Wholesale ISDN30 price control Annexes

Non-confidential version

Statement

Publication date: 12 April 2012

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Legal instruments

PART 1 –DECISION WITH REGARDS TO THE SETTING OF AND REVOCATION OF SMP CONDITIONS

NOTIFICATION UNDER SECTIONS 48(1), AND 86 OF THE COMMUNICATIONS ACT 2003

Decisions for the setting of and revocation of SMP services conditions to be imposed upon BT as a result of the proposed market power determinations made by Ofcom in its Review of retail and wholesale ISDN30 services as published on 20 August 2010.

Background

1. On 28 November 2003, the Director General of Telecommunications ("The Director") published a document entitled *Review of the fixed narrowband line, call origination, conveyance and transit markets*[1] ('the 2003 Wholesale Statement').

2. In the 2003 Wholesale Statement the Director set out his decisions on market definitions, market analyses and the setting, where appropriate, of Significant Market Power ('SMP') conditions for the markets under review including the markets for wholesale ISDN30 exchange line services.

3. On 29 December 2003, Ofcom took over the functions and responsibilities under the Communications Act 2003 relating to the EC Communications directives from The Director.

4. On 19 March 2009, Ofcom published its consultation entitled a *Review of the fixed narrowband services wholesale markets : Consultation on the proposed markets, market power determinations and remedies*[2] ('the 2009 Wholesale Consultation') on proposals reviewing market definitions, market analyses, and where appropriate, the setting of SMP conditions. The 2009 Wholesale Consultation proposed, inter alia, a market for wholesale ISDN30 exchange line services for the UK excluding the Hull Area, that BT had SMP in that market, and that appropriate SMP conditions, including cost orientation, should be imposed on BT as person having SMP.

5. On 15 September 2009, Ofcom published a statement and further consultation entitled *Review of the fixed narrowband services wholesale markets: Statement on the markets, market power determinations and remedies including further consultation*[3] ('the 2009 Wholesale Statement').

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[1] *Review of the fixed narrowband wholesale exchange line, call origination, conveyance and transit markets,* 28 Nov 2003
http://www.ofcom.org.uk/static/archive/oftel/publications/eu_directives/2003/fix_narrow_retail0803.pdf

[2] *Review of the fixed narrowband services wholesale markets,* 19 March 2009
http://www.ofcom.org.uk/consult/condocs/review_wholesale/

[3] *Review of the fixed narrowband services wholesale markets,* 15 September 2009
http://stakeholders.ofcom.org.uk/binaries/consultations/wnmr_statement_consultation/summary/main.pdf

6. Having given careful consideration to every representation about the proposals made in relation to the wholesale ISDN30 market, Ofcom considered it appropriate to review its proposals in relation to that market and confirmed in the 2009 Wholesale Statement that no decisions had been taken in relation to wholesale ISDN30 and a further review would be conducted.

7. On 4 May 2010, Ofcom published a consultation entitled *Review of the retail and wholesale ISDN30 markets*[4] ('the ISDN30 2010 Market Review Consultation'), consulting on proposals made in relation to the ISDN30 markets identified at the wholesale and retail levels. The ISDN30 2010 Market Review Consultation proposed, inter alia, that a charge control would be an appropriate SMP condition to impose at the wholesale level, but the setting of such a condition should be subject to separate consultation.

8. On 20 August 2010, Ofcom published a statement entitled *Review of the retail and wholesale ISDN30 markets*[5] ('the ISDN30 2010 Market Review Statement'), setting out its decisions made in relation to the ISDN30 markets.

9. The ISDN30 2010 Market Review Statement set out our conclusions that BT held SMP in the market for wholesale ISDN30 exchange line services for the UK excluding the Hull Area and it was appropriate to impose a number of SMP remedies on BT. It also concluded that, on the evidence then available, a price control would be an appropriate remedy to impose, but that the imposition of such a remedy should be considered under a separate review which would fully review the costs associated with the provision of wholesale ISDN30 services.

10. On 1 April 2011, Ofcom published a consultation entitled *Price controls for wholesale ISDN30 services*[6] ('the April 2011 Consultation') which included , in Annex 1 to that document, a notification in accordance with section 48 of the Act. The April 2011 Consultation made proposals for the implementation of a charge control under the authority of the market analysis undertaken and notified under the Market Review. It proposed a three year charge control for the period to 31 March 2014.

11. On 20 December 2011 Ofcom published a further consultation entitled *Wholesale ISDN30 Price Control – further consultation* ('the December 2011 Consultation')[7], which included , in Annex 1 to that document, a notification in accordance with section 48A of the Act. The December 2011 Consultation amended some of the proposals set out in the April Consultation, revising the length of control to a two year control and adjusting the value of X accordingly.

12. Copies of both the April 2011 Consultation and the December 2011 Consultation were sent to the Secretary of State in accordance with sections 50(1)(a) and 48C(1) of the Act respectively.

13. Copies of the April 2011Consultation were sent to the European Commission, regulatory authorities of every other member State in accordance with sections 50(3) of the Act

[4] http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30/summary/isbn30.pdf
[5] http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30/statement/statement.pdf
[6] http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf
[7] http://stakeholders.ofcom.org.uk/binaries/consultations/938607/summary/condoc.pdf

14. Ofcom received five responses to the April 2011 Consultation and four responses to the December 2011 Consultation, and has considered every such representation. The Secretary of State has not notified Ofcom of any international obligation on the United Kingdom for this purpose.

15. On 9 March 2012, after making any modifications that appeared appropriate, OFCOM sent a copy of their proposal and a draft statement setting out the reasons for it to the European Commission, BEREC and the regulatory authorities in every other member state, in accordance with section 48B of the Act. On 10 April 2012, Ofcom received a letter from the European Commission confirming that it had no comments on Ofcom's proposals. Ofcom is therefore proceeding to adopt the proposals as notified to the European Commission.

Decisions

Decisions to set SMP Conditions

16. Ofcom hereby, in accordance with section 48(1) of the Act, sets SMP service condition AAA(IS)4A, in relation to the market "wholesale ISDN30 exchange line services" as identified in the ISDN30 2010 Market Review Statement.

17. SMP condition AAA(IS)4A is set out in Schedule 1 to this Notification, and shall have effect from 11 May 2012.

18. The effect of, and Ofcom's reasons for setting the SMP conditions set out in Schedule 1 to this Notification are contained in Sections 3 to 6 of the explanatory statement accompanying this Notification.

Decisions to revoke SMP Conditions

19. Ofcom hereby, in accordance with section 48(1) of the Act, and with effect from 11 May 2012, revokes SMP Service Condition AAA(IS)4 as set under paragraph 17 of the Notification to the ISDN30 2010 Market Review Statement.

20. The effect of, and Ofcom's reasons for revoking SMP condition AAA(IS)4 are contained in Section 6 of the explanatory statement accompanying this Notification.

Ofcom's duties and legal tests

21. Ofcom are, in accordance with section 86(1)(b) of the Act, setting and revoking SMP Conditions, described at paragraphs 16 and 19 above, by reference to the market power determination made in relation to the services market identified in the Notification to the ISDN30 2010 Market Review Statement in which Ofcom are satisfied that there has been no material change since the determination was made.

22. Further, Ofcom consider that the new SMP condition referred to in paragraph 16 of this Notification and the revocation of the SMP condition referred to in paragraph 19 of the Notification comply with the requirements of sections 45 to 47, 87 and 88 of the Act as appropriate and relevant to each of those SMP service conditions.

23. In making all of the decisions referred to in paragraphs 16 to 20 of this Notification, Ofcom has considered and acted in accordance with its general duties set out in section 3 of the Act and the six Community requirements in section 4 of the Act.

Notification

24. Copies of this Notification and the accompanying explanatory statement have been sent to the Secretary of State, The European Commission and BEREC in accordance with section 48C of the Act.

Interpretation

25. Save for references made to the identified wholesale ISDN30 exchange line services market in the Notification as set out in the ISDN30 2010 Market Review Statement and except as otherwise defined in paragraph 26 of this Notification, words or expressions used shall have the same meaning as they have been ascribed in the Act.

26. In this Notification:

(a) **"BT"** means British Telecommunications plc, whose registered company number is 1800000, and 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;

(b) **"the Act"** means the Communications Act 2003 c21

(c) **"the ISDN30 Market Review Statement"** means the statement entitled **"***Review of the retail and wholesale ISDN30 markets"* and its accompanying Notification published by Ofcom on 20 August 2010.

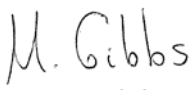
25. For the purpose of interpreting this Notification—

(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.

26. Schedule 1 to this Notification shall form part of this Notification.

Signed by



A person duly authorised in accordance with paragraph 18 of the Schedule to the Office of Communications Act 2002

12 April 2012

SCHEDULE 1

[DRAFT] Setting of SMP services conditions AAA(IS)4A as a result of the market power determination made by Ofcom in the statement entitled Review of the retail and wholesale ISDN30 markets dated 20 August 2010 in respect of the services market for wholesale ISDN30 exchange line services in the United Kingdom but excluding the Hull Area in which it was decided that BT is a person having significant market power.

1. In Schedule 1 to Annex 2 of the final statement entitled Review of the retail and wholesale ISDN30 markets dated 20 August 2010, there shall be set the following SMP services condition AAA(IS)4A, inserting it after Condition AAA(IS)3.

"Condition AAA(IS)4A

Charge control – ISDN30 Services

AAA(IS)4A.1 Subject to paragraphs AAA(IS)4A.4, AAA(IS)4A.6 and AAA(IS)4A.7, 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 AAA(IS)4A.3 and AAA(IS)4A.4) in each of the five categories of services specified in paragraphs AAA(IS)4A.1(a) to (e) below:

a. the aggregate charges for:
   i. ISDN30 Rental Services;
   ii. ISDN30 Connection Services; and
   iii. ISDN30 Enhanced Care Services;
b. the charge for ISDN30 Transfer Service;
c. the charge for the ISDN30 Direct Dial In Planning Service;
d. the charge for the ISDN30 Direct Dial In Connection Service; and
e. the charge for the ISDN30 Direct Dial In Rental Service;

is not more than the Controlling Percentage (determined in accordance with paragraph AAA(IS)4A.7).

AAA(IS)4A.2 For the purpose of complying with paragraph AAA(IS)4A.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 of those Charge Changes been made

a) for the First Relevant Year, on 11 May 2012 of that year; and

b) for the Second Relevant Year, on 1 April of that year.

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

$RC(1-D) \leq TRC$

where:

RC is the revenue change associated with the single Charge Change made in the Relevant Year in question, calculated by the relevant Percentage Change

immediately following the Charge Change multiplied by the revenue accrued during the Relevant Financial Year;

TRC is the target revenue change required in the Relevant Year in question to achieve compliance with paragraph AAA(IS)4A.1, calculated by the Percentage Change required in the Relevant Year in question to achieve compliance with paragraph AAA(IS)4A.1 multiplied by the revenue accrued during the Relevant 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][8]= 0 to 31 March = [x][9], divided by [x][10]; and

b. for the Second 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;

AAA(IS)4A.3 The Percentage Change for the purposes of the service specified in paragraphs AAA(IS)4A.1(b), (c), (d) and (e) (which are referred to in this paragraph as a "single charge category") shall be calculated for the purposes of complying with paragraph AAA(IS)4A.1 by employing the following formula:

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

where:

C_t 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.

AAA(IS)4A.4 The Percentage Change for the purposes of each of the products and/or services specified in paragraphs AAA(IS)4A.1(a), (which is known as a "basket") shall be calculated for the purposes of complying with paragraph AAA(IS)4A.1 by employing the following formula:

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

[8]Based on the date of coming into effect of the condition, as set out at paragraph 13 of the Notification.
[9]The number of days between start date of the charge control and 31 March 2013, minus 1.
[10]The number of days between start date of the charge control and 31 March 2013.

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;

$p_{0,i}$ 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.

AAA(IS)4A.5 Where the Percentage Change in the Relevant Year in question is less than the Controlling Percentage (the "Excess") then the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph AAA(IS)4A.7, but increased by the absolute value of the Excess.

AAA(IS)4A.6 Where the Percentage Change in the Relevant Year in the Relevant Year in question is more than the Controlling Percentage (the "Deficiency") then the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph AAA(IS)4A.7, but decreased by the absolute value of the Deficiency.

AAA(IS)4A.7 Subject to paragraphs AAA(IS)4A.5 and AAA(IS)4A.6, the Controlling Percentage in relation to any Relevant Year in question means:

a. for ISDN30 Rental,ISDN30 Connection Services and ISDN30 Enhanced Care Services;
   i. for the First Relevant Year, [RPI decreased by X_1[11] percentage points]; and
   ii. for the Second Relevant Year, RPI decreased by 13.75 percentage points].

b. for the ISDN30 Transfer Services, RPI decreased by 0 (zero) percentage points.

[11]Where Openreach do not make changes to the published charges for services that form part of the basket between 1 April 2012 and [date[, the value of X_1 = 13.75. Otherwise, the value of X_1 = (1+ RPI) – [Sum{wi * Pm,i} / Sum{wi * P0,i}]* (1+ RPI – 13.75), where wi is the weight of the service in the basket as calculated in paragraph AAA(IS)4A.4; Po,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; Pm,i is the published charge made by the Dominant Provider for the individual service i that forms part of the basket on 1 April 2012, excluding any Discounts offered by the Dominant Provider; RPI is the change in the Retail Prices Index in the period of 12 months ending on 31 October 2011 expressed as a percentage (rounded to two decimal places) of that Retail Prices Index as at the beginning of that period; and X is the value set out in paragraph AAA(IS)4A.7(a)(ii).

c. for the ISDN30 Direct Dial Inward Planning Service, RPI decreased by 0 (zero) percentage points.

d. for the ISDN30 Direct Dial In Connection Service RPI decreased by 0 (zero) percentage points.

e. for theISDN30 Direct Dial In Rental Service RPI decreased by 0 (zero) percentage points.

AAA(IS)4A.8 In the case of the ISDN30 Connection services, the Dominant Provider shall also and, in any event, take all reasonable steps to ensure that, at the end of each Relevant Year, the Percentage Change for those services is no more than RPI increased by 5 percentage points. For the purpose of this paragraph AAA(IS)4A.8, the Percentage Change shall be calculated by employing the following:.

$$C_t = \frac{(p_t - p_0)}{p_0}$$

where:

C_t is the Percentage Change in charges for ISDN30 Connection services at a particular time *t* during the Relevant Year;

p_0 is the average charge made by the Dominant Provider for ISDN30 Connection services immediately preceding the Relevant Year;

p_t is the average charge made by the Dominant Provider for ISDN30 Connection services at the time *t* during the Relevant Year; and

the average charge is calculated as total revenues from ISDN30 Connection services divided by the number of channels connected in that year.

AAA(IS)4A.9 In the case of the ISDN30 Enhanced Care Services, the Dominant Provider shall also and, in any event, take all reasonable steps to ensure that, at the end of each Relevant Year, the Percentage Change for each of those services is no more than RPI decreased by 0 (zero) percentage points. For the purpose of this paragraph AAA(IS)4A.9, the Percentage Change shall be calculated by employing the formula set out in paragraph AAA(IS)4A.3 and its references to each service comprising ISDN30 Enhanced Care Services.

AAA(IS)4A.10 Where:

a. the Dominant Provider makes a material change (other than to a Charge) to any Charge Controlled Service for which a Charge is charged;

b. The Dominant Provider makes a change to the date on which its financial year ends; or

c. there is a material change in the basis of the Retail Prices Index,

paragraphs AAA(IS)4A.1 to AAA(IS)4A.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 AAA(IS)4A.10, 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.

AAA(IS)4A.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 by performing the calculation of the Percentage Change. The data shall include:

a. pursuant to Condition AAA(IS)4A.3,AAA(IS)4A.4 and AAA(IS)4A.8 the calculated percentage change relating to ISDN30 services;
b. pursuant to Condition AAA(IS)4A.2, calculation of the revenue accrued as a result of all relevant individual charge changes during any Relevant Year compared to the target revenue change;
c. All relevant data the Dominant Provider used in the calculation of the percentage change C_t pursuant to Conditions AAA(IS)4A.3, AAA(IS)4A.4and AAA(IS)4A.8;
d. All relevant revenues accrued during the Relevant Financial Year in respect of ISDN30 services;
e. Published charges made by the Dominant Provider at time *t* during the Relevant Year;
f. The relevant published charge at the start of the Relevant Year;
g. Other data necessary for monitoring compliance with the charge control.

AAA(IS)4A.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 Second Relevant Year beginning on 1 April 2013 and ending on 31 March 2014, the Dominant Provider shall make such adjustment to any of its charges for the provision of ISDN30 Services and by such day in the Second Relevant Year (or if appropriate in Ofcom's opinion, by such day that falls after the end of the Second Relevant Year) as Ofcom may direct for the purpose of avoiding such a failure.

AAA(IS)4A.13 Paragraphs AAA(IS)4A.1 to AAA(IS)4A.12 shall not apply to such extent as Ofcom may direct.

AAA(IS)4A.14 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

AAA(IS)4A.15 In this Condition:

a. "**Charge**" means for the purposes of paragraph AAA(IS)4A.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;
b. "**Charge Change**" means a change to any of the charges for the provision of ISDN30 Services;
c. "**Charge Controlled Service**" means a service or basket of services listed in AAA(IS)4A.1(a) to (e);
d. "**Controlling Percentage**" is to be determined in accordance with paragraph AAA(IS)4A.6;
e. "**DDI**" means Direct Dial Inward;
f. "**ISDN30 Services**" means the following services provided by BT in the within the market for wholesale ISDN30 exchange line services, as defined in the Notification to the ISDN30 2010 Market Review Statement:
    i. ISDN30 Rental;
    ii. ISDN30 Transfer Services
    iii. ISDN 30 Enhanced Care Services;
    iv. ISDN30 Connection Services; and
    v. ISDN30 Direct Dial Inward Services,

g. "**ISDN30 Rental Services**" means the rental of an ISDN30 access channel for control and billing purposes;
h. "**ISDN30 Transfer Services**" means the charges for the transfer of control of an ISDN30 line levied per 30 channel access bearer and does not include charges for pre-validation of transfer order for wholesale ISDN30 installation types;
i. "**ISDN30Enhanced Care Services**" means the products described as Service Maintenance Level 3 and Service Maintenance Level 4 in Openreach's price list[12] correct at the date of this statement, or any such product that, from time to time, wholly or partially replaces those products;
j. "**ISDN30 Connection Services**" means the charges for the connection of a new ISDN30 line to a premises comprised of;
    (a) The new installation charge charged per end user on a single installation basis; and
    (b) The installation per channel charge;
k. "**ISDN30 Direct Dial Inward Services**" means the ISDN30Direct Dial Inward Planning Service, Direct Dial Inward Connection Service and the Direct Dial Inward Rental Service;
l. "**ISDN30 Direct Dial Inward Planning Service**" means the charge per DDI installation or change to numbers at a DDI installation
m. "**ISDN30 Direct Dial Inward Connection Service**" means the connection charge per DDI number at a DDI installation;
n. "**ISDN30 Direct Dial Rental Charge**" means the rental charge per number at a DDI installation;
o. "**Ofcom**" means the Office of Communications;
p. "**Percentage Change**" has the meanings given to it in paragraphs AAA(IS)4A.3, AAA(IS)4A.4 and AAA(IS)4A.8;
q. "**Relevant Financial Year**" means the period of 12 months ending on 31 March immediately preceding the Relevant Year in question;
r. "**Relevant Year**" means a defined period covered by either of the First Relevant Year or Second Relevant Year.
s. "**First Relevant Year**" means the period beginning on 11 May 2012[13] and ending on 31 March 2013;
t. "**Second Relevant Year**" means the period of 12 months beginning on 1 April 2013 and ending on 31 March 2014;
u. "**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;
v. "**RPI**" means the amount of the change in the Retail Prices Index in the period of twelve months ending on 31 October immediately before the beginning of a Relevant Year, expressed as a percentage (rounded to two decimal places) of that Retail Prices Index as at the beginning of that first mentioned period; and
w. "**the ISDN30 2010 Market Review Statement**" means the statement entitled **"***Review of the retail and wholesale ISDN30 markets"* and its accompanying Notification published by Ofcom on 20 August 2010.

[12] http://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=o1GUUZA4oSGmoXU5lc%2BgZQD265It6W32TNnfEUU7w1FZ6rNZujnCs99NbIKJZPD9hXYmiijxH6wr%0ACQm97GZMyQ%3D%3D

[13] The date of coming into effect of the condition, as set out at paragraph 13 above.

Annex 2

Technical Description of ISDN30 Provision

A2.1 ISDN30 is an Openreach product name for ISDN Primary Rate Interface ('ISDN PRI') which is a digital telephone line service that provides up to 30 lines over a common digital bearer circuit.

A2.2 Openreach currently provides two versions of ISDN30:

- ISDN30e which is fully compliant with the European Telecommunications Standards Institute (ETSI) standards for ISDN PRI; and
- ISDN30 (DASS) which is a version of ISDN PRI launched by BT before work on the international standards for ISDN PRI were completed. It uses a proprietary signalling standard called DASS2 (Digital Access Signalling System No.2) which differs in some respects from the standardised ETSI call control signalling used in ISDN30e.

A2.3 The ISDN30 DASS service is provided for compatibility with older Private Branch Exchanges (PBX) [14] but newer PBXs are designed to work with the internationally standardised version ISDN30e.

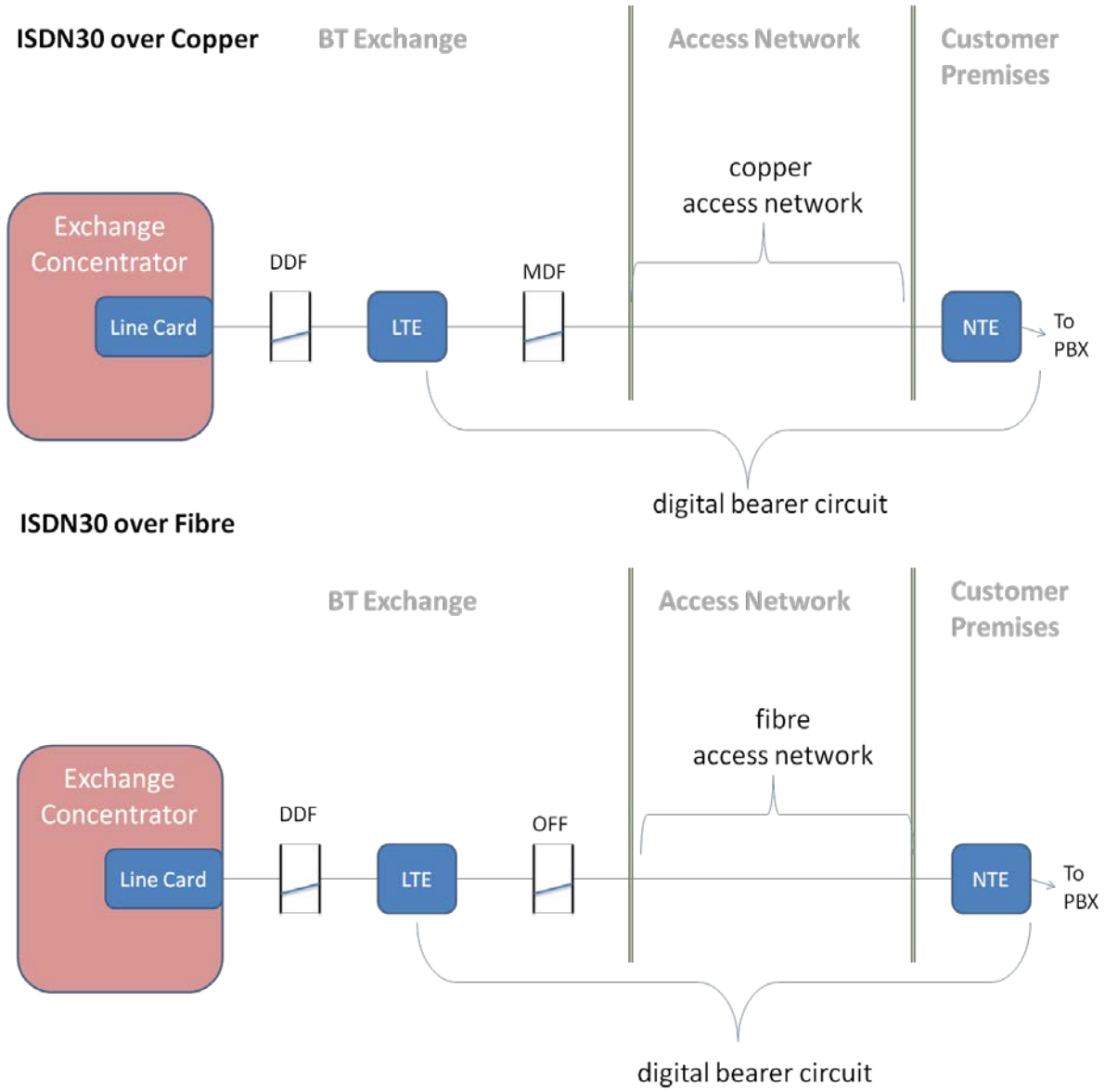
A2.4 From a technical perspective, ISDN30 consists of two main components:

- a 2 Mbit/s digital bearer circuit connecting the customer premises to the exchange; and
- call control and switching functions provided by the exchange.

A2.5 The diagram below shows the key components in an ISDN30 circuit.

[14] Private Branch Exchanges (or PBX) are telephone switching systems used by businesses to provide onsite telephony facilities such as extension numbering, inter-extension calling and outbound and inbound external calling.

Figure A5.1 ISDN30 circuit components



A2.6 They key components are described below:

- Exchange concentrator – the element of the local exchange to which customer lines are connected. The concentrator provides the telephone line interface, traffic concentration and multiplexing of traffic for transmission to the exchange processor[15] which is the local switching unit. Most of BT's exchange concentrator and exchange processor equipment is provided by two vendors. These systems known as System X and AXE10 both support ISDN30.

- Line-card –the line specific functions of the concentrator are provided on electronic circuit boards known as line-cards which are housed in the exchange concentrator. There is one line-card per ISDN30 circuit. The digital bearer circuits terminate on the line-cards.

[15] Generally called a Digital Local Exchange (DLE) in BT's network.

- Multiplexors (not illustrated)–in cases where concentrators are located beyond the maximum allowable transmission distance of the concentrator line-card additional multiplexor equipment is connected between the line terminating equipment (LTE) and line-card as a 'line extender' .Openreach have informed us these are only used in large buildings and normally exchange concentrator line-cards are connected directly to the LTE.

- Digital line system – high bandwidth circuits such as ISDN30 need a digital transmission system to transport the signals across the access network. In addition to the access network cables (copper or fibre) this comprises:

  - Line Terminating Equipment (LTE) –transmission equipment that transforms the signals into a form that can be transmitted over the bearer (either electrical or optical signals). In some cases the equipment may also perform a multiplexing function, combining several circuits onto a higher capacity bearer.

  - Network Terminating Equipment (NTE) – transmission equipment located at the customer premises. Performs similar function to LTE and also provides the customer interface.

- Exchange Flexibility Frames – these wiring frames are used within the exchanges to connect access network cables to electronic equipment inside the exchange and to interconnect electronic equipment within the exchange. For ISDN30 services, generally three different frames are used:

  - Main Distribution Frame (MDF) – copper access network cables terminate on the MDF and are then connected directly or indirectly to LTE equipment;

  - Optical Flexibility Frame (OFF) – the equivalent to the MDF for fibre access network cables; and

  - Digital Distribution Frame (DDF) – an internal frame used to interconnect digital circuits. For ISDN30 it is used to connect the LTE to the exchange concentrator line-card.

A2.7 ISDN30 has been available since the 1980s and over the years Openreach has used a number of different transmission systems for ISDN30, some of which have variants. Each system requires different LTE and NTE and in some cases a secondary NTE (NTE1a) is installed at the customer premises to provide protocol conversion for the ETSI variant of ISDN (ISDN30e).

A2.8 Some of the access bearer systems are capable of supporting more than one 2Mbit/s circuit. These can be used to provide additional ISDN30 services or other services. Some systems support circuits with higher bandwidths that can also be used to provide other services.

Other methods of provision

A2.9 In a small minority of cases, ISDN30 services are provided from exchange concentrators that are located in remote exchanges rather than the serving exchange. This can happen for several reasons:

- a small minority of predominantly rural exchanges are a type known as UXD5 that does not support ISDN30 services;

- where the serving exchange does not have sufficient spare line-card capacity to fulfil a customer order, service may be provided remotely to avoid a delay.

- sometimes the local concentrator is not the most appropriate place to terminate the ISDN30 line e.g. if a customer requires a large continuous number range that cannot be catered for locally; or

- where an exchange closure results in service being provided from a remote exchange.

A2.10 Exceptionally, in remote locations ISDN30 services are provided using point-to-point microwave radio links.

IP based services are now being offered as alternatives to ISDN30

A2.11 In the last few years there has been a marked shift to the use of IP-based technologies for communications networks. This trend is evident in:

- public networks where time division multiplexing (TDM) based telephony networks are beginning to be replaced with IP-based multiservice Next Generation Networks;

- business voice networks where IP-based PBXs are superseding TDM based PBXs; and

- IP and Ethernet transmission technologies are increasingly being used in access and backhaul networks as well as for leased lines in preference to older technologies such as Asynchronous Transfer Mode (ATM).

A2.12 New telephony services based on IP-based technologies that could potentially be substitutes for ISDN30 are now becoming available. There are three main types of IP based services:

- SIP Trunking[16] – an exchange line service that uses IP for voice and data transmission and Session Initiation Protocol (SIP) for the telephony control signalling. SIP Trunking services are generally multi-line services that are used to provide exchange line services to modern IP PBXs that support this type of interface.

- IP Centrex – an exchange line service that includes the functionality of a PBX within the OCP's network. This enables businesses to have the call management features of a PBX such as extension numbering and inter-extension calling without the need to purchase and operate a PBX. Centrex services have been available in various forms for many years and more recently IP-based variants have been introduced and these are commonly known as IP Centrex.[17]

[16] This is sometimes referred to as IP Business Trunks or IP Trunks.
[17] Typically, special IP telephones are used which communicate with a call server located in the OCP's network via an IP access connection and a data local area network (LAN) within the business premises. As with SIP Trunking, IP is used for voice and data transmission and SIP for telephony signalling.

- Hosted VoIP[18] - this is another term used to describe IP Centrex services. It is generally used to describe services provided to small sites that are accessed via an ordinary broadband internet connection.

A2.13 It is important to note that IP based services and the terminology used to describe them are still evolving. This is particularly true of IP Centrex and Hosted VoIP which are somewhat interchangeable.

A2.14 In the Market Review we considered in detail whether IP based services are demand or supply side substitutes for ISDN30. Based on the evidence gathered we concluded that for the period of our forward look, a narrow market definition based on ISDN30 only was still appropriate i.e. Hosted VoIP, IP Centrex or SIP Trunking are not sufficiently close substitutes for them to be regarded as part of a single market including ISDN30. However, we recognised the competitive constraints from IP based services in the SMP assessment.

[18] This is sometimes referred to as Hosted Telephony.

Annex 3

Financial Modelling

A3.1 This annex explains the modelling approach we have taken to forecast the costs of wholesale ISDN30 services from 2010/11 ("the base year") to 2013/14 for the purposes of setting the charge control for wholesale ISDN30 services. Specifically, we describe:

- the approach we have taken to identify the costs of the three wholesale ISDN30 services (rentals, connections and transfers) in 2010/11;
- the updates to the modelling to take account of more recent data available following publication of our April 2011 Consultation[19] (i.e. 2010/11 data);
- the adjustments and assumptions we have made to forecast costs to 2013/14; and
- the implications of our updated assumptions on the 2013/14 cost stacks for ISDN30 services.

A3.2 Our modelling approach is consistent with the conclusions we have set out in sections 3, 4 and 5 of this statement. This annex describes our modelling approach in more detail, in particular providing a detailed description of our calculations.

A3.3 In this annex we summarise the analysis that we presented in the April 2011 Consultation, updating our analysis with revised data and additional explanations where necessary. We do not address stakeholder comments in this annex; these have been fully addressed in Section 5.

A3.4 Based on Ofcom's analysis, the 2013/14 unit costs, on an FAC basis, of providing wholesale ISDN30 services are shown in the table A3.1 below.

[19] We set out the modelling approach for the purposes of our consultation in Annex 6 of the April 2011 Consultation:
http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf

Table A3.1 2013/14 Ofcom cost per channel for wholesale ISDN30 services[20]

	ISDN30 rentals £ per channel	ISDN30 connections £ per channel	ISDN30 transfers £ per channel[21]
Current price (2010/11)	141.00	40.71	4.36
Operating unit cost (2013/14)	107.76	48.62	4.59
ROCE unit cost[22] (2013/14)	7.54	0.14	0.13
Total unit cost 2013/14	**115.30**	**48.75**	**4.72**

Movement in 2013/14 cost stack

A3.5 The 2013/14 forecast cost stack for ISDN30 rentals has increased from £112.60 in our April 2011 Consultation to £115.30. The reasons for the increase in the cost stack are set out in Table A3.2 below.

Table A3.2 Movement in 2013/14 ISDN30 Rental cost stack

Reason for change	ISDN30 rentals £ per channel
April 2011 Consultation	112.60
Steady state adjustment	+4.56
Decrease in operating costs	-0.98
Reduction in transfer cost reallocation	-0.87
Decrease in ROCE unit cost	-0.35
Increase in WACC to 9.7%	+0.33
Total unit cost 2013/14	**115.30**

A3.6 The increase in the steady state adjustment is a result of changes in a number of our assumptions which we discuss in paragraph A3.63 below. These include an

[20] Costs are stated in 2013/14 prices
[21] The transfer cost stack is presented following our adjustment which removes costs over and above that required for the transfer X to equal 0%. These costs are recovered via the wholesale ISDN30 rentals and connections basket. See paragraphs 5.287-299 in Section 5.
[22] The ROCE unit cost represents the weighted average cost of capital multiplied by the mean capital employed and constitutes an allowable return on the assets used in providing the service.

increase of the NRC/GRC uplift from 47% to 50%, a change in the base year of the steady state model from 2009/10 to 2010/11 and updated volumes, WACC and inflation assumptions.

A3.7 The decrease in 2013/14 operating costs is primarily driven by:

- a removal of non-recurring IT costs in 2010/11 which is the base year from which 2013/14 IT costs are forecast. This reduces transfer costs by approximately £0.85 per channel (see paragraph A3.37);
- a reduction in leaver payments, consistent with our approach to using a net efficiency target in the Cost Forecast model. This reduces pay costs by approximately £0.50 per channel, however this is largely offset by the use of net efficiency of 4.5% rather than gross efficiency of 5% (see paragraphs A3.124 to A3.132); and
- a small increase in operating costs as a result of a decrease in 2013/14 volumes, which in part offsets the decreases discussed above. These are discussed in paragraphs A3.99 to A3.104.

A3.8 The reduction in the transfer cost reallocation is mainly driven by a reduction in the 2010/11 IT costs, which form a large part of the ISDN30 Transfer cost stack (this also reduces the MCE for ISDN30 transfers which results in a lower ROCE unit cost). This means that the excess of costs over revenues to be reallocated to ISDN30 rentals has fallen since our April 2011 Consultation.

A3.9 The pre-tax nominal WACC used for ISDN30 services has increased from 9.3% in our April 2011 Consultation, to 9.7%. There has however been a reduction in the MCE allocated to ISDN30 services in the Cost Allocation model (this doesn't include the MCE calculated for the purposes of the steady state adjustment). Therefore the overall impact on the ROCE unit cost for ISDN30 services is small.

A3.10 The reduction in ISDN30 Connections from £54.83 to £48.75 per connection is a result of the following:

- a reduction in 2010/11 non-recurring IT spend;
- a reduction in leaver payments which is largely offset by the use of net, rather than gross, efficiency; however,
- the above reductions are partly offset by an increase in costs as a result of reduction in connections volumes.

Base Year Costs

Approach to establishing base year costs

A3.11 In section 4 we stated that the ISDN30 charge controls will run to 31 March 2014 and will be set using current cost accounting fully allocated costs (CCA FAC).

A3.12 The first step is to identify the CCA FAC for the base year 2010/11, in order to forecast these costs to 2013/14. As we have discussed in section 3, the 2010/11 ROCE reported for wholesale ISDN30 services in BT's regulatory financial statements (RFS) is reported in aggregate as there is no obligation for BT to report costs and profitability at a service level for core wholesale ISDN30 services.

A3.13 Therefore we do not think it would be appropriate to rely solely on the RFS for the purposes of identifying the costs of individual ISDN30 services. In order to understand the profitability of wholesale ISDN30 services, we need to identify the costs and revenues of the three core services: rentals, connections and transfers. This requires us to make a number of assumptions both in relation to the base year (2010/11) costs and for the purposes of forecasting these costs forward to 2013/14.

Basis for cost estimates

A3.14 Wholesale ISDN30 services are provided by Openreach. In the WLR and LLU 2012 Statement,[23] we used two models to establish the base year costs (and forecast these to 2013/14) for all Openreach services, including wholesale ISDN30 services and we rely on these for the purposes of this statement. We explain how these models work in more detail below. To assist stakeholders' understanding of these models, we made non-confidential versions of the models available following the WLR and LLU 2011 Consultation.[24] In addition, a more detailed narrative about the working of the models can be found in section 7 of that consultation.

A3.15 The approach taken to modelling the costs in the WLR and LLU 2012 Statement builds upon the approach taken in the 2009 Openreach Financial Framework Review statement (OFFR statement),[25] where the cost modelling was performed in two stages, as follows:

- First, we created a forecast of operating costs and capital expenditure at an Openreach level (the Cost Forecast model). We calculated these using an activity based costing model, using data based on historically observed activity levels and costs together with estimates of future level of demand.

- Second, we allocated this cost and asset data to individual services to derive unit cost estimates (the Cost Allocation model). This Cost Allocation model also contained legacy asset information and inputs from an additional model (the RAV model) which reflected the required Regulatory Asset Value (RAV) adjustment. We discuss the RAV adjustment in paragraph A3.83 below.

A3.16 The Cost Forecast model is an activity based cost model (this identifies activities within an organisation and assigns costs to the relevant activities). We project Openreach's costs based on our expectations of the assets that will be in use and the costs that will be incurred as a result of activities that Openreach is and will be

[23] See Section 6 in the WLR and LLU 2012 Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_statement.pdf

[24] We refer readers to section 7 of the WLR and LLU 2011 Consultation which provides a detailed discussion on model disclosure relevant to the Cost Forecast and Cost Allocation models. This is available at: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc-2011/summary/wlr-cc-2011.pdf
We explain our approach to model disclosure further in section 6 of the WLR and LLU 2012 Statement available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_statement.pdf

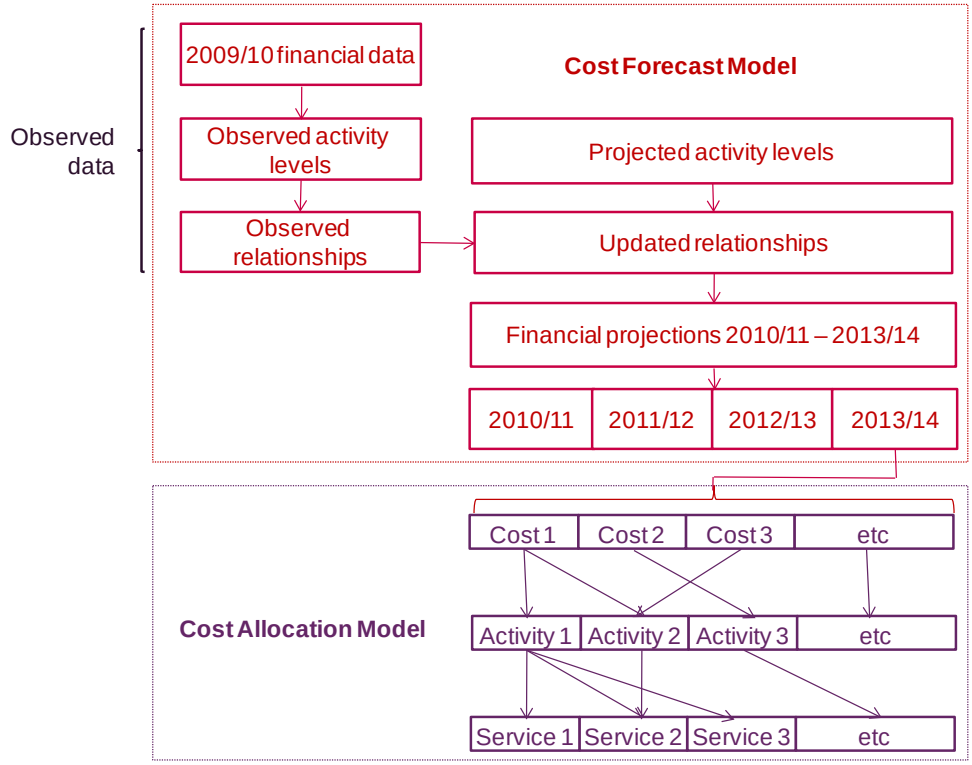
[25] See OFFR Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/openreachframework/statement/statement.pdf

performing to 2013/14.[26] These costs are then allocated to activities which are in turn allocated to individual services.

