

August | 2015

BT WACC

Responding to Ofcom's view of the weighted average cost of capital for BT's leased lines as part of the business connectivity market review consultation

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Glossary

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Glossary

Term	Definition
BCMR	Business Connectivity Market Review
BoE	Bank of England
BT	British Telecom
BT GS	BT Global Services
CAA	Civil Aviation Authority
CAPM	Capital asset pricing model
CI	Contemporary interface
CMA	Competition and Markets Authority
CPI	Consumer Price Index
DGM	Dividend Growth Model
DMS	Dimson Marsh and Staunton
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
ERP	Equity risk premium
FAMR	Fixed Access Market Review
FS	Financial Services
FTI Consulting	FTI Consulting LLP
FTSE	Financial Times Stock Exchange
FTTC	Fibre To the Cabinet
FTTH	Fibre To the Home
ICT	Information and Communication Technologies
ILG	Index-Linked Gilts
LLCC	Leased Line Charge Control
MCT	Mobile Call Termination
NIE	Northern Ireland Electricity
NRA	National Regulatory Authorities
Ofcom	Office of Communications
Ofgem	Office on Gas and Electricity Markets
Ofwat	Water Services Regulation Authority
ORR	Office of Rail and Road
PR	Price Review
RFR	Risk free rate
RoBT	Rest of BT

Term	Definition
RPI	Retail Price Index
S135	Section 135 Notice
TI	Traditional Interface
TMR	Total market returns
UREGNI	Northern Ireland Authority for Utility Regulator (Utility Regulator Electricity Gas Northern Ireland)
WACC	Weighted Average Cost of Capital
WBA	Wholesale Broadband Access

1. Executive Summary

1.1 FTI Consulting LLP have been asked by BT to review Ofcom's proposal for the weighted cost of capital (WACC) to be applied to the leased line charge control (LLCC) as set out in Ofcom's business connectivity market review (BCMR) consultation published in June 2015.

BT Group WACC

- 1.2 We consider that Ofcom's use of the CAPM and approach to calculating the WACC for BT Group is, for the most part, consistent with Ofcom's previous approach and to that used by other NRAs in the UK.
- 1.3 An area of inconsistency is the use of forward looking debt assumptions, rather than considering the cost of embedded debt. Embedded debt is considered by all other UK regulators we have reviewed, and if it were assumed that 50% of BT's debt was embedded then the cost of debt may increase by around 90 basis points compared to Ofcom's calculation.
- 1.4 Ofcom's assumption that forward-looking gearing is around 30% has not been robustly justified, with different pieces of available evidence pointing to both higher and lower estimates. However, we concur with Ofcom that the WACC is not particularly sensitive to the gearing assumptions.
- 1.5 In terms of the remaining BT Group WACC parameters, in some areas Ofcom's estimates appear marginally below where current evidence and regulatory precedent suggest they may lie. This is true for the ERP and the risk free rate, for example. However in other areas, such as the equity beta, Ofcom's estimate may be on the high side as BT's equity beta has decreased between January 2015 and the end of June 2015, although beta remains volatile.
- 1.6 If we amend the cost of debt to consider embedded debt and we update the equity beta to consider data up to 30th June 2015 which provides a range of 0.89 to 1.05¹, with a base case estimate of 1.0, the resulting WACC is 9.7% to 10.5% on a pre-tax nominal basis. However, we recognise the degree of judgement that is required in calculating a WACC and in the round we consider that Ofcom's pre-tax nominal

¹ BT group raw equity beta of 0.85 to 1, which is de-levered at 26% BT gearing (the average over the last two years) and then re-levered at notional 30% gearing with a debt beta of 0.1.

estimate of 10% to be within a reasonable range.

Openreach WACC

- 1.7 Since 2005, Ofcom has disaggregated Openreach's beta from the BT Group beta and Ofcom continues to use this approach in this consultation. Ofcom has kept its estimate of Openreach asset beta constant at 0.5, the level set in the previous FAMR, despite changes to the BT Group beta and comparative betas over this period.
- 1.8 We do not agree with Ofcom that the changes to BT group asset beta are not attributable to the Openreach beta. Ofcom has drawn together four events in BT's recent history and has attempted to use them to tell a story as to the changing asset beta. However the story being told is not compelling and whilst BT's group asset beta has shown large movements, there is a lack of evidence to suggest that these can be assigned to any particular event or operating division and the movement may well be due to the financial crisis which has seen the market being more volatile than usual.
- 1.9 Ofcom has chosen to set the value of the Openreach copper asset beta at 0.5, which is consistent with the value used in the June 2014 FAMR statement. Ofcom has concluded that this remains appropriate as it is between the asset beta of network utilities and UK fixed telecom companies. Our analysis suggests that is not the case, as utility company betas have: (i) increased by 36% between FAMR (March 2014) and end of June 2015 and applying the 36% to the Openreach asset beta increases it to 0.68; and (ii) increased from the 0.40-0.44 as calculated by NERA in January 2015 to 0.48-0.54 as at 30th June 2015.
- 1.10 The beta being proposed by Ofcom does not reflect the recent increases in the asset beta of the comparator network utilities and is below the asset beta calculated on a 1 year daily basis. The increasing beta observed in network utility companies weakens Ofcom's argument that the Openreach beta should not be increased from the June 2014 FAMR level and that the increase in BT's group beta should not be attributed to Openreach. The asset beta being proposed by Ofcom is at the bottom end of the asset beta range proposed by CMA in the energy market investigation.
- 1.11 Based on this information, it would appear reasonable to expect Ofcom to consider a range for the Openreach asset beta of 0.5 0.68, with a base case estimate of 0.6. This would extend the pre-tax nominal WACC for Openreach from 8.4% to a range of 8.3% to 9.6%, with a base case estimate of 9.0%. If the Openreach WACC is also updated for the cost of embedded debt, this gives a range of 8.6% to 9.8% with a base case estimate of 9.3%. However, given the recent upward trend in utility asset betas, we place greater weight on the upper end of the range.

Disaggregating UK Telecoms

- 1.12 Ofcom notes that with its revised parameters, the implied RoBT asset beta increases from 0.74 which was used in the previous LLCC² to 0.82 and that it considers this to be too high to apply to leased lines as there is no evidence to suggest the systematic risk associated with leased lines has increased.
- 1.13 However, the increase in RoBT beta that is being observed by Ofcom may have come about due to its proposal to keep the Openreach beta constant. Increasing the Openreach beta to 0.6 whilst using the Ofcom proposed BT group equity beta of 0.97 would decrease the aggregated RoBT beta to 0.79. Using our upper end Openreach beta estimate of 0.68 would decrease the aggregated RoBT beta to 0.76. Therefore, there may not be a divergence between BT's UK Telecoms business and RoBT but rather a mistreatment of Openreach's asset beta that leads to the perception of a divergence.
- 1.14 Ofcom concludes that, at this time, it would be inappropriate to maintain the current status quo (the two way split of the BT group asset beta "in the light of market evidence from more recent years"). Whilst it maybe theoretically correct to consider a further disaggregation, the market evidence provided by Ofcom to support this is primarily hypothetical a series of hypotheses with limited robust quantitative evidence to demonstrate a divergence in non-systematic risk between the business units. As such, we do not share Ofcom's view that market evidence points towards a three way split of the BT group asset beta.
- 1.15 Furthermore while it is theoretically correct to disaggregate the beta further, there is not the data available for pure-play comparators to permit this disaggregation in practice.
- 1.16 Ofcom's comparators analysis for BT GS asset beta is flawed. It is based on a limited sample of four ICT companies whose business models are not similar to BT GS, who operate in different market (primarily more globally than BT) and is subject to selection bias. This has previously been acknowledged by Ofcom in the 2009 LLCC appeal. Furthermore, the range and volatility of the beta is too broad to draw a meaningful conclusion as to the relative beta of BT GS versus UK Telecoms services.
- 1.17 The UK, European and US telecoms comparators are not "pure play" UK Telecoms operators.
 - They have different business models to BT, a considerable proportion of their income is from non fixed line services and they face different regulatory risks from BT in the UK. As part of its recent energy review, the CMA expressed

² Ofcom, March 2013 BCMR Statement.

caution in considering betas from overseas countries in comparator analysis.

- The spread of asset betas from the comparator sample is large, ranging from 0.30 to 0.81. There is also a large difference between the two year and one year betas. This leads to concerns around the correctness of calculating an average from this data.
- The betas have been particularly volatile in recent times, potentially reflecting the financial crisis, and may therefore not be particularly meaningful in the context of a forward-looking beta.
- 1.18 Furthermore, the calculation of the RoBT beta is very sensitive to the underlying assumptions about the BT group beta and the Openreach beta. Under certain assumption sets, the RoBT is similar to the previous LLCC estimate. Also, the betas of the comparator companies chosen by Ofcom provide little insight into the appropriate beta to apply to a UK Telecoms operator or the value of a UK Telecoms operator beta relative to the BT group beta as the comparator companies have not been shown to be representative of a pure-play UK Telecoms company.
- 1.19 We therefore recommend that Ofcom either undertakes quantitative analysis, using appropriate comparators, to robustly demonstrate the differences in systematic risk and asset betas between leased line services and other services (be it in the categorisation of other UK Telecoms services or another grouping) or it continues to maintain the existing status quo which is less reliant upon assumptions and hypotheses. Applying an asset beta of 0.79 to the RoBT would lead to a WACC of 10.4%. If the cost of debt was also updated as discussed previously, the WACC would increase to 10.6%.

	BT Group (base case)	Openreach	RoBT
Real risk free rate	1.0%	1.0%	1.0%
Inflation assumption	3.2%	3.2%	3.2%
Nominal risk free rate	4.2%	4.2%	4.2%
Equity beta	0.95		
Asset beta	0.73	0.60	0.79
Equity beta @ 30% gearing	1.00	0.81	1.09
ERP	5.4%	5.4%	5.4%
Gearing	30.0%	30.0%	30.0%
Debt premium	2.1%	1.9%	2.2%
Debt beta	0.1	0.1	0.1
Tax rate	19.3%	19.3%	19.3%
Pre-tax nominal WACC	10.2%	9.3%	10.6%

Table 1: Revised estimates of WACC

Sources: FTI Analysis. The estimates presented also include an adjustment to the ERP and the tax rate, both of which are discussed in the body of the report.

2. Introduction

- 2.1 This report has been prepared by FTI Consulting LLP ("FTI Consulting") for BT in connection with Ofcom's proposal for the Weighted Average Cost of Capital (WACC) to be applied to the Leased Line Charge Control (LLCC) as set out in Ofcom's Business Connectivity Market Review (BCMR) consultation published in June 2015.
- 2.2 FTI's work has been led by Schellion Horn and Anthony Legg. Schellion is a Managing Director in FTI's Economic and Financial Consulting practice where she specialises in the economics of regulatory utilities. Anthony is a Director in FTI's Economic and Financial Consulting practice based in London. He is a specialist in regulatory finance and economic regulation, particularly for regulated water, electricity and gas networks.
- 2.3 Unless stated otherwise, all references to "we" and "us" throughout this report refer to the author. We have discussed issues relevant to this report with BT. The opinions expressed in this report are, however, the author's own.
- 2.4 We have been asked to review Ofcom's methodology and approach to calculating the WACC for LLCC and to consider the appropriateness of the resulting value when considered against the evidence which is available to us.
- 2.5 In order to review the WACC for LLCC, we have also undertaken a review of BT Group WACC. However, the focus of our report is on the disaggregation of this WACC for the LLCC and therefore our review of the BT Group WACC should be considered as cursory.

Background

- 2.6 On 12th June 2015, Ofcom published its consultation on BCMR: Leased lines charge controls and dark fibre pricing. In the annexes to the consultation, Ofcom set out its proposed approach to the calculation of WACC, the value of WACC to be applied in the leased line price control and a report by NERA on the value of BT Group beta and a number of comparator companies.
- 2.7 In this LLCC consultation, Ofcom has introduced a significant change to its previous methodology. Ofcom has proposed to disaggregate the Rest of BT (RoBT) WACC, which was previously applied to leased lines, into UK Telecoms and RoBT. Ofcom has defined RoBT to principally be BT Global Services (BT GS), whilst UK Telecoms is intended to represent any part of BT which is not global services or Openreach copper access. Thus it is the UK Telecoms WACC which Ofcom proposes to use in the LLCC.

- 2.8 The disaggregation of UK Telecoms from RoBT is achieved by Ofcom by estimating a separate asset beta for BT GS. Having estimated the betas of BT Group, Openreach copper and BT GS, Ofcom is then able to deduce the beta of UK Telecoms.
- 2.9 In some aspects, Ofcom's disaggregation approach reflects the approach used since 2005 to estimate distinct WACCs for Openreach copper and the RoBT. However whilst in its estimate of the Openreach copper beta Ofcom has found a set of comparators in the UK network utility companies, in its estimates of UK Telecoms it has not been able to find a robust set of pure play comparators.
- 2.10 Consistent with its approach to the disaggregation of the Openreach copper WACC, Ofcom has limited the disaggregation to consideration of the relative asset betas and has not considered whether other variables such as gearing, the debt premium and the debt beta would also vary between business units.
- 2.11 In addition to introducing a further disaggregation, Ofcom has also reduced the weighting applied to the Openreach copper beta from 33% to 25%. However whilst the weighting has changed, Ofcom has taken the decision to hold the Openreach beta constant at 0.5.

Sources of information

- 2.12 In this report, we utilise a number of WACC benchmarks from National Regulatory Authorities (NRA) in the UK and from the Competition and Markets Authority (CMA).
- 2.13 Data on financing, gearing and betas is obtained for comparative companies from Bloomberg. This is used alongside information published by Ofcom in its BCMR consultation (June 2015) and the supporting appendix commissioned from NERA on BT's beta. We have not sought to confirm the accuracy of this information.
- 2.14 We have also made use of data supplied by BT which has previously been made available to Ofcom under a section 135 (S135) notice.
- 2.15 Data sources are listed in relevant footnotes and an appendix to this report.

Restrictions of the report

- 2.16 This report has been prepared solely for the benefit of BT for use in responding to Ofcom's LLCC consultation. We have agreed that BT may provide this report to Ofcom and that it may be published by Ofcom in the context of the LLCC.
- 2.17 FTI Consulting accepts no liability or duty of care to any person other than BT for the content of the report and disclaims all responsibility for the consequences of any person other than BT acting or refraining to act in reliance on the report or for any decisions made or not made which are based upon the report.

Limitations to the scope of our work

- 2.18 This report contains information obtained or derived from a variety of sources. FTI Consulting has not sought to establish the reliability of those sources or verified the information provided.
- 2.19 No representation or warranty of any kind (whether express or implied) is given by FTI Consulting to any person (except to BT under the relevant terms of our engagement) as to the accuracy or completeness of this report.
- 2.20 This report is based on information available to FTI Consulting at the time of writing of the report and does not take into account any new information which becomes known to us after the date of the report. We accept no responsibility for updating the report or informing any recipient of the report of any such new information.

Structure of this report

- 2.21 We have structured our review and analysis into three parts:
 - (a) Review of the WACC calculated by Ofcom for BT Group
 - (b) Approach to disaggregating the BT Group beta into Openreach, Rest of BT and UK Telecoms
 - (c) Conclusions
- 2.22 Additionally, appendices are provided which set out a list of our data sources and additional analysis.

3. BT Group WACC

- 3.1 We begin by considering the calculation of BT Group WACC by Ofcom and each of the parameters that have used by Ofcom.
- 3.2 Consistent with previous WACC decisions and the approach used by other economic regulators in the UK, Ofcom has calculated WACC using the capital asset pricing model (CAPM) which requires the calculation of the cost of equity and the cost of debt, with these two values weighted by the gearing.

Cost of equity

3.3 Of com calculates BT's cost of equity using the standard CAPM approach. This requires the estimation of the Risk Free Rate (RFR), ERP and equity beta. We consider the robustness of Of com's estimation of each of these in turn.

Risk free rate

3.4 Of com proposes a nominal RFR of 4.2% which comprises a real RFR of 1% plus an RPI inflation figure of 3.2%. The 1% real RFR is consistent with that set out by Of com in its March 2015 MCT statement where it reduced the rate from 1.3% to 1.% due to placing more weight on longer term average yields than spot rates and a review of recent CMA and regulatory decisions. The use of longer term yields is aligned with the approach used by other NRAs and CMA, for example the CMA placed most focus on maturities of 15 years or over in its recent energy market investigation.

Decision	Date	Method	Estimate	Sources
Ofgem	17/12/12	Ofgem's estimate based on 10-year average of the yield on index-linked gilts	2.00%	1
ORR	10/13	NA	1.75%	2
Ofgem	18/12/13	Based on 10-year average yield on 10- year benchmark UK index-linked gilts and Belgian nominal government bonds.	NA	3
CAA	01/14	Based on PwC's estimate which focused on "10 to 15 years maturities, given regulatory focus on yields on similar maturity."	0.50%	4
Competition Commission	03/14	Based on long-term UK Government bonds (15 years and more)	1.00- 1.50%	5
Ofgem	11/14	Based on 10-year Real Yield from British Government Securities, Zero Coupon	1.30%	6
Ofwat	12/14	Based on current yields on 10-year to 20-year adjusted for forward-looking expectations	1.25%	7
UREGNI	12/14	Based on the risk-free rate made in several determinations by regulators, with an emphasis added on the one from the Competition Commission in the NIE determination.	1.50%	8
СМА	02/15	As nominal return is studied here, they use yields on nominal gilts for maturities of 15 years and more	1.00- 1.50%	9
Average			1.35%	

Table 2: Recent regulatory precedent on the real risk free rate

Sources: (1) <u>https://www.ofgem.gov.uk/ofgem-publications/53602/4riiot1fpfinancedec12.pdf;</u>

(2) <u>http://orr.gov.uk/__data/assets/pdf_file/0011/452/pr13-final-determination.pdf;</u>

(3) <u>https://www.ofgem.gov.uk/sites/default/files/docs/decisions/decision_letter_idc_0.pdf;</u>

(4) <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf;</u>

(5) <u>https://assets.digital.cabinet-office.gov.uk/media/534cd495ed915d630e00003f/final-determination.pdf;</u>

(6) <u>https://www.ofgem.gov.uk/ofgem-publications/91564/riio-</u>

ed1finaldeterminationoverview.pdf;

(7) <u>http://www.ofwat.gov.uk/pricereview/pr14/det_pr20141212riskreward.pdf;</u>

(8) <u>http://www.uregni.gov.uk/uploads/publications/UR_PC15_DD_Annex_A_-</u>

_Financing_Investment.pdf; and

(9) https://assets.digital.cabinet-

office.gov.uk/media/54edfe9340f0b6142a000001/Cost_of_capital.pdf.

