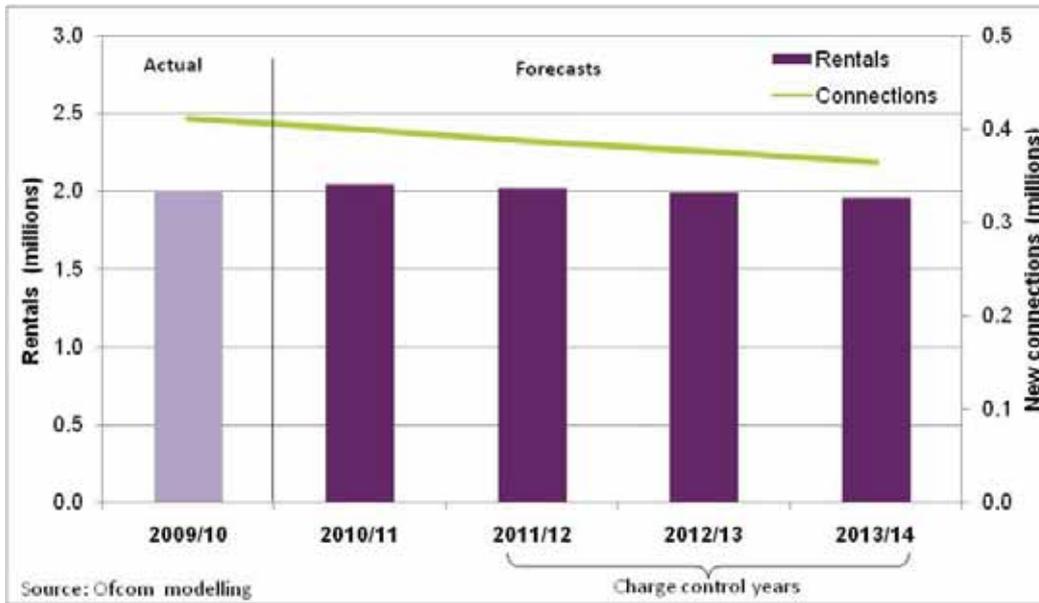
A7.19 Table A7.1 presents the set of calculations used by Ofcom's forecasting model to forecast end user volumes.

Table A7.1 - End user volume forecast calculations

Calculation	Description
Rentals (t)	$\text{Rentals (t)} = \text{Rentals (t-1)} * (1 + \text{Rentals growth rate})$
Connections (t)	$\text{Connections (t)} = \text{Connections (t-1)} * (1 + \text{Connections growth rate})$
Ceases (t)	$\text{Ceases (t)} = \text{Rentals (t-1)} + \text{Connections (t)} - \text{Rentals (t)}$
Broadband re-grades (t)	$\text{Broadband re-grades (t)} = \text{Re-grade \% (t)} * \text{Rentals (t)}$
Ceases (t)	$\text{Ceases (t)} = \text{Rentals (t-1)} + \text{Connections (t)} - \text{Rentals (t)}$

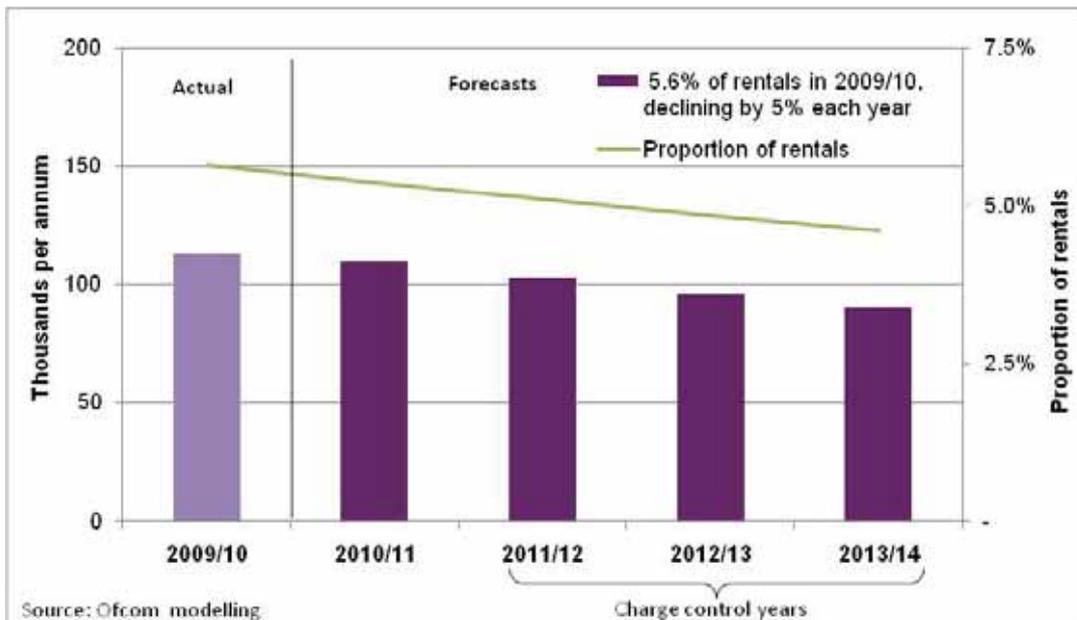
A7.20 Rentals, connections and ceases are interrelated. A cease is treated as a balancing item as it captures churn, that is, the difference between rentals in time (t-1) plus connections in time (t), and actual rentals in time (t). Broadband regrades are expressed as a proportion of rentals. Figure A7.2 sets out our forecasts of WBA rentals and connections in our base case.

Figure A7.2 - - Volume forecasts for rentals and connections in Market 1



A7.21 Broadband re-grades are forecast forward as a percentage of rentals. A re-grade occurs when end users move from IPS Connect Max to IPS Connect Max Premium (and vice versa). In the 2009/10 the percentage of rentals that were regraded in Market 1 was 5.6%, this was calculated based on monthly data provided by BT. Over time we expect this proportion to fall, as end users that have re-graded their line are highly unlikely to do so again in the short term, reducing the potential number of rentals that can be regraded. To reflect this, we assume that as a proportion of rentals, re-grades will fall by 5% year on year. Figure A7.3 below shows how the number of re-grades in Market 1 changes over the duration of the charge control.

Figure A7.3 – Forecast broadband re-grades in Market 1



Bandwidth growth

- A7.22 The end user allocated bandwidth growth profile is a key driver of both costs and revenues. We base our analysis on the level of allocated bandwidth per end user. Our start year value of 48kbit/s was generated from information from BT on the contracted bandwidth for CPs using its IPS Connect product. We calculate average contracted bandwidth per end user by dividing the total contracted bandwidth for IPS Connect by the total number of end users purchasing those services.
- A7.23 There has been a significant year on year increase in demand for and usage of bandwidth, driven largely by innovations in content provision, e.g. iTunes, iPlayer, YouTube, etc. Our base assumption is that average usage per end user will rise by 23% year on year over the period of the charge control, and this is based on actual observed growth in bandwidth. Therefore in our base scenario allocated bandwidth per end user starts at 48kbit/s in 2010/11, increasing by 23% each year of the charge control, so that by 2013/14 it is 89kbit/s (Table A7.2). A full discussion of allocated bandwidth is provided in Section 3.

Table A7.2 - Allocated bandwidth per end user, 2010/11 - 2013/14

2010/11	2011/12	2012/13	2013/14
48kbit/s	59kbit/s	73kbit/s	89kbit/s

Backhaul volumes

- A7.24 We define backhaul as the conveyance of end user traffic from the local exchange to the handover site. Backhaul is required to provide a service to end users, and will be increasing in end users and with allocated bandwidth per end user. This relationship is not a direct one; this is because backhaul provision is installed in large increments.
- A7.25 To understand the relationship between end users, end user bandwidth and backhaul we have conducted exchange level analysis. Using exchange level data provided by BT on the number of DSLAMs and the size of their backhaul¹⁶⁶ we are able to calculate the total bandwidth available by exchange. This can be compared with the required bandwidth by exchange, which is given by the number of end users at an exchange multiplied by the allocated bandwidth per end user. If the backhaul requirement exceeds the available capacity, we assume that BT will add a DSLAM and 155 Mbit/s backhaul circuit to the exchange¹⁶⁷. This relationship drives some of our backhaul volumes, for example the installation of new DSLAM and 155 Mbit/s link requires a new broadband backhaul link. In the model because we assume that new capacity will be a 155Mbit/s circuit there are no additional volumes for E1 and E3 circuits.
- A7.26 In our analysis, although the nominal size of a STM-1 backhaul circuit is 155Mbit/s, the actual capacity is dimensioned by two factors, the management overhead, and

¹⁶⁶ There are three types of SDH backhaul deployed in the WBA market, E1, E3 and STM-1. E1 has a notional capacity of 2Mbit/s, E3 34Mbit/s and STM-1 155Mbit/s.

¹⁶⁷ We note that if the increase was greater than the extra capacity provided by a 155Mbit/s circuit then we would have to add additional DSLAMs and backhaul circuits until enough capacity is provided. However, in practice the increases are all a step increase of 1; this is because the step change in end user bandwidth is small, even for the larger exchanges, relative to the size of additional backhaul.

the capacity utilisation assumption (or capacity overhead). The management overhead captures the signalling and traffic management in the circuits, which along with restrictions on the virtual path sizes mean that the maximum capacity available for broadband is lower than the nominal capacity. For an STM-1 circuit this traffic accounts for 10Mbit/s of the nominal capacity, leaving 145Mbit/s available to carry broadband traffic. Similarly, an E3 circuit has 32Mbit/s available to carry broadband, and an E1 has 1.8Mbit/s free.