A3.17 A summary of the relationship between the two models used to forecast the costs of ISDN30 is shown below. We include a more detailed explanation of each model below this.

A3.18 The Cost Forecast and Cost Allocation models are both expressed in nominal terms, with an inflation assumption included in the Cost Forecast model as part of the forecast of costs to 2013/14. The cost stacks that we show throughout this consultation are therefore in nominal terms.

Figure A3.1 Flow diagrams for the Cost Forecast and Cost Allocation models



A3.19 In the April 2011 Consultation, we explained that for the purpose of the WLR and LLU 2011 Consultation,[27] we had built our own models based on the models used in the 2009 OFFR Statement. Specifically, we:

- modified the Cost Forecast model and extended it to include 2013/14. This model has been audited by Ernst & Young (E&Y); and
- commissioned E&Y to modify and extend the Cost Allocation model on our behalf.[28]

[26] This approach differs from previous approaches to modelling used in the past for example the LLCC statement and the NCC statement. These models used BT's RFS cost data and forecast these forward using relevant asset volume elasticities (AVEs) and cost volume elasticities (CVEs).
[27] Available at: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc-2011/summary/wlr-cc-2011.pdf

A3.20 For the purposes of the WLR and LLU 2011 Consultation, we updated the base year to 2009/10 (in line with BT's audited RFS) and extended the models to 2013/14, in line with the duration of that charge control. The model was populated with data obtained from Openreach under Ofcom's formal powers and also included various assumptions made by Ofcom. The models provided an Ofcom forecast of Openreach's costs for the period to 2013/14.

A3.21 For the purpose of our cost modelling, we ensured that costs relating to the roll-out of NGA were not included in the cost stack for copper products or ISDN30. Cost categories that relate exclusively to NGA, in particular NGA equipment costs, were excluded from the cost model. Common costs were allocated across services including NGA.

A3.22 We carried out cross checks to ensure that ISDN30 costs did not rise as a result of NGA, consistent with our anchor pricing approach. We found that the costs resulting from our modelling were lower than those that would result from a model excluding NGA products as, in our model, common costs are shared with NGA products. This outweighs the tendency for average costs to be higher due to the exclusion of NGA volumes.[29]

A3.23 For the purposes of the WLR and LLU 2012 Statement,[30] we have updated some of the data used in modelling the 2013/14 costs of providing Openreach products, including ISDN30. Specifically, we have:

- updated the RAV model (see paragraph A3.83 below) in line with the 2010/11 RFS;
- ensured that our modelled 2010/11 aggregate costs were consistent with the Openreach 2010/11 management accounts;
- removed non-recurring IT spend allocated to Openreach in 2010/11 to ensure the base year was appropriate for forecasting costs to 2013/14 (see paragraph A3.37 below); and
- updated some of our assumptions in light of further analysis and responses to the April 2011 Consultation and the WLR and LLU 2011 Consultation.

A3.24 In September 2011, BT's 2010/11 RFS were published. As part of the WLR and LLU 2012 Statement, we considered whether we should undertake a full refresh of the Cost Forecast model to replace the 2010/11 actual/forecast data with actual data from the 2010/11 RFS. An alternative approach was to ensure that the 2010/11 outputs from our model were consistent with BT's actual results and only key significant items would be updated.

A3.25 The analysis performed, as part of the WLR and LLU 2012 Statement, showed that our models continued to provide a reasonable basis for forecasting costs. Analysis

[28] We refer readers to section 6 of the WLR and LLU 2011 Consultation which discussed model disclosure of the Cost Forecast and Cost Allocation models and section 7 which provided a detailed narrative on the modelling approach.
[29] The exclusion of NGA volumes means the number of lines assumed for cost forecasting purposes is lower than it would have been in the absence of NGA (or if NGA volumes had been included). The reduction in the number of lines then tends to increase their unit cost.
[30] See section 3 of the WLR and LLU 2012 Statement, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_statement.pdf

set out in the WLR and LLU 2012 Statement[31] showed that the Cost Forecast model produced results consistent with Openreach's March 2011 management accounts and that in the context of that project, it was decided that it would not be appropriate or proportionate to undertake a full model refresh.

The Cost Forecast model

A3.26 Ofcom's Cost Forecast model used actual 2009/10 and budgeted 2010/11 BT data, reconciled to 2010/11 management accounts. This includes data on the relationship between activities, tasks and service volumes which requires the following:

- Service volumes (volumes for each Openreach product/service);
- Visit ratios (The number of times an activity will be carried out to complete a task);
- Activity task times (Number of hours taken to complete a task);
- Labour categorisation (e.g. employee or contractor); and
- Employee numbers, rates and hours worked (measured in Kilo-man-hours 'KMH').

A3.27 The Cost Forecast model also contains regulatory accounting data that enables capital expenditure to be allocated to the appropriate asset types. The base year of the model is 2010/11. The 2010/11 data is a mixture of actual time spent in the year to September 2010 (extracted from Openreach's monthly management accounting system) and forecast activity levels. This has been reconciled to BT's 2010/11 management accounts.

A3.28 The cost forecasts are a function of assumed product volumes applied to product/activity relationships, while the task times are subject to Ofcom's efficiency assumptions. The model uses effective annual hour and cost per employee assumptions (including training, fleet, stores etc). Volume parameters include orders, connections, number of lines, rentals, faults per lines and capital expenditure programmes.

A3.29 The outputs of the Cost Forecast model (including labour hours, total volumes and total costs) are fed into the Cost Allocation model along with data from other sources (including data on the RAV and transfer charges).

A3.30 In addition, within the Cost Forecast model, we also calculate the level of future capital expenditure (capex).

A3.31 We obtained the following data from Openreach;

- The amount of actual and forecast labour time spent on non-volume driven operational capital programmes (termed Complex Kilo-Man-Hours (KMH)), for example on Fault Rate Reduction;

[31] See section 3 of the WLR and LLU 2012 Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_statement.pdf

- The product volume to Operational activity usage factors and the 2009/10 capitalisation ratios for each Operational activity (including Complex KMH). We assumed these ratios to be fixed going forward to 2013/14; and

- The mapping of Capitalised Operational activity (including Complex KMH) to Capex Programmes.

A3.32 We then applied this information to our KMH forecasts, built up from our volume forecasts and Openreach forecast Complex KMH. From this we forecast Operational Capex KMH and then converted these KMHs into costs using FTE assumptions and then allocated the costs to Capex programmes using the mapping provided by Openreach.

A3.33 We then compared the labour element of the 2009/10 and 2010/11 Capex programmes with the total programme costs which were provided by Openreach which were consistent with the RFS. As expected, in most cases Openreach incurs additional costs to labour. This is because for example, when laying Duct, in addition to the labour cost of Openreach's employees, there is the cost of using contractors to dig up where the duct is being laid and the material cost of installing the PVC pipes, pumps etc. Dividing total costs by labour costs produced a 'gross up' factor. The "gross up" factors for 2009/10 and 2010/11 were compared and discussed with Openreach. In our modelling we concluded that the 2010/11 'gross up' factors were appropriate to apply to our forecast labour Capex Programme costs through to 2013/14.

A3.34 Openreach also provided its forecast Programme Capex not driven by Operations. We converted the Programme Capex costs into Fixed Asset categories in order to forecast asset and depreciation costs. To do this BT supplied the allocation mapping used in the 2009/10 RFS to allocate Programme Capex to Classes of Work (COW), such as LDC - D side Copper, and the subsequent mapping of these COWs to Fixed Asset categories. We assumed these 'gross up' factors would remain the same through to 2013/14 and used them to calculate Fixed Asset Capex values that were input into the CA model.

A3.35 Finally for the Cost Forecast model, Openreach supplied RFS data, also in response to formal information requests, on the asset life of each COW and the forecast depreciation charge for legacy assets. Incremental depreciation on Capex calculated in the model was combined with the legacy depreciation and the aggregated depreciation charge output to the CA model.

A3.36 The only change from the capex forecast from the WLR and LLU 2011 Consultation is the forecast 2010/11 copper and duct capex which was replaced by actual data. This is set out in detail in Annex 7 to the WLR and LLU 2012 Statement.

A3.37 In addition, we removed £125m of IT spend from the 2010/11 cost stack. This is explained in Annex 4 to the WLR and LLU 2012 Statement. In summary the £125m represented:

- £78m non-recurring BT IT costs;

- £25m IT costs relating to NGA;

- £10m non-recurring service assurance costs; and

- £12m relating to a change in the allocation base for Service I&P[32] from FTE to project spend.

The Cost Allocation model

A3.38 The Cost Allocation model calculates profitability and unit costs on a CCA basis for all services provided by Openreach. To do this it uses the outputs from the Cost Forecast model combined with:

- asset data (including gross replacement costs, net replacement costs and depreciation);
- CCA adjustments (regulatory adjustments necessary to ensure the data is modelled on a CCA basis); and
- activity to product usage factors (rules for allocating activities to individual products).

A3.39 In the Cost Allocation model, costs are first allocated to "activities", broadly similar to the "cost components" used in BT's RFS. ISDN30 specific activities include 'rental of BTW line-cards (ISDN30)' and 'service centre assurance WLR ISDN30'.

A3.40 There are a number of different allocation basis used to allocate costs to activities. A review of these has been undertaken as part of the WLR and LLU 2012 Statement (see Annex 4 to that Statement) but broadly speaking, there are four main methods of allocations:

- Labour (based on forecast hours spent on work related activities).
- Specific (based on a method which is directly relevant to that cost category (e.g. accommodation costs are allocated on the basis of the floor space each activity occupies.) Where it is possible to match costs to specific activities, the allocation basis reflects this.
- Blended (a combination of labour and specific).
- Depreciation (based on the assets to which they relate).

A3.41 Activity costs are then allocated to products and services. Where the activity relates to a specific product, the activity cost is allocated directly to that product (for example ISDN30 line-cards are allocated directly to ISDN30 rentals). In other cases, the costs are shared between the relevant products and services (for example the rental of access electronics is shared between ISDN30 and e-PPC products).

A3.42 Openreach has provided revised usage factors for activities within the ISDN30 connections and transfers cost stacks. This involves the movement of certain sales and general administrative costs from Connections to Transfers and 'ISDN30 connection' costs (engineering costs associated with circuit provision) from Transfers to Connections. This is a complex adjustment, and the overall impact of

[32] Service I&P costs are IT costs for service introduction and performance. These costs relate to end to end testing of development work packages produced by BTID, making sure the computing code does what it should.

the revised usage factors is minimal. We have therefore decided to base the model on the original usage factors, which are consistent with the RFS.

A3.43 The Cost Allocation model produces unit cost breakdowns split according to activity (e.g. rental of BTW items, use of access fibre and duct etc.) and according to cost category (e.g. pay, motor transport or accommodation).

A3.44 We consider that these models provide a sound basis for forecasting costs, because:

- The models are based on models originally prepared by BT for internal planning purposes;
- These models were subject to close scrutiny during the 2009 appeal of Ofcom's statement entitled "*A new pricing framework for Openreach*" (the OFFR appeal) process, during which no material errors were identified;
- The Cost Forecast model has been updated by Ofcom (taking account of the issues arising during the OFFR Appeal, including the need for simplification) and audited by E&Y, on Ofcom's behalf;
- The Cost Allocation model has been updated by E&Y (taking account of the issues arising during the Appeal, including the need for simplification);
- The base year (2010/11) is consistent with Openreach's internal forecasts for the year and has been reconciled to BT's management accounts;
- The results in each year have been reviewed for reasonableness; and
- The Cost Forecast, Cost Allocation and RAV models have all been subject to external reviews which include testing the logical operation and internal consistency of the models.

A3.45 Our modelling approach, together with its outputs, was fully explained in the WLR and LLU 2011 Consultation and the supporting annexes. To supplement this information, where possible we made non-confidential versions of the charge control models available to stakeholders during the WLR and LLU 2011 Consultation. The charge control models were developed using highly disaggregated data from Openreach. In developing our proposals on model disclosure and transparency, we had regard to our obligations under the Communications Act 2003 (the Act).

A3.46 We provided disclosure of the models as part of the WLR and LLU 2011 Consultation as follows:

- Two non-confidential versions of the Cost Allocation model were made available to stakeholders. An "empty model" was made available to stakeholders. This provided visibility of the full functionality of the model. We also provided a further non-confidential version of the Cost Allocation model showing information on the allocation of costs for in scope services and activities.
- Two non-confidential versions of the Cost Forecast model were made available. An "empty model" was made available to stakeholders. We also provided a further non-confidential version of the Cost Forecast model showing information relevant to the consultation.

A3.47 We refer readers to section 6 of the WLR and LLU 2012 Statement for more detail on the disclosure of the updated models.

Application to ISDN30

A3.48 As explained in the April 2011 Consultation, we consider that it is appropriate to use the Cost Forecast and Cost Allocation models for wholesale ISDN30 services because they form part of Openreach's total cost stack and share a number of common costs with products such as WLR, LLU or e-PPCs which are also included in these models. In addition, as set out above, these models have been audited and reconciled to BT's RFS[33] which ensures that the cost stacks are sufficiently robust for our purposes.

A3.49 Although the output from the Cost Allocation model provides a good starting point for estimating the costs of wholesale ISDN30 services, we need to make a number of ISDN30 specific adjustments (for example, an off-model WACC and steady state adjustment) to ensure the costs are appropriate for forecasting purposes. We discuss these adjustments in detail below.

A3.50 The cost stacks which are derived from the Cost Allocation model are based on Openreach's base year data. We have made a number of general (consistent with the WLR and LLU 2012 Statement) and ISDN30 specific assumptions to forecast costs from 2010/11 to 2013/14. These were set out in our April 2011 Consultation and we discuss the adjustments that are relevant to ISDN30 in more detail below. Broadly speaking, these are:

- As discussed in section 3, we have made a steady state adjustment to the asset base. This is because certain ISDN30 assets are heavily depreciated and the underlying costs are not consistent with a hypothetical network at steady state.
- We have made a number of additional adjustments to the base year numbers in order to ensure the costs are an appropriate starting point for the purposes of forecasting to 2013/14.
- We have used a number of assumptions for the purposes of forecasting the 2010/11 cost stack to 2013/14.

A3.51 Within the WLR and LLU 2012 Statement, there are a number of additional assumptions used which form part of the modelling. Where these do not affect the ISDN30 cost stack, we have not included a discussion of these assumptions. For a full discussion of all assumptions used in the models, we refer readers to the WLR and LLU 2012 Statement.[34]

We have uplifted the asset values to reflect a steady state

A3.52 Towards the end of a product's life, assets may not get replaced and in addition the asset base is likely to include fully depreciated assets. This is likely to introduce three potential distortions to the underlying costs:

[33] We reconciled the ISDN30 base year cost stacks to the 2009/10 aggregate data in BT's RFS, this reconciliation can be found in table A6.2 of our April 2011 Consultation.
[34] See Section 6 in the WLR and LLU 2012 Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_statement.pdf

- The mean capital employed (MCE[35]) is lower than in the case of an on-going network at steady state because assets are being depreciated, but not being replaced. This means that the return on capital employed included in the cost stack is also lower than it would be.

- Where assets are fully depreciated, but still in use, the level of depreciation in the accounts would be lower than would otherwise be the case.

- Increased levels of operating expenditure may be incurred to make up for the reduced levels of capital expenditure.

A3.53 As discussed in section 3, certain assets within the ISDN30 asset base are heavily depreciated, as assets have been in use for long periods of time, and are not being replaced. The heavily depreciated assets can be identified as those with a low ratio of net replacement cost (NRC) to gross replacement cost (GRC).

A3.54 The NRC of an asset reflects the current purchase price of an identical new asset today less an amount of depreciation to reflect the fact that a truly equivalent replacement would not be new, but would have the same remaining useful economic life. The GRC is an asset's current purchase price. Where assets have been purchased and fully depreciated but still in use, they will be part of the GRC but not NRC.

A3.55 Throughout an asset's life, the NRC to GRC ratio declines from "one", when the asset is new, to "zero" at the end of an asset's life. An example of a steady state adjustment would be to assume that in the steady state, with volumes roughly constant over time, assets will on average be half way through their economic lives. Hence, if the accounting and economic lives are equal and we assume straight line depreciation, in the steady state the NRC/GRC ratio should be around 0.5. In this case, a steady state adjustment would consist of uplifting the asset's NRC such that the NRC/GRC ratio is close to 0.5 and adjusting the asset's depreciation based on a correct estimate of its economic life (this is further explained below in paragraphs A3.71 to A3.73).

A3.56 If we assess profitability based on heavily depreciated assets we would conclude that even with constant operating costs and revenues the ROCE would be very high. This would suggest a charge control which reduces prices significantly. An artificially low price could, however, send the wrong price signals to users, leading to an increase in demand which could only be met by new investment, the costs of which could not be recovered at the low prevailing prices.

A3.57 We have therefore made a steady state adjustment for the purposes of identifying the base year (2010/11) profitability for ISDN30 services. We have applied this adjustment to the rental service only, on the basis that this service alone includes the relevant (heavily depreciated) assets. In addition, we have applied this adjustment in calculating the base year costs (2010/11) and have forecast it to 2013/14.

[35] The MCE is the average capital employed over the year, from which we calculate the return on capital employed (ROCE) for any given product. This means the MCE is used as part of a profitability measure (i.e. how much profit is generated per unit of capital employed in the product). It also acts as a basis from which we calculate the allowable return which an investor should receive in a competitive market. We identify this by multiplying the capital employed by the weighted average cost of capital (WACC). This forms part of the FAC of the product.

A3.58 As discussed in Section 3, we considered a range of options for calculating the steady state adjustment in our April 2011 Consultation. In the April 2011 Consultation, we proposed to adjust the NRC ratio of the heavily depreciated assets to 47% of the GRC (this was the NRC/GRC ratio of the remaining non-heavily depreciated assets within the ISDN30 asset base). This approach was consistent with that taken in the WBA 2011 Consultation.[36]

A3.59 In the April 2011 Consultation, we noted that if a product was in a steady state with investment equal to depreciation, we would expect the ratio to be around 50%. We undertook sensitivity analysis and noted that the difference between using 47% and a 50% uplift was small (it would reduce the 'X' by approximately 0.2%[37]). The WBA 2011 Statement published in July, took into account stakeholder responses and additional analysis, which resulted in an increase in the NRC/GRC uplift to 50%:

> "...it is more in line with an ongoing network in a steady state to assume assets are, on average, half way through their useful life..."[38]

A3.60 Given the small impact of moving from 47% to 50%, and the desire for consistency with the WBA 2011 Statement, we have adjusted the NRC of the heavily depreciated assets to 50% of the GRC in the base year. This approach is relatively simple to implement and is based on financial data which can be reconciled to BT's RFS. We believe this is a reasonable proxy of what we would expect for this network in a steady state.

A3.61 For consistency with the 50% assumption, the asset life assumptions need to be a good estimate of the economic lives of the assets in the future. We believe our assumed asset lives (see paragraphs A.3.71 to A3.73 below) are appropriate and consistent with the 50% NRC/GRC ratio.

A3.62 Openreach's adjusted ROCE (using a 50% NRC/GRC ratio) in 2010/11 for wholesale ISDN30 services would have been **25%.** This is still significantly above the '"rest of BT" WACC of 9.7%[39] (in aggregate) in 2010/11. In addition, the impact of our steady state adjustment is to increase Openreach's base year costs for ISDN30 rentals by up to **£82.4m** or **£38.66/channel.** This adjustment is made of the following components:

[36] See paragraph A7.89 in the WBA Consultation, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/823069/summary/condoc.pdf
[37] See table A6.14, in the April 2011 Consultation.
[38] See paragraph 5.94-5.95 in the WBA 2011 Statement, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf
[39] We are of the view that wholesale ISDN30 services should be classified within BT's core network for the purposes of an assessment of risk levels and should be subject to the "rest of BT" rate. The rest of BT rate as set out in the WBA statement is 9.7%, see Annex 4 for a detailed discussion of this.

Table A3.3 Components of the Ofcom steady state adjustment for 2010/11.

Asset	ROCE adjustment £ per channel	Depreciation adjustment £ per channel	Total adjustment £ per channel
ISDN30 Line-cards	3.73	7.43	11.16
Access Electronics	5.18	22.32	27.50
Total	**8.91**	**29.75**	**38.66**

A3.63 The steady state adjustment in the base year has increase from £33.17 per channel in our April 2011 Consultation to £38.66. The reasons for this increase are:

- a change in the base year from 2009/10 to 2010/11 where volumes are lower, and there has been an additional year of depreciation (lower NRC) of the heavily depreciated assets;
- an increase in the adjustment ratio of NRC/GRC from 47% to 50%;
- an increase in the WACC from 9.3% to 9.7%; and
- an increase in the GRC of the ISDN30 linecard assets as Openreach provided updated data which now includes fully depreciated assets in the GRC. This is consistent with the approach taken to Access Electronics.

A3.64 We explain below the steps we have followed in implementing the asset adjustments:

Step 1 – Identify assets which require adjustment

A3.65 We identified the NRC and GRC of the assets within the ISDN30 asset base using data provided by Openreach requested under our formal powers.

A3.66 For the assets with a significant GRC (above £50m) we considered the ratio of the NRC to GRC. If a product is in a steady state with investment equal to depreciation, we would expect the ratio to be around 50%. For assets where no new investment is taking place this ratio will be much lower. In addition, where prudent accounting assumptions have been used, the assets will be more heavily depreciated than appropriate which in turn will reduce the NRC/GRC ratio further.

A3.67 The NRC/GRC ratio of assets within the ISDN30 rental asset base is shown in Table A3.4 below. We have separated out the assets with a GRC greater than £50m and an NRC/GRC ratio significantly below 50%.

Table A3.4 ISDN30 Rental assets: NRC/GRC ratios at 2010/11

Asset	NRC /GRC ratio
ISDN30 line-cards	6%
Access Electronics	11%
Other assets within ISDN30	✂
Total ISDN30 asset base	26%

Step 2 – Adjust the NRC/GRC ratio for the base year

A3.68 Having identified the assets which require adjusting, we have uplifted the relevant NRC to 50% of the GRC. This is done by calculating the GRC for the base year (2010/11) and multiplying it by 0.50 to calculate an adjusted NRC from which we can calculate the ROCE unit cost.

A3.69 The ROCE unit cost is then calculated as the adjusted NRC multiplied by the WACC of 9.7%. See Annex 4 for a more detailed discussion on the WACC for wholesale ISDN30 services.

A3.70 The base year adjustment for the ROCE increases the cost stack for ISDN30 rentals by £8.91 per channel in 2010/11.

Step 3 – Calculate the depreciation for the base year

A3.71 We believe that the GRC in the base year is accurate and have divided this by the approximate accounting asset lives[40] which are:

- ISDN30 line-cards (10 years); and
- Access Electronics (5 years).

A3.72 We have assumed that the above accounting lives are appropriate for the purposes of the steady state adjustment. We consider that our assumed life should be a reasonable estimate of the economic life of the assets going forward. This is so that the control we set will allow BT to recover the costs of the investments needed to support the service.

A3.73 In the past, economic lives have exceeded accounting lives. But we expect economic lives to be shorter in future, because of the likely reduction in ISDN30 demand, and more in line with accounting lives. Therefore as wholesale ISDN30 services are facing a steady decline, we consider that the remaining useful economic life and the accounting asset lives will be similar.

A3.74 Our base year adjustment for depreciation is £29.75 per channel for ISDN30 rentals.

[40] The assets within the ISDN30 asset base have been subject to different accounting asset life assumptions, however we consider that the approximate accounting asset lives above represent reasonable proxies for the accounting asset life.

Step 4 – Calculate base year adjustment

A3.75 From Steps 2 and 3, we have identified the total adjustment necessary for the base year as £38.66 per channel for ISDN30 rentals.

A3.76 We discuss how we have forecast this base year adjustment to 2013/14 from paragraph A3.105 below.

Step 5 - Consider base year operating costs

A3.77 We also considered whether operating costs need to be adjusted to reflect a network at steady state. It is reasonable to assume that, as the ISDN30 assets become increasingly depreciated, the cost of maintaining these assets will increase. The result of higher maintenance costs is operating costs that are above those required to maintain a hypothetical ongoing network. As we have not previously imposed reporting requirements in relation to wholesale ISDN30 services, we do not have comparable historical data which would assist us in identifying the relevant maintenance costs. We have therefore been unable to ascertain whether operating costs need to be adjusted. However, we think it is reasonable to assume that we would not be required to make such an adjustment as our analysis of ISDN30 fault rates has shown this to be quite low.[41] We have therefore not made any such adjustment to base year operating costs.

A3.78 In addition we note that we do apply an Openreach wide efficiency rate when forecasting base year operating costs forward. This also includes the relevant wholesale ISDN30 services. This is discussed in more detail from paragraph A3.124 below.

Adjustments to base year costs

A3.79 In addition to the steady state adjustment discussed above, there are a number of further adjustments that we have made to base year costs. This has enabled us to establish Ofcom base year costs (2010/11) for wholesale ISDN30 services. We have made these adjustments to Openreach's costs to ensure that the base year is an appropriate starting point for forecasting costs to 2013/14. The adjustments we have made to the base year costs for wholesale ISDN30 rentals[42] are summarised below.

A3.80 Some of these adjustments have been made at a total Openreach level, in line with the WLR and LLU 2012 Statement. As such these have been incorporated into the Cost Forecast and/or Cost Allocation models. In addition, we have made some ISDN30 specific adjustments outside these models. Both the general Openreach adjustments which impact ISDN30 and the 'off-line' ISDN30 adjustments are detailed below.

[41] In our April 2011 Consultation, we analysed Openreach's fault rate data based on Openreach KPIs from January 2010 to October 2010 and noted that the percentage of the ISDN30 installed base reported as faulty was low compared to other services and remained low over the period.
[42] We show the impact on ISDN30 rentals in the table below, as the majority of base year adjustments affect the rental product only. Where there is an additional impact on either ISDN30 connections or transfers we discuss this as part of the qualitative explanation of the adjustments.

We have used HCA indexed by RPI for pre-97 assets and CCA for post-97 assets

A3.81 In the 2005 review, we determined the basis that we would adopt in valuing BT's access assets. The decision was that we adopt an indexed HCA value for access duct and copper assets that BT had in place before August 1997, while continuing to use a CCA value for assets that had been built from August 1997. This followed an earlier 1997 decision to change the valuation methodology for BT's entire asset base from HCA to CCA.

A3.82 The RAV adjustment is made in order to restate the value of copper and duct assets acquired prior to August 1997 from a CCA value to an indexed HCA value.

A3.83 We have used a model built by BT to generate the indexed value of the pre-1997 assets and the CCA valuation of the post 1997 assets. The RAV model, on a total BT basis, sets out, on a historic basis the value of assets, additions, disposals, depreciation. It also has a record of the actual current cost adjustments made and holding gains and losses which have accrued. The model calculates the asset and depreciation cost on a forward looking basis. The outputs of the model are historical and forecast CCA and RAV values for the copper and duct asset base, as well as the depreciation charge and holding gains. These outputs are multiplied by the relevant percentage appropriate to the Access network to produce inputs into the Cost Allocation model.

A3.84 As part of the WLR and LLU 2011 Consultation, we reviewed the key inputs and calculations and, subject to the comments below regarding the duct valuation, found no material error. On this basis, we considered that the model provided a reasonable basis for determining the RAV adjustments, subject to the appropriate choice of assumptions.

A3.85 We also examined the key forward looking assumptions during the WLR and LLU 2011 Consultation. Capital expenditure was modelled by Openreach based on the 2009/10 actual data and was broadly consistent with Ofcom's forecasts. We replaced the Openreach capital expenditure forecasts with our own generated from the Cost Forecast Model. We noted that assets are retired in the year when they become fully depreciated and depreciation appeared reasonable at 18 years on average for copper and 40 years for duct.

A3.86 As part of the WLR and LLU 2012 Statement, we have updated our RAV model with data from the 2010/11 RFS[43] including BT's actual 2010/11 Capex. A detailed explanation of the RAV model can be found in annex 7 to the WLR and LLU 2012 Statement.

A3.87 We also re-examined all the other key forward looking assumptions. As set out in Annex 1 of the WLR and LLU 2012 Statement[44] we concluded that the most appropriate method to calculate holding gains on post-1997 Duct was to use forecast RPI which we implemented in our RAV model. This rate differed slightly from the long term RPI used in the WLR and LLU 2011 Consultation. We set out the updated forecast of RPI in paragraphs A3.140 to A3.144 below.

A3.88 We also used forecast RPI for post-1997 Copper assets, for both the balance sheet valuation and the in year holding gain. This was a change from the WLR and LLU

[43] AFI20
[44] Para A1.169

2011 Consultation when the in-year copper holding gain was forecast using a long term RPI of 2.5%.

A3.89 Other key assumptions such as asset lives and retirement schedules have remained the same.

A3.90 As part of the WLR and LLU 2012 Statement, we concluded the following:

- the RAV methodology established in 2005 remains appropriate, meaning that assets deployed before August 1997 will continue to be valued on an indexed HCA basis;
- assets deployed since August 1997 will continue to be valued on a CCA replacement cost basis;
- the appropriate method for estimating the duct CCA valuation is indexing annual spend on the network by RPI; and
- the copper CCA valuation continues to be based on BT's absolute valuation.

A3.91 As duct and copper form part of the ISDN30 rental asset base, we consider there to be no good reason to take a different approach for wholesale ISDN30 services.

A3.92 As noted in the April 2011 Consultation, the RAV adjustment does not form a significant part of the cost stack for ISDN30 rental services (approximately £0.20 per channel). The RAV adjustment has no impact on ISDN30 connection or transfer costs as it relates to copper and duct assets, which do not form part of the asset base of either of these services.

We have excluded BT's revaluation of duct

A3.93 As explained in the April 2011 Consultation, BT increased the 2009/10 valuation of duct to £6.5bn which represented a £1.7bn increase compared to the 2008/9 equivalent valuation. As part of this, BT estimated that the replacement value of post-1997 assets to be £2.9bn.

A3.94 As part of the WLR and LLU 2011 Consultation, we reviewed BT's methodology and considered alternative methodologies. For the purposes of modelling in the consultation, we used a duct valuation of £2.1bn rather than BT's estimate of £2.9bn.

A3.95 As part of the WLR and LLU 2012 Statement, we have taken account of consultation responses and updated data. We have concluded that CCA remains the appropriate approach for valuing post-1997 duct assets. We consider that the appropriate method for estimating CCA value in this case is indexing annual spend on the network by RPI. We set out the forecast of RPI to be used in the RAV model in paragraphs A3.140 to A3.144 below.

A3.96 For the purposes of modelling, we have updated the calculation in the RAV model to reflect BT's actual capex and the relevant RPI. The resulting figures for 2009/10 duct valuation which we have used in our CA model, along with the current 2010/11 capex figure, are:

Table A3.5 – 2009/10 Duct valuation

	£ bn
Gross Replacement Cost	2.9
Less depreciation	(0.6)
Net Replacement Cost	2.3

A3.97 As explained in our April 2011 Consultation, the approach to duct valuation does not have a significant impact on the cost stack for ISDN30 rental services (the exclusion of BT's revaluation of duct reduced the cost stack by approximately £0.20 per channel). The approach to the valuation of duct has no impact on ISDN30 connection or transfer costs as duct assets do not form part of the asset base of either of these services.

Cost Forecasting to 2013/4

A3.98 Having established the base year costs for 2010/11, we have then forecast these to 2013/14. In doing this, we have made a number of assumptions which we discuss in the paragraphs below. We further note that:

- Some of the assumptions, such as volumes and steady state adjustments, have been considered at an ISDN30 specific level.
- Other inputs, such as efficiency and inflation, have been considered at an Openreach level and are therefore consistent with the WLR and LLU 2012 Statement. Where we have considered assumptions at a total Openreach level, we assessed whether it was appropriate to apply these to wholesale ISDN30 services.

Volume forecasts

A3.99 We have used a two stage approach to forecasting volumes for ISDN30 services. We discuss this in detail in Annex 5.

A3.100 This involves forecasting an initial set of volumes for the three core services assuming no change to prices from current levels (Stage 1 volume forecasts). These volume forecasts are shown below.

Table A3.6 Stage 1 volume forecasts

	2010/11	2011/12	2012/13	2013/14
Rentals	2,131,000	1,918,793	1,727,718	1,555,670
Connections	218,000	52,072	46,887	42,218
Transfers	318,000	302,445	287,651	273,581

A3.101 We have input these volumes into the Cost Forecast model and into the additional off-line ISDN30 adjustment models (where we calculate ISDN30 specific adjustments such as the steady state adjustment). We have then calculated the

price change required (i.e. the value of X) for the rentals and connections basket such that revenues are equal to FAC by 2013/14.

A3.102 From this, we have run a Stage 2 volume scenario which takes into account the impact of the Stage 1 price changes. The Stage 2 volume forecasts are shown below.

Table A3.7 Stage 2 volume forecasts

	2010/11	2011/12	2012/13	2013/14
Rentals	2,131,000	1,918,793	1,819,373	1,725,105
Connections	218,000	52,072	153,117	145,320
Transfers	318,000	302,445	287,651	273,581

A3.103 The impact of this approach on the costs and revenues of the wholesale ISDN30 rentals and connections basket is shown below.

Table A3.8 Stage 1 and Stage 2 costs for wholesale ISDN30 rentals and connections basket (including enhanced care costs and revenues)

	Rental and Connections 2013/14 – Stage 1	Rental and Connections 2013/14 – Stage 2
	£m	£m
Revenues	231	260
Costs	193	211

A3.104 Table A3.8 shows the impact of the Stage 2 volumes on the revenues and costs of ISDN30 rentals and connections. As the Stage 2 volumes are higher than the Stage 1 volumes, both the revenues and costs increase.

We forecast costs after the steady state adjustment to 2013/14

A3.105 In order to project costs to 2013/14 starting from a steady state we have forecast the capital expenditure, depreciation and assumed disposal value over the period.

A3.106 In a steady state with a 50% NRC/GRC ratio, total depreciation for access electronics and line-cards would be equal to £93m in 2010/11. This is calculated using the accounting asset lives of 5 years for access electronics and 10 years for linecards.

A3.107 In the steady state, we would expect depreciation to be equal to both capital expenditure and annual disposals. Therefore our 2010/11 assumed capital expenditure and disposals are also equal to £93m.

A3.108 We have forecast capital expenditure to 2013/14, by first applying the forecast inflation applicable to assets of RPI (see paragraphs A3.140 to A3.144) and the net

efficiency target of 4.5% to the prior year capital expenditure (see paragraphs A3.124 to A3.132).

A3.109 The additional capital expenditure element is the change in cost as a result of changing volumes of the relevant service relative to the steady state. If volumes increase this will be positive, if volumes fall this will be negative. This is calculated by reference to the AVE for the relevant asset of 0.5 for access electronics and 1 for line-cards. We discuss these in more detail in paragraphs A3.115 to A3.120 below.

A3.110 The capital expenditure calculated in the steady state model, as a result of these assumptions is estimated to be £73m in 2013/14.

A3.111 We describe the calculations for the relevant cost stacks below.

A3.112 We intend to publish a "stripped out" version of the model used to create the steady state adjustment to enable stakeholders to understand our methodology and, alongside the qualitative explanation in this annex, understand key data that drives the results.[45]

Table A3.9 Steady state adjustment: capital cost calculations

Cost category	Base year	Forecast
GRC	From s.135 data OR	GRC(t) = GRC(t-1)*(1+infl)+total capex(t)-disp(t)
Capital expenditure (capex)	= depreciation	Capex(t) = Capex(t-1)*(1+infl)*(1-eff)
Additional capex (ad capex)	n/a	Ad capex(t) = GRC(t-1)*(1+infl)*AVE*Vol change %
Total capex	=capex+ad capex	Total capex(t)=capex(t)+ad capex(t)
Disposal	= depreciation	Disp(t)=Disp(t-1)*(1+infl)
Depreciation (depn)	= GRC/asset lives	= GRC/asset lives
NRC	= GRC * 0.50	NRC(t)=NRC(t-1)*(1+infl)+Capex(t)-depn(t)

A3.113 The abbreviations and assumptions used in calculating the above costs are shown in the table below.

[45] We explain our methodology concerning model disclosure in more detail in section 2.

Table A3.10 Abbreviations for capital cost calculations

Abbreviation	Description
Infl	Inflation (set at asset inflation rate equal forecast RPI)
Eff	Efficiency (net target 4.5%)
AVE	Asset volume elasticity (1 for line-cards 0.5 for access electronics)
Vol change %	Ofcom forecast volume change per annum (ISDN 30 rentals)

A3.114 Calculating the steady state adjustment in 2010/11 and forecasting this to 2013/14 using the calculations in Table A3.9 results in a unit cost adjustment to the 2013/14 cost stack of £43.68 per channel.

We have used an AVE of 0.5 for Access Electronics and 1 for line-cards

A3.115 The Cost Forecast model is an activity based model which does not use Asset Volume Elasticity (AVEs) or Cost Volume Elasticity (CVEs). The steady state adjustment however is an off-model adjustment which requires us to forecast capital costs to 2013/14. For the purposes of our steady state adjustment, we have considered how the uplift in the assets over time changes with volumes. In order to do this, we have considered the AVEs for the relevant assets. We explain our initial proposals and consultation responses to this in Section 5.

A3.116 As volumes decline, we would expect the GRC of the assets to decline. We have calculated the extent of this decline by considering the AVE. This is the extent to which the GRC changes for a given change in volumes (measured from -1 to +1). This approach has been widely used in other charge controls we imposed on BT (for example the 2009 NCC and 2009 LLCC).

A3.117 We have applied an AVE for ISDN30 line-cards of 1. We consider that line-cards move in line with volumes and do not benefit from economies of scale, this means that the GRC for line-cards reduces by the same proportion as the volumes (measured in lines) for ISDN30 rentals.

A3.118 For Access Electronics, we have applied an AVE of 0.5 to forecast forward the GRC. So for every 1% reduction in volumes, the GRC is reduced by 0.5%. We consider that access products in general benefit from economies of scale and therefore a 1% change in volumes would have a smaller effect on the cost of access products. This is consistent with an AVE for access products which we have used in some previous charge controls.[46]

[46] For example, in the 1996 Price Control Review Statement Oftel stated "*Oftel has considered each of the cost and asset volume relationships for growth in access lines and the volume of calls over the network. Oftel has used, in relation to access, asset volume and cost volume relationships in the region of 0.4-0.6 (that is a 1% increase in the volume of access lines would lead to an increase in assets and costs of between 0.4 and 0.6%)*" (paragraph 6.30).
http://www.ofcom.org.uk/static/archive/oftel/publications/1995_98/pricing/pri1997b/chap6.htm

A3.119 As explained in Annex 5, our base case volumes are completed in two stages. There is an initial calculation of volumes which feeds into a Stage 1 price reduction for the ISDN30 services. This price reduction is then used to calculate switching to ISDN30 services which produces a Stage 2 volume scenario. To be consistent with this, we forecast the asset adjustment in two stages. This means we have calculated the capital expenditure based on the volume decline using the Stage 1 volumes. This then provides a Stage 1 steady state adjustment which is used to calculate the Stage 1 price reduction. The new volumes are then calculated taking into account any switching, and these Stage 2 volumes are used to forecast the final adjustment for the capital expenditure.

A3.120 The impact of using these AVE assumptions is included within the £43.68/channel for 2013/14 in paragraph A3.114 above.

We have used the rest of BT WACC

A3.121 We use the pre-tax nominal "rest of BT" WACC of 9.7% for our base case cost stack for ISDN30 services. We discuss the reasons for using the 'rest of BT' WACC and the underlying calculation of this number further in Annex 4.