3.5 Long term real bond yields have been below 1%, although they have been rising slightly since the beginning of 2015.



Figure 1: Index linked UK Government bond yields

Source: Bank of England, UK real spot curve, 10 and 15 years to maturity.

3.6 Recent NRA and CMA decisions have generally used a real RFR that has been at or above 1%. The average rate of the precedents we have considered is 1.4%. This is consistent with the real yield on long-term bonds as shown above. This issue has been considered previously by NRAs and the CMA in its most recent WACC decision for energy market investigation³ where it stated that:

> "We have also taken into account the fact that the yields observed on indexlinked gilts are likely to be affected by the imperfections associated with the RPI as a measure of underlying inflation. We estimate the historical gap between RPI and Consumer Price Index (CPI) measures of inflation to be around 0.5% between 2005 and 2013. To the extent that the CPI better reflects underlying inflation, measures of the apparent riskless rate of return taken from indexlinked gilt yields may be distorted as a result of that gap. This may be a factor behind negative short-term real yields. In our NIE decision, we noted that, given that the regulated asset base of the company was also indexed by the RPI, we did not need to adjust our estimate of the RFR for this effect. However, in this investigation, the financial performance of the companies is likely to have been

³ CMA Energy market investigation, Appendix 10.4 cost of capital, 10th July 2015

affected by the general rate of inflation in the economy, which we consider to be most accurately measured by the CPI.

Therefore we have considered two approaches; firstly to adjust the historic yield on long-dated Index-Linked Gilts (ILGs) (0.5%) upwards to take account of the gap between RPI and CPI (also 0.5%) in the period 2007 to 2013; this produces an estimate of the real RFR of 1%. Secondly we consider the nominal yield on long-dated gilts (approximately 4%) and deduct the CPI over the period. Between January 2007 and March 2014, the CPI averaged 2.9%. This produces a real RFR estimate of 1.1%. (In theory we would also need to subtract an estimate of the inflation risk premium over the period, however we are not aware of any reliable estimate for this purpose). Both approaches yield a real RFR of around $1\%^{4''}$.

- 3.7 The real RFR proposed by Ofcom falls within the range of regulatory precedent set out above. However, given recent NRA decisions and rising real yields on Government bonds, it may be considered to be at the low end for a forward looking rate.
- 3.8 However when the real RFR is considered in the context of the Total Market Return (TMR), Ofcom's slightly lower RFR is mostly balanced by a slightly higher ERP. The ERP and Ofcom's rebalancing is discussed below.

Market risk premium

- 3.9 Consistent with the March 2015 MCT statement, Ofcom proposes to use an ERP of5.3% in order to maintain the TMR at 6.3%. Ofcom states that this was set by reference to:
 - (a) A rebalancing of the real RFR and ERP as components of the TMR, and
 - (b) An ERP of 5.3% being supported by evidence on historical premiums over UK equities, academic surveys and regulatory precedent.
- 3.10 The use of a TMR approach appears with consistent with the approach being used by some other NRAs and the CMA. The CMA states that this is its preferred approach: "there are two principal reasons for preferring to calculate the ERP in this manner: first ERP estimates can vary depending on the class of risk-free instrument used in the calculation; second the market return has tended to be less volatile than the ERP (as measured, for example, by the ratio of standard deviation to mean), and there is some evidence of the ERP being negatively correlated with Treasury bill rates over the short

⁴ This figure was presented in relation to the January 2007 to March 2014 and is not a forward looking rate. However, the concept of adjusting the yield upwards remains valid for a forward looking approach.

term.5"

- 3.11 The ERP may be calculated on a historical or forward looking basis. Historical methods seek to derive the ERP from a long run series of data on realised returns on equities. Forward-looking approaches seek to estimate the expected ERP based on either the reported expectations of market participants or the ERP implied in asset prices at the start of the period. There are a number of ERP studies, both forward looking and historical, that have been referred to by NRAs and the CMA in their WACC determinations.
- 3.12 Dimson Marsh and Staunton (DMS) is a regularly cited source of information for ERPs. The current estimate of the ERP for the UK on an arithmetic basis relative to bonds, calculated using historical returns, is 5% (and on the less cited geometric basis is 6.1%⁶).
- 3.13 Fernandez is another cited source of ERP and, in contrast to DMS, the ERP are calculated on a forward looking basis, which aligns with the forward looking nature of Ofcom's price control. The 2013 survey reported an ERP of 5.5%, falling to 5.1% in the 2014 survey⁷.
- 3.14 Another source of information is the Barclays 2015 EGS all returns.⁸ This provides a mean 6.9% real return on equity.
- 3.15 NRAs and the CMA have also considered estimates from dividend growth models (DGM), although commonly these are used as a cross-check on other analysis and less weight is placed on these due to doubt over the validity of assumptions in the model. For example, the CMA noted that "we agree that it is essentially arbitrary to assume future long-run growth in dividends per share equal to potential economic growth". However, the CMA did proceed to consider this approach and used a dividend growth methodology published in the BoE quarterly journal to estimate an ERP from 2007 to 2014. The ERP peaked at just over 7% in 2009 before falling back to slightly over 5% in 2014.⁹ The BoE noted the fall in the ERP in its November 2013 financial stability report

- ⁸ Barclays 2015 EGS: https://wealth.barclays.com/en_gb/smartinvestor/betterinvestor/investing-lessons-from-114-years-of-data.html.
- ⁹ The CMA said that "we consider that the lower bound of 5 per cent for the expected return on the market is less well supported than the upper end of the range of 6.5 per cent". See paragraph 13.187, page 13-38, 2014 NIE Determination.

⁵ Paragraph 13.82, page 13-16, 2014 NIE Determination.

⁶ Dimson, Marsh and Staunton, Credit Suisse Global Investment Returns Yearbook 2015

Fernandez, P., Aguirreamalloa, J. and Linares, P., *Market Risk Premium and Risk Free Rate used for 51 countries in 2013: a survey with 6,237 Answers*, 26 June 2013, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=914160 ('Fernandez 2013 Survey').

as being a fall towards long-term average levels¹⁰.

3.16 Across the studies set out above, the average ERP is 5.5%.

Table 3: ERP studies

Studies	ERP
Dimson Marsh and Staunton	5.0%
Fernandez 2014 survey	5.1%
Barclays 2015 EGS	6.9%
Bank of England	5.0%
Average	5.5%

Sources: Paragraphs 3.12 to 3.15.

- 3.17 The NRA and CMA decisions tend to use a point estimate for the TMR that is towards the top of the range that would be expected based on academic studies and empirical evidence. This is a conscious decision. In the 2014 NIE Determination, the CMA set out a range of 5-6.5% for the TMR, but stated that evidence for a TMR at the upper end of this range is stronger than at the lower end.¹¹
- 3.18 Both the ERP chosen by Ofcom and TMR that results from this fall within the range that has been used by other regulators and the CMA in the most recent price control decisions. We have calculated the average ERP to be 5% and the average TMR to be 6.4% from these decisions. Details of these precedents are contained in the appendix to this report.

¹⁰ Financial Stability Report, p8 and Chart 1.6, Bank of England

¹¹ The CMA said that "we consider that the lower bound of 5 per cent for the expected return on the market is less well supported than the upper end of the range of 6.5 per cent". See paragraph 13.187, page 13-38, 2014 NIE Determination.

Decision	Date	ERP	TMR
Ofgem	17 December 2012	5.25%	7.25%
ORR	October 2013	5.00%	6.75%
Ofgem	18 December 2013	4.40%	NA
CAA	January 2014	5.75%	6.25%
Competition Commission	March 2014	4.00-5.00%	5.00-6.50%
Ofgem	November 2014	5.25%	6.55%
Ofwat	December 2014	5.50%	6.75%
UREGNI	December 2014	5.00%	6.50%
СМА	February 2015	4.00-5.00%	5.00-6.50%
Average rate		5.02%	6.44%

Table 4: Recent regulatory precedent on the ERP and the TMR

Sources: see Table 2 previously

Beta

- 3.20 Ofcom commissioned a report from NERA to estimate BT Group's equity beta and that of comparator companies over various time periods, frequencies and against different indexes.
- 3.21 Of com notes that in previous WACC calculations that have placed most weight on two equity betas calculated on a two year daily basis, calculated against the FTSE All Share index. On this basis, BT's group equity beta is calculated to be 0.97.
- 3.22 We note that there is considerable volatility in betas, as demonstrated in the table below, and that there is no definitive guidance on the most appropriate time period or frequency for the calculation. There are pros and cons of the various combinations, as discussed at length by Smithers¹². Smithers summary is that:

"Our recommendation is that using between one year and two year periods with daily data will generally give low standard errors and that if the one year betas and two years betas are little different the time variation problem is unlikely to be significant. If those betas do look different one could estimate one year and six month betas and if these are little different use the one

^{3.19} Ofcom's approach to estimating ERP and the real RFR does show evidence of the rebalancing noted by Ofcom. Ofcom's real RFR is slightly below that suggested by current long term bond yields and regulatory precedent. However, its estimate of ERP is slightly above the average rate and therefore, on balance, its TMR of 6.3% is only slightly below the regulatory precedent average of 6.4%.

¹² See Wright, Mason and Miles (on behalf of Smithers & Co) (2003) "A study into certain aspects of the cost of capital for regulated utilities in the UK", February.

year beta."

- 3.23 However, other academics have taken a different view. For example, in a recent paper published since Ofcom made its original proposal to use daily data, Gilbert et al (as referenced by the CMA) note that monthly and quarterly beta are generally more reliable than those estimated on the basis of high frequency data, i.e. daily or weekly betas.¹³
- 3.24 In selecting two year daily betas, Ofcom has taken an approach which is consistent with its previous price controls. However, there is a range of regulatory precedent in this area with various frequencies and time periods being considered. For example, Ofwat (2014) considered 5 year and 2 year daily and monthly betas but placed most weight on 5 year daily betas where CMA for NIE placed most weight on 2 year daily betas.
- 3.25 As is illustrated in the table below, the equity beta is sensitive to the time period and frequency that is chosen. We have calculated a range of 0.84 to 1.69 using various combinations of frequency and time period. Ofcom's estimate of 0.97 is towards the bottom end of this range.

Frequencies	1 Year	2 Year	5 Year
Daily	0.84	0.99	1.02
Weekly	0.98	0.93	0.96
Monthly	1.69	1.33	0.92

Table 5: BT group equity beta as of 31 January 2015

Source: Bloomberg, ticker "BT\A LN Equity".

Note: Calculated against FTSE All share and for time period to be consistent with that chosen by NERA.

- 3.26 It is also worth noting that BT's beta is currently particularly sensitive to the time period over which is calculated due to the general rise in the equity beta from 2009 followed by the fall since 2013, although it is worth noting that the beta has not fallen below the pre-2009 level. This is shown most by comparing the 1 year, 2 year and 5 year betas.
- 3.27 Since the beta is forward looking, it therefore becomes a judgement as to where BT's equity beta is likely to lie over the period. It could be argued that a longer time period might be more appropriate as the beta would be less influenced by any short term rise or falls. However, it could also be argued that more recent estimates are likely to be a better predictor of the future because they capture the most recent perceptions of the non-diversifiable risk of the company. If the beta analysis is updated from January 31st 2015 to 30th June 2015 then the BT group equity beta increases under a number of

¹³ T.Gilbert, C Hrdlicka, J Kalodimos and S Siegal (2014), Daily data is bad for beta: opacity and frequency dependent betas, review of asset pricing studies

frequency / estimation period combinations and decreases under others. This is shown in the table below and demonstrates how highly sensitive the beta is to the time period chosen.

Table 6: BT group equity beta as of 30 June 2015

Frequencies	1 Year	2 Year	5 Year
Daily	0.83	0.86	1.01
Weekly	0.89	0.97	0.91
Monthly	1.09	1.29	1.00

Source: Bloomberg, ticker "BT A LN Equity".

Note: Calculated against FTSE All share

- 3.28 The equity beta estimates presented range from 0.83 1.29 as of 30 June 2015. This is quite a wide range and demonstrates the current volatility of BT's equity beta. In particular we note the fall in the equity beta on a 2 year daily basis from 0.99 in January to 0.86 at the end of June. Due to the volatility of the beta estimate, we consider that a range of 0.85 1.0 is plausible given the preponderance of estimates are in that range and the fact that this WACC is intended to be used in a forward looking, 3 year price control The equity beta estimates presented above give weight to the upper end of this range.
- An equity beta of 0.85 1.0 implies an asset beta of 0.66– 0.77 if BT's actual gearing of 26% (averaged over the past two years) is used to de-lever the equity beta estimates and a debt beta of 0.1 is used. Re-levering these asset beta estimates using Ofcom's 30% forward-looking gearing assumption, the implied equity beta is 0.89 1.05. We use a base case equity beta of 0.95¹⁴ in the remainder of this report.

Debt beta

- 3.30 The asset beta is a weighted average of the debt and equity betas, so the value of the asset beta is influenced by the choice of debt beta. Moreover, the choice of debt beta can have an impact on the asset beta: as is the case for de-levering and re-levering equity betas, when there is a difference between the gearing levels of comparator companies used to calculate betas and the level of gearing assumed for the entity for which the asset beta is being calculated there will be a difference in the equity beta ultimately calculated.
- 3.31 Table 7: illustrates the potential impact the debt beta assumption can have.¹⁵

 $^{^{14}}$ 0.95 equity beta at 26% gearing which equates to an equity beta of 1 at 30% gearing

¹⁵ The analysis presented is based on Ofcom's assessment of BT's equity beta of 0.97 and gearing of 26%, which implied an asset beta of 0.74 using a debt beta of 0.1.

Assumed forward-looking gearing	Debt beta = 0.1	Debt beta = 0
10%	0.82	0.80
20%	0.90	0.90
30%	1.02	1.03
40%	1.17	1.20
50%	1.39	1.44

Table 7: Impact of debt beta assumption

Source: FTI analysis.

- 3.32 Ofcom has proposed to adopt a debt beta of 0.1, primarily based on its own past decisions and those of other UK regulators.
- 3.33 The evidence in support of Ofcom's position is mixed. Some other regulators have adopted a non-zero debt beta in some of their decisions. However, there is a relationship between debt beta and gearing: higher gearing transfers some of the systematic risk borne by equity investors to debt investors, leading to a higher debt beta. And the level of gearing assumed by other regulators is also somewhat higher than Ofcom has assumed for BT.
- 3.34 For example, Ofcom points to decisions by the CMA (Northern Ireland Electricity in 2014) and its predecessor the CC (Bristol Water in 2010 and Heathrow/Gatwick in 2007). The debt betas in those decisions ranged between 0.05 and 0.10. However, the gearing assumed in those decisions was somewhat higher than Ofcom proposes for BT: the CMA assumed 45% for NIE and the CC assumed 60% in the Bristol Water and Heathrow/Gatwick cases.¹⁶
- 3.35 Overall, Ofcom's decision to adopt a debt beta of 0.10 does not appear to be robustly justified, notwithstanding that it has adopted a similar position in the past. A debt beta of less than 0.10 could certainly be justified for BT, warranting a small increase in the cost of equity.

Forward looking gearing

- 3.36 Ofcom proposes to adopt a forward-looking gearing level of 30% based on an assessment of a reasonable level of gearing for a business like BT Group. Ofcom considers a range of different types of evidence to inform its assessment, including:
 - BT's current and historical gearing levels;

¹⁶ The CC assumed 60% gearing for both Heathrow and Gatwick in the Q5 airports review in 2007: see Competition Commission (2007) "Heathrow Airport Ltd and Gatwick Airport Ltd price control review – Final report", Appendix F, page F36.

- Gearing of comparators from the telecoms and utilities sectors; and
- Ofcom's own previous determinations of BT's gearing in other contexts.
- 3.37 Ultimately Ofcom concludes that a reasonable range for forward looking gearing would lie in the 20 40% range, and then chooses the mid-point of this range.
- 3.38 BT's current gearing level is 21%.¹⁷ This is a reduction compared to levels seen in previous years and has, according to Ofcom, resulted from a large increase in BT's market capitalisation and a small reduction in BT's debt over that period. BT's current gearing is, consequently, at the bottom of the 20 40% range considered reasonable by Ofcom. Arguably Ofcom's decision implies that BT's decision to de-gear itself in recent years has not been an optimal commercial choice, but Ofcom has not attempted to explain why it considers this to be the case e.g. because it considers that the recent reduction in gearing is a temporary phenomenon and that BT's gearing will revert to historical levels again in future.
- 3.39 Nevertheless, it is common-place for regulators including Ofcom to base the gearing assumption upon a notional capital structure, rather than the actual gearing of the entity subject to regulation. This approach is often justified on the basis of wanting to avoid endorsing any particular capital structure adopted by the regulated business, in case that creates moral hazard. The question is whether Ofcom's decision to adopt a 30% gearing level is an appropriate notional assumption.
- 3.40 Another reference point considered by Ofcom is the gearing levels of comparator companies, both in the telecoms and utilities sectors. Ofcom considers that BT's gearing should be higher than that of other UK Telecoms companies because of the Openreach business, which Ofcom considers to be lower-risk than other telecoms activities. Ofcom calculates that Sky's gearing is currently around 33%, while TalkTalk's is about 16%. Ofcom also calculates that Sky's gearing has averaged around 18% over the past two years, while TalkTalk's has been around 15% over the same period.
- 3.41 Ofcom considers, rightly, that BT is likely to face higher levels of systematic risk than utilities such as water and energy companies. Consistent with standard corporate finance theory Ofcom considers that this means that BT's gearing should be lower than utility companies' gearing. Ofcom's assessment of utilities' betas suggests that their current gearing is around 40%.

