
Wholesale Local Access Market Review: Draft Statement

Annexes 17-27

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DRAFT STATEMENT

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A17. Inflation

- A17.1 This annex sets out our rationale and decisions on the price inflation assumptions used for operating costs and asset prices when forecasting costs for the charge controls.
- A17.2 As set out in Section 2, we are setting cost based price controls using a CPI-X control. To forecast costs over the charge control period we need to understand how the input prices for operating costs and capital expenditure are likely to vary over time.
- A17.3 As explained in Annex 11, our modelling approach considers cost inflation separately from efficiency and the effects of changes in volumes. We forecast inflation for pay and non-pay operating costs and assets separately. The operating cost inflation assumptions are used within both the top-down model and bottom-up models. The asset price inflation assumption is only used in the top-down model.¹
- A17.4 In summary, our approach and price inflation forecasts are:
- Pay operating cost inflation. We have considered a range of evidence when setting our pay cost inflation assumptions, including historical and forecast BT data and external pay cost indices. We have decided to adopt a pay cost inflation rate within our forecasts in the top-down and bottom-up models of 2.7% (2.5% in 2017/18, 2.8% in 2018/19, 2.9% in 2019/20 and 2.8% in 2020/21).
 - Non-pay operating cost inflation. We have derived an overall non-pay inflation assumption by weighting together separate inflation estimates for energy costs, accommodation costs (rent and rates) and other accommodation costs and by assuming that all other non-pay operating costs increase at CPI. We have decided to adopt a non-pay inflation rate within our forecasts in the top-down model of 3.3% (3.8% in 2017/18, 4.0% in 2018/19, 2.7% in 2019/20 and 3.0% in 2020/21) and in the bottom-up model of 3.2% (3.7% in 2017/18, 3.8% in 2018/19, 2.6% in 2019/20 and 2.8% in 2020/21).
 - Asset price inflation. We have decided to adopt asset price change assumptions that ensure duct and copper assets are valued consistently with how they are revalued for current cost accounting (CCA) purposes in BT's Regulatory Financial Statements (RFS). We have decided to assume that all other asset prices stay constant in nominal terms.

Pay operating cost inflation

Our proposals

- A17.5 To forecast the increase in BT's future pay costs we considered:

¹ As explained in Annex 14, the bottom-up model uses network engineering algorithms to dimension and cost an MEA network, thereby capturing cost-volume relationships and efficient network design choices. We have separately gathered component unit cost information as part of the bottom-up modelling process.

- historical and forecast pay cost data from BT's management accounts (including PVEO² and total labour cost (TLC) analyses);
- historical pay cost data from BT's Annual Reports;
- public reports of BT's discussions on future pay awards with its Trade Unions; and
- economy-wide studies of historical and forecast changes in pay costs.

A17.6 In the March consultation we proposed a pay cost inflation rate between 2.5% and 3.5% and used a base case of 3.1% within our forecasts. We produced our estimate of pay cost inflation by considering the different sources of evidence in the round and using our regulatory judgement. For example, for 2016/17, we used evidence from BT's forecast TLC and PVEO data, to which we gave the most weight, as well as the trade union agreements and external forecasts for the economy as a whole. This suggested pay inflation of 2.5% per annum. For the remaining years of our forecast (2016/17 to 2020/21) our pay inflation assumption was only based on external forecasts from the Office for National Statistics (ONS), Office for Budget Responsibility (OBR) and Bank of England, all of which suggested that pay inflation was likely to increase. Specifically, we estimated pay inflation from 2017/18 onwards by using our assumption from the previous year, and then reflecting the change in pay inflation indicated by the external forecasts available for the relevant year.

Stakeholder responses

A17.7 TalkTalk highlighted that our approach to pay cost inflation used the highest end of the range of forecasts available and that following publication of our consultation external forecasts of pay cost inflation had been revised downwards. It suggested that a simple average of the most recent data from the Bank of England and OBR would be a reasonable approach to estimating pay cost inflation.³ TalkTalk also considered that we should place little or no reliance on BT's pay agreements with the Trade Unions or BT's internal projections of pay costs. It noted that taking account of pay agreements could reduce BT's incentives to secure a low wage settlement. In addition, TalkTalk highlighted the risk of regulatory gaming if we were to rely on internal BT reports which were not subject to agreement by BT management.

A17.8 Openreach noted that we needed to consider the latest forecasts available (and pointed out a potential error in our reporting of the OBR's average earnings growth forecasts). It was not concerned with the OBR forecasts excluding pension costs or share based payment expenses, and considered that the inclusion of these factors was unlikely to impact growth rates significantly.⁴

A17.9 Openreach also highlighted that we needed to consider the interaction between our pay inflation, efficiency and quality of service (QoS) proposals. For instance, it argued that our base case proposals of 3.1% for pay inflation and 5.5% for efficiency implied a net real cost reduction of 4.6% (assuming CPI of around 2.2%). It noted that a pay inflation assumption

² "PVEO" is a management accounting tool which breaks down annual movements in costs into changes due to Price (inflation), Volume effects, Efficiency (or cost transformation) and Other.

³ TalkTalk response to the March 2017 WLA Consultation, pages 25-26.

⁴ Openreach response to the March 2017 WLA Consultation – Volume 2, pages 62-63.

towards the lower end of our proposed range would imply even higher real cost reductions, and that this needed to be considered together with the additional impact of our QoS proposals.

A17.10 The Communications Union (CWU) highlighted the link between compensation and delivery of quality services and that:⁵

- the most effective way for Openreach to meet its proposed quality of service targets would be to allow for an engineering workforce that is (among other issues) in the upper quartile rates of pay and conditions of work; and
- any weakening of pay and terms and conditions for Openreach employees will inevitably be detrimental for overall staff recruitment, retention, motivation and productivity.

A17.11 A confidential respondent [X] considered that the pay inflation assumption used in our top-down model was too high and would allow BT to earn inefficient returns.⁶ It argued we should reconsider whether an above inflation increase in BT's pay costs was fair and reasonable.⁷

A17.12 Virgin Media broadly agreed with our approach to inflation.⁸

Our reasoning

A17.13 In this sub-section we explain how we have determined appropriate assumptions for pay operating cost inflation over the charge control period for use in our modelling by considering:

- historical and forecast pay cost data from BT's management accounts
- historical pay cost data from BT's Annual Reports;
- public reports of BT's discussions on future pay awards with its Trade Unions; and
- economy-wide studies of historical and forecast changes in pay costs.

BT management accounting pay costs (PVEO & TLC analyses)

A17.14 When reviewing management accounting data we focus on the results for two BT divisions – Technology and Service Operations (TSO) and Openreach. This is because these two divisions represent the majority [X]% (80-100%) of pay costs for the services within the top-down model and the majority [X]% (70-90%) of the pay costs for the services covered by the bottom-up model.⁹ In the rest of this annex we refer to these two BT divisions as the 'Relevant Divisions'. We also refer to the set of services covered by the top-down model as 'Relevant Services' and those covered by the bottom-up model as 'GEA Relevant Services'.

⁵ CWU response to the March 2017 WLA Consultation, paragraphs 9-11.

⁶ [X]

⁷ [X]

⁸ Virgin Media response to the March 2017 WLA Consultation, page 42.

⁹ Openreach response dated 27 September 2017 to question 14a of the 34th s.135 notice.

- A17.15 In the March consultation we noted that BT provided us with PVEO analyses that showed how costs changed or were forecast to change from one year to the next. For the Relevant Divisions, these PVEOs analysed pay costs separately from non-pay costs, although there was no breakdown into the different types of pay costs (such as wages and salaries, pension costs and social security costs). We also noted that after 2015/16, TSO stopped producing historical and forecast PVEOs.
- A17.16 BT also provided us with its TLC analyses that showed how the Relevant Divisions' pay costs were forecast to change from one year to the next due to price, volume, efficiency and other effects.
- A17.17 The pay cost price changes within these PVEO and TLC analyses represent estimates of historical and forecast pay inflation that are BT-specific and that reflect BT management's knowledge of the labour markets and the relevant grade-mix (for example the relevant proportions of managerial and non-managerial staff) within each division.
- A17.18 Following the March consultation, we obtained the available updated PVEO and TLC analyses produced by the Relevant Divisions. We have used these to estimate historical and forecast pay inflation for each Relevant Division as shown in the table below.

Table A17.1: Pay cost inflation – derived from divisional PVEO and TLC analyses

	Historical					Forecast		
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Openreach	[X]%	[X]%	[X]%	[X]%	[X]%	[X]%	[X]%	[X]%
TSO	[X]%	[X]%	[X]%	n/a	[X]%	[X]%	[X]%	[X]%

Source: BT PVEO and TLC data¹⁰

- A17.19 The historical pay inflation estimates are based on the available actual PVEOs. As previously mentioned, BT TSO stopped producing historical and forecast PVEO analysis after 2015/16, so it is not possible to estimate historical pay inflation for TSO in 2016/17. For the same reason, the forecast pay inflation estimates are based on the forecast TLC rather than the forecast PVEO analyses (which are only produced by Openreach). We note that these forecast TLC analyses were submitted by the Relevant Divisions to BT Group as part of the September 2017 BT Group planning process.
- A17.20 The PVEOs suggest that historical pay inflation between 2013/14 and 2016/17 ranged by year and division from 1.8% to 3.2%, with a weighted average across the Relevant Divisions of [X]% between 2013/14 and 2015/16. Looking forward, the TLC analysis suggests that BT forecasts pay inflation in the region of [X]% to [X]% with a weighted average across the Relevant Divisions of [X]%.

BT Annual Report pay costs

¹⁰ Openreach responses dated: 31 May 2017 to question B1 of the 26th s.135 notice and 7 February 2018 to follow-up question 2 to the 43rd s.135 notice (follow-up in relation to question 2 of the original notice).

A17.21 As in the March consultation, we have not relied on data from BT's Annual Reports to generate our pay cost inflation assumption. This is because it does not disaggregate pay cost inflation between BT divisions. Our analysis is focused on pay cost inflation in the Relevant Divisions, given that:

- these divisions account for the great majority of pay costs for the Relevant Services and GEA Relevant Services; and
- the Relevant Divisions may have experienced different changes to grade and skill mix from those in, for example, BT's Global Services, BT Retail or BT Consumer divisions.

Reports of the pay agreement with the Trade Unions

A17.22 In 2017, BT reached new pay agreements with the CWU¹¹ and Prospect¹² Trade Unions. In general, the CWU represents non-managerial staff and Prospect represents managers. The CWU pay agreement extends until April 2018 and was for a 2.6% increase in base pay (backdated to January 2017). As part of the Prospect agreement, BT agreed to invest the following proportions of managers' pay costs to be distributed to staff according to a payband-performance matrix: 1% in January 2018, 2.5% in June 2018 and 2.5% in June 2019.

A17.23 Pay agreements are directly relevant to the wages and salaries element of pay costs and indirectly relevant to social security costs (which tend to increase with base pay). Total pay costs also include pension costs and share based payment expenses. We note, however, that the annual changes reported in the new pay agreements are broadly consistent with the forecast management accounting data.

Economy-wide pay indices

A17.24 We agree with stakeholders that it is important to use the most up-to-date forecasts in our analysis and we have updated our analysis to include the latest versions of the economy-wide pay indices. Figure A17.2 below presents updated data on annual historical growth in median full-time gross weekly earnings from the ONS's 2017 Annual Survey of Hours and Earnings. These annual changes can be considered an estimate for average historical pay inflation in the UK, however they only relate to the wages and salaries element of pay costs. This data shows an average growth rate of 1.5% per annum since 2010/11, and a higher growth rate of 2.0% per annum since 2015/16.

¹¹ The communications union, April 2017, *BT pay deal accepted*. <https://www.cwu.org/news/bt-pay-deal-accepted/> [accessed 15 February 2018].

¹² Prospect, September 2017, *BT Reward Framework Pay Review 2017*. <https://www.prospect.org.uk/our-industries/telecoms/employers/bt/payreview/> [accessed 15 February 2018].

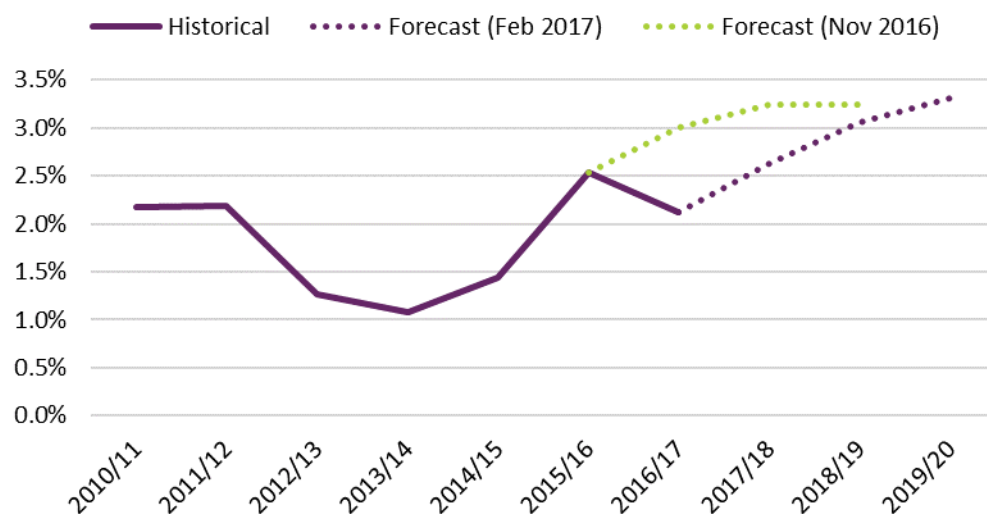
Figure A17.2: Annual percentage change in median full-time gross weekly earnings for all employees



Source: Ofcom analysis of ONS data¹³

A17.25 Figure A17.3 below shows updated ONS data on annual changes in average weekly earnings (total pay i.e. including bonuses) as well as forecasts of the same data series produced by the Bank of England (February 2018 forecast). For the benefit of comparison, we also show the forecast data that was available at the time of our March consultation (November 2016 forecast).

Figure A17.3: Percentage growth in average weekly earnings (actuals (ONS) and forecasts (Bank of England))



Source: Ofcom analysis of ONS and Bank of England data¹⁴

A17.26 Figure A17.3 shows that the actual average weekly earnings growth in 2016/17 (2.1%) was 0.9 percentage points (pp) lower than the Bank of England forecast used in the March

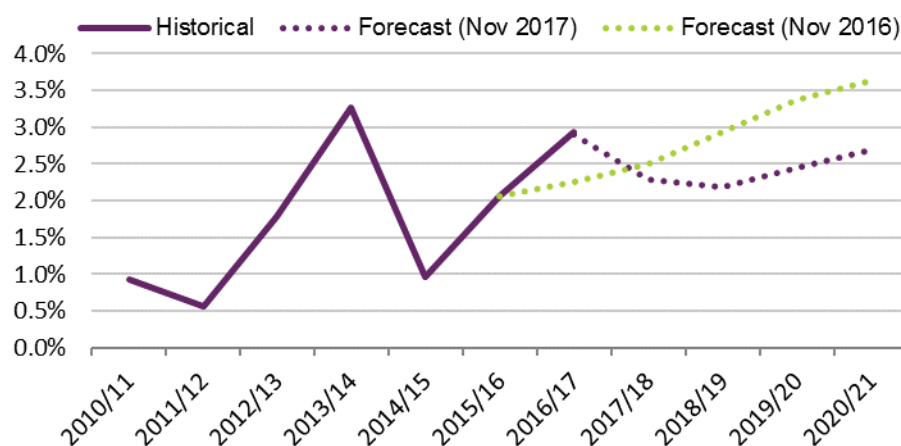
¹³ ONS, *Annual Survey of Hours and Earnings: 2017 provisional and 2016 revised results*, Figure 2. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annualsurveyofhoursandearnings/2017provisionaland2016revisedresults#average-earnings> (accessed 15 February).

¹⁴ Bank of England, *Inflation Report: February 2018*, page 38. <https://www.bankofengland.co.uk/-/media/boe/files/inflation-report/2018/february/inflation-report-february-2018.pdf> (accessed 12 February 2018) and ONS, *Average Weekly Earnings time series dataset*. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/timeseries/kab9/emp> (accessed 10 December 2017).

consultation (3.0%). It also shows that the Bank of England has revised its forecasts of average weekly earnings growth downwards relative to those available at the time of the March consultation. This data suggests an average wage growth rate of 3.0% per annum between 2017/18 and the end of its forecast period, 2019/20.

A17.27 Figure A17.4 below shows historical and forecast data on average earnings growth from the OBR. For the benefit of comparison, we also show the forecast data that was available at the time of our March consultation. We acknowledge Openreach’s observation that our reporting of the OBR’s November 2016 average earnings growth forecasts appeared to be lower than the source data. This was because of the way in which we weighted the OBR’s calendar year forecasts to obtain financial year forecasts. Following the March Consultation we now report the OBR’s financial year forecasts as stated instead of converting from calendar years.

Figure A17.4: Percentage growth in average earnings (OBR)



Source: Ofcom analysis of OBR data¹⁵

A17.28 Figure A17.4 shows that the outturn for average earnings growth in 2016/17 (2.9%) was 0.6pp higher than the OBR forecast used in the March consultation (2.3%). Figure A17.4 also shows that, similar to the Bank of England’s forecasts above, the OBR has revised its forecasts of average earnings growth downwards relative to those included in the March consultation. This data suggests an average rate of 2.4% per annum between 2017/18 and the end of the charge control period, 2020/21.

Our decision

A17.29 Having considered stakeholders’ comments and the updated evidence above, we have decided to use pay cost inflation assumptions within our forecasts, with a geometric mean of 2.7% between 2017/18 and 2020/21. This is within our March consultation range of 2.5% to 3.5% and 0.5pp lower than our proposed base case of 3.1%. We recognise

¹⁵ OBR, November 2017, *Economic and fiscal outlook – supplementary economy tables*.

<http://budgetresponsibility.org.uk/efo/economic-fiscal-outlook-november-2017/> [accessed 15 February 2018].

TalkTalk's concerns about relying on internal forecasts if they have not been agreed by BT management and the scope for reduced incentives to secure low wage settlements if the costs are just passed through in the charge control. However:

- the Relevant Divisions' TLC forecasts are submitted to BT Group as part of its planning process;
- pay agreements are just one of the several sources of evidence that we consider in reaching our decision; and
- in practice, BT has strong commercial incentives to engage in meaningful discussions with the Trade Unions regarding pay and conditions, due to its incentives to achieve the efficiency target that we have set and to outperform the charge control.

A17.30 We recognise that there is an interaction between our proposals on inflation, efficiency, service volumes and quality (as referenced by Openreach and the CWU). Costs are rolled forward in each year of the charge control using our estimates of the impact of inflation, changes in volumes, and efficiency (our assumptions on volume changes and efficiency are discussed in Annexes 18 and 19). For example, if our assumptions on future pay inflation are lower than BT agrees with its staff, this will mean the BT will need to make additional efficiency savings in order to reduce its costs to the level assumed within the charge control.

A17.31 However, in determining our pay inflation assumption, we have taken account of BT's latest pay agreement with the CWU (which we consider to represent pay inflation faced by an efficient telecoms provider) and Openreach's forecast pay costs from its TLC analysis discussed above. We understand this includes its estimates of the impact of our proposals on fault repair.¹⁶

A17.32 For 2017/18, we have evidence from BT's forecast TLC data, to which we give the most weight, as well as BT's agreements with the CWU and Prospect unions and external forecasts produced by the OBR and Bank of England. This suggests pay inflation of 2.5% in 2017/18.

A17.33 For 2018/19 and 2019/20 we have evidence from BT's forecast TLC data, BT's agreement with the Prospect union, and external forecasts produced by the OBR and the Bank of England.¹⁷ This suggests pay inflation of 2.8% in 2018/19 and 2.9% 2019/20.

A17.34 For 2020/21, the final year of the charge control period, we have evidence from BT's forecast TLC data and the OBR's forecast of average earnings growth. This suggests pay inflation of 2.8% in 2020/21.

A17.35 The table below shows the assumptions used for non-pay operating cost inflation on a yearly basis in both the top-down and bottom-up models.

¹⁶ Openreach response dated 4 January 2018 to question 1 of the 43rd s.135 notice.

¹⁷ In 2018/19 and 2019/20 we do not have TLC analyses produced by TSO. In addition, BT's current pay agreement with the CWU extends only to April 2018, whereas its current pay agreement with Prospect extends until June 2020.

Table A17.5: Pay operating cost inflation used within our forecasts

	2017/18	2018/19	2019/20	2020/21
Pay operating cost inflation	2.5%	2.8%	2.9%	2.8%

Source: Ofcom

Non-pay operating cost inflation

Our proposals

- A17.36 Consistent with our approach in other recent charge controls, we proposed to estimate inflation for different types of non-pay costs (energy, accommodation and all other non-pay costs) separately so that we can forecast non-pay inflation rates more accurately. We then weighted the results to produce non-pay inflation assumptions for Relevant Services and for GEA Relevant Services that reflect the different cost mix for these two groups of services.
- A17.37 We proposed an overall non-pay inflation rate over the charge control period of between 2% and 3% for both the Relevant Services and GEA Relevant Services, and used a base case of 2.4% within our forecasts.

Stakeholder responses

- A17.38 A confidential respondent [X] considered that the BEIS electricity price forecast was a reasonable input to our modelling. However, it considered that BT could buy forward and hedge in the energy futures market to reduce its costs. It stated that our energy inflation assumption should reflect that.¹⁸
- A17.39 Openreach also highlighted the interaction between our non-pay inflation and efficiency proposals. For instance, it stated that it would be difficult to achieve cost savings in areas such as energy and accommodation beyond the benefits driven by economies of scale, which it considered would already be captured by our use of CVEs. It therefore considered that our efficiency target should not be applied to such costs.¹⁹ Openreach also highlighted that we appeared to have inappropriately included depreciation in the weights used to calculate the overall non-pay inflation assumption.²⁰
- A17.40 Virgin Media broadly agreed with our approach to inflation.²¹

Our reasoning

- A17.41 In this sub-section we explain how we have determined appropriate assumptions for non-pay operating cost inflation over the charge control period for use in our modelling. To

¹⁸ [X] response to the March 2017 WLA Consultation – Volume 2, page 6.

¹⁹ Openreach response to the March 2017 WLA Consultation – Volume 2, page 63.

²⁰ Openreach efficiency response to the March 2017 WLA Consultation, paragraph 92.

²¹ Virgin Media response to the March 2017 WLA Consultation, page 42.

determine an overall non-pay operating costs inflation assumption we separately consider inflation for the following types of non-pay costs:

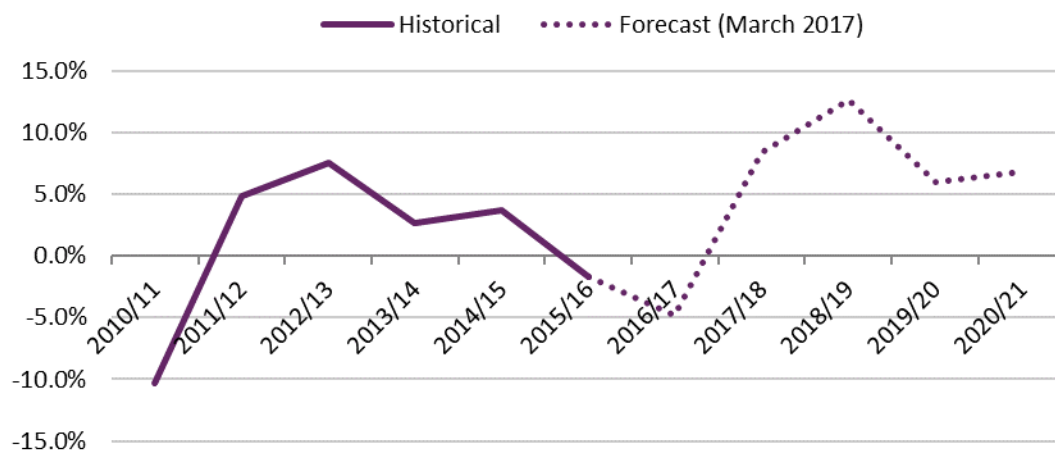
- energy costs;
- accommodation costs; and
- all other non-pay costs.

Energy costs

A17.42 We considered electricity price forecasts produced by BEIS²² as part of its annual updated energy projections (UEPs) which analyse and project future energy use and greenhouse gas emissions in the UK. Consistent with previous market reviews, we used the forecast of prices per kilowatt hour for the ‘services’ sector as an estimate of the electricity price inflation that BT is likely to face.²³

A17.43 BEIS published its latest updated energy projections (UEPs) in March 2017.²⁴ Figure A17.6 below presents our analysis of the latest March 2017 forecasts. Using these forecasts the geometric mean of the percentage change over the period 2017/18 to 2020/21 is 8.1%.

Figure A17.6: Annual percentage change in retail electricity price for services p/kWh



Source: Ofcom analysis²⁵

²² Formerly the Department for Energy and Climate Change (DECC). In July 2016, DECC, was merged into the new Department for Business, Energy, and Industrial Strategy, BEIS.

²³ 2016 BCMR Statement, Annex 32, paragraphs A32.178-181; 2014 FAMR Consultation, Annex 13, paragraphs A13.188-A13.191; and June 2014 WBA Statement, Annex 7, paragraphs A7.108-A7.112.

²⁴ BEIS, *Updated energy and emissions projections 2016* Annex M: Growth assumptions and prices. <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2016> (accessed 15 February 2018).

²⁵ BEIS, *Updated energy and emissions projections 2016*, Annex M: Growth assumptions and prices. We have presented the prices under the reference scenario, which uses central estimates of economic growth and fossil fuel prices. The BEIS forecasts are also based on calendar years and prices are deflated using the ONS' GDP deflator. We have therefore re-inflated the prices using ONS' GDP deflator and converted to a March year end.

- A17.44 We acknowledge a confidential respondent's [redacted] point that BT should be able to reduce its energy costs by hedging and that our energy inflation assumption should reflect that. We note that [redacted].²⁶
- A17.45 We have updated our cross-check analysis of BT's actual unit cost for electricity between 2012/13 and 2016/17 which shows that the price it paid per kilowatt hour was [redacted] as BEIS' historical estimates for the price paid by organisations in the 'services' sector. Our analysis also shows that BT's average actual unit cost of electricity increased between 2012/13 and 2016/17 and was [redacted] than the BEIS average increase of 1.5% per annum over the same period.²⁷
- A17.46 In light of this, and in the absence of a better independent and unbiased view of future electricity prices, we continue to consider that the forecasts of electricity price inflation for the services sector prepared by BEIS remain an appropriate input to calculating our non-pay operating cost inflation assumption.

Accommodation costs

Non-domestic rates costs

- A17.47 BT pays non-domestic rates on its offices but also on its UK network rateable assets.²⁸ The UK network rateable assets consist primarily of "passive" infrastructure assets such as duct, fibre, manholes and cabinets, as well as exchange buildings. The rates on BT's network rateable assets are the largest element of BT's rates bill and are usually referred to as BT's cumulo rates costs.
- A17.48 As in the March consultation, we have decided to forecast BT's cumulo rates costs separately within both the top-down and bottom-up models.²⁹ This means that we give no weight to BT's cumulo rates costs when weighting together the different types of non-pay cost to produce our overall estimate of non-pay inflation below.

Other accommodation costs

- A17.49 As in the March consultation, and consistent with other recent charge controls, we have decided to assume that all other accommodation costs will increase at 3% per annum over the charge control period.³⁰ This is the rate at which rental prices increase for those

²⁶ Openreach responses dated 17 June 2016 to question G1 of the 7th s.135 notice and 31 May 2017 to question E1 of the 26th s.135 notice.

²⁷ Openreach responses dated 17 June 2016 to question G1 of the 7th s.135 notice and 31 May 2017 to question E1 of the 26th s.135 notice.

²⁸ BT's UK network includes assets in England, Scotland, Wales and Northern Ireland.

²⁹ Annex 21 provides more detail on why we have forecast BT's cumulo costs separately and the level of costs we have allowed for in the charge control.

³⁰ 2016 BCMR Statement, paragraph A32.190; June 2014 WBA Statement, paragraph A7.107; and 2014 FAMR Statement, paragraph A13.195.

buildings subject to BT’s agreement with Telereal Trillium, which covers the majority of BT’s properties.³¹

All other non-pay costs

A17.50 As in the March consultation, and given no stakeholder commented on our proposals, we have decided to use CPI to forecast costs where no specific rate can be reliably identified. This is consistent with our approach in other recent charge controls.³² The table below presents the OBR’s forecasts of CPI over the charge control period. The geometric mean between 2017/18 and the final year of the charge control period is 2.2% per annum.

Table A17.7: OBR CPI forecast

	2017/18	2018/19	2019/20	2020/21
CPI	2.9%	2.1%	1.9%	2.0%

Source: OBR data³³

Our decisions

- A17.51 We have calculated our non-pay inflation assumptions by weighting together the estimates for the different types of non-pay costs considered above, with the weights derived from BT’s regulatory accounting information.
- A17.52 We note that the weights we used in our March consultation to calculate non-pay inflation included depreciation. We agree with Openreach’s view that it was inappropriate to include depreciation, as the non-pay inflation assumption is applied in the top-down model to non-pay costs excluding depreciation. . We have therefore now excluded depreciation from the weighting data.
- A17.53 Our non-pay inflation calculations, which are summarised in Table A17.8 below, show that the geometric mean over the period 2017/18 to 2020/21 is 3.3% for the Relevant Services and 3.2% for the GEA Relevant Services. Similarly, Table A17.9 below shows our assumptions for non-pay operating cost inflation on a yearly basis in the top-down and bottom-up models.
- A17.54 We acknowledge Openreach’s comments about the interaction between our non-pay inflation and efficiency proposals. As discussed in the previous section, the top-down model allows BT to recover non-pay costs over the charge control period that are consistent with our estimates of the impact of non-pay inflation, changes in volumes, and efficiency. We note that Annex 19 discusses Openreach’s view that our efficiency target should not be applied to some non-pay costs such as energy and accommodation (due to its view that it has limited ability to achieve cost savings on these types of costs).

³¹ See for example: BT Group, *Profit on sale of property fixed assets*.

<http://www.btplc.com/report/report03/Financialreview/Profitsaleofpropertyfixedassets.htm> (accessed 13 February 2018).

³² 2016 BCMR Statement, paragraph A32.191.

³³ OBR, *November 2017 Economic and fiscal outlook – supplementary economy tables*.

Table A17.8: Weighting of our different non-pay inflation assumptions

Type of cost	Source	Geometric mean inflation (2017/18 to 2020/21)	Average weighting (2017/18 to 2020/21)	
			Relevant Services	GEA Relevant Services
Energy	BEIS	8.1%	[X]% (0-30%)	[X]% (0-20%)
Accommodation (excluding cumulo)	Telereal Trillium contractual rate	3.0%	[X]% (10-30%)	[X]% (0-20%)
All other non-pay costs	CPI	2.2%	[X]% (60-80%)	[X]% (60-80%)
Non-pay operating cost inflation			3.3%	3.2%

Source: Ofcom analysis

Table A17.9: Non-pay operating cost inflation assumptions used within our forecasts

	2017/18	2018/19	2019/20	2020/21
Relevant Services	3.5%	3.5%	2.6%	2.8%
GEA Relevant Services	3.7%	3.8%	2.6%	2.8%

Source: Ofcom analysis

Asset price inflation

A17.55 The asset price inflation assumption discussed below is an input to our estimates of forecast capital costs, both capital expenditure and holding gains and losses, within the top-down model. The asset price inflation assumptions for the assets in the bottom-up model are described in Annex 14.

Our proposals

A17.56 We proposed that duct and copper assets be valued in the same way as they are revalued for CCA purposes in BT's RFS. Within BT's RFS, duct and copper assets are valued using an indexed historic methodology and the Retail Price Index (RPI).³⁴

A17.57 We also proposed that all other asset prices stay constant (i.e. flat in nominal terms). This was based on analyses of historic asset price changes and of holding gains and losses using BT RFS data, both of which suggested that asset price changes for assets other than duct and copper had generally been low, although with some variation year on year.

³⁴ BT's 2017/18 AMD, page 24.

Stakeholder responses

- A17.58 A confidential respondent [X] was concerned about our proposal to use RPI to revalue BT's duct and copper assets. It highlighted that RPI is widely recognised as a flawed measure and that its continued use is inappropriate and inconsistent with previous Ofcom decisions.³⁵
- A17.59 Openreach agreed with our approach to revaluing duct and copper assets using RPI. However, it highlighted the interaction between our asset price inflation and capital expenditure efficiency assumptions which it considered to double-count efficiency savings and understated forecast capital expenditure.³⁶
- A17.60 Virgin Media broadly agreed with our approach.³⁷

Our reasoning and decisions

- A17.61 We have updated our analysis of historical asset price changes, which examines the extent to which BT re-values assets used to support the Relevant Services, to include data from 2016/17.³⁸ This shows that BT re-values all its duct and copper assets and a lower proportion [X]% (40-60%) of the other assets used to provide the Relevant Services. However, because duct and copper account for most of the Relevant Services' assets, this means that [X]% (80-100%) of the assets values³⁹ go through a revaluation.
- A17.62 To understand how much BT re-values these assets on average we weighted these annual price movements by the assets' Gross Replacement Costs (GRCs) in the base year to estimate the average annual asset price change since 2010/11. The results are shown in the table below. If this analysis found that there were large changes to BT's asset prices for non-duct and copper assets then this would cast doubt on our assumption of no nominal change to asset prices for assets other than duct and copper. However, the table below confirms that for assets other than duct and copper, asset price changes have generally been low although with some variation year on year.

Table A17.10: Average asset price change between 2010/11 and 2016/17

	Relevant Services
All non-copper and duct assets	[X]%
Only those non-copper and duct assets subject to revaluation	[X]%

Source: Ofcom analysis

³⁵ [X] response to the March 2017 WLA Consultation – Volume 2, page 6.

³⁶ Openreach response to the March 2017 WLA Consultation – Volume 2, page 63.

³⁷ Virgin Media response to the March 2017 WLA Consultation, page 42.

³⁸ We did this using information on historic asset price changes by class of work, Openreach response to 7th s.135 notice, Question F1, Openreach response to 23rd s.135 notice Question 17, Openreach response to 20th s.135 notice Question, E1 and GRC data contained within the base year of the Charge Control model, Openreach response to 19th s.135 notice Question 3.

³⁹ As measured by mean capital employed.

- A17.63 We have also updated our analysis of holding gains and losses that BT reports within its RFS to include 2016/17. Holding gains and losses can cover a variety of adjustments but largely occur when the value of an asset held by BT increases (or decreases) in value. If holding gains and losses were significant, it might suggest large changes to BT's asset prices and therefore cast doubt on our previous asset price assumption of no nominal change to asset prices for assets other than duct and copper.
- A17.64 Our analysis shows that on average holding gains/losses were -1.5%⁴⁰ of MCE for non-current assets for the Relevant Services⁴¹ since 2010/11, suggesting overall asset price increases of around 1.5% per annum.
- A17.65 BT's published RFS do not distinguish between holding gains or losses on duct and copper assets and those on other assets. It is likely that the revaluation of duct and copper assets, in line with RPI, will have driven most of these holding gains. Further, the 1.5% above has been calculated by comparing holding gains and losses to MCE, which reflects net replacement costs (NRCs), i.e. after the deduction of accumulated depreciation. As BT calculates holding gains and losses with respect to gross replacement costs (GRCs), a better indication of price changes may be to compare holding gains and losses with GRCs. GRCs are not published in BT's RFS but are higher than NRCs and so such a calculation would result in a lower value. This analysis therefore provides evidence to support our assumption of no asset price inflation for Relevant Market assets other than duct and copper.
- A17.66 In relation to the concern raised by a confidential respondent [X] about our use of RPI, we disagree that we should switch to an alternative index. Even though RPI is a flawed index and has had its National Statistic classification withdrawn, we continue to believe it is appropriate to use it to re-value copper and duct to ensure consistency with BT's approach to copper and duct valuation and our past decisions.
- A17.67 Using RPI ensures consistency with the way BT re-values post-1997 duct and copper in the RFS (i.e. using a capital expenditure indexed by RPI approach), which is an approach we considered to be appropriate in the 2014 FAMR Statement.⁴² Additionally, using RPI to revalue copper and duct is consistent with our past decisions and continuing to do so will promote regulatory certainty. We disagree with [X] that the use of RPI for duct and copper is inconsistent with our previous decision. In both the 2014 FAMR Statement and 2016 BCMR Statement we used RPI inflation for duct and copper even though we had switched to CPI for the main charge control indexation.
- A17.68 We acknowledge Openreach's comments about the interaction between our asset price inflation and capital expenditure efficiency proposals. We have discussed these in relation

⁴⁰ Negative costs indicate holding gains and therefore price increases. BT publishes information on holding gains and losses in different markets in its RFS. See, for example, pages 25 and 26 of BT's 2016 RFS.
<http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/FinancialStatements/2016/CurrentCostFinancialStatements2016.pdf> [accessed 15 February 2018].

⁴¹ This analysis was based on the results for the WLA and WFAEL markets that are reported in BT's RFS. Since 2014/15 Assets in the WLA market have included assets relating to GEA services.

⁴² See 2014 FAMR Statement Annex 6.

to non-pay costs above. We note that, as discussed in Annex 19, our capital expenditure efficiency target is calculated net of our asset price inflation assumption (consistent with its application in the top-down model). We therefore do not consider that there is double-counting of cost savings between our asset price inflation and capital expenditure efficiency target.

A17.69 Having considered stakeholders' comments and the evidence outlined above, we have therefore made the following asset price inflation assumptions:

- duct and copper prices will increase by RPI; and
- all other asset prices will stay constant, i.e. flat in nominal terms.

A17.70 The table below presents the OBR's latest forecasts of RPI over the charge control period. The geometric mean between 2017/18 and the final year of the charge control period is 3.1% per annum.

Table A17.11: OBR RPI forecast

	2017/18	2018/19	2019/20	2020/21
RPI	3.8%	3.1%	2.8%	2.9%

Source: OBR data ⁴³

⁴³ OBR, November 2017, *Economic and fiscal outlook – supplementary economy tables*.

A18. Cost and asset volumes elasticities

- A18.1 We would expect changes in the volume of a service provided to impact the costs and assets associated with providing that service. However, where fixed or common costs are incurred, costs may not change by the same proportion as volumes. Therefore, when we forecast costs, we need to appropriately reflect the underlying (sometimes complex) relationship between forecast changes in service volumes and changes in the number of assets and costs of providing those services.
- A18.2 As set out in Section 4, forecast changes in service volumes are converted to changes in network component volumes using usage factors. The impact the change in these forecast network component volumes have on forecast costs in the top-down model (before considering efficiency improvements) is determined by Cost Volume Elasticities (CVEs) and Asset Volume Elasticities (AVEs).
- A18.3 In this Annex, we set out how we have estimated our base year CVEs and AVEs and provide the resulting values that we have then applied in the top-down model. We have used the same methodology that we adopted in the 2016 BCMR Statement⁴⁴ and proposed in the March 2017 Consultation with one small change. We calculate two sets of CVEs, one excluding Repair Costs and one for just Repair Costs.⁴⁵ These CVEs are then applied in the top-down model and the Repair Costs model respectively as described in Annexes 11 and 13.
- A18.4 The remainder of this Annex is structured as follows. We first summarise our March consultation proposals and stakeholders' responses to those proposals. We then set out our analysis in response to stakeholders' comments and our decisions. We explain how we have produced our CVE and AVE estimates and provide updated values based on BT's latest Long-Run Incremental Cost (LRIC) model outputs.

Our proposals

- A18.5 We outlined our proposed approach to estimating CVEs and AVEs in Annex 15 to the March consultation.⁴⁶ In summary, we proposed to:
- i) use LRIC to Fully Allocated Cost (FAC) ratios as a proxy for CVEs and AVEs;
 - ii) calculate our own AVE and CVE estimates using information on the relationship between LRIC and FAC derived from BT's LRIC model;
 - iii) adopt a consistent approach to calculating AVEs and CVEs by calculating CVEs and AVEs for each component that is used in the model;
 - iv) use data that was consistent with the base year data used in the financial model;

⁴⁴ 2016 BCMR Statement, Annex 32, paragraphs A32.85-A32.143.

⁴⁵ We describe how we have defined Repair Costs in Annex 13.

⁴⁶ March 2017 WLA Consultation, Annex 15, paragraphs A15.62-A15.88. We made no changes to these proposals within the September 2017 WLA Consultation.

- v) exclude cumulo costs when estimating CVEs as cumulo costs were forecast separately;
- vi) adjust the CVE and AVE for component CLA 133, WLA Tie Cables to be more consistent with the approach we had adopted in the Single Jumpering Dispute;⁴⁷ and
- vii) keep AVEs and CVEs constant over the charge control period.

Stakeholder responses

- A18.6 We received comments from TalkTalk, Virgin Media, Vodafone, Openreach and a confidential respondent [X]. Those stakeholders that did comment on our proposals were broadly supportive of our proposed approach.⁴⁸
- A18.7 TalkTalk made one specific observation about the AVEs and CVEs we derived and a more general comment about the treatment of product specific fixed costs. The specific observation was that TalkTalk believed our “estimation of the AVE and CVE ratios for Openreach’s license fee (CO801) should be set at 1.00, reflecting that for realistic changes in Openreach’s volumes, costs are linear with respect to volumes”.⁴⁹
- A18.8 TalkTalk’s more generic point, which was made with respect to the attribution of costs to GEA, was that it felt we had incorrectly treated “product specific fixed costs ... as if they are common costs across multiple products and are recovered from products other than those which the fixed costs are specific to”. For example, TalkTalk believed that the implicit fixed costs for Analogue Line Cards (CV903) were incremental to provision of WLR services only as line cards are not used in the provision of either MPF or GEA products.⁵⁰
- A18.9 [X] welcomed that we had calculated AVEs and CVEs rather than relying on BT’s estimates and that the approach was consistent with that used in BCMR. It trusted that “Ofcom’s math’s is correct” and that we had subjected the raw data that BT had supplied to sufficient scrutiny.⁵¹
- A18.10 Vodafone noted that AVEs and CVEs “have a significant influence on the level of projected costs included in the cost models, however it seems they have been based on BT’s unaudited, unpublished, confidential LRIC model”. Vodafone believed that “if BT’s prices are set based on outputs from BT’s LRIC model then the model should at the very least be subject to a third-party audit”.⁵²

⁴⁷ Ofcom, *Dispute between TalkTalk and Openreach relating to single jumpered MPF*, paragraphs A3.60-A3.66. http://webarchive.nationalarchives.gov.uk/20160702162827/http://stakeholders.ofcom.org.uk/enforcement/competition-bulletins/closed-cases/all-closed-cases/cw_01109/ [accessed 20 February 2018].

⁴⁸ For example, see Virgin Media response to the March 2017 WLA Consultation, page 42: “we agree with Ofcom’s general approach and its data sources”.

⁴⁹ TalkTalk response to the March 2017 WLA Consultation, paragraph 7.14.

⁵⁰ TalkTalk response to the March 2017 WLA Consultation, paragraphs 7.13-7.18.

⁵¹ [X] response to the March 2017 WLA Consultation Volume 2, page 6, response to question 4.7.

⁵² Vodafone response to the March 2017 WLA Consultation, page 625.

A18.11 Openreach broadly accepted our approach.⁵³ However, it also noted that “Ofcom has provided its own view of the AVE for the component CL133 WLA Tie Cables, replacing 0.30, derived from the 2015/16 RFS, with 0.87 as Ofcom considers 0.30 to be ‘too low’”.⁵⁴ Openreach noted this was one of several adjustments that we had made to Tie Cable costs and it was “not clear to Openreach why these adjustments were made and on what basis Ofcom has determined the size of the adjustments”. It referred to its own analysis which suggested that the effect of our adjustments was to reduce unit costs significantly and these adjustments would continue to impact forecast costs “so that, by the end of the charge control period, the adjusted forecast unit cost is 40% less than the unadjusted unit cost”. Openreach therefore considered that the adjustments did not achieve the small reduction in unit costs that we intended and that they should therefore be changed “so that the intended outcome is achieved”.⁵⁵

Our reasoning and decisions

Background: LRIC to FAC ratios as a proxy for CVEs and AVEs

A18.12 We first provide as general background the rationale for why we calculate AVEs and CVEs with reference to the ratio of LRIC to FAC costs. Stakeholders made no comments on this proposal.⁵⁶

A18.13 As we set out in Annex 11, we base our modelling of costs for the top-down model on “component” costs extracted from BT’s regulatory financial reporting systems. Therefore, the relevant costs and volumes that the CVEs and AVEs are applied to are component costs and volumes.⁵⁷ For example, to forecast pay operating costs for a component we use the following formula:

$$\text{Pay}(t) = \text{Pay}(t-1) * [1 - \text{eff}] * [1 + \text{IPC}(t)] * [1 + \% \text{volume change}(t)] * \text{CVE}$$

where Pay (t) is the pay operating costs in the year t, ‘eff’ is efficiency, IPC(t) is the input price change in year t and CVE is the assumed pay operating cost volume elasticity (i.e. incremental cost that would change with volumes) for that component.

A18.14 The pay CVE for a component needs to capture the extent to which pay operating costs for that component are expected to change over the control period given the forecast change in component volumes, but holding all else (such as efficiency cost savings or the effects of inflation) constant. The same is also true for non-pay operating costs⁵⁸ and (fixed) assets.⁵⁹

⁵³ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraph 283.

⁵⁴ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraphs 284.

⁵⁵ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraphs 213-217.

⁵⁶ We provided similar descriptions in 2016 BCMR statement, Annex 32, paragraphs A32.94-A32.102 and March 2017 WLA Consultation, Annex 15, paragraphs A15.65-A15.74.

⁵⁷ We do not use AVEs to estimate changes in net current assets. The treatment of net current assets over the control period is discussed in Annex 11.

⁵⁸ Non-pay operating costs exclude depreciation. Depreciation is separately modelled within the top-down model.

⁵⁹ AVEs measure the extent to which asset volumes (measured at gross replacement cost) change with movements in component volumes. AVEs are therefore used to estimate capital expenditure driven by changes in volumes.

CVEs and AVEs should therefore capture the marginal costs associated with the component volume change over the control period.

A18.15 In the short run, marginal costs can be lumpy. Costs may be fixed over a range of outputs but then increase once demand rises above that range. However, in the long run, marginal costs are less lumpy because of inputs that, in the short run, may have been fixed for certain output ranges being treated as fully variable and scalable. For the purposes of charge controls, we focus on the long-run marginal costs, which therefore abstract from a degree of the lumpiness that may be observed in the short run.⁶⁰

A18.16 On this basis, the CVEs (and AVEs) are intended to measure the long-run elasticity of total component costs with respect to changes in component output. Algebraically this can be expressed as:⁶¹

$$CVE = \frac{\% \Delta LRTC}{\% \Delta Q}$$

where: $\% \Delta LRTC$ is the % long-run change in total component cost, and $\% \Delta Q$ is the change in total component volumes.

A18.17 Alternatively, this can be expressed as:

$$CVE = \frac{\Delta LRTC / TC}{\Delta Q / Q}$$

Or

$$CVE = \frac{\Delta LRTC / \Delta Q}{TC / Q}$$

A18.18 As $\Delta LRTC / \Delta Q$ is the long-run marginal cost ('LRMC') and TC / Q is the unit cost or average total cost (ATC), the CVE is equivalent to the ratio of LRMC to ATC:

$$CVE = \frac{LRMC}{ATC}$$

A18.19 Granular information identifying BT's component level long-run marginal costs is not readily available. When setting charge controls, therefore, we have historically used BT estimated CVEs and AVEs based on information from BT's LRIC model. Specifically, we have used BT's information on the ratio of LRIC to FAC.⁶² As the algebra above demonstrates, in

⁶⁰ While this long-run approach may imply that for certain points in time and levels of volume the modelled marginal cost exceeds the likely short-run marginal costs relevant to the control period, at other times the converse will be true. Therefore, these impacts should, to some extent, offset each other over time.

⁶¹ The algebra relates specifically to CVEs but it can also be applied for AVEs.

⁶² Note that here we specifically refer to LRIC as opposed to DLRIC. In the past, BT's regulatory accounts have reported a 'LRIC floor' which generally has related to the DLRIC cost concept. The distinction between LRIC and DLRIC is explained in BT, 2017, *Long Run Incremental Cost Model: Relationships and Parameters*.

<http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2017/LRICModelRelationshipsandParameters2016-17.pdf>. DLRIC involves adding an element of fixed and common cost to the LRIC of a component. For the purposes of estimating CVEs and AVEs, LRIC is therefore a more relevant cost measure than DLRIC as it is closer to the marginal costs that are of interest in the context of CVEs and AVEs.

general, if LRIC is a good proxy for LRMC, and FAC is a good proxy for ATC, then LRIC to FAC ratios can provide a good proxy for CVEs (and AVEs).⁶³

A18.20 Given we forecast pay and non-pay operating costs separately in the top-down model, we need to separate CVEs for pay and non-pay operating costs. We therefore apply separate pay and non-pay CVEs for each component we are forecasting.⁶⁴ This is consistent with the approach we adopted in the June 2014 FAMR Statement and the 2016 BCMR Statement.