A3.122 The Cost Allocation model uses the Openreach WACC of 8.8% for 2010/11 to 2013/14. In order to apply the higher rest of BT rate to ISDN30 services, we have made an off-model adjustment where, instead of using the ROCE unit cost as calculated in the Cost Allocation model, we have multiplied the MCE by 9.7%.

A3.123 The "rest of BT" WACC of 9.7% is also applied to the uplifted steady-state asset base.

We have used a gross efficiency rate of 5% (4.5% net)

A3.124 We have applied a gross 5% efficiency target per annum to all cash costs including capital expenditure. This is equivalent to a rate of 4.5% net of costs incurred in achieving the efficiency target. This is consistent with the efficiency rate applied in the WLR and LLU 2012 Statement.

A3.125 As discussed in Annex 3 to the WLR and LLU 2012 Statement, this rate has been arrived at considering both internal and external data, and efficiency studies. We refer readers to Annex 3 of the WLR and LLU 2012 Statement for a detailed explanation of our efficiency forecast.

A3.126 In our April 2011 Consultation, we proposed to apply the rate estimated in the WLR and LLU 2011 Consultation when forecasting the costs of wholesale ISDN30 services. We remain of the view that the efficiency rate applied in the WLR and LLU 2012 Statement is also appropriate for wholesale ISDN30 services. This is because ISDN30 costs form part of the total Openreach costs which were reviewed as part of the efficiency analysis undertaken for the WLR and LLU 2012 Statement.

A3.127 As discussed in the WLR and LLU 2012 Statement, we have modelled Openreach's costs using a single net efficiency assumption of 4.5% that is applied to all costs in the Cost Forecast model. This combines the effect of all of the various factors that might contribute to the delivery of these savings. These include savings achieved by doing things less often (reduced fault rates), more quickly (reduced task times) and for less money (more efficient task planning).

A3.128 The efficiency rate includes both 'catch up' (to bring Openreach into line with an efficient operator) and 'frontier shift' (to capture the efficiency gains expected by an efficient operator over time).

A3.129 For the purposes of modelling efficiency in the April 2011 Consultation, we used a gross efficiency rate of 5%, and included increased leaver payments in 2013/14 to reflect the costs which would be incurred to achieve this efficiency target. This was equivalent to a net efficiency target of 4.5%.

A3.130 Following responses to the WLR and LLU 2011 Consultation, we have updated the methodology. We have now fixed leaver payments at their 2009/10 level and have applied the efficiency rate of 4.5% to the costs estimated in the Cost Forecast model.

A3.131 The result of this is a reduction in leaver costs in 2013/14 in the ISDN30 Rentals and Connections cost stack, however this is offset in part by an increase in the remaining cost stack because costs are reduced by a net (4.5%) rather than gross (5%) efficiency assumption in the Cost Forecast model.

A3.132 We have also applied the 4.5% net efficiency target to the projected capital expenditure which we derive from our estimate of steady state capital employed assumed in the steady state adjustment. This is discussed in paragraph A3.108 above.

We have used 2.5% inflation for input costs and 3% inflation rate for pay costs

A3.133 The Cost Forecast model is calculated in nominal terms, therefore requires an inflation assumption to be applied to input costs and pay costs.

A3.134 In the WLR and LLU 2011 Consultation, we explained that RPI provides a reasonable proxy of general inflation in the long term, but in the short term observed volatile movements that did not reflect the movements of Openreach's costs. On this basis, we assumed an underlying non pay inflation rate of 2.5% in our base case estimate of Openreach's costs.

A3.135 In the Cost Forecast model, we applied this rate to most costs, except pay costs. Historically, pay costs have tended to be more closely related to RPI (even if they are not explicitly linked). We therefore proposed that a rate of 2.5% should be applied to input costs and 3% should be applied to pay costs. We also proposed to apply these rates to ISDN30 modelling.

A3.136 We have updated our analysis of future inflation as part of the WLR and LLU 2012 Statement. We note that forecasting inflation remains difficult. However we estimate that, based on revised HM Treasury forecasts, RPI (which has historically been a good indicator of pay cost inflation) may average around 3% in 2012/13 and 2013/14.

A3.137 After stripping out an estimate of the impact of expected changes in interest rates, we estimate that BT's underlying rate of inflation will be around 2.5% (on the assumption that Openreach's costs would increase at a rate below forecast RPI).

A3.138 We note that pay has historically been linked (if only indirectly) to RPI and in light of the ongoing economic uncertainty, we consider that it reasonable to assume that pay inflation will be similar to RPI inflation rather than trying to predict whether

increases will be slightly above or below this level. On this basis we have assumed pay costs will increase at a rate of 3%.

A3.139 We have applied 2.5% to non-pay costs and 3% to pay costs for the purposes of forecasting of wholesale ISDN30 costs in the Cost Forecast model.

We have used RPI to forecast holding gains

A3.140 Under a CCA approach to setting prices, assets are valued by reference to the cost of replacing the asset at today's prices – their current cost - rather than their original, or historic, cost. If prices go up, the asset value is higher than it otherwise would have been. As a result, the annual depreciation charge would increase as it is based on a higher asset value. However, over the lifetime of the asset, this increase in the annual depreciation charge – which would cause costs to increase - is offset exactly by the holding gain (the gain made by holding the asset while it increases in value). If asset prices fall however, a decline in the annual depreciation charge is offset by a holding loss (the loss made by holding an asset which is declining in value).

A3.141 Asset inflation also affects the calculation of the mean capital employed and increasing asset prices causes the assessment of the reasonable return on those assets to increase. This is because, if an asset increases in value, a higher profit in absolute terms (in £m) is needed to yield a return on the asset equal to the required minimum (the cost of capital). It is therefore necessary to predict how asset values might change during the control period.

A3.142 As explained above, in line with the WLR and LLU 2012 Statement we have continued to use the RAV approach to valuing pre-1997 assets that we adopted in the 2005 cost of copper review. In accordance with that 2005 decision, the indexed HCA value of the pre-1997 assets will be projected forwards in line with forecast RPI. For the purpose of this calculation we have updated the RPI forecast, taking into account revised HM Treasury forecasts. This is set out in table A3.11 below:

Table A3.11 RPI forecasts

Source	2010/11	2011/12	2012/13	2013/14
WLR and LLU 2012 Statement	5.3%	4.9%	3.4%	3.0%
April 2011 Consultation	4.4%	3.0%	3.0%	3.0%

A3.143 We have used forecast RPI to apply to all assets subject to CCA adjustments in the Cost Allocation model and in the RAV model. For the RAV model assets this applies to all elements (labour and non-labour).[47]

A3.144 We have also used this forecast of RPI as the relevant inflation to forecast the steady state adjustment to 2013/14.

[47] See A6.10 and Section 3 of the WLR and LLU 2012 Statement.

We have included the costs of enhanced care in the wholesale ISDN30 rentals and connections basket

A3.145 As discussed in section 5, we have included the costs and revenues of enhanced care for ISDN30 in the rentals and connections basket.

A3.146 In the April 2011 Consultation, we explained that we were unable to obtain an accurate breakdown of the costs of these services from Openreach as it does not disaggregate the costs of ISDN30 enhanced care from WLR enhanced care.

A3.147 We therefore estimated enhanced care revenues on the assumption that the proportion of customers taking enhanced care stays unchanged at 25% throughout the period to 2013/14.[48] Given our projection of ISDN30 rental volumes, this means that there will be 1.7m wholesale ISDN30 customers taking enhanced care in 2013/14. At the current price of £25, revenues were estimated to be approximately £11m.

A3.148 Openreach informed us that costs across all enhanced care services included within the 'WLR enhanced maintenance product' represented approximately ✂ of revenues, Therefore we have estimated the costs of enhanced care to be✂. This has been included in the rentals and connections basket.

A3.149 The revenues and costs of enhanced care to be included in the Rental and Connections basket are based on ISDN30 rental volumes. As we continue to forecast ISDN30 rental volumes of 1.7m in 2013/14, we consider that the revenue estimate of £11m and the cost estimate of ✂ remain appropriate. We have therefore included them in the rental and connection cost stack for the purposes of calculating of the basket X.

We have reduced the cost of 'ISDN SGA' costs in line with volumes

A3.150 Within the cost forecast model, there is a cost category entitled ISDN SGA. This relates to sales and general admin costs for the ISDN30 product. This cost is included in the ISDN30 connections cost stack.

A3.151 Prior to the publication of our April 2011 Consultation, Openreach provided an updated allocation basis which allocated the cost between ISDN30 connections and transfers. As discussed above in paragraph A3.42 due to the complexity of the adjustment and the immaterial impact on the cost stack, we did not include this update in the Cost Allocation model.

A3.152 The total cost for ISDN SGA in the Cost Allocation model did not decrease over time with volumes and Openreach's forecast cost remains constant over the period. Therefore we proposed to make an adjustment to reflect the fact that as the level of connections fell, we would expect SGA costs to also fall.

A3.153 We have estimated the cost volume relationship in line with other SGA costs within the model and believe that a CVE of 1 is appropriate. We therefore reduced the costs in line with volumes in an off-line adjustment. The impact of this on 2013/14 ISDN30 connections cost stack was a reduction in costs of £3.50 per connection in the April 2011 Consultation.

[48] We have updated our analysis and consider that there has been no material change in the proportion of customers taking enhanced care services since the April 2011 Consultation.

A3.154 As part of the WLR and LLU 2012 Statement, we made updates to the Cost Allocation model. We continue to exclude the ISDN30 SGA update from our modelling, however as a result of updated data, the costs do now vary in part with volumes. This is not, however in line with our April 2011 Consultation assumption of a CVE of 1.

A3.155 We therefore continue to make an off-line adjustment to reflect this. As costs do vary in part with volumes, the revised impact of this adjustment is a reduction in the connection cost stack of £1 per connection.

We have included some costs relating to ISDN30 Transfers in the Rental cost stack

A3.156 The base year cost stack for ISDN30 transfers shows costs above revenues. As set out in section 5, we have recovered the costs which are above revenues through the ISDN30 rental cost stack. This increases the base year cost stack for the ISDN30 rental product.

A3.157 We have made an off-line adjustment to the cost stack derived from the Cost Allocation model. We calculate the projected transfer costs and revenues in each year to 2013/14 on the assumption that transfer charges change at RPI. We then calculate the difference between the costs and revenues calculated on this basis and move the excess of transfer costs over transfer revenues (£3.29m in 2013/14) to the rental cost stack.

A3.158 This adjustment increases the unit cost of rentals in the base year by £1.91 per channel and reduces the cost stack for transfers by £12.04 per transfer. The difference in unit cost impact is due to the much higher volumes for rentals.

We have calculated ISDN30 cost stack reflecting the above adjustments

A3.159 As a result of the above adjustments and assumptions, we have established a forecast of ISDN30 costs from 2010/11 to 2013/14. This incorporates our adjustment to the asset base, and the other adjustments discussed above.

A3.160 We present the total cost forecasts for the two key baskets of services in the tables below.

Table A3.12 Total cost stacks for wholesale ISDN30 rentals and connections basket

	Combined connections, rentals and enhanced care basket			
	2010/11	2011/12	2012/13	2013/14
	£m	£m	£m	£m
Current Pay	7	6	8	7
Other Operating Costs (inc. Enhanced care costs)	9	7	8	7
Transfer Charges[49]	17	13	16	15
Internal Cost of Sales[50]	78	73	79	82
Other Operating Income	0	0	0	0
Internal Capitalisation	0	0	0	0
Depreciation excl holding gains	17	14	15	14
Holding Gains	-10	-5	-5	-5
Operating Cost inc Depreciation	**118**	**108**	**121**	**120**
Off-model cost adjustments:				
Steady state adjustment	82	82	79	75
Reduction in connection Sales + General admin	0	-1	-1	-1
Reallocation of excess transfer costs	3	4	4	3
ROCE @ 9.7%	16	14	14	13
Total Cost	**219**	**207**	**217**	**211**
MCE per model[51]	**162**	**146**	**144**	**134**

[49] Transfer charges are Openreach's share of BT Group costs such as accommodation and corporate overheads.
[50] BT Operate levies charges against Openreach, referred to as Internal cost of sales charges. These charges comprise line-cards rental costs, and other costs such as access and backhaul electronics. These are levied on the basis of costs incurred.
[51] The MCE in these cost stacks is from the Cost Allocation model. This does not include the steady state adjustment as the uplift in ROCE is already included within the steady state adjustment.

Table A3.13 Total cost stacks for wholesale ISDN30 transfers basket

	ISDN30 - Transfers			
	2010/11	2011/12	2012/13	2013/14
	£m	£m	£m	£m
Current Pay	0	0	0	0
Other Operating Costs	0	0	0	0
Transfer Charges	3	3	3	3
Internal Cost of Sales	0	0	0	0
Other Operating Income	0	0	0	0
Internal Capitalisation	0	0	0	0
Depreciation excl holding gains	1	1	1	1
Holding Gains	0	0	0	0
Operating Cost inc Depreciation	**5**	**5**	**5**	**5**
Off-model cost adjustments:				
Steady state adjustment	0	0	0	0
Reduction in connection Sales + General admin	0	0	0	0
Reallocation of excess transfer costs	-3	-4	-4	-3
ROCE @ 9.7%	0	0	0	0
Total Cost	**2**	**1**	**1**	**2**
MCE per model	**1**	**0**	**0**	**0**
Volumes (k)	**318**	**302**	**287**	**274**

Deriving Xs from the cost estimates

A3.161 We have set prices by reference to the cost stacks in 2013/14. As explained in section 4, we consider it appropriate to use an RPI-X glidepath to bring wholesale ISDN30 charges gradually into line with 2013/14 costs over the period of the control. As explained in section 5, we have not made any one-off price adjustments.

A3.162 For the purpose of the price control, RPI will be taken from the October in the preceding year. The RPI figure from October 2011 was 5.4%. Consistent with our underlying inflation forecasts (which are linked, but not equal, to RPI), we have assumed that RPI will be around 3% in October 2012. On this basis, a price control linked to RPI would deliver an increase of just over 8.5% over two years before adjusting for the X, equivalent to an average annual increase of around 4%.

A3.163 The calculation of the X required to deliver a glide-path that should move the prices for the core rental services into line with our cost estimates over the next two years (rounded to the nearest 0.1%) is summarised below.

$$\left\{\left(\frac{\text{Cost estimate } 2013/14}{\text{Revenues } 2013/14}\right)^{\left(\frac{1}{2}\right)} - 1\right\} - \text{RPI estimate}$$

A3.164 We have our updated assumptions for the estimate of 2013/14 costs for the rental and connections basket, discussed throughout this annex and in Section 5. As a result of these updates and with revenues based on the current prices, the basket should be reduced by RPI-13.75% over the two years (rounded from 13.85% to the nearest 0.25).

A3.165 In the April 2011 Consultation, our base case value of X was -10.65% before rounding. As explained in the December 2011 Consultation, reducing the duration of the charge control results in an increase in the X, which reflects the fact that a higher cost reduction is required in each year to achieve the 2013/14 FAC. In the December 2011 Consultation, we estimated that as a result of the change in the duration of the charge control the X would increase from a base case of RPI-10.65% to RPI-14.57%.

A3.166 The 0.72% reduction in the X from the December 2011 Consultation is a driven by the changes in the unit cost stacks described in paragraphs A3.4 to A3.10 above.

Annex 4

Cost of capital

Introduction

A4.1 In this Annex we set out our conclusions for the estimate of the cost of capital to be used in the ISDN30 charge controls. We summarise the analysis that we presented in the April 2011 Consultation, updating our analysis with revised data and additional explanations where necessary. We do not address stakeholder comments in this annex; these have been fully addressed in Section 5.

A4.2 In our April 2011 Consultation,[52] we explained our approach to determining the appropriate WACC for wholesale ISDN30 and proposed an estimate of the cost of capital. We noted that there were two elements to estimating the appropriate cost of capital for wholesale ISDN30 services:

- what the appropriate estimate of the cost of capital is for BT Group, Openreach and Rest of BT; and
- which of these rates is the appropriate WACC for wholesale ISDN30 services.

A4.3 Regarding the appropriate estimate of the cost of capital, in our April 2011 Consultation we explained that we had published our proposed estimates in the WBA 2011 Consultation and that we were also reproducing these in the WLR and LLU 2011 Consultation.[53] Since then the cost of capital estimates have been updated for the purposes of the WBA 2011 Statement.[54] We have decided to use the WACC rates as estimated in the WBA 2011 Statement for the purposes of the ISDN30 charge control.

A4.4 In paragraphs A4.9–A4.17 below, we set out the reasons why we consider that the estimates of the cost of capital in the WBA 2011 Statement, published in July 2011,[55] remain appropriate for ISDN30. We then reproduce the analysis that we used in our April 2011 Consultation in deciding to apply the "rest of BT" rate to ISDN30 services.

Summary of key decisions

A4.5 We consider that the appropriate WACC for ISDN30 services is the "rest of BT" WACC.

[52] See Annex 7 to the April 2011 Consultation, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf
[53] See Annex 7 paragraph A7.2-A7.3 of the April 2011 Consultation, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf
[54] See Section 6 of the WBA 2011 Statement, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf
[55] See Section 6 of the WBA 2011 Statement, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf

A4.6 We consider that the "rest of BT" rate estimated in the WBA 2011 Statement remains appropriate for ISDN30 services.[56] Therefore we will use the pre-tax nominal rate of 9.7% as the appropriate WACC for wholesale ISDN30 services.[57]

We have used the WACC estimated in the WBA 2011 Statement for ISDN30 services

Our April 2011 Consultation proposals

A4.7 In the April 2011 Consultation,[58] we proposed to use the cost of capital rates as set out in the WBA 2011 Consultation[59] and reproduced in the WLR and LLU 2011 Consultation[60] in March 2011.[61] The proposed rates are set out in Table A4.1 below:

Table A4.1 – April 2011 Consultation pre-tax nominal cost of capital estimates

Pre-tax nominal WACC	Openreach	BT Group	Rest of BT
May 2009	10.1%	10.6%	11.0%
Jan 2011 (mid-point)	8.6%	8.9%	9.3%
Jan 2011 (range)	7.9% - 9.4%	8.2% - 9.7%	8.5% - 10.0%

Updated data

A4.8 The cost of capital estimates were updated for the purposes of the WBA 2011 Statement.[62] In reaching our estimate of BT's cost of capital in the WBA 2011 Statement (published in July 2011), we took account of the specific responses on the cost of capital (and subsequent new data) submitted in response to the WBA 2011 Consultation. Our analysis of responses relating to the cost of capital and our conclusions on the individual parameters are set out in detail in Section 6 of the WBA 2011 Statement.[63] We do not seek to repeat those responses here.

A4.9 Our final estimates of the cost of capital (as set out in the WBA 2011 Statement[64]) for BT Group, Openreach and the Rest of BT are shown in Table A4.2.

[56] See Section 6 of the WBA 2011 Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf
[57] We note that the cost of capital estimated in the WBA Statement is currently under appeal by BT. Competition Appeal Tribunal, case 1187/3/3/11.
[58] See Annex 7 paragraphs A7.2 and A7.14 of the April Consultation, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf
[59] See Section 6 of the WBA 2011 Consultation, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/823069/summary/condoc.pdf
[60] See Annex 12 to the WLR and LLU 2011 Consultation, available at:http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc-2011/annexes/wlr-cc-annexes.pdf
[62] See Section 6 of the WBA Statement, available at:http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf
[62] See Section 6 of the WBA Statement, available at:http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf
[63] See Section 6 of the WBA 2011 Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf
[64] See Table 6.3 of the WBA 2011 Statement, available at:

Table A4.2 - BT Cost of capital as estimated in July 2011

	Openreach	BT Group	Rest of BT
Real risk-free rate	1.4%	1.4%	1.4%
Inflation	3%	3%	3%
Nominal risk-free rate	4.4%	4.4%	4.4%
Equity beta	0.67– 0.94	0.77 – 1.04	0.87 – 1.14
Asset beta	0.41– 0.55	0.46 – 0.59	0.51 – 0.65
ERP	5%	5%	5%
Gearing	50%	50%	50%
Debt premium	2%	2 – 2.5%	2.5%
Debt beta	0.15	0.15	0.15
Tax rate	24%	24%	24%
Pre-tax real WACC	**5.6%**	**6.1%**	**6.5%**
Pre-tax nominal WACC	**8.8%**	**9.2%**	**9.7%**

A4.10 In the WBA 2011 Statement, we stated our intention to apply the rates set out in Table A4.2 above in subsequent relevant charge controls, provided that they remained relevant:

> *"The cost of capital estimates for BT which are cited below have been calculated for the purposes of the WBA charge control which will apply to 2013/14. However, we intend to apply these rates to other relevant charge controls. In the case of the forthcoming WLR/LLU charge controls, for example, we note that the charge control statement is likely to be published towards the end of 2011.*
>
> *We intend to apply the cost of capital estimates shown below to the relevant charge controls. However, we will review the evidence on the individual parameters at the time of the publication of these charge controls to ensure that the estimates remain relevant. If the evidence suggests that these cost of capital estimates are no longer appropriate, we will update the estimates. However, in deciding whether an update is necessary, we will have regard to the importance of maintaining a consistent approach.*[65]*"*

http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf

[65] See Paragraph 6.7-8 of the WBA 2011 Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf

A4.11 This intention set out in the WBA 2011 Statement reflects two important considerations:

4.11.1 First, that we consider that consistency is important in order to provide investors with a reasonable expectation that they can recover their investment and make a reasonable rate of return. We believe that this creates a regulatory environment which encourages efficient investment.

4.11.2 Second, having regard to the desirability of a consistent approach, any decision would need to be appropriate in the context of any future charge control review. It would be inappropriate for us to fetter our discretion as to future charge control reviews.

A4.12 In light of this, as part of the WLR and LLU 2012 Statement,[66] we considered whether our estimate of BT's cost of capital calculated for the purposes of the WBA 2011 Statement remained appropriate. We undertook this assessment by reviewing the most recent evidence on the individual parameters to ensure that the estimates remained relevant.

A4.13 As the updated analysis was performed recently, we have concluded that the results found in the WLR and LLU 2012 Statement (published in March 2012) remain appropriate for the purposes of the current ISDN30 charge control. In the WLR and LLU 2012 Statement, we found that cost of capital estimates set out in the WBA 2011 Statement in July 2011 remain appropriate based on the following:

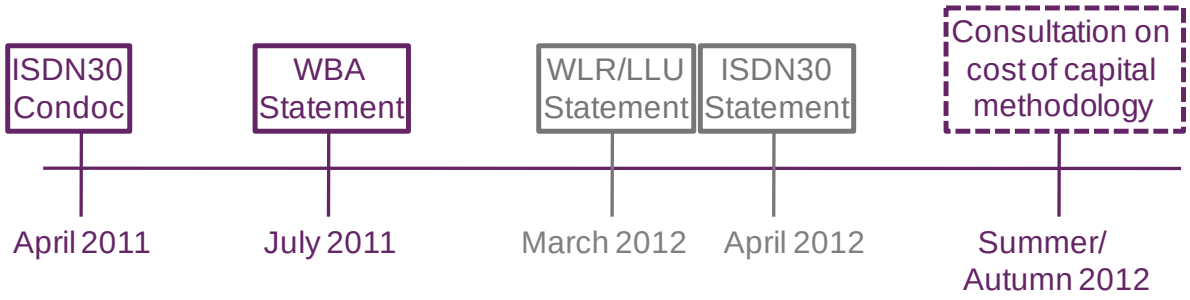
- there has been no significant change in the majority of parameters to warrant a change in our estimates from those set out in July 2011;
- we have observed an increase in the 2 year BT Group asset beta and a decrease in the risk free rate since July 2011. The exact magnitude of these opposing changes is uncertain, however we expect the net effect on the overall WACC to be small; and
- we have also borne in mind the principle set out in the WBA 2011 Statement that consistency is important in order to provide investors with a reasonable expectation that they can recover their investment and make a reasonable rate of return. We continue to believe that this creates a regulatory environment which encourages efficient investment.

A4.14 In updating the analysis of the individual parameters for the purposes of the WLR and LLU 2012 Statement, our methodology has been consistent with that set out in the WBA 2011 Statement.

A4.15 We are proposing to undertake a review of our cost of capital methodology later in the year. Figure A4.1 shows the timing of our recent consultations and statements in relation to the cost of capital and the proposed start date for the review of our approach to estimating the cost of capital.

[66] See Annex 8 of the WLR and LLU 2012 Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_annexes.pdf

Figure A4.1 Cost of capital timeline



A4.16 In reaching our decision not to adjust the WACC set out in the WBA 2011 Statement, we have also had regard to:

- the proximity of this Statement to the WBA 2011 Statement;
- the proximity of this Statement to the WLR and LLU 2012 Statement, with updated analysis;
- the small and uncertain likely impact on the overall WACC of the changes in parameter values observed since July 2011 (as analysed in the WLR and LLU 2012 Statement[67]); and
- our intention to undertake a review of our approach to estimating the cost of capital, which we expect to commence in Summer/Autumn 2012.

Conclusion

A4.17 We will use the WACC as estimated in the WBA 2011 Statement for the purposes of calculating the ISDN30 charge control.

We have used the 'Rest of BT' WACC for ISDN30 services

Our April 2011 Consultation proposals

A4.18 In our April 2011 Consultation, we proposed to use the 'rest of BT' rate as the appropriate WACC for wholesale ISDN30 services. We based our proposal on an assessment of the cyclicality of demand for ISDN30 services and, to a lesser extent, an analysis of the underlying asset base for ISDN30 services. As discussed in paragraphs 5.238 – 5.257, all stakeholders agreed with our proposal to use the "rest of BT" rate for ISDN30 services. We have therefore not sought to update our assessment of the appropriate WACC to be applied to ISDN30. Instead, we have reproduced the analysis undertaken for the April 2011 Consultation below.

Sensitivity of demand to the economic cycle

A4.19 According to the Capital Asset Pricing Model (CAPM), a key determinant of a company's WACC is its "systematic" risk[68] which reflects movements in returns to

[67] See Annex 8 of the WLR and LLU 2012 Statement, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_annexes.pdf

shareholders relative to movements in the return from the equity market as a whole. Systematic risk broadly depends on the extent to which demand for a service varies over the economic cycle. The larger the correlation between demand for the service and the level of activity in the economy as a whole, the higher its systematic risk and the higher the cost of capital.

A4.20 The intuition behind this is that when a risk is specific to a particular service, it is assumed that investors will be able to diversify away from these risks (for example, by investing in services that are not affected by that specific risk). Therefore, investors do not need to be compensated for diversifiable risks through returns on the firm's equity.[69] For example, Openreach's basic copper access services are particularly low-risk because demand is relatively stable over the cycle and, hence, they attract a lower cost of capital than the rest of BT.

A4.21 In contrast, some risks cannot be diversified away by investors, since, to varying extents, they will have at least some bearing on nearly all firms within the economy. Examples include factors that would have an impact on demand, such as fluctuations in GDP growth (e.g. economic downturn), oil prices and interest rates.[70] In the recent determination on the LLCC appeal[71] the CC agreed with us that the correlation of a service's demand with the economic cycle is the most important factor in determining its appropriate cost of capital.

A4.22 The sensitivity of demand (for a service) to the economic cycle is related to the ability of its customers to vary the quantity of the service that they purchase. Higher demand cyclicality is typically associated with services which are primarily bought by business customers, who are more likely to reduce their demand in response to an economic downturn. An example of a service which is primarily purchased by business customers is leased lines.

A4.23 In contrast, copper access services typically present a more stable demand over the economic cycle, due to the fact that they are primarily a residential service and households are less likely to reduce their demand for telephony or broadband services in response to an economic downturn. For this reason copper access services tend to present a lower systematic risk and, on that basis, they can be distinguished from the rest of BT's services.

A4.24 However, it is not sufficient to merely identify a service as a business service to conclude that it is subject to more systematic risk than copper access services. It would be necessary to show that its customers have the ability to vary their usage to a greater extent than in the case of copper access services (whose customers typically only have the binary choice to connect or disconnect). In particular, if it can be shown that the demand for a service varies, or is likely to vary, with the economic cycle to a greater degree than for copper access services, this is likely to

[68] In the CAPM, this is reflected in the size of the company's equity "beta". For a description see, Ofcom, *Ofcom's approach to risk in the assessment of the cost of capital*, Statement, 18 August 2005, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/cost_capital2/statement/final.pdf.
[69] Ofcom, *Ofcom's approach to risk in the assessment of the cost of capital*, Statement, 18 August 2005, paragraphs 3.6 – 3.11, available at:
http://stakeholders.ofcom.org.uk/binaries/consultations/cost_capital2/statement/final.pdf
[70] Ibid, paragraph 3.9.
[71] See the LLCC Appeal decision, paragraph 4.315, available at:
http://www.competition-commission.org.uk/appeals/communications_act/final_determination_excised_version_for_publication.pdf

suggest that the 'rest of BT' rate would be more appropriate. In this regard, in its determination of the LLCC appeal 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 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*"[72]

A4.25 Therefore, although complex analysis is not required to establish the appropriate cost of capital rate, the *a priori* reasoning should be supported by evidence where available. We discuss the evidence that we considered for ISDN30 services below.

Underlying assets of a product or service

A4.26 In principle, the type of assets used in the provision of a product or service can affect its systematic risk, because the nature of the assets can affect the firm's ability to vary cash outflows as demand varies.[73]

A4.27 However, as highlighted by the CC in the LLCC appeal,[74] when assessing the appropriate cost of capital, the nature of the underlying assets is a much less relevant consideration than the project's sensitivity to demand fluctuations which

[72] See the LLCC Appeal decision, paragraphs 4.310-4.311, available at: http://www.competition-commission.org.uk/appeals/communications_act/final_determination_excised_version_for_publication.pdf

[73] For example, a company whose costs are mostly variable is likely to be able to adjust better to changes in demand and, hence, other things being equal, have a lower systematic risk than a company with a higher share of fixed costs.

[74] See the LLCC Appeal decision, paragraph 4.315, available at: http://www.competition-commission.org.uk/appeals/communications_act/final_determination_excised_version_for_publication.pdf

determines the project's cash inflows. Variations in demand are likely to have a more significant impact on the service's systematic risk (i.e. the service's correlation with the economy wide level of activity).

A4.28 However, for completeness, we have also assessed the extent to which the assets used in ISDN30 differ from the assets used in the provision of the copper access products (after the ISDN30 asset adjustment described in Annex 3). Although wholesale ISDN30 services have some assets in common with copper access services, such as duct and copper, these only represent around 16% of the ISDN30 asset base in our Cost Forecast model. We also note that the assets used to supply ISDN30 have much in common with those used to supply PPC local ends, which attract the higher "rest of BT" cost of capital. In fact, when compared to 2Mbit/s ePPCs[75] local ends, we estimate that around 86% of the ISDN30 asset base in our Cost Forecast model is common to 2Mbit/s ePPC local ends.

A4.29 As discussed above, we believe that the nature of the asset base is a secondary assessment and, in our view, the cyclicality of demand will be the most important factor in determining the appropriate cost of capital. The rest of our analysis is therefore concerned with the cyclicality of ISDN30 demand.

Evidence specific to wholesale ISDN30

Evidence on the cyclicality of demand

A4.30 In order to assess the cyclicality of demand faced by wholesale ISDN30 services we have produced a similar analysis to that undertaken by the CC in the LLCC appeal.

A4.31 The CC considered evidence submitted by BT[76] which showed that it was more difficult to forecast demand for leased lines than for copper lines (i.e. that the error in forecasting leased lines tended to be larger than for copper lines) and that leased lines had been subject to higher demand cyclicality, in particular during the economic downturn.

A4.32 The evidence was consistent with the view that, in the face of the downturn, businesses had adjusted their demand for leased lines more significantly than had the mainly residential customers of copper lines.[77] The CC concluded that this showed that demand for leased lines was likely to be more correlated with the economy wide level of activity and that, consequently, the use of the 'rest of BT' rate for leased lines was justified. We agree with the CC that evidence of this type is likely to be helpful.

A4.33 In the following sections we set out an analysis similar to that submitted to the LLCC appeal, but adapted for wholesale ISDN30.

[75] Local end segments of PPCs that Openreach supplies to BT Wholesale as an input to PPCs. They comprise the digital bearer from the end user premises to the local serving exchange, including the transmission equipment at either end of the circuit (i.e. the NTE at the customer premises and the LTE at the serving exchange).
[76] See BT's response to the CC's questions on beta of 26 February 2010 in the LLCC Appeal.
[77] Competition Commission, *Cable & Wireless UK v Office of Communications – Case 1112/3/3/09*, Determination, 30 June 2010, paragraph 4.310 - 4.311, available at: http://www.competition-commission.org.uk/appeals/communications_act/final_determination_excised_version_for_publication.pdf

The uncertainty in forecasting demand for wholesale ISDN30

A4.34 One of the fundamental principles of finance theory is that the rate of return that investors will require from investing in an asset increases as the investment becomes more risky. This principle is based on the assumption that investors are risk averse, and require compensation for any risk that they choose to bear rather than investing in risk-free assets.

A4.35 One way to assess the level of risk involved in an investment is to look at how difficult it may be to forecast its future demand. 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 requirements. This process generates a 12 month forward-looking forecast that is populated with actual volumes at the end of the year. Openreach has provided to us the same GVF data that was used in the submission to the CC in the LLCC appeal, with the only exception that in our case it also includes information on wholesale ISDN30 volumes (which were not included in the submission to the CC).[78]

A4.36 In order to assess the uncertainty in forecasting future demand, we look at the absolute percentage difference between GVF's 12 month forecast and the actual volumes for that year. This difference shows by how much the GVF has erred in estimating the future demand for Openreach's wholesale services. Table A4.3 below shows this percentage difference for the rental services of copper lines, leased lines of different bandwidth and wholesale ISDN30.

Table A4.3 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%	0%	1%	0%	0%	0%	0%
Leased lines - Below 2Mbit/s	10%	11%	4%	2%	4%	3%	6%
Leased lines - 2Mbit/s	5%	1%	1%	1%	3%	3%	2%
Leased lines - Greater than 2Mbit/s	21%	2%	1%	1%	4%	8%	6%
WHOLESALE ISDN30	**5%**	**5%**	**2%**	**0%**	**0%**	**1%**	**2%**

A4.37 The evidence above shows that the GVF's error in forecasting the actual rental volumes of wholesale ISDN30 has tended to be aligned most closely with that of 2Mbit/s leased lines, which is greater than that of copper lines. Table below looks at the GVFs for the connection services of the same wholesale products. In this case, the GVF's error in predicting wholesale ISDN30 connection volumes was

[78] There is an additional difference between the two datasets which relates to the connections volumes for the year 2004/05. According to Openreach, there was an error in the information that was submitted to the CC, in particular, in the volumes of leased lines of 2Mbit/s, less than 2Mbit/s and greater than 2Mbit/s. In the case of the latter two, the spreadsheet submitted to the CC double counted the total volumes of leased lines. The data we use in our analysis corrects these two errors.

significantly larger than for copper lines and indeed greater than that of low bandwidth leased lines.

Table A4.4 Absolute percentage differences between BT's 12 month forecast and actual volumes for year – connections

CONNECTIONS	04/05	05/06	06/07	07/08	08/09	09/10	Average
Copper lines	2%	1%	2%	4%	4%	11%	4%
Leased lines - Below 2Mbit/s	10%	14%	17%	4%	2%	41%	15%
Leased lines - 2Mbit/s	5%	4%	2%	0%	6%	27%	7%
Leased lines - Greater than 2Mbit/s	18%	12%	8%	7%	8%	536%	98%
WHOLESALE ISDN30	**5%**	**4%**	**9%**	**30%**	**59%**	**45%**	**26%**

A4.38 Overall, the above evidence could be interpreted as meaning that it is relatively more difficult to predict future demand for wholesale ISDN30 than for copper lines and that, on the basis of the difficulties in forecasting future demand, wholesale ISDN30 seems to be more similar to leased lines than copper lines. On these grounds, it could be argued that demand for wholesale ISDN30 is subject to a higher degree of uncertainty than copper lines and that the level of uncertainty in predicting wholesale ISDN30 demand is more closely aligned with that of leased lines. However, we believe that it cannot be concluded from this evidence alone that wholesale ISDN30 should be subject to a higher WACC rate than copper access lines.

A4.39 Under the CAPM mentioned above, the return on an investment is only determined by its systematic risk. In other words, reward is not so much determined by the random fluctuations apparent from a forecast error, such as the GVF, but by the correlation of a service's demand with the economic cycle. We acknowledge that the difficulties in forecasting demand may provide an indication of how demand may fluctuate unexpectedly. However, the error in forecasting demand could also be attributed to the quality of the forecasting model or effectively not be driven by the underlying cyclicality of the good or service.

The demand cyclicality of wholesale ISDN30

A4.40 In this section we assess the cyclicality of demand of wholesale ISDN30, and in particular the extent to which demand for these services has been correlated with the economic downturn.

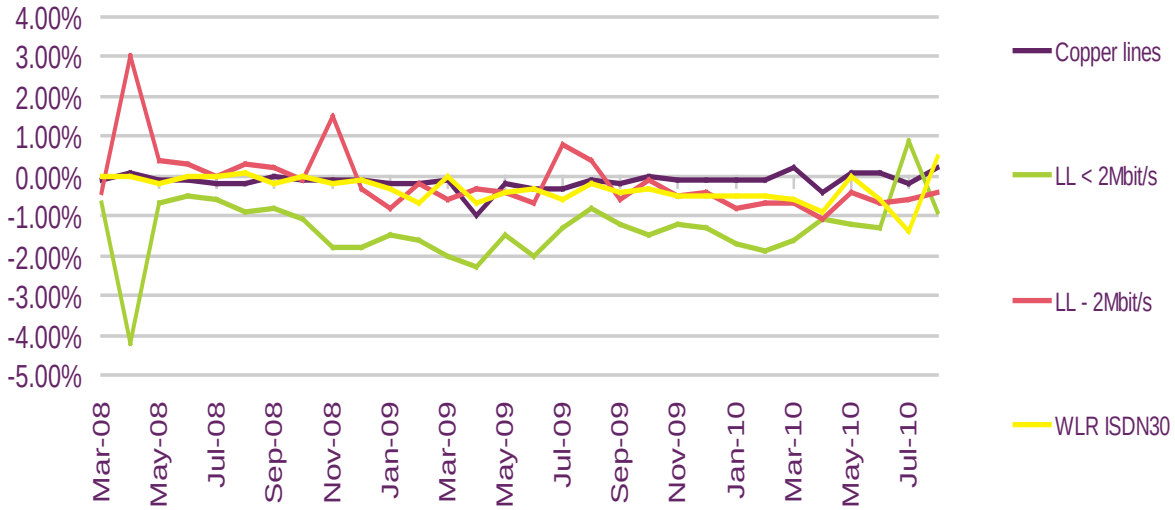
A4.41 Before we conduct the analysis of the demand for wholesale ISDN30 services, our *a priori* thinking is that wholesale ISDN30 is more likely to be classified within the 'rest of BT', rather than within the 'Openreach' WACC rate, for an assessment of risk levels. Wholesale ISDN30 services are mostly bought by small to medium sized enterprises (SME) and corporate customers of Openreach, therefore, we would expect that future demand for these services is likely to be more closely correlated with the economy wide level of economic activity than other access services.

A4.42 However, we recognise that it cannot be concluded that the highest WACC rate is more appropriate for ISDN30 solely on the basis that it is predominantly used by business customers. Instead, we consider below the extent to which the nature of the wholesale ISDN30 product leads to variations in Openreach's volumes and revenues.

A4.43 In assessing the demand cyclicality of wholesale ISDN30 services we have tried to replicate the analysis conducted by BT in its submission to the CC in the LLCC appeal, which used the same GVF data described above. The GVF data used here is prepared on the same basis as the one used in the analysis of the forecasting error and is, therefore, consistent with it.

A4.44 Figure A7.2 below shows the monthly percentage change in the volumes of copper lines, leased lines and wholesale ISDN30 from March 2008 to August 2010.