¹⁷ Paragraph A9.9, June 2015, LLCC Consultation – Annexes, Ofcom. Ofcom calculates that BT's gearing has averaged 26% over the two years up to January 2015: see paragraph A9.8, June 2015, LLCC Consultation – Annexes.

- 3.42 Consistent with its relative risk assessment Ofcom concludes that BT's gearing should lie somewhere between the UK Telecoms comparators and the utilities comparators. While this particular conclusion does not seem unreasonable qualitatively, Ofcom's practical application of this principle is less well justified:
 - Ofcom assesses that Sky's gearing is 33%, which implies BT's gearing level might be above 33% (rather than the 30% Ofcom has concluded upon). Ofcom does not attempt to explain how its assessment that BT is less risky than UK Telecoms operators is consistent with its assessment that BT's gearing should be lower than one of the other major UK Telecoms operators.
 - Ofcom's assessment that gearing for utility companies is around 40% is heavily influenced by the inclusion of Centrica and SSE within the group of comparators, despite Ofcom having dismissed these two companies from its beta analysis as they do not have significant regulated operations. If these two companies are also removed from the comparator set the gearing of utilities increases to around 50%.¹⁸ Moreover, the set of utilities considered by Ofcom comprises only listed companies, whereas many of the unlisted utilities have significantly higher gearing levels.
- 3.43 Applying the methodology proposed, and taking into account the data presented, by Ofcom, a higher level of gearing would appear to have been justifiable for BT (though we note that this would not be consistent with BT's own gearing levels).
- 3.44 Ofcom does not present evidence about the gearing assumptions adopted by other sectoral regulators, but it does present the gearing decisions it has adopted in its own past decisions. Ofcom's own past determinations of BT's gearing have been in a range of 30 40% since 2011.¹⁹ Ofcom notes that its decision to adopt gearing of 30% is similar to the 32% gearing assumed in the June 2014 FAMR Statement. Ofcom does not, however, explain why it has adopted a much lower gearing assumption for the BMCR decision than it did for the MCT Statement in 2015, its most recent decision. On the face of it there has been no material change in the evidence available about BT's gearing to justify such a significant shift in Ofcom's assessment since the MCT Statement. The evidence from past Ofcom determinations suggests, if anything, that a higher level of gearing than 30% could have been justifiable for BT.
- 3.45 Ofcom's proposal to adopt a 30% gearing assumption can also be evaluated in the context of other regulators' decisions, noting that telecoms is likely to have a higher

¹⁹ See Table A9.4 of Ofcom's June 2015 LLCC Consultation – Annexes.

Ofcom calculates that the gearing of these two businesses has been in a range of around 25 – 30% over the past two years. If these companies are less risky than BT then that would imply BT's gearing should be lower than the 25 – 30% range, so presumably Ofcom has not placed much weight on these two particular comparators.

level of systematic risk than many other regulated sectors.

3.46 Table 8 below summarises the gearing assumptions made by a number of other NRAs.

Table 8: Regulatory precedents - Gearing

Decision	Date	Gearing	Sources
Ofgem	17 December 2012	62.50%	1
ORR	October 2013	62.50%	2
Ofgem	18 December 2013	36.05%	3
CAA	January 2014	60%	4
Competition Commission	March 2014	45.00%	5
Ofgem	November 2014	65%	6
Ofwat	December 2014	62.50%	7
UREGNI	December 2014	50%	8
CMA	February 2015	20-40%	9

Sources: (1) <u>https://www.ofgem.gov.uk/ofgem-publications/53602/4riiot1fpfinancedec12.pdf;</u>

(2) <u>http://orr.gov.uk/__data/assets/pdf_file/0011/452/pr13-final-determination.pdf;</u>

(3) <u>https://www.ofgem.gov.uk/sites/default/files/docs/decisions/decision_letter_idc_0.pdf;</u>

(4) <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf;</u>

(5) <u>https://assets.digital.cabinet-office.gov.uk/media/534cd495ed915d630e00003f/final-</u> <u>determination.pdf;</u>

(6) https://www.ofgem.gov.uk/ofgem-publications/91564/riio-

ed1finaldeterminationoverview.pdf;

(7) <u>http://www.ofwat.gov.uk/pricereview/pr14/det_pr20141212riskreward.pdf;</u>

(8) <u>http://www.uregni.gov.uk/uploads/publications/UR_PC15_DD_Annex_A_-</u>

<u>Financing_Investment.pdf;</u> and

(9) https://assets.digital.cabinet-

office.gov.uk/media/54edfe9340f0b6142a000001/Cost_of_capital.pdf.

3.47 Noting Ofcom's assessment of BT's asset beta (0.74) is somewhat higher than the corresponding assumptions by other NRAs, we might infer that the gearing level assumed for BT would be somewhat lower than those adopted by other sector regulators. Consequently, given that utility sector regulators (Ofgem, Ofwat) have adopted gearing in the range of 60 – 65% at recent determinations, this would suggest gearing of less than 60% for BT.²⁰ Airports are also likely to be somewhat less risky than BT on the basis of the asset beta assumptions made by the CAA, suggesting that BT's gearing should be lower than the 55% assumed by the CAA for Gatwick Airport.

We note that these sector regulators have adopted gearing assumptions somewhat higher than the gearing of the six utility comparators selected by Ofcom, suggesting that the comparators considered by Ofcom – as mentioned above – may not be representative of those industries more generally.

Overall, the evidence from other sectors is of limited assistance for directly inferring gearing for BT, but does suggest that a figure less than 50% would be plausible.

3.48 Ofcom's assessment of the forward-looking gearing level for BT of 30% does not appear entirely consistent with the evidence and arguments which it has presented. On the one hand it is not clear why the recent reduction in BT's gearing is not taken into account, but equally a higher level of gearing would appear to be potentially justifiable based on gearing data for comparators and on regulatory precedents. However, we do concur with Ofcom that the level of gearing does not have a large impact on the pre-tax WACC calculation and therefore Ofcom's approach could potentially be justified in that context.

Cost of debt

- 3.49 Ofcom concludes that BT's cost of debt should be 5.4% in nominal, pre-tax terms. This comprises a risk-free rate of 4.2% and a debt premium of 1.2%. The appropriateness of the risk-free rate assessment was considered earlier, but in this section we consider the reasonableness of adopting a debt risk premium of 1.2%.
- 3.50 Ofcom bases its assessment of the debt risk premium on data on the yield-to-maturity of BT's existing bonds and of bonds with similar (BBB) credit ratings. Ofcom considers yields for bonds with various time periods to maturity, reflecting in its view the mixture of short and long-term debt that BT would be likely to rely on.
- 3.51 By relying solely on yield-to-maturity data, which is a measure of forward-looking debt costs (i.e. the cost at which new debt could be raised), Ofcom takes no account of the cost of BT's embedded debt i.e. the debt which BT has already raised. Such an approach ignores the fact that BT has to fund the cost of its existing debt, which could be and, as it turns out, is significantly different from the forward-looking cost which Ofcom concludes on.
- 3.52 Ofcom assesses that the forward-looking cost of debt (i.e. the cost of raising new debt) is 5.4% in nominal, pre-tax terms. However, as Table 9 illustrates, the average coupon (which is the amount BT actually has to pay) on its outstanding Sterling-denominated bonds is over 7.0%.²¹ This is significantly higher than the 5.4% assumed by Ofwat, reflecting a significant reduction in interest rates since BT issued much of its debt.

²¹ BT has also issued a Sterling-denominated index-linked bond of £250m maturing in April 2025. The coupon on this bond is 3.5%, which if converted to nominal terms using Ofcom's assumed inflation rate of 3.2%, equates to around 6.7%. If this was included in the weighted average calculation presented above it would obviously reduce the average slightly, but the overall weighted average would still be considerably higher than the 5.4% nominal cost of debt adopted by Ofcom.

Amount (in million)	Coupon (Nominal)	Maturity
683	8.500%	Dec-16
500	6.625%	Jun-17
300	8.625%	Mar-20
600	5.750%	Dec-28
500	6.375%	Jun-37
Weighted average	7.024%	

Table 9: BT's outstanding nominal Sterling-denominated bonds

Source: FTI analysis of Bloomberg data.

- 3.53 The difference between the costs of existing and new debt is one reason why many sectoral regulators consider both elements of the cost of debt when making their determinations. Ofcom's decision to focus purely on forward-looking debt costs is at odds with other regulators in the UK:
 - The CMA adopted an embedded / new debt ratio of 90/10 in the Northern Ireland Electricity price control appeal in 2014;²²
 - Ofwat adopted a 75 / 25 split at both the PR14 and PR09 price controls;
 - The CAA adopted 70 / 30 splits for both Heathrow and Gatwick Airports in its Q6 price control determination in January 2014.²³
 - Ofgem's approach to the cost of debt uses a trailing average of bond yield data in order to take into account the cost of debt already raised by the energy networks it regulates.
- 3.54 Of com's exclusion of the embedded cost of debt is a key reason why its estimate of BT's cost of debt appears low in comparison to other sectoral regulators' decisions, as Table 10 illustrates.
- 3.55 Ofcom's real pre-tax cost of debt is 2.2% (i.e. 5.4% less the 3.2% assumed inflation rate), lower than the cost of debt allowed by all of the other sectoral regulators in their

See CMA (2014) "Northern Ireland Electricity Limited price determination – a reference under Article 15 of the Electricity (Northern Ireland) Order 1992", Final Determination, paragraph 13.79 (available here <u>https://assets.digital.cabinet-</u> office.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf).

See CAA (2014) "Estimating the cost of capital: a technical appendix for the economic regulation of Heathrow and Gatwick from April 2014: Notices of the proposed licences", January, CAP 1140, paragraph 5.11 (available here <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf</u>). The statement in this paragraph indicates what the CAA decided in its Final Proposals, which it was then updating for Licence Modifications. However, the CAA did not change its assessment of the cost of debt between the Final Determinations and the Licence Modifications.

most recent determinations even though, in many cases, these regulators were considering setting the cost of debt for businesses assumed to have stronger credit ratings (implying a lower cost of debt).

Table 10: Regulatory precedents - cost of debt

Decision	Date	Pre-tax real cost of debt	Sources
Ofgem	17 December 2012	2.92%	1
ORR	October 2013	3.00%	2
CAA	January 2014	3.20%	3
Competition	March 2014	3.10%	4
Ofgem	November 2014	2.60%	5
Ofwat	December 2014	2.59%	6

Sources: (1) <u>https://www.ofgem.gov.uk/ofgem-publications/53602/4riiot1fpfinancedec12.pdf;</u>

(2) <u>http://orr.gov.uk/__data/assets/pdf_file/0011/452/pr13-final-determination.pdf</u>;

(3) <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf;</u>

(4) <u>https://assets.digital.cabinet-office.gov.uk/media/534cd495ed915d630e00003f/final-determination.pdf;</u>

(5) <u>https://www.ofgem.gov.uk/ofgem-publications/91564/riio-</u> ed1finaldeterminationoverview.pdf; and

(6) <u>http://www.ofwat.gov.uk/pricereview/pr14/det_pr20141212riskreward.pdf</u>.

- 3.56 In combination the above suggests that Ofcom should have considered BT's embedded debt costs when setting the cost of debt. That is not to say that BT's embedded debt costs should be treated as a straight pass-through to consumers. Rather, in line with other regulators' approaches, an estimate of the efficient cost of embedded debt could have been taken into account. Such an efficient cost of debt is often estimated from benchmark bond yields averaged over a suitable time horizon, but it would not be unreasonable to reflect BT's own costs in the absence of any evidence to suggest the interest rates on the outstanding bonds were higher than could have reasonably been achieved in the market at the time the bonds were issued.
- 3.57 We do not have information about the amount of debt BT expects to refinance or raise during the price control period, but if Ofcom had adopted a 50 / 50 weighting of BT's embedded (7.0%) and new (5.4%) debt costs this would have implied an overall cost of debt of 6.2% (nominal, pre-tax). This is 80 bps higher than Ofcom's forward-looking assessment. The more weight placed on embedded debt, the higher the overall cost of debt would be.

Transaction costs

3.58 Ofcom makes no explicit allowance in its assessment of the cost of debt for issuance costs. Moreover, by relying solely on yield-to-maturity data in the secondary market it is unlikely that the estimated debt premium includes any allowance for the costs of

issuing debt (such as payments to arrangers of debt and legal fees).²⁴ However, many sectoral regulators do make allowance for transaction costs:

- the CMA included 20 basis points in its cost of debt estimate in the Northern Ireland Electricity price control appeal in 2014 for issuance costs and fees (including for interest rate hedges);²⁵
- Ofwat included a 10 basis point uplift to the cost of debt at PR14 to reflect transaction costs;²⁶ and
- the CAA included 15 and 20 basis points uplifts to the costs of debt for Heathrow and Gatwick Airports respectively in its Q6 price control determination in January 2014.²⁷
- 3.59 On the basis of the above precedents it might be reasonable to add another 10 20 basis points on to the cost of debt observed from either coupons or the yield-to-maturity when setting BT's all-in cost of debt allowance.

Overall assessment on cost of debt

- 3.60 Our analysis suggests that a more appropriate nominal, pre-tax cost of debt would be around:
 - 80 basis points higher to reflect embedded debt costs and the approximate proportions of new and existing debt; and
 - 10 basis points for transaction costs (to be conservative).
- 3.61 These adjustments would imply a nominal pre-tax cost of debt of 6.3% would be more
 - ²⁴ Yield to maturity is a function of expected coupon payments and the price investors are willing to pay to acquire the bond, so does not reflect the issuer's costs of raising that debt (since that will not be incorporated into the stream of coupon payments or the price).
 - See CMA (2014) "Northern Ireland Electricity Limited price determination a reference under Article 15 of the Electricity (Northern Ireland) Order 1992", Final Determination, paragraph 13.76 (available here <u>https://assets.digital.cabinet-office.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf</u>).
 - See Ofwat (2014) "Final price control determination notice: policy chapter A7 risk and reward", p42 (available here: http://www.ofwat.gov.uk/pricereview/pr14/det_pr20141212riskreward.pdf).
 - See CAA (2014) "Estimating the cost of capital: a technical appendix for the economic regulation of Heathrow and Gatwick from April 2014: Notices of the proposed licences", January, CAP 1140, paragraph 5.63 (available here <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf</u>). The statement in this paragraph indicates what the CAA decided in its Final Proposals, which it was then updating for Licence Modifications. However, the CAA did not change its assessment of the cost of debt between the Final Determinations and the Licence Modifications.

appropriate for BT as part of the LLCC determination.

Tax rate

- 3.62 Of comproposes to use a tax rate of 20% which was consistent with the most recent statement on the UK Government for its tax rate during the period of the price control.
- 3.63 In the recent budget, it was announced that the corporate tax rate would fall to 19% in 2017 and 18% in 2020. This would imply an average corporate tax rate of approximately 19.3% over a three year price control starting in 2016/17.²⁸

WACC

- 3.64 Of com calculates a pre-tax nominal WACC for BT group of 10.0%. It is difficult to compare this to other regulatory decisions, given the difference in beta values and gearing that would be expected between BT group and the other regulated companies.
- 3.65 Therefore, to compare the WACC of BT Group to other regulatory decisions Table 11 below presents the nominal pre-tax WACC implied by other regulators' decisions using the same beta, gearing and inflation expectations as Ofcom. We have also updated the WACC estimates to reflect the latest Budget's proposed reductions in corporation tax.
- 3.66 The analysis shows that other regulators' implied nominal pre-tax WACC decisions are in the range of 9.6 11.2%, suggesting Ofcom's proposed WACC for BT (10.0%) is towards the lower end of the range.
- 3.67 The adjustments to Ofcom's estimates we have suggested here (e.g. a different equity beta, higher ERP and cost of debt) broadly cancel each other out, increasing the overall BT Group WACC only slightly from 10.0% to 10.2%, as Table 12 illustrates.