A18.21 AVEs can be calculated in the same manner as CVEs (i.e. separately for each component). In the 2016 BCMR Statement we concluded it was preferable to adopt a consistent approach to estimating CVEs and AVEs.⁶⁵ We have calculated AVEs using the same approach that we adopted in the 2016 BCMR Statement by weighting together LRIC to FAC ratios for each cost category within each super-component by the GRCs of that cost category. We discuss how we have estimated component AVEs in more detail below.⁶⁶

General approach to calculating base year CVEs and AVEs

A18.22 We received no substantive comments on our general approach to calculating base year elasticities except for Vodafone’s comment that the outputs of BT’s LRIC model should be audited.

A18.23 We removed the requirement for BT’s LRIC model to be audited following consultation in 2007.⁶⁷ We understand stakeholders’ concerns that the LRIC model might be subject to the risk for some “gaming” by BT, but we also note that:

- a) BT derives its estimates of LRIC costs for each component by applying cost volume relationships to the FAC costs for each of a number of cost categories;
- b) the FAC cost inputs are subject to change control procedures;⁶⁸ and

⁶³ There may however be occasions where LRIC is not a good proxy for LRMC, for example where there are substantial increment-specific fixed costs. We investigated whether there were any such costs for the components used in the top-down model but were not able to identify any. There is further support for this from BT’s documentation on its LRIC model. BT only identifies two increment specific fixed costs, both of which relate to the core network: core transmission cable and core transmission equipment. See pages 143-144 of BT’s LRIC Relationships and Parameters documentation referred to in the previous footnote.

⁶⁴ Or to be more precise super-component specific; BT’s LRIC model does not contain information on individual components, but rather for super-components which may be an amalgamation of several individual components. Therefore, references below to component information in relation to BT’s LRIC model should strictly be taken as referring to super-components, rather than components. Within this charge control however all components within the top-down model are also super-components. We therefore only refer to components within this Annex.

⁶⁵ 2016 BCMR Statement, paragraphs A32.102-A32.103 and A32.138.

⁶⁶ BT defines a “cost category” within its LRIC model as a “Grouping of costs into unique cost labels by identical cost driver for use in the LRIC model.” See page 33 of BT, 2016, *Long Run Incremental Cost Model: Relationships & Parameters*.

⁶⁷ See Ofcom, 2007, *Changes to BT’s regulatory financial reporting and audit*, paragraphs 4.46-4.55.

https://www.ofcom.org.uk/data/assets/pdf_file/0023/46247/statement.pdf.

⁶⁸ Under conditions first introduced in our 2014 Regulatory Financial Reporting Statement (for example, see paragraph 3.204, https://www.ofcom.org.uk/data/assets/pdf_file/0025/78460/financial-reporting-statement-may14.pdf) we require BT to publish on its web-site all proposed changes to its regulatory accounting methodology by 31 March of the relevant financial year, i.e. pre-publication of the RFS, and also to publish a reconciliation report setting out the changes and the impact of the changes to its regulatory accounting methodology on the Regulatory Financial Statements when the RFS is published.

- c) we review the outputs when estimating CVEs and AVEs and make changes where we see fit: for example, the Tie Cables adjustment in this charge control.⁶⁹

Therefore, in light of these constraints and assurance mechanisms, we do not consider it necessary at present to re-introduce the requirement for BT's LRIC model to be audited.

A18.24 We have therefore adopted the proposals we made in the March consultation. Our general approach is therefore to use:

- a) Information on the relationship between LRIC and FAC from BT's LRIC model⁷⁰ as the basis for our CVEs and AVEs. While we recognise that LRIC data may not be a perfect proxy for LRMC, we consider the estimates it gives to be reasonable and we are not aware of any better proxy.
- b) A consistent approach to calculating our CVEs and AVEs. We estimate pay and non-pay CVEs from the ratio of LRIC to FAC for the relevant operating cost categories for each component. We calculate AVEs from the ratio of LRIC to FAC for fixed asset categories for each component.
- c) Data from BT's LRIC model for the same year as our base year financial information. BT's CCA FAC information is an important component of our base year financial data and forms the input to BT's LRIC model. Therefore, we consider it desirable to use information from BT's LRIC model that is consistent with the base year data used in this statement (i.e. 2016/17).

A18.25 We have also adopted three further proposals that we made in the March consultation. Firstly, we have calculated our own CVE and AVE estimates based on BT's LRIC model outputs, rather than rely, as we have in some previous charge controls, on estimates of CVEs and AVEs made by BT. This was welcomed by some stakeholders, with no stakeholder objecting to the proposal.

A18.26 Secondly, we have calculated these AVEs and CVEs across all cost categories, both direct and indirect. We received no comments on this proposal. The AVEs and CVEs that we are seeking to estimate are used to forecast how all component costs change with component volumes, not just changes to costs within direct cost categories. We therefore consider that our estimates of CVE and AVEs should be calculated with respect to costs within both independent and dependent cost categories.⁷¹ This is the same approach that we adopted in the 2016 BCMR statement.

⁶⁹ See paragraphs A18.39-A18.42 below.

⁷⁰ BT provides detailed super-component LRIC and FAC data, split by cost category, to Ofcom (on a confidential basis) each year within schedules AFI1 and AFI3 as part of the suite of Additional Financial Information (AFI) that accompanies the RFS.

⁷¹ BT describes the differences between dependent and independent cost categories on page 7 of *Long Run Incremental Cost Model: Relationships and Parameters*. Independent cost categories have "cost drivers that are directly related to the external demand for an activity, i.e. they are not dependent on any other cost volume relationships". Dependent cost categories "apply cost-weighted dependent cost drivers ... when there is not a constant relationship between demand and the cost driver. A cost-weighted dependent cost driver uses the same cost volume relationship as the cost category, or cost categories on which it depends."

A18.27 Lastly, we have calculated AVEs using GRC weights, again consistent with what we did in the 2016 BCMR Statement.⁷² We received no comments on this proposal. BT's LRIC model contains capital employed for each component broken down by fixed asset cost categories. The values of the fixed assets in the LRIC model outputs (both LRIC and FAC) reflect the NRCs of the assets. So, if these fixed asset costs were not re-weighted, then any calculated LRIC to FAC ratios would effectively be the NRC weighted averages of the individual cost category LRIC to FAC ratios.

A18.28 However, under our modelling approach, AVEs are applied, in conjunction with our assumptions on efficiency and inflation, to prior year GRCs to forecast additional capex. Additional capex then flows directly into the GRC for the component and indirectly into the NRC. As AVEs are applied to GRCs under our modelling approach, we consider the use of GRC weights in calculating the AVEs is more internally consistent than the use of NRC weights.⁷³

Base year AVE and CVE estimates

A18.29 Using the broad principles explained above we have estimated pay and non-pay CVEs and AVEs for each component that is part of the top-down model as follows:

- a) We have calculated LRIC to FAC ratios (including costs from both independent and dependent cost categories) for each component using outputs from BT's 2016/17 LRIC model for⁷⁴:
 - i) all non-pay operating cost categories⁷⁵ (excluding depreciation categories) to estimate non-pay CVEs;
 - ii) all pay operating cost categories to estimate pay CVEs⁷⁶; and
 - iii) fixed asset cost categories as the first stage in estimating AVEs.⁷⁷
- b) We derive AVEs for each component by weighting together the LRIC to FAC ratios for each cost category for that component by the GRCs of that cost category.⁷⁸

A18.30 We have decided to exclude cumulo costs when calculating non-pay CVEs.⁷⁹ This is consistent with our March consultation proposals and attracted no stakeholder comments.

⁷² For example, paragraphs 5.14 and 5.194-5.199 of Volume 2 of the 2016 BCMR statement.

⁷³ For further discussion about the rationale for using GRC weights see the paragraphs 5.23-5.33 of the November 2015 LLCC Consultation.

⁷⁴ We used the data provided with the 2016/17 AFI1 and AFI3 Schedules that BT provides to us privately as part of its regulatory financial reporting requirements.

⁷⁵ BT defines a "cost category" as a "Grouping of costs into unique cost labels by identical cost driver for use in the LRIC model." BT, 2017. *Long Run Incremental Cost Model: Relationships & Parameters* publication, page 31.

⁷⁶ <http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2017/LRICModelRelationshipsandParameters2016-17.pdf>. Each cost category has a unique code associated with it.

⁷⁷ That is, those cost categories within BT's LRIC model with codes starting "PLOPPYZZ".

⁷⁸ That is, those cost categories within BT's LRIC model with codes starting "CEFA".

⁷⁹ The GRC information was provided within BT's response to 34th s.135 notice Question G18 dated 8 September 2017

⁷⁹ BT's cumulo costs are recorded under the cost category Opex, Non-pay, Other, Plant Support, Rates on installations. The cost category code is PLOPNPOTZZBKJ4ZZ.

We forecast cumulo rates costs separately within the charge control and do not use CVEs to do so.⁸⁰ We therefore exclude cumulo costs from BT's LRIC model outputs when calculating non-pay CVEs.

Repair Cost Component CVEs

A18.31 Using the above approach, we have derived CVE and AVE estimates for all the components that relate to the Relevant Services⁸¹ within the top-down model. But, because we have forecast Repair Costs separately from other operating costs within this charge control we have also calculated separate pay and non-pay CVEs for Repair Operating Costs and for Non-Repair Operating Costs for certain selected components. We have done this in a way that is consistent with the base year adjustment for Repair Costs that we describe in Annex 13. Specifically, we:

- a) Identified the network components that were subject to the Repair Cost base year adjustment. In what follows we call these Repair Cost components.
- b) Identified Repair FAC and Non-Repair FAC for each Repair Cost component by cost category. We did this by combining information BT had provided to us for each Repair Cost component on Repair Costs by RFS Sector and on Repair Costs by cost category to produce a breakdown of Repair Costs by cost category that was consistent with our estimate of total Repair costs in 2016/17. We then calculated Non-Repair costs for each Repair Cost component by cost category as the difference between total costs and the Repair costs we had calculated.⁸²
- c) Identified the LRIC Repair Cost and Non-Repair Cost for each Repair Cost component by cost category. We did this by applying ratio of LRIC to FAC by cost category and component⁸³ to the FAC Repair Costs and Non-Repair Costs by component we calculated in b) above.
- d) Calculated the Repair Cost pay CVE for each Repair Cost component as the sum of the Repair Cost LRIC across all pay cost categories divided by the sum of the Repair cost FAC across all pay cost categories. We calculated the Repair Cost non-pay CVE and Non-Repair Cost pay and non-pay CVEs in a similar way.

Cross-checks and adjustments

A18.32 As for previous charge controls, we undertook some checks that all the pay and non-pay CVEs lay in the range of 0 to 1. In the March consultation we had identified some ratios

⁸⁰ The way we treat cumulo costs within this charge control is discussed in Annex 21.

⁸¹ By Relevant Services we mean all the services that are covered by the top-down model.

⁸² BT defines RFS Sectors on page 264 of its 2017 AMD. Our Repair costs consist only of operating costs and so sectors in this case relate to "the main functional activities performed by BT". BT provided data on Repair Costs by RFS Sector and Cost Category in its responses dated 27 September 2017, 9 January 2018 and 31 January 2018 to questions 10 a) to d) of the 34th s.135 notice. As we explain in Annex 13 our estimates of Repair Costs only include those incurred within the Service Delivery Division of Openreach (BV).

⁸³ BT 2016/17 AFI schedules AFI1 and 3 provided to us privately as part of its Additional Financial reporting requirements.

that lay slightly outside this range. However, our checks on the revised ratios using 2016/17 data identified no exceptions.

- A18.33 The pay CVE we calculated for the Openreach Admin Fee (CO801) for the March consultation was 0.73 and the non-pay CVE was 0.06.⁸⁴ As noted above, TalkTalk commented that the CVE for this component should be 1. The pay costs of this component are very small and reflect attributions of overheads. Virtually all the non-pay costs are an attribution of the Network and Services Administrative Charges that we, Ofcom, charge BT. We refer to these costs as the Ofcom Admin Fee. The mean capital employed for this component are predominantly Net Current Liabilities, which are not forecast using AVEs.
- A18.34 BT calculates the LRIC of the (non-pay) Ofcom Admin Fee costs by applying cost volume relationship (CVR) CV155.⁸⁵ This CVR is entitled Topographic Charges and primarily is applied to the “costs of Wayleaves and Ordinance Survey maps in response to building and maintaining BT’s network”. This CVR assumes that these costs are almost entirely fixed because “this cost is ...closely related to BT’s duct network reach”.⁸⁶
- A18.35 However, the BT’s Ofcom Admin Fee costs are attributed to service revenues⁸⁷ and the size of the costs is also driven by BT’s “Relevant Turnover”, although this is calculated with reference to revenues in a prior period.⁸⁸ It does not therefore seem appropriate to estimate the LRIC of these costs with respect to how variable duct costs are.
- A18.36 It is not clear though what the right cost-volume relationship would be for these costs. But, in the long run changes to these costs, after removing inflation, would be likely to be closely correlated to changes in revenues, and hence to changes in service volumes. We therefore consider they are in fact largely variable and so consider that a CVE closer to 1 would be more appropriate, as TalkTalk has suggested.
- A18.37 We have therefore decided to overwrite the non-pay CVE for component CO801 to be 1. This change makes virtually no difference to the outputs of the top-down model and is therefore not a critical assumption. We have made no change to the pay CVE as the pay costs for this component do not appear to be directly related to the Ofcom Admin Fee.

⁸⁴ March 2017 WLA Consultation, Annex 15, Table A15.10.

⁸⁵ The costs of the Ofcom License Fee are recorded under F8 code F2038967 and are then included within the cost category code PLOPNPOTZZB0L8ZZ (Opex, Non-pay, Other, General Support, Wayleaves/OS Maps). CV155 is applied to this cost category. See BT LRIC Model relationships and Parameters Annex 1 and 5.

<https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2017/LRICModelRelationshipsandParameters2016-17Annex1.xlsx> [accessed 20 February 2018] and

<https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2017/LRICModelRelationshipsandParameters2016-17Annex5.xlsx> [accessed 20 February 2018].

⁸⁶ See BT, 2017. *LRIC Model Relationships and Parameters*, page 59.

<https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2017/LRICModelRelationshipsandParameters2016-17.pdf> [accessed 20 February 2018].

⁸⁷ See the description of the base LICENCEFEE in BT’s 2017 AMD, page 47.

⁸⁸ For example, in 2017/18 our Network and Services Administrative Charges were set at 0.1127% of Relevant Turnover in the calendar year ended 31 December 2015, see Source, pages 6-7 of Ofcom’s Tariff Tables, 2017/18.

https://www.ofcom.org.uk/data/assets/pdf_file/0029/99614/Tariff-Tables-2017-18-.pdf [accessed 20 February 2018].

- A18.38 TalkTalk's more generic comment, which concerned the treatment of product specific costs, was directed towards our re-attribution of common costs. We deal with this comment in Annex 11. However, as noted above, we have not been able to identify any significant increment-specific fixed costs.⁸⁹
- A18.39 In our March consultation, we reset the AVE for component CL133 (WLA Tie Cables) to be 0.87. We explained the great majority of the capital costs for this component are associated with copper assets and that BT's LRIC model estimates LRIC for these by applying the local lines copper cost volume relationship (CVR). This CVR is supposed to apply to "the E-side and D-side of the access copper network" and has a high proportion of fixed common costs because of applying a minimum network assumption "of 100 pair cables on the E-side and 10 pair on the D-side".⁹⁰ We did not believe this was an appropriate CVR to apply to Tie Cable Assets. Subject to some short-term modulatory effects, we expected the main Tie Cable copper assets to be fully variable with volumes in the long run because the number of tie cables required would increase linearly with volumes. We noted that this was the approach we adopted when modelling these assets in the Single Jumpering Dispute.⁹¹ We therefore reset BT's estimated LRIC for the copper assets within this component to be equal to the fully allocated costs. This increased the AVE to 0.87.
- A18.40 BT's criticism of this change was that it, together with some other changes we had made to the forecasting of Tie Cables costs, appeared to reduce Tie Cable unit costs considerably and that this was contrary to our intentions.
- A18.41 However, in the September consultation we changed our approach to forecasting Tie Cable costs whilst retaining the updated AVE for CL133 of 0.87.⁹² We received no further comments on this AVE.
- A18.42 We have therefore received no comments on our rationale for making this change. We continue to believe that the use of the CVR2 cost volume relationship to estimate the LRIC of copper costs for component CL133 is inappropriate. We have therefore decided to adopt our March consultation proposal and reset the LRIC for the copper assets for this component to be equal to the FAC. Using BT's 2016/17 cost data this changes the AVE to 0.91.
- A18.43 Our final CVE and AVE estimates for the components within the 2018 top-down model are presented in Table A18.1.

⁸⁹ See also the comments in the last footnote in paragraph A18.19 above.

⁹⁰ See the description of CV002 on page 37 of BT's 2017 Long Run Incremental Cost Model: Relationships & Parameters. <https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2017/LRICModelRelationshipsandParameters2016-17.pdf> [accessed 20 February 2018].

⁹¹ Ofcom, *The dispute between TalkTalk and Openreach relating to single jumpered MPF*, paragraphs A3.60-A3.66.

⁹² September 2017 WLA Consultation, paragraphs 4.17-4.39.

Table A18.1: CVE and AVE estimates for components relevant to the top-down model

	Super-component	AVE	Non- Repair Pay CVE	Non- Repair Non-Pay CVE	Repair Pay CVE ⁹³	Repair Non-Pay CVE
ICL171	E side copper capital	0.25	0.51	0.71	0.74	0.38
ICL172	E side copper current	0.78	0.44	0.65	0.40	0.75
ICL173	D side copper capital	0.25	0.55	0.81	0.75	0.16
ICL174	D side copper current	0.79	0.50	0.69	0.48	0.64
ICL175	Local exchanges general frames capital	0.24	0.83	0.69	0.89	0.81
ICL176	Local exchanges general frames current	0.78	0.98	0.75	0.98	0.90
ICL177	PSTN line test equipment	0.54	0.97	0.98	0.97	0.96
ICL178	Dropwire capital & PSTN NTE	0.99	0.96	0.32	0.88	0.84
ICL180	Residential PSTN drop maintenance	0.79	0.97	0.80	0.98	0.98
ICL183	PSTN line cards	0.51	0.59	0.71	0.62	0.67
ICL185	Pair gain	0.99	0.98	0.97	n/a	n/a
ICL575	OR Service Centre - Assurance WLR PSTN/ISDN2	0.88	0.85	0.86	0.84	0.90
ICN853	Combi card voice	0.58	0.72	0.75	n/a	n/a
ICP502	Sales product management	0.86	0.98	0.90	n/a	n/a
ICL144	Wholesale Access specific	0.86	0.90	0.82	n/a	n/a
ICL160	Routeing & records	0.79	0.98	0.86	n/a	n/a
ICL161	MDF Hardware jumpering	0.78	0.97	0.87	n/a	n/a
ICL570	OR Service Centre - Provision WLR PSTN/ISDN2	0.88	0.86	0.87	n/a	n/a
ICL139	Local Loop Unbundling systems development	0.86	0.90	0.82	n/a	n/a
ICL572	OR Service Centre - Provision LLU	0.88	0.85	0.88	n/a	n/a

⁹³ Repair Pay CVEs and Non-Pay CVEs are only provided for those components that are modelled in the Repair Cost model.

ICL590	Service Level Guarantees WLA	0.88	0.98	0.97	n/a	n/a
ICF187	LLU Line Testing Systems	0.53	0.61	0.79	0.81	0.81
ICL577	OR Service Centre - Assurance LLU	0.88	0.85	0.80	0.83	0.90
ICL131	Local Loop Unbundling room build	0.48	0.61	0.82	n/a	n/a
ICL132	Local Loop Unbundling hostel rentals	0.48	0.63	0.73	n/a	n/a
ICL133	Local Loop Unbundling tie cables	0.91	0.51	0.74	0.74	0.26
ICT134	Local Loop Unbundling hostel rentals power & vent	0.76	0.78	0.73	n/a	n/a
ICD900	Revenue Receivables	1.00	0.00	0.00	n/a	n/a
ICO801	Ofcom Licence Fee Openreach	0.88	0.53	1.00	n/a	n/a

Source: Ofcom analysis of BT data

AVEs and CVEs after the base year

- A18.44** In the March consultation, we proposed to keep AVEs and CVEs constant after the base year, rather than to adopt a dynamic elasticities approach. We received no comments on this proposal.
- A18.45** We applied dynamic AVEs/CVEs in the 2016 BCMR statement to take account of the predicted significant volume changes in BCMR services. Where volume changes are significant, the assumption that elasticities are constant may be inconsistent with our assumption that fixed and common costs remain constant.⁹⁴
- A18.46** However, as our forecasts of volume growth for the Relevant Services within the top-down model are, in general, low, we have therefore decided to adopt our March consultation proposal and keep AVEs and CVEs constant after the base year. We do not consider this a critical assumption for this set of controls.

⁹⁴ Paragraph 5.216 of Volume 2 of the 2016 BCMR Statement. The discussion on the use of dynamic elasticities for TI services is given in paragraphs 6.165-6.171 of Volume 2 of the 2016 BCMR Statement.

A19. Efficiency

- A19.1 This annex sets out our approach to and rationale for the assumptions we have made in relation to the operating cost and capital expenditure savings that we expect BT can reasonably achieve over the charge control period.
- A19.2 As set out in Section 4, BT's expected cost savings are one of the key elements in forecasting overall costs in the top-down model of copper and common costs.⁹⁵

Summary

- A19.3 Our targets for operating cost and capital expenditure savings need to be consistent with the way in which they are applied in the top-down model.
- A19.4 As set out in Section 4, the top-down model forecasts costs from the base year (2016/17) up to and including the final year of the charge control period (2020/21). Costs in each year are adjusted using our estimates of the impact of inflation, changes in volumes and cost savings. In the model, cost savings that can be achieved by doing things less often, doing things more quickly, or stopping doing things that are no longer needed, are included in our efficiency targets. Our efficiency targets reflect average annual cost savings over the charge control period.
- A19.5 In our March consultation, we explained that that our objective is to set challenging targets, in the interests of promoting efficiency, which "should be capable of being met and exceeded".⁹⁶
- A19.6 We considered a range of evidence when proposing the appropriate efficiency targets for operating costs and capital expenditure. We also noted that the range of evidence used to propose an appropriate efficiency target for capital expenditure was different to that used for operating costs due to the limited availability of data.⁹⁷
- A19.7 Taking all of our analysis in the round, we proposed an efficiency target for all operating costs (including repair costs) of between 3.5% and 6.5%, with a base case of 5.5%. We proposed an efficiency target for capital expenditure of between 1% and 5%, with a base case of 3%.
- A19.8 In addition, as part of our assessment of Openreach's quality of service (QoS) for WLR, MPF and GEA services, we proposed higher QoS standards for Openreach. We also considered that by Openreach investing in preventative maintenance, the volume of faults would reduce over the charge control period. We forecast a c.[X]% (18%-21%) reduction in the fault rate over the five-year forecasting period between our March consultation base year

⁹⁵ As explained in Annex 14, the bottom-up model estimates the unit costs for an efficient fibre network and therefore captures cost-volume relationships and efficient network design choices.

⁹⁶ March 2017 WLA Consultation, paragraph A15.97.

⁹⁷ Our forecasts of capital expenditure in the top-down model are the sum of steady state and growth capital expenditure. BT, like most other companies, does not keep separate records on capital expenditure that is required to meet growth, steady state or reinstatement requirements. This applies to both BT's regulatory cost and management accounting data.

(2015/16) and the final year of the charge control period (2020/21) which equated to a further c.3% (4-5%) annual reduction in repair operating costs.

- A19.9 Following our March consultation, we have updated our analysis of efficiency targets for operating costs and capital expenditure based on new information (including BT's 2016/17 outturn cost data and updated forecasts) and views and evidence provided by stakeholders. In particular, we have confirmed that we are not double-counting cost savings for operating costs between our QoS and efficiency decisions and have provided greater transparency of our overall efficiency decision. We have done this by forecasting repair operating costs separately from non-repair operating costs in the top-down model and applying separate efficiency targets to each.
- A19.10 Taking into account all the evidence available to us, we have decided that the appropriate efficiency target for non-repair operating costs should be 4.5% per annum. We discuss our decision on the appropriate efficiency target for repair operating costs in Annex 13. We estimate that the combined effect of our efficiency targets for repair and non-repair operating costs is equivalent to an overall efficiency target for all operating costs of around 4.8%.
- A19.11 Taking into account all the evidence available to us, we have decided that the appropriate efficiency target for capital expenditure should be 3% per annum.
- A19.12 In the remainder of this annex we discuss in more detail our approach to deciding on efficiency targets for non-repair operating costs and capital expenditure in turn.

Operating cost efficiency

- A19.13 In this section, we discuss our March consultation proposals, stakeholder responses and our further reasoning and decisions in relation to efficiency for non-repair operating costs. This section is structured as follows:
- first, we discuss our general approach to determining an efficiency target that is consistent with the way that it is applied in the top-down model;
 - second, we discuss the various sources of evidence that we have considered to inform our efficiency target; and
 - finally, we discuss how we have used these various sources of evidence to determine an overall appropriate efficiency target over the charge control period.

General approach

Our proposals

- A19.14 In our March consultation, we noted that our efficiency target needed to be consistent with the way that it was applied to the costs of the services covered by the top-down model (referred to as the 'Relevant Services'). As discussed above, our efficiency target therefore needed to reflect expected average annual cost savings over the charge control period that were not due to the impact of inflation or changes in volumes.

- A19.15 We considered a range of evidence when proposing the appropriate efficiency target for operating costs, including:
- BT’s regulatory cost data;
 - BT’s historical and forecast management accounting data;
 - efficiency targets we have set in other charge controls;
 - benchmarking and other external studies; and
 - other public information.
- A19.16 Taking all this analysis in the round, we proposed an efficiency target for all operating costs (including repair costs) within the range of 3.5% to 6.5%, with a base case of 5.5%.
- A19.17 In addition, as set out in Annex 13, we proposed higher QoS standards for Openreach and as a result that the volume of faults would reduce over the charge control period. We forecast a c.[X]% (18-21%) reduction in the fault rate over the five-year forecasting period which equated to a further c.[X]% (4-5%) annual reduction in repair operating costs for the Relevant Services.
- A19.18 We applied the same efficiency target to all operating costs (both repair and non-repair) in the top-down model. In relation to our assessment of efficiency, we noted that fault rates had not changed significantly over the historical period covered by our analyses of BT’s regulatory cost and management accounting data. Therefore, to the extent that analysis of historical data informed our efficiency target, we did not consider we needed to adjust for any improvement in the fault rate in our proposed efficiency target. As a result, we forecast repair-related costs by applying our QoS fault rate reduction adjustments in addition to our efficiency assumption (which was applied to all repair and non-repair operating costs).
- A19.19 We also explained that in the past we had analysed efficiency in terms of two separate components, ‘catch up’ and ‘frontier shift’.⁹⁸ However, we noted (as we did in the 2016 BCMR Statement)⁹⁹ that the data required to undertake that specific type of analysis has been unavailable for some time and that we have been unable to identify a suitable alternative data source.¹⁰⁰ We did, however, also note that we continued to review other sources of data from outside BT to assist our analysis, including benchmarking data.

Stakeholder responses

- A19.20 TalkTalk stated that it broadly agreed with our approach to estimating BT’s efficiency gains over the charge control period.¹⁰¹

⁹⁸ ‘Catch-up’ is the change in costs required to bring an operator in line with those of an efficient benchmark comparator. ‘Frontier shift’ is the movement in efficiency expected by the efficient benchmark operator given technological progress.

⁹⁹ 2016 BCMR Statement, paragraph A29.32.

¹⁰⁰ The data we previously used related to Local Exchange Carriers (LECS) in the US. However, actions taken by the Federal Communication Commission in the AT&T Cost Assignment Forbearance Order, the ARMIS Forbearance Order, and the ARMIS Financial Reporting Forbearance Order, resulted in major revisions to ARMIS data filed for reporting year 2008. Since then, the LECS data has not been available, so the available data is now over nine years old.

¹⁰¹ TalkTalk response to the March 2017 WLA Consultation, pages 27-28.

- A19.21 Openreach considered that there was a risk of double-counting cost savings between our efficiency and QoS proposals. For example, Openreach argued that its forecast cost savings for the charge control period (that helped inform our proposed efficiency target) included the reduction in fault volumes that we had taken account of in our QoS proposals.¹⁰²
- A19.22 Other stakeholders did not comment on our approach to determining an efficiency target for operating costs.

Our reasoning and decisions

- A19.23 We have considered our proposed approach to estimating operating cost efficiency targets in light of stakeholder comments.
- A19.24 We note Openreach's concerns about the risk of double-counting cost savings between our efficiency and QoS proposals. To ensure that this is not the case, and provide greater transparency, we have now forecast repair operating costs separately from non-repair operating costs in the top-down model and applied separate efficiency targets to non-repair operating costs and repair operating costs.
- A19.25 To determine an appropriate efficiency target for non-repair operating costs we have updated our analysis of BT's historical regulatory cost and historical and forecast management accounting data to exclude repair costs. We discuss our approach to identifying and excluding repair costs from these analyses below.
- A19.26 Our approach to deciding on an appropriate efficiency target for repair operating costs is discussed in Annex 13. We continue to consider that our overall approach to assessing efficiency in the round by considering evidence of historical and forecast cost savings using different BT sources, as well as evidence from benchmarking studies, other studies and public statements remains appropriate as in previous market reviews.

Sources of evidence

- A19.27 In this sub-section we present updated analysis of the various sources of evidence that we have considered to inform our efficiency target for non-repair operating costs. We have updated our analysis with the most recent data available (including BT's 2016/17 outturn cost data and latest forecasts) as well as making any additional adjustments necessary to ensure the data is more comparable. In particular, as discussed above, we have removed all costs associated with fault repair and our analysis and decision on the appropriate efficiency targets to apply to these costs is set out in Annex 13.
- A19.28 This section is structured as follows:
- our approach to analysing BT's regulatory cost data;
 - our approach to analysing BT's historical and forecast management accounting data;
 - our use of benchmarking and other external studies; and
 - our use of other public information.

¹⁰² Openreach efficiency response to the March 2017 WLA Consultation, paragraphs 4-6.

Regulatory cost analysis

A19.29 In this section, we set out our analysis of historical cost savings using BT's regulatory cost data as set out in its Regulatory Financial Statements (RFS).

Our proposals

A19.30 We estimated BT's historical cost savings for the Relevant Services by analysing cost data from BT's regulatory accounts from 2009/10 to 2015/16.

A19.31 We applied the same basic methodology to our analysis that we used in the 2016 BCMR i.e. estimating how much of the annual movement in component operating costs was due to inflation and how much was due to changes in volumes to determine the residual improvement in efficiency. To estimate the impact of inflation and volumes on component operating costs we have used the formulae that underpin the top-down model. This included our own inflation assumptions and estimates of the impact of volumes on costs using CVEs for each component, applying separate CVEs to pay and non-pay operating costs.

A19.32 In addition, we recognised that the change in cost between two years, after accounting for inflation and changes in volumes, may reflect factors other than efficiency. For instance, there may have been changes in the way costs were attributed within BT's regulatory accounting system and how they were reported.

A19.33 As in the 2016 BCMR, we mitigated the impact of these other effects by using the restatements of prior year results that BT is required to provide in each RFS.¹⁰³ These restatements reflect major changes in methodologies and changes in market definitions in each RFS. By comparing component costs in the current year and the restated prior year we increased the likelihood that changes in cost after accounting for the impact of inflation and changes in volumes were due to efficiency rather than other factors.

A19.34 In each annual comparison, for each component, we calculated the implied cost savings.¹⁰⁴ We then estimated the proportion of this cost saving which was attributable to the Relevant Services, using the ratio of that component's volumes used by the Relevant Services compared to all services. We then estimated the proportion of the total cost for each component which was attributable to the Relevant Services in the same way. Finally, we estimated efficiency by dividing the sum across components of cost savings for the Relevant Services by the sum across components of total cost for the Relevant Services in the relevant year.

A19.35 We made the following adjustments to component costs to ensure consistency with the top-down model. Specifically, we:¹⁰⁵

¹⁰³ Ofcom, 2014. *Regulatory Financial Reporting - Final Statement*, Annex 2, SMP Conditions, page 123.

¹⁰⁴ As described earlier, efficiency is the residual after adjusting the cost and volume data supplied by Openreach using our inflation and CVE assumptions.

¹⁰⁵ In paragraph A15.119 of the March 2017 WLA Consultation we also listed a number of component cost adjustments in the years between 2009/10 and 2012/13. We have excluded the years prior to 2012/13 as, in general, we place lower weight on older data and these annual comparisons relate to periods up to eight years ago.

- Excluded Network Features, Openreach Time Related Charges, Special Fault Investigations, iNode Features, EVOTAM Testing Systems and Directories as these components are not included in the top-down model.
- Excluded the costs of cumulo rates. These are part of BT's business costs and we would normally expect to include any movement in these costs within our assessment of future cost savings. However, the large projected increases in BT's cumulo costs mean that they are being forecast separately within this charge control and so are not subject to our efficiency assumption.¹⁰⁶
- Combined the costs of Combi Card Voice and PSTN Line Cards given that these components both deliver the same capability for the same market.

Stakeholder responses

A19.36 Openreach proposed several adjustments to our analysis of the regulatory cost data. It considered these adjustments were necessary to isolate the effect of changes in cost due to efficiency from those due to non-efficiency related factors.¹⁰⁷

- **Inclusion of administrative components.** Openreach acknowledged that we excluded some components from our analysis on the basis of its statement that it was not possible to derive meaningful unit costs as these components were comprised of numerous services, each with different units of measure. However, it considered that efficiency should be assessed across all the costs of the Relevant Services and that there had been significant increases in cost for some administrative components. Openreach suggested that these administrative components costs should be included but adjusted for inflation and volume growth, using weighted averages of the inflation, volume growth and cost volume elasticity (CVE) inputs used for the non-administrative components.
- **Self-installation capitalisation credit.** Openreach noted that we had adjusted for an error in the 2015/16 RFS in relation to self-installation costs in our top-down model but not in our regulatory cost analysis.
- **2015/16 Change Control Notification (CCN).** Openreach argued that as only material methodology changes made in the 2015/16 RFS were applied to the restated 2014/15 RFS, there was a £35m overstatement of operating costs for the Fixed Access markets. Openreach noted that we had accounted for £[<]m of this (due to the single non-material methodology change with the highest impact) but considered that we should also account for the remaining £[<]m. It stated that obtaining component-level data on the impact of applying all non-material 2015/16 CCN methodology changes to the restated 2014/15 RFS would be a complex exercise requiring significant time and resource. It suggested that the total reduction of £35m should be applied across all Fixed Access market components weighted on cost.

A19.37 Openreach considered that the impact of its proposed adjustments would reduce historical estimates of efficiency. It also highlighted two other non-modelled factors which in its

¹⁰⁶ We describe what BT's cumulo costs are and how we have modelled them in Annex 21.

¹⁰⁷ Openreach efficiency response to the March 2017 WLA Consultation, paragraphs 30-42.

view, while small, demonstrated that its restatement of our regulatory cost analysis was conservative.

- First, it noted the introduction of the Ofcom Licence Fee component in 2015/16 whose cost (around £4m) would previously have been spread across other components.
- Second, it noted the reallocation of non-specific costs in some activity groups from copper components to NGA components as NGA component costs and volumes increased in 2015/16.¹⁰⁸

A19.38 In addition, Openreach noted that subjective usage factors were used to attribute common costs to different individual services and that movements in relative service volumes therefore represented another non-efficiency related factor that could drive movements in component costs.¹⁰⁹

A19.39 Other stakeholders did not comment on our regulatory cost analysis.

Our reasoning and decisions

A19.40 We have used the same approach as in the March consultation to estimate BT's historical operating cost efficiency by analysing cost data from BT's regulatory accounts for the period 2012/13 to 2016/17.¹¹⁰ The analysis includes the most recent regulatory accounting data available.

A19.41 As noted above, we estimate the impact of inflation and volumes on component operating costs using the formulae that underpin the top-down model. The table below shows the inflation assumptions used for pay and non-pay operating costs in this analysis (see Annex 17 for more information). We have estimated the impact of changes in volumes using CVEs for each component, applying separate CVEs to pay and non-pay operating costs. These CVEs have been calculated in each year consistent with the way we have calculated them for the top-down model.¹¹¹

Table A19.1: Inflation assumptions used in regulatory cost analysis

	Market	2013/14	2014/15	2015/16	2016/17
Pay	All	2.4%	1.8%	2.2%	2.3%

¹⁰⁸ Openreach efficiency response to the March 2017 WLA Consultation, paragraph 43.

¹⁰⁹ Openreach efficiency response to the March 2017 WLA Consultation, paragraphs 47-50.

¹¹⁰ Openreach responses dated: 18 August 2017 to question C1 of the 29th s.135 notice, 13 September 2017 to questions 12 and 13 of the 34th s.135 notice, 15 September 2017 to question C2 of the 29th s.135 notice, and 4 January 2018 to question 10 of the 43rd s.135 notice.

¹¹¹ Annex 18 discusses our approach to calculating the pay and non-pay CVEs in the top-down model using 2016/17 data. For 2013/14 to 2015/16 we have calculated pay and non-pay CVEs for each component in each year using LRIC and FAC data from the Additional Financial Information (AFI) schedules 1-4 that BT provides to us annually. To ensure consistency with the top-down model, we have excluded costs relating to cumulo and Other Operating Income. We have also excluded repair costs. This involved identifying the major cost categories in which repair costs fell in 2016/17 and calculating the proportion of these cost categories that they accounted for. We then excluded the same proportion of these cost categories from the historical LRIC and FAC data used to calculate CVEs for the period 2013/14 to 2015/16.

	Market	2013/14	2014/15	2015/16	2016/17
Non-pay	WFAEL	2.6%	1.9%	0.7%	1.1%
	WLA non-VULA	2.6%	1.9%	0.5%	0.8%
	WLA VULA	2.4%	1.5%	0.1%	0.3%
	Weighted average ¹¹²	2.5%	1.8%	0.5%	0.8%

Source: Ofcom analysis

A19.42 We have made the same adjustments to component costs as in our March consultation. We have also made several additional adjustments having considered stakeholder responses. For example, we agree with Openreach that in principle we should aim to improve the comparability of cost bases where possible to isolate changes in cost due to efficiency from changes due to attribution methodologies.

A19.43 Specifically, we have:

- Excluded repair costs as these costs are now forecast separately in the top-down model and subject to different efficiency targets.¹¹³
- Excluded other operating income. Historically these operating costs have primarily related to BT's profits from its recovery of redundant copper on its core network. As we explain in Annex 22 this programme has now ended and there are unlikely to be significant sales from recovery of redundant copper over the charge control period. Including these sales in our analysis of historical costs could therefore bias the results.
- Adjusted component costs in 2015/16 to correct for an inconsistency in the 2015/16 RFS in the allocation of a manual capitalisation credit of £[3<]m relating to self-installation costs.¹¹⁴
- Adjusted component costs to reflect the impact of methodology changes in the 2015/16 RFS and 2016/17 RFS that were not applied to the 2014/15 and 2015/16 restatements respectively. The impact of this adjustment is to decrease operating costs in the Fixed Access markets by £35m in 2014/15 restated and by £0m in 2015/16

¹¹² The weighted average non-pay inflation rate is used where a component has volumes split across multiple markets.

¹¹³ See Annex 12 for a definition of the repair costs that have been forecast separately in the top-down model and excluded from our regulatory cost analysis. See Annex 13 for an explanation of our approach to determining an appropriate efficiency target for repair costs which includes both expected cost savings associated with fault volume reduction as well as further efficiencies (e.g. reductions in task times).

¹¹⁴ Openreach response dated 20 February 2017 to question 10b of the 24th s.135 notice. This adjustment is based on data which showed the impact of this allocation error on total operating cost for each component. BT stated that it was not possible to allocate this impact between pay and non-pay costs. We have therefore allocated the total adjustment for each component based on its ratio of pay to non-pay operating costs.

restated.^{115 116} It was not possible to obtain robust data on the impact of methodology changes that were not applied to the 2012/13 and 2013/14 restatements.¹¹⁷

- Included administrative component costs that had been previously excluded. We agree with BT that efficiency should, in principle, be assessed across all of the Relevant Services' costs. These costs were excluded from our March consultation analysis on the basis that BT had told us it was not possible to derive meaningful unit costs as the components were comprised of a number of services with different measurement units.¹¹⁸ We have adjusted for the impact of volumes on component costs by using the weighted averages of the volume growth and CVE assumptions used for the non-administrative components. The table below shows the volume growth and CVE assumptions used for administrative components in this analysis.¹¹⁹

Table A19.2: Volume growth and CVE assumptions used for administrative components in our regulatory cost analysis

	2013/14	2014/15	2015/16	2016/17
Volume growth	[X]%	[X]%	[X]%	[X]%
Pay CVE	66.2%	67.9%	71.8%	73.3%
Non-pay CVE	82.5%	75.0%	71.4%	69.8%

Source: Ofcom analysis

A19.44 As discussed above, BT noted three other non-modelled factors that it considered may affect our efficiency estimate. It stated that under our approach the introduction of the Ofcom licence fee component in 2015/16, the costs of which were previously spread across various other components, would lead to an apparent cost saving of around £4m in 2015/16 that would be incorrectly captured as efficiency.¹²⁰ However, this compares to an estimated cost saving of £[X]m for the Relevant Services in 2015/16. We have therefore not adjusted our analysis as we do not consider this to be a material impact. We have also not adjusted for the impact of increasing NGA volumes and movements in relative service

¹¹⁵ Openreach response dated 4 January 2018 to question 9a of the 43rd s.135 notice.

¹¹⁶ We have used market-level data to perform this adjustment as Openreach stated that obtaining component-level data would require significant resources. We have allocated the market-level operating cost impact to each component based on component costs, and to pay and non-pay costs based on the ratio of pay to non-pay costs for each component.

¹¹⁷ Openreach response dated 4 January 2018 to question 9a of the 43rd s.135 notice, which requested the market-level impact of non-processed methodology changes on each prior year restatement published between 2013/14 and 2016/17 using the annual Change Control Notification. Openreach noted that "it is not feasible for us to respond to your request for the years 2013/14 and 2014/15". In an email from BT to Ofcom dated 16 January 2018 in relation to Openreach's response to question 9b of the 43rd s.135 notice BT noted that an alternative approach, using the annual Reconciliation Report in place of the Change Control Notification, "may not accurately reflect the required adjustment to current year costs so that they are comparable to restated prior year costs".

¹¹⁸ Openreach response dated 12 August 2016 to follow-up question 1 of the 7th s.135 notice.

¹¹⁹ The components adjusted in this way are: OR Service Centre – Assurance WLR PSTN/ISDN2, OR Service Centre – Assurance LLU, OR Service Centre – Provision WLR PSTN/ISDN2, OR Service Centre – Provision LLU, Sales product management, Ext LLU SLG, LLU systems development, LLU room build, LLU hostel rentals (in 2014/15), LLU hostel rentals power & vent (in 2014/15).

¹²⁰ Openreach efficiency response to the March 2017 WLA Consultation, paragraph 43a.

volumes on the allocation of common costs as there is no obvious way of quantifying the impact of these two factors.

A19.45 Our regulatory cost analysis involves four annual comparisons:

- 2013/14 costs compared to restated 2012/13 costs in the 2013/14 RFS;
- 2014/15 costs compared to restated 2013/14 costs in the 2014/15 RFS;
- 2015/16 costs compared to restated 2014/15 costs in the 2015/16 RFS; and
- 2016/17 costs compared to restated 2015/16 costs in the 2016/17 RFS.

A19.46 Our estimates of cost savings for non-repair operating costs in each year from these four annual comparisons are set out in the table below. There is a significant variation in estimated cost savings year-on-year. This may to some extent reflect limitations of our analysis rather than actual movements in cost savings. For instance, as discussed above, some non-efficiency related factors may contribute to the residual difference in annual component costs after accounting for the impact of inflation and changes in volumes. However, we consider the estimated average annual cost saving of 5.1% per annum between 2012/13 and 2016/17 to be informative.

Table A19.3: Estimates of historical cost savings for Relevant Services from our regulatory cost analysis

	2013/14	2014/15	2015/16	2016/17	CAGR
Efficiency estimate	[X]%	[X]%	[X]%	[X]	5.1%

Source: Ofcom analysis

Analysis of historical and forecast management accounting data

A19.47 Below we set out our analysis of historical and forecast cost savings using BT's management accounting data.

A19.48 When reviewing management accounting data, we focus on the results for two BT divisions: Technology and Service Operations (TSO) and Openreach. These two divisions (referred to as 'Relevant Divisions') represent the vast majority of operating costs for the Relevant Services.¹²¹

Our proposals

Overview of approach

A19.49 We proposed to estimate cost savings using management accounting data by analysing historical costs for the Relevant Divisions from 2012/13 to 2015/16 and forecast costs from 2016/17 to 2017/18 based on submissions by the Relevant Divisions to the BT Group business planning process.

¹²¹ Openreach's responses dated: 17 June 2016 and 24 June 2016 to question D1 of the 7th s.135 notice; 9 December 2016 to question D1 of the 20th s.135 notice; 27 September 2017 and 28 September 2017 to question 14a of the 34th s.135 notice.

A19.50 In addition, we proposed to apply the same basic methodology to our analysis as was used in the 2016 BCMR. For each Relevant Division and management accounting cost grouping (e.g. pay, energy) we estimated cost savings as the residual change in cost between two years after accounting for the impact of inflation, changes in volumes, and various one-off costs.

Estimating the impact of inflation

A19.51 We proposed to estimate the impact of inflation using assumptions consistent with those used to derive the pay and non-pay operating cost inflation assumptions used in the top-down model.

Estimating the impact of changes in volumes

A19.52 As the Relevant Divisions' costs (within their historical and forecast management accounts) are not broken down by product or service, we proposed to estimate the effect of changes in volumes by applying a CVE (calculated across all network components) to an estimate of the volume growth for each Relevant Division in each year. The growth rate for each Relevant Division needed to reflect the different rate of volume growth across all of the products and services within that division. We proposed to use a number of different approaches to estimate the Relevant Divisions' volume growth rates:

- For Openreach, we weighted together average volume growth in each market by prior year revenues using weights derived from the Openreach Income Statements published within BT's RFS. We then calculated volume growth for each RFS regulated market in each year by analysing revenue growth and removing the impact of price changes. We also undertook some additional analysis to reflect the impact of growth in VULA services. Finally, we performed some cross-checks on these estimates.
- For TSO, we estimated volume growth using information on TSO transfer charges to other divisions. We then calculated an overall volume growth rate by weighting the volume growth rates for each division by its TSO transfer charge.

Cost adjustments

A19.53 We proposed to make the following adjustments to BT's historical and forecast management accounting data to ensure consistency with the top-down model and make annual comparisons like-for-like:

- We excluded cumulo rate costs. As discussed in the regulatory cost analysis section, these costs are forecast separately in the top-down model and are not subject to our efficiency assumption.
- We excluded other operating income for the same reasons as discussed above in the regulatory cost analysis section.
- We excluded Payments to Other Licensed Operators (POLOs) as these costs are not applicable to the Relevant Services.
- We excluded internal transfers that occur between the two Relevant Divisions from the costs of the receiving division. BT divisions' management accounts include both directly incurred costs and transfers from other divisions. Excluding internal transfers between

the two Relevant Divisions from the costs of the receiving division ensures that no double-counting or exclusion of cost-savings occurs and that the costs and any associated cost savings are only recognised in the division where they are incurred.

- We excluded various one-off costs indicated to us by BT on the basis that including these costs would affect the interpretation of the residual change in cost, after accounting for the impact of inflation and changes in volumes, as being due to cost savings.¹²²

Reflecting differences in cost savings between services

A19.54 As in the 2016 BCMR Statement, we then proposed to weight these cost savings to reflect the mix of costs for the Relevant Services, as well as the relative contribution of each Relevant Division. To do this, we requested annual RFS data which showed how Openreach, TSO, and all other divisions' pay and non-pay costs, split by several major cost sectors, had been allocated to the Relevant Services, all other regulated markets and all unregulated markets. We proposed several adjustments to this data to make it consistent with the management accounting cost data that it was used to weight. We:

- reconciled the RFS data to the management accounting data. This process largely consisted of reversing out internal transfers that were captured in the management accounting data but not the RFS data or vice versa;
- mapped the RFS cost sectors to the management accounting cost groupings;
- removed internal transfers between the two Relevant Divisions as in the divisional cost data;
- excluded cumulo rates costs, other operating income and POLO costs as in the divisional cost data; and
- excluded costs attributed to divisions other than Openreach and TSO.