- A7.27 However, not all this can be allocated to broadband traffic, as to ensure that end users receive an acceptable level of quality of service, especially at peak times, a capacity overhead is applied to allocated bandwidth. This is required because the stochastic nature of the traffic generated by end users means that actual bandwidth requirements can not be accurately predicted. For network planning BT uses an overhead assumption of 94%, and we adopt this in the base case. Therefore the actual capacity of a 155Mbit/s circuit is 75Mbit/s, for an E3 circuit it is 17Mbit/s, and for a 2Mbit/s E1 circuit the actual capacity is 0.9Mbit/s¹⁶⁸.
- A7.28 We also have to make an adjustment in the model for subtended exchanges. This is where an exchange (parent) shares its backhaul with another exchange/s (child). The 'child' exchange is typically small, and often in Market 1, and is either paired with a parent in Market 1 or in another market. Where there is one parent and one child exchange, we assume that the backhaul is shared 50-50 between them. A parent exchange can support multiple child exchanges, if there are two child exchanges then we assume the bandwidth will be split 3 ways, if there were 3 then bandwidth would split 4 ways, and so on. Our calculation of available backhaul makes an adjustment for subtended capacity and in our forecasting analysis we do not treat these exchanges differently. If during the charge control the capacity on a child exchange is filled we assume that a DSLAM and a 155Mbit/s circuit will be installed.
- A7.29 The second key driver of backhaul volumes is the number of incremental 155Mbit/s circuits crossing the ATM network. This is dependent on the total traffic crossing the ATM network and therefore it is not directly linked to the number of 155Mbit/s circuits at the exchange level. Additional volumes for ATM customer and network interfaces, network switching, and inter ATM transmissions are all dependent on the number of incremental 155Mbit/s circuits crossing the ATM network.
- A7.30 To forecast the traffic being carried on the ATM network we have to make assumptions of the impact of the bi-directional nature of the traffic. In our base case we set this to 2, this means equal amounts of data are being sent and received. We also have to make an assumption on the number of hops (a hop is a link between two ATM nodes) it takes for data to be transmitted across the ATM network. In our base case we assume that this is 1.8 and this is derived from BT's ATM model which is discussed in Annex 6.
- A7.31 Table A7.3 presents the backhaul calculations used by the WBA model.

¹⁶⁸ This is calculated as the capacity available for broadband divided by (1+Capacity overhead).

Table A7.3- Backhaul volume calculations

Calculation	Description
Total bandwidth required (t) (In Mbit/s)	Total bandwidth required (t) = Rentals (t) * (Allocated bandwidth per end user (t) / 1024)
Total available backhaul (t) (In Mbit/s)	Total available backhaul (t) = [(No. E1 (t) * 1.75Mbit/s) + (No. E3 (t) * 32Mbit/s) + (No. STM-1 (t) * 145Mbit/s) + Additional capacity from subtended DSLAM - capacity taken from subtended DSLAM] / (1 + Capacity overhead)
Incremental 155Mbit/s circuit required (t)	If Total available backhaul (t-1) < Total bandwidth required (t), then add 1x 155Mbit/s circuit
Total bandwidth crossing ATM network (t)	Total bandwidth crossing ATM network (t) = Total available backhaul (t) * Bi-directional traffic * hop count
Incremental 155Mbit/s circuit required crossing ATM network (t)	Incremental 155Mbit/s circuit required crossing ATM network (t) = [Total bandwidth crossing ATM network (t) - total bandwidth crossing ATM network (t-1)] / Actual capacity of a 155Mbit/s circuit Where in the base case the actual capacity of a 155Mbit/s circuit is 75Mbit/s.
ATM customer interface 155Mbit/s (t)	ATM customer interface 155Mbit/s (t) = ATM customer interface (t-1) + [1 * Incremental 155Mbit/s circuits crossing ATM network (t)]. We assume that there is no spare capacity and that every new 155 Mbit circuit crossing the ATM network requires a new customer interface point.
ATM network interface (t)	ATM network interface (t) = ATM network interface (t-1) + 2.8 * Incremental 155Mbit/s circuits crossing ATM network (t), We assume that every new circuit requires 2.8 additional network ports, this is based on the current ratio of ports to 155Mbit/s circuits in 2009/10.
ATM network switching (t)	ATM network switching (t) = ATM network switching (t-1) + 2.8 * Incremental 155Mbit/s circuits crossing ATM network (t). We assume that every new circuit requires 2.8 additional network switching.
Inter ATM transmissions (t)	Inter ATM transmissions (t) = Inter ATM transmissions (t-1) + 2.8 * Incremental 155Mbit/s circuits crossing ATM network (t). We assume that every new circuit requires 2.8 additional inter ATM transmissions.
Tie Cables (t)	Tie Cables (t) = Tie Cables (t-1) + Additional Net Connections (t)
Broadband backhaul circuits (t)	Broadband backhaul circuits (t) = Broadband backhaul circuits (t-1) + Incremental 155Mbit/s circuit required (t).
Additional E1 & E3 circuits	Additional E1 & E3 circuits = 0 This is because we assume that any additional backhaul is a 155mb Mbit/s circuit.

Cost forecast assumptions

- A7.32 We have used BT's 2009/10 RFSs as our base year. The financial information is provided on a component basis. There are a number of adjustments made to this base year cost data, which are discussed in more detail in Annex 6. We have also been provided with the associated base year volumes, and we forecast future volumes from the base year.
- A7.33 There are a number of assumptions that control the way in which costs are forecast. Here is an overview of the main ones:

Operating cost (Opex) efficiency

A7.34 When analysing efficiency improvement for the purposes of setting charge controls we attribute savings to:

- The “catch-up” factor which measures the amount by which BT would need to reduce costs to be as efficient as the efficient benchmark operator, and
- “frontier shift” which is the rate at which an efficient company would be expected to reduce its real unit costs over time due to technical progress and productivity improvements.

We assume catch-up efficiency of 0%

A7.35 We have not commissioned new research into BT’s overall efficiency for the purposes of this review. We can however use the results of some relevant research carried out for other reviews, which we already have. One such study, carried out by NERA,¹⁶⁹ (the “NERA efficiency study”), considered BT’s efficiency on a network basis and compared BT to US Local Exchange Carriers (LECs). This study was used to inform Ofcom’s decision in the 2009 Leased Lines Charge Control (LLCC).

A7.36 NERA estimated BT’s efficiency at a relatively aggregated level, rather than focusing solely on the provision of leased lines. This at least partly reflected the nature of the available data and the fact that the statistical robustness of the results of these studies tends to decline as the degree of disaggregation increases. It does however give the study wide applicability to a range of BT services and its results can be applied in a consistent way across charge controls.

A7.37 NERA’s report provided estimates of BT’s efficiency based on different model specifications. As with its previous study (carried out for then Oftel), it assumed that the relevant benchmark is the top 10% of US LECs, which we refer to as the top decile. NERA’s analysis showed that BT was around, possibly slightly above, the top decile. BT also commissioned Deloitte (“Deloitte 2009 study”) to respond to NERA’s study. As part of the 2009 LLCC consultation process, Ofcom assessed both Deloitte¹⁷⁰ and NERA studies and concluded that both studies consistently show that BT is above the decile.¹⁷¹ This suggests that, at the time of the study, it was appropriate to assume a catch-up factor of 0% for the purposes of forecasting BT’s costs.

A7.38 We recognise that both reports were based on data which may no longer be the most recent available. The US comparator data has been collected on a consistent basis annually by the Federal Communications Commission (FCC)¹⁷² for around 70 LECs. This data is available with some time delay, so the 2008 study used data up to and including 2006. In 2008 the FCC implemented reporting changes, reducing the filing requirements for some LECs. Given that both studies covered data from 1996 to 2006, we did not believe that an additional year’s data would give us significantly different results than one obtained previously.

¹⁶⁹ NERA, 17 March 2008, “The comparative efficiency of BT Openreach.”

<http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/annexes/efficiency.pdf>

¹⁷⁰ NERA, 6 May 2008 “Comments on the Deloitte paper on “the efficiency of BT’s network operations”” <http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/annexes/operations.pdf>

¹⁷¹ See Annex 7 of the 2009 Leased Lines Charge Control Statement.

<http://stakeholders.ofcom.org.uk/consultations/llcc/statement/>

¹⁷² <http://www.fcc.gov/wcb/armis/>

- A7.39 For the purposes of this charge control, BT commissioned Deloitte to produce an updated version of the efficiency report (“Deloitte 2010 study”), which made use of the additional data for 2007. The results showed that BT was still above the decile. Whilst we disagree with some aspects of Deloitte’s approach, as we discuss further below, the consistency in the results of the two Deloitte’s studies provides some indication that BT’s position relative to the benchmark level of efficiency has not changed markedly since the first study. We believe that it is unlikely that BT’s relative efficiency has declined to a point below that of the benchmark operators.
- A7.40 On balance, we propose to make no ‘catch-up’ adjustment for efficiency in our RPI-X model. We also welcome respondents’ views on further evidence regarding alternative catch-up assumptions.

We assume frontier shift of 2% to 5%

- A7.41 We build into our cost forecasts efficiency improvements that BT might reasonably be expected to achieve over the duration of the charge control. These efficiency improvements relate to expected reductions in real unit costs, which do not depend on changes in the volumes but reflect the general improvements in efficiency, which all firms seek to make. In line with our anchor pricing approach, this is based on the likely efficiency improvements of BT’s continuing hypothetical network.
- A7.42 We often base our estimates of likely future efficiency improvements on the trend of reductions in real unit costs in the recent past, for a given service. In its decision on the appeal of the ORFF (the “LLU decision”), the CC indicated that significant weight should be placed on historic trends in efficiency derived in this way. In estimating likely future efficiency improvements for WBA, our preference would therefore be to take into account the trend of BT’s past improvements in real unit costs. However, given that BT’s reporting of the WBA market only became available from 2008/09 onwards, we would only be able to examine unit cost change between 2008/09 and 2009/10. Given the data required, i.e. costs on an end-to-end basis as well as EOI basis, we have not carried out this analysis but intend to consider this question further during the consultation period.
- A7.43 NERA’s comparative efficiency analysis mentioned above also estimated a time trend, which measures the average rate of change in costs of US LECs. It concluded that costs were falling at 2.5% to 3% per annum in real terms for the period 1999 to 2006, lower if data from 1996 were included. In contrast, the Deloitte 2009 study suggested an annual rate of decline of total costs of around 2.2%. This is consistent with Deloitte’s 2010 study that estimated the time trend from the comparative analysis of 2%, or 3% for the period between 2004 and 2007. We believe the comparative analysis results obtained by the Deloitte 2010 study are similar to those obtained by NERA’s previous study. This supports our view that the contribution from the additional year’s data to an estimate of the time trend is small.
- A7.44 We also recognise that Deloitte’s 2009 and 2010 studies also considered efficiency estimates based on total factor productivity (TFP) models. The 2009 study suggested TFP growth rates of around 0% to 1.9% whilst its 2010 results indicate a range of 1% and 2.4% per annum between 1996 and 2007.
- A7.45 Deloitte’s TFP models used data from US LECs as well as European telecommunication incumbent operators. As in the 2009 study, Deloitte’s analysis uses the Tornqvist index for inputs and outputs and estimating what the time trend has been for the two indices. The Tornqvist index is a standard measure used in productivity analysis and takes into account the impact of changing cost weights

over time. Deloitte defined the aggregate Tornqvist index at time t as the average of each output's growth rate using geometric average of the base year and current year cost weights.