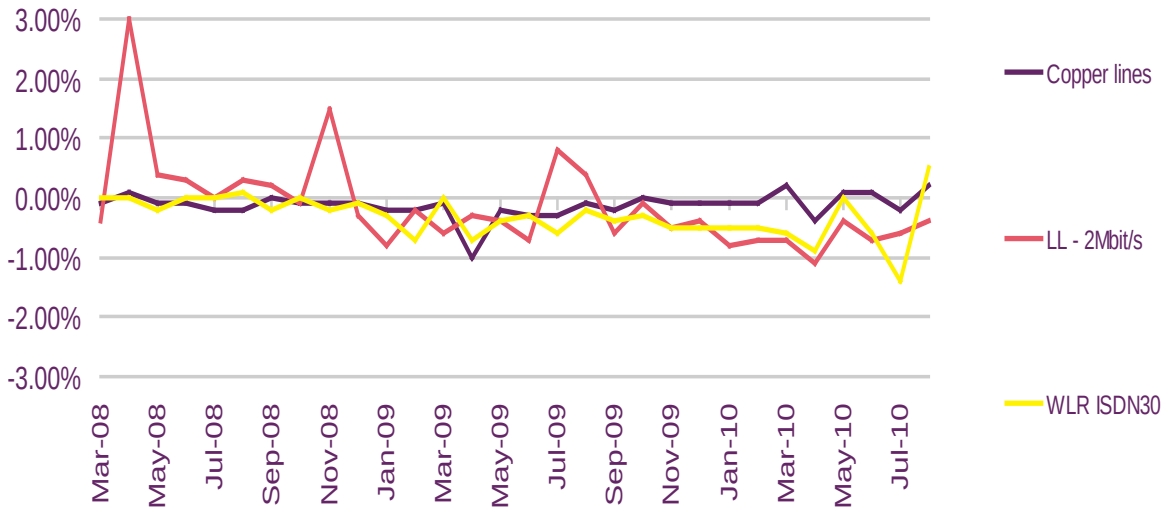
Figure A7.2 Percentage monthly change in volumes of copper lines, leased lines, and wholesale ISDN30[79]



A4.45 The chart shows that wholesale ISDN30 has experienced higher variability of demand than copper lines since the start of 2009 and, particularly, by the end of the period considered. This can be more easily seen in Figure A7.3 below, which only includes copper lines, 2Mbit/s leased lines and wholesale ISDN30 to allow a better reading of the chart.

[79] We have excluded leased lines of bandwidth greater than 2Mbit/s because they present a significantly higher variation in two months and make it more difficult to interpret the chart. However, its exclusion does not alter our conclusions.

Figure A7.3 Percentage changes in monthly volumes of copper lines, leased lines of 2Mbit/s and wholesale ISDN30



A4.46 In light of the above evidence, in particular the higher variability in the demand of wholesale ISDN30 observed since 2009, it could be argued that wholesale ISDN30 is more correlated with the economic cycle than copper lines. Finally, to complete our analysis, we compare the annual change in volumes of copper lines, leased lines of different bandwidth and wholesale ISDN30 using the information in BT's RFS.

Table A7.5 Change in annual volumes of copper lines, leased lines and wholesale ISDN30

RENTALS	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**
Copper lines	**-0.2%**	**-0.4%**	**-0.2%**	**-0.5%**	**-2.5%**
Percentage points (p.p) difference		*-0.2 p.p.*	*0.2 p.p.*	*-0.3 p.p.*	*-2.0 p.p.*
< 2Mbit/s local end		**-38.9%**	**-26.9%**	**17.4%**	**-14.0%**
Percentage points (p.p) difference			*12.0 p.p.*	*44.3 p.p.*	*-31.4 p.p.*
2Mbit/s local end		**-37.9%**	**9.4%**	**2.4%**	**-20.4%**
Percentage points (p.p) difference			*47.3 p.p.*	*-7.0 p.p.*	*-22.8 p.p.*
34/45Mbit/s local end		**-22.0%**	**16.1%**	**-6.9%**	**-18.0%**
Percentage points (p.p) difference			*38.1 p.p.*	*-23.0 p.p.*	*-11.1 p.p.*
140/155Mbit/s local end		**-2.2%**	**-15.5%**	**-12.7%**	**-37.6%**
Percentage points (p.p) difference			*-13.3 p.p.*	*2.9 p.p.*	*-24.9 p.p.*
WHOLESALE ISDN30	**1.8%**	**3.3%**	**2.4%**	**3.1%**	**-7.4%**
Percentage points (p.p) difference		*1.5 p.p.*	*-0.9 p.p.*	*0.7 p.p.*	*-10.5 p.p.*

Source: BT Regulatory Financial Statements for each year.

A4.47 The volume data in the RFS shows that copper lines have been steadily decreasing throughout the period considered. We believe this is driven by the specific conditions of traditional copper lines, which have experienced substitution by mobile, cable and next generation access networks (as well as a steady decline in the number of second lines), rather than any systematic economic fluctuation. We acknowledge that copper lines have experienced acceleration in their rate of decline during the last year, which we consider may be related to the economic cycle. However, we believe that the impact of the economic downturn has been less significant in the case of copper lines than in the case of leased lines or wholesale ISDN30.

A4.48 Leased lines are the wholesale services that have experienced the highest variability of demand, with a more accentuated decline in volumes in 2009/10 due to the economic downturn. Wholesale ISDN30 seems to have been particularly hit by the economic recession, given that its volumes have experienced a shift from positive to negative growth in 2009/10 (a change of -10.5 percentage points, compared to only -2.0 percentage points in the case of copper lines).

A4.49 We consider this to be convincing evidence that ISDN30 is more subject to systematic risk than copper lines. We believe that the above indicates that businesses are more likely to reduce their consumption of ISDN30 services in response to a downturn in the economy, whereas residential customers are less likely to dispense with their single broadband connection when faced with a similar downturn. Typically, residential customers of copper access only face the binary choice between connecting or disconnecting their broadband subscription. Instead, ISDN30 customers can reduce the number of channels they require if, for example, they expect the volumes of calls to decline[80], they decide to close some sites or if they experience a decline in their number of employees.

Conclusions

A4.50 For the reasons set out above, we consider that the WACC estimated for the purposes of the WBA 2011 Statement remains appropriate for wholesale ISDN30 services.

A4.51 As a result of the analysis presented in the April 2011 Consultation, and repeated above from paragraphs A4.20 to A4.50, we consider that the pre-tax nominal 'rest of BT' rate of 9.7% should be applied to wholesale ISDN30 services.

[80] It should be noted that businesses typically purchase a lower number of ISDN30 channels than the total of their employees or telephone lines, on the basis that it is unlikely that all employees will use their telephone services at the same time. Therefore, businesses do not generally require an ISDN30 channel per employee and could potentially reduce their demand for ISDN30 if they expect a lower volume of calls.

Annex 5

Volume Forecasts

Introduction

A5.1 In this annex we describe the approach we have taken to forecast the volumes of core wholesale ISDN30 services up to the end date of the charge control period (i.e. between 2010/11 and 2013/14). The analysis presented in the April 2011 Consultation is summarised and updated with revised data and additional explanations where necessary. We do not address stakeholder comments in this annex; these have been fully addressed in Section 5 at paragraphs 5.174 to 5.198.

A5.2 As discussed in Section 5, we are implementing a two year control starting on May 2012, rather than the three year control proposed in the April 2011 Consultation. We have therefore assumed 2010/11 as the base year of our control (compared to 2009/10 in the April 2011 Consultation). The volume forecasts are used as an input to the Cost Forecast model, which estimates the values of X for the core wholesale ISDN30 services.

A5.3 This annex is structured as follows:

- we describe our general approach in forecasting demand for ISDN30;
- we set out our methodology for estimating the future volumes of wholesale ISDN30 rentals, including an assessment of the likely impact of our charge control on rental volumes; and
- we describe our forecasts for connections and transfers, which are largely based on our forecast of rental volumes.

Summary

A5.4 We estimate that the volumes of wholesale ISDN30 rentals will decline by 19% between 2010/11 and 2013/14. We have estimated that connection volumes will decline by 34% over this same period, derived from the rental forecast.

A5.5 We estimate a smaller decline of 14% in transfer volumes. The smaller decline reflects the assumption that competition will intensify in future, as CPs compete more aggressively for the remaining ISDN30 customers, and that this will tend to generate additional transfers. This is based on the evidence we have of increased competition and an increase in transfer volumes in the last three years.

A5.6 The forecasts are based on an assessment of the information available to us on the future developments of the ISDN30 retail market. We have also accounted for the likely change in demand for ISDN30 as a result of the wholesale ISDN30 charge control.

Our approach in forecasting future demand for ISDN30

We have used all the evidence available to us

A5.7 We recognise that forecasting the demand of a telecommunications service is a complex task. For this reason, we have tried to give due weight to each source of information available to us, in particular:

- the views from stakeholders on the likely evolution of demand for ISDN30 and the extent of future switching to IP based alternatives;
- the latest available volumes data for ISDN30 and IP based services; and
- end users' responses to the market research conducted in our ISDN30 2010 Market Review.

We have not forecast changes to operators' market shares

A5.8 Our analysis has focused on trends in the retail market, from which demand for Openreach's wholesale offering is derived. We have not forecast changes in operators' market shares over the period considered.[81]

A5.9 Since 2004 most of the decline in BT's retail market share has been driven by an increase in the volumes supplied by re-sellers that use Openreach's network. This means that Openreach's share of the wholesale market has remained fairly constant at around 71% of the total wholesale market.[82] Furthermore, as discussed below, in Openreach's view the main driver of the expected decline in wholesale ISDN30 volumes will be the expected increase in take up of IP alternatives to ISDN30, rather than competition from OCPs using alternative inputs to supply ISDN30.

A5.10 It is possible that the CPs' current wholesale market shares could change during the period of the charge control. One operator indicated that it did not intend to reduce its demand for wholesale ISDN30, while it expected that overall market demand would decline more significantly. Because the majority of this operator's ISDN30 provision is based on its own infrastructure, the effect on wholesale ISDN30 volumes is very small. In general, we do not expect significant further investment from OCPs in upstream infrastructure to supply wholesale ISDN30 in competition with Openreach. This is because the ISDN30 market is in long-term decline and because we expect the price reductions resulting from our charge control to encourage some OCPs to use wholesale ISDN30 to a greater extent in future. We allow for this effect using the Switching model which we describe in Annex 6 and which implicitly reflects expected variation in Openreach's wholesale market share over the period of the charge control.

[81] However, we have considered the impact of the charge control on switching between PPCs and ISDN30 in the Switching model. Taking these switching volumes into account induces an implicit shift in market shares.
[82] See the December 2011 Consultation paragraph 4.66, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf

We have taken into account the likely impact of our charge control by forecasting demand in two stages

A5.11 In response to the ISDN30 2010 Market Review Consultation and the April 2011 Consultation, stakeholders have expressed concern that a decrease in the prices of wholesale ISDN30 could result in an unforeseen increase in demand for ISDN30 services. We have addressed this concern by estimating the impact of the charge control on the demand for ISDN30 using a two stage demand forecast:

- Stage 1: we forecast volumes of core services at current prices (Stage 1 volume forecast). This initial volume forecast is then used to derive the initial values of X for the three core wholesale ISDN30 services.

- Stage 2: we adjust our initial volume forecast for connections and rentals to account for the likely impact on demand of the price changes implied by the X derived in Stage 1. Adding the impact of our charge control to our initial volume forecast we derive the Stage 2 volume forecasts.

A5.12 We do not use a two stage forecast for transfers. This is because we do not expect the RPI % safeguard cap to have any significant impact on transfer volumes.

Our forecast of future wholesale ISDN30 rental volumes

Stakeholders' ISDN30 volume forecasts

A5.13 We have adjusted the forecasts submitted by stakeholders to reflect the change in the base year from 2009/10 to 2010/11. In the April 2011 Consultation we presented stakeholders' forecasts covering the period 2009/10 to 2013/14. Since the April 2011 Consultation we have changed the base year of the charge control from 2009/10 to 2010/11 (as discussed in Section 5).

A5.14 To facilitate the comparison between (i) stakeholders' forecasts in the April 2011 Consultation (which used 2009/10 as the base year), (ii) their latest forecasts supplied in Q1 2012, and (iii) our current ISDN30 volumes forecast (which uses 2010/11 actual volumes as the base year); we have calculated the percentage change in ISDN30 volumes between 2010/11 (our current base year) and 2013/14 (the end year of the control) implied by stakeholders' forecasts in the April 2011 Consultation.[83]

A5.15 In Table A5.1 we present stakeholders' forecasts adjusted to reflect the change in the base year to 2010/11.

[83] We have done this by, firstly, calculating the end year volumes implied by the forecast submitted to the April 2011 Consultation with base on the year 2009/10 (i.e. Mar-10) and, secondly, using this end year volumes to estimate the implied percentage change with respect to current 2010/11 volumes (i.e. Mar-11).

Table A5.1 Percentage decline in volumes over the period 2010/11 – 2013/14 (stakeholders forecasts)[84]

	Wholesale ISDN30		Self-supply	
	April 2011 Consultation	Latest	April 2011 Consultation	Latest
Openreach	✂ [- 40% to – 50%]	✂ [-30% to -40%]	N/A	N/A
OCP 1	✂ [- 30% to – 40%]	✂ [30% to 40%]	✂ [- 20% to – 30%]	✂ [-20% to -30%]
OCP 2	✂ [- 0% to -10%]	✂ [- 0% to -10%]	✂ [- 0% to 10%]	✂ [- 0% to 10%]

A5.16 In the April 2011 Consultation, we noted that Openreach had forecast a decline in total wholesale ISDN30 channels in the range of 40% to 50%. This was due, amongst other things, to its expectation of high take up of IP based alternatives.[85] Openreach expected that the aggregate ISDN30 and IP channels would increase slightly over the period of the control but demand would shift from ISDN30 to IP (the latter overtaking ISDN30 ✂). This showed that most of the decline expected by Openreach would result from switching towards IP based services.[86] Since then, Openreach has revised its volumes forecast and it now expects a smaller decline in total wholesale ISDN30 channels in the range of 30% to 40% from 2010/11 to 2013/14.

A5.17 Other stakeholders predicted a less significant decline in the ISDN30 market. One OCP predicted that their wholesale ISDN30 demand would decrease more significantly than demand for its self-supplied volumes. This indicated that it expected to increase the share of its total on net customer base. Since the April 2011 Consultation, this OCP has reversed this view. It now expects to increase its use of Openreach's offering throughout the charge control period[87] and expects that self-supplied volumes will decline over the charge control period (although to a lesser extent than anticipated at the time of the April 2011 Consultation).

A5.18 Another OCP indicated to us that it expected demand for its ISDN30 services to remain relatively unchanged over the period of the charge control, with declines in volumes in the range of 0% to 10%.[88] The latest forecasts from this OCP show that it still considers that demand for ISDN30 will remain broadly constant throughout the charge control period.

A5.19 In the April 2011 Consultation we noted that another stakeholder, not shown in Table A5.1 above, did not submit a volume forecast but told us that, in its view,

[84] We have placed all CPs forecasts in a 10% range to preserve confidentiality.
[85] See the April 2011 Consultation paragraphs A8.15-A8.16, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf
[86] See the April 2011 Consultation paragraphs A8.17, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf
[87] This OCP commented that the change in its wholesale ISDN30 forecast, showing an increase in volumes from 2010/11 to 2013/14, was due to ✂.
[88] See the April 2011 Consultation paragraphs A8.18, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf

switching to IP based alternatives had been delayed by the economic downturn and would not affect ISDN30 volumes until after the end of the charge control period.[89]

A5.20 In the April 2011 Consultation, we noted that we considered the self-supply decline indicated by some stakeholders to be representative of the wider ISDN30 market, as OCPs' purchases of wholesale ISDN30 were small scale compared to the volume of supply using their own infrastructure.

Analysis of short term trend

In the April 2011 Consultation we proposed that the economic downturn was partly responsible for the reduced demand for ISDN30 in 2009/10

A5.21 In the April 2011 Consultation we observed that retail ISDN30 volumes had experienced a significant decrease in the year 2009/10. Projecting the decline in that year forward, we estimated that ISDN30 volumes would decline by 24% from 2009/10 to 2013/14.[90] Adjusting this for the change in the base year to 2010/11, the equivalent decline for the period 2010/11 to 2013/14 would have been 22%.

A5.22 We did not propose to put much weight on this short term trend analysis because we considered that the decline in ISDN30 volumes was dominated by the economic downturn. This assumption was supported by the fact that in the period Dec-06 to Jun-08, the annual growth of Openreach's IP channels had been very significant (✂%), whereas it had significantly slowed down (✂%) during the period Jun-08 to Jun-10. This suggested that a structural shift in demand towards IP based services was not the main factor explaining the decline in ISDN30 volumes. Therefore, we argued that basing the forecast of ISDN30 on the decrease in volumes observed in the last year would not have been appropriate.[91]

A5.23 For these reasons, we have not based our forecasts over the period of the charge control on the short term trends observed in the April 2011 Consultation, nor those indicated by data supplied under subsequent information requests (as further discussed in paragraph A5.41 below).

In the December 2011 Consultation we considered that the latest evidence was consistent with our findings in the April 2011 Consultation

A5.24 Prior to the December 2011 Consultation, we requested additional volume data from stakeholders under formal powers.[92] On the basis of this evidence, amongst other things, we considered whether there had been any material change in ISDN30 markets.[93] In particular, we considered the volume information submitted by Openreach on 9 September 2011 and by OCPs during the course of October in response to formal section 135 requests. We proposed that:

[89] See the April 2011 Consultation paragraphs A8.19, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf
[90] We calculated this as (1-0.066)^4-1, that is, the annual 6.6% decline observed during the period June 2009 and June 2010 and projected for a period of four more years (up to 2013/14).
[91] See the April 2011 Consultation paragraphs A8.26-A8.28, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf
[92] We requested additional volume information from Openreach on 25 August 2011 (1st section 135) and from OCPs on 13 and 14 September 2011 (1st section 135).
[93] See section 4 of the December 2011 Consultation, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf

- the 6% decline in ISDN30 volumes in the period from June 2010 to June 2011 was roughly in line with our expectations, representing only a slightly smaller decline than the one projected in the April 2011 Consultation;[94]

- the new forecasts submitted by CPs projected smaller declines in ISDN30 volumes than they had previously forecasted and that this was consistent with smaller levels of switching towards IP products than they had previously anticipated;[95] and

- the trend in IP volumes was consistent with the findings in both our ISDN30 2010 Market Review Consultation and Statement.[96]

Additional evidence since our December 2011 Consultation

A5.25 Since the December 2011 Consultation we have requested further information from stakeholders, including an update on ISDN30 volumes (actuals) for the quarters ending respectively in June, September and December 2011.

A5.26 Table A5.2 below shows ISDN30 volumes for the period Jun-2010 to Dec-2011.

Table A5.2 ISDN30 volumes, Jun-2010 to Dec-2011 (channels)

	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11
ISDN30 channels	**2,893,237**	**2,866,902**	**2,883,096**	**2,782,575**	**2,738,616**	**2,737,652**	**2,724,316**
Difference		-26,335	16,194	-100,521	-43,959	-964	-13,336
Y-o-Y change					-5.34%	-4.51%	-5.51%

Note: We have used the period from June 2010 to December 2011 as we consider this the most reliable actuals data. ✂. The volumes in Jun-11 are different from those used in the December 2011 Consultation due to differences in the volumes submitted by one CP. However, we do not consider this adjustment to have any material effect, given that the year-on-year reduction in ISDN30 volumes over the period shown above (around 5%) is broadly in line with our April 2011 Consultation forecast that ISDN30 channels would decline annually by 8% throughout the period of the charge control.
Source: Operators' responses to S135 information requests.

A5.27 Table A5.2 above shows a year-on-year decline in ISDN30 volumes of around 5% in the last three quarters of the period Jun-2010 to Dec-2011 (i.e. quarters ending in Jun-11, Sep-11 and Dec-11). Although this decline in ISDN30 volumes is smaller than we had anticipated in our April 2011 Consultation, we believe it is broadly consistent with our forecast that ISDN30 channels would decline annually by around 8%.

A5.28 We show IP volumes for the period Jun-2010 to Dec-2011 in Table A5.3 below.

[94]See the December 2011 Consultation paragraph 4.15 available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf
[95]See the December 2011 Consultation paragraph 4.16 available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf
[96]See the December 2011 Consultation paragraph 4.18 available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf

Table A5.3 IP volumes, Jun-2010 to Dec-2011 (channels)

	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11
IP channels	✂	✂	✂	✂	✂	✂	✂
Difference		✂	✂	✂	✂	✂	✂
Y-o-Y change					✂	✂	✂

Note: We have used the period June 2010 to December 2011, as we consider this the most reliable actuals data. ✂. The volumes shown are different from those used in the December 2011 Consultation due to differences in the volumes submitted by one CP. Hence, the volume data above is different from that used in the December 2011 Consultation. However, we do not consider this adjustment to have any material effect on our April and December 2011 Consultation proposals.
Source: Operators' responses to S135 information requests.

A5.29 The evidence in Table A5.3 above shows that IP channels have increased throughout the period (with the exception of the quarter to Sep-11). It also shows that the year-on-year increase in IP volumes has slowed slightly in the last quarters. This could be attributed to the impact of general economic conditions or could reflect decreasing growth rates as the total demand for IP channels increases.

A5.30 We consider that the latest evidence on volumes of ISDN30 and IP channels is consistent with our April 2011 Consultation volume forecasts, for the reasons discussed above.

Market research findings

A5.31 In the April 2011 Consultation we relied on the results of the market research conducted as part of the ISDN30 2010 Market Review to provide an estimate of future demand for ISDN30 services.

A5.32 The research asked respondents "*how long do you envisage continuing to use ISDN30 services for?*"[97] 53% of respondents answered that they only planned to use it for the next five years. After adjusting for the fact that the market research was conducted in December 2009 and that the charge control period ends in 2013/14, we interpreted this as indicating that around 44% of retail customers might stop using ISDN30 by the end of the charge control period.[98] Taking into account

[97] Ofcom, *Narrowband Multi-channels Market Research*, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30/narrowband.pdf

[98] In order to obtain an expected decline for the period March 2010 to March 2014 which was comparable to the findings of the market research (conducted in December 2009), we made the following adjustments. First, we calculated the total volumes that would remain on ISDN30 by March 2014 (i.e. the end of the charge control) if we assumed the 53% decline resulting from the market research (this gave rental volumes equal to 1.6m channels). Second, using this and the actual ISDN30 volumes in March 2010, as submitted by stakeholders in their S135 information requests (i.e. 2.9m channels), we obtained the expected decline for the period running from March 2010 to March 2014. This was equal to ((1.6m – 2.9m)/2.9m) x 100 = 44%.

the change in the base year of our charge control to 2010/11, the equivalent decline in ISDN30 volumes for the period 2010/11 to 2013/14 is 42%.[99]

A5.33 The same market research also asked end users if they were "*currently considering switching away from ISDN30 services*".[100] The results indicated that 14% were considering switching away from ISDN30. Taking into account the change in the base year of our charge control to 2010/11, the equivalent decline in ISDN30 volumes due to end users switching to alternative products during the period 2010/11 to 2013/14 would be 11%.

A5.34 In the April 2011 Consultation, we proposed that more weight should be given to the second question regarding current plans to switch services, rather than future preferences represented by the first question. That is, we proposed that the survey evidence suggested a decline of closer to 14% than to 44%. In any case, we highlighted that the mid-point decline in ISDN30 volumes derived from the two survey questions (i.e. 29%) was in line with our Stage 1 volume forecast (discussed further below).

A5.35 As discussed in our December 2011 Consultation, the evidence on ISDN30 and IP volumes was consistent with our findings in the ISDN30 2010 Market Review and the April 2011 Consultation and our market research conducted during the ISDN30 2010 Market Review. For this reason, we concluded that conducting a further survey on ISDN30 consumers was not necessary.[101]

Evidence from third party forecasts

A5.36 In the April 2011 Consultation document, we reported that Openreach had provided a report by IDC,[102] published in July 2010. The uptake of IP services in Europe shown in this report represented a decrease compared to previous IDC estimates (reduced by almost ✂).[103] We noted that this was consistent with the uptake of Openreach's IP services in the UK during the year 2010. IDC cited several factors explaining the reduction in their IP volumes forecast. Openreach considered that these factors might not apply to the UK market, implying that the reduced IDC's forecast might not be appropriate for the UK market. According to Openreach, the delay in the adoption of IP-based services in UK could be mainly attributed to ✂.[104]

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[99] To obtain an equivalent change in volumes from March 2011 to March 2014, we used the ISDN30 retail volumes (actuals) in March 2011 (2.8m) and calculated the percentage change implied by the market research. This was equal to ((1.6m – 2.8m)/2.8m) x 100 = 42%.

[100] See question QC6 of the market research, http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30/narrowband.pdf

[101] See the December 2011 Consultation paragraph 4.21, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf

[102] IDC, *Western Europe SIP Trunking Market Update*, July 2010.

[103] The difference in the two forecasts was very significant. The previous forecast expected around ✂m SIP Trunking channels by 2014, their latest view was that they would be around ✂k. Assuming that the decrease in ISDN30 could be attributed entirely to switching to IP alternatives and that IDC's analysis of the European market could be directly applied to the UK market we considered that their IP forecast would suggest a ✂% [20% to 30%] total decline in the ISDN30 market. This took into account that there were 2.9m retail channels in March 2010, therefore IDC's IP forecast implied that ✂m ISDN30 channels would remain by March 2014. Using this same end year volumes and the current March 2011 ISDN30 retail volumes (2.8m), the percentage decline would be slightly smaller ✂% [20% to 30%].

[104] See the April 2011 Consultation paragraphs A8.22-A8.25, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf

A5.37 We note that the findings of the third party forecast are broadly consistent with our volumes forecast. However, we have decided not to update the third party forecasts, on the basis that we did not rely on them extensively in the April 2011 Consultation and stakeholders had expressed doubts about their applicability under current UK market circumstances, as indicated in our April 2011 Consultation document.

Our final Stage 1 volume forecast predicts a 27% decline in ISDN30 volumes

A5.38 Table A5.4 summarises the evidence that we have considered in estimating the future demand for ISDN30.

Table A5.4 Various forecasts for wholesale ISDN30 rental volumes (change between March 2011 and March 2014)

	Range of assumptions	
	April 2011 Consultation	**Latest**
Stakeholder forecasts	✂ [0% to -50%]	✂ [0% to -40%][105]
Market research	- 11% to -42%	- 11% to -42%[106]
External consultants forecast[107]	✂ [-20% to -30%]	✂ [-20% to -30%]

A5.39 As shown in Table A5.4, the latest submissions from stakeholders show that they anticipate smaller declines in ISDN30 volumes than previously forecast. The latest forecasts are more closely aligned with our April 2011 Consultation forecast (that wholesale ISDN30 volumes would decline by 27.5% from 2009/10 to 2013/14, or 27% from 2010/11 to 2013/14).

A5.40 We have not updated the market research and external consultants' forecasts and for this reason they both show the same percentage decline under the "April 2011 Consultation" and the "Latest" column in the table above.[108]

We have maintained the Stage 1 volumes forecast proposed in the April 2011 Consultation

A5.41 Based on the above evidence, we have decided to maintain the end year (i.e. March 2014) volumes forecast that we proposed in our April 2011 Consultation, for the following reasons:

[105]Stakeholders' forecasts relate to their submissions during the course of February 2012.
[106]The figures from the market research relate to the survey conducted in our Market Review, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30/statement/statement.pdf.
[107]The external consultants forecasts relate to the third party forecast discussed in our April 2011 Consultation, paragraphs A8.22 to A8.25, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf.
[108]As we discussed in our December 2011 Consultation (see paragraph 4.14 of the December 2011 Consultation, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf), we did not consider it necessary to conduct this survey again. We have not requested additional third party forecasts (as discussed in paragraph A5.37 above).

- The latest stakeholders' forecasts presented in Table A5.1 above (which show smaller declines in ISDN30 volumes than stakeholders' forecasts in the April 2011 Consultation) have converged towards our forecast in the April 2011 Consultation.

- Our forecast falls in the middle of the decline predicted by our market research (27%).

- In the April 2011 Consultation we expected that volumes would decline annually by 7.7% between 2009/10 and 2013/14 (resulting in a 27.5% decline over the period). Maintaining the end year volumes forecast used in the April 2011 Consultation implies that we forecast a roughly 10% reduction in ISDN30 volumes between 2010/11 and 2013/14. We acknowledge that during the year 2009/10 to 2010/11, ISDN30 volumes have declined by less than this. However, we consider that there are significant uncertainties surrounding the future development of the ISDN30 market (as shown by the variability in stakeholders' forecasts or the changes in ISDN30's short term trend). In particular, we consider that general economic conditions or an acceleration of switching towards IP could affect ISDN30 in the next two years. For this reason, and in line with our April 2011 Consultation proposals, we have decided to put less weight on the ISDN30's short term trend than on stakeholders' forecasts and our market research.

- We also note that due to the shorter control period adopted, it is less likely that our forecast will become significantly misaligned with the actual volumes, however, if such misalignment occurred, we would be able to correct this in just 23 months.

A5.42 Adopting the same end year volumes forecast that we proposed in the April 2011 Consultation results in a Stage 1 decline in wholesale ISDN30 volumes of 27% (i.e. 575k channels) from 2010/11 to 2013/14.

Our Stage 2 volume forecast predicts a decline in future ISDN30 volumes of around 19% by the end of the charge control period

A5.43 To estimate the impact of our charge control on our volume forecasts we (i) obtain the value of X resulting from our Stage 1 volume forecast, and (ii) estimate the impact on wholesale ISDN30 volumes of the reduction in prices implied by this value of X.[109] This is the same approach followed in the April 2011 Consultation.

A5.44 As discussed in Annex 3, the initial values of X are:

- RPI-12.5% on the combined connections and rental basket; and

- RPI % on the transfers basket.

A5.45 We expect that the decrease in ISDN30 prices resulting from these values of X will have three effects, relative to our Stage 1 volume forecast:

- Expansion of the retail market: the price decrease will generate an increase in the retail demand for ISDN30 services. Our calculations indicate that the impact of

[109] For the purposes of estimating the initial value of X on the combined connection and rental basket we have also used the Stage 1 volume forecast of connections and transfers, these forecasts are described in the next sections.

this effect is likely to increase wholesale ISDN30 volumes in 2013/14 by around 4.2%;

- Reduced switching to IP: the decrease in ISDN30 prices caused by the charge control is likely to reduce the extent of switching from wholesale ISDN30 to IP based alternatives. We estimate that this may increase wholesale ISDN30 volumes in 2013/14 by 6.3%; and
- Affect switching from PPCs to wholesale ISDN30: The decrease in prices is likely to affect OCPs' choice of wholesale inputs (PPCs vs. wholesale ISDN30) when providing ISDN30. Our calculations indicate that out of the total ISDN30 channels that would have been supplied using PPCs during the period of the charge control[110] (which currently only represent around 4% of the ISDN30 retail market), around 5.2% would be supplied using wholesale ISDN30 if we decreased the price of the combined wholesale ISDN30 rentals and connections annually by -12.5%. We estimate that switching from supply using PPCs to wholesale ISDN30 is likely to increase our Stage 1 volumes forecast for wholesale ISDN30 rentals by around 0.4% in 2013/14.

A5.46 When these effects are combined together, we estimate that the impact is to increase the initial volume forecast for wholesale ISDN30 rentals by around 10.9%.

A5.47 After we increase our Stage 1 volume forecast by these additional volumes to take into account the impact of our charge control, the decline in wholesale ISDN30 rental volumes for the period 2010/11 to 2013/14 is around 19%.

A5.48 We describe our calculations for each of the three effects below.

<u>We have estimated the impact of the wholesale ISDN30 charge control on retail demand for ISDN30 and switching to IP based services</u>

A5.49 We have estimated the impact of the wholesale ISDN30 charge control on:

- retail demand for ISDN30; and
- switching to IP based alternatives, using the market research conducted during our ISDN30 2010 Market Review, which asked ISDN30 customers about their switching behaviour after an hypothetical 10% decrease in prices.

A5.50 To estimate this impact, we first estimate the likely reduction in wholesale ISDN30 connection and rental prices resulting from our charge control using the volumes forecasted in Stage 1. We discuss in detail each of these steps below.

The estimation of the likely decrease in wholesale ISDN30 prices

A5.51 As discussed in Section 5, we are setting a combined basket for connections and rentals and a safeguard cap on the average connection charges. This means that we are giving some flexibility to Openreach to re-balance its connection and rental charges. To estimate the effect on wholesale prices, we have made some assumptions on the way Openreach will vary its connection and rental prices to meet our charge control conditions.

[110] As described further below, this includes both switching from customers that are currently being supplied using PPCs, as well as future customers that would have been supplied using PPCs but are likely to be supplied using wholesale ISDN30 as a result of our charge control .

A5.52 In particular, we have assumed that Openreach will use its flexibility to increase connection prices in full (i.e. will increase connection prices by the maximum allowed by the safeguard cap, RPI+5%) and will derive rental prices as a residual, by taking into account the constraint imposed by the prior year revenue weighting and the cap on the combined basket (i.e. the RPI–12.5% annual decrease on the combined basket). To derive the prior year revenue weight, we have used our Stage 1 volumes forecast for connections and rentals.[111]

A5.53 After calculating the rental and connection prices, we further adjust these prices to account for the following:

- we have converted the connection price into an equivalent annual value over a period of five years (with five years representing the average ISDN30 customer lifetime). This is because the connection charge is a one-off charge and end users are likely to view this charge as a sunk cost that they would spread over the life of their ISDN30 service. ;[112] and

- we have applied a 'dilution effect' to the aggregate connection and rental price to reflect our assumption that price reductions at the wholesale level will be diluted (reduced) at the retail level. In our ISDN30 2010 Market Review we assumed that wholesale prices accounted for approximately 85% of the corresponding retail price.[113] Since then, in our December 2011 Consultation we argued that BT's standard tariff had decreased by 2% (compared to the standard tariff at the time of the ISDN30 2010 Market Review) and we considered it reasonable to assume that CPs' retail prices would have followed a similar pattern. Assuming a 2% decline in ISDN30 retail prices across the entire market, this would imply that wholesale charges accounted for approximately 87% of the total retail price.[114] We have therefore assumed a 'dilution effect' of 87% (compared to 85% in the April 2011 Consultation).

A5.54 These assumptions and adjustments are summarised in Figure A5.1

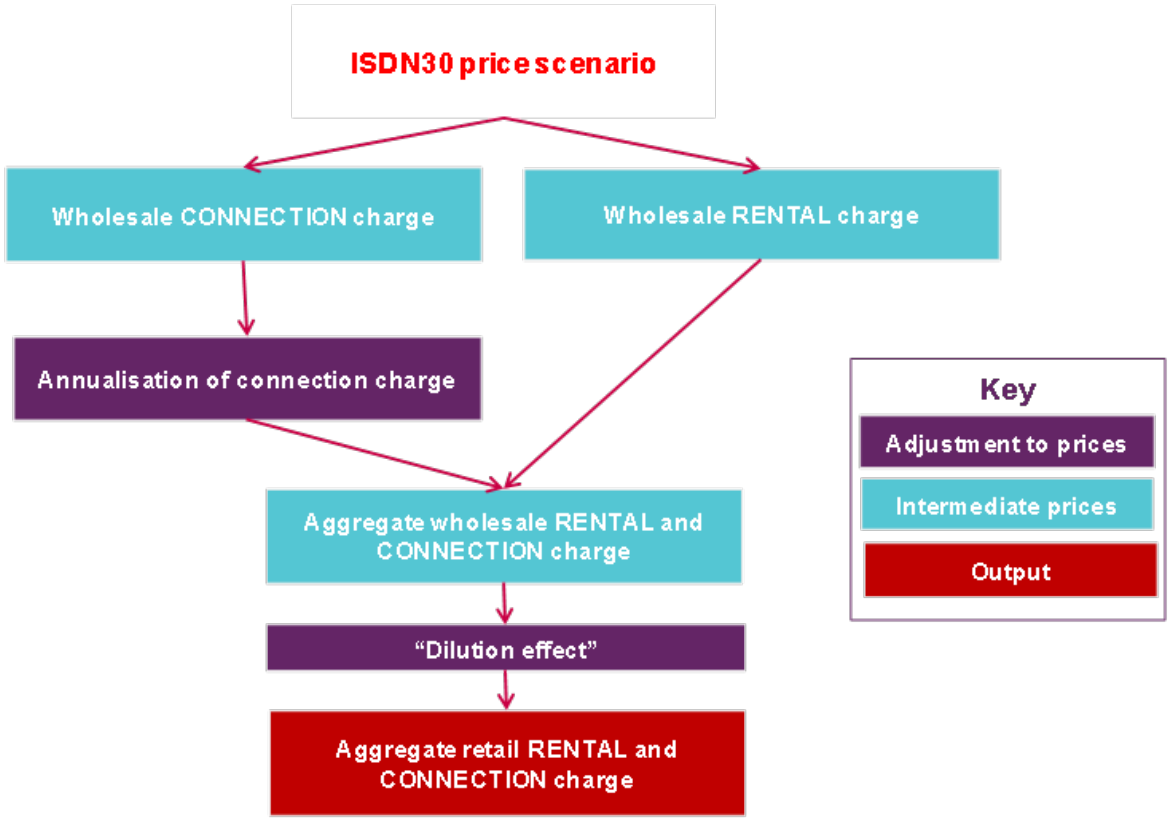
[111] For example, in year 2012/13 (the first in which the decrease in wholesale ISDN30 prices will have to be implemented) we derive the previous year revenue weight for connections and rentals by multiplying the previous year volumes (2011/12) of each service, calculated in Stage 1, by their previous year prices (which we know are the current wholesale ISDN30 prices for both services). The connection price will then be the previous year's connection charge increased by 5%, so in the case of 2012/13 this would be £40.71 x (1+5%) = £42.75. Then, the rental price is derived as a residual. We first estimate the value of X on rentals as:
$X\ rentals = \frac{X\ combined\ \ basket - X\ connections\ \ x\ Prior\ \ year\ \ revenue\ \ weight\ of\ \ connections}{Prior\ \ year\ \ revenue\ \ weight\ of\ \ rentals}$, where we know that the 'X combined basket' is -13.75%; the 'X connections' is +5% and the weights are calculated as described above. Then, we calculate the price of rentals in 2012/13 as the price in the previous year multiplied by the derived value of X, that is, £141 x (1 + X rentals).

[112] For this adjustment we have used a 5 year period and a discount rate equal to the WACC rate of 9.7%. All OCPs have found difficulties in providing an accurate estimate of their customers' average lifetime. We have decided to use the ✂ period given that several OCPs indicated to us that it would be an approximate estimate of their customers' average lifetime and for consistency reasons, given that it was the period used in the Switching model, described in Annex 6. Additionally, the market research conducted during our ISDN30 2010 Market Review found that, on average, ISDN30 customers stay with an OCP for between five to six years (see page 23 of our market research).

[113] See paragraph 6.37 of the April 2011 Consultation, http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30/summary/isbn30.pdf

[114] See paragraph 4.52 of the December 2011 Consultation, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf

Figure A5.1 Adjustments to wholesale ISDN30 prices to derive final aggregate retail prices



Expansion of retail demand

A5.55 The impact of our charge control on retail demand is calculated by multiplying the annual aggregate price change by the price elasticity of demand.[115]

A5.56 Stakeholders were not able to provide information allowing us to calculate the elasticity of demand for wholesale ISDN30 services directly. We have instead used elasticity estimates based on relevant economic literature. In general, the price elasticity of demand for telephony services tends to be relatively low. In the case of ISDN30, this was confirmed by our market research conducted during the ISDN30 2010 Market Review, which found that end users tended to value the reliability of ISDN30 services above any price considerations. The economic literature consulted indicates that it is reasonable to assume an own-price elasticity of demand in the range of -0.1 to -0.3.[116] For the purposes of our base case scenario, we have

[115] The elasticity of demand indicates by how much the demand of a service will vary as a response to a 1% change in the price of this service.

[116] For example, the Carphone Warehouse plc response to the OFFR cites a Vodafone review of price elasticities of fixed line services estimating that they range between -0.02 and -0.17, see page 46, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/openreach/responses/CarphoneWarehouseplc.pdf. We have also looked at a review of empirical studies on own-price elasticity of demand for telephone services in major economies (such as the US). This evidence seems to suggest an average high range of -0.3 elasticity of demand for the local telephony services in large economies such as the USA. We have used this value as our upper bound range. For the review of empirical studies see Manfrim, G. and S. Da Silva (2007), 'Estimating demand elasticities of fixed telephony in Brazil', *Economics Bulletin*, Vol. 12, No. 5 pp. 1 – 19, available at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.98.1939&rep=rep1&type=pdf.

estimated the likely impact of our charge control on retail demand by assuming a price elasticity of demand in the middle of the above range, that is, equal to -0.2. We did not receive any comments from stakeholders on our elasticity assumptions in the April 2011 Consultation and therefore we continue to believe that -0.2 is an appropriate price elasticity of demand. Table A5.5 presents the estimated volume increase in each year due to the additional retail demand estimated using this elasticity and the likely decrease in wholesale ISDN30 prices calculated using the methodology described above.