Stakeholder responses

A19.55 Openreach considered that its proposed adjustments to our regulatory cost analysis, discussed in the previous section, should also be applied to our analysis of its management accounting data. In addition, Openreach considered that RFS service revenue growth rates used in our management accounting analysis were not a good proxy for component volume growth rates used in our regulatory cost analysis. To demonstrate this, Openreach replaced component volumes with service volumes in its own regulatory cost analysis and noted that the estimated cost savings were different in each year when calculated using service volumes instead of component volumes. It concluded that our management accounting analysis did not substantiate the results of our regulatory cost analysis as it was

¹²² BT indicated various one-off costs. Among these costs were leaver costs incurred to achieve cost savings. As in the 2016 BCMR Statement, we did not exclude these particular one-off costs on the basis that this would be inconsistent with how they were treated in the top-down model. The base year costs for the top-down model include leaver costs and the top-down model forecasts how all costs will change over the change control period. If we excluded changes in leaver costs from the cost savings in any year, then this would mean that BT would receive the benefit of these costs twice: once via the base year costs and again via the efficiency assumption.

“not consistent with the top-down modelling approach” and was “not performed on an equivalent basis”.¹²³

A19.56 No other stakeholders commented on our analysis of BT’s management accounting data.

Our reasoning and decisions

Overview of approach

A19.57 Since the March consultation we have updated our analysis of historical and forecast cost savings using the latest available data. This includes 2016/17 outturn cost data as well as BT’s updated business plan forecasts.

A19.58 We have estimated BT’s historical operating cost efficiency for the Relevant Services by analysing its management accounting cost data for the Relevant Divisions for the period 2012/13 to 2016/17.¹²⁴

A19.59 We have estimated BT’s forecast operating cost efficiency for the Relevant Services by analysing its forecast management accounting cost data for the Relevant Divisions for the period 2017/18 to 2020/21.¹²⁵

A19.60 Our approach to estimating historical and forecast cost savings using BT’s management accounting data is the same as we used in the March consultation, with the exception that we have adjusted the cost data to address BT’s concerns about the risk of double-counting between our efficiency and QoS proposals. We discuss our approach to adjusting the cost data in the cost adjustments sub-section below.

Estimating the impact of inflation

A19.61 As in the March consultation, we have estimated the impact of inflation using assumptions consistent with those used to derive the pay and non-pay operating cost inflation assumptions used in the top-down model (discussed in Annex 17). The table below sets out the inflation assumptions that we have applied to the different types of costs in each year.

Table A19.4: Inflation assumptions used in our management accounting efficiency analysis

	2013/14	2014/15	2015/16	2016/17	2017/18 to 2020/21
Pay	2.4%	1.8%	2.2%	2.3%	2.7%
Property	3.0%	3.0%	3.0%	3.0%	3.0%

¹²³ Openreach efficiency response to the March 2017 WLA Consultation, paragraphs 57-61.

¹²⁴ Data for Openreach as a whole from Openreach response dated 6 October 2017 to follow up questions 1a and 1b of the 29th s.135 notice (2012/13 to 2016/17), data for Openreach Service Delivery from Openreach’s response dated 18 August 2017 to questions D4 and D5 of the 29th s.135 notice (2012/13 to 2016/17). Data for TSO from Openreach’s responses dated: 23 October 2015 and 3 November 2015 to questions A1 to A4 of the 24th BT LLCC s.135 notice (2012/13 to 2014/15), 17 June 2016 to questions B1 to B4 of the 7th s.135 notice (2014/15 restated to 2015/16), 31 May 2017 to questions A1 to A4 of the 26th s.135 notice (2015/16 restated to 2016/17).

¹²⁵ Openreach response dated 4 January 2018 to question 1 of the 43rd s.135 notice.

	2013/14	2014/15	2015/16	2016/17	2017/18 to 2020/21
Energy ¹²⁶	2.7%	3.7%	-1.7%	-4.8%	8.1%
Other external (CPI)	2.3%	1.1%	0.1%	1.1%	2.2%
Transfers (CPI)	2.3%	1.1%	0.1%	1.1%	2.2%

Source: Ofcom analysis

Estimating the impact of changes in volumes

A19.62 As in the March consultation, we have estimated the effect of changes in volumes by applying a CVE (calculated across all network components) to an estimate of the volume growth for each Relevant Division in each year. We have updated the analysis to estimate volume growth rates for the Relevant Divisions using the latest available data:

- For Openreach, we have weighted together average volume growth in each market by prior year revenues using weights derived from Openreach's Income Statements published within BT's RFS.¹²⁷ We have then calculated volume growth for each RFS regulated market in each year by analysing revenue growth and after removing the impact of price changes.¹²⁸ We also undertook some analysis to reflect the impact of growth in VULA services.¹²⁹ Finally, we performed a cross check on these estimates.¹³⁰ Our estimates of volume growth over the last four years were broadly consistent in that they suggested a small positive growth in volumes.

¹²⁶ As discussed in Annex 17 we derive energy inflation using historical and forecast estimates of electricity price inflation for the 'services' sector as produced by the Department for Business, Energy, and Industrial Strategy (BEIS), which we deflate using the ONS' GDP deflator and convert from calendar to financial years. The figures in this table are different to those presented in our March consultation as we have updated our analysis using BEIS' March 2017 estimates (stated in 2016 prices) instead of its November 2015 estimates (stated in 2016 prices) as well as the ONS' updated GDP deflator series.

¹²⁷ BT 2016 RFS, page 115. These schedules show Openreach revenues for various regulated markets. We also use other schedules within BT's RFS that provide further splits of market revenues by product and service for both current and prior years together with information on average prices and volumes.

¹²⁸ We did this by comparing revenues in the prior year with current year volumes multiplied by prior year prices.

¹²⁹ Prior to BT's 2014/15 RFS, revenues and costs for VULA services were reported within Wholesale Residual Markets. In the 2014/15 RFS, these costs and revenues were reported within the WLA market but not separately identified. To assess how VULA services contributed to Openreach volume growth we have assumed that Other WLA service revenues reported in the 2014/15 and 2015/16 RFS for 2013/14, 2014/15, 2015/16 and 2016/17 are predominantly VULA services (as is supported by analysis of BT's AFIs) and used this revenue growth as a proxy for volume growth. Before 2014/15 we have estimated VULA volume growth from BT published KPI data on fibre connections and used this to infer VULA service revenues. Finally, we have removed these estimated VULA service revenues from "Other Openreach Markets and Activities" and assumed revenue growth is a reasonable proxy for volume growth for the remaining non-VULA services.

¹³⁰ Firstly, we analysed the change in Openreach reported revenues and estimated volume growth by removing the effect of price increases by deflating them using a price index (Business Telecom Services Producer Price Index published by ONS). Secondly, we analysed internal product transfer costs made by Openreach to other BT divisions (Openreach's responses dated 5 August 2016 to question B10 of the 7th s.135 notice and 31 May 2017 to question A10 of the 26th s.135 notice). We weighted our estimated volume growth for these products using analysis of RFS market data by prior year transfer charges.

- For TSO, we estimated volume growth using information on TSO transfer charges to other divisions.¹³¹ We then calculated an overall volume growth rate by weighting the volume growth rates for each division by its TSO transfer charge.^{132, 133}

A19.63 Table A19.5 below shows our calculated volume growth rates for the two Relevant Divisions.¹³⁴

Table A19.5: Estimates of historical volume growth for Relevant Divisions

	2013/14	2014/15	2015/16	2016/17
Openreach	[X]%	[X]%	[X]%	[X]%
TSO	[X]%	[X]%	[X]%	[X]%

Source: Ofcom analysis

A19.64 Finally, we have applied a standard CVE of [X]% for Openreach and [X]% for TSO across all cost categories for each year. We have calculated these CVEs using BT's LRIC and FAC operating cost (excluding depreciation) data¹³⁵ in a similar way to how CVEs for the top-down model were calculated, except that the results were aggregated across all network components. For each of the Relevant Divisions, the resulting CVEs were very similar for each of the four years that we analysed (2013/14 to 2016/17).¹³⁶ In our March consultation we applied the same CVE to the costs of both Relevant Divisions. However, the CVE for Openreach now excludes the repair costs that we have forecast separately in the top-down model following our March consultation. TSO does not incur any of these repair costs and so they are not excluded when calculating a CVE for TSO.

A19.65 As discussed above, Openreach considered that our approach to estimating an aggregate component volume growth rate for Openreach using RFS service revenues was not consistent with our regulatory cost analysis and top-down modelling approach (both of which use component volumes). Openreach demonstrated this by replacing component volumes with service volumes in its own regulatory cost analysis which it noted resulted in different estimated cost savings in each year. We do not consider that this demonstrates that aggregate weighted service volume growth is an inappropriate proxy for aggregate

¹³¹ Openreach responses dated: 17 June 2016 to question B10 of the 7th s.135 notice and 31 May 2017 to question A10 of the 26th s.135 notice. TSO sends transfer charges to most BT divisions including Global Services, BT Retail and BT Consumer.

¹³² The growth rates we used for Openreach are those that we describe above.

¹³³ We estimated volume growth in BT Wholesale, BT Retail, BT Consumer, BT Business and Global Services divisions from the change in published revenues deflated by a price index. We used the Service Producer Prices Index, series K8U1, to deflate BT Business and Global Services revenues and CPI Index 08.2, Telephone and Telefax Equipment and Services, series D7EM, to deflate BT Retail and BT Consumer revenues.

¹³⁴ We have used the 2016/17 data in the following years. This approach is consistent with that used in other areas where we do not have forecast data.

¹³⁵ LRIC data was taken from the AFI1 and AFI2 schedules, the comparable FAC data was taken from the AFI3 and AFI4 schedules. We note that consistent with the top-down model these CVEs were calculated by excluding other operating income, payments to other licensed operators, cumulo and (for Openreach) repair costs from the LRIC and FAC data.

¹³⁶ The constant CVE assumption is a simplification but is appropriate given the range of costs that the CVE is being applied to and the low volume growth that we have calculated. Its use also does not have a significant impact on our efficiency estimates.

weighted component growth. This is because component volumes are calculated by multiplying service volumes by component usage factors. We would therefore not expect the results of the regulatory cost analysis to remain unchanged if component volumes were replaced with service volumes and the CVEs (which are based on component data) were not also updated.

A19.66 We acknowledge that aggregate weighted service volume growth is only a proxy for aggregate weighted component volume growth. However, volume growth on this basis is not available and BT did not suggest an alternative data source. We therefore consider that our approach to estimating an aggregate weighted component volume growth rate for Openreach is reasonable given the data available.

A19.67 In addition, we note that our analysis of BT's management accounting data is a separate source of evidence, rather than a cross check for the regulatory account analysis. For example, in the regulatory cost analysis we have focused on copper costs, consistent with the top-down model, as the efficient costs of an FTTC network have been forecast in the bottom-up model. However, BT's management accounts do not separate its actual and forecast costs between copper and fibre WLA services (or for that matter between WLA, BCMR and other services). While we have weighted the cost savings to reflect the mix of costs for the Relevant Services, the management accounting and RFS analyses are not directly comparable and we have not assessed them in this way.

Cost adjustments

A19.68 As in our March consultation, we have excluded the following items from BT's historical and forecast management accounting data to ensure consistency with the top-down model and make comparisons like-for-like:

- cumulo rates costs;
- other operating income;
- Payments to Other Licensed Operators;
- internal transfers that occur between the two Relevant Divisions from the costs of the receiving division;¹³⁷ and
- various one-off costs indicated to us by BT.¹³⁸ In particular, when updating our analysis with 2016/17 outturn cost data we observed significant increases in TSO's costs for some cost categories between 2015/16 and 2016/17. BT explained that this increase

¹³⁷ Openreach provided details of "transfers out" and "transfers in" for the Relevant Divisions in its responses dated: 23 October 2015, 2 November 2015 and 10 November 2015 to question A5 of the 24th BT LLCC s.135 notice, 17 June 2016 and 5 August 2016 to question B10 of the 7th s.135 notice and 31 May 2017 to question A10 of the 26th s.135 notice. For each Relevant Division, we removed the transfers in from other Relevant Divisions from the management accounting data. We did not make any adjustments for "transfers out" as these can be separately identified and removed from the management accounting data. For the management accounting forecasts, we only had information on total transfers rather than by division. We have used the split of transfers from 2016/17 for these forecasts and, as transfer charges from 2013/14 to 2016/17 were broadly similar, we do not consider this had a significant impact on the results of our analysis.

¹³⁷ Openreach responses dated: 17 June 2016 and 24 June 2016 to question B6 of the 7th s.135 notice and 31 May 2017 to question A6 of the 26th s.135 notice.

¹³⁸ Openreach responses dated: 17 June 2016 and 24 June 2016 to question B6 of the 7th s.135 notice and 31 May 2017 to question A6 of the 26th s.135 notice.

was due to the merger of BT and EE and we have therefore adjusted the 2016/17 data to exclude these costs.¹³⁹

- A19.69 Following the March consultation, we have excluded two further items from BT’s cost data. First, as discussed in Annex 12, there is some uncertainty over BT’s future pension service costs. We have made an adjustment to the base year (2016/17) costs in the top-down model to reflect BT’s future ongoing pension service costs. BT has included its own estimate of the expected increase in its pension service costs over the charge control period in its latest forecasts and we have excluded these increases in cost from our analysis to avoid double-counting the expected increase in its pension service costs in both the base year adjustment and our efficiency assumption.
- A19.70 Second, as previously discussed, BT was concerned that our approach to determining efficiency and QoS improvements created a risk of double-counting cost-savings. To provide greater transparency and ensure that there is no double-counting, we have decided to forecast non-repair and repair operating costs separately in the top-down model.
- A19.71 In our regulatory cost analysis, we were able to identify and exclude the repair costs using the same definition as in the top-down model. However, it was not possible to map this definition of repair costs to BT’s management accounting data.¹⁴⁰ The closest available proxy using BT’s management accounting data is Openreach’s Service Delivery organisation. We have excluded Openreach’s Service Delivery organisation from our analysis of BT’s historical and forecast management accounting data in order to ensure no double-counting of cost-savings between our efficiency and QoS decisions.
- A19.72 We note that Service Delivery includes all of the repair costs that are forecast separately in the top-down model but also some non-repair operating costs. It is possible that cost savings achieved by Openreach on non-repair operating costs within Service Delivery may be higher or lower than those achieved on non-repair operating costs outside Service Delivery. To the extent that this is the case then we acknowledge that excluding Service Delivery would bias our estimates of Openreach’s cost savings across all non-repair operating costs. However, we have no indication of the likely direction or magnitude of this bias. We consider this limitation of our management accounting analysis when we consider all of the available evidence on cost savings in the round below.

Reflecting differences in cost savings between services

- A19.73 As in the March consultation, we have weighted estimated cost savings using annual RFS data which shows how Openreach, TSO, and all other divisions’ pay and non-pay costs, split by several major cost sectors, were allocated to the Relevant Services, all other regulated

¹³⁹ Openreach responses dated: 9 August 2017 to question A1 of the 29th s.135 notice and 4 January 2018 to question 14e of the 43rd s.135 notice. We have excluded cost increases of [X] from our assessment of TSO’s efficiency in 2016/17.

¹⁴⁰ The repair costs forecast separately in the top-down model are a subset of Openreach Service Delivery’s costs. Openreach was unable to map the definition of these repair costs to its management accounting reporting systems and instead provided cost data for Openreach Service Delivery (Openreach’s response dated 18 August 2017 to questions D4 and D5 of the 29th s.135 notice).

markets and all unregulated markets.¹⁴¹ We have made several adjustments (including one new adjustment since the March consultation) to this data to make it consistent with the management accounting cost data that it is used to weight. Specifically, we have:¹⁴²

- reconciled the RFS weighting data with the management accounting data. This process largely consisted of reversing out internal transfers that have been captured in the management accounting data but not the RFS data or vice versa;
- mapped the RFS cost sectors to the management accounting cost groupings;^{143 144}
- removed internal transfers between the two Relevant Divisions in the same way as in the divisional cost data;
- excluded cumulo rates, other operating income and POLO costs;
- excluded costs attributed to divisions other than Openreach and TSO;¹⁴⁵ and
- following our March consultation, we have also excluded repair costs where possible.¹⁴⁶

A19.74 The table below shows the shares of the Relevant Services costs by division¹⁴⁷ between 2013/14 and 2016/17 after making the above changes. We apply the 2016/17 proportions in our analysis of the forecast data after 2016/17. We use the resulting adjusted weighting data for two purposes. Firstly, we have weighted the Relevant Divisions' management accounts together in proportion to the total operating costs.¹⁴⁸ Secondly, we have re-weighted the cost lines within each Relevant Division's management accounts so that the mix of costs reflects that used to supply the Relevant Services.¹⁴⁹

¹⁴¹ Openreach responses dated: 17 June 2016 and 24 June 2016 to question D1 of the 7th s.135 notice, 9 December 2016 to question D1 of the 20th s.135 notice, 27 September 2017 and 28 September 2017 to question 14a of the 34th s.135 notice.

¹⁴² As in our regulatory cost analysis, we have not made any changes to this weighting data to reflect the allocation changes we have made to our base year data for this control. Doing so would have been complex and would have risked introducing errors into our analysis.

¹⁴³ Openreach responses dated: 1 July 2016 and 22 July 2016 to question D4 of the 7th s.135 notice, 9 December 2016 to question D4 of the 20th s.135 notice, 27 September 2017 and 3 October 2017 to question 14d of the 34th s.135 notice.

¹⁴⁴ The management accounting cost groupings that we have mapped the RFS cost sector data to are: Network Maintenance, Provision and Installation, Property (excluding Electricity), Electricity, Cumulo, Computing and IT, Transport, OOI, POLOs, Pay, Depreciation and All Other Operating Costs. These groupings were selected by Ofcom as they separately identify the largest costs in the Relevant Divisions.

¹⁴⁵ These costs are a small proportion of costs for the Relevant Services and are mostly costs associated with BT Group Functions (Openreach's responses dated: 17 June 2016 and 24 June 2016 to question D1 of the 7th s.135 notice, 9 December 2016 to question D1 of the 20th s.135 notice, 27 September 2017 and 28 September 2017 to question 14a of the 34th s.135 notice). We do however include Group Function transfers such as accommodation costs. These are in both the Openreach and TSO divisional management accounts and the RFS weighting data.

¹⁴⁶ As discussed in Annex 12 the repair costs forecast separately within the top-down model are defined as costs within Openreach's Service Delivery organisation which BT considers that it incurs either directly or indirectly as a result of service repair. We have excluded only the direct costs from the weighting data as these are all within one RFS cost sector (Maintenance). The indirect costs are spread across various other RFS cost sectors and we consider that attempting to identify and exclude all of these costs from the weighting data would be a disproportionate exercise.

¹⁴⁷ Proportions are calculated so that the two Relevant Divisions total to 100% i.e. all other divisions contributing to Relevant Services costs are not factored into this weighting.

¹⁴⁸ Excluding depreciation.

¹⁴⁹ The cost lines used for TSO in the historical analysis are: Pay, Leavers, Network Maintenance, Provision and Installation, Property, Energy, Computing/IT, Transport, Other External and Transfers In. The cost lines used for Openreach in the historical analysis are: Pay, Leavers, Other External and Transfers In. The cost lines used for Openreach are less granular than for TSO. This is because the management accounting reporting system from which the TSO data was extracted could not separately identify the costs of Openreach Service Delivery. Openreach therefore extracted data for Openreach (as a whole) and Openreach Service Delivery from a different management accounting reporting system. (Openreach's response

Table A19.6: Proportion of Relevant Services' operating costs by division

	2013/14	2014/15	2015/16	2016/17
Openreach	[X]% (60-80%)	[X]% (60-80%)	[X]% (60-80%)	[X]% (60-80%)
TSO	[X]% (20-40%)	[X]% (20-40%)	[X]% (20-40%)	[X]% (20-40%)

Source: Ofcom analysis

Results of the management accounting analysis

A19.75 The table below shows estimates of historical cost savings for non-repair operating costs for the Relevant Services over the period 2012/13 to 2016/17. The estimated average annual cost saving over the period was 6.8%.

Table A19.7: Estimates of historical cost savings for non-repair operating costs from the management accounting analysis (2012/13 to 2016/17)

	Average historical cost saving
Openreach	[X]%
TSO	[X]%
Weighted	6.8%

Source: Ofcom analysis

A19.76 As previously mentioned, the forecast management accounting cost data was submitted by the Relevant Divisions to BT Group as part of the September 2017 BT Group business planning process and reflect BT's latest view of achievable cost savings. These forecasts included an update on the potential scope of cost reductions in the business based on BT's ongoing transformation programme (Project [X]). As part of this programme, the potential scope of cost reductions [X]¹⁵⁰ and reduced in BT's forecasts.

A19.77 Our analysis of BT's forecast data indicates that, when calculated on a basis that is consistent with our modelling approach, BT is forecasting average annual cost savings for non-repair operating costs of 3.3% over the period 2017/18 to 2020/21. This indicates that BT might not be able to continue to achieve cost savings in line with historical levels, although we note that there may be more scope for savings than is indicated by BT's

dated 18 August 2017 to questions D4 and D5 of the 29th s.135 notice and 6 October 2017 to questions D1 and D2 of the 29th s.135 notice). The cost lines used for TSO in the forecast analysis are: Pay, Network Maintenance and IT, Energy, Other External and Transfers In. The cost lines used for Openreach in the forecast analysis are: Pay, Leavers, Other External and Transfers In. The granular weighting data discussed above is in each of these cases aggregated as appropriate to reflect the cost lines used.

¹⁵⁰ Openreach response dated 13 September 2017 to question 16a of the 34th s.135 notice.

forecasts as BT has identified some cost saving initiatives that are in the pipeline but have yet to be approved, and are therefore not included in these forecasts.¹⁵¹

Table A19.8: Estimates of forecast cost savings for non-repair operating costs from the management accounting analysis (2017/18 to 2020/21)

	Average forecast cost saving
Openreach	[X]%
TSO	[X]%
Weighted	3.3%

Source: Ofcom analysis

Benchmarking and external studies

A19.78 In this section, we consider evidence from various benchmarking and external studies. We consider that appropriate benchmarking studies and wider economic studies of efficiency can provide a potentially informative source of evidence since they can be used to assess BT's relative efficiency performance.

A19.79 However, there are limitations to the extent to which we can rely on these studies since it is difficult to make comparisons on a like-for-like basis. For example, in benchmarking studies, the impact of differences in exogenous factors (e.g. population density) on differences in cost between operators needs to be carefully controlled for. If a benchmarking study does not control for such factors, then this affects the interpretation of differences in cost between operators as being due to differences in efficiency rather than differences in these exogenous factors.

A19.80 We have assessed the relevance of the results from these studies by considering the extent to which they have calculated efficiency in a way that is consistent with our modelling approach.

[X] study

A19.81 In the March consultation, we explained that BT had provided us with the details of a [X] study undertaken by [X].¹⁵² This study [X].

A19.82 The study [X].¹⁵³ [X].

A19.83 In the March consultation, we proposed to [X].¹⁵⁴ [X].¹⁵⁵ [X].

¹⁵¹ Openreach response dated 4 January 2018 to question 1 of the 43rd s.135 notice.

¹⁵² [X] provided in Openreach's response dated 22nd December 2016 to question B3 of the 20th s.135 notice.

¹⁵³ [X].

¹⁵⁴ Openreach response dated 31 January 2017 to question B4 of the 20th s.135 notice.

¹⁵⁵ [X].

A19.84 We noted [REDACTED].¹⁵⁶ [REDACTED].

A19.85 We asked BT about the accuracy of these driver volumes and it stated that it was aware of the issues and was “working with [the author] to provide revised results”.¹⁵⁷ Given these data issues, we placed low weight on this study in determining our proposed efficiency target. However, we considered that [REDACTED] and stated that we would revisit our assessment if the data issues could be resolved.

A19.86 Since the March consultation [REDACTED].¹⁵⁸ [REDACTED].

A19.87 Using the same methodology described above and [REDACTED], we have calculated efficiency estimates for the Relevant Services [REDACTED]. The table below presents our results for both operating costs and capital expenditure. We refer to the results for capital expenditure when discussing our capital expenditure efficiency target later in this section.

A19.88 [REDACTED].¹⁵⁹ [REDACTED].

Table A19.9: Forecast cost savings per annum from analysis of [REDACTED] study by [REDACTED]

	Cost drivers	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Operating costs	[REDACTED]	[REDACTED]	[REDACTED]%	[REDACTED]%	[REDACTED]%
	[REDACTED]	[REDACTED]	[REDACTED]%	[REDACTED]%	[REDACTED]%
	[REDACTED]	[REDACTED]	[REDACTED]%	[REDACTED]%	[REDACTED]%
	[REDACTED]	[REDACTED]	[REDACTED]%	[REDACTED]%	[REDACTED]%
Capital expenditure	[REDACTED]	[REDACTED]	[REDACTED]%	[REDACTED]%	[REDACTED]%
	[REDACTED]	[REDACTED]	[REDACTED]%	[REDACTED]%	[REDACTED]%

Source: Ofcom analysis of [REDACTED]

A19.89 [REDACTED].

A19.90 [REDACTED].

Other studies

A19.91 In the March consultation, we considered the relevance of three benchmarking studies to our assessment of operating cost efficiency. As explained below, we still consider that there are limitations to the relevance of these studies:

- A 2016 study by Gartner compared spending on IT for nine European telecommunications operators.¹⁶⁰ We note that spending on IT accounts for a relatively

¹⁵⁶ [REDACTED].

¹⁵⁷ Openreach response dated 20 February 2017 to question 4 of the 24th s.135 notice.

¹⁵⁸ [REDACTED] provided in Openreach’s response dated 13 September 2017 to question 16c of the 34th s.135 notice.

¹⁵⁹ [REDACTED].

¹⁶⁰ Openreach response dated 16 December 2016 to question B1 of the 20th s.135 notice.

small proportion of BT's costs for the Relevant Services. We also have concerns about the comparability of results between operators as BT was, at the time of the study, the only fixed-only operator in the sample.

- A study by Deloitte estimating total factor productivity (TFP) growth for nine telecommunications operators over the period 2002 to 2014 which BT submitted in response to the June 2015 LLCC Consultation.¹⁶¹ As in the 2016 BCMR Statement we consider there are potential data issues and that the study is not consistent with our modelling approach.¹⁶²
- Studies by NERA analysing data from 1996 to 2006 and a study by KPMG analysing data from 1987 to 2006 which BT submitted in response to the June 2015 LLCC Consultation. As in the 2016 BCMR Statement we consider there to be issues in relying on studies that analyses changes in costs over periods that long ago. It is doubtful that such changes are relevant to how costs may change over the charge control period even assuming the studies analysed cost in ways that are consistent with our charge control modelling approach.¹⁶³

Economy-wide multi-factor productivity (MFP) and labour productivity studies

A19.92 In the March consultation, we also considered whether we could use measures of efficiency for the UK economy as a whole as benchmarks to help us determine an efficiency target for the WLA market. The different measures of efficiency and our views on their relevance are set out below:

- Office for National Statistics' (ONS) estimates of historic MFP for the economy overall and by sector, which could be considered as measures of frontier shift efficiency. The results for Sector J, Information and Communications, vary significantly by year. Average MFP growth in the sector over the period 1998 to 2015 was 2.8% per annum. The average since 2010 is considerably lower, at 1.7% per annum.¹⁶⁴
- An International Monetary Fund (IMF) paper that contains estimates of historical MFP in the UK. The IMF estimated that MFP growth in the Information and Communications sector declined from 3.5% per annum between 2006 and 2008 to 1.3% per annum over the period 2009 to 2014.¹⁶⁵
- The Office for Budget Responsibility's (OBR) November 2017 forecasts of labour productivity growth in the UK suggest growth of 1.0% per annum in productivity per hour over the charge control period.¹⁶⁶

¹⁶¹ Openreach response to the June 2015 LLCC Consultation, Annex G.

¹⁶² A detailed review of the 2015 Deloitte study is given in paragraphs A29.182-A29.188, Annex 29 of the 2016 BCMR Statement.

¹⁶³ 2016 BCMR Statement, paragraph A29.191.

¹⁶⁴ ONS, April 2017, *Multi-factor productivity estimates: Experimental estimates to 2015*.

¹⁶⁵ IMF 2016, Country Report No. 16/58, United Kingdom: Selected Issues, <https://www.imf.org/external/pubs/ft/scr/2016/cr1658.pdf>.

¹⁶⁶ Table 1.6 of OBR, Economic and fiscal outlook supplementary economy tables – November 2017. <http://budgetresponsibility.org.uk/efo/economic-fiscal-outlook-november-2017/> [accessed 31 January 2018].

A19.93 In its response to our March consultation, BT referred to the ONS study cited above as well as two other ONS studies that it said showed growth “hovering around 0%”¹⁶⁷ both in labour productivity in the whole economy¹⁶⁸ and in productivity per hour in the ‘Information and Communications’ sector and the whole economy.¹⁶⁹ BT considered that this evidence suggested our proposed efficiency target was too high.

A19.94 However, the concerns that we outlined in the March consultation continue to apply to these studies. These studies either do not estimate efficiency in a way that is consistent with our modelling approach or have other issues that make them not relevant to our assessment of efficiency targets for this charge control. Our concerns with these studies include:

- The ONS studies use data on gross value added that includes measures of historical capital investment whereas we apply our efficiency assumption only to (new) capital expenditure.
- The ONS studies show efficiency or productivity growth will vary by sector, with telecoms being one of the higher performing sectors. Estimates for the whole economy are therefore unlikely to be relevant when setting efficiency targets for BT. In addition, even the ONS results for Sector J, Information and Communications, cover a wide range of activities including software publishing (division 58), motion picture and sound recording activities (division 59), radio and TV broadcasting and programming activities.
- Recent work contributed to by ONS staff found that the ONS’ historical estimates of productivity in the telecoms sector between 2010 and 2015 may have been understated due to its approach to measuring quality-adjusted prices in the sector.¹⁷⁰ As a result of this work the ONS is planning to implement changes to the national accounts planned for inclusion in the 2019 ONS Blue Book.¹⁷¹
- The treatment of volume growth in all the studies is inconsistent with how we model the effects of volume growth.

Review of public information

¹⁶⁷ Paragraph 18 of Annex 1 to Openreach’s efficiency response to the March 2017 WLA Consultation.

¹⁶⁸ Office for National Statistics, Labour productivity: April to June 2017, October 2017.

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/bulletins/labourproductivity/apriltojune2017> [accessed 31 January 2018].

¹⁶⁹ Office for National Statistics, Measuring output in the Information Communication and Telecommunications industries: 2016, October 2016.

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/measuringoutputintheinformationcommunicationandtelecommunicationsindustries/2016> [accessed 31 January 2018].

¹⁷⁰ M. Abdirahman (ONS), D. Coyle (University of Manchester), R. Heys (ONS) and W. Stewart (The Institution of Engineering and Technology), A Comparison of Approaches to Deflating Telecoms Services Output, December 2017. <https://www.escoe.ac.uk/wp-content/uploads/2017/02/ESCoE-DP-2017-04.pdf> (accessed 20 February 2018)

¹⁷¹ ONS, Economic Statistics Centre of Excellence – helping ONS measure the fast-changing, modern economy, 12 January 2018. See

<https://www.ons.gov.uk/news/news/economicstatisticscentreofexcellencehelpingonsmeasurethefastchangingmodernconomy> (accessed 20 February 2018).

A19.95 We have reviewed public statements by BT and other external views on BT's cost transformation programmes.

A19.96 In the March consultation, we reviewed the following public information:

- a presentation that BT made to an investor meeting to discuss its Q2 2016/17 results in November 2016; and
- a transcript from BT's presentations at its capital markets day held in May 2016.

A19.97 The slides from BT's investor meeting on Q3 2016/17 results¹⁷² showed operating cost savings of £4.7bn made across the group from 2008/09 to 2015/16. We said in our March consultation that this was a reduction of 6.9% per annum in real terms. The presentation also noted cost synergies of circa £400m by 2019/20 in areas including IT, network and support functions because of BT's recent merger with EE. We considered that these synergies were likely to lead to lower costs across regulated markets over the charge control period.

A19.98 Following the March consultation, we have reviewed more recent public information. In BT's Q3 2017/18 results investor meeting BT referred to cost savings of £300m over the next two years. The savings arose as part of a restructuring programme to remove back office jobs across Global Services, Group functions and TSO and has an associated £300m cost. The slides also confirmed that EE integration synergies of £400m per annum are on track, with £150m delivered in 2016/17 (above the target of £100m) and £250m delivered in the first half of 2017/18.¹⁷³

A19.99 We note that these public statements are not specific to the Relevant Services and any cost savings reported are not consistent with our modelling approach. We also acknowledge that some of BT's public statements that we referred to in the March consultation may now be out of date. However, BT's more recent statements confirm that it has cut costs through EE integration synergies and that it believes there are significant opportunities to continue to make cost savings over the charge control period. We therefore consider that these statements provide qualitative evidence that cost savings are likely to materialise for the Relevant Services.

Efficiency assumptions in other charge controls

A19.100 We have also considered the efficiency assumptions we have adopted in recent fixed telecoms charge controls. We have summarised these efficiency assumptions in the table below. The table below table shows that we have adopted similar operating cost efficiency targets in the range of 4.5-5% per annum in recent charge controls. There has, however, been greater variation for capital expenditure targets.

¹⁷² BT Group plc Q3 2016/17 - investor meeting slide pack. We note that the link to these slides is no longer available.

¹⁷³ BT Group plc Q3 2017/18 - investor meeting slide pack, slides 6 and 12,

<https://www.btplc.com/Sharesandperformance/Quarterlyresults/Investormeeetingpack.pdf> (accessed 21 February 2018).

Table A19.10: Efficiency assumptions used in other charge controls

	Efficiency assumption	Charge control period	Comments
June 2014 WBA Statement	5.0% on operating costs ¹⁷⁴	2014/15 - 2016/17	Based on estimates of TSO's and BT Wholesale's efficiency. No assumption for capital expenditure.
2014 FAMR Statement	5.0% ¹⁷⁵	2014/15 - 2016/17	Applied to operating costs and capital expenditure. Based largely on estimates of Openreach's efficiency.
2016 BCMR Statement: TI services	4.5% on operating costs ¹⁷⁶	2016/17- 2018/19	Based on estimates of Openreach, TSO and BT Wholesale's efficiency. No assumption for capital expenditure.
2016 BCMR Statement: Ethernet services	5.0% on operating costs & 4.0% on capital expenditure ¹⁷⁷	2016/17- 2018/19	Based on estimates of Openreach, TSO and BT Wholesale's efficiency.

Source: Ofcom

A19.101 In the March consultation, we observed that a report produced by Ernst and Young (EY) for BT gave us some comfort that BT has outperformed the efficiency targets we set in the past.¹⁷⁸ In their consultation responses BT and EY stated that we misinterpreted EY's report for BT by assuming this found that BT had made historical operating cost savings of around 5% per annum. They noted the 5% value was an assumption that was used in "a counterfactual analysis to examine what the level of operating costs might have been under a rate of return regime".¹⁷⁹ We note BT's and EY's representation and have not relied on the results of the EY report to reach our decision.

A19.102 Our efficiency target of 5.0% in the 2014 FAMR Statement was to some extent informed by our analysis of BT's historical cost savings up to 2012/13. In response to the 2013 FAMR Consultation BT stated that "delivering efficiencies at the level seen in recent years will become more difficult to achieve going forward".¹⁸⁰ We note that our historical analyses of BT's regulatory cost and management accounting data (described above) suggest average annual cost savings across all operating costs of 4.5% and 5.5% respectively since 2012/13.

¹⁷⁴ June 2014 WBA Statement, paragraphs A7.191-A7.197.

¹⁷⁵ 2014 FAMR Statement, paragraphs A16.101-A16.111.

¹⁷⁶ 2016 BCMR Statement, paragraph A29.4.

¹⁷⁷ 2016 BCMR Statement, paragraph A29.4.

¹⁷⁸ EY report commissioned by BT, "BT's Regulatory Profitability response", 3 October 2016, page 9, paragraph 4.12.

¹⁷⁹ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraph 294.

¹⁸⁰ Openreach response to the 2013 FAMR Consultation, paragraph 477.

Interpretation of available evidence

A19.103 As set out above, we have considered numerous sources of evidence to determine our operating cost savings targets. In reaching our decision, we have given different weights to each piece of evidence. In particular, we have given more weight to sources of evidence that we consider to be more robust and that most closely correspond to the services and the time period that we are forecasting.

Our proposals

A19.104 In our March consultation, we proposed an efficiency target for operating costs of between 3.5% and 6.5%, with a base case of 5.5%. We gave the following weights to the information that we considered:

- We gave high weight to the analysis of regulatory accounting information from BT as it used the same operating cost formulae as the top down model. However, we recognised this did not provide a view of forecast cost savings over the charge control period.
- We gave lower weight to historical and forecast BT management accounting information than in the past as the forecasts had not been formally signed off by BT Group at the time of our consultation.
- We gave low weight to benchmarking studies undertaken for BT, as well as various telecoms-specific and economy-wide studies. This is because the studies were inconsistent with our modelling approach and the range of costs that we applied our efficiency estimates to.
- We gave some weight to public statements made by BT. We considered that these statements provided qualitative evidence that cost savings will continue to materialise at the levels similar to those observed historically.
- We placed little weight on the efficiency targets adopted in recent charge controls we have set as we considered it was more appropriate to give greater weight to more recent and relevant evidence.

Stakeholder responses

A19.105 TalkTalk considered that our proposed range (3.5% to 6.5%) and base case (5.5%) were too low based on the evidence presented in the March consultation. It suggested that a more appropriate range was 5.0% to 6.9%, with a base case of 6.0%.¹⁸¹

A19.106 TalkTalk also suggested that efficiency targets should be set using the ‘fair bet’ principle in that BT should have only a 50% chance of meeting the assumption even if it is fully efficient. It argued that setting the efficiency target in this way would “ensure that on average BT will earn its cost of capital if it is fully efficient”.¹⁸²

¹⁸¹ TalkTalk response to the March 2017 WLA Consultation, pages 27-28.

¹⁸² TalkTalk response to the March 2017 WLA Consultation, pages 27-28.

A19.107 [S<] considered that BT should be pushed harder on operating cost efficiency and that the efficiency target should be set at the “very top end of any range estimated, not just ‘near the top end’”. It added that BT achieved a 40% return on capital employed in some markets, which it said suggested that a 5.5% efficiency target was “an order of magnitude” too low.¹⁸³

A19.108 Openreach stated that an efficiency target of 5.5% per annum for operating costs was “unrealistic” in the context of our QoS proposals¹⁸⁴ and noted that it seemed “very out of line with the typical 1% to 2% target used by other UK sector regulators”.¹⁸⁵

A19.109 Openreach also considered that our analysis placed too much weight on historical BT data which it argued was not necessarily a good predictor of the future. It believed greater weight should be placed on its forecast management accounting data, which suggested relatively lower cost savings. It added that, since the forecasts used in the March consultation, the potential scope of cost reductions had been assessed based on BT’s ongoing transformation programme (Project [S<]) and were now forecast to be around 2.2% per annum over the charge control period.¹⁸⁶

A19.110 BT also considered that a large proportion of its cost base could not be reduced within the charge control period due to it being a price taker (e.g. for electricity) or its costs being based on longer term contracts (e.g. rent).¹⁸⁷

Our reasoning and decisions

A19.111 We have updated the sources of evidence as described above and considered the available evidence in the round to determine an appropriate efficiency target for non-repair operating costs.

A19.112 In relation to TalkTalk’s view on our proposed range and base case, given the evidence presented in our March consultation, we have updated all of our analysis to include, for instance, BT’s 2016/17 outturn cost data as well as its latest forecast data. In addition, as we have excluded repair operating costs from our analysis where possible, our updated analysis is not directly comparable to the analysis presented in the March consultation. We explain how we have used the updated evidence to determine an appropriate efficiency target below.

A19.113 We have also considered the ‘fair bet’ approach suggested by TalkTalk and [S<]’s view that an efficiency target should be set “at the very top end of any range estimated, not just ‘near the top end’”.¹⁸⁸ We note that our objective is to set a challenging target, in the

¹⁸³ [S<] response to the March 2017 WLA Consultation, page 7.

¹⁸⁴ Openreach efficiency response to the March 2017 WLA Consultation, paragraphs 4-6.

¹⁸⁵ Openreach response to the March 2017 WLA Consultation, paragraph 295.

¹⁸⁶ Openreach efficiency response to the March 2017 WLA Consultation, paragraphs 4-6 and 65-67.

¹⁸⁷ Openreach response to the March 2017 WLA Consultation, paragraph 295.

¹⁸⁸ [S<] response to the March 2017 WLA Consultation, page 7.

interest of promoting efficiency, but also one that “*should be capable of being met and exceeded*”.¹⁸⁹

A19.114 [8] cited the 2013 Narrowband Statement where we noted that, on the face of the 2013 RFS, BT appeared to earn a 40% return on capital employed on interconnect services.¹⁹⁰ However, as explained in the 2013 Narrowband Statement, we consider this figure to be misleading as it is largely the result of a heavily depreciated asset base.¹⁹¹

A19.115 In respect of BT’s assertion that our proposed efficiency target was out of line with that of other regulators when assessing this evidence, our targets are set for the services included in the top-down model for this charge control based on the evidence described in this annex. Given that the targets set by other regulators relate to different companies, services and sectors, we do not consider them to be a relevant source of evidence.

A19.116 We note BT’s view that it has limited ability to reduce some costs due to it being a price taker (e.g. for electricity) or due to costs being based on longer term contracts (e.g. rent).¹⁹² We note that our analysis takes this into account as we would expect this to also be the case in the historical and forecast BT cost data that informs our efficiency target.

A19.117 Forecasting cost savings requires a degree of judgement. In reaching our decision, we have carefully considered several sources of evidence in the round. Historical trends are useful only to the extent they can be repeated in future and can be calculated on a basis that is consistent with our modelling approach. Forecast data sources might be more relevant, but may be less reliable either because, in the case of BT’s forecasts, they do not represent an independent view or, in the case of third-party forecasts, are prepared on bases that are inconsistent with our modelling approach.

A19.118 We continue to consider that our regulatory cost analysis provides an important source of evidence and attach a relatively high weight to it in coming to our decision. This analysis is consistent with the way we model costs within the top-down model and covers the same services. As explained above, we estimate the average annual cost saving achieved between 2012/13 and 2016/17 was 5.1%.

A19.119 BT’s historical management accounting data also provides evidence of historical cost savings. One of the limitations of this analysis (and our analysis of BT’s forecast management accounting data) is that we are unable to identify the repair costs that are forecast separately in the top-down model with the same degree of precision as in our regulatory cost analysis. The average annual historical efficiency estimate using this method is 6.8%.

¹⁸⁹ Competition Commission, Case 1111/3/3/09, August 2010, paragraph 2.191 (the Competition Commission is now the Competition and Markets Authority (CMA)).

¹⁹⁰ Ofcom, 2013. *Review of the fixed narrowband services markets, Statement on the proposed markets, market power determinations and remedies*, paragraph A6.213.

¹⁹¹ Ofcom, 2013. *Review of the fixed narrowband services markets, Statement on the proposed markets, market power determinations and remedies*, paragraph A6.214.

¹⁹² Openreach response to the March 2017 WLA Consultation, paragraph 295.

A19.120 We note BT's view that our analysis placed too much weight on historical data which it argued was not necessarily a good predictor of the future. However, we consider that, in the past, historical trends have proved to be a reasonably good indicator of future savings. We have also taken account of the following observation made by the Competition Commission:¹⁹³

“In general terms we think that the predictive power of historic rates of efficiency saving diminishes over time as circumstances, including cost structures and technology trends, change. In our view, however, the historical indicators of Openreach efficiency should be reliable for at least the first year of the price control, and represent useful indicators for the whole period under review.”¹⁹⁴

A19.121 We have taken account of BT's updated forward-looking cost estimates over the charge control period and its assessment of the potential for cost reductions in the business based on BT's ongoing transformation programme (Project [X]).

A19.122 These indicate that BT is not expecting to achieve future savings in line with historical trends. Our analysis of this data indicates that BT is forecasting average annual cost savings for non-repair operating costs of 3.3% (when calculated on a basis that is consistent with our modelling approach) over the period 2017/18 to 2020/21.

A19.123 However, we consider that BT's forecasts might overstate the reduction in future savings. For example, BT has identified some cost saving initiatives that are in the pipeline but yet to be approved and therefore not included in these forecasts. In this respect, we note that the [X] study and BT's public statements do not appear to indicate that we should expect a significant reduction in the rate of savings.

A19.124 We have placed less weight on other external studies since these studies are inconsistent with both our modelling approach (e.g. treatment of changes in volumes) and the range of costs to which we apply our efficiency estimates. However, we note that they are consistent with our view that further cost savings are possible.

Our decision

A19.125 We have weighed the evidence in the round in reaching our decision on the appropriate efficiency target. As discussed above, our objective is to set a target which is 'capable of being met and exceeded' but also one that is challenging.

A19.126 We continue to consider that historical trends provide a useful indicator of future savings over the charge control period. We also note BT's argument that it may not be possible to achieve the same level of savings in future but are not persuaded by its arguments that its cost savings will fall by as much as its forecasts suggest.

A19.127 We therefore consider that an appropriate target for BT would be 4.5% on non-repair operating costs, being slightly below our estimate of the average level of efficiency savings

¹⁹³ Now the Competition and Markets Authority (CMA).

¹⁹⁴ Competition Commission, *The Carphone Warehouse Group plc v Office of Communication*, Case 1111/3/3/09, Determination, August 2010, paragraph 2.185.

achieved over the last four years but higher than indicated in BT's forecasts. We therefore consider that it is challenging but is capable of being met and exceeded.

Capital expenditure efficiency

A19.128 In this section, we set out our decisions on capital expenditure efficiency. In doing so, we discuss our consultation proposals, stakeholder responses and our further reasoning and decisions. We cover the following:

- our general approach to determining an efficiency target that is consistent with the way it is applied in the top-down model;
- sources of evidence that we have considered to inform our efficiency target; and
- how we have used these various sources of evidence to determine an appropriate overall efficiency target over the charge control period.

General approach

Our proposals

A19.129 In the top-down model we forecast growth capital expenditure in each year between the base year (then 2015/16) up to and including the final year of the charge control period (2020/21) by adjusting for the estimated impact of asset price inflation, changes in volumes, and efficiency. We did not apply our efficiency target to forecasts of other capital costs such as depreciation or mean capital employed.

A19.130 We used a different approach to analysing efficiency for capital expenditure to that used for operating costs. This was because our analysis of operating cost efficiency using BT's regulatory cost and management accounting data could not be extended to analyse its capital expenditure in a way that was consistent with our treatment of capital expenditure in the top-down model. Our forecasts of capital expenditure in the top-down model are the sum of steady state and growth capital expenditure.¹⁹⁵ BT, like most other companies, does not keep separate records on capital expenditure that is required to meet growth, steady state or reinstatement requirements.¹⁹⁶

A19.131 In the March consultation, our proposed approach to assessing an efficiency target for capital expenditure included:

- estimating efficiency for different types of capital expenditure by analysing historical management accounting data from BT for the Relevant Divisions;
- undertaking analysis of programme-level capital expenditure data using PVEO¹⁹⁷ analyses produced by Openreach;¹⁹⁸ and

¹⁹⁵ We forecast growth capital expenditure using component growth rates and asset volume elasticities. We forecast these elements separately, but both are subject to our assumptions on efficiency and asset price inflation.

¹⁹⁶ This is true for both BT's regulatory accounting and management accounting data.

¹⁹⁷ PVEO analysis is a management accounting tool that breaks down annual movements in cost as being due to either Price (P), Volumes (V), Efficiency (E) or Other (O).

¹⁹⁸ In doing this we recognised that TSO no longer produces PVEO analyses.

- analysing the results of a [§<] undertaken for BT by [§<].

Stakeholder responses

A19.132 Openreach considered that our approach risked double counting pricing effects. It stated that our assessment of capital expenditure efficiency was based on total spend which included the impact of technological progress and input price changes. It noted that our approach to input prices elsewhere – the valuation of copper and duct at RPI and all other assets at historical cost – resulted in a 2% real price reduction per annum. It stated that our 3% capital expenditure efficiency target was applied in addition to this, resulting in an effective target of around 5% per annum.¹⁹⁹

A19.133 No other stakeholders commented on our general approach to assessing capital expenditure efficiency.

Our reasoning and decisions

A19.134 In relation to Openreach's view that our approach risks double-counting pricing effects we note that, as in the March consultation, our efficiency target for capital expenditure is applied net of our assumptions about asset price inflation. In the analysis that informs our efficiency target we therefore also estimate cost savings as the residual change in cost after accounting for the impact of asset price inflation (and changes in volumes).

A19.135 We therefore decided to maintain the approach we consulted on in our March consultation.

Sources of evidence

A19.136 In this section, we present our updated analysis of the various sources of evidence that we have considered to inform our efficiency target for capital expenditure. We discuss:

- our approach to estimating historical efficiency for different types of capital expenditure using BT's historical management accounting data;
- our analysis of BT's historical and forecast programme-level capital expenditure data; and
- our use of benchmarking and other external studies.