- A7.46 For the reasons set out in the 2009 LLCC Statement¹⁷³, we do not think that it is appropriate to anchor the weights to a base year. We believe that Deloitte's results obtained using their specification of the Tornqvist index are likely to be biased as a result of this aspect of their method. On the balance of evidence, we believe that the likely lower bound of efficiency improvement is around 2% per annum, with a base case of 2.5%.
- A7.47 In the LLCC we were able to use past data on leased line costs to estimate trends in efficiency. This analysis suggested that, with a central frontier shift estimate of 2.5%, an upper bound of 5% was reasonable. As noted above, we have not been able to carry out a similar analysis of WBA costs for this review. However, we think it is unlikely that an assumption of real unit cost reductions in excess of 5% per annum is justified, in the absence of any strong supporting evidence and in the light of the analysis for the LLCC. We therefore propose an upper bound of 5% to allow for potentially higher efficiency savings by BT. We welcome respondents' views on the appropriateness of 2.5% as an efficiency assumption and on whether there is evidence to support a higher or lower figure within the 2% to 5% range.
- A7.48 In the light of evidence above, we propose to assume frontier shift efficiency of 2% to 5% per annum on operating costs, with an estimate of 2.5% for our base case.

Asset and cost volume elasticities (AVEs/CVEs)

- A7.49 AVEs and CVEs define how costs in the WBA model change in response to changes in volume. For a 1% increase in cost component volumes, the asset volume elasticity defines the percentage increase in gross replacement cost (GRC) of the assets required; similarly, the cost volume elasticity defines the percentage increase in operating costs required.
- A7.50 An elasticity of 1 indicates that costs change proportionately (resulting in constant unit costs) whilst an elasticity of 0 indicates that total costs are fixed (and therefore unit costs will have an inversely proportional relationship with volumes). In our analysis we use AVEs and CVEs estimates produced for the 2004 PPC charge control statement. These are displayed in the Table A7.4.

¹⁷³ See Annex 7 of the LLCC statement for a more technical treatment and fuller discussion of this issue: available at <http://stakeholders.ofcom.org.uk/consultations/llcc/statement/>

Table A7.4 - Asset and Cost Volume Elasticities

Assets	Asset volume elasticity (2004)	Operating costs	Cost volume elasticity (2004)
Cable	0.20	Opex – pay	0.24
Duct	0.05	Opex – non pay	0.24
Local Exchange	0.55		
Main Exchange	0.70		
Transmission	0.65		
Other Ntwk Eqpt	0.65		
Motor Transport	0.40		
Land & Bldgs	0.20		
Computers & OM	0.74		
Other	0.64		

A7.51 Based on these AVEs, we calculate an AVE specific to each cost component by using their gross replacement costs (GRC) in 2009/10. For each cost component i,

$$\text{AVE}_i = \frac{\text{Sum (GRC by asset for component } i * \text{asset AVE)}}{\text{Total GRC for component } i}$$

A7.52 For a number of backhaul components we have adjusted the calculated AVE to 1, which means that costs will change proportionately with volumes. This is based on our forecasting of backhaul volumes, which is conducted on an exchange by exchange basis. We assume that when capacity is exhausted at an exchange BT will add a DSLAM and a 155Mbit/s link, and this will require additional backhaul circuits, and customer and network interface ports. These relationships are defined by the technical characteristics of the network, and we assume they are fixed for the duration of the charge control. Given this, our backhaul forecast volumes are analogous to the actual assets that would be required to provide WBA, for instance every additional DSLAM volume would require an actual DSLAM. Therefore for the components listed in Table A7.5 we consider that an AVE of 1 appropriate

Table A7.5 - Components with an AVE of 1

Component	Calculated AVE	New AVE
CO312 ATM customer interface > 155Mbit	0.63	1
CO313 ATM network interface	0.64	1
CO314 ATM network switching	0.64	1
CO316 Inter ATM transmissions	0.36	1
CO681 Broadband backhaul circuits	0.41	1
CR188 DSLAM (capital / maintenance)	0.26	1

Weighted average cost of capital (WACC)

- A7.53 We have included in BT's cost base a return on capital that is equal to its weighted average cost of capital. The WACC is minimum return required on BT's investments. In the model the X is set, so given the assumptions made the value of BT's rate of return in the last year of the charge control is equal to BT's WACC,.
- A7.54 The WACC is estimated using the capital asset pricing model (CAPM), it is disaggregated into separate rates for copper access services and for the rest of BT. The rest of BT WACC is higher than the WACC for copper access to reflect the higher risk of these services. A full discussion of the calculation of the WACC is provided in Section 6.
- A7.55 We consider that the rest of BT rate is the appropriate WACC for WBA on the basis that demand for WBA is likely to be more cyclical, and therefore higher risk, than for copper access services. We have considered BT's arguments that a higher rate is appropriate for WBA services to reflect the need for higher returns on new and innovative services. This was supported by a paper submitted by Dotecon during the consultation period of the 2010 WBA Statement. We do not believe that a higher rate is appropriate, and a full response to the Dotecon submission is set out in Annex 8.
- A7.56 The proposed range for the WACC for the rest of BT is 8.5 – 10.0%, with a mid-point of 9.3%. In our base case, with a long run inflation rate of 2.5% this implies a real return on capital of 6.6%.

Inflation

- A7.57 As discussed in Section 4 we use RPI as our benchmark for inflation for charge control purposes. Our inflation forecasts for the duration of the charge control are based on the average of independent forecasts from both City and Non-City forecasters as of November 2010¹⁷⁴.

¹⁷⁴ HM Treasury, Forecasts for the UK economy: a comparison of independent forecasts (No. 283), November 2010

Table A7.6 - Inflation assumptions used in the WBA model

	2010/11	2011/12	2012/13	2013/14
RPI assumption	4.4%	3.6%	2.7%	3.0%

A7.58 The WBA model is calculated in real terms, therefore our inflation assumptions have a limited impact on X. Where the model uses past inflation (rather than forecasts) this has been taken from the RPI values published by the Office for National Statistics. Historic inflation is used to convert historic nominal asset and input price trends to real price trends, which in turn are used as the basis for forecasting the real asset and input price trends. Historic inflation has been calculated on the basis of the financial year.

A7.59 As noted earlier, the X in the RPI-X formulation will not be exactly equal to the real yearly percentage reduction. When prices are stated in nominal terms, inflation must be accounted for and is treated as a geometric term. That is, prices are defined as:

$$\text{Price (t)} = \text{Price (t-1)} * (1+\text{RPI}) * (1-X)$$

A7.60 In the RPI-X formulation inflation is treated as an arithmetic term. That is,

$$\text{Price (t)} = \text{Price (t-1)} * (1 + \text{RPI} - X)$$

As a result, a geometric adjustment must be made to the real yearly percentage change, that is, X in the RPI-X formulation is equal to the real yearly percentage change multiplied by (1+RPI). For this calculation we have assumed an average RPI of 3.6% based on the geometric average of the RPI forecasts between 2011/12 and 2013/14.

Asset price changes

A7.61 Real holding gains / losses are created where asset prices change at rates other than RPI. Forecasting asset price changes is clearly a difficult task. In the WBA model we take an average of asset price changes over the past 5 years, as supplied by BT, and these are shown in Table A7.7.

Table A7.7 - Asset price changes

Asset	5 year average nominal price change (2005/06 – 2009/10)
Cable*	3.8%
Duct*	3.0%
Local Exchange	0.1%
Main Exchange	0.1%
Transmission	-0.8%
Other Ntwk Eqpt	0.0%
Motor Transport	0.0%
Land & Bldgs	0.2%
Computers & OM	0.0%
Other	0.0%

**For cable and duct we use the five year average from 2004/05 to 2008/09 due to discrepancies with the 2009/10 data.*

- A7.62 For cable and duct we use the five year average from 2004/05 to 2008/09 due to discrepancies with the 2009/10 data. For duct this arises because the assumed unit cost of building duct was increased in 2009, and this led to a large holding gain on duct assets. For cable, in 2009/10 there was a very significant increase in the price of copper driven by the recovery of the world economy. We consider that both of these events are one off items, and would distort the average if included.
- A7.63 Unlike in previous charge controls, “Other network equipment”, “Motor Transport”, “Computers & OM” and “Other” categories have zero holding gain/loss. This is because these assets are now valued at historical cost, and therefore to be consistent with the accounting treatment of these asset, they do not have a holding gain/loss. This means their values reduce in real terms over the duration of the charge control.
- A7.64 We assume that the annual asset price changes set out in Table A7.7 apply over the period from 2010/11 to 2013/14.
- A7.65 Asset price changes have offsetting effects on X:
- The first is a holding gain as a result of the asset price increases. Such a gain reduces costs in the year that it occurs. The reverse is true for holding losses.
 - The second effect is the impact on the real return. An asset price rise increases the value of the asset base, and therefore increases the required return in the cost base. Similarly, a fall in the asset price would reduce the value of the asset base and in turn reduce the cost base to be recovered through the charges in the charge control basket.
- A7.66 As a result, the impact of real price changes depends on which effect dominates and it is not known a priori whether it will increase or decrease the overall cost base.