²⁸ <u>http://www.bbc.co.uk/news/uk-politics-33440315.</u>

Table 11: Regulatory precedents – 9	Simulation of	pre-tax WACC ap	oplying fixed inputs

						Competition				
Regulator	Fixed inputs ^(*)	Ofgem	ORR	Ofgem	CAA	Commission	Ofgem	Ofwat	UREGNI	CMA
		Gas	Network Rail	Offshore	Heathrow	Electricity	Electricity	Water	Northern	Vertically
Date		Dec-12	Oct-13	Dec-13	Jan-14	Mar-14	Nov-14	companies Dec-14	Dec-14	Feb-15
Decision		RIIO-T1	PR13	IDC Decision	"Q6 Price Controls	NIE Appeal	RIIO-ED1 Slow Track	PR14	NIW PC15	Energy Market investigations
Real risk free rate		2.0%	1.8%	2.0%	0.5%	1.3%	1.3%	1.3%	1.5%	1.3%
Inflation assumption	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
Nominal risk free rate		5.2%	5.0%	5.2%	3.7%	4.5%	4.5%	4.5%	4.7%	4.5%
Equity beta		1.06	1.06	1.06	1.06	1.04	1.01	1.06	1.04	1.06
Asset beta	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
ERP		5.3%	5.0%	4.4%	5.8%	4.5%	5.3%	5.5%	5.0%	4.5%
Gearing	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Debt premium	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Debt beta						0.05	0.10		0.05	
Tax rate	19.3%	19.3%	19.3%	19.3%	19.3%	19.3%	19.3%	19.3%	19.3%	19.3%
Pre-tax real cost of equity		9.4%	8.7%	8.2%	8.2%	7.3%	8.2%	8.8%	8.3%	7.4%
Pre-tax nominal cost of equity		13.3%	12.7%	12.2%	12.1%	11.3%	12.2%	12.7%	12.2%	11.4%
Pre-tax real cost of debt		3.2%	3.0%	3.2%	1.7%	2.5%	2.5%	2.5%	2.7%	2.5%
Pre-tax nominal cost of debt		6.4%	6.2%	6.4%	4.9%	5.7%	5.7%	5.7%	5.9%	5.7%
Pre-tax real WACC		7.5%	7.0%	6.7%	6.2%	5.9%	6.5%	6.9%	6.6%	5.9%
Pre-tax nominal WACC		11.2%	10.7%	10.5%	10.0%	9.6%	10.2%	10.6%	10.3%	9.7%
Source		1	2	3	4	5	6	7	8	9

Notes: (*) Ofcom's decision for BT Group.

Sources: See sources of Table A5.

	Ofcom	Differences	FTI
Real risk free rate	1.0%		1.0%
Inflation assumption	3.2%		3.2%
Nominal risk free rate	4.2%		4.2%
Equity beta	1.01	- 0.06	0.95
Asset beta	0.74	- 0.01	0.73
ERP	5.3%	+ 0.1%	5.4%
Gearing	30.0%		30.0%
Debt premium	1.2%	+ 0.9%	2.1%
Debt beta	0.1		0.1
Tax rate	20.0%	- 0.7%	19.3%
Pre-tax real cost of equity	8.0%	- 0.1%	7.9%
Post-tax real cost of equity	6.4%	- 0.0%	6.4%
Pre-tax nominal cost of equity	12.0%	- 0.1%	11.9%
Post-tax nominal cost of equity	9.6%	- 0.3%	9.9%
Pre-tax real cost of debt	2.2%	+ 0.9%	3.1%
Post-tax real cost of debt	1.8%	+ 0.7%	2.5%
Pre-tax nominal cost of debt	5.4%	+ 0.9%	6.3%
Post-tax nominal cost of debt	4.3%	+ 0.8%	5.1%
Pre-tax real WACC	6.2%	-+0.3	6.5%
Pre-tax nominal WACC	10.0%	-+0.2	10.2%
Vanilla real WACC	5.1%	+ 0.3%	5.4%
Post-tax real WACC	5.0%	-+0.2	5.2%

Table 12: Comparison between Ofcom and FTI's calculation of BT Group's WACC

Sources: Ofcom; and FTI Analysis.

4. Disaggregation of BT's group beta

- 4.1 Since 2005 Ofcom has disaggregated the WACC for BT's copper access business (which they refer to as "Openreach") from the RoBT WACC, with the two being weighted together to sum up to the BT Group WACC. This disaggregation is performed by calculating a beta that is specific to Openreach and replacing the BT Group beta with this Openreach specific beta in the CAPM. All other variables in the WACC calculation remain unchanged from those in the BT Group WACC calculation.
- 4.2 Ofcom has chosen to set the value of the Openreach asset beta at 0.5, the value determined previously for the FAMR (2014) charge control. This was calculated by benchmarking the asset beta to a set of UK utility companies, although Ofcom noted this assumption will be reviewed for the 2016 LLCC statement.
- 4.3 In its current LLCC consultation, Ofcom is proposing to introduce a third beta disaggregation. This would split out what is currently RoBT into UK Telecoms (which will be applied to leased lines) and a rest "RoBT" which Ofcom notes is effectively BT GS.
- 4.4 Of com puts forward three arguments to support its proposal for further beta disaggregation:
 - (a) The observed increase in BT's equity beta is mostly attributable to non regulated services, e.g. BT GS or television services.
 - (b) Comparator benchmarking of network utility companies indicates that the Openreach beta is likely to have remained constant over the period.
 - (c) Comparator benchmarking indicates that BT GS is likely to have a higher beta than BT's telecoms services.
- 4.5 On the basis of this evidence Ofcom then argues that further disaggregation of BT's beta is justified. A key aspect of disaggregating the beta further is the appropriate weights to attach to the different business segments, which Ofcom proposes to do based on EBITDA and NRC/Enterprise Value data.
- 4.6 We discuss Ofcom's approach to each of these issues below.

(a) Attributing the change in BT's group beta to particular business units or products

4.7 Of com acknowledges that BT's beta has increased over the recent period (from 2010). However, Of com then notes that this increase is unlikely to be driven by Openreach, or by leased line services, and attributes this increase to others part of BT's business. We examine the four reasons set out by Ofcom.

Profit growth in Global Services

- 4.8 Ofcom reports that the share of BT GS EBITDA has increased from 5% of EBITDA in 2009 to 15% of EBITDA in 2014 and reports NERA who said "this could have been contributing to an increase in BT Group's overall asset beta" (italics added). The evidence that Ofcom provides to support this statement is that asset betas are on average higher for ICT companies. Ofcom bases this analysis on a review of asset betas of companies that PwC selected as being comparable to global services previously. This is despite Ofcom having previously noted that "the comparators were pure ICT businesses without the telecommunications bias of BT Global Services, and so were not necessarily very close comparators", and that the ICT business within BT would have a significant proportion relating to core telecoms services, i.e. more traditional provision of connectivity and managing communication services"²⁹ Ofcom also noted that BT GS is "not a kind of conventional high-tech computing and systems business"³⁰ The CC concurred with this in the 2009 LLCC appeal and noted that "Ofcom and BT had presented some credible arguments that cast doubt on [the extent to which the comparators are similar to GS] this because the difference in nature of BT's ICT business and the comparator group suggested by PwC"
- 4.9 Ofcom does not provide a robust basis for the selection of these comparator IT companies, other than that they were used previously and, therefore, the analysis suffers from selection bias. In fact, depending on the companies that you consider to be suitable comparators, it is possible to calculate a comparator asset beta for global services that is either above or below that of the BT group beta. For example, if you calculate the average of the two year daily asset betas for all traded companies which Bloomberg categorises as "the ICT sector" then the asset beta is 0.32 as of 30 June 2015 which is well below Ofcom's asset beta for Global Services and, indeed, BT's group beta³¹.
- 4.10 In summary, there is a lack of robust evidence provided by Ofcom that the increase in the share of EBITDA generated by Global Services would have been sufficient and / or that the systematic risk of global services was significantly above that of BT's other operations over the period to explain the increase in BT's group asset beta.

³¹ The full list of ICT companies is contained in the appendix to this report.

²⁹ Para 4.302 of CC's final determination in 2009 C&W LLCC appeal

³⁰ Para 4.305 of CC's final determination in 2009 C&W LLCC appeal

Move into pay TV investments and sports rights

- 4.11 Ofcom quote NERA who says that the "the increase in BT's (asset) beta around the BT sports investments *could* have been driven by the perception of the riskiness of the investment given that it entailed entry into a competitive market where BT would have to carve its market share from established incumbents such as Sky and other" (italics added). However, NERA then notes that the "market perception of the riskiness of BT Sport may have declined due to BT establishing a stable share in the content market and engaging in successful rights auctions"
 - (a) First we note, again, that NERA states this *could* have been a factor but provides no evidence to substantiate the hypothesis.
 - (b) Second, the beta is driven by the level of non diversifiable risk. Competition in a market, or needing to carve out market share or succeed in auctions, is a diversifiable risk since an investor could diversify the risk by investing in competitor companies, e.g Sky. Therefore, the level of competition would not impact the beta and this argument is flawed.
 - (c) Third, it is not clear that the market did perceive this as a risk. Indeed, the market may well have perceived this as a growth enhancing strategy in an increasingly digital and content driven world. A review of analyst reports in the period after BT's announcement suggest that whilst some analysts expressed negative expectations towards BT Sports, others were more neutral or positive about BT's new venture. Examples include:
 - Barclays (8 May 2013) : "We do see a clear opportunity for BT to market BT Sports widely, but still struggle to see how it will generate positive returns"³²;
 - Raymond James (25 July 2013): "We maintain our Outperform rating on BT based on our view that: i) the launch of BT Sports has potential to positively surprise by expanding BT's broadband market share, and ii) the company's focus on cost cutting should more than offset the additional content costs."³³; and
 - Morningstar (26 July 2013): "BT Reports Mixed Fiscal 1Q Results, Shares Already Price in Successful Sports TV Launch" ³⁴.
 - (d) Fourth, it could be argued that the beta associated with BT sports is actually below the beta of BT group. BT sports is priced significantly below Sky sports

³² Barclays, BT Group plc, 8 May 2013, page 1.

Raymond James, BT Group plc, 25 July 2013, page 1.

³⁴ Morningstar, BT Group plc, 26 July 2013, pages 1 and 2.

and, for some BT customers, is provided at a significantly lower price compared to Sky's sports packages. As such, BT sports could potentially be characterised as having negative income elasticity as following a reduction in income, customers may switch from other pay-tv services such as Sky to the better priced BT services.

- 4.12 Ideally, one would identify pure play content providers and observe the change in their betas over the period and use these as a comparator for BT sports. However, we have not been able to identify any pure play content providers.
- 4.13 In summary, Ofcom has not provided evidence to support its assertion that BT sports and pay-TV is the driver behind BT's increasing beta. Ofcom's argument around competition is flawed, evidence on investment perceptions is mixed and BT's relative pricing strategy could point to BT sport having a lower beta than competitors.

Investment in fibre to the cabinet (FTTC)

- 4.14 Ofcom notes that BT made its first large FTTC investment in July 2008 and announced further investment in 2010. NERA suggest that these FTTC investments could have been perceived to a have higher risk than other investments in Openreach "i.e that it was a new product, intended to deliver higher speed and better quality of service, albeit also at a higher price. We note that the investment in FTTC has been undertaken since 2008 however, BT's beta was declining between 2008 and increasing from 2010. NERA attributes this earlier decline to the global financial crisis. However, due to the lack of observed correlation between BT's FTTC investment programme and the change in BT's beta and lack of analysis to separate out the impact of the financial crisis, it is not possible to draw any meaningful conclusion about the impact of FTTC on the beta from this analysis.
- 4.15 Ideally we would seek to look at the profile of the asset betas of other "new economy" companies over this period and seek to use this as a comparator for BT's FTTC. However, we are generally wary of using beta comparators due to issues around selection bias and spuriosity that we consider later in relation to Ofcom's beta analysis. It would be difficult to identify a set of companies who share sufficient characteristics with BT's FTTC to draw definitive analysis.

Changes to the defined benefit pension scheme

- 4.16 NERA notes BT's pension scheme, and Ofcom's treatment of it may have impacted beta. However, Ofcom further notes that the impact of this is uncertain and difficult to calculate. We note that:
 - Ofcom has previously rejected BT's request to adjust the WACC for the pension scheme, so making a change to the beta in this price control on this basis would be a change in direction for Ofcom and we would expect Ofcom to explain why
such a change is warranted this time (when it supports Ofcom), when it was not previously warranted (when it supported BT).

- Whilst there may have been pension uncertainty around December 2010 when the Ofcom announcement on pensions was made, this does not explain the increase in the beta seen before this statement or, indeed, the continued increase in the beta post this statement when it became clear that any issues around BT's pensions were either resolved or not significantly impacting BT's growth. There does not appear to be a correlation between the statement being made and a change to the growth rate of BT's beta. Furthermore, concerns around BT's pension deficit existed before Ofcom's statement and in recent years after the statement BT has made significant payments into its pension scheme and agreed a plan for funding the remainder of the deficit. Therefore, any pension impacts are unlikely to have existed for the entire period from 2009 to 2013 when the beta was growing. As such, the link between the pension deficit and the increase in the beta appears to be spurious.
- A review of analyst reports around the period of Ofcom's pension announcement supports our view that whilst the market was concerned, to differing extents, about BT's pension deficit and the impact of funding on BT's business, this risk existed both before and after that the statement and did not appear particularly impacted by it. Therefore, we would not have expected a change to BT's beta as a result of the statement since any risk appears to have already been embedded into it. Analyst's view around the time of the statement support this:
 - UBS (15 December 2010): "Year to date we estimate all of the rise in BT's market cap can be explained by improvement in pension deficit" and "We believe that pressure on future BT cash flows could be greater than on sector as a whole due to declines in BT Retail gross margin and pension risk.";³⁵

³⁵ UBS, BT Group plc, 15 December 2010, pages 2 and 5.

- RBS (15 December 2010): "S&P improved the outlook on BT's BBB rating to positive yesterday in reflection primarily of the reduced pension deficit [...] Maintain concerns on pension and gross margin: [...]The risk to our upgrade is a negative announcement from the Pension Regulator";³⁶
- UBS (21 January 2011): "Solid results expected, IAS 19 pension deficit could fall to zero and grab headlines";³⁷
- UBS (3 February 2011): "Pension remains a risk, but in the absence of a shock from the regulator we believe there is scope for a dividend rise.";³⁸
- JP Morgan (7 February 2011): "Our price target value increases from 200p to 220p, supported also by a reduced pension deficit, and hence our recommendation remains Overweight.";³⁹ and
- Morgan Stanley (15 March 2011): "We believe the major risks to our price target are: [...] (3) Sustained inflation would worsen the pension deficit; [...]".⁴⁰

Beta risk measures relative risk

- 4.17 Ofcom's beta analysis has considered BT's absolute risk but has not considered its risk relative to the market. That is, it may that it is changes to the market returns and not to BT's absolute returns that has led to a change in BT's beta. This possibility has not been adequately considered by Ofcom.
- 4.18 Ofcom has attempted to draw together four events in BT's recent history and use them to attempt to tell a story as to the changing asset beta. However the story they tell is not compelling, in that it neither explains the movements that are seen, nor is based in evidence and sound economic theory.
- 4.19 Rather than attempting to tell a complicated story to explain the movement, there may be far simpler explanations. Ofcom themselves note that the financial crisis has had an impact. Potentially the whole of the period from 2004 to 2012 can be considered as being Financially Services (FS) driven with market returns following the financial services trend. FS are a core part of the market and, as an industry, will be able to "drive" the market. Therefore those companies such as BT, which are not part of the FS sector may, by implication, see their betas diverge from the long term average over this period not because of changes to their own underlying risk but due to changes to

- ³⁹ JP Morgan, BT Group plc, 7 February 2011, page 1.
- ⁴⁰ Morgan Stanley, BT Group plc, 15 March 2011, page 3.

³⁶ RBS, BT Group plc, 15 December 2010, page 1.

³⁷ UBS, BT Group plc, 21 January 2011, page 1.

³⁸ UBS, BT Group plc, 3 February 2011, page 1.

market risk. This market volatility was considered by the CC in the recent Northern Ireland Electricity price control appeal.



Figure 2: FTSE 100 Implied Volatility Index

Source: Competition Commission, Northern Ireland Electricity Limited price determination, 26 March 2014, page 13-33.

4.20 The figure below provides a further illustration of this, as it can be seen that BT's share price movement since 2009 has only been loosely correlated with two large financial services institutions (chosen for illustrative purposes only). Whilst their share prices have remained relatively flat or experienced small rises since 2009, BT has recovered back to pre financial crisis levels and has continued to grow. The existence of a FS sector and an "everything else" sector makes for two quite different profiles, but a market index that is heavily influenced by FS could explain BT's beta profile. Further analysis is warranted by Ofcom as to whether the financial crisis could be the driver behind the beta movements.



Figure 3: BT Group's share price compared to Goldman Sachs' and Citigroup's share price

Source: Bloomberg, "PX_LAST" for tickers "BT/A LN Equity", "GS US Equity" and "C US Equity".

- 4.21 In summary, Ofcom has not provided compelling evidence that the increase in BT's asset beta from 2009 was driven only by changes to non-diversifiable risk in the non regulated businesses. Ofcom has also not considered the extent to which changes in BT asset beta were driven by changes to the market. Given this lack of evidence, it remains plausible that the changes to the asset beta over the period 2008 may be due to:
 - Changes to the market that cannot be attributed to a particular business unit, such as the financial crisis and other market anomalies; and
 - An increase in the beta of the regulated business units. For example we note that during the period of the increase in the asset beta, BT was involved in a number of regulatory disputes and appeals. These would have introduced a degree of regulatory risk into the beta and might also explain the observed changes in the beta. This has been noted by analysts in their valuations of BT. Examples include:⁴¹

⁴¹ These analyst statements demonstrate the impact of regulation on BT's valuation, although not necessarily on the beta itself.

- JP Morgan (24 May 2013): "We downgrade BT to Neutral, seeing BT Sport, regulation and pension as sources of potential negative sentiment over the Summer."⁴²;
- Macquarie Research (26 March 2012): "Regulatory threat in mid term; Infinity reliant on share loss [...] In essence, neither regulatory inference nor reversal of current market share trends is a positive outcome for BT Retail."⁴³;
- Liberium Capital (5 July 2012): "At the full year results in May [BT Group] once again had to walk away from its revenue guidance. The two main reasons have been the weaker economic environment and negative regulatory developments."⁴⁴; and
- Barclays (2 November 2012): "BT provided relief at its 2Q result where profitability was maintained, despite a clearly deteriorating revenue outlook and adverse regulatory headwinds."⁴⁵
- 4.22 Therefore, the evidence provided by Ofcom to explain the increase in BT's beta in recent years does not provide a rationale for keeping Openreach's beta constant or for asserting that the UK Telecoms beta would be lower than the BT GS beta. As such, it is appropriate to reconsider the appropriate value for Openreach's asset beta rather than relying on the FAMR value and also to reconsider whether there is an a priori reason or evidence to support the disaggregation of RoBT and UK Telecoms.

b) Constant Openreach beta

- 4.23 Ofcom has chosen to set the value of the Openreach copper asset beta at 0.5, which is consistent with the value used in the June 2014 FAMR statement. Ofcom has concluded that this remains appropriate as it is between the asset beta of network utilities and UK fixed telecom companies. Although Ofcom notes this assumption will be reviewed for the 2016 BCMR statement.
- 4.24 In support of its position Ofcom presents an average asset beta for comparator network utility companies of between 0.44 (1 year) and 0.4 (2 year) based on analysis provided by NERA for period ending January 2015. This is used to support Ofcom's decision to set the Openreach asset beta at 0.5 and to keep it constant from the FAMR 2014 statement.