Historical efficiency for different types of capital expenditure

A19.137 To inform our view of what BT might be able to achieve in the future we have analysed its historical cost savings over 2014/15 to 2016/17 for different types of capital expenditure using the management accounting data. The different categories we have considered are:²⁰⁰

- Capitalised pay – the capitalisation of pay costs for BT employees;

¹⁹⁹ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraphs 296-387.

²⁰⁰ Category descriptions from Openreach response dated 16 December 2016 to question G1 of the 20th s.135 notice.

- Civil engineering – costs for work undertaken by external third parties to complete civil engineering activity;
- Sub-contractor – costs incurred with external third parties and includes labour-related costs, equipment purchases, traffic management, tree cutting and capitalisation of vehicle costs and tools;
- Stores – cost of capital stores purchased and managed by BT; and
- Other – costs that do not map to the categories above.

Our proposals

A19.138 In the March consultation, we estimated annual capital expenditure cost savings for each of the Relevant Divisions and categories set out above.²⁰¹ We then weighted these outputs to obtain annual estimates of cost savings which reflected the mix of capital expenditure for the Relevant Services as well as the contribution of each Relevant Division.

A19.139 For capitalised pay we estimated cost savings by using our estimates of operating pay cost savings from our analysis of BT's management accounting data. We adjusted these estimates by the difference between our pay operating cost inflation assumption (used to derive the pay operating cost saving estimates) and our asset price inflation assumption to ensure consistency with our approach in the top-down model.²⁰²

A19.140 For civil engineering, we estimated cost savings by analysing annual movements in unit cost for civil engineering activities, which we weighted based on the relative contribution of each activity to civil engineering capital expenditure on the Relevant Services. Finally, we calculated efficiency as the difference between this weighted annual movement in unit cost and our asset price inflation assumption.

A19.141 BT was not able to provide unit cost information for sub-contractor, stores and other capital expenditure in a suitable format for our analysis due to the way costs were recorded on its systems and the wide range of activities that were covered.²⁰³ We therefore proposed to adopt some simple assumptions for historical cost savings for these categories. We considered two scenarios for sub-contractor costs, assuming either no efficiency gains or that these costs may be subject to the same process and task-time improvements as we estimated for capitalised pay (as some of the sub-contractor costs related to labour costs). We proposed to assume no cost savings were achieved on stores and other capital expenditure, noting that these categories represented a relatively small proportion of total capital expenditure on the Relevant Services.

Stakeholder responses

²⁰¹ We note that there is no civil engineering category for TSO (Openreach response dated 16 December 2016 to question G1 of the 20th s.135 notice)

²⁰² For instance, suppose we estimated 5% efficiency on pay operating costs in a year using a pay operating cost inflation assumption of 3%. If our asset price inflation in that year was 2% then our estimate of efficiency on capitalised pay costs would be: $5\% - (3\% - 2\%) = 4\%$.

²⁰³ Openreach response dated 3 January 2017 to question G2 of the 20th s.135 notice.

A19.142 In relation to capitalised pay, Openreach considered that we had incorrectly adjusted our pay operating cost efficiency estimates for inflation to obtain capitalised pay efficiency estimates. It suggested that either of the following two methods were appropriate:²⁰⁴

- adjusting our asset inflation assumption to be the same as our pay operating cost inflation assumption when estimating capitalised labour costs, however it noted that this would require a breakdown of the component capital costs into capitalised pay and other; or
- subtracting from our pay operating cost efficiency estimates the difference between our pay operating cost and asset inflation assumptions.

A19.143 Openreach considered that achieving the same efficiency as capitalised pay costs was “unrealistic” for sub-contractor costs and that we should assume zero efficiency as a base case. It noted that sub-contractor resource was paid on completion independent of time spent on tasks. Openreach acknowledged that it could in theory negotiate lower prices with its suppliers but that such an outcome was “implausible”. For instance, it considered that future negotiations were likely to lead to price increases due to factors such as expected labour shortages following the referendum on whether the UK should remain a member of the EU or not (the “EU referendum”).²⁰⁵

A19.144 In relation to civil engineering costs, Openreach observed that our analysis of its data suggested inefficiencies (i.e. increases in cost net of volume and inflation effects) due to contract renegotiations. It stated that costs were rising not necessarily because engineers were becoming less efficient but because the underlying costs had increased and noted that it was therefore important to consider the two effects together when assessing overall cost savings.²⁰⁶

A19.145 No other stakeholders commented on our analysis of historical efficiency for different types of capital expenditure.

Our reasoning and decisions

A19.146 Since the March consultation we have updated our analysis of historical efficiency for different types of capital expenditure with an extra year of data (2016/17). The table below shows the proportion of capital expenditure on the Relevant Services incurred by each Relevant Division. It shows that Openreach accounts for the majority of capital expenditure on the Relevant Services.

Table A19.11: Breakdown of capital expenditure by division for the Relevant Services

	Openreach	TSO
2014/15	[X]% (80-100%)	[X]% (0-20%)

²⁰⁴ Openreach efficiency response to the March 2017 WLA Consultation, paragraph 76.

²⁰⁵ Openreach efficiency response to the March 2017 WLA Consultation, paragraphs 78-81.

²⁰⁶ Openreach efficiency response to the March 2017 WLA Consultation, paragraph 82.

	Openreach	TSO
2015/16	[X]% (80-100%)	[X]% (0-20%)
2016/17	[X]% (80-100%)	[X]% (0-20%)

Source: Ofcom analysis of BT data²⁰⁷

A19.147 As discussed in Annex 17 we have decided to adopt asset price change assumptions that ensure duct and copper assets are valued consistently with how they are revalued for CCA purposes in BT's RFS. We have assumed that all other asset prices stay constant in nominal terms. We have therefore calculated asset price inflation by weighting together these assumptions based on the relative contribution to the Regulatory Asset Value (RAV) made by duct and copper compared to all other assets.²⁰⁸ The resulting average asset price inflation is 2.1% per annum between 2013/14 and 2020/21.

Capitalised pay

A19.148 Capitalised pay accounted for on average [X]% (20-40%) of capital expenditure by the Relevant Divisions on the Relevant Services over the period 2014/15 to 2016/17.²⁰⁹

A19.149 In general, as stated in the March consultation, we would expect labour efficiency on capital activities to be similar to that on operating costs, especially for engineering activities as they would be subject to similar initiatives on process improvements and work scheduling.

A19.150 As in the March consultation, we have used our estimated efficiencies on pay operating costs for Openreach and TSO from our analysis of BT's management accounting data.²¹⁰ We have then subtracted from these pay operating cost efficiency estimates the difference between our pay operating cost and asset inflation assumptions in each year to ensure consistency with our approach in the top-down model. We note that this approach is the same as that suggested by BT in its response and is also the approach we used in the March consultation.

A19.151 The resulting estimates of historical cost savings for capitalised pay costs for each Relevant Division are shown in the table below.

²⁰⁷ Openreach responses dated: 16 December 2016 to question G1 of the 20th s.135 notice and 23 January 2018 to question 15b of the 34th s.135 notice.

²⁰⁸ We have calculated the relative contribution of duct and copper to the RAV in each year using FAC data from AFI schedule 3 that BT provides to us annually. For the years after 2016/17, we have used the relative contribution of duct and copper in 2016/17.

²⁰⁹ Openreach responses dated: 16 December 2016 to question G1 of the 20th s.135 notice and 23 January 2018 to question 15b of the 34th s.135 notice.

²¹⁰ Our assessment of capital expenditure efficiency relates to all capital expenditure (i.e. it is not split between repair and non-repair costs) and we therefore use pay operating cost efficiency estimates based on costs for Openreach, rather than for Openreach excluding Openreach Service Delivery as used in our assessment of non-repair operating cost efficiency using BT's management accounting data.

Table A19.12: Estimated historical cost savings for capitalised pay costs

	2014/15	2015/16	2016/17	CAGR
Openreach	[X]%	[X]%	[X]%	7.6%
TSO	[X]%	[X]%	[X]%	8.5%

Source: Ofcom analysis

Civil engineering

A19.152 Civil engineering accounted for on average [X]% (10-20%) of capital expenditure by the Relevant Divisions on the Relevant Services over the period 2014/15 to 2016/17.²¹¹

A19.153 As in the March consultation, we have estimated historical efficiency for this type of capital expenditure as the difference between our estimate of the overall movement in unit cost for Openreach civil engineering activities²¹² related to the Relevant Services and our asset price inflation assumption. We consider that this approach is broadly consistent with our general approach to estimating efficiency as the remaining difference in annual cost after accounting for the impacts of inflation and changes in volumes.²¹³

A19.154 Specifically, we have analysed movements in unit cost between 2013/14 and 2016/17 for Openreach civil engineering activities with spend greater than £1m per annum across the top three suppliers for that activity.^{214 215} We have then weighted together the movement in unit cost for each of these activities based on their relative contribution to Openreach's civil engineering capital expenditure for the Relevant Services. This produces an estimate of the overall change in unit cost for these activities, from which we subtract our asset price inflation assumption. The resulting estimates of efficiency for civil engineering costs are shown in Table 19.13 below.

A19.155 We note that all of the estimates in the table are negative and therefore could be considered to represent inefficiency (i.e. cost increases). However, including these increases in the underlying costs (that are over and above our asset inflation assumptions) in our capital expenditure efficiency target is consistent with the way in which our capital expenditure efficiency target is applied in the top-down model. That is, as discussed above, our capital expenditure efficiency target captures any expected cost savings (or increases)

²¹¹ Openreach responses dated 16 December 2016 to question G1 of the 20th s.135 notice and 23 January 2018 to question 15b of the 34th s.135 notice. We note that this expenditure relates only to Openreach as TSO does not have a civil engineering capital expenditure cost category.

²¹² Openreach refers to these activities as "synthetics".

²¹³ We note that volume growth across the Relevant Services is generally quite low so the impact of changes in volumes on unit costs for capital expenditure is likely to be small.

²¹⁴ Openreach responses dated 3 January 2017 to question G2 of the 20th s.15 notice and 13 September 2017 to question 15c of the 34th s.135 notice.

²¹⁵ In the March consultation we limited our analysis to the top 15 activities over the period 2013/14 to 2015/16. This was due to the fact there were large increases in unit costs in 2015/16 due to contract renegotiations with Openreach's suppliers. The unit cost in 2015/16 therefore reflected a mixture of the old and new contract rates that applied in that year. We requested detailed contract-level data for each activity in order to estimate the unit cost based on the old rates and based on the new rates. We limited this detailed request to the top 15 activities with spend greater than £1m.

after accounting for the impact of our asset price inflation and volume growth assumptions (and as noted by Openreach this is likely to be due to increases in the underlying costs not inefficiency).

Table A19.13: Estimated historical cost savings for civil engineering costs

	2014/15	2015/16	2016/17	CAGR
Openreach	[X]%	[X]%	[X]%	-9.0%

Source: Ofcom analysis

Sub-contractor, stores, and other capitalised costs

A19.156 We have not been able to identify a reliable source of data on which to base our estimates of efficiency for sub-contractor, stores and other capitalised costs. Openreach was unable to supply information in a suitable format due to the way costs were recorded on its systems and the wide range of activities that were covered.²¹⁶ As in the March consultation, we have therefore decided to adopt some simple assumptions for efficiencies on these types of capital expenditure.

A19.157 Sub-contractor costs accounted for on average [X]% (20-40%) of capital expenditure by the Relevant Divisions on the Relevant Services over the period 2014/15 to 2016/17.²¹⁷

A19.158 We have considered Openreach's response where it noted it pays its sub-contractor resource per task completed and independently of time spent, and that while it "might be possible [to] deliver efficiency through negotiating lower prices from our suppliers, such an outcome is implausible" due to factors such as expected labour shortages following the EU Referendum.²¹⁸ However, we consider that it should be possible for BT's suppliers to achieve process and task time improvements and for some proportion of these efficiencies to be passed on to BT through the negotiation of lower prices. We have therefore generated a range for our overall historical capital expenditure savings estimate by assuming either no cost savings on sub-contractor costs, or the same cost savings as achieved on capitalised pay costs. In selecting a target that is not the upper bound of that range, our implicit assumption is that BT achieves lower cost savings on sub-contractor costs than on capitalised pay costs.

A19.159 Stores and other capitalised costs accounted for on average [X]% (10-20%) and [X]% (0-10%) respectively of capital expenditure by the Relevant Divisions on the Relevant Services over the period 2014/15 to 2016/17.²¹⁹ In the absence of further evidence enabling us to adopt a different approach since our March consultation, we remain of the view that that the approach we consulted on is reasonable. We have therefore decided to assume no efficiency gains for these types of capital expenditure, noting that these categories

²¹⁶ Openreach response dated 3 January 2017 to question G2 of the 20th s.135 notice.

²¹⁷ Openreach responses dated 16 December 2016 to question G1 of the 20th s.135 notice and 23 January 2018 to question 15b of the 34th s.135 notice.

²¹⁸ Openreach efficiency response to the March 2017 WLA Consultation, paragraphs 78-81.

²¹⁹ Openreach responses dated: 16 December 2016 to question G1 of the 20th WLA s.135 notice and 23 January 2018 to question 15b of the 34th s.135 notice.

represent a relatively small proportion of total capital expenditure on the Relevant Services.

Overall estimates of historical cost savings for capital expenditure

A19.160 We have estimated overall historical capital expenditure cost savings by weighting our estimates of cost savings for each type of capital expenditure by Relevant Division, taking account of the mix of capital expenditure for the Relevant Services. We have then weighted the estimates for each Relevant Division based on the contributions made to total capital expenditure on the Relevant Services. The resulting estimates are shown in the table below.

A19.161 As discussed above, we have generated a range for our overall historical capital expenditure savings estimate by assuming either no efficiency on sub-contractor costs, or the same efficiency as achieved on capitalised pay costs. Our analysis suggests cost savings for the Relevant Services of 1.1% to 3.8% per annum between 2014/15 and 2016/17.

Table A19.14: Historical capital expenditure savings estimates for the Relevant Services

	2014/15	2015/16	2016/17	CAGR
Overall (sub-contractor cost savings assumed zero)	[X]%	[X]%	[X]%	1.1%
Overall (sub-contractor cost savings assumed same as pay)	[X]%	[X]%	[X]%	3.8%

Source: Ofcom analysis

Analysis of programme-level capital expenditure data

A19.162 In this sub-section, we set out our analysis of historical and forecast cost savings for 2014/15 to 2020/21 for capital expenditure using BT's programme-level capital expenditure data.

Our proposals

A19.163 In the March consultation, we undertook some further analysis of capital expenditure efficiency using historical and forecast PVEO analyses produced by Openreach.²²⁰ This analysis considered movements in capital expenditure at the total level across programmes related to the Relevant Services.

A19.164 We noted that the way in which Openreach reflected the impact of inflation and changes in volumes in its PVEO analyses was unlikely to be consistent with how we reflected these

²²⁰ As noted above, TSO no longer produces PVEO analyses.

in our modelling.²²¹ We therefore estimated cost savings by analysing annual changes in capital expenditure from Openreach's PVEOs using our own inflation and volume assumptions. Under this approach, we analysed cost savings for two subsets of Openreach's capital expenditure which excluded programmes that we identified as unrelated to the Relevant Services.

A19.165 We noted that our analysis based on Openreach's PVEOs provided some further support for capital expenditure efficiency targets within our proposed range of 1% to 5%.

Stakeholder responses

A19.166 No stakeholders commented on our PVEO analysis of Openreach's programme-level capital expenditure data.

Our reasoning and decisions

A19.167 The capital expenditure PVEOs produced by Openreach and used in the March consultation separately identified major programmes with expenditure over £20m but aggregated all programmes with expenditure under £20m. Although we excluded from our analysis some major programmes which we considered were not related to the Relevant Services, our analysis may have included expenditure on other programmes under £20m that were not related to the Relevant Services.

A19.168 Following the March consultation, we requested historical and forecast Openreach capital expenditure by individual programme.²²² Openreach classified each programme as either: copper-specific, leased lines, BDUK-related or other. Our starting subset of programmes relevant to our assessment of efficiency for the Relevant Services were those classified as copper-specific or other. As in the March consultation, we then excluded the "OR Repayments Capital"²²³ and "OR Newsites"²²⁴ programmes. However, this more granular data allowed us to also exclude the "OR Core Fibre and Duct"²²⁵ programme as well as some non-material spend on a number of smaller programmes.²²⁶

A19.169 We continue to estimate efficiency as the remaining movement in annual cost after accounting for the impact of inflation and changes in volumes. As in the March consultation, we note that BT's estimates of price and volume effects in its PVEOs are

²²¹ We asked BT to explain how it calculated the Price and Volume effects within its PVEO analyses. It explained that the "price" element mainly related to pay inflation with some supplier inflation in certain years. The volume element was calculated at a programme level [3<]. Openreach response dated 27 January 2017 to questions 13 and 14 of the 23rd s.135 notice.

²²² Openreach responses dated: 30 May 2017 to question A8 of the 26th s.135 notice and 4 January 2018 to question 4 of the 43rd s.135 notice.

²²³ Repayments works are generally accounted for separately within BT's RFS and are not within the Relevant Services.

²²⁴ BT explained, in its response dated 27 January 2017 to question 13 of the 23rd s.135 notice, that the Newsites programme was not a copper-only programme and that "efficiency is largely NGA driven. However historically Newsites, were mainly copper". We have therefore excluded the Newsites programme as we are considering efficiency for non-NGA products and we do not know what proportion of this programme relates to copper services.

²²⁵ This programme relates to the "Provision of Core Fibre Cables to support the Backhaul Network between Main Nodes (exchanges)". Openreach response dated 4 January 2018 to question 4 of the 43rd s.135 notice.

²²⁶ For instance, a programme relating to the installation of mobile masts and legacy programmes relating to the 2012 London Olympic and 2014 Glasgow Commonwealth games.

unlikely to be consistent with our modelling. We therefore use our asset price inflation assumption in the relevant year when estimating efficiency and we assume that the effects of changes in volumes are minimal.²²⁷ The results of our analysis of total capital expenditure across the selected programmes are shown in the table below. Our analysis suggests average historical cost savings of 2.7% per annum between 2014/15 and 2016/17 and average forecast cost savings of 5.0% per annum between 2017/18 and 2020/21.

Table A19.15: Estimates of historical and forecast Openreach capital expenditure savings

	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Selected programmes	[X]%	[X]%	[X]%	[X]%	[X]%	[X]%	[X]%

Source: Ofcom analysis

Benchmarking and external studies

A19.170 In this section, we consider evidence from various benchmarking and external studies. As previously mentioned in the section on operating cost efficiency, we consider appropriate benchmarking data and wider economic studies of efficiency can provide a potentially informative source of evidence of the possible future improvements in efficiency.

However, there are limitations to the extent to which we can rely on these studies since it is difficult to make comparisons on a like-for-like basis.

Our proposals

A19.171 In our March consultation, we noted that BT provided us with the results of a [X] study undertaken for it by [X]. This study, which [X], is discussed in more detail in the previous section on operating cost efficiency. In the consultation, we noted that the study [X] but that we proposed to place lower weight on it than our other analysis of capital expenditure efficiencies due to unresolved data issues. We stated that we would revisit our assessment if these issues could be resolved.

A19.172 In our March consultation, we also considered the relevance of various other economy-wide studies. These included estimates of multi-factor productivity growth and labour productivity growth from the ONS, OBR and IMF, as discussed in the previous section on operating cost efficiency. In the consultation, we proposed to place no weight on the results of these studies due to inconsistencies with our modelling approach such as the treatment of volume effects. Specifically, we noted that the ONS studies used data on gross value added that included measures of historical capital investment, whereas we have applied our capital expenditure efficiency assumption only to new capital expenditure.

Stakeholder responses

²²⁷ Assuming the effect of changes in volumes is very small is a reasonable simplification given that volume growth across the Relevant Services is low. On that basis any growth element to capital expenditure should also be small.

A19.173 BT considered that our proposed target of 3% for capital expenditure efficiency was not supported by external evidence. It cited ONS estimates of labour productivity in construction which showed growth of around 0.2% per annum on average over the last decade. BT also noted that our target seemed out of line with the rates of efficiency improvement assumed by other UK sector regulators.²²⁸

A19.174 We received no further comments from stakeholders on our proposals.

Our reasoning and decisions

A19.175 As discussed in the previous section on operating cost efficiency, we place low weight on external studies of multi-factor and labour productivity due to both inconsistencies with our modelling approach (such as the treatment of volume effects) as well as data issues which may mean the ONS' historical estimates of productivity in the telecoms sector were understated.

A19.176 As discussed in the previous section on operating cost efficiency, since the March consultation BT has provided us with a revised version of the [X] study by [X] in which [X]. We have used this revised study to derive cost saving estimates for the Relevant Services for both operating costs and capital expenditure.²²⁹

A19.177 As previously mentioned, the study author noted [X].

A19.178 [X]. As previously mentioned, our objective is to set an achievable but stretching target. We do not believe that [X], as we have done when considering potential cost savings for operating costs.

A19.179 [X].

Table A19.16: Forecast cost savings per annum from analysis of [X] study by [X]

	[X]	[X]	[X]	[X]
Capital expenditure	[X]	[X]%	[X]%	[X]%
	[X]	[X]%	[X]%	[X]%

Source: Ofcom analysis of [X]

Interpretation of evidence

A19.180 As set out above, we have considered various sources of evidence to determine our capital expenditure efficiency target. Our decision reflects the different weights we have given to each piece of evidence. We have given more weight to sources of evidence that we consider to be more robust and that most closely correspond to the services and the time period that we are forecasting.

²²⁸ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraphs 295 and 389.

²²⁹ [X] provided in the Openreach response dated 13 September 2017 to question 16c of the 34th s.135 notice.

Our proposals

A19.181 In our March consultation we proposed an efficiency target for capital expenditure of between 1% and 5%, with a base case of 3%. We reached this proposal having:

- estimated efficiency for different types of capital expenditure by analysing historical management accounting data from BT. We placed most weight on this analysis which suggested an efficiency target of 1-5%;
- undertaken analysis of programme-level capital expenditure data using Openreach PVEO analyses. This analysis suggested efficiency of around 3% which we noted provided support for the results of the analysis described above; and
- analysed the results of a benchmarking study undertaken for BT by [§<]. We gave this evidence lower weight than our other analysis of capital expenditure data due to unresolved data issues.

Stakeholder responses

A19.182 Openreach considered that our forward looking gross capital expenditure efficiency assumption should be no more than 1%.²³⁰ It considered that there were strong indications that the forecasted level of potential cost reduction was unsupported by both internal (Openreach) and external evidence.²³¹ For instance, it observed that economy-wide estimates of UK labour productivity were relatively flat over the last decade,²³² and that a 3% efficiency target was out of line with the 1-2% assumptions used by other UK sector regulators.²³³

A19.183 No other stakeholders commented on our capital expenditure efficiency target.

Our reasoning

A19.184 Our analysis of efficiency for different types of capital expenditure suggests historical annual average cost savings of 1.1% to 3.8% between 2014/15 and 2016/17. We place medium weight on the results of this analysis. Our cost savings estimates for different types of capital expenditure are weighted to reflect both the mix of capital expenditure for the Relevant Services and the relative contribution of each Relevant Division to capital expenditure on the Relevant Services. However, although our analysis of cost savings for capitalised pay and civil engineering costs²³⁴ was specific and detailed, we have necessarily had to make some assumptions for cost savings achieved on the remaining categories of capital expenditure (sub-contractors, stores, and other) due to gaps in data availability.

A19.185 Our analysis of Openreach's programme-level capital expenditure data suggests historical average annual cost savings of 2.7% between 2014/15 and 2016/17 and forecast average

²³⁰ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraph 293 and Openreach efficiency response to the March 2017 WLA Consultation, paragraph 2.

²³¹ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraph 293.

²³² Openreach response to the March 2017 WLA Consultation – Volume 2, paragraph 389.

²³³ Openreach response to the March 2017 WLA Consultation – Volume 2, paragraph 296.

²³⁴ Capitalised pay and civil engineering accounted for on average [§<] (40-60%) of annual capital expenditure on the Relevant Services between 2014/15 and 2016/17.

annual cost savings of 5.0% between 2017/18 and 2020/21. We place medium weight on the results of this analysis which considers movements in capital expenditure at the total level across programmes related to the Relevant Services, and provides an indication of forecast cost savings over the charge control period. However, as previously mentioned, this analysis makes the simplifying assumption that the volume effect is zero. In addition, it is limited to capital expenditure by Openreach and does not consider capital expenditure by TSO.

A19.186 Our analysis of the results of the [X] study by [X] suggests [X].

A19.187 We note BT's comment that a 3% efficiency target is higher than external estimates of economy-wide productivity such as those produced by the ONS. However, as discussed in the previous section on operating cost efficiency, we place low weight on the results of these studies due to inconsistencies with our modelling approach such as the different treatment of volume effects. The ONS studies use measures of gross value added that include historical capital investment rather than only new capital expenditure which is what our efficiency target is applied to. Further, as discussed above, the ONS' historical estimates of productivity in the telecoms sector may have been understated due to data issues.

A19.188 We also note BT's comment that other UK sector regulators have set lower efficiency targets. We have set operating efficiency targets for BT, specifically for the set of services modelled in the top-down model for this charge control period. The targets set by other regulators relate to different companies, services and sectors and are not therefore a relevant comparison.

Our decision

A19.189 We have looked at the evidence in the round when considering the efficiency target for capital expenditure. As discussed above, our objective is to set a target which is "capable of being met and exceeded"²³⁵ but also one that is challenging. Our analysis of BT's historical efficiency for different types of capital expenditure suggests average annual historical cost savings of 1.1% to 3.8% between 2014/15 and 2016/17. Our high-level analysis of Openreach's capital expenditure on programmes related to the Relevant Services suggests average annual historical cost savings of 2.7% over the same period and average forecast cost savings of 5.0% over the charge control period. This suggests a range of 1.1% to 5.0%. We also place some weight on the [X] study which suggests [X]. We believe that a mid-point of 3.0% represents a stretching but achievable target for cost savings on capital expenditure over the charge control period.

²³⁵ Competition Commission, *The Carphone Warehouse Group plc v Office of Communication*, Case 1111/3/3/09, Determination, August 2010, paragraph 2.191.

A20. Cost of capital

A20.1 When setting a charge control, we are concerned with estimating the weighted average cost of capital (WACC) on a forward-looking basis. As described in Volume 2 Section 3, we have used a glidepath to align charges with costs in 2019/20 and 2020/21 (the final year of the control period). Therefore, for modelling purposes, we require an estimate of the WACC in both 2019/20 and 2020/21.²³⁶

A20.2 The cost models for the WLA charge controls are based on projections of nominal costs without explicit modelling of tax, therefore we require a forecast of the pre-tax nominal WACC.

A20.3 The WACC combines the cost of funding from debt and equity weighted by the gearing, i.e. the value of outstanding debt relative to total financing (i.e. value of debt and equity combined). For gearing, g , and corporate tax rate, t , the pre-tax WACC is defined as follows (since debt finance benefits from a tax shield whereas equity does not):

$$WACC = \frac{Ke * (1 - g)}{1 - t} + Kd * g$$

A20.4 In this formula, we calculate the cost of equity, Ke , using the Capital Asset Pricing Model (CAPM), such that the cost of equity is a function of the risk-free rate (RFR), the expected return on the equity market above the risk-free rate (i.e. the equity risk premium, or ERP) and the systematic risk of the company (i.e. equity beta, β_e):

$$Ke = RFR + ERP * \beta_e$$

A20.5 Our approach to calculating the cost of debt combines the same RFR assumption as used to estimate the cost of equity and adds to the RFR a debt premium (i.e. the corporate debt rate above benchmark risk-free assets), such that:

$$Kd = RFR + dp$$

A20.6 In the March 2017 Consultation, we proposed to adopt the same three-way disaggregation of the BT Group WACC used in the 2016 BCMR Statement and update some of the WACC parameters from those used in that statement. Having considered stakeholders' responses, we have decided to adopt the approach proposed for consultation, with some changes. The main changes from our consultation proposals relate to the following, which we explain in more detail later in this annex:

- a) a reduction in the RPI inflation forecast for 2020/21 from 3.2% to 2.9%, reflecting the most recent updates from the OBR;
- b) a reduction in the real RFR from 0.5% to 0%, reflecting the continuing decrease in long-run average yields on RPI index-linked gilts;

²³⁶ The differences between the 2019/20 and 2020/21 WACCs relate to the inflation and corporate tax assumptions.

- c) an increase in the real ERP from 5.5% to 6.1%. Combined with the reduction in the real RFR, this maintains the real total market return (TMR) at 6.1%, the same as that used in the 2016 BCMR Statement;
- d) an increase in the debt premium of 10 basis points applied to BT Group and each disaggregated part of BT to reflect more recent data on spreads;
- e) an increase in the Openreach copper access asset beta from 0.55 to 0.59 reflecting revised estimates of the BT Group asset beta;
- f) a reduction in the Other UK telecoms asset beta from 0.75 to 0.73 reflecting more recent evidence on benchmark asset betas for telecoms and ICT companies; and
- g) a reduction in the forward looking gearing estimate from 35% to 30% to reflect the exclusion of the pension deficit when measuring financial gearing.

A20.7 Our calculations of the WACC for BT Group, Openreach copper access, Other UK telecoms and the Rest of BT (RoBT) in the final year of the charge control (2020/21) are shown in Table A20.1. For this statement, we apply:

- the Openreach copper access pre-tax nominal WACC of 7.9% to WLA copper and passive access services; and
- the Other UK telecoms pre-tax nominal WACC of 8.9% to fibre access.

Table A20.1: BT WACC, 2018 WLA Statement (2020/21)

WACC component	BT Group	Openreach copper access	Other UK telecoms	RoBT	Source
Real RFR	0%	0%	0%	0%	Ofcom estimate
RPI inflation†	2.9%	2.9%	2.9%	2.9%	OBR
Nominal RFR	2.9%	2.9%	2.9%	2.9%	$= (1 + \text{RFR}) * (1 + \text{inflation}) - 1$
Nominal ERP	6.3%	6.3%	6.3%	6.3%	Ofcom estimate
Debt beta (β_d)	0.1	0.1	0.1	0.1	Ofcom estimate
Asset beta (β_a)	0.78	0.59	0.73	1.25	Ofcom estimate
Asset beta weight	100%	20%	65%	15%	Ofcom estimate
Gearing (forward looking) (g)	30%	30%	30%	30%	Ofcom estimate
Equity Beta (β_e)	1.07	0.80	1.00	1.74	$= (\beta_a - \beta_d * g) / (1 - g)$
Cost of equity (post-tax) (K_e)	9.6%	7.9%	9.2%	13.8%	$= \text{Nominal RFR} + \text{ERP} * \beta_e$
Cost of equity (pre-tax)	11.6%	9.5%	11.1%	16.7%	$= K_e / (1 - t)$
Debt premium (dp)	1.1%	1.0%	1.1%	1.2%	Ofcom estimate
Corporate tax rate (t) †	17.0%	17.0%	17.0%	17.0%	HMRC

Cost of debt (pre-tax) (Kd)	4.0%	3.9%	4.0%	4.1%	= Nominal RFR + dp
WACC (pre-tax nominal)	9.3%	7.9%	8.9%	12.9%	$= (K_e * (1-g)) / (1-t) + (K_d * g)$

Source: Ofcom²³⁷

A20.8 The parameter values underpinning the three-way disaggregation used in the March 2017 WLA Consultation are shown in Table A20.2 below.

Table A20.2: BT WACC, March 2017 WLA Consultation (2020/21)

WACC component	BT Group	Openreach copper access	Other UK telecoms	RoBT	Source
Real RFR	0.5%	0.5%	0.5%	0.5%	Ofcom estimate
RPI inflation	3.2%	3.2%	3.2%	3.2%	OBR
Nominal RFR	3.7%	3.7%	3.7%	3.7%	$= (1 + \text{RFR}) * (1 + \text{inflation}) - 1$
Nominal ERP	5.7%	5.7%	5.7%	5.7%	Ofcom estimate
Debt beta (β_d)	0.10	0.10	0.10	0.10	Ofcom estimate
Asset beta (β_a)	0.76	0.55	0.75	1.08	Ofcom estimate
Asset beta weight	100%	20%	65%	15%	Ofcom estimate
Gearing (forward looking) (g)	35%	35%	35%	35%	Ofcom estimate
Equity Beta (β_e)	1.12	0.79	1.10	1.61	$= (\beta_a - \beta_d * g) / (1-g)$
Cost of equity (post-tax) (Ke)	10.1%	8.2%	10.0%	12.9%	$= \text{Nominal RFR} + \text{ERP} * \beta_e$
Cost of equity (pre-tax)	12.2%	9.9%	12.0%	15.5%	$= K_e / (1-t)$
Debt premium (dp)	1.0%	0.9%	1.0%	1.1%	Ofcom estimate
Corporate tax rate (t)	17.0%	17.0%	17.0%	17.0%	HMRC
Cost of debt (pre-tax) (Kd)	4.7%	4.6%	4.7%	4.8%	= Nominal RFR + dp
WACC (pre-tax nominal)	9.6%	8.0%	9.4%	11.8%	$= (K_e * (1-g)) / (1-t) + (K_d * g)$

Source: Ofcom

A20.9 In the remainder of this annex we first respond to stakeholder responses on our overall approach to estimating the WACC before explaining our approach to setting each of the WACC parameters.

²³⁷ For comparison purposes, the UKRN annual update has previously reported real vanilla WACCs for UK regulators (where the vanilla WACC represents the post-tax cost of equity and the pre-tax cost of debt) with respect to RPI. The real-vanilla WACC (with respect to RPI inflation of 2.9%) is 4.9%, 3.7%, 4.6% and 7.8% for BT Group, Openreach copper access, Other UK telecoms and RoBT respectively. †These inflation and corporate tax rate assumptions relate to 2020/21. As explained in this annex, when estimating a WACC for 2019/20 we have used inflation and corporate tax rate assumptions relevant to this year; all other input parameters remain the same. Note: The pre-tax nominal WACC is rounded to one decimal place but all intermediate calculations are unrounded.

Stakeholder responses on our overall approach to the WACC

- A20.10 Oxera, in a report commissioned by Openreach, said that our proposed WACC for Openreach copper access equated to a real vanilla WACC of 3.6%. Oxera said this was lower than the prevailing decisions for any UK economic regulator, including water.²³⁸ Oxera argued that this was inconsistent with Ofcom’s previous recognition that telecoms businesses are riskier than traditional utilities such as water and energy.
- A20.11 We disagree with Oxera that a real vanilla WACC of 3.6% is lower than any prevailing decisions by UK economic regulators. For example, UKRN’s 2017 Cost of Capital Update Report²³⁹ indicates that the real vanilla WACC determined by the Northern Ireland Utility Regulator in 2014 was lower than this. As noted above, the pre-tax nominal Openreach copper access WACC (2020/2021) now equates to a real vanilla WACC (with respect to RPI) of 3.7%. We do not consider it is appropriate to compare this WACC to decisions made by other regulators several years ago, as market-wide parameters have changed since then. Looking at more recent proposals from other UK regulators, we note that Ofwat published its final methodology document in December 2017 (“2017 Ofwat methodology document”) which proposed a real vanilla WACC of 2.4%²⁴⁰ and the CAA published a consultation in December 2017 (“2017 CAA Consultation”) which included a vanilla WACC of 3.0% to 3.9% for Heathrow airport.²⁴¹ This indicates that the Openreach copper access WACC does not appear out of line with recent regulatory considerations.
- A20.12 Frontier Economics, in a report commissioned by Sky and TalkTalk, did not consider that there was significant value in reconciling estimates of the asset beta for Openreach copper access and Other UK telecoms to BT Group’s asset beta.²⁴²
- A20.13 We disagree with Frontier Economics that there is little value in our disaggregation approach. We consider it is important to reconcile our asset beta estimates for the disaggregated parts of BT back to the BT Group asset beta because:

²³⁸ Oxera report, page 1. Oxera compared our proposed WACC to decisions made by Ofwat, Ofgem, CAA and the CMA in 2014 and 2015.

https://www.ofcom.org.uk/_data/assets/pdf_file/0010/105022/Openreach-vol-2-annex-3-Oxera-report.pdf.

²³⁹ UKRN, *Cost of Capital Annual Update Report*, 31 May 2017, http://www.ukrn.org.uk/wp-content/uploads/2017/05/20170503-UKRN-Annual-WACC-Comparison-Report_FINAL.pdf

²⁴⁰ Ofwat, *Delivering Water 2020: Our final methodology for the 2019 price review*, page 157. <https://www.ofwat.gov.uk/publication/delivering-water-2020-final-methodology-2019-price-review/> [accessed 20 February 2018]

²⁴¹ See Table 5.1, CAA, *Economic regulation of capacity expansion at Heathrow: policy update and consultation*, December 2017, <http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8132> [accessed 20 February 2018]. The 3.0% to 3.9% range referenced is the “as is” range from Table C.1 which does not take into account the third runway at Heathrow.

²⁴² Frontier Economics, 2017. *WLA Market Review – Cost of capital for regulated services*, page 22.

https://www.ofcom.org.uk/_data/assets/pdf_file/0011/105032/Frontier-Economics-Economics-for-TalkTalk-and-SKY.pdf

Note that where we respond to comments made in the Frontier Economics report, we have not separately referenced the same comments made in Sky and TalkTalk’s response.

- No pure play comparator exists for the parts of BT's network that we regulate, especially the local access network.²⁴³ Although in principle we are trying to estimate the asset beta of an operator with an efficient ongoing national network providing the relevant wholesale services, the asset beta of BT Group is a relevant benchmark because it incorporates the asset betas of the regulated activities. This is particularly the case given that we regulate a relatively large proportion of BT's activities.²⁴⁴
- We do not include pension deficit repair payments (or pension holidays) in regulated charges meaning the risk of BT's defined benefit pension is in large part borne by investors in BT. Therefore, we consider that the associated risk should be reflected in the asset betas for each disaggregated part of BT, consistent with the approach set out in our 2010 Pensions Review Statement.²⁴⁵ In our view, the most practicable way to do this is to disaggregate the BT Group asset beta since it is the BT Group asset beta that incorporates investors' views of pension risk.

A20.14 [X] referred again to its 2015 BCMR Consultation response.²⁴⁶ We responded to these points in the 2016 BCMR Statement.²⁴⁷

BT Group WACC

A20.15 As noted above, we start with estimating the WACC for BT Group since we do not have a pure play comparator for the lines of business regulated in this review and the regulated activities within BT represent a large part of the company. We therefore want any disaggregated WACC for the regulated lines of business to be commensurate with the overall WACC for BT Group – which is all the more important when certain risks fall to investors that might not be borne by all comparators we might refer to (such as the risk emanating from the BT pension scheme).

A20.16 We need to estimate several parameters to calculate a WACC for BT Group. These are:

- Real RFR;
- Inflation (to estimate a nominal RFR);
- Equity risk premium (ERP);
- Equity beta, asset beta and gearing;
- Debt beta;
- Debt premium; and
- Corporation tax.

A20.17 The rest of this section sets out our final position on each of these parameters.

²⁴³ See Section 2 for a description of the network we are modelling.

²⁴⁴ According to the 2017 RFS, markets in which BT was found to have SMP represented 66% of returns and 41% of MCE.

²⁴⁵ In that statement, we explained that we considered BT's shareholders bear the risk and reward of the defined benefit pension scheme, so it is appropriate to reflect the risk of the pension scheme in the asset beta. See:

<https://www.ofcom.org.uk/consultations-and-statements/category-1/btpensions>.

²⁴⁶ We summarised this response at paragraph A30.15 of the 2016 BCMR Final Statement.

²⁴⁷ 2016 BCMR Final Statement – Annex 30, paragraphs A30.25-A30.26.

https://www.ofcom.org.uk/data/assets/pdf_file/0032/54977/final-annexes-29-30.pdf.

Real RFR

Our proposals

A20.18 In the March 2017 WLA Consultation we proposed to reduce the real RFR from 1.0% (as used in the 2016 BCMR Statement) to 0.5%. Our proposal reflected the continued reduction in yields on index-linked gilts. We noted that the proposed decrease in the real RFR, combined with the proposed increase in the ERP, did not have a significant impact on the cost of equity but that combined with our proposed debt premium it did reduce the cost of debt.

Stakeholder responses

A20.19 Oxera considered that our proposed reduction in the real RFR was excessively large and out of line with UK regulatory precedents.²⁴⁸ Oxera said that spot rates on index-linked gilts had declined sharply following the EU referendum result in June 2016 and argued that Ofcom's proposed reduction in the real RFR appeared to be driven almost entirely by this movement in yields.²⁴⁹ Oxera noted that after the EU referendum result, volatility of yields on government bonds increased sharply, and argued that, given this, any short-term movement in yields needed to be treated with caution, saying "it would not be advisable to make large adjustments in key parameters on the basis of this data".²⁵⁰ Oxera concluded that we should keep the real RFR at 1.0%, the same as that used in the 2016 BCMR Statement, arguing that this would be consistent with regulatory precedents and not unduly influenced by short-term market movements.²⁵¹

A20.20 Frontier Economics highlighted the importance of the real RFR since it is an input to both the cost of equity and cost of debt, and argued in particular that our proposal leads to a significant overstatement of the forward-looking cost of debt.²⁵² Frontier Economics said that Ofcom's proposed rate of 0.5% lay between the 10 and 15 year average for yields on index-linked gilts but was significantly above spot rates.²⁵³ Given the long-term downward trend in spot rates, Frontier Economics argued that there was no basis to assume that the real RFR would return to long-term averages within the timeframe of the charge control.²⁵⁴ Although Ofcom cited a number of factors that may have depressed returns on index-linked gilts, Frontier Economics said that Ofcom had not provided evidence that these factors fully explain current yields or that their effects will be lifted before the end of the charge control period.²⁵⁵ In addition, Frontier Economics argued that Ofcom cannot rely on

²⁴⁸ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 5.

²⁴⁹ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 5.

²⁵⁰ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 6.

²⁵¹ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 7.

²⁵² Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, pages 7 and 12.

²⁵³ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, pages 7-8.

²⁵⁴ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 8.

²⁵⁵ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 9.

decisions made by other UK regulators as evidence that its proposed approach was reasonable.²⁵⁶ Frontier Economics suggested that we should move to an approach based on forward RFR estimates and argued that we should use a real RFR of -1.5%, broadly equivalent to forward rates on 5 and 10 year gilts taken out in the last year of the charge control.²⁵⁷

- A20.21 In response to Oxera's report, TalkTalk said Oxera had ignored market data on index-linked gilts which had been decreasing consistently since 1995 and have been negative since 2014.²⁵⁸ TalkTalk said that in light of market data, the fall in yields cited by Oxera following the EU Referendum vote is irrelevant since an appropriate estimate of the real RFR was zero or lower before the vote and has reduced since then.²⁵⁹ TalkTalk added that Oxera's argument, supported by Openreach and BT, to ignore recent movements in gilt yields is the opposite to BT's argument in 2014 that we should take account of revenue increases in index-linked gilt yields.²⁶⁰
- A20.22 TalkTalk and Sky said that recent publications from Ofwat and the CAA support a lower real RFR than that proposed by Ofcom.^{261, 262} TalkTalk noted that the 2017 Ofwat methodology document used an estimate of the real RFR of -0.88% (with respect to RPI) while the 2017 CAA Consultation, supported by a report from PwC,²⁶³ proposed a range for the real RFR of between -1.4% and -1.0%.²⁶⁴

Our reasoning

- A20.23 We have updated our analysis of historical yields on index-linked gilts and forward rates on those gilts. In light of that analysis, and taking account of the effect on the cost of debt, have decided to reduce our estimate of the real RFR to 0.0% as explained below.

Yields on index-linked gilts

- A20.24 We have updated our analysis of movements in historical averages of yields on index-linked gilts to 29 December 2017. Table A20.3 compares the latest data to that presented in the March 2017 WLA Consultation (which used data to 31 December 2016) for both five and ten-year gilts. Yields on five and ten-year index-linked gilts are negative over averaging periods of ten years or less and do not approach positive yields until we reach a 10 to 15-year averaging period.

²⁵⁶ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 9.

²⁵⁷ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 14.

²⁵⁸ TalkTalk response to Oxera paper on WACC proposals, paragraphs 2.5-2.6.

²⁵⁹ TalkTalk response to Oxera paper on WACC proposals, paragraph 2.8.

²⁶⁰ TalkTalk response to Oxera paper on WACC proposals, paragraph 2.10. TalkTalk cites paragraph A14.38 of the 2014 Fixed Access Statement.

²⁶¹ TalkTalk letter dated 22 December 2017 titled Emerging evidence on the risk-free rate, page 2.

²⁶² Sky letter dated 26 January 2018 titled the appropriate risk-free rate for estimating BT's cost of capital in the WLA market review, page 2.

²⁶³ PwC, 2017. *Estimating the cost of capital for H7*. http://publicapps.caa.co.uk/docs/33/PwC_H7InitialWACCrange.pdf.

²⁶⁴ TalkTalk letter dated 22 December 2017 titled emerging evidence on the risk-free rate, page 2.

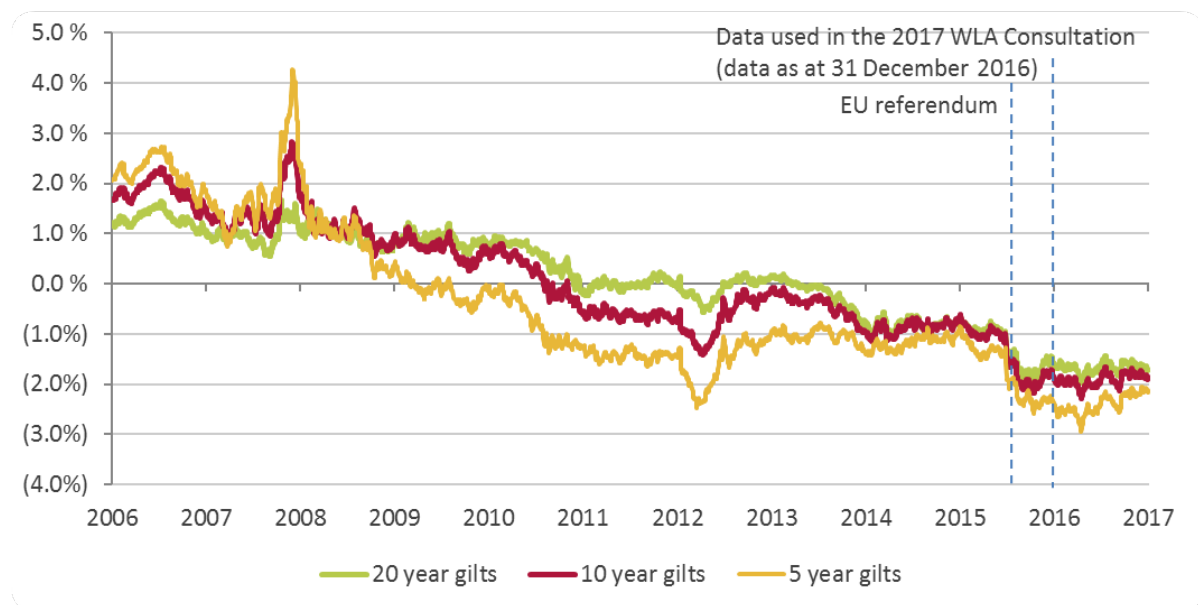
Table A20.3: Yields on index-linked gilts

Averaging period	Five-year gilts		Ten-year gilts	
Data as at:	31 Dec 2016 Consultation	29 Dec 2017 Statement	31 Dec 2016 Consultation	29 Dec 2017 Statement
Spot rate	(2.4)%	(2.1)%	(1.9)%	(1.9)%
1 month	(2.3)%	(2.1)%	(1.8)%	(1.8)%
3 months	(2.4)%	(2.2)%	(1.9)%	(1.8)%
1 year	(1.8)%	(2.4)%	(1.4)%	(1.9)%
2 years	(1.5)%	(2.1)%	(1.2)%	(1.7)%
5 years	(1.4)%	(1.6)%	(0.8)%	(1.1)%
10 years	(0.3)%	(0.8)%	0.1%	(0.3)%
15 years	0.4%	0.1%	0.7%	0.4%
20 years	1.0%	0.7%	1.2%	0.9%

Source: Ofcom analysis of Bank of England data

A20.25 Figure A20.4 below illustrates that spot yields on five, ten and 20-year index-linked gilts are now around -2%, extending the period of negative yields previously observed.

Figure A20.4: Spot rates on five, ten and twenty-year index-linked gilts



Source: Bank of England, Ofcom analysis. Data as at 29 December 2017

A20.26 As set out in the March 2017 WLA Charge Control Consultation, several factors could be affecting real gilt yields at present, such as:

- a) **Credit risk effects.** Following the referendum on whether the UK should remain a member of the EU or leave the EU (the “EU referendum”), ratings agencies downgraded UK Government debt. Such downgrades tend to be associated with higher borrowing costs, which could mean that gilt yields would be expected to rise.²⁶⁵
- b) **Flight to safety.** Where investors move money to less risky assets such as government gilts, the increased demand can raise prices and reduce yields.
- c) **Bank of England actions.** Quantitative easing (QE), whereby the Bank of England purchases large quantities of government bonds, could act to reduce yields on government debt.²⁶⁶ In addition, the Bank of England base rate was reduced from 0.5% to 0.25% in August 2016 although it was subsequently increased back to 0.5% on 2 November 2017.²⁶⁷
- d) **Pension fund demand.** A June 2016 report by Schroders states that “UK private sector defined benefit schemes already own an estimated 80% of the long-dated index-linked gilt market and potential demand is almost five times the size of the market”.²⁶⁸ This scarcity issue could raise gilt prices and reduce yields.²⁶⁹
- e) **Measures of inflation.** Index-linked government gilts are linked to RPI and yields may be affected by issues with RPI as a measure of inflation.