Cost forecasts

A7.67 The cost forecasts are split into three parts; capital, operating and administration costs. Together these make up total costs. It is important to recognise that we are proposing an RPI – X charge control, therefore the costs are forecasted in real terms so that the value of X is unaffected by the assumed rate of inflation. Some values are forecast in nominal terms, and then converted into real terms, to capture price changes that diverge from the RPI. Also note that we forecast financial year-end costs and revenues.

Capital costs

A7.68 The capital cost forecasts are split into two parts. The ‘steady state’ element is the forecast of what would happen to costs if there was no change in volumes during the charge control period. The ‘additional’ element is the change in cost brought about by changing volumes. If volumes increase this will be positive, if volumes fall this will be negative.

A7.69 The steady state and additional elements are summed together to generate a total cost forecast.

A7.70 Table A7.8 explains the various terminology used in this section.

Table A7.8 - Explanation of accounting terms

Name	Description
Asset lives	Asset lives for components are calculated by dividing the GRC by the depreciation charge in the base year assuming straight line depreciation.
Gross Replacement Cost (GRC)	The current cost accounting equivalent of Gross Book Value
Inflation	The general change in prices across the economy. We have used RPI data obtained from the Office of National Statistics (“ONS”)
Net Replacement Cost (NRC)	The current cost accounting equivalent of Net Book Value
Nominal Price Trend (npt)	The change in price of a cost component. We have used data supplied by BT.
WACC	BT’s Weighted Average Cost of Capital.

A7.71 Table A7.9 sets out the abbreviations used in the cost forecasting calculations.

Table A7.9 - Abbreviations used in cost forecasts

Abbreviation	Description
Capex (t)	Capital expenditure in year <i>t</i>
CCA dep (t)	Current Cost Accounting depreciation, or Supplementary depreciation in year <i>t</i>
Disp (t)	Disposals in year <i>t</i>
eff	Efficiency factor, the percentage reduction in costs arising from efficiency gains
GRC(t)	The value of Gross Replacement Cost (GRC) in year <i>t</i> (taken as a year-end figure)
GRC(t-1)	The value of GRC <i>previous</i> year (taken as a year-end figure)
HCA dep (t)	Historical Cost Accounting depreciation in year <i>t</i>
NCA (t)	Net Current Assets in year <i>t</i>
NRC (t)	Net Replacement Cost in year <i>t</i>
OCM dep (t)	Operating Capability Maintenance depreciation in year <i>t</i>

Forecasting of “steady state” capital costs

A7.72 The ‘steady state’ element is the forecast of what would happen to costs if there was no change in volumes during the charge control period. Table A7.10 presents the steady state calculations used by Ofcom’s forecasting model.

Table A7.10 - Steady state capital and depreciation costs (in nominal terms)

Calculation	Description
Gross Replacement Cost (GRC)	Base year GRC is taken from BT's response to our information request. Subsequent years are calculated as: $\text{GRC}(t) = \text{GRC}(t-1) * [1 + \text{npt}(t)] + \text{Capex}(t) - \text{Disp}(t)$
OCM depreciation (OCM dep)	Base year OCM depreciation is taken from BT's response to our information request and is the sum of HCA depreciation and CCA depreciation. In subsequent years we assume straight line depreciation, calculated as: $\text{OCM dep}(t) = \text{GRC}(t) / \text{asset life}$ <p>Where asset life in the base year is equal to GRC/OCM dep.</p>
Capital expenditure (Capex)	Base year capital expenditure is assumed to be equal to OCM dep. Subsequent years are calculated as: $\text{Capex}(t) = \text{Capex}(t-1) * [1 + \text{npt}(t)] * (1 - \text{eff})$
Disposals	Base year disposals are assumed to be equal to OCM dep. Subsequent years are calculated as: $\text{Disposals}(t) = \text{Disposals}(t-1) * [1 + \text{npt}(t)]$
Cumulative OCM depreciation	Base year and future levels of cumulative OCM depreciation is calculated as the difference between GRC and NRC. $\text{Cumulative OCM dep}(t) = \text{GRC}(t) - \text{NRC}(t)$
Net replacement cost (NRC)	Base year NRC is taken from BT's response to our information request. Subsequent years are calculated as: $\text{NRC}(t) = \text{NRC}(t-1) * [1 + \text{npt}(t)] + \text{Capex}(t) - \text{OCM dep}(t)$
Net current assets (NCA)	Base year NCA is taken from BT's response to our information request. Subsequent years are calculated as: $\text{NCA}(t) = \text{NCA}(t-1) * (1 + \text{inflation})$

Forecasting of "additional" capital costs

- A7.73 The 'additional' element is the change in cost induced by changing volumes of services relative to the steady state. If volumes increase this will be positive, if volumes fall this will be negative.
- A7.74 Table A7.11 presents the additional calculations used by the WBA model. The base year in all these cases is zero by construction. As with the steady state capital and depreciation costs, additional costs are also forecast as year-end values.

Table A7.11 - Additional capital and depreciation costs

Calculation	Description
Additional Capex	$\text{Capex}(t) = \text{Total GRC}(t-1) * [1 + \text{npt}(t)] * \text{AVE} * \text{vol change \%}(t)$
Additional GRC	$\text{GRC}(t) = \text{GRC}(t-1) * [1 + \text{npt}(t)] + \text{Capex}(t)$
Additional OCM dep	$\text{OCM dep}(t) = \text{GRC}(t) / \text{asset life}$
Additional cumulative OCM depreciation	$\text{Cumulative OCM dep}(t) = \text{Cumulative OCM dep}(t-1) * [1 + \text{npt}(t)] + \text{OCM dep}(t)$
Additional NRC	$\text{NRC}(t) = \text{Additional GRC}(t) - \text{OCM dep}(t)$

Forecasting of total capital costs

A7.75 Table A7.12 presents the final set of calculations used by Ofcom's forecasting model in the capital cost category. In this table steady state values will be prefixed by 'ss' and additional (volume driven) values will be prefixed by 'ad'.

Table A7.12 - Total capital and depreciation costs

Calculation	Description
Total GRC	$\text{Total GRC}(t) = \text{ss GRC}(t) + \text{ad GRC}(t)$
Real return on capital	$\text{Real return on capital}(t) = [\text{ss NRC}(t) + \text{ad NRC}(t) + \text{NCA}(t)] * \text{pre tax real WACC} / \text{deflation factor}(t)$
Real depreciation	$\text{Real depreciation}(t) = [\text{ss OCM dep}(t) + \text{ad OCM dep}(t)] / \text{deflation factor}(t)$
Real total holding loss	$\text{Real total holding loss}(t) = -[\text{ss NRC}(t) + \text{ad NRC}(t)] * \text{npt}(t) / \text{deflation factor}(t)$
Real total capital and depreciation cost	$\text{Real total capital and depreciation cost}(t) = \text{Real return on capital}(t) + \text{Real depreciation}(t) + \text{Real total holding loss}(t)$
Real unit capital cost	$\text{Real unit capital cost} = \text{Real total capital and dep cost}(t) / \text{volume}$

Operating costs

A7.76 Table A7.13 presents the operating cost calculations used by the WBA model.

Table A7.13 - Operating costs

Calculation	Description
Pay	Base year pay is taken from BT's response to our information request. Subsequent years are calculated as: $\text{Pay}(t) = \text{Pay}(t-1) * (1-\text{eff}) * [1 + \text{npt}(t)] * (1 + \text{vol change \%}(t) * \text{CVE})$
Non-pay	Base year non-pay is taken from BT's response to our information request. Subsequent years are calculated as: $\text{Non-pay}(t) = \text{Non-pay}(t-1) * (1-\text{eff}) * (1 + \text{npt}(t)) * (1 + \text{vol change \%}(t) * \text{CVE})$
Real total operating expenditure	Real total opex(t) = [Pay(t) + Non-pay(t)] / deflation factor

Administration Costs

- A7.77 BT has a number of administrative "cost components" that do not have associated volumes. Usage factors for these components represent the proportion of total administration costs attributed to a particular service.
- A7.78 In our base year, service level administration costs are given by the multiplication of the cost usage factors by the administration component costs. We calculate base year administration related values for depreciation, holding gain/loss, return on capital, and Pay and Non-pay Opex. We use these to calculate administration costs. To forecast these forward we cannot assume that every increase in end user access would incur an extra "unit" of an administration service.
- A7.79 Instead we derive service based AVEs, for depreciation, holding gain/loss and return on capital we use the weighted average AVE. For Pay and Non-pay Opex we use the weighted average CVE. These are calculated using 2009/10 data and we estimate a separate value for each of our cost categories. The weighted average AVE and CVE for each of the cost categories administration costs is shown below in Table A7.14.

Table A7.14 – Weighted average AVE/CVEs for administration costs

	Weighted average AVE	Weighted average CVE
Depreciation	0.5	-
Holding gain/loss	0.5	-
Return on capital	0.4	-
Pay Opex	-	0.23
Non-pay Opex	-	0.13

A7.80 Using the weighted average CVEs and AVEs, we then forecast total administration costs for each service as:

$$\text{Administration costs (t)} = \text{Administration costs (t-1)} * (1 + \text{vol change \% (t)}) * \text{weighted average AVE or CVE}$$

Key quantitative issues

A7.81 Here we discuss how we have approached a number of modelling challenges regarding:

- Modelling a hypothetical ongoing network
- The treatment of ancillary services in the WBA Market

Hypothetical ongoing network

A7.82 As discussed in Section 3, we have adopted an anchor pricing approach and are modelling a hypothetical ongoing network based on 20CN costs. In previous charge controls start year values of Gross Replacement Cost (GRC), Net Replacement Cost (NRC) and OCM depreciation were taken from BT's regulatory financial statements. However, we are concerned that the 2009/10 data is not suitable for modelling a hypothetical ongoing network.