- ⁴³ Macquarie Research, BT Group plc, 26 March 2012, page 3.
- ⁴⁴ Liberium Capital, UK Telecom Opportunities, 5 July 2012, page 31.
- ⁴⁵ Barclays, BT Group plc, 2 November 2012, page 1.

⁴² JP Morgan, BT Group plc, 24 May 2013, page 1.

4.25 First we note, that updating the network utility company betas to the 30th of June leads to an increase in the beta to 0.48 (2 year) to 0.55 (1 year)⁴⁶.

Table 13: Asset betas and gearing for network utilities companies as of 30 June	ł
2015	

Company	1-year daily	2-year daily	1-year gearing	2-year gearing
National Grid	0.54	0.50	40%	41%
Severn Trent	0.49	0.43	48%	49%
Pennon Group	0.42	0.40	39%	42%
United Utilities	0.51	0.43	50%	52%
Centrica	0.73	0.61	30%	26%
SSE	0.58	0.49	27%	28%
Average	0.55	0.48	39%	40%

Source: Bloomberg, tickers "NG/ LN Equity", "SVT LN Equity", "PNN LN Equity"," UU/ LN Equity", "CNA LN Equity" and "SSE LN Equity".

Note: Beta is levered using: equity beta*(1-gearing) + debt beta*gearing.

The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1. The gearing is the spot gearing.

4.26 Also, as illustrated in the figures below, asset betas of the utility network companies have been increasing over time.

⁴⁶ Obtained from Bloomberg on 30 June 2015 calculated on a 1 year daily basis and 2 year daily basis against the FTSE 100 shares.



Figure 4: One-year daily asset beta of network utilities companies

-Centrica -SSE Average Source: Bloomberg, tickers "NG/ LN Equity", "SVT LN Equity", "PNN LN Equity"," UU/ LN Equity",

"CNA LN Equity" and "SSE LN Equity".

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Note: Beta is levered using: equity beta*(1-gearing) + debt beta*gearing.

The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1.



Figure 5: Two-year daily asset beta of network utilities companies

----Centrica -----SSE -----Average

Source: Bloomberg, tickers "NG/ LN Equity", "SVT LN Equity", "PNN LN Equity"," UU/ LN Equity", "CNA LN Equity" and "SSE LN Equity".

Note: Beta is levered using: equity beta*(1-gearing) + debt beta*gearing. The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1.

4.27 The average asset beta, calculated on a two year daily basis, grew by 36% between March 2014 and July 2015. Therefore, we would have expected Ofcom's benchmark to also be increased from the June 2014 level to reflect the increase in the average asset beta of the comparator group. Applying the percentage change from the network utility companies to the Openreach asset beta would lead to an increase from 0.5 to 0.68.

	1-year daily	2-year daily	Increase of the 1- year daily beta	Increase of the 2- year daily beta
As of 31 March 2014	0.39	0.35		
As of 31 January 2015	0.44	0.41	12.8%	17.7%
As of 30 June 2015	0.55	0.48	39.9%	36.2%

Table 14: Average of asset beta of the network utility companies

Source: Bloomberg, tickers "NG/ LN Equity", "SVT LN Equity", "PNN LN Equity"," UU/ LN Equity", "CNA LN Equity" and "SSE LN Equity".

Note: Increases shown are relative to 31 March 2014. Beta is levered using: equity beta*(1-gearing) + debt beta*gearing.

The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1.

- 4.28 Ofcom has not considered regulatory precedent relating to network utility asset betas, despite there being a number of recent precedents available. In particular, in its energy market investigation, the CMA is using an asset beta of 0.5-0.6 for energy supply and generation.
- 4.29 The analysis presented above indicates that:
 - The beta being proposed by Ofcom does not reflect the recent increases in the asset beta of the comparator network utilities and is below the average asset beta calculated on a 1 year daily basis;
 - The increasing beta observed in network utility companies weakens Ofcom's argument that the Openreach beta should not be increased from the June 2014 FAMR level and that the increase in BT's group beta should not be attributed to Openreach; and
 - The asset beta being proposed by Ofcom is at the bottom end of the asset beta proposed by CMA in the energy market investigation.
- 4.30 It would appear reasonable to expect Ofcom to consider the range of information which suggests that an Openreach asset beta could lie in the range of 0.5 to 0.68. This reflects the general increase in network utility betas since the FAMR. This would increase the pre-tax nominal WACC for Openreach in a range of 8.3% to 9.6%, with a base case estimate of 9.0% based on an asset beta of 0.6. If the Openreach WACC is also updated for embedded debt, the range becomes 8.6% to 9.8% with a base case estimate of 9.3%.

4.31 Ofcom notes that with an increasing BT Group beta and an unchanged copper access beta, the implied RoBT beta will increase – using the proposed BT group asset beta of 0.74, an Openreach beta of 0.5 with weighting of 25%, the implied RoBT asset beta is 0.82 which is above that applied in previous leased line price controls. Ofcom does not consider that the systematic risk of leased lines is likely to have increased since the March 2013 BCMR statement and uses this as one of the bases for proposing a further WACC disaggregation.

Updating the RoBT WACC for the revised Openreach WACC

- 4.32 Previously in this report, we have provided a critique of Ofcom's discussion on the upward trend in the beta and the extent to which the evidence does not support Ofcom's supposition that this is predominantly driven by Global Services, sports rights and unregulated services. The increase in beta could equally be attributed to regulated as well as non-regulated businesses and that the underlying reasons for this increase may well have come from the rest of the market.
- 4.33 There are several drivers behind the increase in the RoBT asset beta from 0.74 (March 2013 LLCC) to the 0.82 calculated by NERA for this LLCC.
 - The proposal to keep Openreach's asset beta constant at 0.5, despite an increase in the BT group asset beta forces up the RoBT beta, as it is effectively the balancing item. If Openreach's asset beta were to be increased to 0.6 as suggested previously, the RoBT asset beta would fall from 0.82 to 0.79⁴⁷, whilst with an upper end asset beta for Openreach of 0.68, the RoBT asset beta would fall to 0.76.
 - The use of data from January 2015 rather than a more recent period is another driver. Using a BT group asset beta of 0.67 (2 year daily as at 30th June 2015), which is lower than that implied by the 0.97 equity beta calculated by NERA, whilst keeping the Openreach asset beta constant at 0.5 results in an asset beta of 0.73 for RoBT. Even a slight reduction of the BT Group asset beta to 0.73, which is the FTI BT base case asset beta, results in a slightly reduced RoBT asset beta of 0.81 assuming an Openreach asset beta of 0.5.
- 4.34 The impact of these two drivers on the RoBT beta is demonstrated in the table below. This highlights that the sensitivity of the RoBT asset beta to the treatment of the BT Group and Openreach asset beta and shows the instability in the calculation – that would only be increased if UK Telecoms was to be disaggregated from RoBT.

⁴⁷ This assumes a weighting of 25% on Openreach, as per Ofcom's current proposal

Assumption	BT Group asset beta	Openreach asset beta	RoBT asset beta
Ofcom's consultation	0.74	0.50	0.82
Update BT group asset beta for FTI base case BT group asset beta	0.73	0.50	0.81
Update Openreach asset beta for change in utility betas since FAMR	0.74	0.68	0.76
Openreach asset beta at 0.6 (top end of CMA energy range)	0.74	0.60	0.79
Update BT group asset beta for FTI base case and update Openreach asset beta to 0.68	0.73	0.68	0.73
Update BT group asset beta for FTI base case and update Openreach asset beta to 0.60	0.73	0.60	0.76

Table 15: Impact of BT Group and of Openreach's asset beta on RoBT's asset beta

Sources: FTI analysis drawing on figures presented previously

4.35 Therefore, there may not be a divergence between BT's UK Telecoms business and RoBT but rather a mistreatment of Openreach asset beta or a timing issue that leads to the perception of a divergence.

The systematic risk of leased lines

- 4.36 Ofcom analyses leased line volume variance and forecasting accuracy to support its argument that the systematic risk of leased lines has not increased. Ofcom assesses that variability of leased lines monthly rental volumes has been broadly stable over the last four years, while forecasting uncertainty has not increased. We have not reviewed this data so we are not able to comment on these specific conclusions, but as a general point we note that these indicators are not ideal measures of systematic risk. For example, leased lines rental volumes could provide some information about leased lines revenues, but not about profitability (and it is profit that drives shareholder returns and betas). Further, the data which Ofcom has considered is historical data, rather than forward-looking (and it is the latter which is more important to beta calculations). Overall, the evidence presented does not robustly support a view that the RoBT beta calculation is erroneous, potentially due to the holding of Openreach beta constant.
- 4.37 Of com also notes that the increase in BT's beta coincided with an increase in BT's market capitalisation and that, given the lag due to a 1 year rolling average, suggests in

the increase in the asset beta and market capitalisation are closely correlated.

4.38 Graphically, the two variables are generally moving in the same direction between 2009 and 2013. However since then there has been a divergence between the two variables as BT's market capitalisation has continued to increase whilst BT's asset has fallen. Ofcom has not provided an explanation as to why this divergence has occurred. It is also possible that the correlation between the variables in spurious. There are many reasons for the increase in market capitalisation which may or not may not be related to a change in the systematic risk associated with BT group or its underlying divisions. For example, it may due to the perceived strength of BT relative to its competitors – and the level of competition is a diversifiable risk.

The correlation between the increase in BT group asset beta and the leased line beta

4.39 Ofcom then proceeds to provide a rationale, summarising a report from NERA, as to why the increase in the beta should not be attributed to leased line services. We have provided a critique of this earlier in this report. However, we reiterate again that Ofcom's hypotheses are that – a set of theories without supporting evidence and analysis – that provide little evidence as to the drivers behind the increase in the BT group asset beta or insight into the relative divisional or product betas.

The leased line beta relative to comparator betas

- 4.40 Of com notes that an asset beta of 0.82 would be above comparator UK, European and US telecoms companies.
- 4.41 However, the 0.82 may be higher than comparators because of the Openreach beta being held constant at 0.5. An increase in the Openreach beta would bring the RoBT beta (pre disaggregation from UK Telecoms) closer to the average of the comparator companies selected by Ofcom. This is shown below.

Comparator	Asset beta
RoBT (Openreach's asset beta of 0.60)	0.79
European telecoms	0.51
US telecoms	0.55
UK fixed telecoms operators	0.61

Table 16: Comparison of RoBT asset beta with other telecoms operators as of 31January 2015

Sources: FTI analysis; and Bloomberg.

Note: Beta is levered using: equity beta*(1-gearing) + debt beta*gearing. Asset betas are based on 2 years of daily data. RoBT asset beta calculated assuming 25% weight is attached to Openreach and BT Group asset beta calculated using average of actual debt. The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1. This is based on January 31st analysis, including for RoBT, to be consistent with the analysis undertaken by NERA.

4.42 We also note that since January 2015 when NERA undertook their analysis, the BT Group beta has been falling whilst some of the other comparator betas have been increasing. At 30th June 2015 the RoBT asset beta is 0.73 on a 2 year daily basis (assuming Openreach at 0.5), whilst the UK fixed telecoms operator beta has decreased from 0.61 to 0.59 on a 2 year daily basis, against FTSE 100 Share.

Compositor	Asset beta 2
Comparator	year
RoBT (BT Group's asset beta as of 30 June 2015 and Openreach's	0.73
asset beta of 0.5)	
RoBT (BT Group's asset beta as of 30 June 2015 and Openreach's	0.69
asset beta of 0.60)	
European telecoms	0.54
US telecoms	0.56
UK fixed telecoms operators	0.59

Table 17: Comparaison of RoBT asset beta with other telecoms operators as of 30June 2015

Sources: FTI analysis; and Bloomberg.

Note: Beta is levered using: equity beta*(1-gearing) + debt beta*gearing. Asset betas are based on 2 years of daily data. RoBT asset beta calculated assuming 25% weight is attached to Openreach and BT Group asset beta calculated using average of actual debt. The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1. The betas are calculated against FTSE 100 Shares.

- 4.43 We note that there are limitations with Ofcom's selection of comparator companies and, as such, they are not representative of a pure play UK Telecoms operator.
- 4.44 With regards to the construction of Ofcom's UK fixed telecoms operators comparator set, there are three key limitations:
 - (a) The UK fixed telecoms operators chosen by Ofcom cannot be considered to be pure-play comparators for BT's UK Telecoms business:
 - Sky has its own access network and so may capture part of the "Openreach" beta. Furthermore, a considerable part of its business is not telecoms related and therefore is not a like for like comparator.
 - ii. TalkTalk and Colt have different business models to BT different types of customers, market focus, network infrastructure and are not subject to price controls. Whilst many of the differences may be diversifiable risk some, such as regulatory risk, may not be.
 - (b) The sample size of three is too limited to draw meaningful conclusions.
 - (c) The beta has demonstrated considerable volatility in recent times and it is difficult to conclude on a forward looking beta in times of volatility.



Figure 6: Two-year daily asset beta of UK Telecom companies

Source: Bloomberg, tickers "TALK LN Equity", "SKY LN Equity" and "COLT LN Equity". Notes: Beta is levered using: equity beta *(1-gearing) + debt beta *gearing. The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1; and when net debt was negative, gearing is assumed to be zero.

- 4.45 The asset betas for European telecoms operators are also not appropriate pure-play comparators for BT's UK Telecoms business:
 - The majority of these companies have more income relating to mobile activities than non-mobile and Ofcom has not dealt with the issue of whether there should be adjustment to the asset beta to account for this.
 - Even discounting their mobile operations, these operators are not operating in the "telecom" space that is equivalent to "UK Telecoms". They also have access networks, that may be copper based and may also have global services style businesses or other subsidiaries. They are also likely to have different levels of regulatory risk. This could result in their beta being above or below that which may be associated with "UK Telecoms".
 - Despite being calculated across the All Europe index, many of these operators have a significant proportion of their operations outside of Europe. Or, they may have a greater proportion of their operations in a particular home market.
 - NERA has calculated the BT beta against the "home" FTSE All share market but

has calculated the European betas against the European market.

- These operators may be operating in markets that have been less or more exposed to the market volatility caused by the financial crisis. This is important when using All Europe index as opposed to home indexes.
- NERA's analysis shows (as summarised in Table A9.8 of Ofcom's consultation) there is a large spread of asset betas, ranging from 0.31 to 0.82 on a one year basis and 0.35 to 0.56 on a two year basis. The difference between the two years and the large range creates concerns around calculating an average from this data.
- To be fit for purpose as comparators, further analysis is required on the nature of the operations of these businesses and the extent to which they are therefore an appropriate comparator for a standalone "UK Telecoms" business.



Figure 7: Two-year daily asset beta of European Telecom companies

Source: Bloomberg, tickers "TEF SM Equity", "DTE GR Equity", "PROX BB Equity", "KPN NA Equity", "ORA FP Equity", "TIT IM Equity", "ILD FP Equity", "MOBB BB Equity", "TEL NO Equity", "TEL2B SS Equity" and "SCMN VX Equity".

Notes: Beta is levered using: equity beta*(1-gearing) + debt beta*gearing. The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1; and when net debt was negative, gearing is assumed to be zero.

- 4.46 The asset betas for US telecoms operators are also not an appropriate comparator for BT's UK Telecoms business:
 - There is a small sample of five companies;
 - Number of these companies have significant revenues from outside of telecoms, indicating a different business model; and
 - The regulatory environment, and therefore the regulatory risk being captured in the beta, is substantially different to the UK.

Company	Mobile revenue	Total Non-Telecom revenue
AT&T	54%(1)	44%(2)
Verizon	67%(1)	8%(3)
Time Warner Cable	0%	53%
Comcast	0%	54%(4)
Century Link	0%	30%(5)
Weighted average ⁽⁶⁾	42%	33%

Table 18: Proportion of revenue of US telecoms operators which is non-mobile
revenue

Sources: Ofcom consultation dated June 2015; AT&T, Form 10-K for the year 2014, page 6; Verizon, Form 10-K for the year 2014, page 164; Time Warner Cable, Form 10-K for the year 2014, page 110; Comcast, Form 10-K for the year 2014, 27 February 2015, page 53; and Century Link, Form 10-K for the year 2014, page 42.

Notes: (1) as of Ofcom consultation; (2) Service Revenue includes Video which is not part of telecoms and which are not able to split, so we have assumed Time Warner Cable's split for Video; (3) Mass Markets include Video which is not part of telecoms and which are not able to split, so we have assumed Time Warner Cable's split for Video; (4) Cable Communications includes Video which is not part of telecoms and which are not able to split, so we have assumed Time Warner Cable's split for Video; (4) Cable Communications includes Video which is not part of telecoms and which are not able to split, so we have assumed Time Warner Cable's split for Video; (5) Strategic Services includes Video which is not part of telecoms and which are not able to split, so we have assumed Time Warner Cable's split for Video; (5) Strategic Services includes Video which is not part of telecoms and which are not able to split, so we have assumed Time Warner Cable's split for Video; (5) Strategic Services includes Video which is not part of telecoms and which are not able to split, so we have assumed Time Warner Cable's split for Video; (5) Strategic Services includes Video which is not part of telecoms and which are not able to split, so we have assumed Time Warner Cable's split for Video; Video and (6) the average is weighted by the total 2014 revenue of each company.