A20.27 It is difficult to know which of the above factors have the most impact on real yields, but given that gilt yields remain negative and that yields fell following the EU referendum, this could imply that any potential credit risk effects are more than offset by the other factors (which will drive up gilt prices and reduce yields).

A20.28 In its November 2017, Financial Stability Report (November 2017 FSR),²⁷⁰ the Bank of England noted that long-term real risk-free interest rates remain close to historically low levels.²⁷¹

Forward rates on index-linked gilts

²⁶⁵ An August 2016 paper by Frontier Economics considered that the referendum result could affect gilt yields in two ways: credit risk effects (which could increase yields) and capital market effects (such as a flight to safety and quantitative easing which could reduce yields). Frontier Economics, ‘Paying the Full WACC?’, 10 August 2016, <https://www.FfrontierEconomics-economics.com/publications/paying-full-wacc/> [accessed 20 February 2018].

²⁶⁶ On 4 August 2016 the Bank of England announced that it would extend its quantitative easing programme by purchasing an additional £60bn of government bonds and £10bn of corporate bonds, taking the total amount of asset purchases to £435bn. <https://www.bankofengland.co.uk/markets/market-notice/2016/asset-purchase-facility-gilt-purchases-market-notice-august-2016> [accessed 20 February 2018].

²⁶⁷ See <https://www.bankofengland.co.uk/monetary-policy-summary-and-minutes/2016/mpc-august-2016> [accessed 20 February 2018]. and <https://www.bankofengland.co.uk/monetary-policy-summary-and-minutes/2017/november-2017> [accessed 20 February 2018].

²⁶⁸ Schroders, 2016. *Pension funds and index-linked gilts: A supply/demand mismatch made in hell*, page 1. <http://www.schroders.com/en/sysglobalassets/schroders/sites/ukpensions/pdfs/2016-06-pension-schemes-and-index-linked-gilts.pdf> (the June 2016 Schroders report).

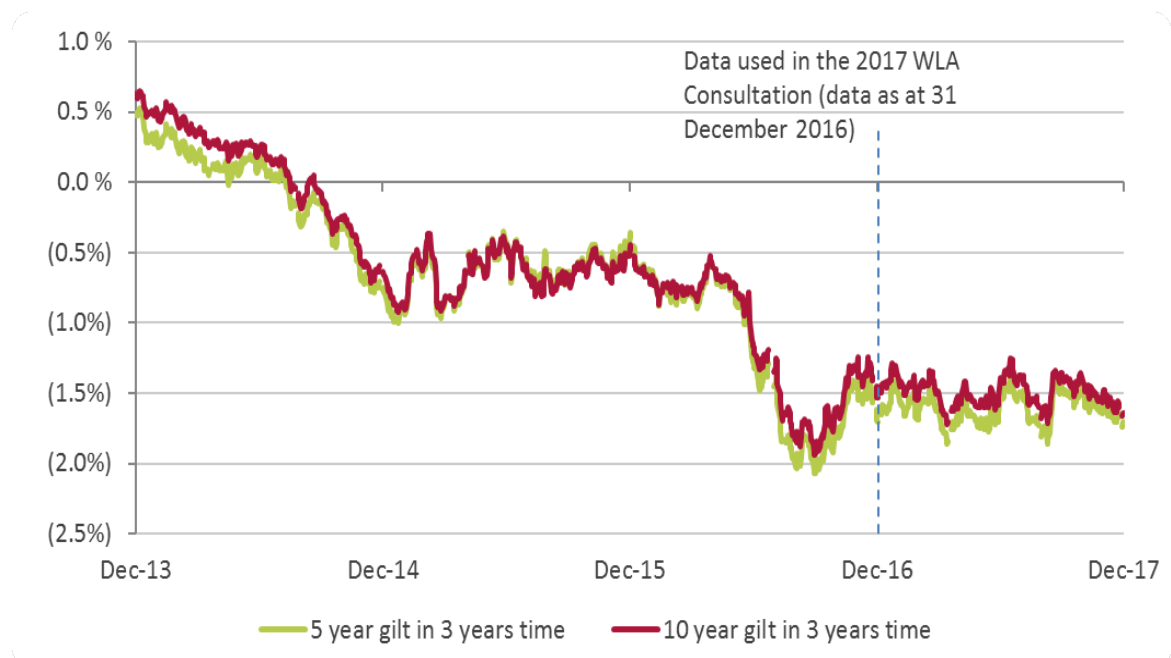
²⁶⁹ Page 3 of the June 2016 Schroders report said that this mismatch between demand and supply suggests that “long-dated index-linked gilt yields are likely to remain suppressed for the foreseeable future”.

²⁷⁰ <https://www.bankofengland.co.uk/financial-stability-report/2017/november-2017>.

²⁷¹ November 2017 FSR, page 25.

A20.29 Yields on gilts of different maturities can be used to estimate forward rates which may be a more relevant measure when estimating a forward-looking real RFR. Figure A20.5 below illustrates that forward rates on five and ten-year gilts taken out in three years' time are around -1.5%.²⁷²

Figure A20.5: Forward rates on 5 and 10-year gilts taken out in three years' time



Source: Bank of England, Ofcom analysis. Data as at 29 December 2017. The 5 and 10-year lines represent forward rates on 5 and 10-year gilts taken out in December 2021.

Recent regulatory decisions on the real RFR

A20.30 Table A20.6 summarises the real RFR used in recent regulatory decisions. The table also reports the real ERP and real total equity market return (TMR, equal to the real RFR plus the real ERP) since these are often considered together. This is because there may be an inverse relationship between the real RFR and ERP such that the TMR is more stable.²⁷³ This

²⁷² The forward rates represent the implied future yield on an investment in a five- or ten-year index-linked gilt made in three years' time. They are calculated using the following formula:

$$f_{t,T} = \left[\frac{(1+r_T)^T}{(1+r_t)^t} \right]^{\frac{1}{T-t}} - 1$$

where for the five-year gilt calculation, r_t denotes the annual yield in the first three years, so $t=3$ and r_T denotes the annual yield in the first eight years, so $T=8$ in this example. In other words, for the forward five-year gilt calculation we are solving for the future yield required to equalise the difference between the yields on a gilt taken out today with three years to maturity (the proceeds of which can then be reinvested at a future yield for a further five years) and the yield on a gilt taken out today with eight years to maturity.

²⁷³ The 2003 Smithers & Co report recommended that the cost of equity should be derived from estimates of the TMR, with any changes in the real RFR or ERP offsetting each other. See pages 48 and 49, Smithers & Co, A study into certain aspects of the cost of capital for the regulated utilities in the UK, 13 February 2003 ('2003 Smithers & Co report'). <http://webarchive.nationalarchives.gov.uk/20080715040953/http://www.ofcom.org.uk/static/archive/oftel/publications/pricing/2003/cofk0203.htm>. Also, the CMA said in its 2014 NIE Determination that "historically, the market return has

could imply that, when estimating the cost of equity, the assumption made about the TMR has a greater impact on the cost of equity than the relative balance of the RFR and ERP, when the equity beta is close to one. However, under our approach to the cost of debt, the RFR is also an important input (because we combine the RFR with an estimate of the debt premium to obtain the overall cost of debt).

Table A20.6: Recent regulatory decisions on the real RFR, ERP and TMR

Organisation	Date	Real RFR	ERP	TMR
CAA (NERL)	Feb-14	0.75%	5.50%	6.25%
CMA (NIE)	Mar-14	1.50%	5.00%	6.50%
OFGEM	Nov-14	1.60%	5.25%	6.85%
OFWAT	Dec-14	1.25%	5.50%	6.75%
UR (Water)	Dec-14	1.50%	5.00%	6.50%
CMA (BW)	Oct-15	1.30%	5.30%	6.60%
UR (Gas)	Sep-16	1.25%	5.30%	6.55%
UR (Electricity)	Jun-17	1.25%	5.25%	6.50%

Source: UKRN Report – Cost of Capital – Annual Update Report, 31 May 2017,²⁷⁴ pages 9 and 12. Ofgem 2014 decision from ED1.²⁷⁵ UR 2017 decision from Northern Ireland Electricity Networks Limited Transmission & Distribution 6th Price Control (RP6), 30 June 2017. Note: TMR equals real RFR plus ERP.

A20.31 While Table A20.6 shows that real RFR estimates used in recent regulatory decisions have typically been between 0.75% and 1.5%, as noted above, recent publications from Ofwat and the CAA in advance of the next round of price controls indicate that real RFR estimates used by these regulators in their final decisions are very likely to reduce, offset in part by higher ERP estimates. This is shown in Table A20.7.

Table A20.7: Recent regulatory publications on the real RFR, ERP and TMR

Organisation	Date (control period)	Real RFR	ERP	TMR
OFWAT	Dec-17 (5Y March 2025)	(0.88%)	6.31%	5.44%
CAA	Dec-17 (2020-2024)	(1.4%) – (1.0%)	6.5% - 6.6%	5.1% - 5.6%

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 term”. See paragraph 13.148, page 13-30, 2014 NIE Determination, https://assets.digital.cabinet-office.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf.

²⁷⁴ http://www.ukrn.org.uk/wp-content/uploads/2017/05/20170503-UKRN-Annual-WACC-Comparison-Report_FINAL.pdf.

²⁷⁵ Table 1, Ofgem, Decision on our methodology for assessing the equity market return for the purpose of setting RII0-ED1 price controls, 17 February 2014

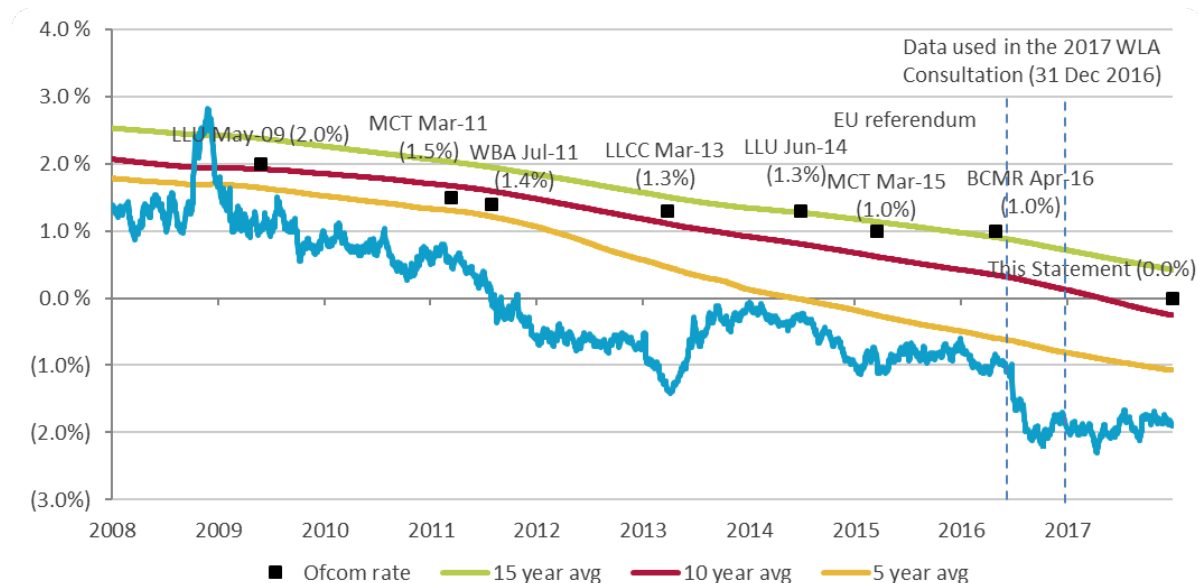
https://www.ofgem.gov.uk/sites/default/files/docs/2014/02/decision_on_equity_market_return_methodology_0.pdf.

Source: Ofwat methodology document, page 16. CAA: 2017 CAA consultation page 78

Our decision

- A20.32 In previous decisions, our real RFR assumptions have followed longer term averages of the yields on index linked gilts rather than spot rates. One of the reasons for this “smoothing” approach based on longer term averages is to avoid placing weight on spot rates that may be volatile and instead gradually adjust the rate in such a way as to avoid large swings from one regulatory decision to the next. A further reason, related to our cost of debt approach, is that our approach to charge controls caps charges for a period of time without adjusting for future debt financing costs (an approach referred to in other regulated sectors as indexation).
- A20.33 Since firms issue debt over a number of years and at various points through the economic cycle, and because we calculate the cost of debt from the RFR, we consider it is appropriate to estimate the real RFR by reference to longer term average yields on index-linked gilts. More generally, a point which affects both the cost of equity as well as the cost of debt is that telecoms investments are relatively long-lived (especially in the WLA market) and an efficient network operator would be expected to finance investments (whether network renewals or enhancements) steadily through time. For example:
- BT’s network infrastructure assets have asset lives of between two and 40 years, with the main WLA assets of duct, copper and fibre having asset lives towards the mid-point and top of this range.²⁷⁶ Within the WLA charge control models, the weighted average asset life is around 24 years.
 - The average maturity on BT’s debt is currently around 6-10 years (see sub-section on the cost of debt below).
- A20.34 We therefore disagree with Frontier Economics that it would be appropriate to adopt the current spot or forward rates on index-linked gilts because we do not consider this would recognise that firms issue debt over a number of years and would not appropriately smooth the cost of debt over time. Instead, we consider that our approach of placing weight on longer term averages of the yields on index-linked gilts would appropriately reflect BT’s forward-looking cost of debt, while providing a reasonable estimate of the real RFR for the purposes of setting the cost of equity.
- A20.35 An implication of our approach is that, to the extent that long run average yields on index-linked gilts continue to decline, our estimate of the real RFR will decline as well. Given the continued reduction in long-run average yields on index-linked gilts we have decided to further reduce our estimate of the real RFR to 0.0%.
- A20.36 To illustrate how our real RFR assumptions closely follow long-term average yields, Figure A20.8 shows our decisions compared to yields on ten-year gilts over different averaging periods – spot rates, five-year averages, ten-year averages and 15-year averages.

²⁷⁶ Page 178 of BT’s 2017 annual report shows the asset lives used by BT for network infrastructure assets. Page 98 of the 2017 RFS shows that duct, copper and fibre are the main categories of asset used to deliver WLA.

Figure A20.8: Yields on 10-year gilts and Ofcom decisions on real RFR

Source: Bank of England, Ofcom analysis. Data as at 29 December 2017

A20.37 While we agree with Oxera that it would be inappropriate to change our estimate of the real RFR in response to short-term market movements, our decision to reduce the real RFR to 0.0% recognises the continued reduction in long run average yields and is not, as Oxera suggested, the result of placing particular weight on reductions in spot rates following the EU Referendum result. Figure A20.8 indicates that the reductions in spot rates that occurred following the EU Referendum result have persisted. Further, we disagree with Oxera that a reduction in the real RFR would be out of line with UK regulatory precedents. As shown in Table A20.7, recent regulatory publications from Ofwat and the CAA indicate a reduction in the real RFR from previous decisions (to values below those we have decided on for this statement).

A20.38 Combined with our decision to increase the ERP, the reduction in the real RFR does not have a significant impact on the BT Group cost of equity. Nevertheless, combined with our decision on the debt premium, the reduction in the real RFR does reduce the estimated cost of debt. We consider this is appropriate given yields on BT's debt and benchmarking to corporate bonds more generally, as explained in the next section.

A20.39 Combined with our proposed RPI inflation forecast for 2020/21 of 2.9% (see below), the projected nominal RFR is 2.9%.

Cost of debt

Our proposals

A20.40 In the March 2017 WLA Consultation we proposed a pre-tax nominal cost of debt proposed for BT Group of 4.7%, representing the sum of the nominal RFR of 3.7% and a debt premium of 1.0%.

Stakeholder responses

- A20.41 Oxera said that our estimate for the cost of debt is lower, in real terms, than any prevailing UK regulatory allowance for the cost of debt. Given that BT's credit rating is BBB+ and other UK regulators set cost of debt allowances based on target credit ratings of BBB+ or higher, Oxera considered this was unreasonable.²⁷⁷
- A20.42 Oxera argued that the proposed reduction in the debt premium (from 1.2% in the 2016 BCMR Statement to 1.0%) was affected by increased volatility on the yields of government bonds and sterling denominated BBB bonds following the EU referendum result, which in turn created instability in spreads.²⁷⁸ Oxera said we should not put undue weight on recent and volatile data when estimating the debt premium.²⁷⁹ Oxera argued that we should revert to the debt premium of 1.2% used in the 2016 BCMR Statement. Oxera also argued that other UK regulators have tended to provide for higher debt issuance costs than the 10 basis points we proposed to allow,²⁸⁰ although it did not propose to uplift the cost of debt to recognise this.²⁸¹
- A20.43 Frontier Economics said that our cost of debt was too high compared with forward yields on BBB rated debt, which imply a current cost of debt of between 3.1% and 3.5%.²⁸² Frontier Economics considered that while our debt premium and inflation assumptions were reasonable, it was not appropriate to combine these with a real RFR based on longer run averages as this assumed mean reversion in yields not supported by evidence.²⁸³ Frontier Economics also noted that we had compared our cost of debt to the weighted average cost of BT's existing debt and new debt expected to be issued during the charge control period. Frontier Economics said this was inconsistent with the principles set out in our defence of BT's appeal of the 2012 WBA Decision.²⁸⁴
- A20.44 TalkTalk argued that Oxera's comparison of Ofcom's proposal to previous decisions made by other UK regulators ignored "medium term market evidence in favour of excessive reliance on outdated regulatory judgements".²⁸⁵ TalkTalk added that Oxera provides no evidence on the actual cost of debt being paid by BT which would demonstrate that the cost of debt allowed by Ofcom is well above the forward-looking cost of debt for BT Group.²⁸⁶ TalkTalk said that current yields to maturity on BT Group debt were low, and effectively negative in real terms.²⁸⁷

²⁷⁷ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 8.

²⁷⁸ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 9.

²⁷⁹ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 9.

²⁸⁰ Oxera quotes the CMA decision on Northern Ireland Electricity price determination (2014) where an additional 0.2% was allowed for holding cash ahead of use (in addition to the 0.1% debt issuance costs) and the CAA allowance for Heathrow Airport Limited (0.15%) and Gatwick Airport Limited (0.2%) used in its 2014 decision.

²⁸¹ Oxera response, prepared for Openreach, on WACC proposals in the June 2017 WLA Consultation, page 16.

²⁸² Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 12.

²⁸³ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 10.

²⁸⁴ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 11.

²⁸⁵ TalkTalk response to Oxera on WACC proposals, September 2017, paragraph 3.3.

²⁸⁶ TalkTalk response to Oxera on WACC proposals, September 2017, paragraph 2.12.

²⁸⁷ TalkTalk response to Oxera on WACC proposals, September 2017, paragraphs 2.13-2.14.

Our reasoning

- A20.45 In principle, we are seeking to estimate a forward-looking efficiently incurred cost of debt. We consider that our approach of combining a long-run RFR with a debt premium, where the long-run RFR recognises that firms issue debt over a number of years and at various points through the economic cycle, is consistent with this objective.
- A20.46 In the 2011 WBA Statement, we also estimated BT's cost of debt by reference to long-run yields on gilts combined with a debt premium. BT appealed that decision on the basis that we had not taken account of the cost of its existing (embedded) debt. During the appeal, we said that our approach was consistent with giving BT a fair bet (i.e. an expectation of debt cost recovery on average), since bond rates could go up or down, but BT would have the opportunity to recover the forward-looking efficiently incurred cost of debt.²⁸⁸
- A20.47 Since 2009 there has been a downward trend in bond yields, contributed to by the Bank of England's QE programme as explained above.²⁸⁹ The scale and timing of QE, coupled with the extended period of low interest rates, may have been beyond what was reasonably expected ex-ante.²⁹⁰ In other words, even considering the "normal" cycle of interest rates, following QE, an efficiently financed firm might not have been given the opportunity to recover efficiently incurred costs.
- A20.48 While we continue to consider it appropriate to base the RFR on long-run averages, we recognise this means the RFR underpinning the cost of debt is currently above spot rates. We therefore consider that it is appropriate to ensure that our allowed cost of debt appears reasonable when compared to estimates of the weighted cost of BT's existing and new debt. As explained below, we estimate BT's cost of debt at 4.0% using our RFR plus debt premium approach. This sits comfortably within the range of the estimated weighted cost of BT's existing and new debt of 3.5% to 4.4%.
- A20.49 In the rest of this section we explain how we have updated our analysis of the BT Group debt premium and the weighted average cost of BT's existing and new debt before concluding on the cost of debt.

²⁸⁸ For example, see paragraphs 2.131-2.140 of the 2012 Appeal.

http://www.catribunal.org.uk/files/1187_BT_CC_Determination_110612.pdf.

²⁸⁹ We also note that demand from pension funds for index-linked gilts has been increasing since 2009, which could also have acted to reduce yields. The Pension Protection Fund's 2017 Purple Book shows that that pension fund asset allocation to all bonds has increased over the last decade. Within bonds, index linked gilts are the largest category, and have been increasing as a proportion of total bond assets every year since 2009. See <http://www.pensionprotectionfund.org.uk/Pages/ThePurpleBook.aspx> [accessed 20 February 2018].

²⁹⁰ The Bank of England purchased £435bn of gilts between 2009 and January 2018, with most purchases taking place in 2009, 2012 and 2016. The Bank of England's staff working paper "QE: the story so far" notes that QE interventions have tended to be associated with a fall in long-term government bonds yields. The paper references a study that estimates that the 2009 purchase reduced long term gilt yields by about 100 basis points, although the impact on yields of more recent QE purchases has been more muted. See; <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2016/qe-the-story-so-far.pdf?la=en&hash=8F7A0D4F0C0E466ACA9A03325776C2A13AAF55F> [accessed 20 February 2018].

Debt Premium Approach

- A20.50 Approximately 56% of BT's outstanding listed debt is euro denominated, with 23% dollar denominated and the remainder sterling denominated.²⁹¹
- A20.51 As at 29 December 2017, based on information provided by Openreach, we estimate that BT's fixed rate listed debt (all currencies) had an outstanding tenor of around [8] (~(6-8)) years²⁹² while for sterling denominated debt it was slightly higher at around 9.5 years.²⁹³
- A20.52 Previously we placed more weight on the observed spreads on sterling denominated debt over government bonds for BT Group because the tenor on sterling bonds was similar to the tenor of all BT's debt.²⁹⁴ However, as the average tenor of all BT's debt is now below the tenor on its sterling bonds we have also considered spreads on an index of BBB bonds over government gilts with a maturity of five to ten years because this is consistent with the rating on BT's debt (BBB+)²⁹⁵ and the weighted average maturity of BT's debt.
- A20.53 For the purposes of determining a range for the debt premium we have considered debt spreads over a one and two-year period.

Sterling debt

- A20.54 We have considered the sterling denominated debt of BT Group with both short-term and long-term maturity dates because we would expect BT to raise debt of varying maturities when considering its future financing requirements. Table A20.9 below lists the sterling debt we have considered alongside the average, minimum, maximum and upper and lower quartile spread of this debt in the last one and two years.

Table A20.9: Spread of BT's sterling denominated debt over UK gilts

Maturity	Tenor (years)	1 year					2 year					Current
		Avg	Min	Max	Lower quartile	Upper quartile	Avg	Min	Max	Lower quartile	Upper quartile	29 Dec 17
Mar-19	1.2	0.8%	0.6%	0.9%	0.7%	0.9%	1.0%	0.6%	1.7%	0.8%	1.2%	0.6%
Mar-20	2.2	0.7%	0.7%	0.8%	0.7%	0.8%	0.9%	0.6%	1.5%	0.7%	1.0%	0.7%
Dec-28	10.9	1.3%	1.0%	1.6%	1.2%	1.3%	1.3%	0.9%	2.1%	1.1%	1.4%	1.4%
Jun-37	19.5	1.3%	1.0%	1.7%	1.2%	1.3%	1.3%	0.9%	2.1%	1.2%	1.4%	1.5%
Average	9.5	1.0%	0.9%	1.1%	1.0%	1.0%	1.1%	0.8%	1.8%	1.0%	1.1%	1.1%

²⁹¹ Ofcom analysis using S&P Capital IQ, data as at 31 December 2017.

²⁹² Derived from Openreach's response dated 1 September 2017 to question 4 of the 35th s.135 notice. Openreach's response provides information on debt that had been issued up to the end of June 2017. We note that BT issued three further tranches of debt in November 2017. Our analysis of BT's cost of debt does not include these tranches of debt.

²⁹³ See Table A20.9. Tenor is the term used to describe the length of time until a bond matures.

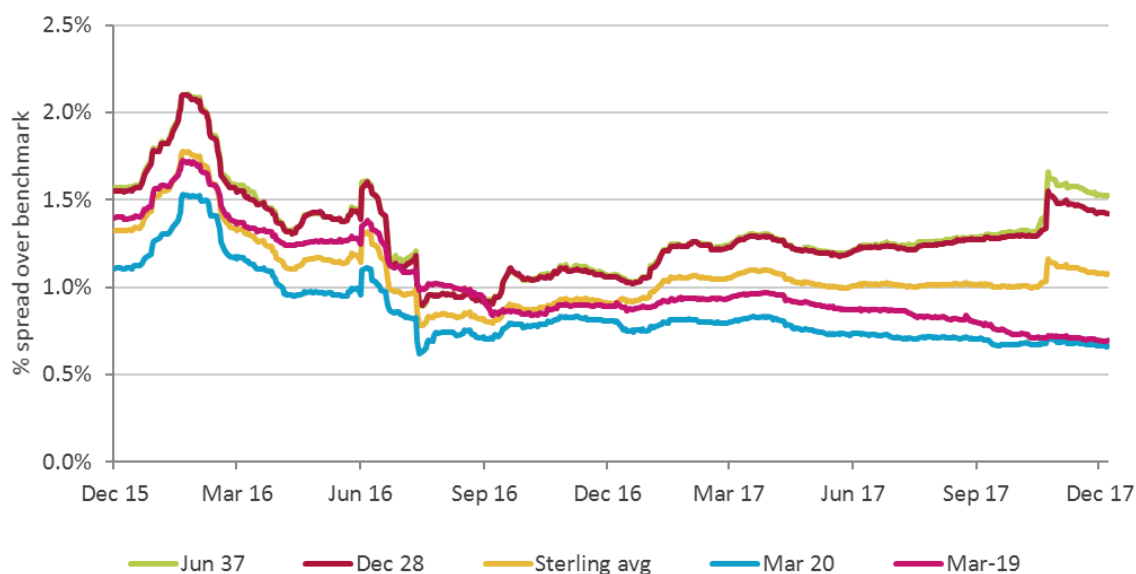
²⁹⁴ We have focused on the spreads of BT's sterling denominated bonds to inform our debt premium estimate. While we could also take account of the spreads of bonds denominated in other currencies, this would involve taking into account expectations of future exchange rates. We would not expect the currency denomination of the debt to have a material impact on the total cost of BT's bonds because of the opportunity for arbitrage. We note that BT's website states: "Our policy is to raise debt in markets/currencies where there is strong investor demand and we get the best rate, if that is outside of the UK then we will swap the debt immediately into fixed sterling to mitigate currency risk". See: <http://www.btplc.com/Sharesandperformance/Fixedincome/index.htm> [accessed 20 February 2018].

²⁹⁵ This is the Bloomberg composite rating which is a blend of the ratings from Moody's, S&P, Fitch and DBRS.

Source: Bloomberg, Ofcom analysis. Spread over nominal gilt yields. Average maturity is a weighted average and average spreads are simple averages. These bonds have a Bloomberg Composite credit rating of BBB+. Data to 29 December 2017. Since the March 2017 WLA Consultation, BT's June 2017 sterling bond has matured, hence it is not shown in this table. The table does not include sterling debt issued by BT in November 2017 since one and two-year average spreads are unavailable.

A20.55 Figure A20.10 charts the spread of BT's sterling debt over the last two years.

Figure A20.10: Spread of BT's sterling denominated debt over UK gilts



Source: Bloomberg, Ofcom analysis. Data to 29 December 2017. Sterling average is a simple average of the spread of BT's sterling denominated debt over UK gilts. This figure does not include sterling debt issued by BT in November 2017.

A20.56 The preceding table shows that the debt premium for BT Group has been between 0.9% and 1.1% over the last year, averaging 1.0%. The two-year range is 0.8% to 1.8% with an average of 1.1%. The interquartile range is narrow at 1.0% over one year and 1.0% to 1.1% over two years.²⁹⁶

BBB Index

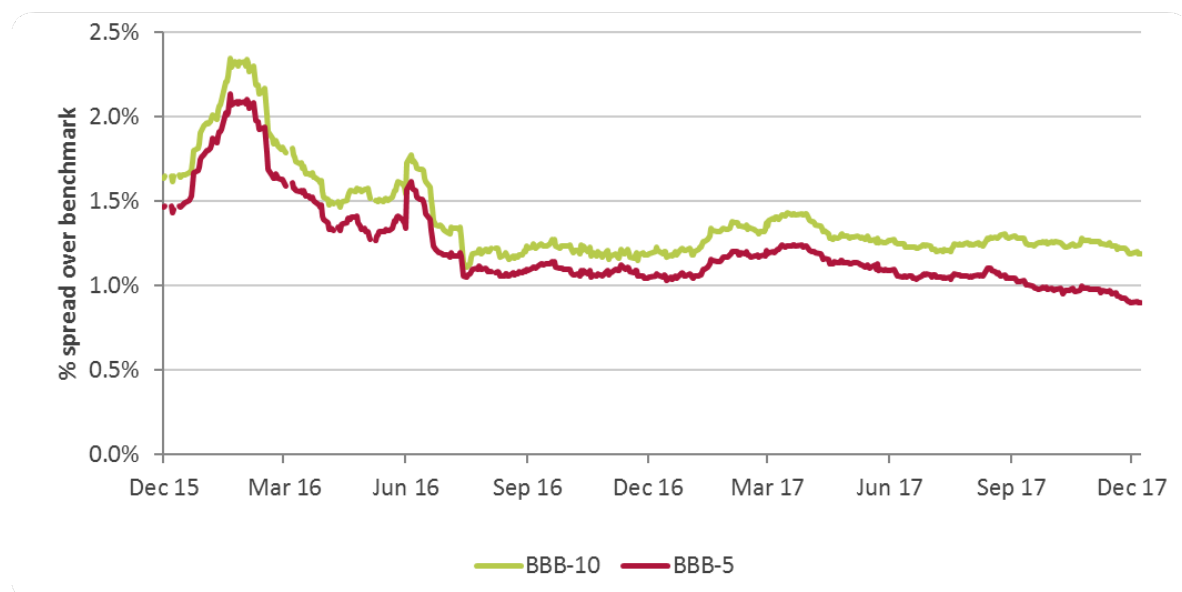
A20.57 Figure A20.11 shows the spread of an index of BBB bonds over UK gilts with maturities of five and 10 years.

A20.58 Over the last year, the five-year BBB index spread has ranged from 0.9% to 1.2% (1.0% to 1.1% interquartile) with an average of 1.1% and the 10-year BBB index spread has ranged from 1.2% to 1.4% (1.2% to 1.3% inter-quartile) with an average of 1.3%. Over the last two years the five-year BBB index spread has ranged from 0.9% to 2.1% (1.1% to 1.3% inter-quartile), with an average of 1.2% and the 10-year BBB index spread has ranged from 1.1%

²⁹⁶ We note that across all BT's sterling debt (including that issued in November 2017) average spreads in January 2018 were 1.1%, so on this basis we do not consider that excluding from our analysis the debt issued by BT in November 2017 affects our conclusions in this section.

to 2.4% (1.2% to 1.5% inter-quartile) with an average of 1.4%. The composite BBB index spreads are slightly higher than BT's actual debt spreads over the same period.²⁹⁷

Figure A20.11: Spread over nominal gilts of an index of 5 and 10-year BBB bonds



Source: Bloomberg, Ofcom analysis. Data to 29 December 2017

Weighted average cost of existing debt and new debt

Existing debt

A20.59 We asked Openreach to provide a breakdown of the interest rate on its fixed and floating rate debt, taking account of any hedging effects, for the 2016/17 financial year.²⁹⁸ According to its 2017 annual report, fixed rate debt represented around 88% of BT's total debt, with floating rate debt the remainder.²⁹⁹

A20.60 The relevant cost of existing fixed debt is uncertain and could be estimated in several ways, for example as of today, as at the end of the charge control period (2020/21) or as a weighted average over that period. In addition, while the interest rate may currently be fixed, BT's future hedging strategy could see it swap fixed debt for floating debt.³⁰⁰

²⁹⁷ The BBB index includes bonds with ratings of BBB-, BBB and BBB+. Since BT's debt is currently rated at BBB+, we would expect its actual debt spreads to be lower than the spreads for the index (since the index also includes spreads for bonds with a lower credit rating). For example, the differential between a composite BBB and A rated 10-year corporate bond was 50 basis points over the past year.

²⁹⁸ On page 223 of its 2017 annual report BT gives an effective interest rate on fixed debt, after hedging, of 4.9% (average for the 2016/17 financial year). Openreach provided us with details of this calculation and an equivalent calculation for its floating rate debt in its response dated 3 August 2017 to question 4 of the 28th s135 notice. Openreach updated its response to include the effects of the three tranches of debt issues in June 2017 in its response dated 1 September 2017 to question 4 of the 35th s135 notice

²⁹⁹ Using data from page 223 of BT's 2017 Annual Report.

³⁰⁰ Openreach response dated 26 September 2017 to question B9d of the 12th s.135 notice.

A20.61 We estimate that the interest on BT's existing fixed debt is between [X]% and [X]%.³⁰¹

A20.62 The relevant cost of floating rate debt is also uncertain, although it represents a smaller amount of total debt than fixed rate debt. We estimate that the interest on BT's floating rate debt was around [X]% as at March 2017. Given that part of BT's floating rate debt is represented by its index-linked bond due in 2025, and RPI inflation to which it is linked is generally expected to be lower at the end of the control period compared to the levels prevailing at the time of BT's 2017 annual report,³⁰² it is possible that the floating rate debt cost could decrease from current levels. To allow for this possibility we assumed a floating rate debt range of [X]% to [X]%.³⁰³

A20.63 Combining these estimates and weighting by the estimated relative amounts of fixed and floating debt as at March 2017, we estimated that the cost of BT's existing debt is between [X]% and [X]%.³⁰⁴

New debt

A20.64 BT issues debt in different currencies and hedges that debt using swaps where the debt is issued in currency other than sterling. Sterling debt may also be swapped to fixed or floating rates depending on BT's financing strategy.

A20.65 All of BT's listed debt is currently rated BBB+. To estimate the cost of new debt issued during the charge control period we have considered historic and forward yields on an index of BBB rated debt. We have considered bonds with maturities of around five to 10 years because, as noted above, BT's average tenor is around 6-8 years across all currency denominations, but we recognize that BT could issue new debt with longer maturities.³⁰⁵

A20.66 Figure A20.12 shows yields over the last two years for an index of BBB bonds with five and 10-year maturities. The average yield over the last year was 1.7% and 2.5% respectively while over two years the average was 1.7% and 2.6% respectively.

³⁰¹ The higher number is the rate as at 31 March 2017 and the lower number is the estimated rate in 2020/2021, taking account of debt that is due to mature over the next three years (where more recent debt has been issued at a lower interest rate).

³⁰² RPI was 3.1% in March 2017 according to ONS (i.e. as at the time of BT's annual report) while the most recent OBR forecast for the end of the charge control period is 2.9%. We estimate that the index linked note represents about [X]% of BT's floating debt.

³⁰³ This reflects the expected decrease in RPI inflation multiplied by the proportion of floating rate debt represented by the index-linked bond.

³⁰⁴ We have assumed that the amount of floating debt as a proportion of total debt remains at estimated March 2017 levels.

³⁰⁵ For example, in June 2017 BT issued three tranches of debt with maturities of five, seven and 10 years while in November 2017 BT issued three tranches of debt with maturities of seven, 14 and 30 years.

Figure A20.12: Yields on indices of 5 and 10-year BBB bonds

Source: Bloomberg, Ofcom analysis. Data to 29 December 2017

A20.67 Forward rates on BBB bonds can also be calculated. Figure A20.13 shows forward rates on five and 12-year BBB bonds for the final year of the charge control.³⁰⁶ As at 29 December 2017, forward rates were between 2.7% and 3.2%, and so higher than spot yields were observed over the last couple of years.

³⁰⁶ The end of the charge control is in 2020/21, which is in three years' time. On Bloomberg, information on BBB indices exist for three-year, eight-year and 15-year periods. A forward rate can therefore be estimated for five-year and 12-year periods where the five-year forward rate is estimated from the three-year and eight-year indices. Ideally, we would estimate a 10-year forward rate from a three-year and 13-year bond. However, this information is not available in Bloomberg and therefore we estimate a 12-year rate from the three-year and 15-year indices. It is unlikely that this rate will be significantly different from the 10-year forward rate.

Figure A20.13: Forward yields on indices of 5 and 12-year BBB bonds at 2020/21

Source: Bloomberg, Ofcom analysis. Data to 29 December 2017. In December 2017, the lines represent forward rates on five- and 12-year BBB bonds in December 2021. The 12-year line represents the forward rate implied by the Bloomberg three-year and 15-year BBB indices.

A20.68 Given that, for this calculation, we are concerned with new debt to be issued over the period of the charge control, we have put more weight on forward rates. While the tenor of new debt issued by BT is uncertain we consider that a range of 2.5% to 3.5% is a reasonable estimate of the cost of new debt.³⁰⁷

Weighting of existing debt and new debt

A20.69 Around 30% of BT's listed debt is due to mature before the end of the charge control. If BT were to replace all the debt that is due to mature we might therefore expect around 30% of its debt to be 'new debt' by the end of the charge control. Alternatively, given that the average maturity of BT's listed debt is around six to eight years and this is a three-year charge control ending in 2020/21, we might expect up to 50% of debt to be new. However, we do not know with certainty how much of its existing debt BT will refinance, given its objective to reduce net debt.³⁰⁸ To allow for this uncertainty, we have assumed that new debt will represent between 25% and 50% of debt by the end of the charge control period.

³⁰⁷ BT's December 2017 quarterly results indicate that the three tranches of debt it issued in November 2017 had effective sterling interest rates between 2.37% and 3.66%, broadly comparable to our forward looking new debt range. See page 9 here: <https://www.btplc.com/Sharesandperformance/Quarterlyresults/2017-2018/Q3/Downloads/Newsrelease/q318-release.pdf>

³⁰⁸ See page 26 of BT's 2017 Annual Report.

- A20.70 Applying these weightings to the estimated cost of existing debt and new debt would imply an average cost of debt for BT of 3.4% to 4.3%.
- A20.71 As noted in the March 2017 WLA Consultation, when estimating the weighted average cost of existing and new debt it may be appropriate to include an allowance for debt issuance costs since these costs are not included in operating costs within BT's Regulatory Financial Statements (RFS), so would not otherwise be included in charge controls based on BT's cost data.³⁰⁹ We asked Openreach for details of the issuance costs associated with the six tranches of debt it issued during March 2016 and June 2017 and on an annualised basis these ranged from [X]% to [X]% with an average of [X]%.³¹⁰
- A20.72 In its Bristol Water decision, the CMA allowed for a 10 basis points uplift in the cost of debt for a notional company.³¹¹ Taking account of this and the evidence on BT's actual debt issuance costs, we consider it is appropriate to include an allowance of 10 basis points for debt issuance.³¹² This means that our estimate for the cost of debt for BT under a weighted cost of debt approach would be 3.5% to 4.4%.
- A20.73 Oxera noted that other regulators have in the past also included an allowance for cash holding costs. In its Bristol Water decision, the CMA indicated that these are costs that might be incurred to avoid breaching debt covenants,³¹³ for example, the costs associated with maintaining a credit facility. We do not consider that costs other than debt issuance are likely to be material for an assessment of BT's cost of debt and have therefore only included an allowance of 10 basis points for debt issuance.³¹⁴

Our decision

- A20.74 We consider that a range for the BT Group debt premium of 1.0% to 1.5% would be appropriate because it captures the interquartile range of the average spread on BT's sterling denominated debt over the last one and two years (1.0% to 1.1%) and the interquartile ranges of the spread on five- and 10-year BBB corporate bonds over the last one and two years (1.0% to 1.3% over the last year and 1.1% to 1.5% over the last two years).³¹⁵ The mid-point of this range is 1.25%. However, we do not consider that this mid-point represents an appropriate central estimate for the BT Group debt premium because BT's credit rating is higher than the average company in the BBB index (as indicated by the

³⁰⁹ Openreach response dated 1 September 2017 to question 4 of the 35th s.135 notice.

³¹⁰ Openreach responses dated 12 August 2016 to question B8a of the 12th s.135 notice and 1 September 2017 to question 4 of the s.135 notice.

³¹¹ See Appendix 10, paragraphs 48-53, CMA Bristol Water (October 2015), https://assets.digital.cabinet-office.gov.uk/media/5627997640f0b60368000001/Appendices_5.1_-_11.1_and_glossary.pdf.

³¹² We also note that the 2017 Ofwat methodology document proposes an uplift of 10 basis points to cover debt issuance and cash holding costs while the 2017 CAA consultation discusses a 10-basis point uplift for debt issuance costs. See section 6.4.5 of the 2017 Ofwat methodology document and Table C.2 of the 2017 CAA consultation.

³¹³ Paragraph 44, CMA Bristol Water decision.

³¹⁴ We note that the 2017 Ofwat methodology document proposed to include cash holding costs of 3.5 to 4.5 basis points within an overall allowance for debt issuance and cash holding costs of 10 basis points. See section 6.4.5 of the 2017 Ofwat methodology document.

³¹⁵ Referencing inter quartile ranges avoids placing weight on the highest and lowest spreads over the period.

fact the average spread on its sterling debt has been at the low end of the 1% to 1.5% range over the last one and two years)³¹⁶ and the tenor on BT's overall debt is lower than the tenor on BT's sterling debt.³¹⁷ We therefore consider that a value below the midpoint of the range would be appropriate and have decided to use a debt premium for BT Group of 1.1%.

A20.75 The resulting pre-tax nominal cost of debt for BT Group is 4.0%, representing the sum of the nominal RFR of 2.9% and the debt premium of 1.1%. This is comfortably within the range implied by the weighted average cost of BT's existing debt and new debt (3.5% to 4.4%).

RPI inflation

Our proposals

A20.76 In our March 2017 WLA Consultation we considered it appropriate to calculate the nominal RFR and ERP by reference to RPI because the data used to inform our estimates is typically in real terms with respect to RPI (for example index-linked gilts are linked to RPI and the historical yields from the 2017 Yearbook are in real terms with respect to RPI for much of the period). We proposed using RPI forecasts from the OBR consistent with other parts of the charge control.

A20.77 We proposed to use the OBR's most recent forecasts of 3.1% for 2019/20 and 3.2% for 2020/21.³¹⁸

Our reasoning and decisions

A20.78 Stakeholders did not comment on our inflation assumptions. We have updated our inflation assumption using the November 2017 OBR forecasts consistent with other parts of the charge control. The OBR's RPI forecast is 2.8% for 2019/20 and 2.9% for 2020/21.³¹⁹ In this statement, we have used these RPI forecasts in our WACC calculations for 2019/20 and 2020/21 respectively.

TMR and ERP

Our proposals

A20.79 In the March 2017 WLA Consultation we proposed to increase our estimate of the real ERP from 5.1% (used in the 2016 BCMR Statement) to 5.5% to reflect the proposed reduction in

³¹⁶ We would expect the spread on BT's BBB+ rated bonds to be lower than the spread on a BBB index of bonds since the index includes bonds with lower credit ratings than BT (i.e. BBB- and BBB rated bonds).

³¹⁷ Yields typically increase with tenor, so we would expect the spread on BT's overall debt to be a little lower than the spread on its sterling debt.

³¹⁸ OBR, 2016. *Economic and Fiscal Outlook*, page 93 <http://cdn.obr.uk/Nov2016EFO.pdf>.

³¹⁹ OBR, 2017. *Economic and Fiscal Outlook*, page 101 <http://cdn.obr.uk/Nov2017EFOwebversion-2.pdf>.

the real RFR from 1.0% (in the 2016 BCMR Statement) to 0.5%. Combining our estimates of the real RFR and ERP produced a real TMR for equities of 6.0%. We noted that the real TMR in the 2016 BCMR Statement was 6.1% and that our proposed reduction in the real RFR to 0.5% implied an ERP of 5.6%. We said that while we proposed to increase our estimate of the real ERP, we proposed only to increase it to 5.5%, reflecting our consideration that the relationship between the TMR and ERP may not be one for one.³²⁰

Stakeholder responses

- A20.80 Oxera said that academic evidence suggests the TMR is relatively stable,³²¹ and while Ofcom appear to recognise this, it proposed a reduction in the TMR from that used in the 2016 BCMR Statement.³²² Oxera argued that we had not provided any evidence to justify the existence of relationship between the TMR and ERP that was not one-for-one, and cited the 2013 Smithers report which said there was no empirical basis for the assumption that falls in risk free rates should translate to falls in expected market returns.³²³ Oxera said a TMR of 6.0% was lower than that used by other UK economic regulators and argued we should revert to a TMR of 6.1% used in the 2016 BCMR Statement.³²⁴
- A20.81 Frontier Economics noted that we had assumed the real TMR was relatively stable but said we had implicitly assumed a 20% level of pass through since the proposed 0.5 percentage point reduction in the real RFR was only offset by a 0.4 percentage point increase in the real ERP, resulting in a 0.10 percentage point reduction in the real TMR.³²⁵ Frontier Economics said that using its preferred real RFR estimate of -1.5%, this would imply an ERP of 7.1% and a real TMR of 5.6%.³²⁶
- A20.82 Frontier Economics also considered there was a risk that Ofcom’s approach to relying on backward looking estimates of the real RFR could bias the real TMR estimates in two ways:
- If only a small proportion of the reduction in the real RFR is passed through into a reduction in the TMR, the fact that Ofcom’s estimate of the real RFR is above the forward-looking real RFR means that the TMR would be over-estimated on a forward-looking basis; and
 - If the TMR is assumed to be broadly constant, the decomposition of the TMR between the RFR and ERP will be incorrect, with the ERP underestimated.³²⁷

³²⁰ Paragraph A16.75, March 2017 WLA Consultation.

³²¹ Oxera referenced page 7 of a 2013 called the cost of equity capital for regulated companies: a review for Ofgem by Wright and Smithers “(2013 Smithers report)”. <https://www.ofgem.gov.uk/ofgem-publications/86100/wrightsmithersequitymarketreturnpdf>.

³²² Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 4.

³²³ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 5.

³²⁴ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, pages 4-5.

³²⁵ i.e. 20% (0.1/0.5) of the change in real RFR was passed through to the real TMR. Frontier Economics, 2017. *WLA Market Review – Cost of capital for regulated services*, Page 13

³²⁶ i.e. compared to the 1% real RFR used in the 2016 BCMR Statement, the real RFR reduces by 2.5%. If 20% of this change (0.5%) is passed through to the TMR, this reduces to 5.6% from the 6.1% used in the 2016 BCMR Statement, with the ERP as the balancing figure.

³²⁷ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the June 2017 WLA Consultation, page 13.

A20.83 TalkTalk said that evidence available since the 2013 Smithers report is not consistent with a view that the real TMR is relatively stable, noting that:

- The 2017 Yearbook finds that in the 16 years 2000-2016, the annualised real return on equities in the UK was 2.4%, compared to 6.9% in the 50 years 1967-2016, pointing to there being a structural break in 2000;³²⁸
- PwC's 2017 analysis for Ofwat demonstrates that there has been considerable inconsistency in decade by-decade equity market returns and that recent returns have been much lower than those between 1976 and 1995;³²⁹
- Ofwat says that evidence from the [2017 Yearbook] points to expectations that future equity returns will be lower than the historical average. TalkTalk said that Ofwat referred to the 2017 Yearbook when referencing a TMR of 3% to 3.5% over the next few years;³³⁰ and
- Ofwat cites evidence from Credit Suisse and The Economist showing that there is a relationship between the real interest rate and equity returns over the next five years such that current low interest rates will continue to drive lower equity returns.³³¹

A20.84 TalkTalk said that we should consider whether a further reduction in the TMR would be justified, potentially to as low as around 4.0%.³³²

Our reasoning

A20.85 Estimating the ERP directly is difficult since it is not directly observable and depends on the weight placed on different estimates.³³³ While the TMR is also not directly observable, the TMR has been historically less volatile than the ERP.³³⁴ Therefore, we first consider historical ex-post and historical ex-ante estimates of the TMR, and subtract our proposed RFR to obtain an estimate of the ERP. We then cross-check this estimate against other evidence on the ERP. The analysis below is the same as that presented in the March 2017 WLA Consultation, updated for more recent data where relevant.