Table A5.5 Estimation of the impact of our charge control on additional retail demand for ISDN30 (Stage 1)[117]

Years	12/13	13/14
Rental price (beginning of period)[118]	£123.1	£107.4
Connection price[201]	£42.7	£44.9
Annualised connection price[201]	£11.2	£11.7
Aggregate price[119]	£134.2	£119.1
Price change[120]	-11.5%	-11.3%
After 87% dilution[121]	-10.0%	-9.8%
Elasticity[122]	-0.2	-0.2
% change in volumes[123]	2.0%	2.0%
Stage 1 volumes[124]	1,727,718	1,555,670
Increase in volumes (channels)[125]	34,490	30,498

[117] The prices shown in Table A5.5 are derived from the 2011/12 prices and applying our values of X, which calculate the price decreases in real terms. Therefore, the above prices are in real terms with basis on year 2011/12. We only show the two years in which the reduction in connection and rental prices will take place.
[118] The rental and connection price have been calculated using the approach discussed in paragraphs A5.51 to A5.54 above.
[119] The aggregate price reflects the sum of the rental and the annualised connection price for that year.
[120] The percentage change in the aggregate price with respect to the previous year. The prices in year 2011/12 are not shown as they are equal to the current prices, i.e. £141/channel for rentals and £40.71/channel for connections. The aggregate price for both services in 2011/12 after the annualisation of the connection charge is £151.55/channel.
[121] The change in the aggregate price after applying an 87% dilution effect to the wholesale price change (i.e. equal to the price change multiplied by 87%).
[122] The price elasticity of demand assumed in our base case scenario. As described above, it falls in the middle of the -0.1 to -0.3 range.
[123] The percentage change in volumes is obtained by multiplying the aggregate price change after applying the dilution effect by the assumed elasticity.
[124] The initial volume forecast for rentals in our base case scenario. This is derived by assuming a 27% decline in rental volumes from Mar-11 to Mar-14 (equal to an annual decrease of around 10%).
[125] The annual increase in volumes is obtained by multiplying the percentage increase in volumes by the Stage 1 volumes forecast for that year.

A5.57 As shown above, we estimate that it is likely that retail demand will expand by a total of 64,987 channels (i.e. the sum of the impacts for the two years, shown above). This is equal to an increase of around 4.2% with respect to the Stage 1 volumes forecast at the end of the charge control.

A5.58 These results differs to the Stage 1 forecasts in our April 2011 Consultation, in which we forecast a total of 78,426 channels and an increase of around 5.0% with respect to the Stage 1 forecasts. The differences are driven by the following factors:

- the steeper decline in prices compared to the April 2011 Consultation proposals (largely due to the shorter control) will result in larger increases in retail demand in each year of the charge control;
- assuming the same end year volumes means that there will be a larger wholesale ISDN30 customer base in year 2012/13 than under our proposals in the April 2011 Consultation;[126] and,
- the delay to the start of the control implies that our current charge control has no impact on retail demand during the year 2011/12, unlike the April 2011 Consultation which proposed that the control was in place during that year. .

A5.59 The impact of the third effect is greater than the combination of the first two effects, leading to a smaller increase in retail demand from our current charge control than in our April 2011 Consultation proposals.

A5.60 We note however that the difference between the market expansion effect estimated in the April 2011 Consultation and that estimated in our current decision has a marginal effect on the value of X (less than our rounding error margin of 0.25%).

Reduced switching to IP

A5.61 A decrease in the prices of wholesale ISDN30 rentals is likely to affect existing customers' decision to switch to IP based services[127]. Our Stage 1 volume forecast has implicitly assumed a rate of switching to IP alternatives at current wholesale ISDN30 prices (i.e. 27% of the 2010/11 installed base). However, the decrease in the prices of wholesale ISDN30 rentals resulting from our charge control (calculated as described above) is likely to reduce switching to IP.

A5.62 To understand how our charge control will affect switching to IP, we have used some of the questions in the market research conducted during our ISDN30 2010

[126] This is because there is a larger customer base in our current base year (2010/11) than we anticipated in the April 2011 Consultation. We have also maintained the same end year volumes in 2013/14, therefore, there is a higher number of wholesale ISDN30 channels in every year of the period considered, except in 2013/14 (when volumes are the same as we estimated in the April 2011 Consultation).

[127] We note that only rental charges are likely to affect existing customers' decision to switch to IP alternatives because these are annual recurring charges. Instead, connection prices are unlikely to affect their decision, given that existing customers will have already incurred these costs and they will be regarded as sunk. We acknowledge that there may be existing customers considering whether to increase their amount of ISDN30 channels (in which case they would incur connection charges for any additional channel they would like to add to their existing volumes) or switch to IP. However, we believe that the impact of our charge control on these customers will have already been accounted for in our estimation of the impact of our price changes on retail demand, which estimates the additional demand for rentals and connections that is likely to result from our proposed price changes.

Market Review that considered customers' response to changes in ISDN30 prices. In particular, our market research asked end users, "*if the price of ISDN30 fell by 10%, to what extent would this affect their decision to move away from ISDN30?*"[128]. Their responses were adjusted to reflect their level of certainty as indicated by their response to a follow up question. The results lead to the estimate that 42% of respondents considered that the 10% price decline would have little effect or was unlikely to impact their decision. 55% of respondents considered that it would be more likely or that they would definitely stay with ISDN30. The remaining 3% did not answer.

A5.63 However, amongst the responses of the end users that were actively considering switching (14% of all respondents), 69% considered that a price decrease of 10% would have little effect or was unlikely to impact their decision. Only 26% stated that the price decrease was likely to affect their decision to switch, responding that it would be less likely or that they would definitely stay with ISDN30. On this basis, we have considered it appropriate to assume that around 26% of customers switching to IP every year would decide to remain using ISDN30 if we decreased prices by an annual 10%.

A5.64 As shown in Table A5.6 below, we have estimated that our charge control will result in price changes that are above the 10% price decrease that was the object of our market research question and closer to annual decreases of around 11% after the different adjustments considered. Therefore, to estimate how switching is likely to be affected by price changes that are around 11% we have assumed that the decision to switch to IP was linear with the changes in prices, which gives us an annual decrease in switching equal to around 29%[129]. We have also applied an adjustment of two percentage points to reflect barriers to switching (e.g. the cost of investing in different customer premise equipment), as shown in Table A5.6 below. This results in a final decrease in switching of around 27%.

A5.65 In order to estimate the volumes of channels that are likely to remain on ISDN30 as a result of our charge control in every year, we have multiplied the annual decrease in switching calculated above by the change in the volume of wholesale ISDN30 rentals in every year (on the basis that we are assuming that all difference in rental volumes in every year can be attributed to switching to IP). Table A5.6 presents the additional volumes resulting from the decrease in switching in every year of the charge control following the price decreases calculated using the approach described above.

[128] See question QC10 of the market research.

[129] In other words, we have assumed that if a 10% price change would result in a decrease in switching of 26% (i.e. the decrease estimated using the market research findings), then a 11% price decrease would result in a decrease in switching equal to roughly 29% (i.e. equal to 11% x 26%/10%).

Table A5.6 Estimation of the impact of our charge control on switching from ISDN30 to IP alternatives

Years	12/13	13/14
Volumes switching[130]	191,075	172,048
Rental price (beginning of period)[131]	£123.1	£107.4
Price change[132]	-12.7%	-12.8%
After 87% dilution[133]	-11.1%	-11.1%
% decrease in switching if linear[134]	29.1%	29.2%
Final % decrease in switching[135]	27.0%	27.0%
Increase in volumes (channels)[136]	51,590	46,453

A5.66 Our calculation results indicate that the charge control is likely to increase our Stage 1 volume forecast by around 98,043 channels by the end of the charge control due to consumers switching to alternative products (98,043 is the sum of the impacts in each of the two years of the charge control shown in Table A5.6 above). This increase represents 6.3% of the total Stage 1 volumes forecast at the end of the charge control.

A5.67 In the April 2011 Consultation, we estimated a total of 89,108 channels and an increase of around 5.7% with respect to the Stage 1 forecasts due to the reduction of switching. The main reasons for this difference are as follows:

- the steeper decline in prices than in the April 2011 Consultation proposals (largely due to the shorter control) will result in a stronger reduction of switching to IP in each year of the charge control;
- assuming the same end year volumes means that there will be a larger annual percentage decline in ISDN30 volumes in Stage 1 now than in our April 2011

[130] The volumes switching are calculated as the difference between the wholesale ISDN30 rental volumes in that year and the previous year (under the assumption that all the decrease in wholesale ISDN30 volumes can be attributed to switching to IP). The volumes considered are the ones calculated in our initial volume forecast (which assumed a decrease in rental volumes of 27% by the end of the charge control, equal to an annual 10% decrease).
[131] The rental price in every year of the charge control, assuming the combined basket X of -12.5%. For the reasons described in paragraph A5.61 we do not need to account for the impact of the reduction in connection prices on switching to IP here.
[132] The percentage change in the price of wholesale ISDN30 rental with respect to the previous year's price. The prices in year 2011/12 are not shown as they are equal to the current prices, i.e. £141/channel.
[133] The change in the rental price after applying an 87% dilution effect to the wholesale price change (i.e. the percentage price change multiplied by 87%).
[134] The percentage decrease in switching if we assume that the decision to switch is linear with the changes in prices, as described above in paragraph A5.64).
[135] The final decrease in switching is obtained by adjusting down the linear annual decrease in switching by two percentage points from roughly 29% to 27%.
[136] The annual increase in volumes is obtained by multiplying the final percentage decrease in switching by the volumes switching derived from the Stage 1 volumes forecast for that year.

Consultation proposals. This, together with the assumption that all the structural decrease in ISDN30 volumes is driven by switching to IP, implies that larger numbers of customers are switching to IP under our current decision than under our April 2011 Consultation proposals; and,

- the delay to the start of the control implies that our current charge control has no impact on switching to IP in the year 2011/12, unlike the April 2011 Consultation which proposed that the control was in place during that year.

A5.68 Considering the overall effect on the reduction in switching to IP due to the charge control, the combination of the first two effects has a greater impact on switching than the third effect. This results in a greater reduction of switching to IP from our current decision than in the April 2011 Consultation proposals.

A5.69 The difference between the April 2011 Consultation and our current calculations do not have a significant impact on the value of X (less than the rounding error of 0.25%).

The impact of our charge control on switching from 2Mbit/s PPCs to wholesale ISDN30

A5.70 We have considered how the charge control is likely to affect OCPs' choice of wholesale inputs for supplying retail ISDN30. The charge control will change the relative prices of wholesale ISDN30 and 2Mbit/s PPCs and therefore is likely to affect OCPs' choice between these two technologies.

A5.71 We have considered two ways that the change in the relative prices of the two inputs might affect demand for wholesale ISDN30:

- OCPs might decide to switch some of their *existing* customers (currently supplied using PPCs) to wholesale ISDN30; and

- OCPs might decide to supply *future* customers using wholesale ISDN30 whilst at current prices (i.e. before implementation of our charge control) they would have used PPCs.

A5.72 We have developed the "Switching model" to estimate these supply side effects (see Annex 6 for more detail on this model).

A5.73 The results from the Switching model indicate that if the price of ISDN30 rental and connection services decrease by the amounts shown in Table A5.5 above (annual price decreases of roughly 11% after the different adjustments), around 6,404 channels or 5% of the total ISDN30 channels that would have been supplied using PPCs are likely to switch to Openreach's wholesale ISDN30 product (including both, switching from *existing* customers and *future* customers).[137] The impact of this switching will increase our Stage 1 volume forecast for wholesale ISDN30 rental services by 0.4% by the end of the charge control period.

A5.74 This compares to a total of 11,494 channels and an increase of 0.7% with respect to the Stage 1 forecasts in our April 2011 Consultation. The main reasons for this difference are as follows:

[137] This is described in more detail in Annex 6.

- the higher wholesale ISDN30 prices throughout the charge control, due to the delay in introducing our control, results in lower levels of switching (see paragraph A6.49);

- changes to the Switching model's treatment of "existing" and "new customers" result in lower levels of switching (as discussed in paragraph A6.68).

A5.75 The difference between the April 2011 Consultation and our current calculations do not have a significant impact on the value of X (less than the rounding error of 0.25%).

Summary of the impact of our charge control on demand for wholesale ISDN30 rentals

A5.76 Table A5.7 below summarises the effects on rental volumes that we expect as a result of the charge control.

Table A5.7 Summary of the impacts of our charge control on rentals (base case scenario)

	Volumes 2013/14	Share of Stage 1 forecast
Stage 1 forecast	**1,555,670**	**N/a**
Switching from 2Mbit/s PPCs	6,404	0.4%
Expansion of retail demand	64,987	4.2%
Decrease in switching to IP	98,043	6.3%
Stage 2 forecast	**1,725,105**	**10.9%**

A5.77 As a result of the effects considered, we estimate that the charge control will increase volumes by 10.9% (i.e. 169,435 channels) compared to forecasts without the charge control.

A5.78 The final volume forecast, taking the charge control into account, is that wholesale ISDN30 rentals will decline by 19% from the year 2010/11 to the end of the charge control period in 2013/14.

Our forecast of future wholesale ISDN30 connection volumes

A5.79 We have forecast connection volumes in a consistent manner with rental volumes, following the same approach we used in the April 2011 Consultation.

A5.80 In Table A5.8 we present stakeholders' estimates of the expected decline in the annual volumes of connections for the period 2010/11 to 2013/14 both in our April 2011 Consultation (adjusted using the same approach described in paragraph A5.14 above) and in their latest submissions in February 2012. The connection forecasts are compared to the stakeholder's rental forecasts in each case.

Table A5.8 Percentage decline in connection and rental volumes over the period 2010/11 – 2013/14 (stakeholders' forecasts)

	April 2011 Consultation		Latest	
	Connections	Rentals	Connections	Rentals
Openreach	✂ [- 50 to -60%]	✂ [- 40% to -50%]	✂ [-40% to -50%]	✂ [- 30% to -40%]
OCP 1	N/a	N/a	✂ [-10% to -20%]	✂ [-20 to -30%]
OCP 2	✂ [-0% to – 10%]	✂ [- 0% to -10%]	✂ [-50% to -60%]	✂ [- 0% to -10%]

A5.81 Table A5.8 above shows that there is significant variation in stakeholders' forecasts. Openreach expects a smaller decline in connection volumes now than at the time of the April 2011 Consultation, which is consistent with the smaller decline in its latest rentals forecast.

A5.82 In order to ensure consistency with our Stage 1 volume forecast for rentals, we have derived our Stage 1 connection volumes from the rental Stage 1 volumes. To do this we have assumed that the difference in the rental volumes of two consecutive years is proportional to the amount of gross connections (i.e. the number of new subscribers to ISDN30) less churn (i.e. the loss of customers subscribing to ISDN30).[138] In other words, we have followed this relationship:

$$Rentals_t - Rentals_{t-1} = Gross\ connections_t - Churn_t$$

A5.83 We have calculated wholesale ISDN30 gross connection volumes using the above relationship. First, we have estimated the annual churn rate for the period between 2004/05 and 2010/11 as shown in the last row of Table A5.9 below.

[138] We note that transfers do not affect the calculation of connections, given that they only relate to a transfer of an end customer over Openreach's network (i.e. a transfer from one OCP using Openreach's network to another OCP using Openreach's network).

Table A5.9 Estimation of churn volumes for the period 2004/05 to 2010/11

		05/06[139]	06/07	07/08	08/09	09/10	10/11
a	Rentals[140]	2,133,850	2,159,625	2,224,647	2,271,656	2,066,327	2,045,506
b	Difference[141]	94,986	25,776	65,022	47,009	-205,330	-20,820
c	Connections[142]	417,000	389,000	272,000	276,000	200,869	218,243
d	Churn (c – b)[143]	322,014	363,224	206,978	228,991	406,199	239,063
	% rentals[144]	15.1%	16.8%	9.3%	10.1%	19.7%	11.7%

A5.84 Second, using all the annual churn rates in the last row of the table above, we calculate the average churn rate for the period running from 2004/05 to 2010/11, equal to 13.8% of rental volumes.[145] Then, we apply this average churn rate to our Stage 1 rental volumes forecast to obtain the churn volumes for each year of the period running from 2011/12 to 2013/14. Finally, we obtain the annual gross connection volumes for the period 2011/12 to 2013/14 by adding these churn volumes to the difference in the rental volumes calculated in Stage 1, as follows:

$$Gross\ connections_t = Rentals_t - Rentals_{t-1} + Churn_t$$

A5.85 This is shown in Table A5.10 below.

[139] The first actual data corresponds to the year 2004/05. We only report here from year 2005/06.
[140] Rental volumes for the period considered provided by Openreach.
[141] The difference between one year's rental volumes and the previous year's rental volumes.
[142] Connection volumes for the period considered provided by Openreach.
[143] Churn volumes calculated as shown above.
[144] Each year's churn volumes as a share of that year's total rental volumes. The average churn rate of 13.8% is calculated averaging these percentages.
[145] That is the average churn rate of 13.8% is calculated as the average of 15.1% (the 2005/06 churn rate, as shown in the last row of Table A5.9), 16.8% (2006/07), 9.3% (2007/08), 10.1% (2008/09), 19.7% (2009/10) and 11.7% (2010/11).

Table A5.10 Estimation of connection volumes for the period 2011/12 to 2013/14

		Ofcom forecast		
		11/12	12/13	13/14
a	Rentals calculated in Stage 1[146]	1,918,793	1,727,718	1,555,670
b	Difference[147]	-212,207	-191,075	-172,048
c	Churn[148]	264,279	237,962	214,265
d	Connections (b + c)[149]	52,072	46,887	42,218

A5.86 Using this approach we have estimated that connections would decrease by 42% from 2010/11 until the end of the charge control period in 2013/14 if current prices remained unchanged. To obtain the final gross connection volumes in Stage 2 we need to account for the impact of our charge control on connection volumes. We do this by using our Stage 2 rental volumes forecast and applying the same methodology used to estimate the Stage 1 connection volumes. Using this approach we obtain the Stage 2 connection volume forecast shown in Table A5.11 below.

Table A5.11 Estimation of the Stage 2 volume forecast for connections for the period 2011/12 to 2013/14

		Ofcom forecast		
		11/12	12/13	13/14
a	Rentals calculated in Stage 2[150]	1,918,793	1,819,373	1,725,105
b	Difference[151]	-212,207	-99,420	-94,268
c	Churn[152]	264,279	250,586	237,602
d	Connections (b + c)[153]	52,072	151,166	143,334

A5.87 As shown above, we estimate that connection volumes will decrease by around 34%[154] by the end of the charge control, after accounting for the impact of the

[146] Our initial volumes forecast for rentals.
[147] The difference between one year's rental volumes forecast and the previous year's rental volumes forecast.
[148] Churn volumes have been calculated multiplying the rental volumes by the 13.8% average churn rate calculated previously.
[149] Connections volumes calculated as described above.
[150] Our adjusted volumes forecast for rentals.
[151] The difference between one year's rental volumes forecast and the previous year's rental volumes forecast.
[152] Churn volumes have been calculated multiplying the rental volumes by the 13.8% average churn rate calculated previously.
[153] Connections volumes calculated as described above.

charge control. As can be seen in Table A5.11 there is a significant increase in the connection volumes in 2012/13 relative to that same year Stage 1 volume forecast. This is due to the additional volumes resulting from the expected impact of our charge control on demand for ISDN30.[155] However, this increase (relative to the Stage 1 volume forecast) declines slightly over the period of the charge control, reflecting our prediction of structural decline in ISDN30 volumes.[156]

Our forecast of future wholesale ISDN30 transfer volumes

A5.88 To estimate the volumes of transfers we have firstly looked at Openreach's expected transfer volumes for the period to 2013/14 in the April 2011 Consultation and in its submission on 3 February 2012 in Table A5.12 below.

Table A5.12 Percentage decline in transfer volumes over the period 2010/11 – 2013/14

	April 2011 Consultation	Latest
Openreach	✂ [- 60% to – 70%]	✂ [-20% to -30%]

A5.89 There is a significant difference between Openreach's transfer volumes forecast used in the April 2011 Consultation and the most recent evidence submitted by Openreach.

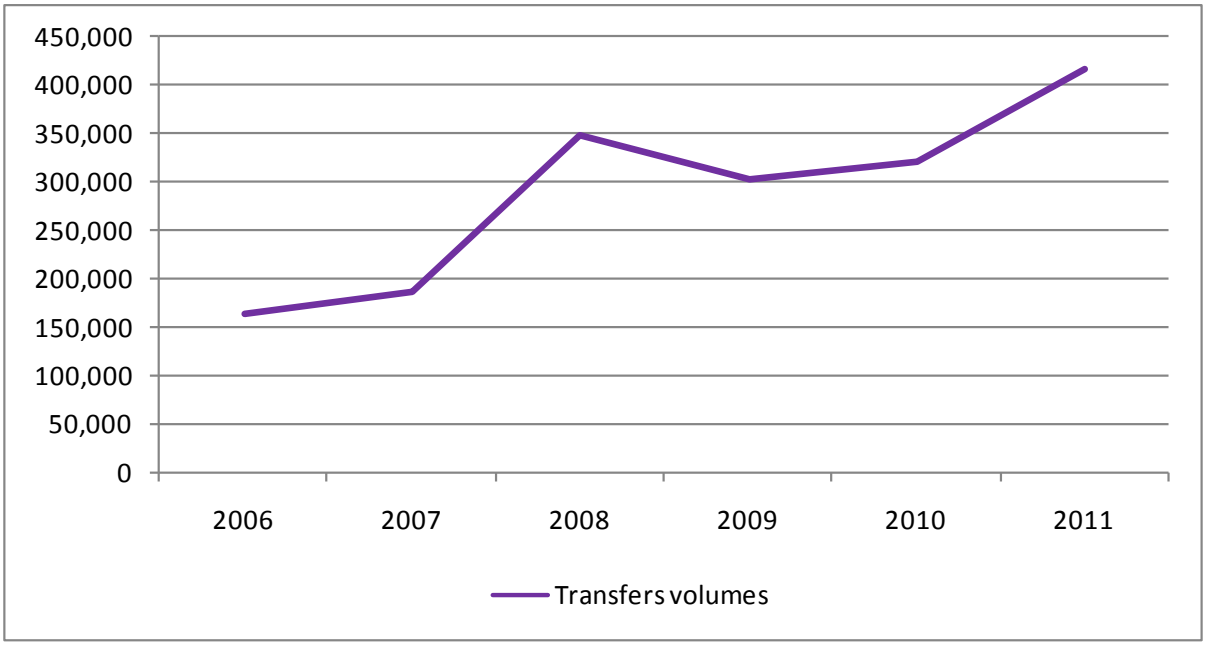
A5.90 As discussed in the April 2011 Consultation, we believed that Openreach had significantly overestimated the decline in transfer volumes. We expect that transfers will not necessarily decline in proportion to the expected decline in rentals..In fact, as shown in Figure A5.2 below, over the last three years the volumes of transfers initially declined and increased thereafter. This has resulted in an increase of the percentage of transfers as a share of rentals over the period (see Table A5.13).

[154] That is (143,334/218,000 – 1) = - 34%, where 218,000 channels are the number of connections in year 2010/11.

[155] We note that there is a discrepancy between the change in annual connections from Stage 1 to Stage 2 and the additional rental channels that our Volumes forecast model estimates will result from our charge control. This is due to the methodology we have used to derive connection volumes from rental volumes. We note however that the impact of this difference on the value of X is not likely to be material – we estimated that the assumption of 100k additional connections only resulted in a decrease in the value of X of 0.07pp – because connections respresent a small share of the total revenues of the combined connections and rentals basket.

[156] The effect on the value of X of adopting a different forecast profile for connections is not significant, given that they only represent around 2% of the total revenues of the combined connections and rentals basket.

Figure A5.2 Transfer volumes (05/06 – 10/11)



Source: BT's RFS 2006/07, 2008/09, 2010/11.

A5.91 We believe that even if the wholesale ISDN30 market is expected to decline, transfers could remain fairly stable as indicated by the increase in transfers in the last three years. We consider that the increase in transfers volumes shown by the latest evidence might reflect increased competition between BT Retail and other re-sellers for the remaining ISDN30 customers. We have assumed a decline in transfer volumes of around 14% during the period of the charge control. This represents a slight increase in the number of transfers as a percentage of the rental volumes, to around 16% of total rental volumes. This is shown in Table A5.13 below.

Table A5.13 Transfer volumes share of rental volumes before and after period of charge control

	2004/05	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**
Rental volumes	2,038,864	2,133,850	2,159,625	2,224,647	2,271,656	2,066,327
Transfer volumes	110,367	164,000	186,000	346,000	302,000	316,977
% share	**5.41%**	**7.69%**	**8.61%**	**15.55%**	**13.29%**	**15.34%**
	2010/11	**2011/12**	**2012/13**	**2013/14**		
Rental volumes	2,131,000	1,918,793	1,819,373	1,725,105		
Transfer volumes	318,000	302,445	287,651	273,581		
% share	**14.92%**	**15.76%**	**15.81%**	**15.86%**		

Summary of the Stage 2 volume forecast of wholesale ISDN30 core services

A5.92 The final adjusted volumes forecast for all three core services used in our Cost Forecast model is presented in Table A5.14 below.

Table A5.14 Final core services forecast for the period 2010/11 to 2013/14

	Actual	Ofcom forecast		
	10/11[157]	**11/12**	**12/13**	**13/14**
Rentals[158]	2,131,000	1,918,793	1,819,373	1,725,105
Connections[159]	218,000	52,072	151,166	143,334
Transfers[160]	318,000	302,445	287,651	273,581

[157] The 2010/11 actual volumes correspond to the volumes we use in our Cost Forecast model and differ from the volumes provided by Openreach in its forecasts. The difference between the two estimates mainly reflects that our Cost Forecast model includes volumes from Northern Ireland and they are mid-year (Openreach's S135 submission being end of year).
[158] The final rental volumes for the entire period of the charge control are calculated by using the final estimated volumes in 2013/14 (shown in Table A5.7) which accounts for all the impacts of the charge control, deriving an annual decrease relative to the current 2010/11 actual volumes (equal in this case to an annual percentage decline of around 10%) and, using this, estimating the volumes of rental channels in every year of the charge control period (i.e. from 2011/12 to 2013/14).
[159] The connection volumes as shown in Table A5.11 above.
[160] The transfer volumes as shown in Table A5.13 above.

Annex 6

Switching Analysis

Introduction

A6.1 This annex sets out the analysis and assumptions used in our estimate of the number of channels that switch from PPCs to wholesale ISDN30 as a result of the imposition of the charge control.

A6.2 We summarise the analysis that we presented in the April 2011 Consultation, updating our analysis with revised data and additional explanations where necessary. We do not address stakeholder comments in this annex; these have been fully addressed in Section 5 at paragraphs 5.325 to 5.339, and do not affect the underlying methodology of our switching analysis.

A6.3 OCPs can choose between different wholesale inputs to provide retail ISDN30 services, including wholesale ISDN30 and 2Mbit/s Partial Private Circuits (PPCs) to provide retail ISDN30 services. When deciding whether to use wholesale ISDN30 or PPCs, several factors determine OCPs' choice, including the prices that Openreach charges for the supply of wholesale ISDN30.

A6.4 We have developed a model (the 'Switching model') to assess to what extent OCPs are likely to switch from using PPCs to wholesale ISDN30 when the price of wholesale ISDN30 is reduced in line with the charge control.

A6.5 This annex includes the following sections:

- a summary of the results of the switching analysis;
- an overview of the factors that determine OCPs' choice of form of supply;
- a description of the costs incurred by OCPs in the provision of retail ISDN30 services using PPCs;
- a description of the structure of the Switching model and assumptions we have made; and
- the estimates of the volumes of channels switching from PPCs to wholesale ISDN30 using different scenarios.

Summary of results

A6.6 We estimate that approximately 5% of future and current ISDN30 channels provided using PPCs are likely to switch to Openreach's wholesale ISDN30 services due to the lower prices arising from the charge control. The additional channels our model has estimated as switching to wholesale ISDN30 would only represent 0.4% of the total Openreach volumes by the end of the charge control.

OCPs' choice of wholesale input to supply retail ISDN30

A6.7 There are three main forms of supply for retail ISDN30 services (see Annex 2). OCPs' preference for using a particularly form of ISDN30 supply is linked to their business strategy. OCPs that have an infrastructure strategy (i.e. they have a

strong preference to deploy their own services rather than purchase wholesale services from others such as Openreach) often use three forms of supply and will normally choose them in the following order of preference:

- end to end own infrastructure: the OCP uses its own exchange concentrator and connects it to the customer with a digital bearer running over its own access network;

- own infrastructure and 2Mbit/s PPCs: the OCP uses its own exchange concentrator and connects it to the customer using a PPC rented from BT or another infrastructure provider; and

- wholesale ISDN30 purchased from Openreach: the OCP uses Openreach's wholesale ISDN30 service.

A6.8 The OCP's choice of wholesale input may vary from customer to customer. An OCP will typically assess which is the less costly form of supply for each customer. The key factors affecting this choice are:

- the location of the customer, which will determine the costs of extending the OCP's network as well as the likelihood of additional demand from other customers and, hence, the potential for economies of scale and scope;

- the expected customer revenues, which are dependent on:

  - the number of ISDN30 channels purchased and the prospects of future additional demand for ISDN30 and other services from that customer;

  - the customer's expected lifetime, which will depend on the duration of the initial contract and the operator's view on the likelihood of it being extended[161]; and

- the relative prices of wholesale ISDN30 and alternative methods of provision.

A6.9 Where OCPs already have their own infrastructure, it is likely to be cost effective to use it rather than purchasing wholesale services from BT. This is because it makes the services simpler to provide and because investing in infrastructure alters the structure of the OCP's costs. When an OCP installs its own access network it typically incurs high sunk and fixed costs (i.e. the costs of installing the infrastructure required), but the variable costs (i.e. the costs of running the services once the infrastructure has been installed) of using it are then relatively low. OCPs tend to locate their access networks in areas with a high number of customers because this way they can spread their high fixed costs over a larger number of services (benefiting from economies of scope) and customers (benefiting from economies of scale). In this way, OCPs can recover their initial investment in infrastructure while at the same time reducing their variable costs.

A6.10 Most infrastructure OCPs will typically use PPCs in cases where the cost of extending their access network exceeds the expected customer revenues and is not justified in terms of the benefits of any potential economies of scale and scope associated with the access network extension.

[161] The average contract length of an ISDN30 retail customer tends to be around five years. However, many end users tend to extend their initial contract and OCPs' view on the probability of an initial contract being extended will be a factor in their choice of method of provision.

A6.11 Typically, infrastructure OCPs that have used PPCs to provide retail ISDN30 services only opt for wholesale ISDN30 where the costs of serving a customer using PPCs significantly exceed the costs of purchasing wholesale ISDN30. Other things being equal, these OCPs tend to prefer PPCs to wholesale ISDN30 because this allows them to make more use of their own infrastructure.

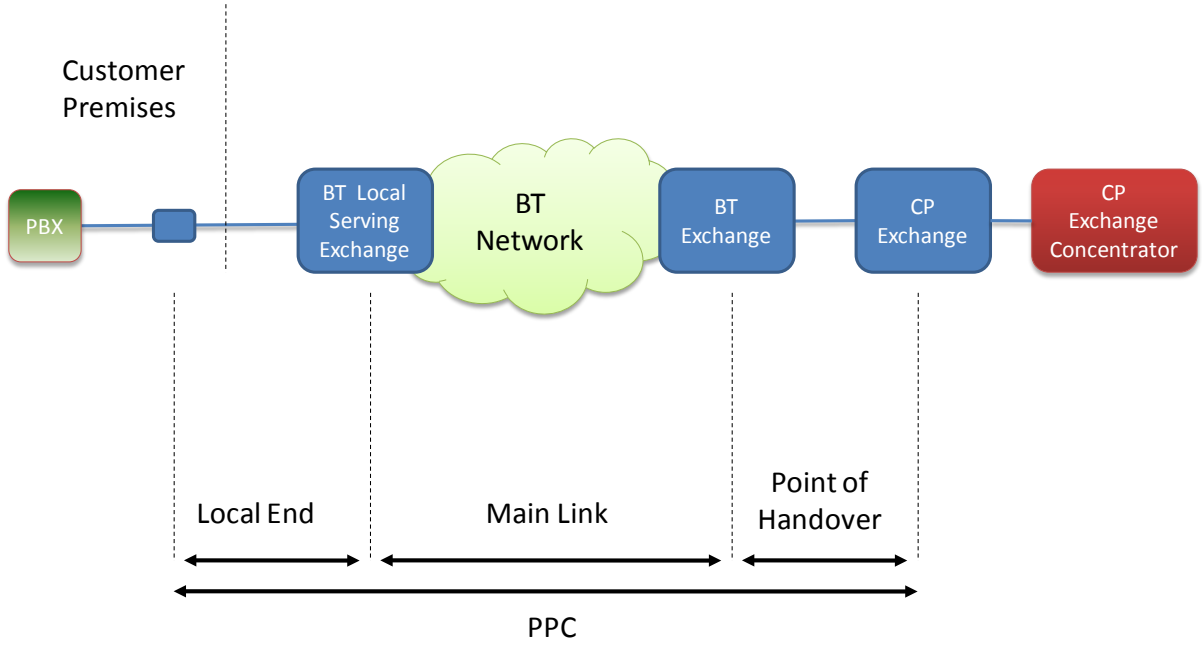
Provision of ISDN30 using PPCs

A6.12 Although most OCPs purchase PPCs from BT Wholesale, in a few instances they make use of other infrastructure providers' wholesale inputs.

A6.13 Approximately 102,410 ISDN30 channels were provided using PPCs in June 2011 (compared to 96,492 in June 2010). These represented 14% of the total channels self supplied by infrastructure providers and around 4% of the total number of retail channels in the same year.

A6.14 Figure A6.1 below illustrates the provision of ISDN30 using a PPC.

Figure A6.1 Provision of ISDN30 using a PPC



A6.15 A PPC provides a circuit of dedicated transmission capacity between end-users premises and a Point of Handover (PoH). The PoH is a high bandwidth interconnection circuit between the BT and CP networks used for multiple PPCs. In PPC terminology, the end-user is referred to as the third-party.

A6.16 Figure A6.1 above shows that a PPC is comprised of three segments:

- the Local End connecting the customer premises to the BT local serving exchange;
- the Main Link connecting the BT local serving exchange to a remote BT exchange where the PoH is located. Depending on the location of the serving exchange and the PoH, the main link may cross the core of BT's network between Tier1 nodes (i.e. major nodes); and

- the Point of Handover, a short distance circuit segment between the BT main exchange and a nearby CP exchange.

A6.17 In order to provide ISDN30 using a BT PPC, OCPs have to provide several inputs of their own as well as renting a PPC from BT. In the April 2011 Consultation we listed the set up and recurring costs that OCPs need to incur to provide retail ISDN30 services using PPCs. This included costs relating to OCPs' own infrastructure and to BT's PPC costs (see Table A9.1 and A9.2 in the April 2011 Consultation).[162]

Structure and purpose of the Switching model

A6.18 The main objective of the Switching model is to estimate the extent to which, as a result of our charge control on wholesale ISDN30 services, OCPs may switch current and future provision of ISDN30 from PPCs to Openreach's wholesale offering. We have not assessed how our charge control on ISDN30 will impact OCPs' use of their end to end infrastructure. This is because OCPs are likely to consider these investments as sunk (i.e. not recoverable) and, therefore, OCPs are unlikely to switch customers from their network to Openreach. Furthermore, supply over end to end own infrastructure is the OCPs' preferred form of supply, given that it allows them to spread their high fixed costs over a larger amount of services. Therefore we consider that it is unlikely that our charge control will affect OCPs' choice between this form of supply and wholesale ISDN30.

A6.19 The Switching model should not be confused with the incremental cost differential analysis we discuss in Annex 7. The incremental cost analysis is a cross-check on the differential between (i) the wholesale ISDN30 rental and connection charges that will result from the charge control and (ii) the rental and connection charges for a 2Mbit/s PPC. Both wholesale ISDN30 and a PPC can be used to supply a retail ISDN30 service. If the differential is at the appropriate level (i.e. it is broadly equal to the difference in the incremental costs of these two services) CPs will be encouraged to deploy retail ISDN30 based on the efficient (cost minimising) wholesale service.

A6.20 The Switching model, on the other hand, is intended to identify the least cost option of supply based on OCPs' costs. This model is used to estimate the volumes of ISDN30 which are likely to be provided using either PPCs or wholesale ISDN30, when the price of the latter is set at the level implied by our charge control. By comparing our estimates of OCPs' costs of supply using either technology we can estimate the proportion of current and future PPC demand that may switch to wholesale ISDN30. This then feeds into our estimate of demand for ISDN30.

A6.21 As described below, the structure of the PPC wholesale charges is such that PPCs tend to be more economical the higher the number of ISDN30 channels used in a bearer. The maximum number of ISDN30 channels that can be provided over a single 2Mbit/s PPC bearer is 30. The switching model estimates the number of channels that may switch from PPCs to Openreach's wholesale ISDN30 in two steps:

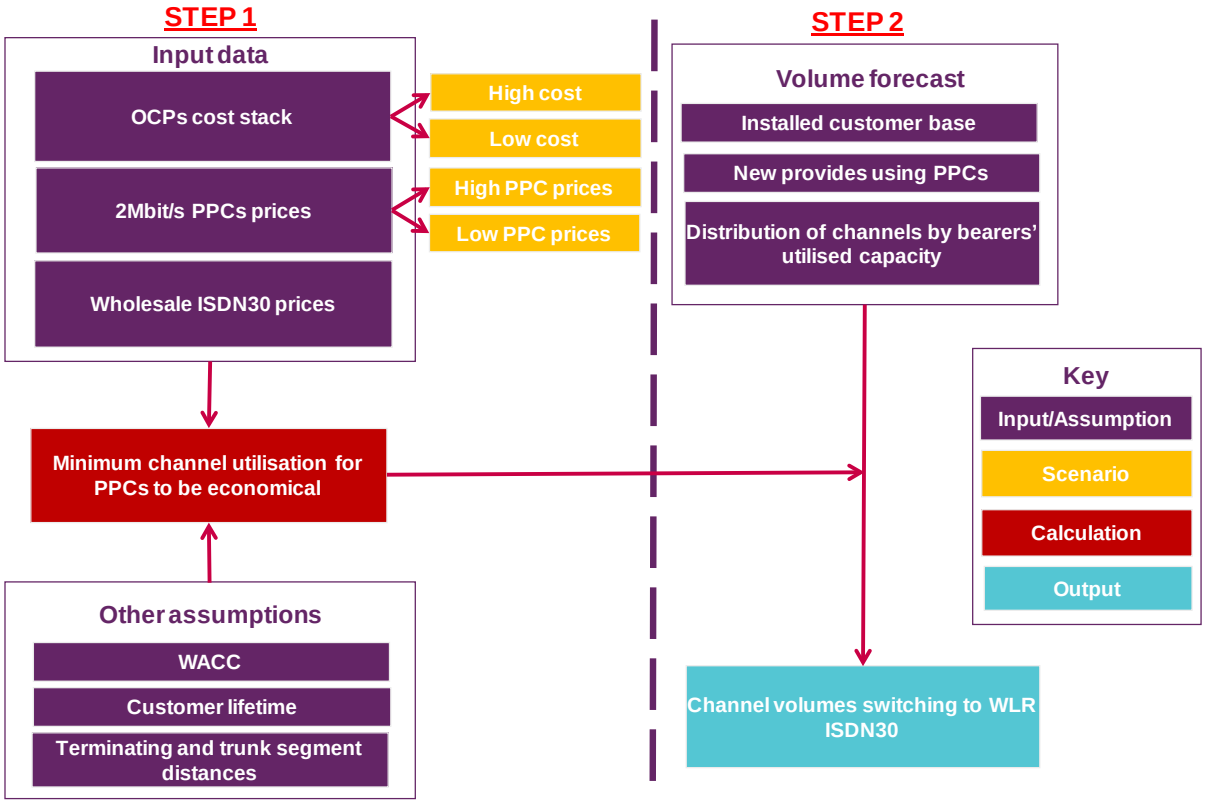
- Step 1: We calculate the minimum number of channels per 2Mbit/s PPC bearer that would make supply of ISDN30 using PPCs more economical than supply using Openreach's wholesale ISDN30;

[162] See the April 2011 Consultation, pp. 193-194, available at http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf

- Step 2: We estimate the number of ISDN30 channels that will switch from PPCs to Openreach's wholesale ISDN30 product. The inputs to this step are the outputs from Step 1, the ISDN30 volumes forecast and the distribution of total ISDN30 channels by the bearers' utilised capacity (i.e. how many channels are supplied on bearers with 18 channels, 20 channels, 22 channels, etc.).