- 4.47 The comparability of firms for the purposes of estimating beta values was considered by the CMA in the recent energy review. The CMA considered two main dimensions:
 - (a) The geographical scope of operations, including whether the firms are active in GB and the extent to which they are diversified across a number of different countries; and
 - (b) The type and range of activities undertaken by the firms, including whether they are vertically integrated and whether they also undertake regulated business, such as owning distribution networks.
- 4.48 We would expect Ofcom to undertake further analysis on the extent to which its proposed comparators represent pure play UK Telecoms operators and thus are suitable to use as comparators. This would include a review of the geographical scope of operations and the type and range of activities compared to BT.
- 4.49 The resulting beta estimations should also be subject to a robustness test focussing on the sample size, volatility of observations and spread.
- 4.50 In summary, the calculation of the RoBT beta is very sensitive to the underlying assumptions about the BT group beta and the Openreach beta. Under certain

assumption sets, the RoBT is similar to that used in the previous LLCC. Furthermore, the betas of the comparator companies chosen by Ofcom provide little insight into the appropriate beta to apply to a UK Telecoms operator or the relative value of a UK Telecoms operator beta relative to the BT group beta as the comparator companies have not been shown to be representative of a pure-play UK Telecoms company.

Disaggregation framework

- 4.51 Of com put forward three arguments to support its proposal for further beta disaggregation:
 - (a) The observed increase in BT's equity beta is mostly attributable to non-regulated services, e.g. BT GS or television services.
 - (b) Comparator benchmarking of network utility companies indicates that the Openreach beta is likely to have remained constant over the period.
 - (c) Comparator benchmarking indicates that BT GS is likely to have a higher beta than BT's telecoms services.
- 4.52 However, we have presented evidence that indicates the evidence supporting Ofcom's positions is not definitive. As a result, Ofcom's criteria for disaggregating beta further (as set out in the August 2005 WACC statement) are not met, as summarised in the table below.

Ofcom criteria	Met or not	Comment
A priori reason for thinking that the systematic risk faced by the project is different from that faced by the overall company	May be met	In this case, this is whether the systematic risk of leased lines is likely to be different from RoBT. Whilst Ofcom has set out its hypothesis for why this may be the case, this is not supported by a strong evidence basis.
Evidence is available to asset variations in risk, e.g. benchmark firms that are close to pure play comparators or other quantitative analysis	Not met	The benchmark firms identified by NERA / Ofcom are not close to pure play comparators for UK Telecoms. Other reliable quantitative analysis has not been provided.
Correctly identifying variations in risk and reflecting this is in adjusted rate of return is likely to bring about gains for consumers	Not met	Where differences can be correctly calculated then it is to be expected that the consumer will gain for such a differentiation – unless this leads to over complexity in pricing structure or increased regulatory costs etc. However, in this case, there is insufficient information available to be able to correctly identify variations in risk.

Table 19: Ofcom's disaggregation framework

Source: Ofcom BCMR Consultation June 2014 and FTI analysis

4.53 We expand our discussion below.

A priori reason for thinking that the systematic risk faced by leased lines is different from that faced by the other overall company

- 4.54 Of com notes that leased lines are small proportion of the operation of BT group contributing between 6% and 15% in 2013/14 depending upon the contribution measure used.
- 4.55 Ofcom notes that there is not a body of evidence on the relative income elasticity of users of leased lines, other than two studies which indicate that calls are more income elastic than access products and business users have a higher income elasticity than residential users. However, these papers are 20 and 15 years old respectively and may not be representative of current consumer preferences, plus they are only two

papers.48

- 4.56 We note Ofcom's reasoning that leased lines, beyond a minimum level of connectivity, may be expected to have a higher beta than copper access lines, but discuss our concerns around Ofcom's approach to estimating this variation below.
- 4.57 With regards to leased lines, fixed voice and broadband services being expected to have a lower systematic risk than for other services by BT, particularly ICT services, we do not share Ofcom's thinking. As we have moved towards a digital economy, ICT services are now becoming mainstream and there is less of a distinction made between ICT and non ICT services since most of the economy is now reliant upon ICT in some shape or form. Therefore, the demand for ICT services is likely to fluctuate less over the economic cycle than that which PwC may have expected when writing its 2005 report and as such, there may not be an a priori reason to expect ICT services to have a higher beta.

Evidence to assess variation in risk

- 4.58 Ofcom proceeds to set out evidence that supports the disaggregation of the leased line beta and places it between its calculation of the BT Openreach and the BT GS beta.
- 4.59 First Ofcom presents evidence that fixed telecoms usage services face higher systematic risk than fixed access lines. This is limited to:
 - A statement from PwC, made in 2005, that it may expect call volumes to fluctuate more than access volumes in response to changing economic circumstances. However, this statement was not backed up by any numerical analysis and was for an earlier time period that may not be representative of the current period.
 - Volume variability data from BT which Ofcom recognises has limitations due it not being possible to identify systematic risk separately from non systematic risk (which is crucial for beta calculation) and lack of consistent data across BT.
- 4.60 As such, there is no evidence to support the notion that BT Openreach and leased lines would have, or would not have, the same level of systematic risk and asset beta.
- 4.61 Ofcom proceeds to estimate the asset beta for leased lines and fixed telecoms usage services, but recognising that these cannot be estimated individually, proceeds to group them together into "other UK Telecoms"⁴⁹. However, even at this more

⁴⁸ Lester D. Taylor, "Telecommunications Demand in Theory and Practice" (1994); and David G. Loomis and Lester D. Taylor, "The Future of the Telecommunications Industry: Forecasting and Demand" (1999).

⁴⁹ In para A9.8, Ofcom defines BT's "other UK Telecoms" to include wholesale leased lines services as well as its fixed voice, broadband and bundled services

aggregated level, the analysis undertaken by Ofcom is not sufficient to estimate the relative variation in risk between UK Telecoms and RoBT. This is based on its review of the asset betas of UK Telecoms, European telecoms operators and US telecoms, which suggests an upper bound for the asset beta of 0.76. We have previously explained why these are not suitable comparators for other UK Telecoms. As such, there is no robust evidence to suggest that the beta for leased lines (or other UK Telecoms) should be bounded at a maximum of 0.76.

- 4.62 Ofcom then proceeds to set out asset betas for four ICT companies which it uses as comparators for BT GS. This is used to support its view that BT GS would have a higher beta than BT group and therefore, by implication, the beta for other UK Telecoms must be below that BT group beta.
- 4.63 Ofcom's choice of comparators was based on a 2005 report by PwC which "considered five pure play ICT comparators for BT's global services operations". This number reduced to four due to a change in focus of one of the original set. However it is unclear why these companies have been chosen as pure play ICT comparators, and why other comparators have not been chosen or at least considered given more companies are likely to have emerged during the past 10 years since the original study. As a result, there is likely to be sample bias in Ofcom's analysis and it is not clear that a pure play ICT beta would be below BT group beta.
- 4.64 By way of comparison, we have calculated two year daily asset betas for all traded companies which Bloomberg considers to be in Europe and classified as "IT Consulting and Other services". There are 149 companies, with asset betas as of 30 June 2015 ranging from (0.27) to 1.37 with an average asset beta of 0.32.⁵⁰ Whilst this may appear implausibly low given Ofcom's prior expectation, it does demonstrate the extent to which average asset betas can mask large spreads and also the potential for sample bias to be introduced into the analysis.
- 4.65 The ICT company asset beta analysis presented by Ofcom does not, therefore, provide robust evidence that asset betas for ICT companies would be above those for providers of "other UK Telecoms" services or that there should be a divergence between the asset beta of BT GS and other UK Telecoms services that would justify a disaggregation of the RoBT beta.

Benefits to consumers

4.66 There is potentially a benefit to consumers if the disaggregation of BT Group's asset beta between Other UK Telecoms and RoBT would lead to an increase in the robustness of the calculation and would mean that the price controls being set for

⁵⁰ Underlying analysis, included the list of companies in this classification are included in the appendix to this report.

particular services were more likely to lead to regulated returns at the appropriate cost of capital. That is, where the rate is not too low than it may harm investment incentives and not too high that customers are paying higher prices.

4.67 However, Ofcom does not have sufficient evidence to be able to either accurately calculate appropriate betas for either RoBT or Other UK Telecoms services or to demonstrate that there would be a difference between the two. As such, it is likely that the regulated returns would either be above or below the appropriate cost of capital and it cannot be demonstrated that the change in approach would lead to an improved outcome for customers.

Conclusion on leased line beta analysis

- 4.68 Ofcom concludes that, at this time, it would be inappropriate to maintain the current status quo (the two way split of the BT group asset beta "in the light of market evidence from more recent years". However, the market evidence provided by Ofcom is primarily hypothetical a series of hypotheses with limited robust quantitative evidence to support them. As such, we do not share Ofcom's view that market evidence points towards a three split of the BT group asset beta.
- 4.69 We therefore recommend that Ofcom either undertakes quantitative analysis, using appropriate comparators, to robustly demonstrate the differences in systematic risk and asset betas between leased line services and other services (be it in the categorisation of other UK Telecoms services or another grouping) or it continues to maintain the existing status quo which is less reliant upon assumptions and hypotheses.

Weightings to attach to each business segment

- 4.70 As discussed above, Ofcom proposes to disaggregate the overall BT Group beta into three segments: (i) Openreach; (ii) leased lines; and (iii) rest of BT (RoBT). RoBT would primarily comprise Global Services (GS).
- 4.71 We have commented above on the difficulties of disaggregating the BT Group beta and on the inconclusive evidence Ofcom has presented in support of its proposed approach. However, if Ofcom proceeds with its proposed disaggregation, then a key element of that disaggregation will be the weight it attaches to each business segment.
- 4.72 Of com considers three types of evidence to inform the weightings it attaches to each segment:
 - Mean Capital Employed (MCE);
 - EBITDA; and
 - Regulatory Net Replacement Cost (NRC) / Enterprise Value (EV).

- 4.73 Ofcom considers that it is not appropriate to place much weight on the MCE data, instead placing more weight on EBITDA and NRC/EV data. Ofcom presents evidence for both 2012/13 and 2013/14.
- 4.74 On the basis of this evidence Ofcom concludes that it is appropriate to reduce the weight attached to Openreach from 33% adopted in the June 2014 FAMR Statement to 25% for the LLCC Consultation. A reduction in Openreach's share of EBITDA and NRC/EV between 2012/13 and 2013/14 is the sole evidence advanced by Ofcom in support of its position.
- 4.75 The 75% weighting attached to parts of BT other than Openreach is then further disaggregated into leased lines and RoBT based on shares of EBITDA in 2013 and 2014. Ofcom relies on EBITDA for this disaggregation as it is the only one of the three metrics above that is available for all of the divisions of BT (according to Ofcom). On the basis of this evidence Ofcom concludes that around 60% of BT is leased lines (i.e. other UK telecoms services) and 15% is RoBT.

Evaluation

- 4.76 The weights attached to each of the different business segments potentially have a very significant effect on the beta estimates. To illustrate the potential impact we have calculated what the implied asset beta for leased lines would be for different weights attached to Openreach. The weight attached to RoBT is held constant, as is the asset beta estimates that Ofcom has assumed. The results are presented Table 20: below.
- 4.77 The results illustrate that even a relatively small change in the weight attached to Openreach (or leased lines) can have a significant impact on the asset beta for leased lines when everything else is held constant. For example, increasing the weight on Openreach from 25% to 35% requires an increase in the leased lines asset beta from 0.75 to 0.80 (a 6.7% increase) in order to keep the RoBT beta and the BT Group beta unchanged.

Weight on Openreach	Weight on Leased lines	Weight on RoBT	Implied asset beta for Leased Lines
20%	65%	15%	0.73
25%	60%	15%	0.75
30%	55%	15%	0.77
35%	50%	15%	0.80
40%	45%	15%	0.83
45%	40%	15%	0.88
50%	35%	15%	0.93
55%	30%	15%	1.00
60%	25%	15%	1.10

Table 20: Sensitivity of asset beta to weighting assumptions

Source: FTI analysis assuming a BT Group beta of 0.74, an Openreach beta of 0.50 and a RoBT beta of 1.1, all based on Ofcom's BCMR Consultation.

- 4.78 The fact that betas are quite sensitive to the choice of weightings means that a high degree of confidence must be had before changes are made to the weightings. However, there are a number of shortcomings with Ofcom's analysis of the weights to attach to the different business segments which mean that the required degree of confidence is not possible.
- 4.79 We outline some of the shortcomings of Ofcom's analysis below.
- 4.80 Ofcom's analysis of the appropriate weights to attach to each of BT's business segments places relatively little weight on MCE data. However, given that the objective of the disaggregation is to disaggregate the asset beta, MCE would actually be the most theoretically relevant piece of evidence: the asset beta of BT is a weighted average of the asset betas of the different segments, where those segments are weighted together based on the respective proportions of BT's debt and equity within those business segments (and debt and equity will add to capital employed). The MCE data suggests that a weighting of around 55% for Openreach would be more appropriate, significantly higher than the 25% proposed by Ofcom.
- 4.81 While we do not propose that a weight of 55% be attached to Openreach, the wide range of weightings justified by different sources of data illustrates the uncertainty around the exercise Ofcom has attempted to undertake.
- 4.82 Ofcom also appears to be placing significance to one year's data: the justification it has advanced for reducing the weight attached to Openreach is solely based on changes between 2012/13 and 2013/14. However, data such as EBITDA can be volatile from year to year, reflecting market conditions, so caution ought to be exercised about attaching too much importance to a single year's data (because next year's data could show the opposite). In any case, the detailed breakdown of EBITDA shown in Table

A9.17 suggests that there has been very little change in the shares of EBITDA between 2013 and 2014 e.g. the proportion of EBITDA accounted for by BT Consumer, BT Business and BT wholesale was 43% in 2013, but 42% in 2014, an immaterial change.

- 4.83 If Ofcom was being consistent with their forward-looking approach to gearing, cost of debt and beta then it would be necessary to try and forecast the different business segments' shares of EBITDA, MCE and NRC/EV in the future, rather than look at historical data.
- 4.84 Further, Ofcom has not clearly explained why it has chosen to treat leased lines' beta as the residual in the calculation, rather than (say) the beta of RoBT: Ofcom argues that it has comparators available for both leased lines (paragraph A9.97) and RoBT (GS) (paragraph A9.81), so it could have taken a different approach. That is, Ofcom has not clearly explained why it considers the comparators it has selected for RoBT (ICT companies) to be superior comparators for that business segment than the comparators it has identified for the leased lines segment.

Summary

4.85 Ofcom's decision to disaggregate BT's beta into three elements rather than two requires weights to be attached to each of the three segments. The beta estimates are sensitive to these choices of weights because at least one of the betas is treated as a residual. Because of this sensitivity it is important that there is a high degree of confidence about the differences between the different business segments. However, Ofcom has not presented robust evidence to support its proposition that BT's asset beta should be disaggregated into three different parts. Ofcom has not demonstrated that its three segment approach is superior to the two-segment approach it has adopted in the past.

5. Conclusion

BT Group WACC

- 5.1 We consider that Ofcom's use of the CAPM and approach to calculating the WACC for BT Group is, for the most part, consistent with Ofcom's previous approach and to that used by other NRAs in the UK.
- 5.2 An area of inconsistency is the use of forward looking debt assumptions, rather than considering the cost of embedded debt. Embedded debt is considered by all other UK regulators we have reviewed, and if it were assumed that 50% of BT's debt were embedded then the cost of debt may increase by around 90 basis points compared to Ofcom's calculation.
- 5.3 Ofcom's assumption that forward-looking gearing is around 30% has not been robustly justified, with different pieces of available evidence pointing to both higher and lower estimates. However, we concur with Ofcom that the WACC is not particularly sensitive to the gearing assumptions.
- 5.4 In terms of the remaining BT Group WACC parameters, some areas Ofcom's estimates appear marginally below where current evidence and regulatory precedent suggest they may lie. This is true for the ERP and the risk free rate, for example. In other areas, such as the BT group equity beta, Ofcom's estimate may be considered marginally above current estimates of the equity beta.
- 5.5 If we amend the cost of debt to consider embedded debt and we update the equity beta to consider data up to 30th June 2015 which provides a range of 0.89 to 1.05⁵¹, with a base case estimate of 1.0, the resulting WACC is 9.7% to 10.5% on a pre-tax nominal basis. However, we recognise the degree of judgement that is required in calculating a WACC and in the round we consider that Ofcom's pre-tax nominal estimate of 10% to be within a reasonable range.

Openreach WACC

5.6 Since 2005, Ofcom has disaggregated Openreach's beta from the BT Group beta and Ofcom continues to use this approach in this consultation. Ofcom has kept its estimate

⁵¹ BT group equity beta of 0.85 to 1, which is de-levered at 26% BT gearing (the average over the last two years) and then re-levered at notional 30% gearing with a debt beta of 0.1.

of Openreach asset beta constant at 0.5, the level set in the previous FAMR, despite changes to the BT Group beta and comparative betas over this period. There appear to be two key arguments that Ofcom has used to defend this assumption.

Changes to BT Group asset beta

5.7 The first argument that Ofcom puts forward is that the increase in BT's group asset beta is mostly due to non Openreach services. Ofcom has drawn together four events in BT's recent history and has attempted to use them to tell a story as to the changing asset beta. However the story being told is not compelling, in that it neither explains the movements that are seen or is based on evidence and sound economic theory. Whilst BT's group asset beta has shown large movements, there is a lack of evidence to suggest that these can be assigned to any particular event or operating division.