A20.86 We agree with TalkTalk's observation that actual equity returns vary from year to year and over time. However, what we are attempting to estimate is the forward-looking expected TMR. While expectations are not observable, we can observe what has happened in the past. Consistent with previous reviews, we prefer to estimate the TMR by reference to

³²⁸ TalkTalk response to Oxera paper on WACC proposals, September 2017, paragraph 4.3, first bullet.

³²⁹ TalkTalk response to Oxera paper on WACC proposals, September 2017, paragraph 4.3, second bullet. The analysis by PwC referred to by TalkTalk can be seen in figure 3 of Ofwat's publication: "Delivering Water 2020: consultation on PR19 methodology. Appendix 13; Alining risk and return", 11 July 2017, <https://www.ofwat.gov.uk/wp-content/uploads/2017/07/Appendix-13-Risk-and-return.pdf>.

³³⁰ TalkTalk response to Oxera paper on WACC proposals, September 2017, paragraph 4.3, third bullet.

³³¹ TalkTalk response to Oxera paper on WACC proposals, September 2017, paragraph 4.3, final bullet.

³³² TalkTalk response to Oxera paper on WACC proposals, September 2017, paragraph 3.11.

³³³ ERP estimates can also be based on different proxies for the RFR which may not be consistent with how we have estimated the RFR.

³³⁴ From Table 72 of the 2017 Yearbook the ratio of standard deviation to arithmetic mean for the nominal TMR is 1.9; lower than the equivalent ratio for the nominal ERP calculated for equities against bonds (3.5) and equities against bills (3.2).

historical equity returns (historical ex-post estimates), as recommended in the 2003 Smithers & Co report,³³⁵ and historical ex-ante returns (for example, adjusted for expectations as suggested by Dimson, Marsh and Staunton in the 2017 Yearbook), as explained below. Therefore, even though our real RFR estimate is above current forward indicators of the real RFR (e.g. by reference to forward rates on index-linked gilts), this does not mean our estimate of the real TMR is above the forward-looking long-run estimate of the real TMR (unless the evidence we have considered is a poor indicator of the forward-looking long run real TMR).

A20.87 In relation to Frontier’s concern that, with a constant TMR, an estimate of the real RFR based on historical data could underestimate the ERP, we have explained our approach to estimating the real RFR above. However, in light of our estimate of the real TMR, we have cross-checked that the implied real ERP is reasonable against other evidence, as set out below.

Historical ex-post estimates of the TMR

A20.88 Historical ex-post approaches assume that the average realised real TMR is a good proxy for the expected real TMR. Datasets from the 2017 Yearbook and 2017 Barclays Equity Gilt Study (2017 Barclays EGS) are the main source for historical returns that we have relied on.

A20.89 Table A20.14 shows arithmetic average real returns over the period 1900 to 2016 from the 2017 Yearbook and the 2017 Barclays EGS, assuming different holding periods for equity.

Table A20.14: Arithmetic average real return on equity

Holding period	1-year	2-year	5-year	10-year	20-year
2017 Yearbook	7.3%	7.2%	7.0%	6.9%	7.0%
2017 Barclays EGS	6.8%	6.7%	6.5%	6.3%	6.3%

Source: Ofcom calculations based on Table 75 of the 2017 Yearbook and Figure 11 of the 2017 Barclays EGS. The averages shown are averages of rolling averages – e.g. for a 10-year holding period the average shown is the average annual return for 10-year holding periods for each year from 1909 to 2016. The holding period averages have been estimated using the same approach taken by the CMA in Table 13.7 of its 2014 NIE Determination.

A20.90 Table A20.14 indicates that the real historical ex-post average annual return on equity for holding periods of between one and twenty years lies somewhere between 6.3% to 7.3%, with returns associated with longer holding periods being lower than returns associated with shorter holding periods.

³³⁵ The 2003 Smithers & Co report recommended that the cost of equity should be derived from estimates of the TMR, with any changes in the real RFR or ERP offsetting each other. See pages 48 and 49. On page 49 the 2003 Smithers & Co report says that “given our preferred strategy of fixing on an estimate of the equity return, any higher (or lower) desired figure for the safe rate would be precisely offset by a lower (or higher) equity premium, thus leaving the central estimate of the cost of equity capital unaffected”.

Historical ex-ante estimates of the TMR

- A20.91 In previous charge controls we have considered two historical ex-ante approaches to estimating the real TMR.
- A20.92 First, we considered Fama and French's approach of estimating the real TMR from the sum of average real dividend yields and the average real rate of dividend growth.³³⁶ Data from the 2017 Barclays EGS suggests that the average real dividend yield has been 4.5% over the period 1900 to 2016 while the average real rate of dividend growth was 1.2%. This suggests a long run real TMR of around 5.7%.³³⁷
- A20.93 Second, in the 2017 Yearbook, Dimson, Marsh and Staunton (DMS) try to infer what returns investors may have been expecting in the past by separating the historical equity premium into elements that correspond to investor expectations and those that relate to non-repeatable good or bad luck. DMS considers dividend income, real dividend growth, expansion of valuation ratios and changes in the real exchange rate.³³⁸ DMS infer that globally diversified investors expect an arithmetic average ERP over treasury bills of 4.5% to 5.0%.³³⁹ Given the average long run real return on global treasury bills (which is the DMS preferred measure of risk free returns³⁴⁰) is 0.9%,³⁴¹ this implies an expected real TMR of 5.4% to 5.9%.

Summary of TMR estimates

- A20.94 Historical ex-post estimates calculated over a long horizon would broadly support a real TMR estimate of 6% to 7% while historical ex-ante estimates over the same period would broadly support estimates of 5.5% to 6%.
- A20.95 We note that the 2017 Yearbook identifies that low real interest rates have historically been associated with subsequent periods of low real equity returns³⁴² and that "since real interest rates remain at low levels, this is likely to depress returns on all asset classes –

³³⁶ Fama, E. F. and French, K. R., 'The Equity Premium', Journal of Finance Vol. LVII, No. 2, April 2002.

³³⁷ In its 2014 NIE Determination the CMA noted that more recent dividend yields were below the historical average which might suggest that current expected returns are lower than historical averages. Current dividend yields remain below historical averages which might suggest current expected returns are below 5.7%. See paragraph 13.144 of the 2014 NIE Determination.

³³⁸ See for example pages 32-37 of the 2017 Yearbook.

³³⁹ Page 37 of the 2017 Yearbook. We note that the 3% to 3.5% TMR figure quoted by TalkTalk in its response is actually an estimate of the geometric average ERP over treasury bills set out on the same page of the 2017 Yearbook. Consistent with previous reviews we place weight on the arithmetic mean averages when considering historical returns rather than geometric averages. This is consistent with the approach recommended in the textbook Principles of Corporate Finance (see pages 162 and 163, 11th edition) and page 9 of the 2016 Brattle Report.

³⁴⁰ See page 26 of the 2017 Yearbook.

³⁴¹ See page 229 of the 2017 Yearbook. The equivalent long run real return on UK treasury bills is 1.2% from page 212 of the 2017 Yearbook.

³⁴² Slide 11, Credit Suisse Global Investment Returns Yearbook 2017 – Slide desk, https://research-doc.credit-suisse.com/docView?language=ENG&format=PDF&sourceid=csplusresearchcp&document_id=1071583721&serialid=J5yMXIRJvfnMRo%2F26sXGb92xh7MkFirw5X%2Bj3R5kq7g%3D

including equities” (as TalkTalk identifies).³⁴³ This may indicate that it would be appropriate to select a TMR at or below the low end of the range of historical ex-post estimates.

ERP

A20.96 In line with our March 2017 WLA Consultation, we have looked at evidence from:

- a) historical premia of UK equities over UK gilts;
- b) forward looking estimates of the ERP; and
- c) recent regulatory precedents.

Historical premia of UK equities over gilts and treasury bills

A20.97 The 2017 Yearbook reports that the average (arithmetic mean) equity premium over bonds for the UK between 1900 and 2016 was 4.9%.³⁴⁴ The average equity premium over treasury bills was 6.1% (arithmetic mean) for the same period.

A20.98 The Barclays 2017 EGS indicates that the average (arithmetic mean) premium of equities over bonds for the UK between 1900 and 2016 was 5.0%.³⁴⁵ The average equity premium over treasury bills was 6.2% (arithmetic mean) for the same period.³⁴⁶

A20.99 These sources suggest that the nominal ERP is between 4.9% and 6.2% depending on whether the equity premium is measured relative to Government gilts (in which case it is closer to 5%) or treasury bills (in which case it is closer to 6%). The corresponding figure is slightly less in real terms. Taking the long-run view of inflation in the 2017 Yearbook consistent with the period of estimation for equity returns (which gives long-run inflation at 3.9%),³⁴⁷ the range for the real ERP would be 4.7% (against gilts) to 5.9% (against treasury bills).

Forward looking estimates of the ERP (surveys and the dividend growth model)

A20.100 The 2017 survey of academics and investment professionals by Fernandez et al³⁴⁸ gives a mean ERP for the UK of 5.9% and median of 6.2%. This mean is higher than reported for the UK in the equivalent 2015 and 2016 surveys (5.2% and 5.3% respectively).³⁴⁹

³⁴³ Credit Suisse Yearbook 2017: Low Interest Rates Hit Returns on Equities, <https://www.credit-suisse.com/corporate/en/articles/news-and-expertise/credit-suisse-yearbook-2017-201704.html> [accessed 20 February 2018].

³⁴⁴ Table 72, page 212, 2017 Yearbook.

³⁴⁵ Derived from tables on page 158 (inflation), 170 (real equity and gilt returns) of the Barclays 2017 EGS.

³⁴⁶ Derived from tables on page 158 (inflation), 170 (real treasury bill and gilt returns) of the Barclays 2017 EGS.

³⁴⁷ Table 72, page 212, 2017 Yearbook. Long-run inflation is 4.1% calculated using the Barclays 2016 EGS.

³⁴⁸ Fernandez P., Pershin V., and Acin I.F., ‘Discount Rate (Risk-Free Rate and Market Risk Premium) used for 41 countries in 2017: a survey’, 17 April 2017. The survey was sent to “finance and economics professors, analysts and managers” (page 2).

<http://www.valumonics.com/wp-content/uploads/2017/06/Discount-rate-Pablo-Fern%C3%A1ndez.pdf>.

³⁴⁹ Fernandez, P., Ortiz, A., Acin, I.F., ‘Market Risk Premium used in 71 Countries in 2016: a survey with 6,932 answers’, 9 May 2016. https://econpapers.repec.org/scripts/redir.pf?u=http%3A%2F%2Fresearchleap.com%2Fwp-content%2Fuploads%2F2017%2F10%2F03_Market_Risk_Premium_Used_in_71_Countries.pdf;h=repec:mgs:iibrme:v:2:y:2017:i:6:p:23-31 [accessed 20 February 2018].

- A20.101 Some practitioners have sought to infer estimates of the ERP from surveys of academics and investment professionals. However, these surveys are susceptible to, for example, how the questions are framed, implicit assumptions on the averaging method, treatment of inflation and benchmark instrument for the RFR. Therefore, we have not relied on the results of such surveys, preferring to rely on projections where the assumptions are made explicit.³⁵⁰ However, we consider that surveys such as this may provide an indication of whether the ERP could be increasing or decreasing.
- A20.102 Using the dividend growth model (DGM) it is possible to calculate an implied ERP using current market values, forecasts for earnings/dividends and an explicit assumption about the RFR. We have previously placed less weight on such methods because they require the use of subjective input parameters such as analyst expectations and an assumption of future dividend growth rates.³⁵¹ However, outputs from DGM models may provide an indication of whether the ERP is increasing or decreasing.³⁵²
- A20.103 The Bank of England’s November 2017 FSR indicates that UK equity risk premiums have increased since January 2016, unlike in the US and euro-area where equity risk premiums have fallen.³⁵³ Figure A16.15 below shows the Bank of England’s estimates of the nominal ERP derived using a DGM, indicating a moderate increase in the ERP since the referendum.³⁵⁴
- A20.104 The chart below shows that the ERP estimates obtained from a DGM can vary widely depending on the time when the estimation is made. Broadly speaking, the ERP appears to range from around 5% to 13% over the period shown in the chart. However, in the last five years the ERP estimates have tended to fall within a narrower range of 7% to 10%.

³⁵⁰ This is consistent with the limitations of survey approaches identified by the CMA in its 2014 NIE Determination. See paragraph 13.156 and pages 13-31, 2014 NIE Determination.

³⁵¹ See for example paragraphs A8.27-28 of Ofcom, 2009. *A New Pricing Framework for Openreach – Statement*. <http://stakeholders.ofcom.org.uk/binaries/consultations/openreachframework/statement/statement.pdf>; and paragraphs A10.56-60 of the March 2015 MCT Statement.

³⁵² This is consistent with the Bank of England’s view in its Q2 2017 quarterly bulletin “An improved model for understanding equity prices” where it said “given the uncertainty associated with measuring the ERP, the Bank’s analysis tends to focus less on the precise level of the ERP and more on changes in the ERP over time or on the level of the ERP relative to historic averages” (page 93). <https://www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2017/an-improved-model-for-understanding-equity-prices.pdf?la=en&hash=F0385353B45A130A1AA557165FBEC5E326FD57FB> [accessed 20 February 2018].

³⁵³ Chart A.20, November 2017 FSR.

³⁵⁴ The ERP derived from the BoE DGM is nominal because it has been estimated by reference to nominal gilts. In the 2015 MCT Statement we considered ERP estimates produced by the Bank of England and said that we favoured these estimates over those produced by other organisations such as Bloomberg (footnote 171, 2015 MCT Statement). We understood that the Bank of England’s results were derived from the FTSE All Share index while Bloomberg’s results were based on the FTSE100 index. We favoured the Bank of England’s results because the FTSE All Share reflects a more diversified portfolio of equities.

Figure A20.15: Bank of England ERP estimates derived from a DGM

Source: Bank of England. Data to 29 December 2017. The above ERP estimates are taken from the Bank of England's DGM model. We note that the data contained in this chart was used to inform Chart A.20 in the Bank of England's November 2017 Financial Stability Report.

Recent regulatory precedents

A20.105 Table A20.6 showed that the most recent real ERP estimates used by other UK regulators have typically been between 5.25% and 5.5% although more recent regulatory announcements from Ofwat and the CAA (as shown in Table A20.7) indicate that ERP estimates are likely to be higher in the next round of price controls, at somewhere around 6.5%. These ERP estimates should be viewed in conjunction with the real RFR and TMR used in the relevant publications.

Summary of empirical and regulatory estimates of the ERP

A20.106 The table below summarises the preceding evidence on the ERP.

Table A20.16: Summary of evidence on the real ERP

Basis	Nominal/ real	ERP %
Historical premia of UK equities over gilts and treasury bills	Nominal	4.9% - 6.2%
Academic/user surveys	Unknown	c.6%
Dividend growth model (BoE)	Nominal	7% - 10%
Recent regulatory precedent	Real	5.25% - 6.5%

Source: Ofcom analysis

Our decisions

A20.107 In the 2016 BCMR Statement we used a real ERP of 5.1% which, combined with our real RFR of 1.0%, gave a real TMR of 6.1%.

A20.108 Although we proposed to reduce the TMR to 6.0% in our March 2017 WLA Consultation, in light of Oxera's comments we have reviewed whether more recent evidence on the TMR would support a reduction from the 6.1% real TMR used in the 2016 BCMR Statement. While historical data and academic reports would generally support our view that the TMR is relatively stable compared to the real RFR and ERP, there is a range of evidence to consider and regulatory judgement is required when selecting a point estimate.

A20.109 Table A20.17 compares the evidence on the real TMR we have set out above compared to the same evidence considered in the 2016 BCMR Statement.

Table A20.17: Summary of evidence on the real TMR

		2016 BCMR Statement	This Statement	Change
Historical ex-post	2017 Yearbook	6.9% - 7.2%	6.9% - 7.3%	Up
	Barclays EGS	6.4% - 6.9%	6.3% - 6.8%	Down
Historical ex ante	Fama French approach	5.5%	5.7%	Up
	DMS approach	5.7% - 6.2%	5.4% - 5.9%	Down

Source: Ofcom analysis

A20.110 Table A20.17 indicates that changes in TMR estimates since the 2016 BCMR Statement have been mixed, with some sources of evidence suggesting a slight increase, and some suggesting a slight decrease. We also note that this is an area where views of experts and practitioners may differ and where judgement is required. In light of this evidence and differing views, we consider it is preferable to fix the TMR and within that the RFR and ERP would offset one another.³⁵⁵ Therefore, we have decided to continue to use a real TMR of 6.1% as in the 2016 BCMR statement.

A20.111 Combined with our decision to use a real RFR of 0.0%, a 6.1% real TMR implies a real ERP of 6.1%. Given the uncertainty in estimating the ERP and the range of evidence on it (see Table A20.16) we consider that an ERP of 6.1% lies within the plausible range of the future yield on equities above the RFR.

A20.112 Applying our proposed inflation forecast of 2.9% for 2020/21, the nominal ERP is 6.3%, to which we then apply the estimated equity beta within the CAPM framework.

³⁵⁵ This is consistent with the view advanced in the 2003 Smithers & Co report (as noted above).

Equity beta and asset beta - BT Group

Our proposals

A20.113 In the March 2017 WLA Consultation we proposed to derive a forward-looking equity beta for BT Group using the following three steps:

- a) Derive the equity beta for BT Group using BT's equity returns relative to market equity returns over the recent past. We proposed to use an equity beta of 1.02, equal to the two-year equity beta for BT Group measured against the FTSE All Share as at 31 December 2016.³⁵⁶
- b) Derive the asset beta for BT Group by removing the effect of financial gearing from the equity beta estimated in the preceding step.³⁵⁷ We said that in previous WACC decisions we have estimated the gearing by considering short-term debt and long-term debt as a proportion of enterprise value³⁵⁸ but we considered whether the deficit associated with BT's defined benefit pension scheme should also be taken into account when estimating financial gearing. We noted that the two-year asset beta excluding the pension deficit was 0.81 (based on gearing of 22%), while including the accounting value of the pension deficit in financial gearing the asset beta was 0.72 (based on gearing of 32%).³⁵⁹ We proposed to use an asset beta between these two estimates and proposed a value of 0.76 for BT Group, recognising the uncertainty associated in evaluating the impact, if any, of the pension deficit on financial gearing.
- c) Derive a forward-looking equity beta by applying a forward-looking gearing rate for BT Group to the asset beta estimated in the preceding step. We proposed to use a forward gearing of 35%, noting that it was similar to BT's current and longer term gearing averages (taking account of the pension deficit as set out in the previous point) and fell within a credible range based on comparator companies.

A20.114 Combining our asset beta estimate of 0.76, our forward looking gearing estimate of 35% and our debt beta estimate of 0.1 we derived a forward-looking equity beta for BT Group of 1.12. This was calculated using the following formula where the term "Gearing" refers to forward gearing:

$$\beta_{equity} = \frac{\beta_{asset} - \beta_{debt} * Gearing}{1 - Gearing}$$

³⁵⁶ We said that we placed most weight on equity betas calculated against the FTSE All Share index because it reflects what might be termed the 'home bias' of investors towards domestically listed companies. We also said that we placed most weight on equity betas calculated over a two-year period of daily returns because we consider it provides the most appropriate balance between a short enough estimation period to remain relevant on a forward-looking basis whilst having enough data points to be sufficiently statistically robust. This is consistent with previous BT WACC decisions.

³⁵⁷ Asset betas are calculated using the following formula: $\beta_{asset} = Gearing * \beta_{debt} + (1 - Gearing) * \beta_{equity}$.

³⁵⁸ Where enterprise value is the sum of market capitalisation and short- and long-term debt.

³⁵⁹ Both of these estimates were derived using a debt beta of 0.1.

Stakeholder responses

A20.115 Stakeholder responses focused on the methodology used to estimate the financial gearing used to de-lever the observed equity beta to estimate an asset beta. Comments focused on whether financial gearing should be estimated gross or net of cash and whether it was appropriate to include an estimate of BT's pension deficit.

Gross debt or net debt

A20.116 Oxera stated that our approach to estimating gearing based on the sum of long-term and short-term debt is inconsistent with regulatory precedent and industry best practice.³⁶⁰ Oxera said that "UK regulators appear to favour estimating a firm's gearing based on net debt, which nets out cash and cash equivalents from a firm's short and long-term financial liabilities".³⁶¹

A20.117 Oxera added that, based on discussions with BT, "the cash on BT's balance sheet relates to its financing activities. [X]. Therefore, the cash on BT's balance sheet should be netted off in the gearing calculation."³⁶²

A20.118 Oxera said that netting off BT's average cash balances over the past two years (c.£2.5bn) reduced the gearing to 17%.

Pension deficit

A20.119 Oxera noted that we had reviewed the treatment of BT's pension deficit in 2010 and decided not to make an adjustment to the WACC. Oxera considered that our proposal to include BT's pension deficit when estimating gearing created a regulatory inconsistency. Oxera argued that a change in regulatory approach might be desirable if the previous approach was incorrect, there had been a material change in circumstances, or new academic evidence offered a superior approach to estimating the WACC. Oxera did not consider that these conditions had been met, saying that no other UK regulator includes the impact of pension deficits in its assessment of WACC; since 2010 BT's pension deficit has remained broadly unchanged and Ofcom has not cited any new academic evidence to support its proposal.³⁶³

A20.120 Oxera added that our proposal to include the pension deficit increases the gearing and lowers BT's WACC. Oxera considered this was inconsistent with the Modigliani-Miller theorem which implies that a firm's capital structure should not affect its WACC.³⁶⁴

³⁶⁰ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, pages 13.

³⁶¹ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, pages 13.

³⁶² Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, pages 14.

³⁶³ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, pages 11.

³⁶⁴ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, pages 12-13.

A20.121 Oxera collaborated with Professor Ian Dobbs³⁶⁵ and said that our approach to including the pension deficit in gearing implicitly assumes that the risk of pension assets and liabilities is matched and equal to the debt beta. Oxera said that this assumption is unlikely to hold, with the beta of the pension assets and liabilities likely to be greater than the debt beta.³⁶⁶

A20.122 Oxera argued that in the absence of any compelling evidence or argument supporting our proposal it would be inappropriate for us to adjust BT's WACC as a result of its pension scheme.³⁶⁷

A20.123 Finally, Oxera said that as our forward-looking gearing estimate of 35% was driven by inclusion of the pension deficit we should revert back to the forward looking gearing estimate of 30% used in the 2016 BCMR Statement.³⁶⁸

A20.124 TalkTalk agreed with the inclusion of the pension deficit in the gearing calculation.³⁶⁹ TalkTalk said that none of Oxera's objections to our proposal were relevant:³⁷⁰

- other UK regulators have different duties to Ofcom, such as financeability;
- it is unclear why there would need to have been a change in scale of the pension deficit for Ofcom to change its view on the appropriate way to take the deficit into account; and
- it is unclear why Ofcom should need new academic evidence to change its view on the appropriate way to take the deficit into account.

A20.125 TalkTalk also said that evidence from financial market analysis demonstrates that the pension deficit is treated as akin to debt.³⁷¹ In addition, TalkTalk noted that the approach proposed by Ofcom was originally proposed by Oxera in a 2009 paper.³⁷²

Our reasoning and decisions

Equity beta derived from market data

A20.126 We commissioned NERA to estimate the equity and asset betas for BT and comparator companies as at 30 September 2017. Its report can be found in Annex 31. Figure A20.18 below shows the two-year equity beta for BT Group measured against the FTSE All Share and illustrates that BT's two-year equity beta has been relatively stable since the March 2017 WLA Consultation. As at 30 September 2017 the two-year equity beta was 1.03 when measured against the FTSE All Share.

³⁶⁵ Professor Dobbs produced a report for BT when we considered the approach to the pension deficit in 2010. His 2010 report, 'Defined benefit pension plans, the cost of capital and the regulatory allowed rate of return' is here:

https://www.ofcom.org.uk/_data/assets/pdf_file/0017/51812/bt_ian_dobbs.pdf.

³⁶⁶ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 13.3

³⁶⁷ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, page 13.

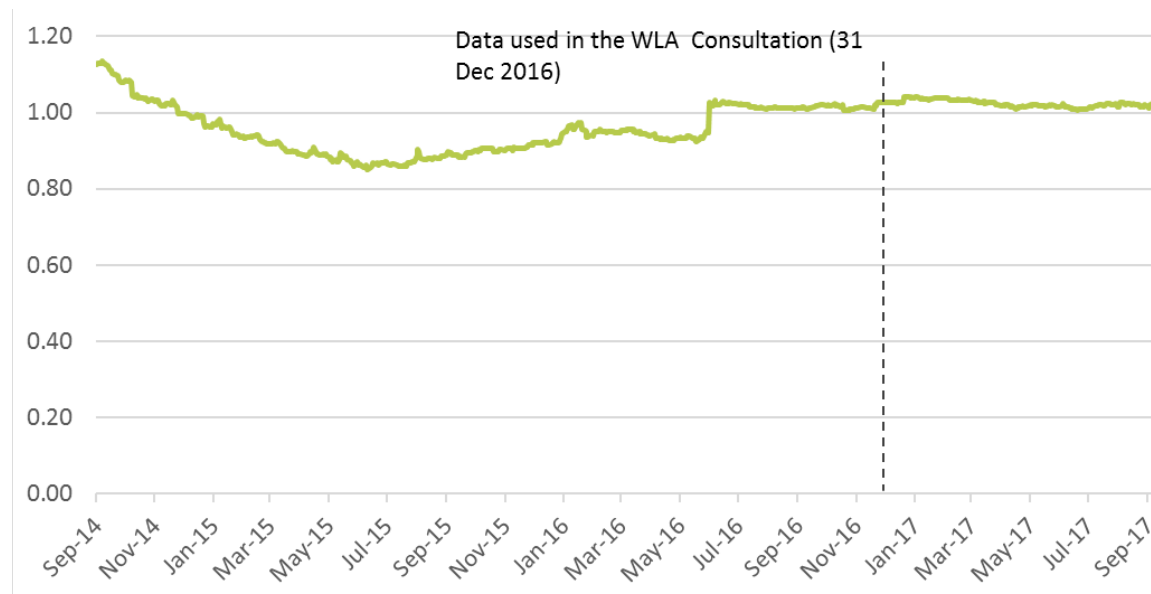
³⁶⁸ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, pages 14-15.

³⁶⁹ TalkTalk response on WACC proposals in the June 2017 WLA Consultation, paragraph 6.37, page 31.

³⁷⁰ TalkTalk – Response to Oxera paper on WACC proposals, paragraph 5.3

³⁷¹ TalkTalk – Response to Oxera paper on WACC proposals, paragraph 5.4

³⁷² TalkTalk – Response to Oxera paper on WACC proposals, paragraph 5.8. TalkTalk refers to Oxera's 2009 paper, *Defined benefit pension plans: defining the cost*. http://www.oxera.com/Oxera/media/Oxera/downloads/Agenda/Pension-Plans_1.pdf?ext=.pdf.

Figure A20.18: BT Group 2-year equity beta against the FTSE All Share

Source: NERA

Asset beta

A20.127 The asset beta is calculated from the equity beta using average gearing over the same two-year period used to estimate the equity beta and assuming a debt beta of 0.10 (consistent with our conclusion on the debt beta below).

A20.128 BT's average gearing in the two years to 30 September 2017 was 26%, with gearing measured by considering short-term debt and long-term debt as a proportion of enterprise value.³⁷³

A20.129 We have decided not to make any adjustments to gearing to net off cash or to include any contribution to debt arising from the fact that BT's pension scheme is in deficit, as explained below.

Gross or net debt

A20.130 In previous decisions, we have estimated asset betas using gross debt rather than net debt.³⁷⁴

A20.131 We asked NERA to consider again whether it would be appropriate to net off cash when estimating the gearing. NERA said that in circumstances where cash is not used to finance

³⁷³ Annex 31 (NERA report), Table 3.2.

³⁷⁴ Page 7, Annex 10 of 2015 LLCC Consultation,

https://www.ofcom.org.uk/data/assets/pdf_file/0033/57768/nera_final_report.pdf. This annex also explains that while our previous consultants, Brattle Group, used a 'working capital screen' to estimate gearing (where long term debt only was included in the gearing calculation where the working capital of the company was positive otherwise both short-term and long-term debt was included in the calculation), in practice the gearing estimates for BT were unaffected given its working capital has been negative for an extended period.

ongoing operations, and when it can be freed up to cover the short-term liabilities it might be appropriate to net off cash from the total stock of debt when calculating the gearing.³⁷⁵

A20.132 The reasons given by Oxera for BT holding cash indicate that it is required for the ongoing operations of the business and is not available to pay off debt. This suggests that it would not be appropriate to net off cash when calculating the gearing. Openreach was also unable to provide evidence that cash or any other current assets were held for the purpose of, or available for, paying off debt in each of 2014/15, 2015/16 and 2016/17.³⁷⁶ On this basis, we consider that it is appropriate to continue measuring gearing using gross debt, and to not net off cash.

Pension deficit

A20.133 In our 2010 Pension Review we considered how to take account of BT's defined benefit pension scheme when setting charge controls. This included a consideration of whether to allow deficit repair payments and whether it was necessary to adjust the cost of capital. We concluded that it was not appropriate to make an adjustment to BT Group's asset beta for the pension scheme,³⁷⁷ which was consistent with the exclusion of deficit repair payments from the charge control, meaning that risks associated with the pension scheme sat with BT's shareholders.³⁷⁸

A20.134 Our proposal in the March 2017 WLA Consultation intended to be a refinement of our approach in the 2010 Pensions Review and was confined to the issue of gearing. When estimating the cost of equity, we intended that the gearing used to de-lever the equity beta and re-lever the asset beta would have included the same pension deficit in each calculation.³⁷⁹ However, we recognise that changing the way gearing is measured can also affect the relative weights of debt and equity in the WACC calculation. As a result, it would only be appropriate to include the pension deficit in financial gearing if it could be considered a source of financial leverage or funding.

A20.135 We commissioned NERA to help us consider whether it is appropriate to include the pension deficit when estimating financial gearing. NERA's report can be found in Annex 30.

A20.136 NERA explain that "while Ofcom is right to recognise the fact that the deficit represents a prior claim when the market determines the equity beta for BT Group, it does not follow that Ofcom should adjust the capital structure such that it treats the deficit as gearing, because BT's shareholders are still required to provide the equity capital necessary to close the deficit".³⁸⁰

³⁷⁵ Annex 31 (NERA report), Appendix B, Pages 55-56.

³⁷⁶ Openreach response dated 1 September 2017 to Question 5 of the 35th S135 notice.

³⁷⁷ 2010 Pensions Review, paragraph 7.63.

³⁷⁸ 2010 Pensions Review, paragraph 7.61.

³⁷⁹ This means that while any risk associated with the pension scheme would be 'stripped out' when estimating the asset beta, it would be 'added back in' when estimating the forward-looking equity beta.

³⁸⁰ Annex 30 (NERA report), page 24.

A20.137 NERA also said that, following our 2010 Pensions Review, the equity beta should reflect the risk of the pension scheme and an approach that did not de-lever the equity beta to try to separate out pension risk is better suited for calculating a cost of equity that reflects the pension risk.³⁸¹ NERA explain that our March 2017 consultation proposal assumed that “funding for the closure of the pension deficit can be obtained at preferential (‘cost of debt’) terms, and that a portion of the equity risk can be explained by the pension deficit risk, assumed to share the same risk features as traditional financial debt. This assumption is neither consistent with the financial literature (which stipulates that the pension assets and liabilities have much higher betas, and are therefore more risky, than traditional debt) and implies that the pension deficit is as risky as traditional debt, and can be funded at the existing cost of debt).”³⁸²

A20.138 We have considered carefully the recommendations contained in NERA’s report. In practice, we consider that pension deficits are similar to operating liabilities i.e. they represent a form of operational leverage (such as decommissioning liabilities for oil and gas rigs) rather than financial leverage. This is because, while the future obligation is known and committed, it does not constitute a source of funds that BT can draw upon. As, the pension deficit does not represent a source of financial leverage or funding for BT Group it should not be included in financial gearing. We have therefore not included any measure of the pension deficit in the gearing calculation.³⁸³ The BT Group asset beta unlevered using financial debt only will include pension deficit risk. This approach is consistent with our 2010 Pension Review where we decided that risks associated with the pension scheme sit with BT’s shareholders, as noted above.

Conclusion on BT Group asset beta

A20.139 De-levering the BT Group two-year equity beta of 1.03 using average gearing of 26% gives an asset beta of 0.78.³⁸⁴

A20.140 While this is slightly higher than the BT Group asset beta of 0.76 we proposed in the March 2017 WLA Consultation, this is only due to the previous proposed treatment of the pension deficit in gearing. Using a consistent approach to gearing to that used for this statement, the BT Group asset beta used in the March 2017 WLA Consultation would have been 0.81 (de-levered using the then two-year gearing of 22%). As a result, when disaggregating the BT Group asset beta, some or all of the asset betas for the disaggregated parts of BT would have been slightly higher than proposed in the March 2017 WLA Consultation. We set out our decisions on the BT Group asset beta below and then consider the implications for disaggregation later in this annex.

Forward-looking gearing

³⁸¹ Annex 30 (NERA report), page 23.

³⁸² Annex 30 (NERA report), page 23.

³⁸³ NERA also concludes that the pension deficit should not be included in measures of financial gearing. See Annex 30 (NERA report), page 24.

³⁸⁴ Annex 31 (NERA report), Table 3.1 (page 9) and Table 3.2 (page 14).

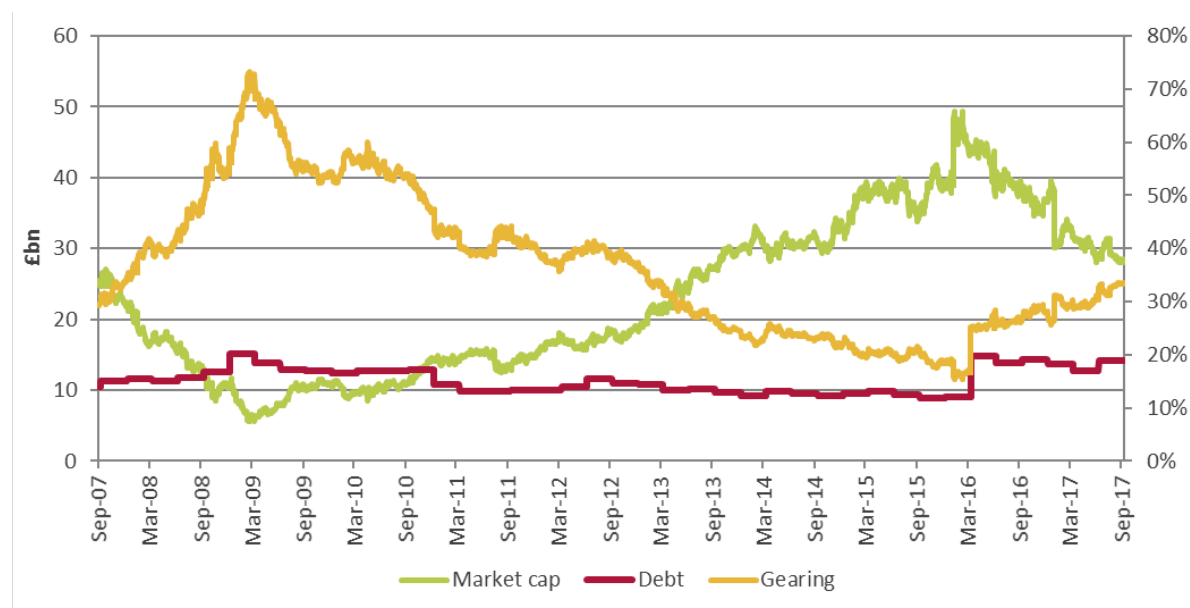
A20.141 Given that we decided above not to include BT's pension deficit when measuring gearing, our forward looking gearing estimate only considers short-term and long-term debt as a proportion of enterprise value, consistent with previous market reviews.

A20.142 As can be seen in Figure A20.19 below, BT's gearing increased in January 2016 following its acquisition of EE. Since then, while BT's debt levels have been relatively stable, its gearing has increased as its market capitalisation has reduced (especially following the EU referendum). As at 30 September 2017, BT's gearing stands at around 33%.

A20.143 We consider that a reasonable forward looking gearing level for BT Group would lie between 25% and 50%. The lower end of this range approximately reflects the average gearing for BT over the last two years. The upper end of the range is around the level of the most highly geared UK utilities and the maximum level proposed in the 2016 Brattle Report for the European Commission.³⁸⁵ Over the last one and two years, the average gearing of most UK and European telecoms operators has fallen within this range, with the average across all these operators around 35%.³⁸⁶

A20.144 We consider that forward gearing of 30% is reasonable since it is similar to BT's current and longer-term gearing averages and falls within a credible range based on comparator companies. This is the same as the forward looking gearing assumption used in the 2016 BCMR Statement.

Figure A20.19 BT Group gearing, market cap and total debt



Source: Bloomberg (debt = short-term + long-term debt; gearing = debt/(Market cap + debt))

³⁸⁵ On 18 July 2016 the European Commission published a report from Brattle reviewing approaches to estimating the WACC across European telecoms regulators ("2016 Brattle Report") in which Brattle recommends a maximum forward-looking gearing rate for telecoms operators of 50% to 55%.

<https://publications.europa.eu/en/publication-detail/-/publication/da1cbe44-4a4e-11e6-9c64-01aa75ed71a1/language-en>.

³⁸⁶ See Annex 31 (NERA report), Table 3.2 (page 14) and Table 3.4 (page 26).

Forward-looking equity beta

A20.145 Combining an asset beta of 0.78, a forward-looking gearing of 30% and a debt beta of 0.10 (see next section) we derive a forward-looking equity beta for BT Group of 1.07.

Debt beta

Our proposals

A20.146 We proposed to use a debt beta of 0.1, the same as that used in the 2016 BCMR Statement.

Stakeholder responses

A20.147 No stakeholders specifically commented on our debt beta proposals.

Our reasoning and decisions

A20.148 We have considered the following sources of evidence on debt betas:

- a) Brealey, Myers and Allen in their textbook Principles of Corporate Finance estimate that debt betas of large firms are in the range of 0 to 0.2;³⁸⁷
- b) the CMA used a debt beta of:
 - i) zero in its 2015 Bristol Water review;³⁸⁸
 - ii) 0.05 in the NIE Determination;³⁸⁹
 - iii) 0.1 in its 2007 Heathrow and Gatwick review and its 2010 Bristol Water review,³⁹⁰ and
- c) the 2016 Brattle Report suggests a debt beta of 0.10 for firms with a BBB credit rating while a debt beta of 0.05 would be appropriate for firms with an A rating.

A20.149 We have used a debt beta of 0.10 in recent charge control decisions. We would associate a higher debt beta with relatively higher debt premiums and gearing levels, and vice versa. The table below shows the gearing levels and debt premia we have used alongside our debt beta assumptions in recent decisions.

³⁸⁷ Page 436, Franklin Allen, Richard A. Brealey, and Stewart Myers, Principles of Corporate Finance 11th edition, 2013.

³⁸⁸ CMA noted that its choice of “debt beta has very little impact on the cost of capital if Bristol Water’s gearing level is similar to the comparators used”. Paragraph 10.150, Bristol Water 2015.

³⁸⁹ NIE Determination, paragraph 13.175c and pages 13-36.

³⁹⁰ CC report on Heathrow and Gatwick, Appendix F, paragraph 106.

<http://webarchive.nationalarchives.gov.uk/20140402194940/http://www.competition-commission.org.uk/our-work/directory-of-all-inquiries/heathrow-and-gatwick-quinquennial-review/final-report-and-appendices-glossary> [accessed 20 February 2018]; Bristol Water Determination, Annex N, paragraph 151.

<http://webarchive.nationalarchives.gov.uk/20121212135622/www.competition-commission.org.uk/our-work/directory-of-all-inquiries/bristol-water-plc-water-price-limits-determination> [accessed 20 February 2018].

Table A20.20: Ofcom's recent debt beta, debt premium and gearing decisions

Year	Decision	Debt beta	Gearing	Debt premium range
2016	BCMR Statement	0.10	30%	1.1% – 1.5%
2015	MCT Statement	0.10	40%	1.0% - 1.6%
2014	FAMR Statement	0.10	32%	1.0% - 1.5%
2013	LLCC Statement	0.15	40%	1.7% - 2.3%
2011	MCT Statement	0.10	30%	1.0% – 2.0%

Source: Ofcom³⁹¹

A20.150 As set out above, we estimate a range for the BT Group debt premium of 1.0% to 1.5%. This is much the same as the range we used in the 2016 BCMR Statement (1.1% to 1.5%) when gearing was also the same as we have adopted here (30%) and a debt beta of 0.1 was used.

A20.151 We therefore consider it appropriate to assume a debt beta of 0.1. This is the same as proposed in the March 2017 WLA Consultation and used in the 2016 BCMR Statement.

Corporate tax rate

Our proposals

A20.152 In the March 2017 WLA Consultation we proposed to use a corporate tax rate of 19% for 2019/20 and 17% for 2020/21 (the final year of the control period). This was based on the most recent government announcements (Summer Budget 2015 and Budget 2016).³⁹²

Stakeholder responses

A20.153 No stakeholders commented on our corporate tax proposals.

Our reasoning and decisions

A20.154 We have decided to use a corporate tax rate of 19% for 2019/20 and 17% for 2020/21 (the final year of the control period).

³⁹¹ March 2011 MCT Statement, March 2015 MCT Statement (Table A10.1), 2013 LLCC Statement, and June 2014 FAMR Statement (Table A16.1 and Table A16.2), 2016 BCMR Statement (Table A30.1).

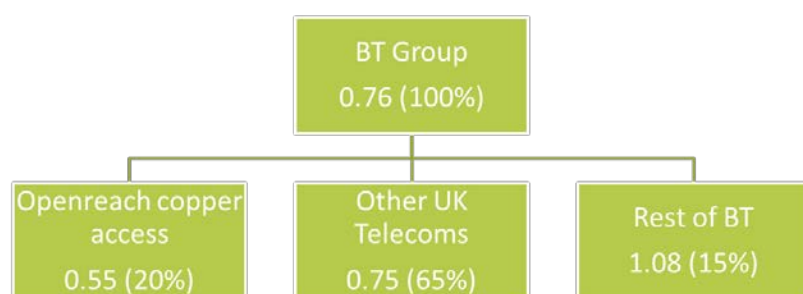
³⁹² <https://www.gov.uk/government/publications/rates-and-allowances-corporation-tax/rates-and-allowances-corporation-tax> [accessed 20 February 2018].

Disaggregation of BT Group asset beta

Our proposals

A20.155 In the March 2017 WLA Consultation, we proposed to split the BT Group asset beta between: Openreach copper access,³⁹³ Other UK telecoms³⁹⁴ (which included fibre access) and the Rest of BT (RoBT) which primarily included BT's ICT operations from its Global Services and Business and Public Sector divisions).³⁹⁵ This is illustrated in Figure A20.21, which shows the asset betas used in the March 2017 WLA Consultation and the relative weights put on each disaggregated part of BT (so that the weighted sum of each disaggregated asset beta equals the BT Group asset beta).

Figure A20.21: Asset betas and weights used in the March 2017 WLA Consultation



Source: Ofcom

A20.156 In estimating asset betas for the disaggregated parts of BT we need to exercise judgement, considering evidence from benchmark operators that are similar to each disaggregated part (albeit not pure-play comparators) and the overall BT Group asset beta. In the rest of this section we set out our position in the March 2017 WLA Consultation, stakeholder responses (most of which are focused on the Other UK telecoms asset beta) and our conclusions on disaggregating the BT Group asset beta as follows:

- a) Asset beta weightings;
- b) Comparator company asset betas;
- c) Openreach copper access asset beta;
- d) Other UK telecoms and RoBT asset beta; and
- e) Fibre access asset beta.

³⁹³ Since 2005 we have distinguished BT's copper access services from other services it provides because we consider that the copper access lines to customer premises have a lower systematic risk than other services such as those delivered over those lines (i.e. usage services such as voice and broadband).

³⁹⁴ Other UK telecoms included BT's wholesale and retail leased lines, fixed voice, broadband and bundled services.

³⁹⁵ On 1 April 2016 BT reorganised its divisions and the UK-focused parts of Global Services moved into a new 'Business and Public services' division (which also includes the old BT Business division) while multinational and international clients continued to be served from Global Services. Other changes included EE's business division moving into the new 'Business and Public Sector' division so that the EE division focused on the consumer market. See BT press release dated 1 February 2016: <http://www.btplc.com/news/#/pressreleases/bt-announces-new-structure-1304769> [accessed 20 February 2018].

Asset beta weightings

Our proposals

A20.157 In the March 2017 WLA Consultation we proposed to assign a weighting of 20% to Openreach copper access, 65% to Other UK telecoms and 15% to RoBT.

Stakeholder responses

A20.158 No stakeholder specifically commented on our proposed weightings.

Our reasoning and decisions

A20.159 Table A20.22 below reports weightings for 2015/16 and 2016/17 based on EBITDA and the ratio of net replacement cost to enterprise value (NRC/EV) for Openreach copper access as a proportion of BT Group.

Table A20.22: Weightings for Openreach copper access

	2015/16	2016/17
EBITDA	26%	24%
Regulatory NRC/EV	17%	15%

Source: Ofcom³⁹⁶

A20.160 In estimating the relevant weightings, we have considered the same period as used for estimating the BT Group asset beta – i.e. the last two years, although we recognise there is a slight mismatch between the available financial data (two years to March 2017) and the beta estimation period (two years to September 2017).

A20.161 We have decided to adopt our consultation proposal and apply a weighting of 20% to Openreach copper access. This estimate lies between the weighting implied by the EBITDA and NRC/EV proportions.

A20.162 To estimate the weightings of Other UK telecoms and RoBT we have considered the proportion of BT Group EBITDA that related to each division in 2015/16 and 2016/17. This is shown in Table A20.23.

Table A20.23 Proportion of total EBITDA represented by each BT division

	2015/16	2016/17
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³⁹⁶ EBITDA is estimated using information reported in BT's RFS (specifically the 'performance summary by market table'), with EBITDA equal to total revenue less HCA operating costs (excluding depreciation). 'Openreach copper access' includes EBITDA associated with WLR and WLA (excluding fibre) markets and a proportion of 'Other Openreach markets and activities' that we estimate relates to internal SMPF. Note that Table A16.28 in the March 2017 WLA Consultation did not exclude fibre from the EBITDA weightings. This has been corrected in Table A20.22 above. Total EBITDA is equal to that reported in BT's annual report but the 2015/16 percentage assumes that EE was owned for the entire financial year. NRC is taken from the cost model supporting this Statement divided by BT's average enterprise value for the year, derived from Bloomberg. Note that in the 2016 BCMR Statement enterprise value was taken at the end of the financial year but we consider that an average for the year better matches the NRC (which is an average of the opening and closing balances for the year).

Global Services	13%	6%
Openreach	34%	34%
BT Consumer	13%	13%
BT Business and Public Sector	14%	20%
BT Wholesale	7%	11%
EE	20%	15%
Other	(1%)	0%
Total	100%	100%

Source: 2015/16 data from pro-forma results published by BT on 29 June 2016,³⁹⁷ 2016/17 data taken from BT's annual report. Note that the Openreach division reported here includes wholesale copper access, wholesale Ethernet leased lines and wholesale fibre broadband products and is therefore broader than the copper access business alone described above.

A20.163 We note that the proportion of EBITDA represented by Global Services has reduced in 2016/17 due to issues in its Italian business³⁹⁸ and the 2016 reorganisation noted above. Since BT's ICT operations (which are captured in the RoBT asset beta) are spread across its Global Services and Business and Public Sector divisions in 2016/17, we asked BT to provide EBITDA figures for UK-focused ICT services in Business and Public Sector and internationally focused ICT services in Global Services in 2016/17. BT told us that in 2016/17 EBITDA for ICT services across these two divisions represented around [X]% (10%-15%) of BT Group EBITDA,³⁹⁹ a percentage comparable to the 2015/16 percentage for Global Services in Table A20.23. As such we consider that it remains appropriate to apply a weighting of 15% to the RoBT, which captures BT's ICT operations.

A20.164 Based on the analysis set out above, Openreach copper access would receive a weighting of 20% and the RoBT would receive a weighting of 15%, which implies a weighting for Other UK telecoms of 65%. These weightings remain the same as proposed in the March 2017 WLA Consultation.