A6.22 Figure A6.2 below summarises the model's structure.

Figure A6.2 The Switching model structure



A6.23 In the following sections we describe in detail each of these steps, the assumptions we have used and the different scenarios modelled.

Step 1: The minimum number of channels required for provision of ISDN30 using PPCs to be economical

A6.24 Retail ISDN30 services are generally charged on a per-channel basis. At the wholesale level, the cost of providing ISDN30 services using PPCs is mainly driven by the wholesale charges of a 2Mbit/s PPC which are levied on a per-bearer basis (each of which is capable of supporting up to thirty channels). In contrast, Openreach's wholesale ISDN30 charges are on a per-channel, rather than on a per-bearer basis. For this reason, the costs of using wholesale ISDN30 are driven by the amount of channels purchased, rather than the number of bearers.

A6.25 This means that for an OCP the costs of using wholesale ISDN30 increase linearly with the number of channels required by the end user, whereas in the case of PPCs they increase on a per-bearer basis and therefore do not vary regardless of the number of channels in use on each bearer. Therefore, an increase in the number of channels increases the costs of wholesale ISDN30 while decreasing the costs of the 2Mbit/s PPC on a per channel basis.

A6.26 Given the above, the Switching model calculates the number of channels at which PPC provision becomes more economical than wholesale ISDN30 using two inputs:

- a cost model of ISDN30 provision using PPCs which includes OCPs' own infrastructure costs and relevant PPC charges; and
- estimates of the wholesale ISDN30 prices resulting from our charge control.

A6.27 Below we describe the assumptions used in our model.

Cost scenarios used

A6.28 Based on information we have received from OCPs we have developed two cost scenarios,

- a 'High' cost scenario in which we have used the cost figures provided by OCPs. This represents the OCPs' view of the average cost of providing ISDN30 over PPCs; and
- a 'Low' cost scenario in which we have amended some of the assumptions in the OCPs' cost stack. This represents our view of the lowest cost of providing ISDN30 over PPCs and therefore the most attractive case for the provision of ISDN30 over PPCs. It uses the cheapest Third Party Infrastructure components and assumes that OCPs' equipment capital costs are sunk and so not relevant to the choice between PPCs and wholesale ISDN30.

A6.29 The main features of the two scenarios are summarised in Table A6.1 below and explained in detail in the following sections.

Table A6.1 Assumptions in the High and Low cost scenarios

Cost component	High cost scenario	Low cost scenario
Third party infrastructure charge	Provision of Local End over fibre infrastructure with 2Mbit/s 4 by 2 multiplexors. New fibre infrastructure required at ✂% of sites. ✂Mbit/s circuits in use on the 4x2 multiplexors.	Provision of Local End over existing copper infrastructure – cheapest method of provision of Local End.
OCPs' exchange concentrator costs	Includes the capital costs of the OCPs' exchange concentrator and associated exchange space	Assumes these capital costs are sunk and will not affect the decision to switch
OCPs' transmission costs	Includes the capital costs associated with the transmission equipment	Assumes these capital costs are sunk and will not affect the decision to switch to wholesale ISDN30
OCPs' provision and service management costs	Uses the ✂£/hour pay rate for technicians dealing with provision activities provided to us by the OCP.	Uses the £17.26/hour Standard Cost Model pay rate for these activities.
Share of Point of Handover costs	A pro-rata share of the PoH connection and rental costs are included	Does not include a share of the PoH connection and rental costs, as these are sunk costs

A6.30 The rationale behind these assumptions is explained below.

OCP costs that have remained unchanged since the April 2011 Consultation

A6.31 In the April 2011 Consultation we presented a list of the costs that OCPs need to incur to provide ISDN30 services using PPCs. We discussed the treatment of each of these costs in the High and Low cost scenarios used in our Switching model. Some of these costs have remained unchanged since the April 2011 Consultation, in particular:

- OCPs' exchange concentrator costs (see paragraph A9.33 of the April 2011 Consultation);
- OCPs' transmission costs (see paragraph A9.34 of the April 2011 Consultation);
- OCPs' provision and service management costs (see paragraphs A9.35-A9.37 of the April 2011 Consultation);
- OCPs' point of handover costs (see paragraph A9.38 of the April 2011 Consultation);
- our treatment of excess construction charges (see paragraph A9.39-A9.42 of the April 2011 Consultation);
- labour related cost inflation (see paragraph A9.45 of the April 2011 Consultation); and,

- terminating and trunk segment distances (see paragraph A9.46 of the April 2011 Consultation).

A6.32 We do not discuss the above costs further and refer to the April 2011 Consultation for a more detailed analysis. Below we only discuss the costs that have been subject to changes since the April 2011 Consultation.

Third party infrastructure charge

A6.33 Since the publication of our April 2011 Consultation, BT has introduced new PPC charges in October and December 2011. Accordingly, we have updated the PPC prices in the Switching model with the latest available prices from BT's carrier price list. For this reason, the costs presented below relate to BT's PPC prices effective on 25 January 2012 and differ from the prices we presented in our April 2011 Consultation.

A6.34 For the High cost scenario we assume that the PPC is provided over fibre infrastructure and that on average:

- the £2,403 'Additional charge to provide new fibre infrastructure at a new site' charge is applicable at ✂ of sites i.e. a cost of ✂£ per site and at other sites existing fibre is available (not chargeable); and

- that ✂ circuits on each 4 by 2 multiplexor are in use. ✂ of the £4,532 'Provide a 2Mbit/s 4x2 at existing fibre site' charge is applicable to each circuit.

A6.35 In practice, 2Mbit/s PPCs can be provided more cheaply if the service is provided over existing copper infrastructure. Therefore, in the Low cost scenario we assume:

- that a single 2Mbit/s PPC is provided using HDSL over existing copper infrastructure; and therefore,

A6.36 that the £1,206 '2Mbit/s circuit delivered by HDSL on existing copper' charge is applicable.

Customer lifetime, annualised connection costs and WACC

A6.37 Connection costs are the 'upfront' costs incurred by the OCP when a new customer joins its network. Once incurred, these costs are likely to be sunk because the OCP is unlikely to be able to recover them if the customer subsequently leaves its network. OCPs typically recover connection costs partly through a one-off connection charge and partly through ongoing rental charges. In the Switching model we assume that both wholesale ISDN30 and PPC connection costs are recovered over a period of 5 years.[163] The market research that we conducted

[163]Sensitivity analysis we conducted in the April 2011 Consultation using the Switching model suggested that increasing the assumed customer lifetime above 5 years was unlikely to have a material impact on the value of X. Assuming significantly shorter customer lifetimes (e.g. 2 year) could lead to a more significant increase in the use of wholesale ISDN30 in preference to PPCs, with a maximum impact of about 35,738 channels switching over the period of the charge control. However, this had no material impact on the value of X. We have not repeated this sensitivity in our current decision.

during our ISDN30 2010 Market Review found that, on average, ISDN30 customers stay with an OCP for between five to six years.[164]

A6.38 For the annualised connection costs we have used the "rest of BT" WACC applicable to leased lines as the discount rate. Since the publication of the WBA 2011 Statement we have set the "rest of BT" WACC at 9.7% (compared to 9.3% at the time of the April 2011 Consultation).[165] We note that our decision on the level of the "rest of BT" WACC, as set out in the WBA 2011 Statement, is currently under appeal.[166]

The wholesale 2Mbit/s PPCs prices

A6.39 BT's PPC charges are currently subject to the charge controls introduced in the Leased Lines Charge Control Decision (LLCC Decision) of July 2009[167], which will last until 30 September 2012. The Switching model takes the impact of the charge controls on PPC pricing into account.

A6.40 All the PPC inputs used to provide ISDN30 are subject to a basket price cap and sub caps that apply to certain services within that basket. The main basket price cap limits the average increase in prices for that basket to a maximum of RPI-1.75%. The average increase is naturally always lower than the maximum increase permitted for any individual price within the overall basket, which is given by the safeguard cap of RPI % or RPI+5%. To reflect this, we have developed two cost scenarios.

- In the 'Low PPC prices' scenario we have assumed that BT will reduce prices of every PPC input by the basket cap applicable to that PPC input.

- In the 'High PPC prices' scenario, we assume that BT will increase prices to the extent allowed by the safeguard cap applicable to each PPC input (which means that charges for other services in the basket must decrease by more than the value of the basket cap).

A6.41 This means that for each of the 'Low' and 'High' cost scenarios described in the previous section, the model estimates the extent of switching for the 'Low PPC prices' and 'High PPC prices' scenarios.

A6.42 We note that since the April 2011 Consultation, BT has introduced new PPC charges on 10 October 2011 and 1 December 2011. We have changed the PPC prices in the base year of the charge control (2010/11) in our model to reflect the charges effective on 25 January 2012. This has not had a significant impact on the results of our Switching model, given that the 2010/11 PPC charges have been broadly aligned with the forecast for that year that we used in the April 2011 Consultation (as discussed in paragraph A6.77 below).

[164] See Ofcom, *Narrowband Multi-channels Market Research*, page 23, available at: http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30/narrowband.pdf
[165] See the WBA 2011 Statement, available at http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf
[166] See *British Telecommunications (Wholesale Broadband Access Charge Control) v Office of Communications*, Competition Appeal Tribunal, case number 1187/3/3/11, available at http://www.catribunal.org.uk/237-7278/1187-3-3-11-British-Telecommunications-plc-Wholesale-Broadband-Access-Charge-Control.html
[167] See http://stakeholders.ofcom.org.uk/consultations/llcc/statement/

A6.43 In our model we have assumed that PPC prices will be affected by the price caps that we imposed in our LLCC Decision up to the year 2012/13, reflecting the fact that the LLCC Decision will last until 30 September 2012. In the April 2011 Consultation we assumed that in the last year of the ISDN30 charge control (i.e. 2013/14) PPC prices would remain at the level of the year 2012/13, under the assumption that our LLCC Decision would have brought prices in line with the underlying costs over the current period of the charge control[168].

A6.44 We are currently reviewing the charge controls for leased lines that will be effective after September 2012 and expect to publish a consultation document later this year. The assumption of the April 2011 Consultation regarding PPC prices is subject to uncertainty. We have therefore conducted a sensitivity analysis on our Switching model to establish whether different results of the ongoing review of leased lines charges could have a material impact on the ISDN30 charge control.

A6.45 A positive X value in the LLCC control would tend to lead to a higher level of switching from PPCs to wholesale ISDN30 than the constant PPC prices we previously assumed. We have not conducted a sensitivity analysis for negative values of X, as the impact of switching from PPCs would be lower in these cases.

A6.46 We have chosen RPI + 8% (on all the PPC service baskets used in our Switching model) as an estimate of a high X scenario for the purpose of this sensitivity analysis. Our analysis has shown that even under this high X value scenario, the impact on the volumes switching from PPCs to wholesale ISDN30 would not be of a degree to materially change our final values of X.[169]

The wholesale ISDN30 charges implied by our charge control

A6.47 To estimate the minimum number of channels at which PPCs become more economical than wholesale ISDN30, we need to compare the costs of using PPCs with the cost of using wholesale ISDN30 after the charge control is imposed.

A6.48 As described in more detail in section 5, under our charge control, we are setting a price cap on the combined basket for connections and rentals. Therefore, as in the case of our volumes forecast described in Annex 5, for the purpose of calculating the likely price decrease in wholesale ISDN30 connections and rentals resulting from our charge control, we have assumed that Openreach will increase connection prices by the maximum allowed by the safeguard cap, RPI+5%. We then derive rental prices as a residual by calculating the change in the rental required for compliance with the basket cap (RPI-12.5%) given the assumed increase in connection charges, and using prior year revenue weights. To derive the prior year revenue weight, we have used our Stage 1 volumes forecast for connections and rentals (as described in Annex 5). The ISDN30 prices used in the Switching model are the same as those used in our volume forecast, shown in Table A5.5X.

A6.49 We note that the delay in the introduction of the charge control – as well as other changes to our Cost Forecast model, discussed in Section 5 – imply that charges

[168] We acknowledge, nonetheless, that the costs of PPCs could subsequently change, for example, due to declining PPC volumes.

[169] Under this scenario we assume that PPC prices will increase by RPI+8% in 2012/13 and 2013/14, both in the case of the High and Low PPC price scenarios described above. The Switching model estimates that 18,675 channels (15.2% of the total volumes of channels that would have otherwise been provided over PPCs) are likely to switch from supply using PPCs to wholesale ISDN30. The difference with our base case scenario (which estimates 6,406 channels switching) is not of a degree to materially affect our decision on the value of X.

for wholesale ISDN30 rentals and connections will be higher than the charges we proposed in the April 2011 Consultation. This has now resulted in lower levels of switching compared to the forecasts of the model presented in the April 2011 Consultation (as also discussed in paragraph 5.337).

Model outputs from Step 1

A6.50 For each of the previous four scenarios considered (i.e. the 'Low/High cost' scenarios and the 'Low/High PPC prices' scenarios) the model calculates the minimum number of channels at which PPCs will become more economical than wholesale ISDN30 as:

$$Minimum\ number\ of\ channels =$$

$$\frac{[Costs\ of\ PPC\ provision\ (own\ infrastructure + 2Mbit/s\ PPCs)]}{[Wholesale\ ISDN30\ prices\ per\ channel\ (rental\ +\ connection)]}$$

A6.51 In other words, the minimum number of channels represents the required level of utilisation of a bearer (i.e. the number of channels supplied in a 2Mbit/s PPC bearer) that makes the costs of supplying ISDN30 using a PPC equal to the prices of a wholesale ISDN30 circuit with that same amount of channels. Therefore, if the end user requires a circuit with less than the minimum number of channels, the OCP is likely to be better off supplying this customer using wholesale ISDN30 rather than using PPCs[170].

A6.52 In addition to the four scenarios described above, when estimating the minimum number of channels required for PPCs to be economical, we have differentiated between existing customers and future new provides. This is because OCPs' choices will be different in each case.

A6.53 For existing customers, OCPs have to choose between continuing supply using PPCs or switching these customers to wholesale ISDN30. Because one-off connection costs will have already been incurred and are sunk (i.e. cannot be recovered), an OCP will only decide to switch an end user if the connection and rental prices of wholesale ISDN30 are below the recurring costs of PPCs. The OCPs' choice to switch from PPCs to wholesale ISDN30 may also be affected by other considerations such as the potential disruption that switching may cause to the end user. For this reason, we believe that our model is likely to overestimate the extent of switching that is likely to occur for existing customers.

A6.54 In the case of new provides, OCPs' decision on the form of supply will be determined by their recurring costs as well as their one-off set up costs. Therefore, the comparison will be made between their total costs of provision using PPCs (set up and recurring) and wholesale ISDN30 connection and rental prices.

A6.55 In light of the above, the model calculates the minimum number of channels separately for existing customers and new provides. Table A6.2 below summarises the results.

[170]For example, suppose the total costs per circuit are £3,000 using a PPC and that the sum of the connection and rental prices of wholesale ISDN30 are equal to £150 per channel. Then, only for customers requiring 20 or more channels will the OCP be better off using PPCs rather than wholesale ISDN30. This is because at 20 channels the costs of supplying a customer using a PPC are equal to the costs of wholesale ISDN30 (i.e., £150 per channel).

Table A6.2 Minimum number of channels required for provision of ISDN30 over PPCs to be economical by the end of the charge control

	High cost scenario		Low cost scenario	
	High PPC price	Low PPC price	High PPC price	Low PPC price
New provide	Uneconomical	Uneconomical	27	26
Existing customer	23	22	20	19

A6.56 As shown in Table A6.2 above, the switching model forecasts significantly different results for new provides and existing customers. In the case of new provides, the reduction in wholesale ISDN30 prices under the charge control is likely to make provision using PPCs uneconomical only under the High cost scenario.

A6.57 For existing customers (i.e. customers that are already being supplied using a PPC), the number of channels required for PPCs to be economical when compared to wholesale ISDN30 is much lower. This follows from the fact that for existing customers OCPs will only switch provision to wholesale ISDN30 if the sum of the connection and rental price is lower than the rental costs of using PPCs. Instead, for new provides OCPs will compare the connection and rental prices of both wholesale ISDN30 and PPCs, therefore, the number of channels at which it is economical to provide ISDN30 using PPCs will be higher in this case.

Step 2: The number of channels switching to wholesale ISDN30

A6.58 Step 1 of the Switching model estimates the number of channels required for PPCs to be more economical than wholesale ISDN30 under the charge control. This means that at the new wholesale ISDN30 prices, OCPs' customers that are being served using bearers with a lower channel utilisation than the one calculated by the model would be better off being supplied using wholesale ISDN30.

A6.59 In order to estimate the number of channels that are likely to switch from PPCs to wholesale ISDN30 we need to know how the total number of channels provided using PPCs are distributed over bearers with different channel utilisation. For this purpose, OCPs have provided to us the average number of ISDN30 channels provided in their 2Mbit/s PPC bearers and, in some cases, they have been able to provide the exact distribution of their total customer base over the PPCs used to supply them (e.g. how many channels are provided using bearers of, say, ten channels, fourteen channels, fifteen, etc.). Using this information and the minimum number of channels calculated in Step 1 we can estimate the number of channels that are likely to switch to wholesale ISDN30 by the end of the charge control.

A6.60 For example, if in Step 1 our model has calculated that the minimum number of channels for PPCs to be economical is, say, 24 and the information submitted by our stakeholders shows that there are, say, 30k channels being supplied using bearers with less than 24 channels, then in Step 2 our model will estimate that 30k channels are likely to switch to wholesale ISDN30.

A6.61 To arrive at the final estimate of the number of channels switching from PPCs to wholesale ISDN30, we have made further assumptions relating to:

- forecasting the channels provided using PPCs; and
- the distribution of channels over bearers with different channel utilisation.

A6.62 Each of these assumptions is explained below.

Forecast of ISDN30 channels provided using PPCs

A6.63 We have assumed two different volumes forecast for the period of the charge control relating to: (i) existing customers, and (ii) the future new provides that are likely to be supplied using 2Mbit/s PPCs.

Volume forecast for existing customers

A6.64 Since the April 2011 Consultation we have requested an update of the ISDN30 channels provided using PPCs from our stakeholders. The number of ISDN30 channels provided by CPs using PPCs was 102,410 in June 2011 (compared to 96,492 in June 2010). In our model we have assumed for simplicity that the number of existing customers will remain constant over the period of the charge control. In practice, some of the customers currently being supplied using PPCs are likely to switch to IP based alternatives or will be supplied by OCPs using their own access networks but the difference is unlikely to be material.

Volume forecast for new provides

A6.65 We have forecast the volumes of new provides that are likely to be supplied using PPCs during the period of the charge control using two sources of information. First, we have obtained OCPs' latest volumes of PPC new provides for the year 2010/11.

A6.66 Secondly, we have assumed this same volume of new provides for each year of the charge control from 2011/12 to 2013/14 but we have reduced it every year by the rate of decline in wholesale ISDN30 connections for this period obtained from our Stage 1 volume forecasts described in Annex 5 (i.e. an annual reduction in the new provide volumes of around 10% for this period).[171]

A6.67 Using a 10% annual reduction in new PPC provides the model estimates that the likely volumes of new ISDN30 channels supplied using PPCs for the period 2011/12 to 2013/14 will be around 20,081 channels.

A6.68 We note however that since the April 2011 Consultation we have delayed the introduction of our charge control (as discussed in the December 2011 Consultation). Under our current decision, Openreach is only likely to introduce price reductions starting in the charge control year 2012/13 (compared to 2011/12 at the time of the April 2011 Consultation). This means that, for the purposes of

[171] New PPC provides declined by 6.5% during the year Sep-10 to Sep-11 (the last quarter available). We believe the rate of decline in new PPC provides is likely to accelerate in the next years. For example, in the half year from April 2011 to Sep 2011, there were 3,176 new PPC provides. Assuming the same number of new provides in the remainder of the year to Apr-12, this would result in a 23% decline with respect to the previous year or 6,352 new provides during the period Apr-11 to Apr-12 (which is broadly in line with our forecast of 7.4k new channels for the year 11/12). We therefore consider it reasonable to assume an annual 10% decline in new PPC provides from the year 2010/11 to 2013/14.

estimating the switching volumes, we have treated the new PPC provides in the year 2011/12 as "existing customers", whereas only new PPC provides in the years 2012/13 and 2013/14 are effectively treated as "new provides". This has increased the number of channels treated as "existing customers" from 96,492 (in the April 2011 Consultation) to 109,817 channels in our current decision. Conversely, the volumes treated as "new provides" have declined from 29,987 to 12,674 by the end of the year 2013/14. These changes have resulted in lower levels of switching from PPCs to wholesale ISDN30 in our current decision (compared to the April 2011 Consultation) given that, as described in paragraphs A6.52 – A6.57, existing customers are less likely to switch to wholesale ISDN30.

A6.69 The sum of the existing customers and new provides channels gives us the total pool of ISDN30 PPC provides that could switch to wholesale ISDN30 during the charge control period (2010/11 to 2013/14), which we estimate at 122,491 channels.

Distribution of ISDN30 channels over bearers by the bearers' utilised capacity

A6.70 As discussed above, the distribution of channels by the bearers' utilised capacity is used to determine the extent of switching once the model has calculated the minimum number of channels required for PPCs to be more economical than wholesale ISDN30. Since our April 2011 Consultation we have requested an update of this information[172] and the data provided by OCPs is presented in Figure A6.3 below, which shows the share of total ISDN30 channels by the bearers' utilised capacity (e.g. it shows that around ✂ of the total channels provided using PPCs are supplied using bearers of less than ✂ channels).

Figure A6.3 ✂

A6.71 As can be seen in Figure A6.3 above, there have been no significant changes in the distribution of channels by the bearers' utilised capacity. The vast majority of channels continue to be provided using bearers at close to full capacity (i.e. 30 channels). There has been however a slight increase in the average number of channels per 2Mbit/s PPC bearer on average across all OCPs using PPCs to supply ISDN30 from around 27 channels in the April 2011 Consultation to around 28.5 for the model discussed in this Annex (with the median being 30 channels). This change has resulted in lower levels of switching from PPCs to wholesale ISDN30 in our decision compared to the April 2011 Consultation.[173] The Switching model assumes that new provides will have the same distribution (shown in Figure A6.3) as the existing customers.

A6.72 Figure A6.3 above also shows that there is a significant share of channels that are currently provided using bearers with a relatively low channel utilisation (for example, the ✂% of total channels that are currently provided using circuits with less than ✂ channels). Even at current prices, our model predicts that under the assumptions used, supplying these channels using PPCs may not be economical and that OCPs would be better off supplying them using wholesale ISDN30. This

[172] See OCPs response to 1st section 135 ✂

[173] A higher number of channels per bearer results in a lower per channel cost of supply using PPCs, as PPC charges are on a per bearer basis. Therefore, for a given wholesale ISDN30 price, the higher the number of channels per PPC the lower the cost of supply using PPCs relative to wholesale ISDN30.

shows that some additional factors (outside those explicitly included in the model) matter for the actual choices. For example:

- the customer premises might be located closer to the OCPs' network than the average trunk and terminating segment distances assumed by our model;
- OCPs' might choose to connect their network to an end user. Even if they incur losses in the short term, the OCP might anticipate being able to recoup the losses in the future, if, for example, they anticipate additional future demand from that customer;
- the ISDN30 service may be provided in conjunction with other services at the same site, which could make provision using PPCs economical;
- the end user may have requested a high number of circuits to be connected and the bearers with lower channel utilisation simply reflect the residual of the channels requested (e.g. if an end user requests 305 channels, it will have to purchase 10 bearers with 30 channels and the residual 5 channels in a single bearer); or
- it may result from a reduction in the number of channels initially purchased by the end user and the fact that OCPs may be unwilling to involve the end user in the disruption that is likely to be required to switch that customer to wholesale ISDN30.

A6.73 It should be noted that the Switching model does not distinguish between bearers that are uneconomical under the current wholesale ISDN30 prices and those that will only become uneconomical as a result of our charge control. This is because we have been unable to determine the precise reasons for which OCPs continue to supply bearers that are uneconomical under current wholesale ISDN30 prices. Therefore, our model estimates that, when the charge control is in place, the channels that are currently being supplied in uneconomical conditions will switch to wholesale ISDN30. However, this will overestimate the true extent of switching to wholesale ISDN30. We return to this point below when we discuss the incorporation of the results of the switching model in our volume forecast.

Estimation of volumes switching to wholesale ISDN30

A6.74 The switching model estimates that the volume of channels switching from PPCs to wholesale ISDN30 will be in the range of 6,102 to 18,724 channels or, equivalently, 5% to 15% of the volume of channels that would have been provided over PPCs throughout the period of the charge control, including existing customers and new provides. As shown in Table A6.3 below, the lower end of the range results from assuming the Low cost and Low PPC price scenarios, whereas the high end of the range is based on the High cost and High PPC price scenario.

Table A6.3 Number of ISDN30 channels switching to wholesale ISDN30 under each scenario

	High cost scenario		Low cost scenario	
	High PPC price	**Low PPC price**	**High PPC price**	**Low PPC price**
New provides	✂	✂	✂	✂
Existing customers	✂	✂	✂	✂
Aggregate	✂	✂	✂	✂

A6.75 As discussed in Annex 5, the output from the switching model is included in our Stage 2 volumes forecast. For the purposes of our base case scenario (i.e. the scenario used to derive the values of X in our Cost Forecast model), we have used the Low cost scenario and have estimated an average of the High and Low PPC price scenarios. This results in a total of 6,406 channels switching to wholesale ISDN30 (around 5.2% of total PPC volumes for the period).

A6.76 We have adopted the Low cost scenario because we believe it is the more plausible representation of the costs that OCPs will have regard to when deciding whether to switch supply to wholesale ISDN30. We believe this is likely to be the case for existing customers (where OCPs are likely to view their PPC costs as sunk, as discussed earlier) and, to a significant extent, for new provides (where OCPs are likely to accommodate additional demand out of their spare capacity and without incurring substantial additional costs). Additionally, we believe that, by adopting this scenario, we take account of the fact that more use seems to be made of PPCs in practice than would be predicted by the model. It is also consistent with our conservative approach to setting the charge control for this market, given that the Low cost scenario will result in the lower number of channels switching to wholesale ISDN30 and, consequently, in lower values of X and higher regulated prices for wholesale ISDN30.

A6.77 In the April 2011 Consultation we estimated an average of the High and Low PPC price scenarios because we believed that this was likely to be the most plausible scenario for future PPC prices. We recognised that BT may well increase PPC terminating segment prices (with reductions in trunk segment prices). However, we believed that it may not raise all charges to the maximum allowed by the safeguard caps imposed by the existing LLCC Decision (as currently modelled in the High PPC price scenario). On this basis, we believed that an average of the two price scenarios (High and Low) was a good representation of the likely future PPC prices for the purposes of our switching analysis. We have checked BT's changes to PPC prices since our April 2011 Consultation[174] and we can confirm that these have been broadly in line with an average of our High and Low PPC price scenarios. We therefore continue to believe that this assumption is appropriate.

[174] BT changed the relevant PPC prices in our model on 10 October 2011 and 1 December 2011.

A6.78 When compared to Openreach's total wholesale volumes in our Stage 1 volumes forecast in the last year of the charge control (i.e. 1.6m channels) described in Annex 5, the additional 6,406 channels that our model has estimated will switch to Openreach would only represent 0.4% of the total Openreach wholesale ISDN30 volumes. Therefore, we believe that the charge control will have a relatively modest impact on the volumes of channels that will switch from PPCs to wholesale ISDN30.

Annex 7

Incremental cost analysis

Introduction

A7.1 In this Annex we describe the "incremental cost analysis". This analysis has been conducted to ensure that prices resulting from the wholesale ISDN30 charge control do not distort the choice between the various wholesale inputs (MPF, PPCs and wholesale ISDN30) that could be used to provide retail ISDN30 services. We summarise the analysis that we presented in the April 2011 Consultation, updating our analysis with revised data and additional explanations where necessary. We do not address stakeholder comments in this annex; these have been fully addressed in Section 5 at paragraphs 5.318 to 5.324, and do not affect the underlying methodology of our incremental cost analysis.

A7.2 In Section 4 we explained our decision to set the wholesale ISDN30 charge control using costs measured on a current cost accounting (CCA) fully allocated cost (FAC) basis. We described the analysis that we have carried out to ensure that prices resulting from the charge control would maintain an appropriate difference between the prices for wholesale ISDN30 and the prices of more upstream inputs which could also be used to supply a retail ISDN30 service, principally 2Mbit/s PPCs. By this we mean that the difference in prices should not be less than the difference between the incremental costs of wholesale ISDN30 and of 2Mbit/s PPCs. We refer to this analysis as the "incremental cost analysis".

A7.3 As highlighted in paragraphs A7.30 to A7.33 below, the incremental cost model uses cost data provided by Openreach in its submissions. The LRIC differential analysis in the April 2011 Consultation was based on Openreach's costs in the financial year 2009/10 (i.e. our base year costs at the time). We have not updated our LRIC differentials model using Openreach's 2010/11 cost data for the following reasons:

- prices of wholesale ISDN30 services have remained unchanged since the April 2011 Consultation;[175]
- the LRIC differentials analysis is a cross-check on our values of X, rather than used to set the charge control values;
- we have concerns with Openreach's 2010/11 LRIC cost data for the reasons discussed in paragraphs 5.291 – 5.293 and we consider that the outputs of our Cost Forecast model provide more reliable cost data; and
- in placing reliance on Openreach's LRIC cost data for the purposes of a cross check, we prefer to rely on the 2009/10 data as this is more closely aligned with our Cost Forecast model outputs.

A7.4 We therefore consider that the results of the April 2011 Consultation LRIC differentials model remain valid. Additionally, we note that we did not receive any

[175] We have also checked that BT's changes to PPC prices since our April 2011 Consultation have been broadly consistent with our assumptions at the time regarding the likely future prices of PPCs, as discussed further in paragraph A6.77.

comments from stakeholders on our approach to modelling the LRIC differentials in the April 2011 Consultation (as discussed in Section 5).

A7.5 We note however that since the April 2011 Consultation we have changed some of the assumptions used in our Cost Forecast model which also affect the LRIC differential analysis (see Annex 3 for a description of the assumptions used in our Cost Forecast model). For this reason, in this annex we have updated our LRIC modelling to be consistent with the assumptions used in our Cost Forecast model. Additionally, we have reduced the duration of the control from three to two years and this has resulted in changes to the values of X. We explained this in detail in the December 2011 Consultation. We have also updated BT's PPC prices to reflect the prices applicable in January 2012. We note however that these changes do not alter our conclusions in the April 2011 Consultation, as discussed further below.

A7.6 The annex is structured as follows:

- we provide a summary of the results;
- we provide an overview of the rationale for conducting the incremental cost analysis; and
- we describe the incremental cost analysis.

Summary of results

A7.7 We have carried out a cross-check on the differentials between wholesale ISDN30 and 2Mbit/s PPCs and an analysis of the differentials between the former and MPF. We are satisfied that the difference between the prices of these wholesale inputs is at least as large as the difference between their incremental costs.

A7.8 We therefore continue to regard CCA FAC as being an appropriate measure of costs for the purpose of setting the wholesale ISDN30 charge control.

The purpose of the incremental cost analysis

A7.9 We use CCA FAC as the basis for setting the ISDN30 charge control for the reasons highlighted in Section 4. We have also performed a cross check on our cost estimates to ensure that differences between the prices of (i) MPF and 2Mbit/s PPCs (PPCs) and (ii) wholesale ISDN30 are broadly consistent with differences in their incremental costs. We believe that this will ensure that the choice between wholesale inputs (MPF, PPCs and wholesale ISDN30) that could be used to provide retail ISDN30 services will not be distorted. On the basis of these prices, the wholesale input with the lowest price would correspond to the minimum cost of providing retail ISDN30. This is the approach used in the WLR and LLU 2012 Statement[176], and is supported by the Competition Commission (CC) in its determination in the WLR and LLU 2009 price control appeals[177].

[176] See the WLR and LLU 2012 Statement, available at http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_statement.pdf

[177] Competition Commission, *The Carphone Warehouse Group plc v Office of Communications*, Determination, Case 1149/3/3/09, paragraph 3.9, available at: http://www.competition-commission.org.uk/assets/bispartners/competitioncommission/docs/appeals/carphone-warehouse-group-plc-wholesale-line-rental-appeals/wlr_determination.pdf

A7.10 We have carried out a detailed analysis of the LRIC differentials between PPCs and wholesale ISDN30, given that PPCs are currently in use to provide retail ISDN30 services.

A7.11 We have also identified that retail ISDN30 services could technically be provided using MPF and an OCP's network infrastructure. However, there are currently no OCPs using MPF to provide ISDN30 services and only one OCP has expressed interest in doing so in future (as discussed in our December 2011 Consultation). We have therefore conducted only a high level cross-check of the LRIC differentials between MPF and wholesale ISDN30 (as described further in paragraphs A7.16 to A7.26 below).

Allocative and dynamic efficiency considerations

A7.12 We have concluded that we will use CCA FAC as the basis for setting the wholesale ISDN30 price control. This approach is consistent with the CC determination in the WLR and LLU 2009 price control appeals. In particular, the CC did not consider that in setting WLR/LLU prices we had erred by adopting an approach that took greater account of productive efficiency considerations than allocative or dynamic efficiency considerations.[178] We have used this same approach in the latest WLR and LLU 2012 Statement, set on 3 February 2012. Similar considerations arise in the setting of the wholesale ISDN30 price control since PPCs and wholesale ISDN30 are alternative wholesale inputs that are currently used to provide retail ISDN30 services. OCPs demand for these services would be distorted if the difference in their charges was less than the difference in their incremental costs. This distortion could lead to inefficient outcomes. This could include inefficient investments that would ultimately result in end users paying higher retail prices.

A7.13 In the WLR and LLU 2012 Statement we have discussed the relative importance of different efficiency considerations.[179] We consider that for productive efficiency the differential should be equal to the absolute difference in LRIC, ensuring that CPs' choice of wholesale inputs is based on the cost minimising option. We consider that allocative efficiency considerations are less relevant because CPs' arbitrage between wholesale inputs used to provide the same retail services would undermine any attempt to recover a higher share of common costs from one input than the other.

A7.14 In terms of dynamic efficiency, we consider that there are two important considerations that are in opposition. On the one hand, we consider that differentials should reflect absolute LRIC differences to ensure efficient investment incentives. In the case of ISDN30 and 2Mbit/s PPCs, we do not consider that we should actively promote upstream competition by increasing the price differentials to assist entry using PPCs to compete with wholesale ISDN30 at the retail level. One reason that was considered in the previous market review of the ISDN30 market for not imposing price regulation on wholesale services was the view that upstream competition using PPCs may act as a competitive constraint on its prices. However, as discussed in Section 3, we have concluded that the availability of PPCs has

[178] Competition Commission, *The Carphone Warehouse Group plc v Office of Communications*, Determination, Case 1149/3/3/09, para. 3.176, available at: http://www.competition-commission.org.uk/appeals/communications_act/wlr_determination.pdf

[179] See the WLR and LLU 2012 Statement, paragraphs 7.59 – 7.62, available at http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc/statement/LLU_WLR_CC_statement.pdf

been unable to constrain the prices of wholesale ISDN30 and that a control on wholesale ISDN30 prices is needed. We have also concluded that the difference between the prices for ISDN30 and PPCs should move towards reflecting the underlying difference in costs rather than, for example, aiming to give an additional incentive for OCPs to use PPCs. Nevertheless, we believe that we should not set prices which would favour the more downstream input (wholesale ISDN30), so we want the price difference to be at least as great as the difference in incremental costs.

A7.15 On the other hand, we consider that it is important to provide investors with a stable regulatory framework, including stakeholders' expectations of changes in future charges. Therefore, although we consider that differentials should reflect absolute LRIC differences, we recognise that a more rapid reduction of the price differentials between wholesale ISDN30 and 2Mbit/s PPCs might be detrimental to the stability of the regulatory framework.

A7.16 On balance, we consider that price differentials resulting from CCA FAC are appropriate. The resulting price differentials are greater than the differences in LRICs. We do not consider that there is a strong case for greater price differentials due to the resulting productive inefficiencies. Conversely, we do not think we should decrease the differentials more rapidly, as this could undermine expectations of a stable and predictable regulatory framework.

A7.17 For the reasons set out above and consistent with our position in the WLR and LLU 2012 Statement, we will use CCA FAC as the basis for setting the wholesale ISDN30 charge control and will cross check our cost estimates to ensure that differences in the prices of PPCs and wholesale ISDN30 are broadly consistent with, and not less than, the differences in their incremental costs. The incremental cost differential analysis is described in the following sections.

We have not estimated the differential between wholesale ISDN30 and MPF

A7.18 As discussed above, we have only carried out a high level cross-check of the LRIC differentials between wholesale ISDN30 and MPF. This is because there are currently no OCPs using MPF to provide ISDN30 services and, as far as we are aware, only one operator has expressed interest in doing so in future.

A7.19 As discussed in paragraph 5.314, since the April 2011 Consultation we have received additional information that one operator expects to provide an IP-like, rather than a purely wholesale ISDN30, service in the future. However, the submission from this CP shows that it only expects to provide a small number of channels over the period of the charge control. We therefore consider that this new evidence supports our view that we should only do a high-level cross-check on the MPF differentials.

A7.20 There are significant fixed costs associated with establishing a point of presence at a BT exchange (e.g. ordering the space, installation and commissioning of equipment and backhaul circuits), which is likely to make provision of ISDN30 services using MPF relatively less attractive. We believe that this is one of the main reasons that there are currently no OCPs using MPF to supply ISDN30.

A7.21 Due to these fixed costs, we consider that MPF is only likely to be regarded as an option to supply ISDN30 where unbundling has already occurred for broadband and/or telephony. The corollary of this is that the provision of retail ISDN30 is unlikely to drive investment in MPF, given that there are a relatively low number of

ISDN30 circuits, even in city exchanges where demand for these services is mostly concentrated.

A7.22 In addition to the fixed costs involved in MPF, the distance between the local exchange and the customer premises also determines the costs of supply using MPF and, therefore, may limit the extent to which OCPs can make use of MPF to provide ISDN30. Where this distance is significant, up to three copper lines may be required to provide ISDN30 using MPF, increasing the total costs of provision.

A7.23 In Table A7.1 below we present the 2009/10 CCA FAC and LRIC costs of wholesale ISDN30 rental (for a circuit including eight channels) and the costs of an MPF rental (including three copper lines). We approximate the effect of the charge control on wholesale ISDN30 prices by assuming that wholesale ISDN30 prices are equal to their CCA FAC costs in 2009/10. We would ideally estimate the price differentials between ISDN30 and MPF at the end of the charge control in 2013/14, however, we don't project the prices and costs of MPF as part of the ISDN30 charge control. Additionally, for the reasons described in paragraphs A7.11 above, we consider that we should only conduct a high-level cross check on the differentials between ISDN30 and MPF. For these reasons we have considered it appropriate to base our analysis on 2009/10 costs.[180]

A7.24 We then calculate the cost and price differentials between these two forms of supply under the above conditions. We make the comparison assuming a circuit with eight channels, which is the minimum number of channels that customers can purchase from Openreach, as our analysis suggests that MPF is more likely to be a viable alternative for low capacity installations. For higher capacities, PPCs are a more likely alternative to wholesale ISDN30.

[180] Updating this analysis to the financial year 2010/11 would have required us to rely on Openreach's 2010/11 cost data to obtain the LRIC cost for wholesale ISDN30. We have decided that this would not be appropriate for the reasons highlighted in paragraphs A7.3 – A7.4 above.