A7.83 A number of 20CN components have become heavily depreciated and we believe the reported level of costs reported for these assets do not reflect an ongoing network. The ratio of net replacement cost to gross replacement cost (NRC/GRC) provides an indication of the level of depreciation. In a steady state, there would be continuous investment to replace assets that are fully depreciated and written off, and we would expect the NRC/GRC ratio to be maintained through time. A low NRC/GRC ratio indicates that continuous investment has not been taking place, and that the reported costs are unlikely to reflect an ongoing network.

A7.84 Table A7.15 reports the aggregate level base year values of NRC and GRC and the calculated NRC/GRC ratio for the physical backhaul asset categories in the WBA market¹⁷⁵.

¹⁷⁵ We exclude SMPF related components as these are not including in the basket. We note that there are also other components used in the provision of WBA outside of these categories, but we do not consider that the aggregation of this group would be appropriate because of the diverse nature of the assets.

Table A7.15 – Estimated NRC/GRC ratios for WBA components

Component category	NRC (£m)	GRC (£m)	NRC/GRC ratio
ATM*	153.2	901.2	17.0%
Backhaul	181.2	548.1	33.1%
DSLAM	376.8	1,232.0	30.6%
Backhaul and DSLAM	558.0	1780.2	31.3%
All assets	711.2	2681.4	26.5%

*This includes the ATM cost adjustment discussed in Annex X

- A7.85 It is clear from Table A7.15 that the level of depreciation is of particular concern for ATM assets. In aggregate for ATM assets the NRC/GRC ratio is 17.0%; in contrast the NRC/GRC ratio for all assets is 26.5%. And, if we exclude ATM assets from this calculation, this rises to 31.3%. The low ratio suggests that ATM costs are not representative of an ongoing network, and therefore an upward adjustment needs to be made to base year ATM costs.
- A7.86 First though, it is important to understand what drives this result. ATM assets support the provision of WBA across the three WBA markets. However, in Market 3 areas where 21CN investment has taken place, customers have been moved off the ATM network. This has had an indirect spillover effect on Market 1, as the movement of Market 3 customers off the ATM platform has allowed higher capacity to be allocated on the network for Market 1 areas. This has not required additional investment in 20CN.
- A7.87 However, our modelling approach excludes 21CN investment. To ensure consistency we also need to exclude any spillover of 21CN investment on 20CN. This requires us to define a counterfactual. This sets out the investment that would have taken place in 20CN and the ATM platform in a world where there was no 21CN investment. We have identified three potential counterfactuals. Table A7.16 sets out a qualitative analysis for each of these, profiling the average asset life, Capex, Depreciation, GRC, NRC and the NRC/GRC ratio.

Table A7.16 – Possible investment strategies, assuming no 21CN investment

	Run down network	Close network	Continuous investment
Asset life	Starts with weighted average asset life of all assets. As assets with shorter lives become fully depreciated, weighted average increases.	Starts with weighted average asset life of all assets. As assets with shorter lives become fully depreciated, weighted average increases.	Weighted average of old and new asset lives
Capex	0	0	Invests to replace assets that are being written off
Depreciation	GRC/Asset life until fully depreciated, then 0	GRC/Asset life	(Capex / New asset life) + (old GRC / Old asset life)
GRC	Maintained	Reduces towards 0 as assets written off	Assets written off + capex means that GRC maintained
NRC	Reduces towards 0	Reduces towards 0	Increases with new capex
NRC/GRC ratio	Reduces towards 0	Zig-zags towards 0	Increases as new capex added

A7.88 Under the first two strategies it is highly unlikely that the network would have been able to support the increase in traffic driven by increasing customer numbers and bandwidth usage across the three markets. The 2010 Communications Market Report (CMR) reported that fixed broadband growth was 20% in 2007, 11% in 2008 and 5.5% in 2009¹⁷⁶, while in Section 3 we highlight the growth in bandwidth. To meet this increasing demand, it is highly likely that without 21CN investment BT would have had to continuously invest in the ATM network. This is our counterfactual.

A7.89 If BT had been continuously investing in the ATM network the NRC/GRC ratio for ATM assets would be higher than what the current data shows. In our base case the target NRC/GRC ratio for ATM assets is 31.3%, this is the combined NRC/GRC ratio for backhaul and DSLAM assets. We consider that this provides a good proxy for the ratio expected in an ongoing network for 20CN physical backhaul network assets.

A7.90 We have identified three different approaches to uplifting the NRC/GRC ratio, the calculations involved and impact on the cost stack of each approach is summarised in Table A7.17.

¹⁷⁶ Ofcom, Communications Market Report, 2010, p325

Table A7.17 – Possible approaches to the NRC/GRC adjustment

	Capex uplift	NRC uplift	NRC uplift + revised asset life
Asset life	Unchanged	Unchanged	New asset life assumption
Capex	= (Target – Actual ratio) * Total GRC / (1 – Target ratio)	0	0
GRC	Increases with new Capex	Unchanged	Unchanged
NRC	Increases with new Capex	= Target NRC/GRC ratio * GRC	= Target NRC/GRC ratio * GRC
Impact on cost stack			
Depreciation	Increases	Unchanged, as it is calculated as GRC / Asset life	Increases if new asset life < old asset life assumption
Return on capital	Increases due to higher NRC	Increase by WACC * (Target – Actual ratio) * GRC	Increase by WACC * (Target – Actual ratio) * GRC

- A7.91 Uplifting Capex increases GRC as well as NRC, depreciation (through GRC) and return on capital (through NRC) are added to the cost stack. This approach assumes that assets which are fully depreciated are no longer used, and are written off in GRC and NRC. However, if there are components that on an accounting basis are fully depreciated (NRC=0), but are still being used (GRC>0), then applying a Capex uplift would overstate GRC, and lead to an over recovery of costs. As our analysis has indicated that there are a number of fully depreciated ATM assets still in use, we consider that a Capex uplift would not be appropriate. This problem does not affect the NRC adjustment.
- A7.92 There are two approaches to uplift NRC, a straight NRC uplift and an NRC uplift with revised asset life assumptions. The key difference is that with revised asset life assumptions depreciation will be increased if the new asset life assumption is shorter than the old, whereas, with a straight NRC uplift depreciation is unchanged. We consider that the NRC uplift with revised asset life assumptions best matches our counterfactual.
- A7.93 In the counterfactual of continuous investment BT would have replaced any fully depreciated assets. In modelling terms this would increase both NRC and depreciation. Depreciation would be increased as the weighted average asset life would be lower than implied by the current data. This is because in the model asset life is calculated as GRC divided by OCM depreciation. If the level of OCM depreciation is not representative of an ongoing network, the implied asset life and the level of depreciation will be inconsistent. Table A7.18 highlights that for ATM assets the implied asset life of 27 years is significantly higher than other component categories, if we exclude ATM assets the implied asset life for all assets is 14.9 years.

Table A7.18 – Estimated asset life for WBA components

Component category	GRC (£m)	OCM depreciation (£m)	Asset life = GRC/OCM depreciation
ATM	901.2	33.4	27.0
Backhaul	548.1	24.1	22.8
DSLAM	1,232.0	95.5	12.9
Backhaul and DSLAM	1780.2	119.6	14.9
All assets	2681.4	153.0	17.5

- A7.94 This suggests that the level of depreciation for ATM assets would not be consistent with our counterfactual of continuous investment. This is because the reported OCM depreciation does not make an allowance for the reinvestment in the existing assets as they approach the end of their lives that would have occurred in the counterfactual. If investment had been taking place, the weighted average asset life would be lower and depreciation higher. To mirror this in the model we propose to adjust the ATM asset life to 10 years. This is based on BT's book life assumption used to depreciate the assets, for accounting purposes.
- A7.95 The adjustment to NRC with a revised asset life assumption of 10 for ATM assets to meet a target NRC/GRC ratio of 31.3% increases base year NRC by £129.3m and depreciation by £8.8m. This adjustment ensures the model is consistent with the counterfactual of continuous investment in the ATM platform. Sensitivity analysis around our approach to the NRC/GRC adjustment is reported in Table A7.21.
- A7.96 We note that a possible alternative approach to the NRC/GRC adjustment is to base the analysis on fixed assets by class of work based on BT's asset register. An initial analysis of this data suggests that under this approach ATM, DSLAM, and SDH backhaul would all require an upward adjustment in the base year¹⁷⁷. This approach is likely to adjust a smaller proportion of ATM, DSLAM and backhaul costs (i.e. those that are directly related to SDH assets), but applied to a wider set of cost components. Our proposed approach to making the HON adjustment is to apply it to broad asset categories, and the NRC/GRC ratio for DSLAM assets is above the average and do not appear out of line with other asset types. As such, we have adopted a method that simply adjusts the NRC/GRC ratio of ATM-related assets to the average.

¹⁷⁷ This data is provided to Ofcom in the CCA AFI's Schedule 11

Treatment of ancillary services

- A7.97 There are a number of ancillary services in the WBA market, the charges associated with these services can be classified as:
- a) Pure pass through: BT Wholesale (BTW) charges to CPs are simply a pass through of charges incurred by Openreach (OR)
 - b) BTW charge: A charge set by BTW where there are no OR costs
 - c) Additional mark-up: BTW charges to CPs encompass an additional mark-up to the charges incurred by OR.
- A7.98 Table A7.19 provides a full list and description of the ancillary services in the WBA market and the type of charge associated with the service.