Comparator company asset betas

A20.165 Our disaggregation of the BT Group asset beta is informed by the asset betas for comparator companies. In the March 2017 WLA Consultation we estimated two-year asset betas for the following comparators: UK network utilities, UK telecoms operators, European telecoms operators, and international ICT companies. We commissioned NERA to provide updated estimates of the asset betas for these comparators. NERA has also considered US telecoms comparators. NERA's report can be found in Annex 31, and asset betas have been calculated using data to 29 September 2017. In this section, we present

³⁹⁷ See <http://www.btplc.com/Sharesandperformance/Quarterlyresults/2015-2016/RestatedhistoricalfinancialinformationJune2016/Downloads/Proforma/ProformahistoricalfinancialsJune2016.pdf>.

³⁹⁸ See page 6 of BT's 2017 Annual report.

³⁹⁹ Openreach response dated 3 August 2017 to question 3 of Annex 1 of the 28th s.135 notice.

the updated estimates for each comparator group before setting out our asset beta decisions.

Comparator companies for Openreach copper access

A20.166 Openreach copper access refers to the line of business within BT which owns, maintains and sells access connections – i.e. the building block to the WLA market which is concerned with connections to premises at a fixed location. We refer to “copper access” as short-hand because the term was first used before BT’s investment in fibre.⁴⁰⁰

A20.167 Because Openreach copper access refers to the underlying connections to premises, we would expect this line of business to face lower systematic risk than BT Group. As in previous market reviews, we consider that asset betas for UK network utilities can inform our estimate of the asset beta for Openreach copper access, although we consider that Openreach copper access could face greater systematic risk than UK network utilities.⁴⁰¹

A20.168 As at 29 September 2017 the two-year asset beta for five UK network utilities⁴⁰² against the FTSE All Share Index ranged from 0.33 to 0.61, with an average of 0.40. This average has decreased from the 0.46 presented in the March 2017 WLA Consultation (which considered data to 31 December 2016).⁴⁰³

A20.169 We note that the decrease in asset betas is more pronounced for the one-year asset betas compared to the two-year asset betas (the one-year average asset beta has fallen from 0.41 to 0.29).

A20.170 NERA notes that this trend is consistent with the expected behaviour of the betas for utilities which are perceived as ‘defensive’ stocks. The betas for defensive stocks fall in times of heightened market uncertainty – in this case caused by the UK Brexit vote – as they are seen as offering stable returns in times of increased market volatility.⁴⁰⁴

Table A19.24: Asset betas for UK network utilities

	Asset beta vs FTSE All Share		Average gearing	
	1-year	2-year	1-year	2-year
National Grid	0.36	0.34	46%	44%
Severn Trent	0.27	0.36	49%	48%
Pennon Group	0.32	0.38	48%	48%

⁴⁰⁰ The 2005 WACC Statement (which first introduced beta disaggregation) makes various references to copper access. For example, in paragraph 7.48 we said the “copper access WACC estimate should only be applied, at a wholesale level, to the building blocks for BT’s WLR and LLU products”.

⁴⁰¹ Although we consider that systematic demand risk is likely to be lower for Openreach copper access than BT Group, we do not consider it is clear that systematic demand would be as low as that for products provided by pure utility operators (such as water and electricity networks).

⁴⁰² The five network utility comparators all have significant regulated assets. According to 2016 annual reports, National Grid, United Utilities and Severn Trent generate more than 90% of profits from regulated activities, while for Pennon Group the proportion is around 80%. SSE generates around half of its profits from regulated activities.

⁴⁰³ Paragraph A16.107, March 2017 WLA Consultation.

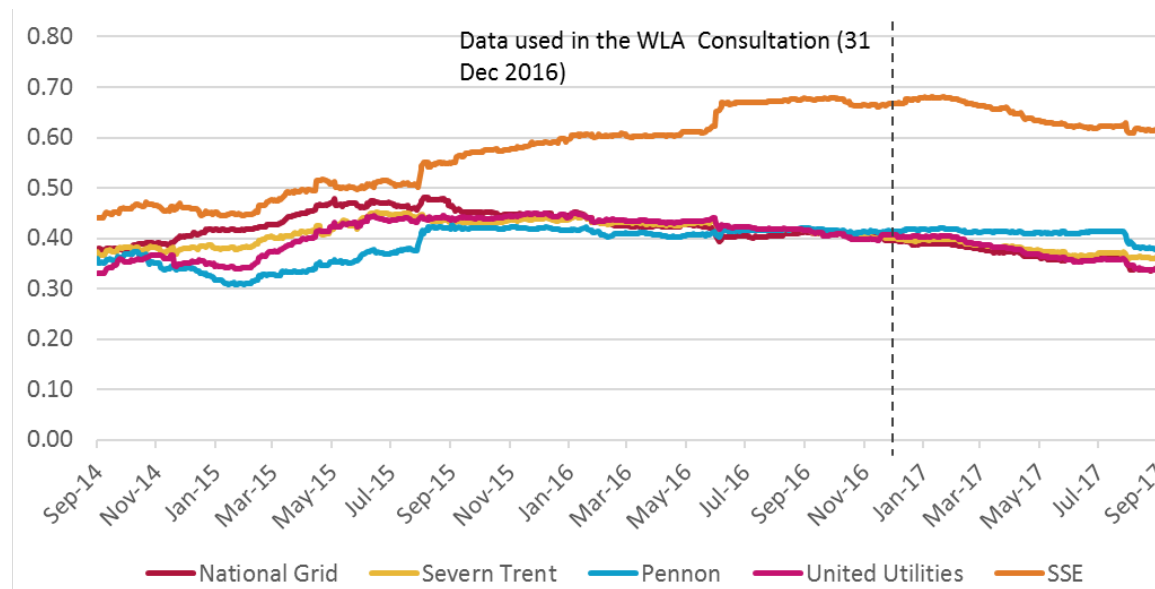
⁴⁰⁴ Annex 31 (NERA report), Page 16.

United Utilities	0.24	0.33	54%	53%
SSE	0.26	0.61	34%	33%
Average	0.29	0.40	46%	45%

Source: NERA. Calculated using a debt beta of 0.1 and data up to 29 September 2017

A20.171 As can be seen from Figure A20.25, the two-year asset beta for UK utilities has reduced since the data considered in the 2017 WLA Consultation.

Figure A20.25: Two-year asset betas for UK network utilities against the FTSE All Share Index



Source: NERA. Calculated using a debt beta of 0.1 and data up to 29 September 2017

A20.172 When considering the Openreach copper access asset beta, we also take account of the asset betas for UK telecoms operators. In general, we would expect the systematic risk facing Openreach copper access to be lower than that facing UK telecoms operators since they sell more usage-dependent services downstream from Openreach.

A20.173 As at 29 September 2017 the two-year asset beta for Sky is 0.62, for TalkTalk is 0.59 and for Vodafone⁴⁰⁵ it is 0.6 measured against the FTSE All Share, with the overall average UK telecoms asset beta at 0.60. This average is slightly below the average presented in the March 2017 WLA Consultation of 0.62.⁴⁰⁶

Table A20.26: Asset betas for UK fixed telecoms operators

Asset beta vs FTSE All Share		Asset beta vs FTSE All World		Average gearing	
1-year	2-year	1-year	2-year	1-year	2-year

⁴⁰⁵ We recognise that Vodafone has historically been predominantly a mobile operator, but with the acquisition of Cable & Wireless Worldwide in 2012 it has fixed telephony assets in the UK.

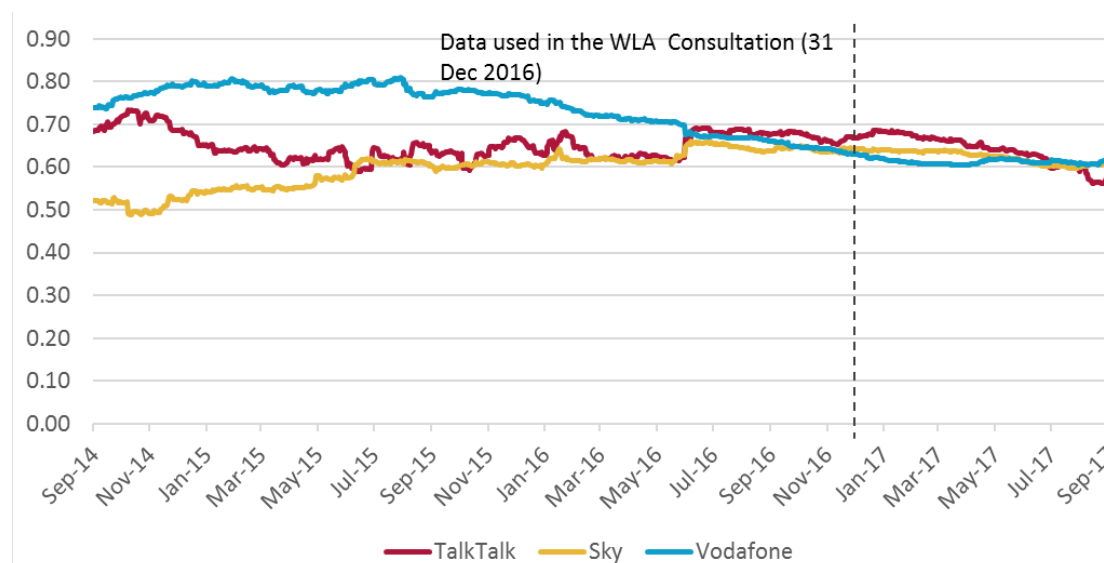
⁴⁰⁶ March 2017 WLA Consultation, paragraph A16.110.

Sky	0.37	0.62	0.35	0.70	36%	35%
TalkTalk	0.12	0.59	-0.05	0.61	34%	29%
Vodafone	0.64	0.60	0.47	0.52	43%	42%
Average	0.37	0.60	0.26	0.61	38%	35%
BT		0.78		0.86		

Source: NERA. Calculated using a debt beta of 0.1 and data up to 29 September 2017

A20.174 Figure A20.27 shows that the two-year asset betas for Sky, TalkTalk and Vodafone have generally decreased since the data used to inform the March 2017 WLA Consultation.

Figure A20.27: Two-year asset betas for UK telecoms operators against the FTSE All Share



Source: NERA. Calculated using a debt beta of 0.1 and data up to 29 September 2017

Comparator companies for Other UK telecoms

A20.175 When considering the asset beta for Other UK telecoms, we generally take account of the asset betas of UK telecoms operators (as above) and European telecoms operators. We also asked NERA to estimate asset betas for some US telecoms operators.

A20.176 In relation to European telecoms operators, as at 30 September 2017 the two-year asset betas against the FTSE All Europe index ranged from 0.39 to 0.60, with an average of 0.49. This represents a fall from the average as presented in the March 2017 WLA Consultation (0.54). Against the All World index, the updated range is 0.51 to 0.86, with an average of 0.70 which is slightly higher than the average of 0.69 reported in the March 2017 WLA Consultation.

Table A19.28: Two-year asset betas for European telecoms operators

Asset beta vs FTSE All Europe	Asset beta vs FTSE All World	Average gearing
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Telefonica	0.60	0.86	56%
Deutsche Telecom	0.42	0.69	46%
Proximus (was Belgacom)	0.49	0.70	20%
KPN	0.45	0.62	40%
Orange	0.47	0.66	46%
Telecom Italia	0.53	0.71	67%
Iliad	0.53	0.74	13%
Orange Belgium (was Mobistar)	0.39	0.51	25%
Telenor	0.51	0.72	28%
Tele2	0.60	0.82	24%
Swisscom	0.44	0.64	26%
Average	0.49	0.70	36%
BT	0.63	0.86	

Source: NERA. Calculated using a debt beta of 0.1 and data up to 29 September 2017

A20.177 On average, European telecoms asset betas measured against the FTSE All Europe have fallen since the March 2017 WLA Consultation (from 0.54 to 0.49) while asset betas measured against the FTSE All World have slightly increased (from 0.69 to 0.70).

A20.178 When compared against a consistent market index, the two-year BT Group asset beta is the highest amongst European telecom comparators against the FTSE All Europe and FTSE All World. In general, the asset betas measured against the FTSE All World are currently higher than those against the FTSE All Europe.

A20.179 Table A20.29 shows that the two-year asset betas for US telecoms against the “home” index (i.e. S&P500) range from 0.40 to 0.45, with an average of 0.44. Against the All World Index, the range is 0.36 to 0.49 with an average of 0.41. When disaggregating the BT Group asset beta we place little weight on these comparators as US telecoms providers are subject to different regulatory regimes than those applying to UK and European telecoms providers.

Table A19.29: Two-year asset betas for US telecoms operators

	S&P500	World	Average gearing
AT&T	0.40	0.36	35%
Verizon	0.43	0.38	36%
Century Link	0.50	0.49	59%
Average	0.44	0.41	43%

BT	n/a	0.86	26%
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Source: NERA. Calculated using a debt beta of 0.1 using data up to 29 September 2017

Comparator companies for RoBT

A20.180 When we introduced our three-way disaggregation in the 2016 BCMR Statement, the RoBT primarily represented BT's ICT operations in Global Services. Since BT's 2016 reorganisation, its ICT services are spread between Business and Public Sector (UK ICT Services) and Global Services (International ICT Services), as noted above.

A20.181 In the 2016 BCMR Statement we commissioned NERA to identify suitable comparators for BT's ICT operations.⁴⁰⁷ NERA has updated this analysis in its report in Annex 31. NERA's analysis identified that BT's ICT activities provide services in three main areas: i) managed networked IT services and security, ii) unified communications and IT infrastructure and iii) Professional services and IT consulting. NERA identified two tiers of comparators:

- a) "Tier 1" comparators that are active across all three main business areas in Global Services; and
- b) "Tier 2" comparators that are active in two of the three main business areas in Global Services.

A20.182 Table A20.30 shows the two-year asset betas calculated by NERA for ICT comparators against the FTSE All World index and against a home index (typically the S&P 500 for US ICT comparators and the FTSE All Europe for European ICT comparators).

Table A20.30: ICT company asset betas and gearing

	Asset beta vs All World	Asset beta vs home index	Average gearing	Tier 1
IBM	0.73	0.72	23%	✓
Unisys	1.07	1.06	44%	✓
Amdocs	0.69	0.73	1%	✓
Computer Science	0.85	0.84	29%	✓
Teletech	0.80	0.88	10%	✓
Indra Sistemas	0.92	0.60	33%	✓
Cancom	0.72	0.45	39%	✓
Atos SE	0.65	0.47	47%	✓
Cdw	0.74	0.77	29%	
Cognizant	1.21	1.24	3%	
Xerox	0.82	0.79	42%	

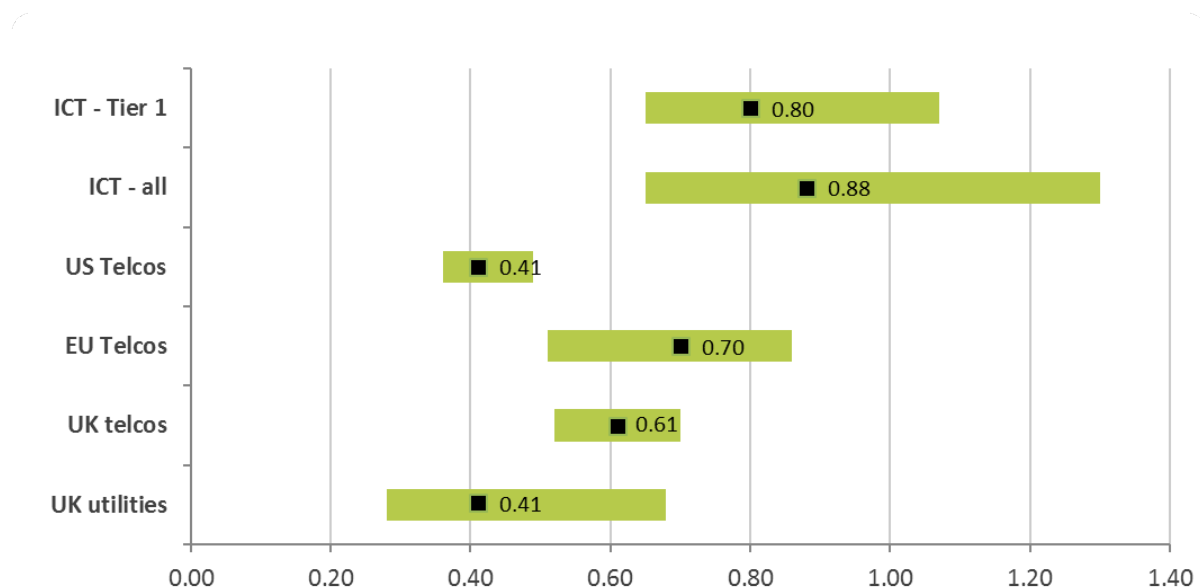
⁴⁰⁷ 2016 BCMR Statement, Annex 31.

Sopra Steria Group	1.17	0.80	8%
Cap Gemini	1.30	0.93	0%
Tieto	0.76	0.52	7%
CGI Group	0.74	0.61	1%
Average - all	0.88	0.76	21%
Average - Tier 1	0.80	0.76	28%

Source: NERA. Estimated assuming a debt beta of 0.10 using data up to 29 September 2017

A20.183 Figure A20.31 shows the min-max range and average asset betas for the ICT comparators as well as the UK, European and US comparators discussed earlier. Asset betas are shown against the FTSE All World index since this is our preferred basis of comparison for companies listed on different stock markets.⁴⁰⁸

Figure A20.31: Asset beta comparisons against the FTSE All World index



Source: Ofcom analysis using NERA data. Green bar represents the min-max range and the square marker is the average asset beta

A20.184 As in the March 2017 WLA Consultation, the evidence suggests that, on average, a telecoms operator is likely to exhibit a lower asset beta than an ICT business. The average two-year asset beta for UK and European telecoms operators is around 0.65 (0.70 for European telecoms and 0.61 for UK telecoms) against the FTSE All World index whereas for ICT businesses the average asset beta is between 0.80 and 0.88 (depending on whether we include all ICT comparators or just Tier 1 ICT comparators) and all of the 15 ICT comparators have an asset beta above or equal to 0.65 against the FTSE All World index.

⁴⁰⁸ See section 2.2 of the Annex 31 (NERA report) where NERA says that “in comparing betas for companies from different jurisdictions, Ofcom may also want to consider using a consistent index for all companies, i.e. the FTSE All World index”.

While the ranges overlap to some extent, the range for the ICT comparators is wide, which implies some uncertainty in coming to a point estimate for these companies.⁴⁰⁹

A20.185 Based on the ICT comparators, NERA considered that a reasonable asset beta range would be 0.70 to 1.25.⁴¹⁰

Openreach copper access asset beta

Our proposals

A20.186 We proposed to use an asset beta of 0.55 for the Openreach copper access asset beta. This was the same as that used in the 2016 BCMR Statement. We said that, given there had not been a significant change in the average asset betas for UK utilities or UK and European telecoms comparators since the information considered in the 2016 BCMR Statement we considered that an Openreach copper access asset beta of 0.55 remained appropriate.

Stakeholder responses

A20.187 Frontier Economics said that we set the Openreach copper asset beta between the average values for UK network utilities and UK telecoms comparators and below that of BT Group all estimated using the FTSE All Share index. Frontier Economics said that given there had been few significant movements in the average values of the comparators since the 2016 BCMR Statement, our proposal was reasonable in light of limited new information.⁴¹¹

A20.188 TalkTalk also appeared to agree that 0.55 was a reasonable asset beta for Openreach copper access.⁴¹²

Our reasoning and decision

A20.189 As noted above, given our decision to exclude the pension deficit from gearing, the BT Group asset beta as at 30 September 2017 is 0.78. On a consistent treatment of gearing which excludes the pension deficit, it was 0.81 at the time of the March 2017 WLA Consultation. Both of these asset beta values are above the 0.72 BT Group asset beta estimated at the time of the 2016 BCMR Statement. In light of this, we now consider whether an upward revision to the Openreach copper access asset beta of 0.55 used in the 2016 BCMR Statement would be appropriate in light of this and other evidence.

A20.190 As in previous reviews, while we would expect Openreach copper access to face lower systematic risk than BT Group, we consider that it may face greater systematic risk than other UK network utilities. Therefore, much as we did in the 2014 FAMR⁴¹³ and 2016 BCMR

⁴⁰⁹ We also noted in paragraph A16.120 of the March 2017 WLA Consultation that statements from BT in early 2017 indicated that the outlook for UK public sector and international corporate markets (which are served by ICT operations) had deteriorated, and said that this may support a view that returns in BT's ICT operations are more volatile and face greater systematic risk than other parts of its business.

⁴¹⁰ Annex 31 (NERA report), page 43.

⁴¹¹ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the June 2017 WLA Consultation, page 16.

⁴¹² TalkTalk response on WACC proposals in the March 2017 WLA Consultation, paragraph 6.4.3.

⁴¹³ 2014 FAMR Statement, paragraphs A14.215-A14.219.

Statements,⁴¹⁴ we have started by looking at the mid-point between the BT Group and network utility asset betas (i.e. 0.59).⁴¹⁵ We have then considered whether it would be appropriate to shade this asset beta of 0.59 up or down by reference to other relevant factors in order to estimate an asset beta for Openreach copper access:

- a) *Comparison with asset betas for UK telecoms providers:* An Openreach asset beta of 0.59 would be similar to the average two-year asset beta for UK telecoms operators of 0.60. These UK telecoms asset betas suggest that the Openreach copper access beta should be no higher than 0.60, since the likes of Sky and TalkTalk might be expected to face somewhat higher systematic risk (since they sell more usage dependent services downstream from Openreach, not just fixed lines).
- b) *Comparison with changes in asset betas of European telecoms:* Since the 2016 BCMR Statement (which considered data as at October 2015), most European telecoms comparators have seen a fall in their two-year asset betas against the All Europe index but an increase in their asset betas against the All World index.⁴¹⁶ On average the asset betas for European telecoms decreased by 9% against the All Europe index but increased by 8% against the All World index since the 2016 BCMR Statement.⁴¹⁷ Given that the asset betas for European telecoms comparators went up or down depending on the reference index, taken in isolation, these comparators provide little evidence pointing to changing the Openreach asset beta from that used in the 2016 BCMR Statement.
- c) *BT pension scheme effect:* Allowing for the effect of BT's defined benefit pension scheme means that we might expect the Openreach asset beta to be somewhat higher than that of a comparator company without such a defined benefit pension scheme. For example, in our December 2010 Pension Review Statement we considered, in light of expert advice, that BT's asset beta could be higher than otherwise by around 0.05, but that there was no robust way of estimating this effect.⁴¹⁸ This would apply for all lines of business within BT Group, including Openreach copper access.

⁴¹⁴ 2016 BCMR Statement, paragraphs A30.207-A30.212.

⁴¹⁵ The mid-point between the average utility two-year asset beta of 0.40 and the BT Group two-year asset beta of 0.78 is 0.59. In the March 2017 WLA Consultation, if we had excluded the pension deficit from the calculation the midpoint of the range between BT Group and UK utilities would have been 0.64 (using two-year asset betas of 0.81 and 0.46 respectively). We may have rounded down from this midpoint using the same approach described in this paragraph as 0.64 would have appeared high compared to UK telecoms comparators asset betas at the time (two-year average of 0.62), but we consider it would have suggested the Openreach copper access asset beta should be increased from the 0.55 used in the 2016 BCMR Statement.

⁴¹⁶ Annex 31, Section 3.2.3.

⁴¹⁷ Annex 31, Section 3.2.3. While the average asset beta for US telecoms decreased against both the S&P index (down 6%) and the All World index (down 23%) since the 2016 BCMR Statement, we put less weight on the asset betas of US telecoms as noted above.

⁴¹⁸ Ofcom, 20 10. *Pensions Review*, paragraphs 7.33-7.48.

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

- d) *Asset beta for other disaggregated parts of BT Group:* In determining the asset beta for each disaggregated part of BT Group, we need to take account of the relevant weightings and comparator asset beta evidence since we require the weighted sum of disaggregated betas to reconcile to that of BT Group. As explained below, we have selected the RoBT asset beta from the top of the ICT asset beta range recommended by NERA, and the Other UK telecoms asset beta towards the top end of our range. Any reduction in the Openreach asset beta from 0.59 implies that one or both of the Other UK telecoms and RoBT asset betas would need to increase, in order that the weighted sum of asset betas remains consistent with the BT Group asset beta. Given the limitations on increasing the RoBT or Other UK telecoms asset betas when considering external benchmarks for these lines of business, we do not consider that a reduction in the Openreach copper access beta below the mid-point of the network utilities and BT Group would be appropriate.

A20.191 In light of all the above, we do not consider that it would be appropriate to round up or down the asset beta estimate of 0.59 for Openreach copper access, which is the midpoint of the range between the average asset beta for UK utilities and the asset beta for BT Group.

Other UK telecoms and RoBT asset beta

Our proposals

A20.192 In the March 2017 WLA Consultation, we recognised that BT completed the acquisition of EE in January 2016, meaning that it had significant mobile operations. We considered it was reasonable to include EE within the Other UK telecoms disaggregated part of BT Group, supported by a report from NERA.⁴¹⁹

A20.193 We considered that a reasonable range for the asset beta of Other UK telecoms would be 0.55 to 0.75 (against the FTSE All Share), consistent with the 2016 BCMR Statement. We proposed to use an asset beta of 0.75, which was higher than the value of 0.70 used in the 2016 BCMR Statement. This was for three reasons:

- it reflected the fact that the proposed BT Group asset beta (0.76) was slightly higher than that considered in the 2016 BCMR Statement (0.72);
- the asset betas of Sky and TalkTalk (which are more UK-focused than Vodafone, the third UK telco comparator) had also increased since the 2016 BCMR Statement; and
- an asset beta of 0.75 for Other UK telecoms implied a more reasonable asset beta for the RoBT (i.e. BT's ICT activities) given the weightings we proposed for the three lines of business into which we disaggregate BT.

Stakeholder responses

A20.194 Oxera said that its estimate of BT Group's historical gearing (17%, using a net debt approach, as discussed above) resulted in a higher asset beta for BT Group. Given that we

⁴¹⁹ See paragraphs A16.126-A16.128 and Annex 21 of the March 2017 WLA Consultation.

did not propose to change the Openreach copper access asset beta or the RoBT asset beta, this meant that the Other UK Telecoms asset beta would need to increase from 0.75 to 0.90 given the weightings of each disaggregated part.⁴²⁰

A20.195 Frontier Economics said that the proposed point estimate of 0.75 was inappropriately high and that a more appropriate range was 0.55 to 0.65.⁴²¹

A20.196 Frontier Economics did not consider that the 0.55 to 0.75 range was appropriate because i) the UK telecoms asset betas presented in the March 2017 WLA Consultation (which ranged from 0.57 to 0.65) did not support an asset beta as high as 0.75,⁴²² and ii) the EU telecoms asset betas, measured against the FTSE All Europe were all below 0.70 and the majority were below 0.55. Frontier Economics said that we had generally preferred asset betas calculated against home indices to determine the level of asset betas while using broader indices such as the FTSE All World when considering relative asset betas. On this basis, Frontier Economics argued we should put more weight on the European telecoms asset betas measured against the FTSE All Europe.⁴²³

A20.197 Frontier Economics did not agree with our three reasons for selecting a point estimate at the top of the range because:

- *The BT Group asset beta had increased.* The increase in the estimated asset beta for BT Group could be due to sampling variation.⁴²⁴ Even if there had been an increase in the underlying asset beta, the low weight of the non-copper regulated services does not mean that the asset beta for these services will also increase.⁴²⁵ Frontier Economics noted that the scope of BT's unregulated business had increased over the past decade, citing the acquisition of EE and investment in sport broadcast rights, and argued that increases in the BT Group asset beta could be driven by activities such as these or changes in the risk profile of the non-regulated activities more generally.⁴²⁶ Frontier Economics said that although we presented evidence that there is no relationship between the percentage of mobile assets and telecom operators' asset betas, this did not demonstrate that the asset beta of the EE business was exactly equal to the asset beta of BT's fixed business.⁴²⁷
- *The asset betas of Sky and TalkTalk had increased.* Frontier Economics argued that increases in Sky and TalkTalk's asset beta estimates do not support increasing the asset beta to a level of 0.75 because i) there has been no marked upward trend beyond the degree of volatility that would usually be expected in asset beta estimates, ii) we excluded Vodafone whose asset beta had been falling, and iii) the level of asset betas

⁴²⁰ Oxera response, prepared for Openreach, on WACC proposals in the March 2017 WLA Consultation, pages 14.

⁴²¹ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, pages 16 and 23.

⁴²² Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 16.

⁴²³ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 17.

⁴²⁴ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 18.

⁴²⁵ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 18.

⁴²⁶ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, pages 19 and 20.

⁴²⁷ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 18.

for UK telecoms have been below 0.75 since the 2016 BCMR Statement.⁴²⁸ Frontier Economics considered that since the activities of UK telecoms operators are largely unregulated their asset betas may over-estimate the asset beta for regulated services.⁴²⁹ Frontier Economics said regulation could reduce the cost of capital by reducing the variability of cash flows.⁴³⁰

- *Reconciliation to the BT Group asset beta.* Frontier Economics said that the reconciliation to the BT Group asset beta added little information.⁴³¹ Frontier Economics argued that in opting for a three-way disaggregation of the BT Group asset beta our implicit working hypothesis has been that the high asset beta observed for BT Group can be explained by the impact of BT's ICT activities. However, the continued increase in the BT Group asset beta suggests that BT's ICT activities alone may not explain why BT's asset beta is higher than comparators. Frontier Economics considered that alternative explanations could include i) sampling variation in the estimates, with BT's true asset beta being in line with comparators, ii) asset betas for BT's non-Openreach and Global Services divisions being higher than those for other telecoms operators, and iii) the BT Group asset beta being distorted by the BT pension scheme such that the asset beta does not reflect the asset beta of the underlying operating assets.⁴³²

Our reasoning and decisions

A20.198 In this section, we set out:

- What activities are included in Other UK telecoms;
- The asset beta range for Other UK telecoms; and
- Our decision on the asset betas for Other UK telecoms and RoBT.

Activities included in Other UK telecoms

A20.199 Other UK telecoms includes BT's wholesale and retail leased lines, mobile, fixed voice, broadband and bundled services. Frontier Economics argued that increases in the BT Group asset beta may have been caused by non-regulated activities such as EE, sports rights or differences in risk between regulated and non-regulated activities, with the implication that it may not be appropriate to include these activities in Other UK telecoms.

A20.200 We recognise that each of BT's activities could be associated with different systematic risk and hence different asset betas. However, the appropriateness of further disaggregation depends on whether the available data allows us to identify variations in systematic risk.

A20.201 We have already considered whether some of the activities highlighted by Frontier Economics could be associated with higher systematic risk than fixed telecoms activities. In

⁴²⁸ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 20.

⁴²⁹ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 21.

⁴³⁰ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 21.

⁴³¹ Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 22.

⁴³² Frontier response, prepared for TalkTalk and Sky on WACC proposals in the March 2017 WLA Consultation, page 22.

the 2016 BCMR Statement we considered the systematic risk of ICT services and pay TV, concluding that while there was sufficient evidence to suggest ICT activities will tend to be associated with higher systematic risk than standard telecoms (a conclusion we consider remains valid) it was less clear cut that a vertically integrated pay TV business would be associated with higher systematic risk.⁴³³

A20.202 In this review, we have further considered whether there is evidence that mobile asset betas are materially different from fixed telecoms asset betas. We commissioned NERA to consider this issue, and, after considering qualitative and quantitative indicators of differences in systematic risk, NERA concluded “there is no evidence of statistically significant difference in the betas of fixed vs. mobile telecoms network operators”.⁴³⁴ On this basis we consider it is reasonable to include EE within the Other UK telecoms disaggregated part of BT Group.

A20.203 While there may be differences in systematic risk between BT’s regulated and unregulated wholesale and retail activities, it is difficult to estimate asset betas specific to these activities given the lack of pure play comparators. Frontier Economics’ recommended asset beta range of 0.55 to 0.65 is based on asset betas from UK and European telecoms companies that are engaged in a range of regulated and unregulated wholesale and retail telecoms activities. As such, it is not clear why these comparators would represent appropriate benchmarks for the regulated telecoms activities within Other UK telecoms but not the unregulated activities. In the 2016 BCMR Statement we considered it would be reasonable to assume that the systematic risk faced by the telecoms activities included within Other UK telecoms is likely to be reasonably similar since they are characterised by: (a) using a fixed telecoms network, which often involves shared or similar infrastructure, and hence similar degrees of operational gearing; and (b) involves sales to customers or consumers who are able to scale demand in response to changes in the macro-economic cycle to a greater extent than for basic access connections.

A20.204 We consider that data from BT on the monthly volume variability and forecast accuracy of different types of products supports this view,⁴³⁵ although we recognise there are limitations with this evidence.⁴³⁶ This data is shown in Tables A20.32 and A20.33 and indicates that:

- Openreach copper access rental volumes showed almost no monthly variability and could be forecast by BT with a good degree of accuracy;
- the variability of call volumes and rental volumes for other regulated services (e.g. ISDN2, ISDN30, leased lines) is higher than Openreach copper access services and

⁴³³ 2016 BCMR Statement, paragraph A30.233.

⁴³⁴ Annex 32 (NERA report), page 17. NERA’s report updates the report they produced for us to support the March 2017 WLA Consultation, where NERA came to the same conclusion. The earlier report can be found in Annex 21 of the March 2017 WLA Consultation.

⁴³⁵ We would expect services with lower demand risk to be associated with lower volume variability and be easier to forecast.

⁴³⁶ Limitations of the evidence are that it can only give an indication of total risk (i.e. systematic and company specific risk combined).

slightly more difficult to forecast. The variability and forecast accuracy of these services is broadly similar.

Table A20.32: Ratio of monthly maximum to monthly minimum volume in a given year for BT rental and call volumes

	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Average
Copper lines (WLR, LLU)	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Other copper lines (incl ISDN2)	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
ISDN30	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Leased lines	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
WBA	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Fibre Broadband	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Call minutes	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Mobile minutes					[X]<]%	[X]<]%	[X]<]%
Mobile subscribers	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
TV subscribers	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%

Source: Ofcom analysis of Openreach response dated 2 November 2017 to Question 1 of the 28th s.135 notice.

Table A20.33: Ratio of actual to forecast annual rental and call volumes

	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	Average
Copper lines (WLR, LLU)	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Other copper lines (incl ISDN2)	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
ISDN30	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Leased lines	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
WBA	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Fibre Broadband	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Call minutes	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
Mobile minutes				[X]<]%	[X]<]%	[X]<]%	[X]<]%
Mobile subscribers	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%
TV subscribers	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%	[X]<]%

Source: Ofcom analysis of Openreach response dated 2 November 2017 to Question 1 of the 28th s.135 notice.

A20.205 In addition, the underlying volume data provided by Openreach does not indicate that retail volumes generally have greater monthly variability or are more difficult to predict than wholesale volumes. Where there are differences, those differences do not appear significant on average.⁴³⁷

A20.206 For the reasons given above, we consider that it is reasonable for Other UK telecoms to include mobile, leased lines, fixed voice, broadband and bundled products. We consider further below whether it is appropriate to apply the Other UK telecoms asset beta to fibre access services.

Asset beta range for Other UK telecoms

A20.207 Based on evidence from telecoms comparators, we have considered whether our proposed asset beta range of 0.55 to 0.75 remains appropriate.

A20.208 The range captures the two-year asset betas of UK telecoms comparators measured against the FTSE All Share (which range from 0.59 to 0.62, averaging 0.60). As noted by NERA none of the three UK telecoms comparators are perfect comparators for BT's Other UK telecoms activities; for example, TalkTalk has fewer infrastructure assets and focuses on retail customers, Sky predominantly sources revenues from its pay TV operations and Vodafone is predominantly focused on mobile services and only generates a minority of its revenue from the UK.

A20.209 That said, the UK telecoms asset betas are in a narrow range. NERA considered that, given there are only three comparators, it would be appropriate to consider 90% confidence intervals for the asset betas, which would support a range of 0.45 to 0.70, overlapping closely with our 0.55 to 0.75 range.

A20.210 It is difficult to determine the appropriate market index when estimating asset betas for European telecoms comparators where we seek to use these asset betas to inform our Other UK telecoms range.⁴³⁸ We asked NERA to consider whether updated asset beta evidence from European telecoms comparators supported our proposed 0.55 to 0.75 range. NERA concluded that the latest data did not support a change in our proposed asset beta range of 0.55 to 0.75.⁴³⁹

A20.211 We consider that an asset beta range of 0.55 to 0.75 remains appropriate for Other UK telecoms. However, in determining a point estimate we have taken account of the slight reduction in telecoms asset betas, as explained below.

Asset beta for Other UK telecoms and RoBT

A20.212 We agree with Oxera that if no changes were made to the Openreach copper access or RoBT asset betas, a higher BT Group asset beta would imply a higher Other UK telecoms asset beta under our disaggregation approach. However, Oxera has not considered

⁴³⁷ Ofcom analysis of Openreach response dated 2 November 2017 to Question 1 of the 28th s.135 notice.

⁴³⁸ In Annex 31 (NERA report), NERA has estimated asset betas for European comparators against the FTSE All Europe and FTSE All World indices, though we note it would be possible to estimate asset betas against different market indices, including domestic European indices.

⁴³⁹ See Annex 31 (NERA report), page 42.

whether its Other UK telecoms estimate of 0.90 is reasonable against comparator companies. An asset beta of 0.90 is well outside of our 0.55 to 0.75 range and we do not consider this would be supported by the comparator evidence. In addition, given a BT Group asset beta of 0.78, an Openreach copper access asset beta of 0.59 and the asset beta weightings described above, an Other UK telecoms asset beta of 0.90 would imply a RoBT asset beta of 0.51. This is well below the bottom end of the ICT asset beta range discussed above.

- A20.213 In the March 2017 WLA Consultation we proposed to increase the Other UK telecoms asset beta from 0.70 (as used in the 2016 BCMR Statement) to 0.75. One reason for this was the increase in the BT Group asset beta from 0.72 in the 2016 BCMR Statement to 0.76 proposed in the March 2017 WLA Consultation (although this would have been 0.81 had it not been for the pension adjustment to gearing). We do not agree with Frontier Economics that sampling variation in the estimates could mean that BT's true beta is in line with comparators. NERA has considered this in its report in Annex 31. While NERA does not dispute the fact that the plausible range for BT's asset beta may overlap with the plausible range of comparator companies, on average, or in expectation, the best estimate for BT's asset beta is higher than the best estimate for many of the telecoms comparators.⁴⁴⁰
- A20.214 As noted above, when selecting a point estimate for the Other UK telecoms and RoBT asset betas we need to consider evidence from comparator companies as well as the weightings and implications for the asset beta for the other parts of BT. We agree with Frontier Economics that BT's pension scheme may well affect its asset beta, but for the reasons given above this is not a factor we would rely on to reduce BT's asset beta in a particular line of business.
- A20.215 Nevertheless, the increase in the asset beta for Other UK telecoms on which we consulted went further than would be reasonable given the latest evidence from a range of comparators. As noted above, UK and European telecoms comparators do not have asset betas clustered at the upper end of the Other UK telecoms range of 0.55 to 0.75. Against the home index, UK and European telecoms asset betas imply a value at the lower end of the range, and only when measured against the FTSE All World Index would the European telecoms comparators imply a value in the upper half of the range.
- A20.216 However, there is a limit to how much the Other UK telecoms asset beta can be reduced (from the consultation proposal of 0.75) given the implication for the other two disaggregated parts of BT Group. A reduction in the Other UK telecoms asset beta would imply an increase in the Openreach copper access or RoBT asset beta. However, we do not consider it would be appropriate to adopt an asset beta for Openreach copper access any higher than we have already (for example, to a point higher than that of UK telcos which rely on Openreach for access), nor do we consider that the RoBT asset beta should lie outside the ICT asset beta range set out above, i.e. any higher than 1.25.

⁴⁴⁰ See Annex 31 (NERA report), page 66.

A20.217 We have therefore reduced the Other UK telecoms asset beta to 0.73, which is consistent with a RoBT asset beta of 1.25 when the Openreach copper access asset beta is 0.59.⁴⁴¹

Fibre access asset beta

Our proposals

A20.218 In the March 2017 WLA Consultation, we considered that fibre access services (referred to as next generation access “NGA” in the consultation) were likely to face higher systematic risks than copper access services but were likely to share similar risk characteristics to other telecoms usage services.

A20.219 We recognised that, in principle, the asset beta for BT’s fibre access services may further differ from that of other businesses within our definition of Other UK telecoms. However, we considered a more granular disaggregation would be difficult based on the evidence available. We therefore proposed to apply the Other UK telecoms asset beta to fibre access services.

Stakeholder responses

A20.220 Vodafone understood that Ofcom’s proposal was to apply the Openreach copper access WACC to purely copper based products and the Other UK telecoms WACC to fibre access services. Vodafone said it accepted some of our rationale that copper access services are more of a utility type service with steady demand characteristics and that fibre access services are more of a premium service with varying demand characteristics, especially over the coming charge control period.⁴⁴²

A20.221 However, Vodafone considered that as fibre access services become more widely used and the demand curve flattens out, they will become the new standard utility type product, with greater certainty of demand and the associated lower risks.⁴⁴³ Vodafone also considered that the NGA services currently delivered by BT with FTTC do not represent a significant investment risk, or step change for Openreach with the incremental upgrade of fibre from the exchange to the cabinet and within cabinet broadly being achieved by Openreach within its normal capital expenditure budget.⁴⁴⁴

A20.222 Vodafone therefore considered that Ofcom should consider whether it would be appropriate to apply the Openreach copper access WACC to all WLA products, including NGA.⁴⁴⁵

Our reasoning

⁴⁴¹ This is based on weightings of 20%, 65% and 15% for Openreach copper access, Other UK telecoms and RoBT respectively.

⁴⁴² Vodafone response to the March 2017 WLA Consultation, paragraph 13.3.

⁴⁴³ Vodafone response to the March 2017 WLA Consultation, paragraph 13.4.

⁴⁴⁴ Vodafone response to the March 2017 WLA Consultation, paragraph 13.4.

⁴⁴⁵ Vodafone response to the March 2017 WLA Consultation, paragraph 13.5.

A20.223 In practice, the absence of a pure-play fibre access operator means we need to consider whether it is more appropriate to include fibre access services within copper access or Other UK Telecoms.⁴⁴⁶

A20.224 The EC has considered the question of the systematic risk associated with NGA (i.e. fibre access) services, and commissioned a report from Brattle, which was published in July 2016. In its report, Brattle considered that NGA networks would face higher systematic risks than legacy networks for three main reasons:

- systematic demand risks;
- capital leverage; and
- long-term pay-offs.

A20.225 ‘Legacy’ services in the 2016 Brattle Report appear to include all services provided over the copper access network. In contrast, we have previously distinguished between access and usage services in our cost of capital determinations.

A20.226 In our view, the distinction between access and usage remains a more helpful framework for analysis of systematic risk, since the access line remains the building block of fixed telephony services (both from the customer’s perspective and from a network perspective). Different usage services can be added to access depending on the end-customers’ requirements: i.e. fixed voice, standard broadband and now superfast broadband.

A20.227 Notwithstanding this, the three factors identified by Brattle (systematic demand risks, capital leverage and long-term pay-offs) seem relevant within an access/usage framework, and so we have organised our reasoning under those headings below.

Systematic demand risks

A20.228 Brattle considered that NGA networks may be a ‘luxury’ product and more sensitive to changes in income than legacy networks resulting in greater systematic risk and a higher asset beta.⁴⁴⁷

A20.229 We are not aware of recent empirical studies on the income elasticity of fibre broadband compared to other telecoms services, but previous reports have argued that usage (such as voice calls) is more income elastic than access.⁴⁴⁸ For example, in its 2005 report for Ofcom, PwC said that “it seems reasonable to anticipate that call volumes [i.e. usage] will fluctuate more in response to changing economic circumstances, because businesses and individuals are more likely to react to changes in business activity and incomes by altering

⁴⁴⁶ At present NGA networks make up a fraction of the revenues and profits of listed telecoms operators. While CityFibre (AIM listed) operates fibre networks, its shares are not traded as regularly as telecoms operators like BT. This illiquidity issue can reduce the reliability of the measured asset betas. For example, in 2017 the average bid-ask spread (a measure of liquidity) for CityFibre was 4.3% compared to less than 0.1% for BT, Sky and TalkTalk (data taken from Bloomberg).

⁴⁴⁷ Page 99, 2016 Brattle Report.

⁴⁴⁸ The income elasticity of demand measures the responsiveness of demand to changes in income. Services with low income elasticity would be expected to exhibit lower systematic risk compared to services with higher income elasticity.

their immediate pattern of consumption of telecommunications services than by changing their consumption of access”.⁴⁴⁹

A20.230 For this reason, the demand risk facing fibre access services could be higher than for copper access. Data from BT set out in Tables A20.32 and A20.33 on the monthly volume variability and forecast accuracy of different types of products supports this view as fibre broadband volumes are generally more variable and harder to predict than copper access lines.⁴⁵⁰ While fibre broadband volumes are also more variable and harder to predict than other telecoms products, this could indicate that it is a growing business and we note that this variability has reduced over time. Furthermore, we note from the evidence in Annex 5(a) that there is less propensity for consumers to downgrade than to upgrade in terms of the headline speed of their fixed line broadband package.

A20.231 We agree with Vodafone that as fibre access services become more widely used, they are likely to exhibit more stable demand. This is all the more so when we recognise that a fibre access network can deliver broadband at a variety of speeds – including lower speeds. However, in doing so, the fibre network provider would typically need to accept lower revenues, thereby reducing its income from the access connection even if the customer is not lost (for example to a rival using regulated access to a copper network). Therefore, we do not consider we are at the point where the systematic demand risk for fibre access is equivalent to that of copper access.

Capital leverage

A20.232 Capital leverage refers to the relative proportion of fixed costs within the total costs of a project. Higher capital leverage (i.e. relatively higher fixed costs) will tend to increase the asset beta since the volatility of returns are magnified.

A20.233 Brattle said that the presence of sizeable and relatively fixed capital obligations would mean that a fall in revenues would prompt a disproportionately larger fall in the project NPV.⁴⁵¹ The size of this effect on the asset beta will depend on the extent to which operators can vary capital investments in response to variations in demand.⁴⁵²

A20.234 In the UK, BT’s fibre access is currently largely delivered via FTTC, which uses existing infrastructure in the local access network. Incremental capital expenditure to deliver FTTC may not therefore have driven a significant difference in capital leverage between NGA and BT’s existing (copper access) connections. We consider this is supported by the fact

⁴⁴⁹ Ofcom, 2005. *Disaggregating BT’s Beta*, page 11.

https://www.ofcom.org.uk/data/assets/pdf_file/0026/53549/disaggregating.pdf

⁴⁵⁰ We would expect services with lower demand risk to be associated with lower volume variability and be easier to forecast. As noted above, there are limitations of this evidence.

⁴⁵¹ 2016 Brattle Report, page 97.

⁴⁵² 2016 Brattle Report, page 98.

that BT's capital expenditure on fibre was, on average, less than its spend on copper in the seven years to March 2016.⁴⁵³

Long-term payoffs

A20.235 Brattle reasoned that long-lived investments with payoffs extending far into the future are likely to face higher systematic risk. This is because the value of the investment is more volatile and will vary more strongly with macroeconomic conditions.⁴⁵⁴ To the extent that newer investments, such as fibre access, have longer term payoffs than more mature products such as copper access, this could indicate that it would be more appropriate to associate fibre access with the Other UK telecoms asset beta rather than the Openreach copper access asset beta, for the time being.

Our decision

A20.236 Using the framework above, we consider that the systematic risk of NGA is likely to exceed that of copper access for the time being, so it remains appropriate to include fibre access services within Other UK telecoms.

A20.237 We have therefore decided to apply the Other UK telecoms asset beta of 0.73 to BT's fibre access services.

Disaggregation of BT Group debt premium

Our proposals

A20.238 In the March 2017 WLA Consultation we considered two approaches to disaggregating the BT Group debt premium. Under the first approach, we applied the lower end of the proposed 0.9% to 1.3% BT Group debt premium range to Openreach copper access (i.e. 0.9%), the proposed BT Group debt premium of 1.0% to Other UK telecoms and the top end of the BT Group debt premium range to the RoBT (1.3%). Under the second approach, we considered what the debt premium for the different parts of BT could be based on inferred credit ratings, noting that it is difficult to assess precisely what rating the different parts of BT would achieve. Under the inferred credit ratings approach the implied debt premiums were 0.9% for Openreach, 1.0% for Other UK telecoms and 1.1% for RoBT. We proposed to apply the debt premiums from the inferred credit ratings approach because we considered they were likely to better approximate differences in the risk of debt as seen by credit rating agencies.

⁴⁵³ See figure 1 of Appendix 2: Ofcom's response to the Department for Culture, Media and Sport's 2016 report *Establishing world-class connectivity throughout the UK*.
<https://publications.parliament.uk/pa/cm201617/cmselect/cmcmds/714/71402.htm> [accessed 20 February 2018].

⁴⁵⁴ 2016 Brattle Report, page 99.

Stakeholder responses

A20.239 No stakeholders specifically commented on our disaggregated debt premium proposals. We responded to Frontier Economics' comments on our approach to setting the BT Group cost of debt above.