Beta driver	Ofcom hypothesis	FTI analysis
Profit growth of BT GS	BT GS share of EBITDA increased from 5% (2009) to 15% (2014) and BT GS is more risky, based on benchmarking betas of 4 global ICT companies.	Analysis does not suggest that this was necessarily the case as the benchmarking undertaken by Ofcom has limitations.
Move into pay TV and sports rights	Analysts considered this to be a risky move More risky as more competitive areas	Brokers reports suggest this was also viewed as an opportunity for BT Competition does not infer systematic risk and therefore should not impact the CAPM Sports rights asset beta may be below BT group beta as low income elasticity as customers switch from Sky etc due to lower BT price
Investment in FTTC	Analysts considered FTTC to be higher risk, particularly during introduction phase	Very weak, likely spurious, correlation between FTTC investment and profile of BT Group asset beta. Not clear that analysts did consider this to be risky as no evidence provided to back this up
Changes to the defined pension scheme	Uncertainty around the scheme, followed by Ofcom's announcement not to allow BT to recover in regulated services led to increased risk	This is a hypothesis, but Ofcom doesn't provide evidence to support this. Ofcom's December 2010 announcement does not appear to have materially changed Analyst views on BT's pension risk and its impact on BT's valuation.
Impact of the financial crisis	Not considered by Ofcom	Period 2004-2012 could be considered largely driven by the financial crisis and BT's group beta, as a non financial services firm, may be driven by the movement of FS firms (who can move the market) rather than changes to particular divisions of BT.

Table 21: Changes to BT Group asset beta

Benchmarking Openreach asset beta

5.8 Ofcom has chosen to set the value of the Openreach copper asset beta at 0.5, which is consistent with the value used in the June 2014 FAMR statement. Ofcom has concluded that this remains appropriate as it is between the asset beta of network utilities and UK fixed telecom companies. Our analysis suggests that is not the case, as utility company betas have increasing over time and therefore the lower end of the range should be increased. This is supported by recent CMA precedent.

Comparator	Ofcom analysis	FTI analysis
Asset beta of network utility companies	0.44 (1 year daily) 0.4 (2 year daily)	Updated to current time period 0.55 (1 year daily) 0.48 (2 year daily)
Change in asset beta of network utility companies	Not Considered	36% increase in asset beta between FAMR (March 2014) and June 2015 (when applied to Openreach, it increases asset beta to 0.68).
Regulatory precedent	Not Considered	CMA energy review statement (July 2015) uses asset beta of 0.5-0.6 for supply and generation (historical analysis)

Table 22: Utility company asset beta analysis

5.9 The analysis presented above indicates that:

- (a) The beta being proposed by Ofcom does not reflect the recent increases in the asset beta of the comparator network utilities and is below the asset beta calculated on a 1 year daily basis;
- (b) The increasing beta observed in network utility companies weakens Ofcom's argument that the Openreach beta should not be increased from the June 2014 FAMR level and that the increase in BT's group beta should not be attributed to Openreach; and
- (c) The asset beta being proposed by Ofcom is at the bottom end of the asset beta proposed by CMA in the energy market investigation.
- 5.10 Based on this information, it would appear reasonable to expect Ofcom to consider a range for the Openreach asset beta of 0.5 0.68, with a base case estimate of 0.6. This would increase the pre-tax nominal WACC for Openreach from 8.4% to a range of 8.3% to 9.6%, with a base case estimate of 9.0%. If the Openreach WACC is also updated for the cost of embedded debt, this gives a range of 8.6% to 9.8% with a base case estimate of 9.3%. However, given the recent upward trend in utility asset betas, we place greater weight on the upper end of the range.

Disaggregating UK Telecoms

5.11 Ofcom notes that with an increasing BT Group beta and an unchanged Openreach copper access beta, the implied RoBT beta will increase – using the proposed BT group asset beta of 0.74, an Openreach beta of 0.5 with a weighting of 25%, the implied RoBT asset beta is 0.82 which is above the 0.74 used in the previous LLCC⁵². Ofcom sets out three reasons why it thinks it would be inappropriate to apply an asset beta of 0.82 to leased lines.

The systematic risk of leased lines

- 5.12 Ofcom notes that there is limited evidence to suggest that the non diversifiable risk associated with leased lines has increased since the previous LLCC. However, the increase in RoBT that is being observed by Ofcom may have come about due to its proposal to keep the Openreach beta constant. Increasing the Openreach beta to 0.6 whilst continuing to use Ofcom's proposed equity beta of 0.97 would decrease the aggregated RoBT beta to 0.79. Therefore, there may not be a divergence between BT's UK Telecoms business and RoBT but rather a mistreatment of Openreach's asset beta or weighting that leads to the perception of a divergence.
- 5.13 Ofcom's comparators analysis for BT GS asset beta is flawed. It is based on a limited sample of five ICT companies whose business models are not similar to BT GS, who operate in different market (primarily more globally than BT) and is subject to selection bias. Adjusting the sample to include all traded European ICT companies, as classified by Bloomberg,⁵³ provides an asset beta below BT Group, demonstrating the potential impact of selection bias. Furthermore, the range and volatility of the beta is too broad to draw a meaningful conclusion as to the relative beta of BT GS versus UK Telecoms services.

Correlation between BT group beta and the leased line beta

5.14 Ofcom has summarised a report from NERA, which provides hypotheses on the increase in the beta. We provided a critique of this "story" in regards to Openreach above. However, we reiterate again that Ofcom's hypothesis are that – a set of theories with very limited supporting evidence and analysis – that provide little evidence as to the drivers behind the increase in the BT group asset beta or insight into the relative divisional or product betas. They do not provide a solid basis for regulatory decision making.

⁵² Ofcom, March 2013 BCMR Statement.

⁵³ The companies including in the sample have been selected using Bloomberg's GICS classification. These are the companies classified under "IT Consulting and Other services" in Western Europe.

Comparator analysis

- 5.15 Ofcom has sought to estimate an asset beta for UK Telecoms from a set of comparators drawn from the UK, Europe and the US. However, we consider the validity of this analysis to be limited:
 - The comparators are not "pure play" UK Telecoms operators. They have different business models to BT, a considerable proportion of their income is from non fixed line services and they face different regulatory risks from BT in the UK. As part of its recent energy review, the CMA expressed caution in considering betas from overseas countries in comparator analysis.
 - The spread of asset betas from the comparator sample is large, ranging from 0.31 to 0.86. There is also a large difference between the two year and one year betas. This leads to concerns around the correctness of calculating an average from this data.
 - The betas have been particular volatile in recent times, potentially reflecting the financial crisis, and may therefore not be particularly meaningful in the context of a forward-looking beta.
- 5.16 In summary, the calculation of the RoBT beta is very sensitive to the underlying assumptions about the BT group beta and the Openreach beta. Under certain assumption sets, the RoBT is similar to the previous LLCC estimate. Furthermore, the betas of the comparator companies chosen by Ofcom provide little insight into the appropriate beta to apply to a UK Telecoms operator or the relative value of a UK Telecoms operator beta relative to the BT group beta as the comparator companies have not been shown to be representative of a pure-play UK Telecoms company.

Disaggregation framework

5.17 We agree that it maybe methodologically advantageous to have WACCs that are specific to a charge control. However, in practice this is not possible because the data does not exist to perform product level WACC disaggregation. In the 2005 WACC statement, Ofcom explained the case for disaggregating the WACC will be stronger under three circumstances. We consider that these have not been met.

Ofcom criteria	Met or not met?	Comment
Priori reason for thinking that the systematic risk faced by the project is different from that faced by the overall company	May be met	In this case, this is whether the systematic risk of leased lines is likely to be different from RoBT. Whilst Ofcom has set out its hypothesis for why this may be the case, this is not supported by a strong evidence basis.
Evidence is available to asset variations in risk, e.g. benchmark firms that are close to pure play comparators or other quantitative analysis	Not met	The comparator firms identified by NERA / Ofcom are not close to pure play comparators for UK Telecoms. Other reliable quantitative analysis has not been provided. The ICT firms chosen as BT GS comparators are too small a sample size and a large variation in beta can be obtained by changing the sample definition.
Correctly identifying variations in risk and reflecting this is in adjusted rate of return is likely to bring about gains for consumers	Not met	Where differences can be correctly calculated then it is to be expected that the consumer will gain for such a differentiation – unless this leads to over complexity in pricing structure or increased regulatory costs etc. However, in this case, there is insufficient information available to be able to correctly identify variations in risk.

Table 23: Ofcom's criteria for disaggregation

Source: Ofcom.

Conclusion on leased line beta analysis

- 5.18 Ofcom concludes that, at this time, it would be inappropriate to maintain the current status quo (the two way split of the BT group asset beta "in the light of market evidence from more recent years"). However, the market evidence provided by Ofcom is primarily hypothetical a series of hypotheses with limited robust quantitative evidence to support them. As such, we do not share Ofcom's view that market evidence points towards a three way split of the BT group asset beta. Furthermore, the beta analysis is very sensitive to the time period as we have demonstrated by updating NERA's beta analysis.
- 5.19 We therefore recommend that Ofcom either undertakes quantitative analysis, using appropriate comparators, to robustly demonstrate the differences in systematic risk and asset betas between leased line services and other services (be it in the categorisation of other UK Telecoms services or another grouping) or it continues to maintain the existing status quo which is less reliant upon assumptions and hypotheses.

Weightings to attach to each business segment

- 5.20 As discussed above, Ofcom proposes to disaggregate the overall BT Group beta into three segments: (i) Openreach; (ii) leased lines; and (iii) rest of BT (RoBT). RoBT would primarily comprise Global Services (GS). While we do not think that this further disaggregation of beta is appropriate, the weight attached to each business segment has a significant impact on betas.
- 5.21 In this context Ofcom's decision to reduce the weight attached to Openreach from 33% adopted in the June 2014 FAMR Statement to 25% for the LLCC Consultation has a significant effect on betas for the leased lines business (because Ofcom treats this beta as a residual item determined by the weights and asset betas attached to Openreach and RoBT (GS)). Our analysis suggests that, for example, increasing the weight on Openreach from 25% to 35% requires an increase in the leased lines asset beta from 0.75 to 0.80 (a 6.7% increase) in order to keep the RoBT beta and the BT Group beta unchanged.
- 5.22 However, despite the significant implications of the weight attached to Openreach, Ofcom does not present a robust case for the change that is has made. Ofcom chooses to place most weight on EBITDA and NRC/EV measures, rather than the theoretically preferred measure of MCE. Further, Ofcom only looks at data over a very short time horizon e.g. a reduction in Openreach's share of EBITDA and NRC/EV between 2012/13 and 2013/14 is the sole evidence advanced by Ofcom in support of its position. Annual data, particularly for measures like EBITDA which are exposed to market conditions, can be volatile, so we would question how Ofcom has satisfied itself that the high evidential burden which needs to be met to justify a change in weights has been met on the basis of changes in one year's worth of data. In any case, the detailed breakdown of EBITDA shown in Table A9.17 suggests that there has been very little change in the shares of EBITDA between 2013 and 2014 e.g. the proportion of EBITDA accounted for by BT Consumer, BT Business and BT wholesale was 43% in 2013, but 42% in 2014, an immaterial change.
- 5.23 Overall, Ofcom has not presented robust evidence to support its proposition that BT's asset beta should be disaggregated into three different parts or that the change to the weight attached to Openreach's beta is robustly justified and likely to persist in future.

Appendix 1 Beta analysis.

A1.1 To calculate the asset beta, the beta is levered using the following formula:

equity beta*(1-gearing) + debt beta*gearing.

- A1.2 The equity beta and the gearing are calculated using Bloomberg, and the debt beta is assumed to be 0.1 to be consistent with Ofcom.
- A1.3 As said above, the equity beta is retrieved from Bloomberg using the "BETA_RAW_OVERRIDABLE" function. With this function, the beta can calculated on different period or at different frequencies. The beta period is adjusted using the "BETA_CALC_INTERVAL_OVERRIDE" function to retrieve the 1-year, 2-year or 5-year equity beta, and its frequency is adjusted to have the data on a daily, weekly or monthly basis. The equity beta is calculated against the FTSE 100 Shares, which is the default setting of Bloomberg.
- A1.4 Then, the gearing is calculated using the following formula :

Net debt / (Net Debt + Market Capitalisation)

- A1.5 The Net Debt and the Market Capitalisation are retrieved using Bloomberg, respectively with the "NET_DEBT" and the "CUR_MKT_CAP" functions, on daily, weekly or monthly frequencies, depending on the frequency of the asset beta calculated.
- A1.6 Then, the gearing is averaged over the period consistent with the calculation of the asset beta, i.e. to calculate a 1-year asset beta, the gearing is averaged over one year previous to the date of the calculation.
- A1.7 Then, the asset beta can be calculated at different dates, at different frequencies and on different periods.

Company	mpany Ticker	
National Grid	NG/ LN Equity	0.50
Severn trent	SVT LN Equity	0.43
Pennon Group	PNN LN Equity	0.40
United Utilities	UU/ LN Equity	0.43
Centrica	CNA LN Equity	0.61
SSE	SSE LN Equity	0.49
Average		0.48

Table A1: Two-year daily asset beta of Network utilities companies as of 30 June 2015

Source: Bloomberg.

Note: Beta is levered using: equity beta *(1-gearing) + debt beta *gearing.

The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1.

Table A2: Two-year daily asset beta of Telecom companies as of 30 June 2015

Company	Ticker	Asset beta
Amazon	AMZN US Equity	1.34
Microsoft	MSFT US Equity	1.08
Apple	AAPL US Equity	0.81
IBM	IBM US Equity	0.73
AT&T	T US Equity	0.47
Verizon	VZ US Equity	0.48
Time Warner Cable	TWC US Equity	0.67
Comcast	CMCSA US Equity	0.81
Century Link	CTL US Equity	0.39
Telefonica	TEF SM Equity	0.52
Deutsche Telekom	DTE GR Equity	0.55

Company	Ticker	Asset beta
Belgacom	PROX BB Equity	0.59
KPN	KPN NA Equity	0.52
Orange	ORA FP Equity	0.62
Telecom Italia	TIT IM Equity	0.37
Illiad	ILD FP Equity	0.67
Mobistar	MOBB BB Equity	0.38
Telenor	TEL NO Equity	0.74
Tele2	TEL2B SS Equity	0.61
Swisscom	SCMN VX Equity	0.34
Talk Talk	TALK LN Equity	0.55
Sky	SKY LN Equity	0.55
Colt	COLT LN Equity	0.62
Vodaphone	VOD LN Equity	0.83
Average		0.63

Source: Bloomberg.

Note: Beta is levered using: equity beta *(1-gearing) + debt beta *gearing.

The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1.

Table A3: Two-year daily asset beta of ICT companies as of 30 June 2015

		Asset			Asset
Company	Ticker	beta	Company	Ticker	beta
Accenture Plc-A	ACN US Equity	1.01	Nyherji Hf	NYHR IR Equity	
Cap Gemini	CAP FP Equity	0.95	Glintt - Global	GLINT PL Equity	0.42
Atos	ATO FP Equity	0.77	Prevas Ab-B Shs	PREVB SS Equity	0.42
Computacenter Pl	CCC LN Equity	0.70	Sodifrance	SOA FP Equity	0.26
Atea Asa	ATEA NO Equity	0.37	Consort Nt	MLCNT FP Equity	
		Asset			Asset
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Company	Ticker	beta	Company	Ticker	beta
Indra Sistemas	IDR SM Equity	0.74	Cheops Technolog	MLCHE FP Equity	
Bechtle Ag	BC8 GR Equity	0.87	Softronic Ab-B	SOFB SS Equity	0.18
Sopra Steria Gro	SOP FP Equity	0.32	Altia Consultore	ALC SM Equity	0.09
Econocom Group	ECONB BB Equity	0.46	Emakina	ALEMK BB Equity	0.27
Altran Tech	ALT FP Equity	0.77	Itera Asa	ITE NO Equity	0.16
Evry Asa	EVRY NO Equity	0.17	Scisys Plc	SSY LN Equity	0.22
Tieto Oyj	TIE1V FH Equity	0.74	Visiativ Sa	ALVIV FP Equity	0.30
Alten	ATE FP Equity	0.47	02i	ALODI FP Equity	
Sesa Spa	SES IM Equity	0.19	Tdmi Ag	ARX GR Equity	
Cancom Ag	COK GR Equity	1.11	Enea Ab	ENEA SS Equity	0.58
Engineering Spa	ENG IM Equity	0.40	Syzygy Ag	SYZ GR Equity	0.49
Gfi Informatique	GFI FP Equity	0.15	Avega Ab-B Shs	AVEGB SS Equity	0.45
Reply Spa	REY IM Equity	0.35	Ubisense Group	UBI LN Equity	0.01
Ework Scandinavi	EWRK SS Equity	0.34	Space Hellas Sa	SPACE GA Equity	0.04
Devoteam Sa	DVT FP Equity	0.25	Atoss Software	AOF GR Equity	0.28
Allgeier Se	AEI GR Equity	0.46	Orbis Ag	OBS GR Equity	
Luxoft Holding I	LXFT US Equity	1.37	Soft Computing	SFT FP Equity	0.08
Tecnocom Telecom	TEC SM Equity	0.46	Keywords Studios	KWS LN Equity	0.23
Ordina Nv	ORDI NA Equity	1.06	Realtech Ag	RTC GR Equity	0.06
Gft Technologies	GFT GR Equity	0.98	Locasystem Inter	MLLOI FP Equity	0.18
Neurones	NRO FP Equity	0.21	Compta	COMAE PL Equity	0.06
Interxion Holdin	INXN US Equity	0.57	Snp Schneider-Ne	SHF GR Equity	0.28
Ausy	OSI FP Equity	0.20	Siili Solutions	SIILI FH Equity	
Quest Holdings	QUEST GA Equity	0.33	Byte Computers	BYTE GA Equity	0.26
Sii	SII FP Equity	0.18	Triad Group Plc	TRD LN Equity	0.15
Sqs Software Qua	SQS LN Equity	0.18	Octo Technology	ALOCT FP Equity	0.29