Table A7.19 – Broadband Ancillary services in Market 1

Ancillary service	Description
<i>Additional mark up charge</i>	
Cancellation charges for end user access	<ul style="list-style-type: none"> Where a customer requests cancellation of an End User Access order, as defined within the Conditions of Service, a one-off Single Payment Charge will be levied. The charge will be calculated on the number of Working Days between the date the Customer requests the cancellation and the Original Delivery Date (ODD). ODD is the initial agreed installation date
End user cease charges	<p>Cease charges will apply when</p> <ul style="list-style-type: none"> A BT Wholesale ADSL End User service is terminated (cease) or Replaced by a non-BT Wholesale ADSL End User service (cease and re-provide). The cease and re-provide is not applicable to Market 1 by definition.
<i>BT Wholesale charge</i>	
Administration charge	Where order details received from the Customer are illegible, materially incomplete, or incorrect, BT reserves the right to charge the Customer.
Availability checker charges	Enables the potential broadband line speed offered from BT Wholesale to be estimated by inputting the telephone number or postcode onto the Wholesale line checker system. The Availability checker also details broadband products available at the serving exchange.
End user migration charges: a) IPS to IPS b) DS to IPS c) IPS to DS	<ul style="list-style-type: none"> EU migrates from one Customer to another w/o change of product and speed. Available to all BT IPStream ADSL EUs. EU migrates from one customer to another with change of product and speed. Available to all BT IPStream ADSL EUs. A single charge is raised (re-grade and migration). <p>When an EU requests a change of product - this will be subject to a re-grade order, subsequent and separate to the Migration order (£5 for re-grade Plus £11)</p>
Re-grade charges	Re-grade charges for IPS Connect are applicable when end users move from IPS Connect Max to Max Premium service (and vice versa).
<i>Pure pass through charge</i>	
Abortive visit charge	<p>Cases like</p> <ul style="list-style-type: none"> BT Engineer attends an incorrect address as provided by the Customer When the site for installation does not meet the requirements for installing the service e.g. minimum space requirements, availability of power etc End User no longer wants the installation completed When entry is refused to the End User address, or no access can be gained, at the appointed time, as agreed between BT and the Customer <p>When the Customer cancels an order for End User access on the Customer Confirmed Date (CCD).</p>
Internal shift of end user line	Internal shifts of exchange line wiring apply where a Customer requests the main socket (linebox) to be moved to another location within the same building.
Reworking charge	BT Engineer at an End User site has to make good any existing non-BT installed wiring to make it fit for installation. Work will only be undertaken with the consent of the End User and charges will be raised against the End User.
Special Fault Investigation	Once a SFI is raised by the Customer (CP), it is investigated in OR network first. If no fault is found on OR side, then BT start investigating the fault and will be billed £160 from OR. If BTW does not find the fault in its network the £160 (OR costs) will be passed through to the CP.

A7.99 We do not propose to include all of these charges in the control and the criteria we have considered when deciding this is discussed in Section 5. The ancillary services included in the basket are reported in Table A7.20, this provides a summary the rationale behind the services inclusion, and, if applicable, the safeguard cap applied.

Table A7.20 – Ancillary services included in the basket

Ancillary Service	Safeguard cap	Rationale
End user cancellation charges	RPI-0%	BTW has a £6 mark up on the charge levied by OR. We include the relevant costs and revenues in the basket and apply a safeguard cap.
End user cease charges	-	Cease charges are a cost of switching between operators. High cease charges, if passed on to retail customers, could be an impediment to competition. In addition, there are minimal costs involved for BTW. Often the service is a data only change to BTW's systems which incurs minimal or no marginal activity on the part of BTW, although in some cases OR may be required to remove the SMPF jumpers which support the underlying SMPF service. Given the benefits to competition of low cease charges, and the minimal cost involved, we are proposing to set BTW's cease charge (or mark-up) to £0. Any cease costs incurred by BTW (other than charges levied by OR) may then be recovered through the connection charge
End user migration charges	RPI-0%	The level of migration charges can effect competition between CPs at the retail level. Alongside this the charge is often set at £0, this is a commercial decision by BT with the expectation that the migration costs will be recovered over the lifetime of the user from the new product being purchased. This means that costs are greater than revenues. Therefore, we consider that it is appropriate that this charge is in the main basket, we also apply a safeguard cap, and this is to ensure effective competition in the retail market.
Re-grade charges	RPI-0%	This is a BTW charge. Across the market the majority of re-grades are priced at £0, this is a commercial decision by BT with the expectation that the re-grade costs will be recovered over the lifetime of the user from the new product being purchased. This means that costs are greater than revenues. Given this treatment we consider it is appropriate to include the revenue and charges in the main basket, with a safeguard cap.

Forecasting of service costs and the value of X

A7.100 Real total costs on a component basis are given by the sum of each components operating and capital cost. We forecast these costs at the total market level; however, as the charge control only applies to Market 1 we have to allocate the component costs by market.

A7.101 However, BT's 2009/10 RFS show only limited attribution (47%) of costs across the three geographic WBA markets with an aggregation of Market 3 costs with non-geographic (national) costs. Therefore we have developed a cost attribution methodology to cover all costs resulting in a full FAC base for 2009/10. The updated costing methodologies follow the regulatory accounting principles set out in

BT's Primary Accounting Documents¹⁷⁸ of which consistency with the cost causality principle is a key factor.

A7.102 The cost allocations are linked to our model volumes and change through time to match forecast service volumes. For example a number of cost components are allocated based on relative number of rentals and connections in each market and this will change over time depending on our forecast assumptions. A full list of allocation by component and an explanation of our cost attribution methodology is provided in Annex 6.

A7.103 We use the allocation by component to calculate component costs by Market. We then convert this into Market 1 service costs using Market 1 forecast end user and backhaul volumes. For a service that uses a number of different components, the total costs of service y is given by:

$$\text{Service y costs} = \text{Sum (Usage of component k * Unit cost of component k) * Volume of service y}$$

A7.104 Having selected the appropriate services to include in a basket, the model then adds the relevant administration costs of these services to the costs in the basket. The model then compares the total costs and revenues in the last year of the charge control. Charge control year costs and revenues are calculated as the average of current and previous financial year costs and revenues. The value of X for the basket is solved for such that the two are equal.¹⁷⁹ X is then the weighted average real annual price change for the services in the basket.

Results and key sensitivities

A7.105 Table A7.21 below we present the results of our sensitivity analysis on the values of X. We note that the sensitivities are calculated assuming the X applies for three years from 2011/12 onwards.

¹⁷⁸ <http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/index.htm>

¹⁷⁹ For Xs that are applied equally for all services within a basket, the value of X can be calculated as

$$X = 1 - \left(\frac{C_T - P_{SMPF} W_T}{V_T P_0} \right)^{\frac{1}{T}}$$
 where costs at the final year of the price control is C_T , P_{SMPF} is the pass through of Openreach SMPF charge, W_T is the volume of corresponding rental or connections that would attract Openreach's SMPF charge, final year revenues calculated as final year volumes V_T multiplied by final year price $P_T = P_0(1-X)^T$. If a different level of X is applied for each of the services, an iterative method is required to determine the level of X to be applied to the basket.

Table A7.21 - Range of Xs

Scenario	Description	basket
Central estimate		-12.75%
<i>Allocated Bandwidth per end user growth sensitivities</i>		
Bandwidth growth = 0%	With no growth in allocated bandwidth, bandwidth revenues fall with the decline in end users, while backhaul costs are lower than in the base case. This will result in a lower value of X.	-8.00%
Bandwidth growth = 10%	Lower bandwidth growth reduces both revenues and costs. The change in revenue overshadows the change in cost. This will result in a lower value of X.	-10.75%
Bandwidth growth = 35%	Higher bandwidth growth increases both revenues and costs. The change in revenues overshadows the change in costs. This will result in a higher value of X.	-13.75%
<i>Asset price change sensitivities</i>		
Use 2005/06 – 2009/10 average for all assets	A higher five year average for cable and duct will increase costs, and therefore there is a lower X.	-12.25%
<i>AVE and CVE sensitivities*</i>		
AVEs 25% higher 2004 PPC values	Higher AVEs will mean that capital costs are higher. This will result in a lower value of X.	-12.75%
Pay CVE 0.5, Non-pay CVE 0.5	Higher CVEs will mean that operating costs are higher. This will result in a lower value of X.	-12.75%
<i>Base year cost sensitivities</i>		
No NRC/GRC adjustment	With no adjustment in the base year, base year costs will be lower. This will result in a higher value of X.	-13.00%
Target NRC/GRC ratio = 31.3% for all assets	If the adjustment is applied to all assets base year costs will be higher. This only has a limited impact because the target ratio is derived from the average of the backhaul and DSLAM ratio. This will result in a lower value of X.	-12.75%*
Target NRC/GRC ratio = 50% for ATM assets	Base year costs will be higher, driven by higher ATM costs. In the base case the ratio is only uplifted to 31.3%. This will result in a lower value of X.	-12.25%
Target NRC/GRC ratio = 50% for all assets	With the adjustment applied to applied assets with a target of 50% base year costs will be significantly higher. This will result in a lower value of X.	-11.75%
<i>Capacity overhead sensitivities</i>		
Overhead = 85%	A lower overhead increases the capacity available for broadband traffic, this reduces backhaul costs. This will result in a higher value of X.	-13.50%
Overhead = 100%	A higher overhead reduces the capacity available for broadband traffic, this increases backhaul costs. This will result in a lower value of X.	-12.25%
<i>Efficiency sensitivities</i>		
Opex efficiency = 2%	Lower efficiency means higher costs and a lower	-12.5%

Scenario	Description	basket
	value of X.	
Opex efficiency = 5%	Higher efficiency means lower costs and a higher value of X.	-13.25%
<i>End user growth sensitivities</i>		
Market 1 growth = 0%	Costs will be higher than in the base case as more end users will be supported. This is overshadowed by the higher revenues generated by the larger end user base. This will result in a higher value of X.	-13.00%
Market 1 growth = -2.5%	Both costs and revenues will be lower in line with the fall in end users. This will result in a lower value of X.	-12.25%
Market 1 growth = 0.5%	Costs and revenues will be higher in line with the increase in the number of end users. The increase in revenue overshadows the increase in costs. This will result in a higher value of X.	-13.25%
<i>WACC sensitivities</i>		
WACC = 8.5%	A lower WACC means a lower return on capital and therefore lower costs. This will result in a higher value of X.	-13.00%
WACC = 10.0%	A higher WACC means a higher return on capital and therefore higher costs. This will result in a lower value of X.	-12.25%
*Note these values are lower than the base case as expected, but the impact is very small		