Table A7.1 Wholesale ISDN30 and MPF cost and price differentials in 2009/10

	wholesale ISDN30 (8 channels)	MPF (3 lines)	Differential (wholesale ISDN30 – MPF)
CCA FAC cost	£804.1[181]	£256.5[182]	£547.6
LRIC cost	£✂[183]	£156.3[184]	£✂
2009/10 prices	£1128.0[185]	£267.3[186]	£868.8
FAC vs. 2009/10 MPF[187] price	£804.1[188]	£259.2[187]	£544.9

A7.25 As shown in Table A7.1, if wholesale ISDN30 prices were reduced to their CCA FAC level in 2009/10[189], the differences in the prices of ISDN30 and MPF rental (i.e. £544.9) would be significantly greater than the differences in their LRICs (i.e. £✂). Table A7.1 also shows that the costs involved in MPF rental are significantly lower than those of wholesale ISDN30 rental. In the case shown in Table A7.1, the LRIC costs of MPF rental are around ✂% of the ISDN30 LRIC costs. We believe that the fact that OCPs are currently not using MPF to supply ISDN30, when charges are much lower, suggests that there are other cost elements, in addition to Openreach's rental prices, which determine OCPs' choice between these two wholesale inputs (as discussed above). It also suggests that the fact that price differentials have been above the difference in incremental costs has not distorted investment decisions in practice.

A7.26 In light of the above, we believe that the differences in the prices of wholesale ISDN30 and MPF rentals are likely to be at least as large as the differences in their LRICs when supplying ISDN30 services. We are also confident that the effects of

[181] In the year 2009/10 the ISDN30 CCA FAC rental per channel per year, after all the relevant adjustments (as discussed below), is £100.5.
[182] In 2009/10 the CCA FAC for MPF rental was £85.5 per line per year, see BT's Regulatory Financial Statements, page 55, available at: http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2010/CurrentCostFinancialStatements2010.pdf.
[183] In the year 2009/10 the ISDN30 LRIC rental per channel per year, after all relevant adjustments (discussed below), is £✂.
[184] In 2009/10 the LRIC for MPF rental was £52.1 per line per year, see BT's Regulatory Financial Statements, page 55, available at: http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2010/CurrentCostFinancialStatements2010.pdf.
[185] Current wholesale ISDN30 rental charge is £141.0 per channel.
[186] For most of the 2009/10 year the price of an MPF rental was £86.4 per line per year, see Openreach's price list, available at: http://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=totid5BwFmkf9vLcBITRyZF9loRxWIbIKK6V7YWmlYAlMnGHsqdC0vzO163bJmh34D91D7M0q8u%2F%0AllSgtIFAKw%3D%3D.
[187] We have estimated the price differential assuming wholesale ISDN30's 2009/10 FAC and the 2010/11 MPF price, FAC and LRIC and we can confirm that the price differential is still greater than the LRIC differential between the two.
[188] This is the price for eight wholesale ISDN30 rental channels if prices were set at the 2009/10 CCA FAC costs.
[189] We take CCA FAC level in 20098/10 as a proxy for wholesale ISDN30 prices after the effect of the charge control has been accounted for.

our charge control are unlikely to affect OCPs' choice between these two wholesale inputs to a significant extent. Therefore, we do not think there is a need to conduct any further analysis of the differentials between wholesale ISDN30 and MPF.

Estimating the LRIC differentials between 2Mbit/s PPCs and wholesale ISDN30

Our approach to estimating the LRIC differentials

A7.27 Throughout our analysis we have concentrated on the differences in the LRICs of the two wholesale products. This means that cost elements that are comment to both PPCs and wholesale ISDN30 are not considered. Our approach has been:

- first, to identify and categorise the physical differences between the two products (for example, wholesale ISDN30 involves a 'line-card' and PPCs do not); and
- second, to consider the likely LRIC difference for each of the categories identified, drawing on the CCA FAC numbers and other sources where possible.

A7.28 In doing this, we have:

- relied on Openreach's CCA FAC estimates and (unaudited) LRIC estimates to derive the LRIC differentials;
- assumed a thirty channel wholesale ISDN30 circuit as a benchmark for calculating the costs of wholesale ISDN30;
- assumed that both wholesale inputs are used to supply the same end user; and
- assessed two scenarios in our calculation of the differentials, the first including what we believe are the most plausible assumptions (our 'base case scenario') and, the second, including the assumptions that result in the largest differentials (the 'conservative scenario').

A7.29 We deal with each of these issues in turn below.

We have used Openreach submissions for the Incremental Cost model to estimate the LRIC differentials

A7.30 In estimating the incremental cost differences between PPCs and wholesale ISDN30 we have not used the Cost Forecast model. The Cost Forecast model does not include all the relevant costs of PPCs because PPCs are sold by BT Wholesale rather than Openreach. The Cost Forecast model only includes the costs of "e-PPC" local ends, which are local end segments of PPCs that Openreach supplies to BT Wholesale as an input to PPCs. They comprise the digital bearer from the end-user premises to the local serving exchange, including the transmission equipment at either end of the circuit (i.e. the NTE at the customer premises and the LTE at the serving exchange).

A7.31 Therefore, Openreach has supplied cost data to enable us to compare wholesale ISDN30 and PPCs on a like with like basis. These data have been collated specially for this purpose and includes PPC costs that are incurred by BT Wholesale together with equivalent costs incurred by Openreach in the case of wholesale ISDN30.

A7.32 Because e-PPC local ends are only one input to PPCs, there are several cost elements of a 2Mbit/s PPC that are not included in the e-PPC local end cost stack. These costs relate to activities that are provided by BT Wholesale and include:

- PPC product management and service management costs;
- PPC main link costs; and
- Point of handover (PoH) costs.

A7.33 We asked Openreach to provide estimates of those 2Mbit/s PPC costs that relate to activities carried out by BT Wholesale.

We have used a thirty channel circuit as the benchmark for calculating the costs of wholesale ISDN30

A7.34 In our incremental cost model the costs of e-PPCs are provided on a per bearer basis, whereas the model allocates costs of wholesale ISDN30 on a per channel basis. We assume that this reflects the underlying cost of the service in each case as well as the charging structure for each service. A 2Mbit/s PPC provides exactly thirty channels capacity. If a smaller number of channels are used, there is no saving in cost (or charges). Wholesale ISDN30 also provides up to thirty channels but in contrast, costs and charges rise and fall with the number of channels taken.

A7.35 We therefore calculate the difference in incremental costs assuming that thirty wholesale ISDN30 channels are used. This means that the comparison will be on a like-for-like basis. The cost differences we identify will then reflect the costs of the additional equipment or service levels associated with the more downstream service, wholesale ISDN30. If we assumed a lower number of channels, ISDN30 would inevitably tend to be the lower cost option and some of the cost differences would reflect the fact that, in effect, a smaller number of channels are supplied, as a 2Mbit/s PPC always provides capacity equal to thirty channels. We therefore compare prices and costs assuming thirty channels in each case.

We have assumed that both wholesale inputs are used to supply the same end user

A7.36 Some of the differences in the costs allocated to PPCs and wholesale ISDN30 simply reflect the fact that PPCs are mostly used to provide retail services other than ISDN30; PPCs are primarily intended to be used to provide retail leased lines. In fact, in 2009/10 BT provided 179,185 2Mbit/s local end PPCs and of these ✂. Different retail uses may be reflected, for example, in differences in the location of typical customers or average circuit lengths which can affect average costs.

A7.37 We want price differentials to reflect the LRIC differentials, so that, where OCPs' have a choice between two wholesale inputs that could be used to provide the same retail service (i.e. ISDN30), OCPs have an incentive to choose the one which minimises overall costs. Therefore, in order to enable a comparison of the costs of both products, we have estimated what the costs would be if both wholesale inputs were used to supply the same customer (rather than using the cost data from BT's financial statements).

A7.38 We have excluded differences driven by the fact that PPCs are used by customers with different requirements or for services other than ISDN30. For example, PPCs and wholesale ISDN30 services can be supplied over copper or fibre. When providing a PPC or a wholesale ISDN30 circuit, OCPs' choice between fibre and

copper generally depends on the end user's requirements (rather than being a function of the wholesale input chosen in each case). As a result of the different requirements of the typical customers for PPCs (which are primarily used to supply retail leased lines) and wholesale ISDN30, both have on average a different copper to fibre ratio. In our model, some access network costs are allocated to both services on the basis of their average copper to fibre ratio (e.g. an ISDN30 cost component may be attributed a higher cost because on average a higher proportion of ISDN30 bearers use copper than is the case for PPCs).

A7.39 However, we consider that the choice of fibre or copper should be independent of the choice of wholesale input (i.e. ISDN30 or PPC) if, as we assume, the circuit is in either case used to supply ISDN30 services to a given retail customer. In other words, if copper is used when the service is supplied using wholesale ISDN30, then copper will also be used if the service is supplied using a 2Mbit/s PPC. Therefore, even if our model shows differences between the average costs of wholesale ISDN30 and 2Mbit/s PPCs resulting from differences in the average copper to fibre ratio, we exclude them because we consider that such differences would disappear if both products were used to supply the same end user and do not result from differences in their underlying incremental costs. This greatly simplifies our analysis.

A7.40 Additionally, in order to compare 'like with like', we have only considered those cost elements in the PPC cost stack that have an equivalent in wholesale ISDN30. For example, as discussed below, to provide ISDN30 services using PPCs, operators require a PoH and, for PPC users, PoH costs are recovered in separate PoH charges. However, wholesale ISDN30 prices do not recover costs relating to the PoH. Therefore, we have excluded the PoH costs from the LRIC differential analysis.

We have used BT's unaudited estimates to derive LRICs from our CCA FAC costs

A7.41 In relation to the LRIC difference, our estimates are taken from the (unaudited) LRIC figures in BT's 2009/10 regulatory accounts[190]. Our approach is consistent with moving the differentials towards those implied by these LRIC estimates. In line with the WLR and LLU 2012 Statement, we have not reviewed these LRIC figures and do not necessarily regard them as robust. However, we used the same approach in the WLR and LLU 2009 price control, which has since been reviewed by the CC under appeal.

A7.42 In one respect we depart from the methodology used in the WLR and LLU 2012 Statement. We have estimated the incremental cost differential using the costs of PPCs and wholesale ISDN30 in the year 2009/10. The approach followed in the WLR and LLU 2012 Statement is to compare the costs of both products at the end of the charge control (i.e. 2013/14). Whilst reliance on "end of control" costs would be preferable, we consider that this is not practicable for the ISDN30 control because this price control review only deals with one of the wholesale inputs (ISDN30), while the existing charge control on PPCs is due to expire in September 2012. This means that, to compare charges at the end of the control we would have had to use a forecast of PPC costs and volumes and would have introduced additional uncertainty into the analysis. Although Ofcom is currently reviewing the leased lines charge control, and plans to publish a consultation document on proposals for the period beyond September 2012 shortly, we do not consider it would be appropriate to delay our statement to take into account any initial

[190] According to Openreach the cost estimates submitted to us are pure LRICs, with the only exception of some cost components relating to e-PPCs, which are DLRICs.

proposals that may be made. This means that we necessarily base our analysis on the costs of both services in 2009/10. However we also carry out an analysis of the sensitivity of our results to changes in assumptions and the results of this give us additional assurance that the charge differential resulting from our charge control will be at an appropriate level, taking into account the nature of this analysis as a cross check.

We have conducted a 'base case scenario' to derive the LRIC differentials and a 'conservative scenario' as a cross-check on our estimates

A7.43 When assessing the likely cost differentials between the two products, we have constructed two cost scenarios. In the first scenario, our 'base case scenario', we derive the LRIC differentials using what we believe are the more plausible assumptions on the likely direction and magnitude of the differentials. For example, we may consider that the differences in the costs shown by our model result from different allocation methods which do not reflect true differences in the underlying incremental costs of the two services and, therefore, assume that the differential is zero.

A7.44 Alternatively, we recognise that there are some uncertainties surrounding our estimates of the incremental cost differentials. These are mainly due to the fact that some of the PPC activities sit within BT Wholesale (whereas they all sit within Openreach in the case of wholesale ISDN30), as well as to the fact that both wholesale inputs are primarily used for different retail services and the differences in costs may reflect this, rather than differences in their underlying incremental costs (as discussed above). For this reason we have also developed a 'conservative scenario' in which we adopt the assumptions that result in the largest differentials between the two services. The objective of this is to understand if under this approach the differences in the prices between the two services are still at least as large as the differences in their incremental costs.

A7.45 After carrying out these two cost scenarios we have found that even in the case of the 'conservative scenario' the differences in the prices of the two wholesale inputs are larger than the differences in their incremental costs[191]. For this reason we only report the results of our base case scenario here.

We have conducted only a high level cross-check on the LRIC differentials

A7.46 We note that PPCs represent only 14% of the total self-supplied channels and around 4% of the total ISDN30 retail market. In this instance, our analysis has been guided by the principle of proportionality and, therefore, we have carried out only a high level assessment of the differences in LRICs between PPCs and wholesale ISDN30. We believe that the detail of the analysis conducted is sufficient for us to be relatively confident that the ISDN30 charge control will not lead to the differences between the prices of both wholesale inputs being less than the difference in their incremental costs.

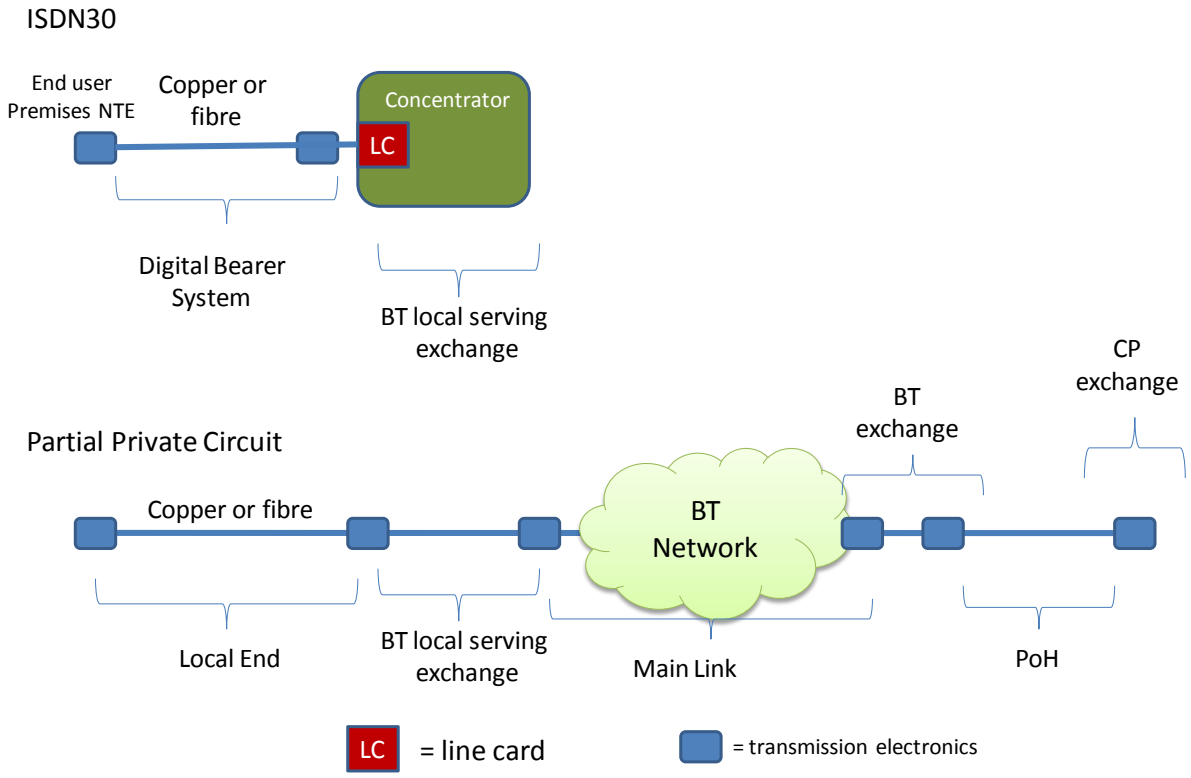
[191] In fact, in the case of the conservative scenario the ISDN30's 2009/10 FAC for connections and rentals is above the LRIC differentials by ✂%[more than 10%]. We note that we do not view the 'conservative scenario' as superior to our 'base case scenario'. To the contrary, we adopt the latter because we believe it is the most plausible scenario and conduct a second, most conservative scenario, just as a cross-check on our base case scenario.

We have estimated the difference between the cost of supplying wholesale ISDN30 and 2Mbit/s PPCs rentals

A7.47 In the rest of this section, we set out how we have estimated the LRIC differentials between 2Mbit/s PPCs and wholesale ISDN30. Our approach is to first identify and categorise the physical differences between the two products under the assumption that they are used to supply the same customer (for example, wholesale ISDN30 involves a 'line-card' and PPCs do not); and, second, to consider the likely LRIC difference for each of the cost categories identified, drawing on the CCA FAC numbers and the (unaudited) LRIC figures in BT's 2009/10 regulatory accounts.

A7.48 From the technical perspective, we understand that Openreach builds the ISDN30 digital bearer systems from the same components that it uses for e-PPC Local Ends. Therefore, wholesale ISDN30 and e-PPC Local Ends share a number of cost elements. The diagram below illustrates the components used to provide ISDN30 and 2Mbit/s PPCs.

Figure A7.1 ISDN30 and Partial Private Circuits



A7.49 The main network differences between the two are:

- ISDN30 uses a line-card and exchange concentrator, whereas PPCs do not;
- PPCs connect end-user premises to a remote OCP exchange. They therefore generally have a main link and a PoH in addition to the local end. ISDN30 circuits normally connect end-user premises to an exchange concentrator in the local serving exchange. They therefore have a digital bearer system that is equivalent to a PPC local end but generally do not include a main link or PoH;
- backhaul circuits used to connect end-users to exchange concentrators located in adjacent exchanges. As explained in Annex 2, these are used in a small

proportion of cases, typically where the serving exchange does not support ISDN30;

- the use of different ratios of copper and fibre access network cable, with around ✂% of ISDN30 circuits being provided over copper and only around ✂% in the case of PPCs; and

- the different access digital bearer systems they use, whilst ISDN30 and PPCs can be provided on the same digital line systems, ISDN30 tends to use smaller digital line systems (e.g. 2x1 or 4x2), whereas PPCs tend to use larger line systems (e.g. 4x2 and 16x2).

A7.50 BT has explained that the choice of transmission system used for digital bearer systems depends on a range of factors including customer preferences, whether other services are provided at the same location, the availability of fibre cable at or near customer premises and the availability of transmission systems at the serving exchange. Thus, in practice the differences in the cost stacks for cable and transmission components for ISDN30 and PPCs are likely to be driven by the fact that they are used to supply different sets of customers. For this reason, as discussed above, throughout our analysis we have considered that the cable and transmission system component costs for local end segments do not contribute to the LRIC differentials.

A7.51 Additionally, we have excluded the PoH segment of PPCs - that is, the link between BT and an OCP's network - from the scope of our comparison. Wholesale ISDN30 charges do not recover any costs associated with a link between BT and the OCP's network, such as a PoH in the case of PPCs, the cost of which are also recovered in separate charges. For this reason we have excluded the PoH, thereby restricting our analysis of the differentials to the PPC local end and main link.

A7.52 In Table A7.2 we show the rental costs of providing a 2Mbit/s PPC and a 30 channels wholesale ISDN30 bearer on a LRIC basis.

Table A7.2 Estimate of LRIC differential between ISDN30 and 2Mbit/s PPC rentals

	2009/10 £	2009/10 £	Differential £
	ISDN30	**2Mbit/s PPC**	**ISDN30 – 2Mbit/s PPC**
Backhaul costs	✂	✂	✂
Local access network costs	✂	✂	✂
Line Test Equipment	✂	✂	✂
ISDN30 line-card	✂	✂	✂
Access network repair	✂	✂	✂
Product management	✂	✂	✂
Service centre costs	✂	✂	✂
Total LRIC	✂	✂	✂

A7.53 As shown in Table A7.2 above, we have excluded some of the differences in the LRIC costs of the two services on the basis that differences in these costs can be attributed to differences in network components and activities resulting from the fact that each wholesale input is typically used to supply retail customers with different service requirements (as discussed above in paragraphs A7.36 to A7.40). Therefore, Table A7.2 above shows differences in the costs of wholesale ISDN30 and PPCs that we believe are only driven by differences in their incremental costs. Below we discuss our approach to assessing the likely cost differential between the two wholesale inputs and for each of the cost groups shown in Table A7.2 above.

Backhaul costs

A7.54 As discussed above, a minority of ISDN30 circuits are connected to exchange concentrators located in remote exchanges over a backhaul link[192]. In the case of wholesale ISDN30, the backhaul costs in our model include the transmission costs attributed to ISDN30 for this linking circuit, including the transmission electronics equipment involved. Openreach has indicated that 14% of the exchanges used for ISDN30 incur these backhaul costs and that the average distance of these backhaul circuits is 4.3km (i.e. the average distance between local exchanges to which the end-user is connected and the exchange housing the exchange concentrator).

A7.55 In contrast, no backhaul costs are included in the e-PPC cost stack in our model. The reason for this is that even if these ISDN30 backhaul costs have their

[192] These costs should not be confused with the links between the exchange concentrators and exchange processors where these are not co-located in the same building, rather than backhaul segments for ISDN30 lines which are not served from the local serving exchange.

equivalent in the distribution element of PPCs (i.e. the main link)[193], they relate to activities that sit with BT Wholesale. Under these circumstances, we have requested Openreach to provide the PPC costs that would be equivalent to the ISDN30 backhaul costs, including both backhaul electronics and backhaul fibre and duct costs. These costs are shown in Table A7.3 below.

Table A7.3 PPC main link costs equivalent to wholesale ISDN30 backhaul costs

	2Mbit/s PPC main link (£/link)	2Mbit/s PPC per km distribution (£/km)
Unit cost from Openreach cost stack	✂	✂
Adjustment for average Km distance[194]	✂	✂
Adjustment for exchanges incurring backhaul costs in ISDN30[195]	✂	✂
Adjustment to LRIC basis[196]	✂	✂

Note: The backhaul costs included in the table above exclude 21CN costs.

A7.56 The PPC main link costs from the Openreach cost stack have been adjusted to obtain figures on an equivalent basis to wholesale ISDN30 backhaul costs. In the case of ISDN30 only 14% of total bearers incur backhaul costs and the average length of backhaul circuits used is then 4.3km. On this basis, we calculate the average cost of a PPC main link where in 14% of cases a main link 4.3km is needed and in the remaining 86% of cases no main link will be needed. The CCA FAC estimates are then adjusted to obtain costs on a LRIC basis. As shown above, this results in a total LRIC cost of £✂[197] in the case of PPC backhaul costs, whereas the figure is equal to £✂ in the case of wholesale ISDN30.

A7.57 We believe that if the two wholesale inputs were used to supply the same end user, it could be assumed that the ISDN30 costs should be the same as the backhaul costs incurred when supplying using PPCs, given that they would effectively involve the same equipment inputs. However, the above data shows significant differences in the costs allocated to each service. We believe that this is likely to be due to differences in the routing of the backhaul circuits again reflecting differences in end use and customer location. Circuit routing depends on the availability of capacity between the two nodes that are being linked by the backhaul circuit in any particular case, and this is likely to be reflected in our cost stacks.

A7.58 In light of this, we believe that backhaul costs should be the same for both services if we assumed that they connect the same two points in the network (i.e. if they are

[193] The main link is a circuit segment that connects the BT local serving exchange to a BT main exchange where the PoH is located.
[194] We multiply the PPC backhaul distribution costs, which are on a Km basis, by the average distance of wholesale ISDN30 backhaul circuits (i.e. 4.3Km). This adjustment does not apply to the PPC main link costs (left column) because these costs are expressed on a circuit, rather than distance, basis.
[195] We adjust both costs to account for the fact that backhaul costs are only incurred in 14% of Openreach exchanges in the case of wholesale ISDN30. This adjustment applies to both costs (i.e. to the two columns).
[196] The PPC backhaul costs have a LRIC:FAC ratio of ✂. We derive the LRIC costs by multiplying the CCA FAC costs by these LRIC:FAC ratio.
[197] This is the sum of £✂ and £✂, as shown in the last row of Table A7.3.

used to supply the same end user). Therefore, we have considered that the LRIC differentials for these costs should be excluded.

Local access network costs

A7.59 Local access network costs include costs relating to the access electronics equipment, access network ducts, access network cables (copper and fibre) and costs relating to the main distribution frame. Currently, the model allocates different costs to each service. On a LRIC basis these are equal to £✂ for wholesale ISDN30 and £✂ for PPCs.[198] However, the majority of these differences are driven by the allocation method used by our model, in particular, the fact that the products use different proportions of copper and fibre. As discussed above, we believe that these differences are mainly driven by the end user requirements and, therefore, they would disappear if both wholesale inputs were used to supply the same end user. In light of this, we exclude these costs from the estimation of the LRIC differentials.

Line test equipment costs

A7.60 Line test equipment costs relate to the electronics equipment that supports line testing of both the PSTN and ISDN circuits. This equipment is only used for telephony services, hence no costs are allocated to PPCs. We have therefore considered that these costs should contribute in full to the LRIC differentials (a differential of £✂).

Line-card costs

A7.61 Each ISDN30 circuit is connected to an ISDN30 line-card in the exchange concentrator. Line-card costs recover the costs associated with the line-card, the concentrator and other common assets in the local exchange. They represent an important input for wholesale ISDN30 but are not required for the provision of PPCs. The costs are therefore directly attributable to wholesale ISDN30 services.

A7.62 Following our approach in the WLR and LLU 2012 Statement, we have used the LRIC to FAC ratio for line-cards in BT's 2009/10 regulatory accounts and we have applied this to the CCA FAC figure for line-card costs in 2009/10 in our model. The LRIC to FAC ratio estimate for 20CN ISDN30 line-cards prepared by BT in its 2009/10 regulatory accounts is around ✂% of the CCA FAC figure. An important difference with WLR/LLU is that Openreach is currently not using any 21CN line-cards in the case of ISDN30 and has no plans to migrate ISDN30 to 21CN. Therefore, we have used the costs currently allocated to line-cards, which reflect the costs of the 20CN line-cards currently being used by Openreach.

A7.63 Openreach currently uses several types of line-cards for various versions of its System X and AXE10 exchange concentrators. All types of line-cards are no longer in manufacture and Openreach manages demand by re-using its existing stock. The age of BT's ISDN30 line-cards means that we need to be careful when using the

[198] We have calculated these LRIC estimates after adjusting the costs of ISDN30 and PPC's Access electronics using the same uplift that we have applied in our Cost Forecast model (see Annex 3). As discussed in Annex 3, the NRC/GRC of ISDN30 Access Electronics was 13% in 2009/10 and we have adjusted this ratio to 50% to approximate their steady state level. We have applied this same adjustment to PPC's Access electronics costs, given that this equipment is shared by both wholesale inputs. This results in an increase of around ✂ in the ISDN30 and PPC Access electronics costs (relative to the initial 2009/10 value shown by our model).

figures in BT's current regulatory accounts for line-card costs, because BT may be using some fully depreciated equipment. This could mean that the accounting costs understate the true economic cost of providing voice services. As the CC has noted, there are two effects of Openreach continuing to use fully depreciated line-cards. First, if many of the line-cards being used are *fully depreciated*, the more recent CCA FAC figures for line-cards would tend to underestimate the LRIC as these would make no allowance for the cost of capital or depreciation of these assets. Second, for those line-cards that have *not been fully depreciated*, because the economic life of the line-cards has been proved to exceed the length of time over which they were depreciated (which was ten years), historic CCA FAC figures may overstate the LRIC by depreciating the assets over too few years[199].

A7.64 However, we believe that in the case of ISDN30, because depreciation was last at a steady state level in ✂ and most line-cards are likely to have been fully depreciated[200], the first effect is likely to dominate the second effect. Consequently, we believe that the LRIC is likely to underestimate the true economic cost of the line-cards in a hypothetical ongoing network.[201] For this reason we have adjusted the LRIC costs of line-cards using the same uplift that we have applied in our Cost Forecast model. As described in Annex 3, we have adjusted the NRC/GRC ratio of ISDN30 line-cards to 50% to approximate their steady state level. This adjustment results in an increase of around ✂% in the ISDN30 line-card costs (relative to the initial value shown by our model). In this case, the LRIC differential for line-cards is equal to £✂.

Access network repair

A7.65 In terms of fault repair costs, the comparison of the LRIC estimates shows £✂ for wholesale ISDN30 and £✂ for PPCs. We believe that the differences in LRIC costs are not likely to be driven by differences in the repair costs of PPCs and wholesale ISDN30. Both services use the same equipment and, therefore, we would expect them to have similar repair costs. In the case of the equipment that they do not share, such as line-cards, the concentrator and common assets in exchanges, the repair costs for these assets are recovered through the line-card cost component and would already be accounted for in the cost differential for line-cards.

A7.66 In contrast, we believe that the differences in repair costs are mainly driven by the allocation of costs according to the different ratios of copper/fibre used by the two services and the different mixes of digital line systems. These differences are likely to be driven by the end users' requirements and, as discussed above, we believe that when the two wholesale inputs are used to supply the same end user these differences are likely to disappear. In light of the above, we assume no difference in the incremental costs of network repair.

[199] Competition Commission, *The Carphone Warehouse Group plc v Office of Communications*, Determination, Case 1149/3/3/09, paragraph 3.138, available at: http://www.competition-commission.org.uk/appeals/communications_act/wlr_determination.pdf

[200] As discussed in Annex 3, the NRC/GRC of ISDN30 line-cards in 2009/10 is 8%.

[201] This might not be the case if the network was being rapidly run down, stocks of line-cards were sufficient to meet all future demand and they had no alternative use.

Enhanced care and maintenance costs

A7.67 In terms of maintenance service levels, wholesale ISDN30 has recently been subject to Openreach's service harmonisation initiative[202]. Under the current arrangements, the Service Maintenance Level 2 is provided as a standard for wholesale ISDN30 and is included in the rental charge[203]. Customers can opt for two additional levels of enhanced care services, Level 3 and 4. As discussed in Section 5, most ISDN30 customers use Level 2 and the costs of this basic level of care are recovered through the ISDN30 rental charges.

A7.68 The case of PPCs is similar to wholesale ISDN30. There are effectively three different maintenance levels: 'Regular Care', 'Enhanced Care' and 'Enhanced Care +'[204]. The 'Regular Care' option is provided as standard and is included in the PPC rental charge. It includes very similar levels of response and repair times to the ones included in wholesale ISDN30's maintenance Level 2, as shown in Table A7.4 below:

Table A7.4 Standard care service options for PPCs and wholesale ISDN30

	Operational hours	Response time	Target Repair Time
PPC – Regular Care	08:00 – 17:00 (except Sunday and bank holidays)	< 1 working day	< 2 working days
Wholesale ISDN30 – Service Maintenance Level 2	08:00 – 17:00 (except Sunday and bank holidays)	N/a	< 1 – 2 working days depending on time of fault report[205]

Source: BT Wholesale, PPC Product Handbook and Openreach, Maintenance Options Overview

A7.69 In light of the similarities between the characteristics of the standard levels of maintenance service between PPCs and wholesale ISDN30 (i.e. 'Regular Care' and 'Service Maintenance Level 2', respectively), we believe that the majority of OCPs purchasing PPCs to provide ISDN30 services are likely to opt for 'Regular Care' in the same way as they primarily use Service Maintenance Level 2 in the case of wholesale ISDN30 (as discussed in Section 5). Because both the PPC and wholesale ISDN30 case the costs associated with the standard care are recovered

[202] See 'Maintenance Options Overview' at: http://www.openreach.co.uk/orpg/home/products/serviceproducts/serviceharmonisation/serviceharmonisation.do

[203] See 'Rental Product Options' at: http://www.openreach.co.uk/orpg/home/products/pricing/notificationDetails.do?data=ThQLPOgdo8c%2FpcQlNXj7BVoAzMfOCIw%2B7d4ELMHNgDf%2BdE2ASH3YBwU5Ud37NnywlmbMkfEWV9Hg%0AS5od5xPk5mMrG2JXeytL6pFJZpTLM42nMTEF%2BKjWmexJt5mYlgMVVCBTHUk%2FAkGGPXhiPyurwQ%3D%3D

[204] See PPC's Product Handbook http://www.btwholesale.com/pages/downloads/service_and_support/contractual_information/docs/ppcoffer/briefings/ppc_product_handbook_Issue_4_sept2010.pdf and PPC Circuit Rental Charges price list B8.03 at: http://www.btwholesale.com/pages/cmsjsps/service_and_support/service_support_hub/online_pricing_hub/cpl_hub/cpl_pricing_hub/cpl_browsable_sections/cpl_browsable_sectionb_8.jsp

[205] Under the service description, Openreach states that faults are repaired by the end of the next working day (i.e. 23:59 pm of the next working day), which may result in one to two working days depending on the time at which the fault is reported.

through rental charges, we have decided to exclude enhanced care from the analysis of the LRIC differentials.

A7.70 Therefore, we consider that repair costs and maintenance services are unlikely to contribute significantly to the differences in incremental costs (given that PPCs and wholesale ISDN30 have similar repair costs and similar levels of maintenance services). Thus, we have not included any difference in our estimate of the LRIC for fault repair and maintenance costs.

Product management costs

A7.71 In relation to the product management functions, these costs relate to activities such as pricing, regulatory affairs, account management and portfolio strategy. We would not expect the differences between the two services to be very significant and, in fact, the LRIC is equal to £✂ in the case of wholesale ISDN30 and £✂ in the case of PPCs. Differences in the average incremental costs of each service could be driven by the fact that BT supplies a much larger portfolio of PPC services than of wholesale ISDN30 services (e.g. they include PPCs of different bandwidth). However, if we compared 2Mbit/s PPCs to wholesale ISDN30 for a given hypothetical user, we believe most of these differences would disappear. Therefore, we have decided to exclude these costs from the incremental cost differences.

Assurance service centre costs

A7.72 Under this cost component we include differences in LRICs that are due to differences between service centre costs. These service centre costs relate mostly to activities associated with fault handling[206]. We have first adjusted the PPC assurance costs to account for the fact that these costs relate to fault handling over the entire PPC circuit (i.e. they also include fault handling over the backhaul and core of the circuit, which are not included in full in the case of the ISDN30 assurance costs).To do this, Openreach has provided to us information on the number of faults occurring at different segments of its network. As shown in Table A7.5 below, around 72% of PPC faults occur in segments of the network that are also used for ISDN30 (i.e. customer, access network, a reasonable share of backhaul/core and other)[207]. Therefore, we have decided to account for only 72% of the total PPC assurance costs in our model.

[206] Examples of the type of activities that drive these costs are: fault reception and fault diagnosis – answering customer calls, creating a fault record and an initial diagnosis; dispatch of field and exchange based technicians; monitoring fault repair process and providing progress updates to the customer; escalation of problems when repair is exceeding expected time; final testing to prove that fault is cleared and closing of the fault record.

[207] We have first adjusted the share of faults occurring in the backhaul and core segments of BT's network to account for the fact that only 14% of ISDN30 circuits incur backhaul costs, Second, a ✂ faults that are reported but are subsequently 'not found or right when tested'. We have assumed that these should be broadly similar between PPCs and ISDN30 (given that they use similar equipment). We have allocated this type of faults to the network segments by assuming that they would be shared across the different network segments in proportion to the faults reported in these segments (e.g. if 30% of the total faults are reported in the customer segment, then we assume that a 30% of the faults 'not found or right when tested' would relate to the customer segment).

Table A7.5 Distribution of PPC faults over BT's network (%)

	Total	After adjustment
Customer	✂	✂
Backhaul and core	✂	✂
Access network	✂	✂
Other	✂	✂
Total	100.00%	71.91%

A7.73 Even after the above adjustments, we obtain a LRIC cost that is higher for PPCs (£✂) than for wholesale ISDN30 (£✂). We do not consider it is clear directionally which of wholesale ISDN30 and PPCs should have higher service centre costs on a LRIC basis. The analysis is further complicated by the fact that these costs sit in BT Wholesale for PPCs and in Openreach for wholesale ISDN30.

A7.74 In principle, we believe that ISDN30 should have higher assurance costs than PPCs because they would typically involve a higher number of faults, relating to their additional equipment when compared to PPCs (e.g. the exchange concentrator, the line-card or the NTE1a). We have requested BT to provide information on the number of faults on 2Mbit/s PPCs to compare them to wholesale ISDN30. Unfortunately, BT is not able to supply this information and we have therefore not been able to assess whether the difference in the LRICs may be driven by this.

A7.75 In light of the above, we have adopted a cautious approach and have assumed a zero LRIC differential for these activities.

The differences between the costs of wholesale ISDN30 and 2Mbit/s PPCs connections

A7.76 We have followed a similar approach to estimate the likely LRIC differentials between the connection costs of PPCs and wholesale ISDN30. In this case, the differences in costs are mainly driven by the different service management costs and the provision costs of the two wholesale inputs. Table A7.6 below shows the LRIC differentials between the connection of a 2Mbit/s PPC and a 30 channels wholesale ISDN30 bearer under the assumptions considered.

Table A7.6 Estimate of LRIC differential between ISDN30 and 2Mbit/s PPC connections

	2009/10 £	2009/10 £	Differential £
	ISDN30	**2Mbit/s PPC**	**ISDN30 – 2Mbit/s PPC**
Routing and records	✂	✂	✂
Connection	✂	✂	✂
Product management	✂	✂	✂
Service centre costs	✂	✂	✂
Computing	✂	✂	✂
Total LRIC	✂	✂	✂

A7.77 As in the case of rentals, some of the LRIC differences have been excluded on the basis that differences in these costs only reflect the fact that the two products are used to supply different types of customers. We discuss our approach for each cost component shown in Table A7.6 in turn below.

Routing and records

A7.78 Routing and records includes costs related to the allocation and recording of circuit routings in BT's access network. The LRIC costs for wholesale ISDN30 are £✂ and £✂ for PPCs. These differences are mostly driven by the differences in the mix of copper/fibre as well as in the digital bearer systems used by the two services. Therefore, we assume that the differential is likely to be zero.

Connection costs

A7.79 Connection costs include costs associated with the provision, cessation and rearrangement of ISDN30 and PPC circuits. These costs reflect works such as testing, line up of circuits, updating records, labelling equipment for onward connection and connecting transmission equipment at the specified bit rate.

A7.80 In the case of PPCs, connection costs relate to activities undertaken in both the local end and the main link, whereas they only relate to the local end network in the case of ISDN30. In order to adjust the PPC costs to a comparable basis with the wholesale ISDN30 connection costs, we have requested to Openreach a distribution of the PPC connection costs over the different network segments of the PPC. However, Openreach has been unable to provide this disaggregation of the PPC connection costs. Instead, Openreach has been able to provide us a distribution of the service management costs ('SMC') by the network segment that generates them. We use this information to adjust the PPC SMC costs to a comparable basis to ISDN30 (as described below). We use this information as a proxy for the distribution of the PPC connection costs by network segment.

A7.81 The allocation of the PPC SMC costs by network segment is shown in Table A7.7.

Table A7.7 Allocation of SMC costs by network segment (%)

	Total	Adjusted
Local end	✂	✂
Main link equipment	✂	✂
Main link distribution	✂	✂
Main link trunk	✂	✂
Point of handover	✂	✂
Total	100%	✂

A7.82 To adjust the LRIC estimates of the PPCs' connection costs in our model we have taken into account only the share of SMC costs relating to local ends and a 14% of the share of costs relating to the main link equipment and distribution (for the same reasons as in the case of backhaul costs discussed above). We have not included trunk or PoH costs, as these have no equivalent in the wholesale ISDN30 cost stack. In other words, we have considered ✂ [around 50%] of the total PPC connection costs given by our model.

A7.83 After these adjustments, the LRIC costs allocated to these services are £✂ for wholesale ISDN30 and £✂ for PPCs. We believe that connection costs should be higher in the case of ISDN30 than PPCs, given that the former includes additional costs relating mostly to the connection to the concentrator. We have therefore included the £✂ LRIC differential.

Product management

A7.84 As in the case of rentals, we would not expect sales and product management costs to be significantly different between the two wholesale products if we compared only 2Mbit/s PPCs (rather than the entire portfolio of leased lines) and wholesale ISDN30. The LRIC costs for this component are £✂ for wholesale ISDN30 and £✂ for PPCs. Due to the negative differential we have assumed that the LRIC differentials between the two products are zero.

Service management centre costs and computing

A7.85 The differences in the service management centre (SMC) costs and computing are two of the main drivers of the differences in the LRICs of wholesale ISDN30 and PPCs connection. These costs relate to the SMC costs dealing with the provision of wholesale ISDN30 and PPC circuits and, in the case of the computing cost component, to the systems and development costs used by these service centres in the provision of both wholesale inputs[208].