		Asset			Asset
Company	Ticker	beta	Company	Ticker	beta
Groupe Open	OPN FP Equity	0.25	Litebulb Group L	LBB LN Equity	0.13
Ntt Com Security	AAGN GR Equity	0.05	Union Technolog	FPG FP Equity	0.41
Phoenix It Group	PNX LN Equity	0.04	Shs Viveon Ag	SHWK GR Equity	0.27
Proact It Group	PACT SS Equity	0.42	Novotek Ab-B Sh	NTEKB SS Equity	0.33
Aubay	AUB FP Equity	0.30	Ixonos Oyj	XNS1V FH Equity	0.12
Know It Ab	KNOW SS Equity	0.50	Eckoh Plc	ECK LN Equity	0.21
Novabase Sgps Sa	NBA PL Equity	0.38	It Competence Gr	3IT GR Equity	
Acando Ab	ACANB SS Equity	0.46	Sanderson Group	SND LN Equity	0.14
Business & Decis	BND FP Equity	0.16	Performance Tech	PERF GA Equity	0.02
Its Group	ITS FP Equity	0.29	Publishing Techn	PTO LN Equity	0.29
Addnode Group Ab	ANODB SS Equity	0.49	Norcom Info	NC5A GR Equity	0.67
Prodware	ALPRO FP Equity	0.46	Precio Sys-B Shs	PRCOB SS Equity	0.50
Keyrus	KEY FP Equity	0.25	Easyvista	ALEZV FP Equity	0.13
Docdata Nv	DOCD NA Equity	0.46	Nixu Oyj	NIXU FH Equity	
Cs Comm & System	SX FP Equity	0.14	Is Solutions Plc	ISL LN Equity	-0.07
Infotel	INF FP Equity	0.26	Generic Sweden A	GENI SS Equity	0.28
Adesso Ag	ADN1 GR Equity	0.29	Plenum Ag	PLEK GR Equity	
Solucom	LCO FP Equity	0.26	Ipplus Plc	IPP LN Equity	0.06
Datagroup Ag	D6H GR Equity	0.51	Pinnacle Technol	PINN LN Equity	-0.21
Valtech- Regr	LTE FP Equity		6pm Holdings Plc	6PM MV Equity	-0.03
Fdm Group Holdin	FDM LN Equity	0.24	Enables It Group	EIT LN Equity	0.09
Hiq Intl Ab	HIQ SS Equity	0.67	Isc Business Tec	I5Q GR Equity	-0.08
Umanis - Reg	ALUMS FP Equity	0.16	Tech-Value Spa	TV IM Equity	0.03
Cybercom Group	CYBE SS Equity	0.44	Cbrain A/S	CBRAIN DC Equity	0.28
Bouvet Asa	BOUVET NO Equity	0.35	Athena It-Group	ATHENA DC Equity	
Ncc Group Plc	NCC LN Equity	0.35	Euroconsultants	EUROC GA Equity	0.18

Company	Ticker	Asset	Company	Ticker	Asset beta
Anite Plc	AIE LN Equity	0.41	Quality And Reli	OUAL GA Equity	0.09
Affecto Oyj	AFE1V FH Equity	0.36	Diadrom	DIAH SS Equity	0.33
Columbus A/S	COLUM DC Equity		Msc Konsult Ab-B	MSCB SS Equity	0.05
Redcentric Plc	RCN LN Equity	0.04	Amalphi Ag	AMI GR Equity	0.09
Parity Group Plc	PTY LN Equity	0.10	Pro Dv Ag	PDA GR Equity	
Sogeclair	SOG FP Equity	0.48	Pc Systems Sa	PSYST GA Equity	0.06
Kps Ag	KSC GR Equity	0.73	Infronics System	INRO IN Equity	0.00
Reditus	RED PL Equity	0.23	Wirtek As	WIRTEK DC Equity	0.74
Solutions 30 Se	ALS30 FP Equity	0.26	Xtranet I Stockh	XTRA SS Equity	
First Derivative	FDP LN Equity	0.25	Totally Plc	TLY LN Equity	0.04
Caperio Holding	CAPE SS Equity		Softline Ag	SFD1 GR Equity	
Data Respons Asa	DAT NO Equity	0.14	Mxc Capital Ltd	MXCP LN Equity	-0.27
Digia	DIG1V FH Equity	0.35	Ttl Information	TTO GR Equity	
Vision It Group	VIT BB Equity	0.12	Lavide Holding	LVIDE NA Equity	0.42
Conet Techn-Prf	CT71 GR Equity	0.05	Trsb Groupe	MLTRS FP Equity	
Seven Principles	T3T GR Equity	0.34	Magillem Design	MLMGL FP Equity	
Ctac Nv	CTAC NA Equity		Flexos Sa	FLEX BB Equity	
Secunet Securit	YSN GR Equity	0.28			
Average Of The Ict Comp	anies				0.32

Source: Bloomberg.

Note: Beta is levered using: equity beta*(1-gearing) + debt beta*gearing.

The gearing was calculated using the net debt ("NET_DEBT") and the market capitalisation ("CUR_MKT_CAP") as retrieved by Bloomberg; the equity beta ("BETA_RAW_OVERRIDABLE") was also retrieved by Bloomberg; and assumes a debt beta of 0.1.

A1.8 The table below provides an explanation on how precedent regulators calculate their asset betas.

Regulator		Date	Decision		Hypothesis for the calculation of the beta	Source
Ofgem	Gas	December	RIIO-T1 Final		Based on the relative risk assessment	1
orgeni	Transmission	2012	Proposals		and on the initial proposition.	-
ORR	Network Rail	October 2013	PR13 Final Determination		NA	2
Ofgem	Offshore Transmission	December 2013	IDC Decision	OFTOs	Estimated from a hybrid comparator group assembled by Grant Thornton	3
CAA	Heathrow Airport	January 2014	Q6 Price Controls - Licence Modifications		Calculated from regulatory precedents for other sectors and a qualitative assessment of the relative risks of airports. Does not consider the appropriate period or frequency to calculate betas.	4
Competition Commission	Electricity Distribution	March 2014	NIE Appeal - Final Determination	Northern Ireland	Based on utilities comparators' 2-year daily betas. However, they look at ten years of data, specifically 5 x 2 year windows (so the betas are estimated using 2-year daily data) and they also take into account estimates for UREGNI which were based on 10 x 1 year windows. They use net debt when calculating asset betas, but they note net or gross debt are both "justifiable".	5
Ofgem	Electricity Distribution	November 2014	RIIO-ED1 Slow Track - Final Determinations		Based on the "Consultation on our methodology for assessing the equity market return for the purpose of setting RIIO price controls" published on 6 December 2013	6
Ofwat	Water companies	December 2014	PR14 Final Determinations		Based on water companies 5-year and 2- year, daily and monthly asset betas, and on the January 2014 document. Most	7

Table A4: Calculation of the asset beta by precedent regulators

Regulator		Date	Decision	Hypothesis for the calculation of the beta	Source
				weight placed on 5-year daily betas.	
UREGNI	Northern Ireland Water	December 2014	NIW PC15 Final Determination	Beta based on a low to moderate NI Water's exposure to cost risk, its price control based on a price cap, a sizeable RCV and a high RCT-to-revenue ratio.	8
СМА	Vertically integrated	February 2015	Energy Market investigations - Analysis of cost of capital of energy firms	Based on monthly and quaterly betas of comparable companies, for a period of 7 years.	9

Sources : (1) <u>https://www.ofgem.gov.uk/ofgem-publications/53602/4riiot1fpfinancedec12.pdf</u>, paragraph 3.44;

(2) <u>http://orr.gov.uk/__data/assets/pdf_file/0011/452/pr13-final-determination.pdf;</u>

(3) <u>https://www.ofgem.gov.uk/sites/default/files/docs/decisions/decision_letter_idc_0.pdf</u>, page 2;

(4) <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf</u>, pages 41-46;

(5) https://assets.digital.cabinet-office.gov.uk/media/534cd495ed915d630e00003f/final-determination.pdf, pages 13-33 to 13-37;

(6) <u>https://www.ofgem.gov.uk/ofgem-publications/91564/riio-ed1finaldeterminationoverview.pdf</u>, page 42;

(7) <u>http://www.ofwat.gov.uk/pricereview/pr14/det_pr20141212riskreward.pdf</u>, pages 34-35;

(8) <u>http://www.uregni.gov.uk/uploads/publications/UR_PC15_DD_Annex_A_-_Financing_Investment.pdf;</u> Annexe A, pages 9-10; and

(9) <u>https://assets.digital.cabinet-office.gov.uk/media/54edfe9340f0b6142a000001/Cost_of_capital.pdf</u>, pages 14-21.

Appendix 2 Risk free rate precedents

A2.1 The table below provides the regulatory precedent in relation to the real risk free rate

Table A5: Regulatory precedent in relation to the real risk free rate

Regulator	Ofgem	ORR	Ofgem	CAA	Competition Commission	Ofgem	Ofwat	UREGNI	СМА	Average
Date	Gas Transmission 17/12/2012	Network Rail Oct-13	Offshore Transmission 18/12/2013	Heathrow Airport Jan-14	Electricity Distribution Mar-14	Electricity Distribution Nov-14	Water companies Dec-14	Northern Ireland Water Dec-14	Vertically integrated Feb-15	
Decision	RIIO-T1 Final Proposals	PR13 Final Determination	IDC Decision	"Q6 Price Controls -	NIE Appeal - Final Determination	RIIO-ED1 Slow Track Final Determinations	PR14 Final Determinations	NIW PC15 Final Determination	Energy Market investigations - Analysis of cost of capital of energy firms	
			OFTOs		Northern ireland					
Real risk free rate	2.00%	1.75%	2.00%	0.50%	1.25%	1.30%	1.25%	1.50%	1.25%	1.42%
Source	1	2	3	4	5	6	7	8	9	

Sources: (1) https://www.ofgem.gov.uk/ofgem-publications/53602/4riiot1fpfinancedec12.pdf;

(2) <u>http://orr.gov.uk/__data/assets/pdf_file/0011/452/pr13-final-determination.pdf;</u>

(3) <u>https://www.ofgem.gov.uk/sites/default/files/docs/decisions/decision_letter_idc_0.pdf;</u>

(4) <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf;</u>

(5) https://assets.digital.cabinet-office.gov.uk/media/534cd495ed915d630e00003f/final-determination.pdf;

(6) https://www.ofgem.gov.uk/ofgem-publications/91564/riio-ed1finaldeterminationoverview.pdf;

(7) <u>http://www.ofwat.gov.uk/pricereview/pr14/det_pr20141212riskreward.pdf;</u>

(8) http://www.uregni.gov.uk/uploads/publications/UR_PC15_DD_Annex_A - Financing_Investment.pdf; and

(9) https://assets.digital.cabinet-office.gov.uk/media/54edfe9340f0b6142a000001/Cost of capital.pdf.

Appendix 3 ERP and TMR precedents

A3.1 The table below provides the regulatory precedent in relation to the ERP and TMR.

Table A6: Regulatory precedent in relation to the real risk free rate

Destulator	Offer	000	Offer	014	Competition	Offer	Ofwet		0144	Average
Regulator	Orgem	URR	Orgem	CAA	Commission	Urgem	Utwat	UREGNI	CIVIA	Average
	Gas	Notwork Doil	Offshore	Heathrow	Electricity	Electricity	Water	Northern	Vertically	
	Transmission	Network Rail	Transmission	Airport	Distribution	Distribution	companies	Ireland Water	integrated	
Date	17/12/2012	Oct-13	18/12/2013	Jan-14	Mar-14	Nov-14	Dec-14	Dec-14	Feb-15	
Decision	RIIO-T1 Final Proposals	PR13 Final Determination	IDC Decision - OFTOs	"Q6 Price Controls -	NIE Appeal - Final Determination - Northern Ireland	RIIO-ED1 Slow Track Final Determinations	PR14 Final Determinations	NIW PC15 Final Determination	Energy Market investigations - Analysis of cost of capital of energy firms	
ERP	5.25%	5.00%	4.40%	5.75%	4.50%	5.25%	5.50%	5.00%	4.50%	5.02%
TMR	7.25%	6.75%	6.40%	6.25%	5.75%	6.55%	6.75%	6.50%	5.75%	6.44%
Source	1	2	3	4	5	6	7	8	9	

Sources: (1) https://www.ofgem.gov.uk/ofgem-publications/53602/4riiot1fpfinancedec12.pdf;

(2) <u>http://orr.gov.uk/ data/assets/pdf_file/0011/452/pr13-final-determination.pdf;</u>

(3) <u>https://www.ofgem.gov.uk/sites/default/files/docs/decisions/decision_letter_idc_0.pdf;</u>

(4) <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf;</u>

(5) https://assets.digital.cabinet-office.gov.uk/media/534cd495ed915d630e00003f/final-determination.pdf;

(6) <u>https://www.ofgem.gov.uk/ofgem-publications/91564/riio-ed1finaldeterminationoverview.pdf;</u>

(7) <u>http://www.ofwat.gov.uk/pricereview/pr14/det_pr20141212riskreward.pdf;</u>

(8) http://www.uregni.gov.uk/uploads/publications/UR PC15 DD Annex A - Financing Investment.pdf; and

(9) https://assets.digital.cabinet-office.gov.uk/media/54edfe9340f0b6142a000001/Cost_of_capital.pdf.

August 2015

Appendix 4 WACC precedents

A4.1 The table below displays the WACC provided by precedent regulators.

Table A7: Comparison of WACC provided by precedent regulators

					Competition					
Regulator	Ofgem	ORR	Ofgem	CAA	Commission	Ofgem	Ofwat	UREGNI	CMA	Ofcom
	Gas	Network Rail	Offshore	Heathrow	Electricity	Electricity	Water	Northern	Vertically	Telecom-
	Transmission	Network Ruli	Transmission	Airport	Distribution	Distribution	companies	Ireland Water	integrated	munication
Date	17/12/2012	0ct-13	18/12/2013	Jan-14	Mar-14	Nov-14	Dec-14	Dec-14	Feb-15	Jun-15
Decision	RIIO-T1 Final Proposals	PR13 Final Determination	IDC Decision	"Q6 Price Controls -	NIE Appeal - Final Determination	RIIO-ED1 Slow Track Final Determinations	PR14 Final Determinations	NIW PC15 Final Determination	Energy Market investigations - Analysis of cost of capital of energy firms	LLCC Consultation
			OFTOs		Northern ireland					BT Group
Real risk free rate	2.0%	1.8%	2.0%	0.5%	1.3%	1.3%	1.3%	1.5%	1.3%	1.0%
Inflation assumption								3.4%	2.5-3.0%	3.2%
Nominal risk free rate			3.9%					5.0%	4.0%	4.2%
Equity beta	0.91	0.95	0.88	1.10	0.6 - 0.7	0.90	0.80	0.83		1.01
Asset beta				0.50	0.38	0.38	0.30	0.44	0.55	0.74
ERP	5.3%	5.0%	4.4%	5.8%	4.5%	5.3%	5.5%	5.0%	4.5%	5.3%
Gearing	62.5%	62.5%	36.1%	60.0%	45.0%	65.0%	62.5%	50.0%	20.0-40.0%	30.0%
Debt premium										1.2%
Debt beta					5.0%	10.0%		5.0%		0.1
Tax rate	21.3%	20.2%	21.0%	20.2%		20.0%	20.0%	20.0%	27.0%	20.0%

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Competition										
Regulator	Ofgem	ORR	Ofgem	CAA	Commission	Ofgem	Ofwat	UREGNI	CMA	Ofcom
Pre-tax real cost of equity	8.6%	8.1%		8.6%		7.5%	7.1%			7.8%
Post-tax real cost	6.8%	6.5%		6.8%	4.9%	6.0%	5.7%	5.7%		6.4%
Pre-tax nominal cost of equity			9.8%						9.6-10.3%	12.0%
Post-tax nominal cost of equity			7.8%							9.6%
Pre-tax real cost										
of debt	2.9%	3.0%		3.2%	3.1%	2.6%	2.6%	1.4%		2.2%
Post-tax real cost of debt	2.3%	2.4%		2.6%		2.1%	2.1%			1.8%
Pre-tax nominal cost of debt			4.7%					4.9%	5.5%	5.4%
Post-tax nominal cost of debt										4.3%
Pre-tax real WACC	5.1%	4.9%		5.4%		4.3%	4.3%			6.22
Pre-tax nominal WACC			8.0%						8.6%	10.0%
Vanilla real WACC	4.4%	4.3%		4.7%	4.1%	3.8%	3.7%	3.5%		5.1%
Post-tax real WACC	4.0%	3.9%		4.3%		3.5%	3.4%			5.0%
Source	1	2	3	4	5	6	7	8	9	10

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- Sources: (1) https://www.ofgem.gov.uk/ofgem-publications/53602/4riiot1fpfinancedec12.pdf;
- (2) <u>http://orr.gov.uk/___data/assets/pdf_file/0011/452/pr13-final-determination.pdf;</u>
- (3) <u>https://www.ofgem.gov.uk/sites/default/files/docs/decisions/decision_letter_idc_0.pdf;</u>
- (4) <u>http://www.caa.co.uk/docs/33/CAP%201140.pdf;</u>
- (5) https://assets.digital.cabinet-office.gov.uk/media/534cd495ed915d630e00003f/final-determination.pdf;
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- (10) http://stakeholders.ofcom.org.uk/binaries/consultations/llcc-dark-fibre/summary/llcc-dark-fibre.pdf.