Annex 8

Returns in the broadband market- Summary report prepared for BT by dotecon

Introduction

- A8.1 As part of its response to the wholesale broadband access market review, BT submitted by dotecon on “returns in broadband market 1”¹⁸⁰. As this concerned the appropriate rate of return on BT’s investments in broadband, it is of more relevance to the charge control than to the market review. Hence we address the points made by dotecon as part of this consultation.
- A8.2 The dotecon report is a wide-ranging document which touches on many issues which are related to the cost of capital, albeit tangentially in some cases. In summary, dotecon’s conclusions are as follows:
- A8.3 BT’s cost of capital should reflect specific risks as well as systematic risk;
- A8.4 This should apply both to current generation broadband and investments in ADSL2+ if regulated;
- A8.5 Profitability should not be assessed on the basis of ROCE at a single point in time;
- A8.6 The conditions set out by Ofcom under which it would allow a rate of return above the WACC are too onerous.
- A8.7 Our response to each of these points is:
- We continue to believe that the capital asset pricing model (CAPM), under which only systematic risks are rewarded through the cost of capital, is in general appropriate. This has recently been confirmed by the Competition Commission’s (CC) decisions in the Openreach Financial Framework Review (OFFR) and Leased Lines Charge Control (LLCC) appeals ¹⁸¹.
 - We do not propose to regulate BT’s returns on its ADSL2+ investments. Our proposed approach, based on controlling charges for an “anchor product” provided (or equivalent to one provided) over existing technology will give BT good incentives to invest in ADSL2+ where it is efficient to do so (as explained in Section 3).
 - We agree that ROCE at a single point in time cannot give a complete picture of economic profitability. We have also considered ROCE over a time series of past data and, insofar as possible, consider the internal rate of return on BT’s investments in WBA.

¹⁸⁰ http://stakeholders.ofcom.org.uk/binaries/consultations/wba/responses/BT_Annex_5.pdf

¹⁸¹ See the CC’s decisions in case 1111/3/3/09 “The Carphone Warehouse Group plc v Office of Communications”, August 2010 (the “LLU decision” and in case 1112/3/3/09 “Cable and Wireless UK v Office of Communications”, June 2010 (the “LLCC decision”).

- Dotecon argues that the conditions, under which Ofcom would consider real options¹⁸² arguments to be relevant to the cost of capital, which were set out in our 2005 cost of capital statement, are too onerous. However, whilst we have not been persuaded of the practical value of the real options approach since 2005, we do attach importance to ensuring that risk is adequately rewarded, by allowing the regulated firm a “fair bet” on its risky investments¹⁸³. We have considered the implications of the fair bet approach for the control on BT’s WBA charges. But we are not persuaded that, in the circumstances, an adjustment needs to be made to BT’s WACC for this reason.

A8.8 We believe that the cost of capital appropriate to WBA is likely to be the “rest of BT” rate, which reflects a higher level of systematic risk than the copper access rate, but not an additional allowance for “new product” risk.

Allowance for risk

A8.9 Dotecon advances three main arguments in favour of adjusting BT’s WACC upwards. These are: regulatory risk; specific risk; and the value of real options.

Regulatory risk

A8.10 We do not believe that any additional allowance should be made for regulatory risk that is, any tendency for the actions of the regulator to create uncertainty which could increase the cost of capital. To the extent that regulation increases the (systematic) risk associated with BT’s investment, this should already be reflected in the measured beta. In addition, we seek to minimise regulatory risk by regulating in a consistent way over time – an approach which has sometimes been described as a “regulatory contract”¹⁸⁴.

A8.11 The anchor pricing approach which Ofcom proposes to adopt in setting the control on BT’s WBA charges is an application of this regulatory principle. When considering how to set charges in the face of possibly changing technology, Ofcom generally adopts what it refers to as an “anchor pricing” approach. This means that it continues to set charges based on the existing or legacy technology until the new technology becomes established. Once a new technology has been established, charges can gradually be moved to reflect the new technology, in terms of both the level and structure of charges.

A8.12 The key advantage Ofcom sees with this approach is that it provides BT (and also competing operators) with good incentives in terms of whether and when to invest in a new technology. If all relevant charges are set on the basis of continued use of the existing or legacy technology, then companies will have an incentive to invest in the new technology only if it lowers costs compared to the old technology. If the new technology raises quality as well as lowering costs, then there will be an incentive to invest if consumers are prepared to pay for the improved quality.

¹⁸² For example, in making an investment, a firm foregoes the *option* to defer the investment and wait and see how demand for the products it will support will evolve. See “*Ofcom’s approach to risk in the assessment of the cost of capital*”, final statement, 18 August 2005, section 9, for a discussion of the relevance of real option theory to the cost of capital.

¹⁸³ See example, Annex 4 of ‘Provision of technical platform services: guidelines and explanatory statement’, September 2006.

¹⁸⁴ See example, Ofcom’s first Pension review consultative document, December 2009.

- A8.13 Ofcom’s “anchor pricing” approach can be contrasted with an approach that involves the regulator trying to set charges in line with what it judges to be the most efficient technology at any point in time, even if that technology is not well established. There are significant risks of regulatory failure with this second approach. If the regulator sets charges to reflect costs at any point any time, the regulated company may observe that if it starts to introduce a new technology that reduces its costs, the regulator will rapidly set prices that take away the cost saving advantages of the new technology. This could reduce the incentive for a regulated company to try to introduce (or experiment with) new technologies.
- A8.14 In addition, the latter approach will normally require the values of existing assets to be written down from time to time, when new technology lowers the cost of providing existing services. It could then be hard to ensure an approach to depreciation which is consistent over time and between different charge controls and which gives a reasonable expectation of cost recovery. There would then be a risk that the cost of sunk investments might not be recovered if a change in technology led to an immediate reduction in charges. This in turn could lead to an increase in uncertainty and regulatory risk, and a consequent reluctance to invest.
- A8.15 For these reasons, Ofcom’s anchor pricing approach provides good incentives to invest and minimises regulatory risk.
- A8.16 Dotecon points out that some other regulators are reviewing the operation of the RPI-X regime and in particular the distribution of risk between the firm and its customers. Dotecon suggests that “loading too much risk on the regulated firm may discourage investment”, with the apparent implication that Ofcom should consider shorter charge control periods but with a greater degree of cost pass-through. A shorter period between charge control reviews would mean that charges could be brought into line with costs more frequently, by the regulator, whilst explicit pass-through mechanisms would do this automatically. Both would result in the risk of unanticipated changes in cost being borne by customers to a greater extent.
- A8.17 Ofcom agrees that there is a balance to be struck in determining the duration of a charge control and hence the extent to which the firm bears the risk that costs and profits may differ from forecasts made at the time the cap was set. However, it is likely to be necessary for cost minimisation and efficient investment that a significant part of the risk associated with a project remains with the firm. The fact that, under RPI-X, the firm is able to benefit for a period of time by reducing costs below forecast, or by introducing new products for which customers might be prepared to pay a premium¹⁸⁵, increases the strength of the incentives on the firm relative to a regime with a high degree of cost pass-through. Ofcom considers the appropriate duration and form of a charge control on a case by case basis but in general attaches considerable importance to the efficiency incentives of RPI-X. Then, by ensuring that the WACC is consistent with the resultant level of risk, investment incentives are also preserved. By contrast, shorter control periods, or longer control periods combined with explicit cost pass through provisions, would seriously weaken incentives on BT to minimise costs and make efficient investments and could in some circumstances encourage inefficient investments. Moreover, Ofcom’s practice has generally been to adopt a cautious approach to the cost of capital, recognising that the costs of setting too low a cost of capital, which

¹⁸⁵ Charges for new products and services are not generally subject to RPI-X control. Customers may be protected by “anchor product” regulation, which relies on the possibility of substitution to an existing product for which the charge is controlled.

could harm investment incentives, may outweigh the costs of setting a rate which is too high.

- A8.18 The markets which are regulated by Ofwat and Ofgem (which Dotecon describes as “relevant precedents”) differ from communications markets in a number of key respects. Dotecon notes that in some cases, the regulated company may in effect be under an obligation to invest. A different approach to investment by regulated firms, with the regulator taking a greater role in identifying investment needs and allowing them to be funded through revenues from charge-controlled services, may be appropriate in those circumstances. Such an approach is unlikely to be appropriate to BT’s investments however, and indeed we believe that we should not directly control the prices of the NGA services referred to by Dotecon at all. Our focus in this consultation is instead on protecting customers by controlling prices for existing WBA products, allowing prices and returns on investments in newer products (including NGA but also other service upgrades such as ADSL2+) to reflect customers’ willingness to pay for the higher functionality offered. By this means, we also give good incentives for BT to make new investments where it is efficient for them to do so.

Specific risk

- A8.19 Under the CAPM approach to the cost of capital used by Ofcom and most regulators, specific risk¹⁸⁶ is not reflected in the cost of capital because it is possible for a shareholder to avoid such risk by holding a diversified portfolio of securities. We do not believe that there is a general argument in favour of departing from the CAPM by allowing for specific risk in the cost of capital. Ofcom’s view on this point has recently been upheld by the CC. In its decision on the ORFF appeal, the CC considered the relevance of “multi-factor” models¹⁸⁷ of the cost of capital and states at paragraph 2.421

“We note that multi-factor models of this type are not typically used for cost of capital estimation in UK regulation. Previous CC reports have, for example, stated that at present such models lack a truly comprehensive theoretical justification and their predictive power has not been adequately demonstrated in the UK.”

- A8.20 The CC therefore supported the CAPM approach used by Ofcom.
- A8.21 Dotecon also appears to suggest that Ofcom should consider further disaggregations of BT’s cost of capital by estimating a higher rate to apply to riskier projects. Ofcom has so far determined only two rates, a lower rate to apply to copper access services and a higher rate for the rest of BT. Our view is that further disaggregations are not practical, a view with which the CC has also recently agreed in its decision on the LLCC appeal.
- A8.22 The CC’s decision on the cost of capital is explained in para 4.238 – 4.333 of the LLCC decision. In its para 4.243 (and more fully in para 4.293), the CC lists the

¹⁸⁶ In the CAPM, two types of risk are typically identified, commonly termed systematic (market or undiversifiable) risk; and specific (diversifiable or idiosyncratic) risk. Risks that are specific to any particular company or product are diversified away by investors and are therefore not priced into investors’ required rates of return and hence company cost of capital estimates.