[208] In the case of connections, these services include: giving progress reports to customers; arranging site access for technicians at customer premises; monitoring progress of work; allocating field resources; coordinating activities with other departments; escalating problems and service testing once installation work is complete.

A7.86 As in the case of rentals, these costs relate to the provision of the entire PPC circuit, including the local end and the main link. Instead, the service centre costs relate mainly to the access network in the case of ISDN30 (with only 14% of circuits incurring backhaul costs). To adjust the PPC SMC costs we have followed the same approach described in the case of PPC connection costs (paragraphs A7.79 to A7.83 above).

A7.87 After these adjustments, the LRIC costs allocated to wholesale ISDN30 for these activities are £✂ and £✂ for SMC and computing costs, respectively. In the case of PPCs the LRIC costs are £✂ and £✂ for SMC costs and computing, respectively. Because ISDN30 involves the provision of the ISDN30 service in addition to the 2Mbit/s bearer included in the PPC, we consider that the overall provision costs should be higher for ISDN30, as shown by the LRIC differentials in both cases. Therefore, we have included the difference in the LRICs shown by our model, equalling £✂ for SMC costs and £✂ for computing.

Tests on the LRIC differentials

A7.88 As discussed above, the main objective of the incremental cost analysis is to ensure that the differences in the prices of PPCs and wholesale ISDN30 are at least as large as the differences in their incremental costs. For this purpose, we have used the differentials estimated above and the current prices of a 2Mbit/s PPC (as of 25 January 2012)[209] to derive the price for wholesale ISDN30 that would be reflective of the LRIC differentials.

A7.89 In the case of the 2Mbit/s PPC prices, we have used the charges shown in Table A7.8 below and have adjusted to a basis that is comparable to ISDN30.

[209] BT introduced changes to its PPC prices in October and December 2011 and the charges presented in Table A7.8 above reflect the prices effective on 25 January 2012.

Table A7.8 PPC prices used in the comparison of the differentials with wholesale ISDN30

	Prices	Adjustments		
	2009/10	**Rentals**	**Connections**	**Rentals + Connections**
Local end (£/circuit)[210]	627.25	627.25	N/a	627.25
Main link (£/circuit)[211]	427.98	59.79	N/a	59.79
Terminating segment (£/km)[212]	55.98	33.52	N/a	33.52
PPC connection (£/circuit)[213]	2,045.40	N/a	✂	✂
Total PPC price[214]	N/a	720.56	✂	✂

A7.90 As discussed above, we have decided to compare the price and cost differentials in the year 2009/10. Therefore, we have compared the PPC prices in 2009/10, as shown in Table A7.8 to the wholesale ISDN30 connection and rental FACs in 2009/10. We show this in Table A7.9 below.

[210] The local end fixed circuit charge is considered in full.
[211] The main link fixed circuit charge is multiplied by 14% to account for the fact that only 14% of ISDN30 circuits incur backhaul costs.
[212] The terminating per Km charge is first multiplied by 14%, for the same reasons as above, and then by 4.3Km, the average distance of wholesale ISDN30 backhaul circuits.
[213] The PPC connection charge is multiplied by the share of SMC costs that relate to network segments that have an equivalent in wholesale ISDN30, as shown in Table A7.7 above.
[214] This is the sum of the above rows in each case.

Table A7.9 Price differentials between wholesale ISDN30 and PPCs in 2009/10 (£/circuit)

		Rentals	Connections	Rentals + Connections
1	Wholesale ISDN30 FAC	3,015.42	1,268.51	4,283.92
2	Total PPC price	✂	✂	✂
3	LRIC differential	✂	✂	✂
4	PPC price + differential (2+3)[215]	✂	✂	✂
5	Difference (1 – 4)[216]	✂	✂	✂
6	**Percentage difference (5/1)[217]**	✂	✂	✂

A7.91 The table above shows in row five, the difference between the wholesale ISDN30 price that would exactly reflect the estimated LRIC differentials (row 4, above) and the wholesale ISDN30 FACs (which we take as a proxy for the price of wholesale ISDN30 after the effect of the charge control is accounted for) (row 1, above). It then expresses this difference as a share of the wholesale ISDN30 FACs. A positive (negative) sign implies that at current ISDN30 FACs the differences in the prices of the two inputs are larger (smaller) than the LRIC differentials.

A7.92 As shown above, when taken together, the difference in the charges for connections and rentals are broadly in line with the differences in the LRICs of both wholesale inputs (with differences between the two of around ✂%[more than 20%]). If taken on an individual service basis, the disparity between the differences in prices and LRICs is more significant and is negative in the case of connections.

A7.93 However, we believe that in the case of the incremental cost differential analysis, the relevant benchmark should be the aggregate rental and connection charges, rather than the prices and costs of each service individually. This is because we think some flexibility to vary relative connection and rental prices is desirable[218], whereas setting the differentials of both services separately equal to the LRIC would effectively tie the pricing structure of one product to that of the other, and that would not be appropriate. It is also likely to be unnecessary, since the choice between the two wholesale inputs will not depend on either connection or rentals alone, but on the aggregate charges. This is without prejudice to the possibility that a charge for connections or rentals could fail to be cost oriented.

A7.94 In addition to the assessment of the price differentials in year 2009/10, we have conducted a high level cross-check on the differentials in the last year of the price control (2013/14). Only a high-level check is possible because we cannot be certain

[215] The sum of the PPC price and the LRIC differential between wholesale ISDN30 and PPCs. This is the wholesale ISDN30 that would exactly reflect our estimated LRIC differentials between the two services.
[216] The difference between the wholesale ISDN30 FACs in 2009/10 and the wholesale ISDN30 charges that would exactly reflect our estimated LRIC differentials between the two services.
[217] Percentage difference between the wholesale ISDN30 FACs in 2009/10 and the estimated LRIC-reflecting prices.
[218] We note that this is one of the reasons why we are proposing to set a combined basket for connections and rentals.

how prices, in particular, will change up to 2013/14, given the flexibility BT has over the prices of individual services within the PPC basket and because we do not know the form of control, if any, which will apply from September 2012. For this purpose we have estimated, on the one hand, the likely prices of ISDN30 and PPCs in 2013/14 and, on the other hand, any change in the difference in the incremental costs of both services by 2013/14 on the basis of reasonable assumptions.

A7.95 In relation to ISDN30 prices, we have used the same approach as we have used in our volumes forecast, described in paragraph A5.82.[219] However, the volumes used to derive the prior year revenue weight are those obtained from the Stage 2 volumes forecast (rather than the Stage 1 volumes forecast used to derive the impact of our charge control on volumes). For the 2013/14 PPC prices we have estimated an average of the two scenarios used in the Switching model (the 'High' and 'Low' PPC price scenarios described in paragraphs A6.40).[220]

A7.96 To estimate the incremental cost differentials for the rental service, we have adopted an approach that is consistent with our calculation of the differentials in the year 2009/10. We first identify the additional items of equipment supplied with wholesale ISDN30, that is, the line-card and line test equipment (which are the only two cost elements specific to ISDN30). We then consider the change in the cost of these items projected by the ISDN30 Cost Forecast model over the period to 2013/14.

A7.97 In the case of connections, we consider that the differences in the incremental costs of the two services are not driven by equipment that is specific to ISDN30 and, instead, result from differences in the costs of activities that are common to both services. In this case, due to the fact that we lack an appropriate projection of the costs of PPCs to 2013/14 (as discussed in paragraph A7.42) we have assumed that the differential would change in line with the variation of the ISDN30 relevant costs in the Cost Forecast model. In other words, we have assumed that the 2013/14 incremental cost differential between ISDN30 and PPCs would be equal to their differential in 2009/10, increased by the percentage variation in the relevant costs of ISDN30 from 2009/10 to 2013/14. This seems reasonable, given the underlying similarity between the activities involved in ISDN30 and PPC connections.

A7.98 Table A7.10 shows the incremental cost differentials between the two services in 2013/14 estimated using the approach described above. We note that there have been changes to the figures presented in Table A7.10 since the April 2011 Consultation. These are mainly due to the different end year prices for wholesale ISDN30 under a two year control, as well as changes to our Cost Forecast model (see Annex 3).

[219] We have assumed that Openreach will use its flexibility to increase connection prices in full (i.e. will increase connection prices by the maximum allowed by the safeguard cap, RPI+5%) and will derive rental prices as a residual, by taking into account the constraint imposed by the prior year revenue weighting and the cap on the combined basket (i.e. the RPI–12.5% annual decrease on the combined basket).

[220] The 'Low PPC price' scenario assumes that individual prices will increase annually by the maximum permitted by the price cap on the average charge of the basket in the LLCC. The 'High PPC price' scenario assumes annual price increases equal to the safeguard caps on each individual charge.

Table A7.10 Price differentials between wholesale ISDN30 and PPCs in 2013/14 (£/circuit)

		Rentals	Connections	Rentals + Connections
1	Wholesale ISDN30 price	3,114.56	1,346.48	4,461.04
2	Total PPC price	✂	✂	✂
3	LRIC differential[221]	✂	✂	✂
4	PPC price + differential (2+3)[222]	✂	✂	✂
5	Difference (1 – 4)[223]	✂	✂	✂
6	**Percentage difference (5/1)[224]**	✂	✂	✂

A7.99 As shown above, we estimate that the difference in the charges for connections and rentals are likely to be larger than the differences in the LRICs of both wholesale inputs by around ✂[more than 30%]. This is a slightly smaller percentage difference than we estimated in the April 2011 Consultation, however, this change is not sufficiently material to change our conclusions.[225]

A7.100 Additionally, we note that we have not annualised the PPC and wholesale ISDN30 connection charges and costs. If we had done this over a reasonable average customer lifetime this would have given less weight to connections and more to the rental differential, resulting in a larger difference between the price differential and the incremental cost differential. In other words, we have adopted a conservative approach in estimating the differentials and it is likely that they would be larger than the ones shown in Table A7.9 and Table A7.10 above.

A7.101 In light of the above, we believe we can be confident that having regard to the effect of the charge control, the differences in the prices of wholesale ISDN30 are likely to be broadly in line with the differences in their incremental costs. Importantly, we believe the above shows with a significant degree of confidence that the differences in the prices of the wholesale inputs is likely to be at least as large as the differences in LRICs. In light of this, we continue to regard CCA FAC as being a reasonable basis for informing the setting of charges.

[221] The LRIC differentials discussed above under our base case scenario.
[222] The sum of the PPC price and the LRIC differential between wholesale ISDN30 and PPCs. This is the wholesale ISDN30 that would exactly reflect our estimated LRIC differentials between the two services.
[223] The difference between the wholesale ISDN30 FACs in 2009/10 and the wholesale ISDN30 charges that would exactly reflect our estimated LRIC differentials between the two services.
[224] Percentage difference between the wholesale ISDN30 FACs in 2009/10 and the estimated LRIC-reflecting prices.
[225] As in the case of the Switching model (see paragraphs A6.44 to A6.46), we have run an additional sensitivity by assuming that PPC prices will change by RPI+8% in the years 2012/13 and 2013/14. This slightly decreases the extent by which differences between wholesale ISDN30 and PPC prices will be above their differences in incremental costs in 2013/14 to ✂[more than 30%]. However, this change does not affect our conclusions.

Annex 8

Ancillary Services

Introduction

A8.1 In the table below we have listed all ancillary services relating to the provision of wholesale ISDN30 services. As discussed in Section 5, we have imposed a price control on each DDI charge in the form of a safe-guard cap of RPI %. The remaining ancillary services remain subject to obligations imposed under the ISDN30 2010 Market Review including the requirement to provide access on fair and reasonable terms and that Openreach does not unduly discriminate in matters connected with such access. We have not included Enhanced Care Services in our definition of Ancillary services in this Annex, as they are considered separately, as discussed in Section 5.

Table A8.1 Ancillary services for wholesale ISDN30 services

	Ancillary service
1	Conversion from wholesale ISDN30 DASS to ISDN30e for transfer from any CP where a conversion is ordered at the same time as the transfer: per channel (up to and including 60 channels); 61 or more channels
2	DDI connection charges: planning Charge per DDI Installation or Change to Numbers at a DDI Installation
3	DDI connection charges: per DDI Number at a DDI Installation (New orders can only be ordered in blocks of 10 or as a single DDI number).
4	Rental Charge per number at a DDI installation (DDI rental charges apply to all numbers within the ranges provided.)
5	Reconfiguration – 0 to 15 channels; 16 to 30 channels; 31 to 60 channels; 61 and over
6	Standby power – option 1(a) 4x2 and 1x2 integral batteries; option 1(b) 16x2 battery pack and 1x2 SDH access; option 2 standalone battery
7	Business continuity services (for WLR3 only) - Wholesale ISDN30 Out Of Area per 2M Bit/s Bearer
8	Business continuity services (for WLR3 only) - ISDN30 site assurance (Option 1). For each Wholesale ISDN30 channel at the assured site associated with the telephone number whose calls are to be diverted; ISDN30 site assurance (Ooption 2). For each Wholesale ISDN30 2 Mbit/s transmission bearer at both the main and the assured site(s) associated with the telephone number whose calls are to be diverted; DDI Dual Parenting per DDI number range (minimum entry level 1000 DDI's and in blocks of 1000) Charged per Main Billing Number
9	Cancellation charges for orders cancelled before the customer confirmed date
10	ISDN30 DASS Customer Controlled Call Barring
11	ISDN30 DASS Customer Controlled Channel Busying
12	ISDN30 DASS Customer Controlled Diversion

13	ISDN30 DASS Selective Outgoing Call Barring - All calls (permits 999 & 112 access)
14	ISDN30 DASS Selective Outgoing Call Barring - International & Premium Rate Services (permits 999 & 112 access)
15	ISDN30 DASS Selective Outgoing Call Barring - National, International & Premium Rate Services (permits 999 & 112 access)
16	ISDN30 DASS Selective Outgoing Call Barring - Operator Controlled calls (permits 999 & 112 access)
17	ISDN30 DASS Selective Outgoing Call Barring - International, Premium Rate Services & Operator calls (permits 999 & 112 access)
18	ISDN30 DASS Selective Outgoing Call Barring - Supplementary Services
19	ISDN30 DASS Administration Provided Basic Diversion
20	ISDN30 DASS Administration Provided Diversion on Engaged/Failure of BT bearer
21	ISDN30 DASS Administration Provided Diversion on No Reply
22	ISDN30 DASS Calling Line Identity Presentation
23	ISDN30 DASS Calling Line Identity Restriction
24	ISDN30 DASS Connected Line Identity Restriction
25	ISDN30 DASS Permanent Outgoing Calls Barred
26	ISDN30 DASS Permanent Incoming Calls Barred
27	ISDN30 DASS Sub Addressing - 6 Octet
28	ISDN30 DASS Presentation Number
29	ISDN30e Selective Outgoing Call Barring - All calls (permits 999 & 112 access)
30	ISDN30e Selective Outgoing Call Barring - International & Premium Rate Services (permits 999 & 112 access)
31	ISDN30e Selective Outgoing Call Barring - National, International & Premium Rate Services (permits 999 & 112 access)
32	ISDN30e Selective Outgoing Call Barring - Operator Controlled calls (permits 999 & 112 access)
33	ISDN30e Selective Outgoing Call Barring - International, Premium Rate Services & Operator calls (permits 999 & 112 access)
34	ISDN30e Administration Provided Call Forward of Voice & Data Calls on Busy
35	ISDN30e Administration Provided Call Forward of Voice & Data Calls on No Reply
36	ISDN30e Administration Provided Call Forward of Voice & Data Calls on Unconditional
37	ISDN30e Calling Line Identity Presentation

38	ISDN30e Connected Line Identity Presentation
39	ISDN30e Connected Line Identity Restriction
40	ISDN30e Permanent Outgoing Calls Barred
41	ISDN30e Permanent Incoming Calls Barred
42	ISDN30e 20 Octet Sub Addressing
43	ISDN30e Customer Controlled Call Forwarding
44	ISDN30e Call Deflection
45	ISDN30e Presentation Number
46	Caller Redirect (CNI) - One Months Service Per number
47	Caller Redirect (CNI) - Quarterly (or part thereof) Per Number
48	DDI Caller Redirect - Connection charge per installation, Rental is per consecutive 10 number DDI block (or part thereof)
49	Pre-validation of Transfer Order for Wholesale ISDN30 installation types

Annex 9

Equality impact assessment

Introduction

A9.1 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.

A9.2 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.

A9.3 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.

The wholesale ISDN30 price control

A9.4 The aim of the wholesale ISDN30 price control is to assess Openreach's returns from its wholesale ISDN30 services and assess what form of price control is appropriate to ensure that charges for this service are not excessive.

A9.5 The main stages of developing this price control for wholesale ISDN30 services were:

9.5.1 we assessed whether a price control was appropriate;

9.5.2 we decided which type of price control was more appropriate (i.e. cost orientation, safeguard cap, retail minus, and/or an RPI-X charge control)

9.5.3 we accounted for the impact of our charge control on businesses and demand when deciding on the values of X.

A9.6 We decided that it was appropriate to impose an RPI-X charge control.

Equality assessment of the wholesale ISDN30 charge control

A9.7 We have considered whether the wholesale ISDN30 charge control would have an adverse impact on promoting equality. In particular we have considered whether the control would have a different or adverse effect on UK consumers and citizens with respect to: age, disability, gender reassignment, pregnancy and maternity, race, religion, sex and sexual orientation, and, in Northern Ireland, religious belief and dependents.

A9.8 The intention behind our approach to regulating wholesale ISDN30 is to ensure that relevant prices are set at an efficient level going forward, and that they are reflective of the underlying costs of provision. This should result in lower prices for all consumers that purchase this wholesale service. Many of these consumers are businesses, who may then pass these savings on to their own customers.

A9.9 We do not have detailed sectoral information on the businesses that purchase wholesale ISDN30 services or whether there is a correlation between the customers of their products or services and the defined equality groups. We also do not have information any correlation between retail ISDN30 and the defined equality groups.

A9.10 However, we do not have any reason to suspect that the benefit of the price control would not be the same for all consumers and business, nor that there would be a correlation between the affected consumers and businesses and any of the above defined equality groups. On that basis we believed that it would be disproportionate to commission relevant research.

A9.11 We also did not find any reason to suspect that there would be potential for negative impacts against the defined equality groups.

Annex 10

Glossary

Asset volume elasticity (AVE): Measures the percentage change in gross replacement costs for a 1% change in volumes.

Backhaul: Connection from the first access node (for example the local exchange or street cabinet) to the core network.

Bandwidth: In digital telecommunications systems the rate at which information can be transferred. In digital systems, it is measured in bits per second (bit/s).

Calling line identification presentation (CLIP): A telephone service, available in analogue and digital phone systems and most Voice over Internet Protocol (VoIP) applications, that transmits a caller's number to the called party's telephone equipment during the ringing signal, or when the call is being set up but before the call is answered.

Capital expenditure: Spending on assets that have physical substance and are held for use in the production or supply of goods or services, for rental to others, or for administrative purposes on a continuing basis in an entity's activities.

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.

Current cost accounting (CCA): An accounting convention, where assets are valued and depreciated according to their current replacement cost whilst maintaining the operating or financial capital of the business entity.

Current generation access (CGA): The copper cable access network that BT uses to provide telephony and broadband services and some ISDN30 services. .

Digital line system: A transmission system used to transport digital signals across the access network. In addition to the access network cables (copper or fibre) this comprises Line Terminating Equipment (LTE) and Network Terminating Equipment (NTE).

Direct dial-in (DDI): Gives businesses the capability to allow incoming calls to be routed directly to employees rather than routing via a central switchboard number.

Digital distribution frame (DDF): An internal wiring frame used to interconnect digital equipment in an exchange. For ISDN30 it is used to connect the LTE to the exchange concentrator line-card.

Distributed long run incremental cost (DLRIC): The LRIC of the individual service with a share of costs which are common to other services over BT's "core" network.

Distributed stand alone cost (DSAC): An accounting approach estimated by adding to the DLRIC a proportionate share of the inter-increment common costs. Rather than all common costs shared by a service being allocated to the service under consideration, the common costs are instead allocated amongst all the services that share the network increment.

Early termination charge (ETC): The total fee that will be charged for early termination of a contract or agreement.

Earnings before interest and tax (EBIT): An approximate measure of a company's operating cash flow based on data from the company's income statement. It is calculated by looking at earnings before the deduction of interest expenses and taxes.

Exchange concentrator: The element of the local exchange to which customer lines are connected. The concentrator provides the telephone line interface, traffic concentration and multiplexing of traffic for transmission to the exchange processor which is the local switching unit.

Exchange flexibility frames: These wiring frames are used within the exchanges to connect access network cables to electronic equipment inside the exchange and to interconnect electronic equipment within the exchange.

Fully allocated cost (FAC): An accounting approach under which all the costs of the company are distributed between its various products and services. The fully allocated cost of a product or service may therefore include some common costs that are not directly attributable to the service.

Gross replacement cost (GRC): The cost of replacing an existing tangible fixed asset with an identical or substantially similar new asset having a similar production or service capacity.

HCA (historic cost accounting) depreciation: The measure of the cost in terms of its original purchase price of the economic benefits of tangible fixed assets that have been consumed during a period. Consumption includes the wearing out, using up or other reduction in the useful economic life of a tangible fixed asset whether arising from use, effluxion of time or obsolescence through either changes in technology or demand for the goods and services produced by the asset.

Hosted VoIP: A term used to describe IP Centrex services. It is generally used to describe services provided to small sites that are accessed via an ordinary broadband internet connection.

Internal rate of return (IRR): A common measure of profitability used by businesses when deciding where to make their investments. It is calculated using information on the cash outflows (investments and operating expenditure) and inflows (revenues) generated by an activity over its lifespan. The IRR is the discount rate that would yield an NPV equal to zero.

Incremental costs: Those costs which are directly caused by the provision of that service in addition to the other services which the firm also produces. Another way of expressing this is that the incremental costs of a service are the difference between the total costs in a situation where the service is provided and the costs in another situation where the service is not provided.

IP Centrex: An exchange line service that includes the functionality of a PBX within a CP's network. This enables businesses to have the call management features of a PBX such as extension numbering and inter-extension calling without the need to purchase and operate a PBX.

IP (Internet Protocol): The packet data protocol used for routing and carriage of messages across the Internet and modern telecommunications networks.

ISDN2: A type digital telephone line service that supports telephony and switched data services. ISDN2 allows a business to handle two phone calls simultaneously. It is primarily used by smaller businesses.

ISDN30: A type of digital telephone line service that provides up to 30 lines over a common digital bearer circuit. These lines provide digital voice telephony, data services and a wide range of ancillary services. It is primarily used by larger businesses.

Line-card: The line specific functions of the concentrator are provided on electronic circuit boards known as line-cards which are housed in the exchange concentrator. There is one line-card per ISDN30 circuit. The digital bearer circuits terminate on the line-cards.

Line terminating equipment (LTE): Transmission equipment that transforms the signals into a form that can be transmitted over the bearer (either electrical or optical signals). In some cases the equipment may also perform a multiplexing function, combining several circuits onto a higher capacity bearer.

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.

Long run incremental cost (LRIC): The cost caused by the provision of a defined increment of output given that costs can, if necessary, be varied and that some level of output is already produced.

LRIC + Equi-Proportional Mark-Up (EPMU): An approach that takes estimates of the LRIC of providing relevant services and then marks up these amounts to take account of an organisation's common costs. Using an EPMU rule, any common costs can be allocated across the different services in proportion to the LRICs of individual services.

Main distribution frame (MDF): An internal wiring frame where copper access network cables are terminated and cross connected to exchange equipment by flexible wire jumpers.

Mean capital employed (MCE): The mean value of the assets that contribute to a company's ability to generate revenues.

Metallic path facilities (MPF): 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.

Minimum contract period (MCP): The amount of time a customer must remain in a contract for before being able to cancel it.

Modern equivalent asset (MEA): 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.

Multiplexor: A device that combines multiple circuits for transmission over a higher capacity bearer circuit.

Net present value (NPV): A common measure of profitability used by businesses when deciding where to make their investments. It is calculated using information on the cash outflows (investments and operating expenditure) and inflows (revenues) generated by an activity over its lifespan. The NPV calculates the expected return of an activity over its life for a given discount rate.

Net replacement cost (NRC): Gross replacement cost less accumulated depreciation based on gross replacement cost. An alternative is *Depreciated replacement cost (of tangible fixed assets other than property:-*The cost of replacing an existing tangible fixed asset with an identical or substantially similar new asset having a similar production or service capacity, from which appropriate deductions are made to reflect the value

attributable to the remaining portion of the total useful economic life of the asset and the residual value at the end of the asset's useful economic life.

Network terminating equipment (NTE): Transmission equipment located at the customer premises. Performs a similar function to LTE and also provides the customer interface.

Next generation network (NGN): A network that uses IP technology in the core and backhaul to provide all services over a single platform.

Openreach: The access division of BT established by Undertakings in 2005.

Optical flexibility frame (OFF): The equivalent to the MDF for fibre access network cables.

Partial private circuit (PPC): A generic term used to describe a category of private circuits that terminate at a point of connection between two communications providers' networks. It is therefore the provision of transparent transmission capacity between a customer's premises and a point of connection between the two communications providers' networks. It may also be termed a part leased line.

Points of handover (POH): A point where one communications provider interconnects with another communications provider for the purposes of connecting their networks to third party customers in order to provide services to those end customers.

Private branch exchanges (PBX): Telephone switching systems used by businesses to provide onsite telephony facilities such as extension numbering, inter-extension calling and outbound and inbound external calling.

Return on capital employed (ROCE): The ratio of accounting profit to capital employed. The measure of capital employed can be either Historic Cost Accounting (HCA) or Current Cost Accounting (CCA).

Return on sales (ROS): The ratio of operating profit divided by net sales, usually presented in percent.

Retail price index (RPI): A measure of inflation published monthly by the Office for National Statistics. It measures the change in the cost of a basket of retail goods and services.

Shared metallic path facility (SMPF): 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.

SIP Trunking: An exchange line service that uses IP for voice and data transmission and Session Initiation Protocol (SIP) for the telephony control signalling. SIP Trunking services are generally multi-line services that are used to provide exchange line services to modern IP PBXs that support this type of interface.

Synchronous digital hierarchy (SDH): A high capacity digital transmission technology used by operators in their backhaul and core networks and to a lesser extent in access networks. SDH supports a range of circuit bandwidths starting at 155 Mbit/s. SDH also allows multiple SDH circuits to be multiplexed for transmission over higher capacity SDH circuits.

Truncated IRR: A methodology used to assess the profitability of an activity in the past. 'Truncated IRR' can be estimated using data over a reasonable period of time (as opposed to the entire lifetime of the activity) and it only requires estimates of the value of the relevant assets at the start ('opening') and end ('terminal') dates of the period.

Annex 11

List of evidence

Introduction

A11.1 We have referenced the evidence we have relied upon in relation to our findings throughout this Statement; and we have also explained how we have relied upon that evidence.

A11.2 Whilst this annex lists the main evidence we have relied upon, the list is for convenience only and is not intended to be exhaustive.

Ofcom documents : regulatory statements / consultations

A11.3 Price control consultation for wholesale ISDN30 services, including: http://stakeholders.ofcom.org.uk/consultations/isdn30-2011/

- Consultation 1 April 2011
- Responses
- Further consultation 22 December 2011
- Responses to the further consultation

A11.4 Review of retail and wholesale ISDN30 services, including: http://stakeholders.ofcom.org.uk/consultations/isdn30/

- Consultation 4 May 2010
- Responses
- Market Research
- Statement 20 August 2010

A11.5 Charge control review for LLU and WLR services, including: http://stakeholders.ofcom.org.uk/consultations/wlr-cc-2011/

- Consultation 31 May 2011
- Responses
- Further consultation 23 November 2011
- Responses to the further consultation
- Statement 7 March 2012

A11.6 A new pricing framework for Openreach, Statement, 22 May 2009: http://stakeholders.ofcom.org.uk/consultations/openreachframework/statement/

A11.7 Wholesale Broadband Access (WBA) charge control review consultation, including:

http://stakeholders.ofcom.org.uk/consultations/wba-charge-control/

- Consultation 20 January 2011
- Responses
- Wholesale Broadband Access (WBA) Charge Control Model 15 Feb 2011
- Statement 20 July 2011 WBA Charge Control - Charge control framework for WBA Market 1 services
- Charge control model 5 August 2011

A11.8 Wholesale mobile voice termination consultation (MCT), including: http://stakeholders.ofcom.org.uk/consultations/mtr/

- Consultation 1 April 2010
- Responses
- Statement 15 March 2011

A11.9 Leased Lines Charge Control Consultation, 8 December 2008: http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/summary/leasedlines.pdf

A11.10 Leased Lines charge control statement, 2 July 2009: http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/statement/llccstatement.pdf

A11.11 Wholesale Fixed Narrowband Market Review, 2003: http://stakeholders.ofcom.org.uk/binaries/consultations/750148/fixednarrowbandstatement.pdf

A11.12 Wholesale Fixed Narrowband Market Review, 15 September 2009: http://stakeholders.ofcom.org.uk/binaries/consultations/wnmr_statement_consultation/summary/main.pdf

A11.13 Review of BT Network Charge Control Consultation, 19 March 2009: http://stakeholders.ofcom.org.uk/binaries/consultations/review_bt_ncc/summary/reviewbtncc.pdf

A11.14 Review of BT Network charge Controls statement, 15 September 2009: http://stakeholders.ofcom.org.uk/binaries/consultations/review_bt_ncc/statement/nccstatement.pdf

A11.15 Mobile Call Termination Statement, 27 March 2007: http://stakeholders.ofcom.org.uk/binaries/consultations/mobile_call_term/statement/statement.pdf.

A11.16 NTS Retail Uplift further consultation, 10 February 2011: http://stakeholders.ofcom.org.uk/binaries/consultations/nts-retail-uplift/summary/nts-retail-uplift.pdf

A11.17 Price Control Review Statement (Oftel), 1996:
http://www.ofcom.org.uk/static/archive/oftel/publications/1995_98/pricing/pri1997b/chap6.htm

A11.18 Pay TV phase three document – Proposed remedies, 26 June 2009:
http://stakeholders.ofcom.org.uk/binaries/consultations/third_paytv/summary/paytv_condoc.pdf

A11.19 Review of the wholesale local access market, Statement, December 2004:
http://stakeholders.ofcom.org.uk/binaries/consultations/rwlam/statement/rwlam161204.pdf

A11.20 Review of the wholesale local access market, Statement, October 2010:
http://stakeholders.ofcom.org.uk/binaries/consultations/wla/statement/WLA_statement.pdf

Ofcom documents: other statements / guidance

A11.21 How will Ofcom consult?: Ofcom Consultation Guidelines November 2007:
http://stakeholders.ofcom.org.uk/consultations/how-will-ofcom-consult

A11.22 Framework for Disclosure of Charge Control Models, October 2010:
http://stakeholders.ofcom.org.uk/binaries/consultations/784024/Charge_control.pdf

A11.23 Better policy-making: Ofcom's approach to impact assessment:
http://www.ofcom.org.uk/about/policies-and-guidelines/better-policy-making-ofcoms-approach-to-impact-assessment/

A11.24 Future broadband – Policy approach to next generation access, Consultation, 26 September 2007:
http://stakeholders.ofcom.org.uk/binaries/consultations/nga/summary/future_broadband_nga.pdf

A11.25 Consumer Switching Consultation:
http://stakeholders.ofcom.org.uk/binaries/consultations/consumer-switching/summary/switching.pdf

A11.26 Pricing Of Telecommunications Services From 1997: Oftel's Proposals for Price Control and Fair Trading:
http://www.ofcom.org.uk/static/archive/oftel/publications/1995_98/pricing/pri1997b/chap6.htm

A11.27 Ofcom, The Business Consumer Experience, December 2009:
http://stakeholders.ofcom.org.uk/binaries/research/consumer-experience/bce.pdf

A11.28 Cost of Capital Statement, 2005:
http://stakeholders.ofcom.org.uk/binaries/consultations/cost_capital2/statement/final.pdf

A11.29 Oftel, *Guidelines on the Operation of the Network Charge Controls,* 2001:
http://www.ofcom.org.uk/static/archive/oftel/publications/ind_guidelines/pcr1201.htm

A11.30 Clarification of the cost orientation obligation in the WLA market, 7 December 2010
http://stakeholders.ofcom.org.uk/consultations/wla/?a=0

A11.31 Access to Bandwidth: Delivering Competition for the Information Age, November 1999: http://www.ofcom.org.uk/static/archive/oftel/publications/1999/consumer/llu0799.htm

A11.32 Valuing copper access, second consultation, 16 March 2005: http://stakeholders.ofcom.org.uk/binaries/consultations/copper/summary/copper2.pdf

Information requests - S135 requests

A11.33 Ofcom issued a series of notices under section 135 of the Communications Act 2003 ('the Act') requiring various CPs to provide specified information as set out in the Notice for the purposes of an analysis of identified markets as contemplated by Section 79 under the Act. These are commonly known as S135 requests. In this review we have relied upon information provided under such notices that were served in connection with the Market Review; the WLR/LLU Review (where the information related to cost data for modelling)[226] and notices served specifically in relation to this review. We summarise those notices below.

A11.34 S135 request of 16 July 2010 ('1st Openreach135') covering accurate and detailed information to assist our understanding, including to populate our own cost forecast and allocation models used for the purposes of each of these reviews. Information was received from Openreach.

A11.35 S135 requests of 16 July 2010 ('1st OCP 135s') requesting information to assist our understanding of how infrastructure competitors provide ISDN30 services, the costs of provision and the volumes involved. The information was received from key competitors to Openreach in the supply of wholesale ISDN30 products and services.

A11.36 S135 request of 16 July 2010 ('2nd Openreach135') covering accurate and detailed information assisting us to understand the differences between the incremental costs of WLR ISDN30 and 2Mbit/s PPCs' rental and connection services; to further understand the profitability of ISDN30 services. Information was received from Openreach.

A11.37 S135 request of 16 July 2010 ('3rd Openreach135') covering accurate and detailed information to assist us understanding the demand for WLR ISDN30 compared with other wholesale services provided by Openreach/ BT. Information was received from Openreach.

A11.38 S135 request of 25 August 2011 ('4th Openreach 135') covering updated volumes information of ISDN30 and IP-based services, including actual and forecasts for the period of the charge control. Information was received from Openreach.

A11.39 S135 request of 10 October 2011 ('5th Openreach 135') requesting updated information to assist our understanding, including to populate our own cost forecast model; to understand the differences between the incremental costs of WLR ISDN30 and 2Mbit/s PPCs' rental and connection services; and the 2010/11 cost floors and ceilings for core wholesale ISDN30 services. Information was received from Openreach.

[226] See Annex 14 at: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc-2011/statement/annexesMarch12.pdf

A11.40 S135 requests of 14 September 2011 ('2nd OCP 135s') requesting updated information of how infrastructure competitors provide ISDN30 services and the volumes involved. The information was received from key competitors to Openreach in the supply of wholesale ISDN30 products and services.

A11.41 S135 requests of 18 January 2012 ('3rd OCP 135s') requesting updated information on ISDN30 and IP-based services volumes and ISDN30 new connections using PPCs. The information was received from key competitors to Openreach in the supply of wholesale ISDN30 products and services.

A11.42 S135 request of 18 January 2012 ('6th Openreach 135') covering updated volumes information of ISDN30 and IP-based services, including actual and forecasts for the period of the charge control; updated information on the breakdown of ISDN30 circuits by their channel utilisation; and the share of Openreach customers on different service maintenance levels. Information was received from Openreach.

EC documents

A11.43 Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:337:0037:0069:EN:PDF

A11.44 Directive 2009/140/EC of 20 November 2009 amending Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services.

A11.45 Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services.

Appeals

A11.46 Competition Commission, *The Carphone Warehouse Group plc v Office of Communications*, Case 1149/3/3/09, available at: http://www.competition-commission.org.uk/appeals/communications_act/wlr_determination.pdf.

A11.47 Competition Appeal Tribunal, LLCC Appeal: http://www.catribunal.org.uk/files/1112_Cable_Wireless_Determination_300610.pdf

A11.48 Competition Commission, *Cable & Wireless UK v Office of Communications*, Determination, Case 1112/3/3/09, June 2010, (LLCC Appeal): http://www.competition-commission.org.uk/appeals/communications_act/final_determination_excised_version_for_publication.pdf

Academic literature / Government Publications

A11.49 Analysis Consulting "*to undertake a comparison between the valuation of the existing [copper access] network and a hypothetical Modern Equivalent Asset (MEA)*" http://stakeholders.ofcom.org.uk/binaries/consultations/copper/annexes/loop.pdf

A11.50 IDC, *Western Europe SIP Trunking Market Update*, July 2010

A11.51 *Economics Bulletin*, Vol. 12, No. 5 pp. 1 – 19, available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.98.1939&rep=rep1&type=pdf

A11.52 The General Building Cost Index is published by the Building Cost Information Service (BCIS) http://www.bcis.co.uk/

A11.53 *Measuring Administrative Costs: UK Standard Cost Model Manual*, telecommunications engineers (cat. 5242), available at p. A18 http://www.bis.gov.uk/files/file44505.pdf

A11.54 Brattle group, "Estimate of BT's Equity Beta", commissioned by Ofcom, October 2010

A11.55 Oxera, *Assessing profitability in competition policy analysis*, OFT Economic Discussion Paper 6, July 2003 http://www.oft.gov.uk/shared_oft/reports/comp_policy/oft657.pdf

A11.56 Efficiency review of BT Openreach, March 2010: http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc-2011/annexes/Efficiency_Review_Report.PDF

Other BT information

A11.57 BT Regulatory Financial Statements (RFS) 05/06; 06/07; 07/08; 08/09; 09/10; 10/11

A11.58 Openreach Carrier Price List: http://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=CRdZCG1nNAFk46d2aTKmailhWjbv3ISjzoi4SeIn498lMnGHsqdC0vzO163bJmh34D91D7M0q8u%2F%0AIlSgtIFAKw%3D%3D

A11.59 Openreach, Maintenance Options Overview, http://www.openreach.co.uk/orpg/home/products/serviceproducts/serviceharmonisation/serviceharmonisation.do

A11.60 Repair service levels offered to Openreach WLR, LLU, ISDN2 and ISDN30 customers: http://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=o1GUUZA4oSGmoXU5lc%2BgZQD265It6W32TNnfEUU7w1FZ6rNZujnCs99NbIKJZPD9hXYmiijxH6wr%0ACQm97GZMyQ%3D%3D

A11.61 Openreach pricing list for repair services: http://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=o1GUUZA4oSGmoXU5lc%2BgZQD265It6W32TNnfEUU7w1FZ6rNZujnCs99NbIKJZPD9hXYmiijxH6wr%0ACQm97GZMyQ%3D%3D

A11.62 DDI Pricing: http://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=dLs8GxYbnYP2uRcs8CSohLVXg9qIg6ZASNDEpcqizEglMnGHsqdC0vzO163bJmh34D91D7M0q8u%2F%0AIlSgtIFAKw%3D%3D

A11.63 BT Retail's price offering, available at: http://www.bt.com/pricing/current/Exch_Lines_boo/0011_d0e2917.htm#0011-d0e2917

A11.64 BT Retail's price offering, available at: http://business.bt.com/phoneservices/phone-lines-and-calling-plans/isdn/

A11.65 BT Wholesale, PPC Product Handbook, available at: http://www.btwholesale.com/pages/downloads/service_and_support/contractual_information/docs/ppcoffer/briefings/ppc_product_handbook_Issue_4_sept2010.pdf

A11.66 PPC Circuit Rental Charges price list: http://www.btwholesale.com/pages/cmsjsps/service_and_support/service_support_hub/online_pricing_hub/cpl_hub/cpl_pricing_hub/cpl_browsable_sections/cpl_browsable_sectionb_8.jsp

A11.67 BT Wholesale, PPC Operations and Maintenance Manual: https://www.btwholesale.com/shared/document/Products/Data/PPC/Handbook_and_technical/ppc_operations_and_maintenance_manual_issue8_2_11Jan12.pdf

A11.68 Openreach KPIs from January 2010 to October 2010 (available to Openreach customers at http://www.openreach.co.uk/orpg/customerzone/products/wlr3/wlr3kpi/wlr_kpi.do)

A11.69 BT's Long Run Incremental Cost Model: Relationships and Parameters 2011, available at: http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2011/LongRunIncrementalCostModel2011.pdf.