¹⁸⁷ These are alternatives to the CAPM which allow for multiple factors (including potentially, specific risk) to influence the cost of capital, in addition to the two factors of the CAPM. The best known multifactor model is the Fama-French three factor model.

criteria set by Ofcom in 2005 for identifying a product-specific cost of capital as follows:

“strong a priori reasons for believing that the risk faced by the activity was different from that of the overall company; availability of evidence to assess differences in risk; and an expectation that reflecting differences in risk in an adjusted rate of return would bring gains for consumers”.

- A8.23 The CC rejected the contention that Ofcom erred in choosing only from the copper access or rest of BT rates for the cost of capital, because the appellant had failed to show that Ofcom “could have alternatively and more appropriately done something else”. The CC places the evidential burden on those proposing an alternative to show that Ofcom could have done something better, which dotecon has not done.
- A8.24 Our view remains that the above criteria are only satisfied for copper access services. In particular, in 2005 we were able to obtain “reasonably good evidence that income elasticities of demand on exchange lines are relatively low” (para 4.289 of the leased line decision, *op cit*), but did not find similar evidence for other services. Therefore we have considered whether the appropriate rate to apply to WBA services is the copper access rate or the rest of BT rate, but have not attempted to estimate a specific rate for WBA services.

Real options and the fair bet

- A8.25 Dotecon argues that Ofcom should be more willing to take account of real options, apparently on the assumption that BT would then be allowed a higher cost of capital. However, dotecon does not show that recognition of option value would in fact imply an increase in BT’s allowed cost of capital, and there appears to be a possible confusion in the dotecon report between the concept of real options and that of a “fair bet”. The idea behind “real options” is that there is a value associated with being able to modify a project at a later point. So a “wait and see” option may have value for a firm, because the ability to wait and see how demand develops can mitigate the risk of investment. Dotecon argues that the value of these real options should somehow be reflected in regulatory charges.
- A8.26 However, whilst dotecon take issue with the criteria set by Ofcom in 2005 for real options to be taken into account, they do not say how real options could in practice be valued. Indeed they themselves draw attention (pages 14 – 15) to the difficulty of calculating the value of real options and the dangers of erroneously incorporating returns arising from market power.
- A8.27 Ofcom believes that the fair bet is likely to be a more relevant concept. An investment is a “fair bet” if, at the time of investment, expected return is equal to the cost of capital. This means that, in order to ensure that an investment is a fair bet, the firm should be allowed to enjoy some of the upside risk when demand turns out to be high (i.e. allow returns higher than the cost of capital) to balance the fact that the firm will earn returns below the cost of capital if demand turns out to be low. This issue is particularly important where there is significant uncertainty around demand (or other factors that affect returns), and so is particularly relevant to NGA. Ofcom explains the relevance of the fair bet to NGA regulation in section 5 of “Future Broadband: policy approach to next generation access”¹⁸⁸. It is interesting

¹⁸⁸ Future Broadband: policy approach to next generation access, September 2007
http://stakeholders.ofcom.org.uk/binaries/consultations/nga/summary/future_broadband_nga.pdf

to note that dotecon's Figure 1 on page 9 is very similar to Figure 7 on page 37 of the Ofcom document, tending to confirm the view that the fair bet is in fact the concept of most relevance to dotecon's concerns.

- A8.28 Ofcom also recognises that, if the level of risk associated with a project declines over time, this should be reflected in the allowed rate of return. Paragraph A4.6 of Ofcom's 2006 statement on technical platform services¹⁸⁹ states:

"Incremental tranches of investment in the same, successful project would be likely to have a lower ex ante risk of failure and therefore the variation of the observed return from the cost of capital on an incremental tranche of investment would also be likely to be lower. Therefore, the amount of return associated with the payoff resulting from a successful outcome to a fair bet would be expected to decline with each additional tranche of investment."

- A8.29 We have therefore considered the appropriate cost of capital to allow in setting a control on BT's WBA charges in the light of this.
- A8.30 Dotecon points out that, when broadband services were first developed, "BT sunk significant resources without any guarantee of success". Whilst this may be true to an extent, we do not agree that the situations of investments in NGA and WBA now "are closely comparable" as dotecon claim (paragraph 30).
- A8.31 Firstly, from the time when BT first started to deploy WBA in 1999/2000 to date, BT's charges have been subject only to a ceiling which has allowed BT to enjoy some of the upside risk, consistent with the fair bet approach. BT has therefore now had a large degree of pricing freedom over quite an extended period. It is also relevant that, as noted above, the riskiness of successive tranches of investment in successful projects will decline over time, as does the required rate of return.
- A8.32 Secondly, we note that BT was in fact able to take steps to minimise the risk of its investments in broadband, particularly in market 1 (which is the only market in which it is proposed to apply a charge control). Indeed, even when broadband was relatively new, the level of risk was reduced by the evidence of unmet demand (for example, based on experience in other countries) and because BT was able to test the water by making initially quite modest investments (in limited areas, using small DSLAMs). Finally, BT was able to reduce its exposure to risk through the contracts it negotiated at the time with its equipment suppliers.
- A8.33 Moreover, Market 1 exchanges were generally the last exchanges to be broadband-enabled throughout the period 2003-2005. By this time BT had a clear understanding of demand from the areas that had been broadband-enabled earlier. In addition, before making the investment decision BT had run an exchange trigger scheme, where it set demand targets for each exchange and then asked consumers to register interest in purchasing broadband. If the interest exceeded the demand target then this triggered BT to deploy broadband. As it turned out, the level of interest was such that the trigger scheme was in the end found to be unnecessary.
- A8.34 However, we agree with dotecon that it would be wrong to put too much weight on ROCE calculated for a single year. Internal rate of return (IRR) is in general the preferred measure of the true economic profitability of a product although, in a

¹⁸⁹ See footnote 183

steady state, IRR and ROCE measures should be similar. As discussed in Annex 7, we have considered the need for an adjustment to WBA asset values to approximate their steady state levels. We have also considered ROCE data for all the years for which BT has been able to provide data and, to the extent possible, have calculated IRR over this period and the period covered by the charge control. The IRR analysis is intended as a cross-check to ensure that the proposed control does not risk denying BT a reasonable rate of return. Thus we believe that we have sufficiently taken account of fair bet considerations and that the proposed charge control will not harm investment incentives.

A8.35 In the light of the above we propose:

- to set a charge control on WBA in Market 1 to bring charges into line with costs (over three years), projected on an anchor pricing basis;
- not to allow for additional project-specific risk in the cost of capital
- not to try to estimate a disaggregated cost of capital, but to use the higher “rest of BT” rate.

Annex 9

BT's voluntary commitment in Market 1

Introduction

A9.1 BT has made the following commitment in relation to pricing of WBA services.



Annex 10

Glossary

21CN: BT's next generation network upgrade.

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

Backhaul: Connection from the first access node (for example the local exchange or street cabinet) to the core network.

Bandwidth: The measure of the how much data can be carried across a link in the network.

Broadband: a service or connection which capable of supporting always-on services which provide the end-user with high data transfer speeds.

BT: British Telecommunications plc.

Business Connectivity Market Review (BCMR): An Ofcom market review published in July 2008, in which Ofcom set out our view of competition and imposed regulation in relation to the market for leased lines in the UK.

Cable modem: a cable modem is a device that enables a consumer to access the Internet via a cable access line.

Core network: The backbone of the network which carries multiple services over high capacity routes around the country.

CP (Communications provider): a person who provides an Electronic Communications Network or provides an Electronic Communications Service.

DSL (Digital Subscriber Line): a family of technologies generically referred to as DSL, or xDSL, capable of transforming ordinary local loops into high-speed digital lines, capable of supporting advanced services such as fast Internet access and video-on-demand. ADSL (Asymmetric Digital Subscriber Line), HDSL (High bit rate Digital Subscriber Line) and VDSL (Very high data rate Digital Subscriber Line) are all variants of xDSL.

DSLAM (Digital Subscriber Loop Access Multiplexer): apparatus used to terminate DSL enabled local loops, which comprises a bank of DSL modems and a multiplexer which combines many local loops into one data path.

Hull Area: 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.

IP (Internet Protocol): the packet data protocol used for routing and carriage of messages across the Internet and similar networks.

IP network: a network that uses IP; for example the Internet is a public IP network.

KCOM: KCOM plc (formerly Kingston Communications (Hull) PLC), communications provider which operates in the Hull Area.

Local loop: the access network connection between the customer's premises and the local serving exchange, usually comprised of two copper wires twisted together.

Local loop unbundling (LLU): a process by which a dominant provider's local loops are physically disconnected from its network and connected to competing provider's networks. This enables operators other than the incumbent to use the local loop to provide services directly to customers.

Main distribution frame (MDF)/unbundled local loop: the equipment where local loops terminate and cross connection to competing providers' equipment can be made by flexible jumpers.

Metallic Path Facilities: the provision of access to the copper wires from the customer premises to a BT MDF that covers the full available frequency range, including both narrowband and broadband channels, allowing a competing provider to provide the customer with both voice and/or data services over such copper wires.

Modem: abbreviation of modulate-demodulate, a device that converts a digital signal into analogue for transmission purposes. It also receives analogue transmissions and converts them back to digital.

NGN (Next Generation Network): A network that uses new (usually IP) technology in the core and backhaul to provide all services over a single platform.

PO (Principal Operator): large operators with a substantial presence across the UK as a whole on the basis of network coverage (along with national market shares).

Shared metallic path facility (SMPF)/shared access: the provision of access to the copper wires from the customer's premises to a BT MDF that allows a competing provider to provide the customer with broadband services, while the dominant provider continues to provide the customer with conventional narrowband communications.

Wholesale Broadband Connect (WBC): BT's WBA 21CN product using Ethernet backhaul and ADSL2+ technology.