Our reasoning

A20.240 Consistent with previous market reviews, we consider that a firm facing lower systematic risk could attract a higher credit rating for a given level of gearing than a firm facing higher systematic risk. This implies that BT's businesses with lower systematic risk (i.e. Openreach copper access) would face a lower cost of debt than the RoBT (at the same level of gearing).

A20.241 Below we consider the debt premium implied by the two approaches set out in the March 2017 WLA Consultation before concluding.

Applying the BT Group debt premium range

A20.242 We set out a debt premium range for BT Group above of 1.0% to 1.5% and decided to set the BT Group debt premium at 1.1%. Under this approach, we would apply the bottom of the range to Openreach copper access (1.0%), the BT Group debt premium to Other UK telecoms (1.1%) and the top end of the range to RoBT (1.5%).

Inferred credit ratings

A20.243 The credit ratings of UK utilities currently generally range from BBB to A- compared to BT Group at BBB+. ⁴⁵⁵ While on the face of this evidence BT Group's rating (BBB+) sits within the range of UK utilities, the utilities are all more highly geared than BT Group (with the exception of SSE which, for a similar level of gearing as BT, has a higher credit rating).

A20.244 To estimate the potential difference in the debt premium for Openreach copper access, we have compared the spreads between BBB-rated debt and A-rated debt with maturities of 10 years (as at 29 December 2017), which is shown in the table below. ⁴⁵⁶ This suggests that the spread between A-rated debt and BBB-rated debt is between 0.13% and 0.42%; the lower spread reflecting a comparison with UK utilities and the higher spread reflecting a comparison against BBB and A-rated companies in general. Assuming a one notch uplift to Openreach copper access from the BT Group rating, Openreach copper access might be able to reduce its cost of debt by around 0.04% to 0.14% relative to BT Group. ⁴⁵⁷

Table A20.34: Spread between BBB and A-rated benchmark indices (10 years)

	1-year average	2-year average
BBB vs A ratings	0.41%	0.42%

⁴⁵⁵ Long-term credit ratings from S&P: Severn Trent (BBB), United Utilities (BBB+), National Grid and SSE (A-).

⁴⁵⁶ There are effectively three ratings notches between BBB rated debt and A rated debt.

⁴⁵⁷ One-notch estimates have been derived by dividing the figures in the table by three.

UK Utilities BBB vs A ratings	0.13%	0.17%
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Source: Bloomberg, Ofcom analysis using data to 29 December 2017. BBB index is the BVCSGU10 Index from Bloomberg. 'A' index is the BVCSGK10 Index from Bloomberg. UK Utilities BBB index is the BVGBUB10 Index from Bloomberg. UK Utilities A index is the BVGBUA10 Index from Bloomberg.

A20.245 Any adjustment based on this approach is approximate as it depends on the extent to which Openreach copper access is perceived as utility-like and the assumed level of gearing, among many factors. As in the March 2017 WLA Consultation, we consider that an adjustment somewhere between the utility range and that for other companies might imply a debt premium for Openreach around 0.1% lower than for BT Group – i.e. around 1.0% compared to BT Group's 1.1%.

A20.246 It is similarly difficult to assess precisely what rating the Other UK telecoms activities would achieve. However, we note that many of the UK and European telecoms comparators described above have similar credit ratings to BT Group, and similar levels of gearing,⁴⁵⁸ implying that the Other UK telecoms activities might have a debt premium similar to that of BT Group; i.e. the 1.1% debt premium estimated above.⁴⁵⁹

A20.247 To estimate the debt premium for the RoBT under a three-way disaggregation, we can use the weightings from the asset beta disaggregation. On this basis, the weightings imply a RoBT debt premium of 1.2%.⁴⁶⁰

A20.248 Table A20.35 compares the result of this credit ratings approach to the approach of applying the range of the BT Group debt premium.

Table A20.35: Summary of alternative approaches to the debt premium

Approach	BT Group	Openreach copper access	Other UK telecoms	RoBT
BT debt premium range	1.1%	1.0%	1.1%	1.5%
Credit rating approach	1.1%	1.0%	1.1%	1.2%

Source: Ofcom calculations

Our decision

A20.249 We have decided to use a debt premium of 1.0% for Openreach copper access and 1.1% for Other UK telecoms, noting that these values are the same under both approaches described above. For presentation purposes, we have used a debt premium of 1.2% in calculating the WACC for the RoBT. This would be consistent with placing more weight on the credit rating approach and disaggregation weightings, rather than applying the BT

⁴⁵⁸ See for example Figures 3.4 and 3.14 in Annex 31 (NERA report).

⁴⁵⁹ S&P rates 11 of the 14 UK and European telecoms companies listed earlier in this annex. Five of these have BBB ratings (similar to BT), three have A ratings and two have BB ratings. Orange Belgium is owned by Orange S.A and does not have a separate credit rating. S&P does not rate Iliad or Tele2.

⁴⁶⁰ $1.0\% \times 20\% [\text{Openreach copper access}] + 1.1\% \times 65\% [\text{Other UK Telecoms}] + 1.2\% \times 15\% [\text{RoBT}] = 1.1\% [\text{BT Group}]$.

Group range. We think the credit rating approach is likely to better approximate differences in the risk of debt as seen by credit rating agencies.⁴⁶¹

Our decision on the disaggregated WACC

A20.250 Table A20.36 summarises the pre-tax nominal WACC for BT Group and the three-way disaggregation for 2019/20 and 2020/21. The differences in the WACCs between these years are due to different assumptions for RPI inflation and corporate tax rates, as explained above.

Table A20.36: BT pre-tax nominal WACC for BT Group and disaggregated lines of business

	BT Group	Openreach copper access	Other UK telecoms	RoBT
2020/21	9.3%	7.9%	8.9%	12.9%
2019/20	9.4%	7.9%	9.0%	13.1%

Source: Ofcom

⁴⁶¹ Whether the credit rating or the ranges approach is adopted here would not matter for regulated charges since the Openreach copper access and Other telecoms debt premia are the same under each approach and we do not use the resulting RoBT figure in determining a benchmark rate of return for any regulated activities.

A21. Cumulo rates

A21.1 In this annex we set out how we have forecast BT's business rate (cumulo) costs and attributed these to services in both the top-down and bottom-up models. In summary, we have decided to adopt the following approach:

- We have forecast BT's cumulo costs separately from other costs so that we can reflect the large increase in BT's Rateable Values (RVs) that came into effect on 1 April 2017. These forecasts reflect:
 - the latest revisions to these RVs that took place in January 2018. These revisions reduce much of the uncertainty of our forecasts in the March and September consultations;
 - the transition scheme that applies in England; and
 - the effect of increasing demand for GEA-FTTC and MPF (including when bought in conjunction with GEA) lines on BT's RVs over the charge control period.
- We have decided not to treat BT's cumulo costs as a pass-through cost item in this charge control.
- We have attributed cumulo costs by:
 - firstly, estimating the cumulo costs attributable to GEA services by assuming each GEA rental connection attracts an RV of £18 per annum in each year;
 - secondly, allocating all cumulo costs attributable to GEA services to GEA rental services; and
 - finally, allocating all non-GEA cumulo costs across non-GEA network components using a profit weighted net replacement cost (PWNRC) approach.

A21.2 The net effect of these decisions is that we are forecasting the contribution from BT's cumulo rates costs to be £5.91 per line on MPF rentals costs and £9.08 per line on GEA 40/10 rentals costs in 2020/21.

A21.3 The remainder of this annex is divided into three main sections:

- in the first, we set out how we have forecast BT's cumulo rate costs over the charge control period together with the underlying assumptions that we have made;
- in the second, we describe how we have attributed our forecast of BT's cumulo costs across services for use within these charge controls; and
- lastly we summarise the resulting forecasts of cumulo unit costs for the main services over the charge control period.

Forecasts of BT's Cumulo rates costs

Introduction and background to cumulo rates

A21.4 Cumulo rates are the non-domestic rates (property tax) BT pays on its rateable assets in the UK. It is called a cumulo assessment because all of the rateable assets are valued

together. BT's cumulo rateable assets consist primarily of passive assets such as duct, fibre, copper, cabinets, manholes and junction boxes as well as exchange buildings. "Active" electronic assets – electronic equipment such as DSLAMs, MSANs, multiplexors and modems – are in general non-rateable. In previous charge controls we have allowed BT to recover an appropriate share of BT's cumulo rates costs within its wholesale prices.

- A21.5 Payments on non-domestic rates are usually calculated by multiplying a Rateable Value (RV) for the property by a "rate in pound".⁴⁶² RVs are assessed by the relevant rating authority in each nation. For example, the Valuation Office Agency (VOA) is the rating authority that makes assessments in England and Wales.
- A21.6 The RV is specific to each property or assessment and is a measure of the open market rental value. RVs are published in each nation's rating lists⁴⁶³ and periodically reassessed. Historically that has usually happened every 5 years. The most recent reassessments by the rating authorities in England, Scotland and Wales came into force in April 2017, and in Northern Ireland in April 2015.
- A21.7 Valuation authorities can change entries in rating lists and ratepayers can appeal their assessments. However, once they have been initially assessed and no appeals have been lodged, RVs generally stay constant over the life of a rating list unless there have been 'material changes in circumstance' (MCC). What constitutes a valid MCC has been determined by past rating precedent but in general MCCs reflect physical changes to assets within the assessment; economic changes in circumstance do not constitute valid grounds for claiming that there have been MCCs.
- A21.8 There is a transition scheme that applies in England, that effectively reduces "bill shock" by limiting any increases (or decreases) to payments resulting from reassessments.⁴⁶⁴ For a business whose assessment is under transition, the rates bill may therefore not be the direct result of applying the rate in the pound to the RV.

Our overall approach

- A21.9 BT's cumulo costs are part of its operating costs. In previous charge controls we have allowed BT to recover a proportion of these costs from the relevant services in that control. For example, we allowed BT to recover an appropriate share of its cumulo costs from MPF and WLR services in the 2014 FAMR Statement and from leased lines in the 2016

⁴⁶² Rates in the pound are set centrally by each nation and are the same for all ratepayers in a nation. By rate in the pound (sometimes also called the rate poundage) we mean the standard non-domestic rating multiplier. For an introduction to how rates liabilities are calculated see <https://www.gov.uk/introduction-to-business-rates> [accessed 20 February 2018]. Northern Ireland is different in that the rate poundage in each of the 11 districts is made up of two separate rates: a regional rate poundage that is the same in each district and a district rate poundage that is different for each district.

⁴⁶³ We use the term rating lists to cover lists of RVs (in Northern Ireland the RV is called the net annual value or NAV). In England and Wales this list is called the Rating List. In Scotland, it is the Valuation Roll, see <https://www.saa.gov.uk/valroll.html> [accessed 20 February 2018].

⁴⁶⁴ The scheme limits increases on a ratepayer's bill before inflation to 42% (2017/2018), 32% (2018/2019), 49% (2019/2020), 16% (2020/21) and 6% (2021/22). There is also a District Rate Convergence scheme in Northern Ireland that affects payments over the period 2015/16 to 2018/19 which has a much smaller impact on payments. We discuss both these schemes in more detail below.

BCMR Statement. We have decided to allow recovery of an appropriate share of BT's forward looking cumulo costs within this charge control.

- A21.10 In the March consultation, we proposed forecasting BT's cumulo rates costs separately since they were likely to rise significantly from 2017/18 onwards. That was due to significantly higher RVs in BT's cumulo assessment compared to 2016/17. These higher RVs will remain in place for at least five years, so they cover the charge control period.
- A21.11 As TalkTalk agreed with our overall approach and no other stakeholder commented on our approach or suggested another approach, we have decided to forecast BT's cumulo rates separately within this charge control.

BT's UK RV on 1 April 2017

Our proposals

- A21.12 In the March consultation we first estimated BT's cumulo costs using public data over the period 2010 to 2017. BT's RVs in the United Kingdom declined from £286m in April 2010 to £197m in October 2016.⁴⁶⁵ We estimated that BT's in-year liability fell from £133m in 2010/11 to £96m in 2016/17, which was very similar to what BT recorded in its accounts. This gave us confidence that we could estimate BT's cumulo liabilities reliably.
- A21.13 We then noted that BT's RV would increase from £197m in October 2016 to £812m in April 2017 as a result of the revaluation carried out by the rating authorities in England, Scotland and Wales. We assumed that there would be no change to BT's draft RVs for April 2017, although we noted that BT was intending to challenge its 2017 reassessments and that we would take account of any changes in our statement. Stakeholder responses to the March consultation focussed on the likelihood of BT achieving reductions to its April 2017 RVs.⁴⁶⁶
- A21.14 In the September consultation we updated our approach⁴⁶⁷ to take account of new developments, in particular:
- A 5% increase in BT's RV in England and Wales effective from 23 March 2017⁴⁶⁸; and

⁴⁶⁵ BT's cumulo RV increased in England and Wales at the end of March 2017. As discussed in our September consultation this increased the total UK RV to £206m. The England and Wales RVs at the end of March 2017 were reduced in January 2018. The revised total UK at March 2017 is now £201m.

⁴⁶⁶ Stakeholder responses to our March 2017 WLA Consultation are discussed in paragraphs 3.15-3.18 of the September 2017 WLA Consultation.

⁴⁶⁷ See September 2017 WLA Consultation, Section 3. We also noted the revised check, challenge and appeal processes that applied in England and Wales, see <https://www.gov.uk/guidance/how-to-check-your-rateable-value-is-correct> [accessed 20 February 2018].

⁴⁶⁸ Central Rating List, England 2010.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/671669/2010_Central_Rating_List_for_England.pdf.

Central Rating List, Wales 2010.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/671670/2010_Central_Rating_List_for_Wales.pdf.

- A 29% reduction in Virgin Media's RVs (compared to the draft values initially published in September 2016).⁴⁶⁹

A21.15 We said that we expected BT would be successful in achieving reductions in its RV, though the timing of this was uncertain. We considered that we should reflect this likely reduction in our forecasts and proposed to reduce BT's 1 April 2017 RVs by 20-35% with a base case of 25%. We also noted that we would update our forecasts if changes to BT's RVs were published prior to our final statement.⁴⁷⁰

Stakeholder responses

A21.16 TalkTalk and Sky argued that the rate reduction Virgin Media was able to achieve was an appropriate proxy for BT's likely rate. They also considered BT's historical success at negotiating lower rates should be taken into account.⁴⁷¹ TalkTalk believed the forecast should be set at the upper end of 20-35% range.⁴⁷² In addition, UKCTA did not agree Virgin Media's achieved reduction should be the top-end of our range given BT's "larger network and significant proven experience" in negotiations.⁴⁷³

A21.17 Virgin Media argued that our proposed 25% adjustment was inappropriate and "at best, a guesstimate".⁴⁷⁴ It noted that "the underlying network, data inputs, operating models and assumptions made by the VOA for Virgin Media may not be consistent, or indeed comparable, to those applicable to BT." Virgin Media believed we should be more cautious in forecasting cumulo rate costs and urged us "to engage with BT to derive estimates of any potential reduction in non-domestic rates and the likelihood that these will occur."⁴⁷⁵ It also argued that any under or over-recovery of costs could be rectified in future market reviews.⁴⁷⁶

A21.18 Openreach also considered that our proposed 25% reduction was speculative. It argued that "Virgin Media is not a good reference point for estimating the size of any reduction that might be made to BT's RV" and noted some differences between BT's and Virgin Media's networks.⁴⁷⁷

Our reasoning and decisions

⁴⁶⁹ Values in England and Wales can be obtained via downloads from the VOA website available at: <https://voaringlists.blob.core.windows.net/html/rldata.htm> [accessed 20 February 2018].

⁴⁷⁰ See paragraphs 3.34 and 3.40 of the September 2017 WLA Consultation.

⁴⁷¹ TalkTalk response to the September 2017 WLA Consultation, paragraphs 3.4 and 3.6, pages 6 and 7 and Sky response to the September 2017 WLA Consultation, paragraph 4.3, page 9.

⁴⁷² TalkTalk response to the September 2017 WLA Consultation, paragraph 3.6.

⁴⁷³ UKCTA response to the September 2017 WLA Consultation, paragraph 12.

⁴⁷⁴ Virgin Media response to the September 2017 WLA Consultation, response to question 3.1, page 4.

⁴⁷⁵ Virgin Media response to the September 2017 WLA Consultation, response to question 3.1, page 3.

⁴⁷⁶ Virgin Media response to the September 2017 WLA Consultation, response to question 3.1, pages 3-4.

⁴⁷⁷ Openreach response to the September 2017 WLA Consultation, response to question 3.1, paragraph 42.

- A21.19 At the end of January 2018, changes were made to BT's published cumulo RVs in England, Wales and Scotland on the VOA and SAA websites.⁴⁷⁸ The SAA website now notes that this RV is not under appeal.
- A21.20 We asked BT to provide estimates of its latest forecasts of its cumulo costs in 2017/18.⁴⁷⁹ In its response BT noted [X]. If revised NAVs are published before we publish our final statement we will update these Northern Ireland estimates accordingly. We note that this is not a critical assumption. Northern Ireland RVs account for less than 2% of BT's total RV.
- A21.21 We have decided to adopt these latest RVs [X] to inform our forecasts of BT's cumulo rates costs. Since we understand that the England, Wales and Scotland RVs are unlikely to change, we no longer need to estimate any potential reductions. We note that the latest 1 April 2017 RVs in England, Scotland and Wales are 27% lower than the draft values published in October 2016, very close to the 25% base case reduction we assumed for our September consultation.
- A21.22 The 1 April 2017 RVs we now use to inform our forecasts are given in the final column of Table A21.1 below. For comparison, the table also shows the RVs that applied at 31 March 2017 and the draft values that originally applied at 1 April 2017.⁴⁸⁰

Table A21.1: BT's cumulo RVs in each nation (£m, nominal)

BT's Cumulo RVs that applied at	31 March 2017 (final RVs on 2010 list)	1 April 2017 (draft RVs as published October 2016)	1 April 2017 (updated January and February 2018)
England	171.80	714.87	524.23
Wales	7.71	28.19	20.67
Scotland	15.86	64.00	47.00
Northern Ireland	5.30	5.30	[X]
Total	200.68	812.36	[X]

Source: Compiled RVs from rating agencies: VOA, SAA and Land and Property Services (Northern Ireland)

⁴⁷⁸ See Central Rating List for England 2017, page 5, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/676705/Central_Rating_List_for_England_2017.pdf; Central Rating List for Wales, page 2, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/676706/Central_Rating_List_for_Wales_2017.pdf; Scottish Assessors website, https://www.saa.gov.uk/search/?SEARCHED=1&SEARCH_TABLE=valuation_roll_cpsplit&SEARCH_TERM=scottish+telecom&x=11&y=9&DISPLAY_COUNT=10&ASSESSOR_ID=&TYPE_FLAG=C&ORDER_BY=PROPERTY_ADDRESS&H_ORDER_BY=SET+DESC&R_ORDER_BY=SET+DESC&UARN=Z99655%2F0067&PPRN=67173845&ASSESSOR_IDX=12&DISPLAY_MODE=FULL_HISTORY#results [accessed 20 February 2018].

⁴⁷⁹ Openreach response dated 1 February 2018 to question 2 of the 46th s.135 notice.

⁴⁸⁰ The value of BT's RV in England at 31 March 2017 determines what BT will pay after 2017/18 under the 2017 English transition scheme.

Forecasting BT's cumulo costs from 2017/18

Our proposals

- A21.23 As noted above, RVs can change over time as a result of MCCs. The VOA told us that, in the past, two main MCCs had affected BT's RV: increasing MPF volumes and increasing volumes of fibre access connections (using both FTTC and FTTP technology).⁴⁸¹
- A21.24 Accordingly, in the March consultation, we assumed that BT's cumulo RV would change due to MCCs associated with the growth of GEA fibre and MPF (including when bought in conjunction with GEA) rental volumes.⁴⁸² We assumed that:
- a) each new GEA FTTC rental would increase BT's RVs by £18 consistent with the VOA's 2010 rating list guidance.⁴⁸³
 - b) each extra MPF line would decrease BT's RV by £30. This was supported by updating our analysis for the 2014 FAMR Statement that compared changes to BT's RV against changes in MPF and GEA volumes.⁴⁸⁴
 - c) the net changes to BT's RV from these MCCs would be distributed across England, Wales, Scotland and Northern Ireland in proportion to the RVs in each nation at April 2017. However, we made no changes to the Northern Ireland NAV post 1 April 2017 as there had been no changes to BT's NAV between 2011/12 and 1 April 2015.
- A21.25 We also assumed that any future business rate relief on full-fibre infrastructure, the proposals for which had been outlined in the Governments Autumn statement,⁴⁸⁵ would not apply to BT's GEA FTTC lines.
- A21.26 We converted our forecasts of BT's RV to costs by making assumptions about rates in the pound in each nation using the latest Office for Budget Responsibility (OBR) forecasts of RPI and CPI and the impact of the transition scheme in place in England.
- A21.27 In our September consultation we updated our forecasts to reflect our views about the likely reductions to the April 2017 RV (as explained above), and also confirmed that the 100% business rate relief only applied to new fibre laid in England after 1 April 2017.⁴⁸⁶ Our forecasts of cumulo payments in 2020/21 are shown in Table A21.2 below.

⁴⁸¹ See paragraph A17.18 of the March 2017 WLA Consultation. The loss of RV from increasing MPF is due to reduced profits from downstream services, notably wholesale calls and wholesale broadband access.

⁴⁸² See March 2017 WLA Consultation, Annex 17, paragraph A17.32.

⁴⁸³ The VOA's 2010 Rating Manual Section 873: Practice Note 2010: Next Generation Access Telecommunications Networks (NGA). This no longer appears to be accessible from the VOA's web-site.

⁴⁸⁴ 2014 FAMR Statement, A26.69-A26.73. We assumed that each FTTC connection might increase BT's RV by £18 and each FTTP connection by £20 (these figures were taken from the VOA's 2010 Rating Manual Section 873) and that any remaining change was due to changes in MPF volumes.

⁴⁸⁵ See March 2017 WLA Consultation, Annex 17, paragraph A17.29.

⁴⁸⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/640703/Consultation_on_Business_Rates_Relief_for_New_Fibre_on_Telecommunication_Hereditaments.pdf.

Table A21.2: Forecasts of BT's cumulo costs in 2020/21 (£m, nominal)

	March Consultation	September Consultation
BT's cumulo costs	389.9	354.3

Source: Part of table A17.6 in the March 2017 WLA Consultation and table 3.4 in the September 2017 WLA Consultation

Stakeholder responses

- A21.28 In response to the March consultation, TalkTalk agreed with our proposed overall approach of starting with the published RV for April 2017 and then adjusting this in line with estimated MCCs.⁴⁸⁷ It considered that the £18 increase per additional GEA connection was appropriate as it was based on the most recent evidence from the VOA but noted that the MCC effect may be higher than this in the future for BT and similarly that BT may enjoy higher RV reductions as a result of WLR to MPF migrations than it had done historically.⁴⁸⁸
- A21.29 Openreach said there was uncertainty about the future of any “regime for MCCs in the current ratings period to 2022”,⁴⁸⁹ and that the MCC regime for the 2017 rating list had yet to be agreed with the rating authorities. It was concerned that our assumption of £18 RV per FTTC line might risk it not being able to recover its costs.
- A21.30 A number of stakeholders suggested that cumulo costs should be treated as a “pass-through” cost item. We address this issue separately below.

Our reasoning and decisions

- A21.31 We have forecast that the growth in GEA rental volumes will be several times higher than the growth in MPF rental volumes (including lines bought in conjunction with GEA FTTC services) over the period 2017/18 to 2020/21 (as discussed in Annex 10). We also forecast that growth in MPF rental volumes per annum will be a small fraction of what it was over the period 2011/12 to 2016/17. As a result, we consider it is likely that BT's RVs will continue to increase over the charge control period. We have therefore decided to forecast BT's RVs to reflect the impact of these MCCs. In the absence of any other information we have assumed that MPF growth and growth in fibre access connections will continue to be the main MCC impacts.
- A21.32 For clarity:
- d) we have not assumed that BT's RVs stay constant over the charge control period, since this seems unlikely for the reasons given above; and
 - e) we have not treated cumulo as a “pass-through” cost item, or instituted some form of pass through, for reasons we explain further below.

⁴⁸⁷ TalkTalk response to March 2017 WLA Consultation, paragraph 6.22.

⁴⁸⁸ TalkTalk response to March 2017 WLA Consultation, paragraph 6.23.

⁴⁸⁹ Openreach response to the September 2017 WLA Consultation, response to question 3.1, paragraph 43.

- A21.33 We have updated our analysis of revisions to BT’s RVs in England, Scotland, and Wales over the life of the 2010 rating list to reflect all the published changes. Our estimates of changes in BT’s RVs for every extra MPF connection at each revision are, as we have noted in previous consultations, quite volatile. However, the average reduction over the 2010 rating list remained between £30 and £35, though the average over the last three years has been higher.⁴⁹⁰ We have received no other evidence on which to estimate the effect of this MCC. TalkTalk provided no evidence to support its assertion that the MCC may be higher or suggest a way of estimating what the effect would be. We have therefore decided to adopt our consultation proposals and assume that each extra MPF connection reduces BT’s RV by £30.
- A21.34 We note Openreach’s concern that our assumption of £18 RV per FTTC line might introduce some risk that it might not be able to recover its costs in the future. Openreach however provided no evidence or suggestions for how to replace that assumption. Whilst the effects of both MCCs we have considered are somewhat uncertain, they offset each other to some extent. So, any forecast errors in BT’s final RVs resulting from these assumptions are likely to be low and are unlikely to have a major impact on our estimates of BT’s future cumulo rate costs. We therefore believe the risk of significant future under recovery is low. We have therefore decided to adopt our consultation proposals and assume that each extra GEA connection increases BT’s RV £18. We discuss this assumption more when discussing the attribution of BT’s cumulo costs below.
- A21.35 In addition, the Government’s bill to grant 100% business rate relief on new full-fibre infrastructure for a 5-year period from 1 April 2017 received royal assent on 8 February 2018.⁴⁹¹ This bill only affects new fibre installed after 1 April 2017 in England and Wales, although the Scottish Government has announced that it will “match the UK Government’s rates relief on certain new fibre investment, subject to confirmation of the associated details”.⁴⁹²
- A21.36 The draft statutory instrument defines “new fibre” as fibre that was not laid, flown, affixed or attached before 1 April 2017.⁴⁹³ This is consistent with the views expressed by DCLG⁴⁹⁴ in its August 2017 consultation document, that the Government does not intend to permit

⁴⁹⁰ We have used MPF and Openreach fibre base volumes as published in BT’s KPI documents (see for example the Q3 2016/17 KPIs available at <https://www.btplc.com/Sharesandperformance/Quarterlyresults/2017-2018/Q3/Downloads/KPIs/q318-KPIs.xlsx> [accessed 20 February 2018]) and RVs published in England, Scotland and Wales as described above and assumed that each fibre connection will increase BT’s RV by £18. We have not made any changes to BT’s assessment in Northern Ireland as there were no changes to BT’s NAVs there from 2011 to 2017.

⁴⁹¹ <https://services.parliament.uk/bills/2017-19/telecommunicationsinfrastructure/relieffromnondomesticrates.html> [accessed 20 February 2018].

⁴⁹² See page 43, <http://www.gov.scot/Resource/0052/00524214.pdf>.

⁴⁹³ Condition 3 (2), <https://publications.parliament.uk/pa/bills/lbill/2017-2019/0065/18065-DPM.pdf>.

⁴⁹⁴ Department for Communities and Local Government – now called Ministry of Housing, Communities and Local Government (MHCLG).

relief on dark fibre which, whilst lit after 1 April 2017, was in fact present before 1 April 2017.⁴⁹⁵

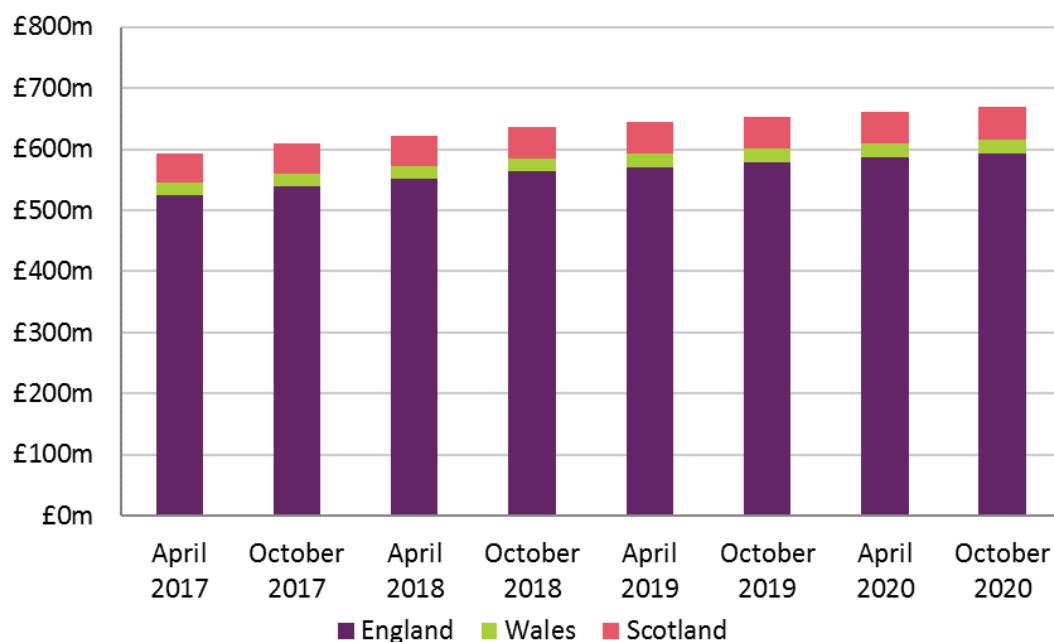
- A21.37 Openreach had rolled out most of its commercial FTTC network by 1 April 2017 so any new GEA connections are likely to be concentrated largely in BDUK areas.
- A21.38 In our September consultation we estimated the number of connections that might be subject to relief over the charge control period. We did this by applying take-up assumptions to forecasts of the remaining network rollout likely to take place under the BDUK Phase 2 programme. These calculations suggested that any relief that BT might qualify for would be quite small and might reduce BT's total payments in 2021/22 by less than 1%.⁴⁹⁶ We therefore proposed to assume that the impacts of any future business rates relief on full-fibre infrastructure on BT's RVs would be minimal over the charge control period. We received no comments on this proposal.
- A21.39 As we explain in Annex 14, more recently BT has announced plans to deliver FTTP to 3 million premises by 2020. Under our anchor pricing approach, which we consider incentivises full-fibre investment while protecting existing fibre customers from high prices, we have modelled an overlay FTTC network. This means that we have not modelled FTTP costs, and consistent with this have also not taken account of any cost savings from business rates relief when forecasting BT's RVs.
- A21.40 We have used the assumptions above to forecast BT's RVs after 1 April 2017 and have also assumed that any net changes to BT's RVs are distributed across England, Wales, Scotland, and Northern Ireland in proportion to the RVs we assumed at 1 April 2017. As in March we have not made any changes to Northern Ireland's NAV after 1 April 2017. Our resulting forecasts of BT's RVs (excluding those in Northern Ireland)⁴⁹⁷ are shown in Figure A21.3 below.

⁴⁹⁵ Paragraphs 7 and 9 of DCLG's consultation.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/640703/Consultation_on_Business_Rates_Relief_for_New_Fibre_on_Telecommunication_Hereditaments.pdf.

⁴⁹⁶ See September 2017 WLA Consultation, Section 3, paragraph 3.50.

⁴⁹⁷ We exclude Northern Ireland RVs because [3<]. If revised NAVs are published before we publish our final statement we will include NI NAVs in this graph.

Figure A21.3: Ofcom forecasts of BT's RVs (£m, nominal)

Source: Ofcom analysis using compiled RVs from rating agencies

Forecasts of rates in the pound

A21.41 Historically, rates in the pound have generally increased in England and Wales with the change in the RPI index from the prior September. However, the government announced in December 2016 that indexation will change to CPI from 2020/21. The Scottish government has set its small business rate in the pound to be the same as that in England in recent years though the supplement that applies to large assessments has been different since 2016/17. Rates in the pound in Northern Ireland have two components: a national rate and a regional rate. Historically these have increased at different rates to those in England, Scotland and Wales.

Our proposals

A21.42 In our March consultation we assumed the small business multiplier in England and Scotland, the standard rate in Wales, and the overall rate in Northern Ireland would increase in line with our forecasts of RPI until 2019/20 and by CPI from 2020/21 onwards. We also assumed that the supplement for large assessments in England and Scotland would remain at the 2017/18 values of 1.3p and 2.6p respectively.

Stakeholder responses

A21.43 In response to our September consultation, Openreach was concerned that the forecast cumulo poundage rates were understated due to the use of inflation assumptions from the November 2016 report of the OBR.

A21.44 Openreach also argued that the average poundage rate for GEA lines was not consistent with the rates assumed in our March consultation.⁴⁹⁸ In addition, Openreach considered the 2017/18 Northern Ireland rate should be 57.2p, rather than 58.7p.⁴⁹⁹

Our analysis and decisions

A21.45 The 2017/18 rates in the pound for each nation were published some time ago. The English and Welsh governments have recently confirmed rates in the pound for 2018/19. The Scottish government has announced draft rates in the pound values for 2018/19. We have assumed that the rates in the pound in Scotland will remain at their draft values in 2018/19. All three governments have decided to bring forward the change in indexation to CPI to April 2018.⁵⁰⁰

A21.46 From 2019/20 we assume that the small business multiplier in England and Scotland and the rate in the pound in Wales will increase in line with our forecasts of CPI (using the most recent OBR forecasts) and that the supplements for large assessments in England and Scotland will remain at the 2017/18 values of 1.3p and 2.6p respectively.

A21.47 Draft rates in the pound in Northern Ireland for 2018/19 have not yet been announced. We have assumed that the rate in the pound that applies to each NI district will increase in 2018/19 at the same annual rate as the average over the last 2 years. If rates in the pound in Northern Ireland for 2018/19 are announced before our final statement, we will update these estimates accordingly. From 2019/20 we assume that rates will increase annually in line with our forecasts of CPI.

A21.48 We have reviewed our calculation of the Northern Ireland rate in light of Openreach's comments. We have weighted the rates in the pound for each district by our estimate of the BT NAV in that district. We have then also estimated the effect of the District Rate Convergence Scheme that has been in place in Northern Ireland since 2015/16 and ends on 31 March 2019. This scheme was introduced to "ensure that there is no sudden and excessive increase in the district rates payable in respect of any property arising out of local government reorganisation."⁵⁰¹ Our calculations suggest that this scheme has a relatively small effect on the rates in the pound that will apply to BT's assessment. We now

⁴⁹⁸ Openreach response to the September 2017 WLA Consultation, response to question 3.1, paragraph 55. We issued a clarification note in response to this concern in October 2017, see

https://www.ofcom.org.uk/data/assets/pdf_file/0019/107434/WLA-market-review-consultation-clarification.pdf.

⁴⁹⁹ Openreach response to the September 2017 WLA Consultation, response to question 3.1, paragraph 56.

⁵⁰⁰ England: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/680680/BRIL_1_-_2018.pdf; Wales: <http://gov.wales/topics/localgovernment/finandfunding/businessrates/?lang=en> [accessed 20 February 2018];

Scotland: see Tables 2.08 and 2.10, Scottish Government Draft Budget: Budget 2018/19,

<http://www.gov.scot/Resource/0052/00529171.pdf>.

⁵⁰¹ http://www.legislation.gov.uk/nisr/2015/83/pdfs/nisr_20150083_en.pdf. There was a reduction in the number of district councils from 26 to 11 which took effect on 1 April 2015. The relief takes the form of reductions in the amounts chargeable in respect of district rates. The reductions vary each year, are stated in terms of pence in the pound and also vary according to the districts in which the assessment was originally made and where it now sits. We are not aware information has been published that shows how BT's NAVs in each of the original 26 district councils has been re-distributed across the 11 new district councils.

estimate the 2017/18 Northern Ireland rate in the pound is 57.4p, close to the value that Openreach provided in its consultation response.

A21.49 The rates in the pound we have used in our calculations are given in Table A21.4 below.

Table A21.4: Forecasts of standard non-domestic rates in the pound (nominal)

	England	Wales	Scotland	Northern Ireland
2017/18	47.9p	49.9p	49.2p	57.4p
2018/19	49.3p	51.4p	50.6p	61.0p
2019/20	50.3p	52.5p	51.6p	62.3p
2020/21	51.2p	53.5p	52.5p	63.4p

Source: Ofcom analysis based on sources cited above.

The transition scheme in England

A21.50 The English transition scheme has a major impact on BT's cumulo rate costs from 1 April 2017 onwards,⁵⁰² because, as Table A21.1 shows, England accounts for around 88% of BT's UK RVs. We received no comments from stakeholders on how we proposed to reflect this scheme in our March consultation and have therefore not changed our approach, which is summarised below.

A21.51 The scheme is complex but essentially limits increases on a ratepayer's bill before inflation to a maximum of 42% in 2017/18, 32% in 2018/19, 49% in 2019/20, 16% in 2020/21 and 6% in 2021/22. The increase is measured using the last rateable value for England in the previous rating list. Table A21.1 shows this was £171.8m for BT. The large increase to BT's English RV means that BT's cumulo rate payments in England will be subject to these transition rules until 2019/20, but not in 2020/21.

A21.52 Changes to RVs post April 2017 as a result of MCCs are not subject to transition arrangements.⁵⁰³ Therefore the increases that we forecast to BT's RVs post April 2017 are not subject to transition and have an immediate impact on BT's cumulo costs.

Forecasts of BT's cumulo costs

A21.53 Table A21.5 sets out our forecasts of BT's cumulo costs which we have derived by applying our forecast rates in the pound and the 2017 English transition scheme to our forecasts of BT's cumulo RVs.

⁵⁰² Rating and Valuation, England The Non-Domestic Rating (Chargeable Amounts) (England) Regulations 2016 SI No. 1265, Part 2, http://www.legislation.gov.uk/uksi/2016/1265/pdfs/uksi_20161265_en.pdf.

⁵⁰³ Section 13 in Part 2 in Rating and Valuation of the Legislation, 2016. Rating and Valuation, England The Non-Domestic Rating (Chargeable Amounts) (England) Regulations 2016 SI No. 1265, Part 2. http://www.legislation.gov.uk/uksi/2016/1265/pdfs/uksi_20161265_en.pdf.

Table A21.5: Forecasts of BT's total cumulo costs (£m, nominal)

	2017/18	2018/19	2019/20	2020/21
BT's Cumulo Rates Costs	[X]	[X]	[X]	[X]

Source: Ofcom analysis

A21.54 Our forecasts suggest that BT's cumulo costs will roughly quadruple by 2020/21 compared to our estimate of its 2016/17 costs of £96m. The estimate of costs in 2020/21 is close to the base case we presented in our September consultation.⁵⁰⁴

Cumulo costs as a potential 'pass-through' cost item

Our proposals

A21.55 In our March and September consultations, we proposed using our forecasts of BT's cumulo rates costs to inform our overall cost estimates. As discussed above, we proposed in our September consultation to estimate the reduction that we considered BT would be able to achieve to its RVs.

Stakeholder responses

A21.56 Vodafone and Openreach suggested that to avoid the forecast uncertainty, cumulo costs could be treated as a 'pass-through' cost item, within the charge control formula.

A21.57 Vodafone considered that the risks of BT over-recovering were far higher than the risk of it under-recovering citing what it considered to be "10.5bn in excess profits over the last 12 years".⁵⁰⁵ It argued that "a pass-through system that considers the rates that BT actually pays will always provide a more accurate ... recovery of costs".⁵⁰⁶

A21.58 Openreach said that, apart from uncertainty about what BT's RVS would be at 1 April 2017, there was further uncertainty over the impact of any MCCs. In its view, this provided further support to consider introducing pass-through arrangements. It also said: "We believe a pass-through mechanism would be relatively straightforward to set out in an SMP condition and to design in a way that addresses Ofcom's concerns over the distribution of benefits".⁵⁰⁷ It noted that other regulators had implemented pass through arrangements for costs "subject to a large degree of uncertainty". For example, Ofgem treated business rates in this way in its electricity distribution price controls.⁵⁰⁸

Our reasoning and decisions

⁵⁰⁴ See Table 3.4. The base case was the 25% reduction in BT's draft April 2017 RVs. We estimated the costs under this assumption to be £354.3m in 2020/21.

⁵⁰⁵ Vodafone response to the September 2017 WLA Consultation, paragraph 1.7.2.

⁵⁰⁶ Vodafone response to the September 2017 WLA Consultation, paragraph 1.7.1.

⁵⁰⁷ Openreach response to the September 2017 WLA Consultation, response to question 3.1, paragraphs 44-50.

⁵⁰⁸ Openreach response to the September 2017 WLA Consultation, response to question 3.1, paragraph 45.

- A21.59 As explained above, BT has now agreed the value of its April 2017 RV with all the rating authorities except for Northern Ireland, so there is significantly less uncertainty about its future cumulo costs. The case for pass-through arrangements is therefore much weaker than it was previously.
- A21.60 We forecast many different types of costs when setting a charge control and it is not clear that the uncertainty in forecasting the MCC impacts of cumulo costs is greater than for other types of costs, as the MCC effects offset each other to some degree. We therefore do not believe that uncertainty over MCCs provides a compelling case to introduce pass-through arrangements.
- A21.61 Further, similar to the arguments we make in Annex 12 in relation to pension service costs, there are additional reasons why we consider that it would not be appropriate to adopt pass-through arrangements. These include:
- the fact that BT has some influence over both the level of its cumulo costs and the timing of any changes – therefore there may be opportunities for gaming;
 - some changes may only be made once the charge control period has ended when the relevant SMP conditions may no longer be in force;⁵⁰⁹ and
 - it would be complex to implement and reduce transparency and certainty on the level of the charge control. For example, once revisions to BT’s RV had been agreed, the costs would need to be attributed and this would be difficult for stakeholders to predict.
- A21.62 We have also discussed with other regulators the arrangements they have for business rate costs when setting their price controls. In summary:
- Ofgem has a mechanism in place to allow for any difference between modelled and actual costs to be reflected in future revenue requirements in its electricity network controls, but in practice there is a two-year delay in implementing any differences.^{510,511}
 - Similarly, the CAA allow Heathrow Airport to pass-through 80% of any changes to its rate costs from the 2017 rating revaluation. In practice these corrections usually take place two years later.⁵¹²
 - Ofwat considers business rates to be a controllable cost. In previous price reviews mechanisms were in place to allow water companies to reflect higher rates than allowed in their final determination. However, the threshold for this adjustment is quite high and is unlikely to be raised on business rates alone. Ofwat has proposed removing this mechanism for business rates for its next price control.⁵¹³

⁵⁰⁹ For example, BT’s appeal of its 1995 Assessment took five years to resolve.

⁵¹⁰ https://www.ofgem.gov.uk/system/files/docs/2017/01/guide_to_riioed1.pdf.

⁵¹¹ For example, suppose non-domestic rates for a network company were forecast to be £100m in year 1. In year 2, the company might submit details that its non-domestic were £120m. The revenue requirement for this operator in Year 3 would then be adjusted by the full £20m difference, subject to small timing differences to reflect the NPV of this cost difference since Year 1.

⁵¹² <http://www.caa.co.uk/WorkArea/DownloadAsset.aspx?id=4294975875>, pages 16-17[accessed 20 February 2018].

⁵¹³ Ofwat’s current price control, https://064f1d25f5a6fb0868ac-0df48efcb31bcf2ed0366d316cab9ab8.ssl.cf3.rackcdn.com/wp-content/uploads/2015/10/det_pr20141212riskreward.pdf.

- In its current charge control, ORR has pass-through arrangements in place for Network Rail's cumulo rates costs. However, the intention was for any differences between forecast and actual rate costs to be taken into account in the next charge control.⁵¹⁴

A21.63 Therefore, even though most other UK regulators have (or have had) some allowance for changes in business rates, in practice they take two years to implement and/or have quite high thresholds. As our charge controls span three years, it is likely any pass-through effects for a particular charge control period would need to be considered in the following charge control period, which would not be consistent with the forward-looking nature of the cost estimates on which we need to base our charge controls.

A21.64 In light of the above and the fact that there is only limited uncertainty over BT's cumulo rate costs for the charge control period, we do not consider it would be appropriate to adopt pass-through arrangements for BT's cumulo costs.

Attributions of BT's cumulo costs

A21.65 Having forecast BT's cumulo costs, the next stage is to attribute these costs across different services. In this section we first review how the current attribution approach has evolved historically. We then summarise our proposals and stakeholders' comments on those proposals before finally presenting our reasoning and decisions.

General approach to attribution of BT's cumulo costs

Introduction

A21.66 It would be desirable to link the attribution of BT's cumulo costs to the valuation model used to support the VOA's assessment. However, that is not straightforward. The rating authorities assess BT's cumulo RVs using the "receipts and expenditure" (R&E) method. According to the Competition Commission (CC):⁵¹⁵

"This approach estimates the profits of a business that uses the rateable assets and seeks to allocate these profits between a notional tenant (i.e. user of the assets) and a notional landlord (i.e. owner of the assets). The notional landlord, for the purposes of the charge control, is the public authority which levies cumulo rates. The notional tenant is BT".⁵¹⁶

Proposals for the next price control <https://064f1d25f5a6fb0868ac-0df48efcb31bcf2ed0366d316cab9ab8.ssl.cf3.rackcdn.com/wp-content/uploads/2017/12/Final-methodology.pdf>.

⁵¹⁴ Paragraphs 12.78-12.80. http://orr.gov.uk/data/assets/pdf_file/0011/452/pr13-final-determination.pdf.

⁵¹⁵ Now the Competition and Markets Authority (CMA).

⁵¹⁶ Competition Commission, 2013. British Sky Broadcasting Limited and TalkTalk Telecom Group Plc v Office of Communications, Case1192/3/3/12, Determination 27 March 2013, paragraph 11.7, http://www.catribunal.org.uk/files/1192-93_BSkyB_CC_Determination_270313.pdf. In paragraph 11.8 the Competition Commission described the VOA's calculation of BT's RVs in the following six steps

- The revenues are assessed from the services that use the rateable assets;
- A measure of operating costs relating to those services is deducted;
- Also deducted are a maintenance charge for the landlord's assets and the tenants' own capital expenditure;

- A21.67 In the 2012 LLU WLR Charge Control statement we noted that Openreach had told us that “it is impossible to allocate costs to products based on information from the R&E calculation used by the valuation authorities”⁵¹⁷ and we concluded that “we believe that it is neither feasible nor appropriate, due to the level of complexity, to replicate the VOA’s calculations”.⁵¹⁸ In the subsequent appeal the CC noted that “both Ofcom and Sky/TalkTalk recognised that the VOA’s aggregate calculations could not practically be used in its exact form as an allocation methodology”.⁵¹⁹
- A21.68 In recent years BT has attributed cumulo costs within its RFS using variants of a “profit weighted net replacement cost” (PWNRC) methodology. This methodology attributes BT’s cumulo costs across the rateable assets in proportion to the share of the net replacement costs (NRC) of the asset multiplied by the return for that asset (the profit weight).⁵²⁰ The return is the ratio of profit to capital employed, which is measured by NRC in BT’s regulatory accounts. Multiplying the return by the NRC produces an estimate of the relative “profit” likely to be generated by that rateable asset. This approach to the attribution of BT’s cumulo costs is broadly consistent with that adopted by the rating authorities when valuing BT’s assets.

Appeal of the cumulo attribution within the 2012 LLU WLR Charge Control Statement

- A21.69 Sky and TalkTalk appealed the allocation of BT’s cumulo rates to MPF and WLR in the 2012 LLU WLR Charge Control, alleging that Ofcom had erred in using the PWNRC method to allocate cumulo rates between different services.⁵²¹ They argued that this method of allocating BT’s cumulo costs to MPF and WLR services did not reflect cost causality and was not sufficiently simple or transparent. Sky and TalkTalk proposed alternative methodologies which they considered better approximated the principles of the aggregate calculation of BT’s cumulo rates to individual services.
- A21.70 The CC found that Ofcom did not err in allocating the costs of BT’s cumulo rates, stating that the PWNRC approach was, to a sufficient degree, consistent with cost causality.⁵²² Further, the CC agreed with Ofcom that a broadly equal allocation between MPF and WLR should be expected given the similarity of these services in their use of the rateable assets

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- iv) This gives a ‘divisible balance’, being a measure of profit from the business;
 - v) The tenant’s return on its investments is deducted from this; and
 - vi) The residual is taken to be the RV.

⁵¹⁷ 2012 Charge control review for LLU and WLR services Annexes, paragraph A4.74, https://www.ofcom.org.uk/data/assets/pdf_file/0018/50355/annexesmarch12.pdf.

⁵¹⁸ 2012 Charge control review for LLU and WLR services Annexes, paragraph A4.75.

⁵¹⁹ Competition Commission, 2013, paragraph 11.97.

⁵²⁰ We directed BT to apply the relevant Weighted Average Cost of Capital (WACC) in 2015. See paragraphs A17.59 and A17.60. Prior to that BT applied returns that were reported in the RFS. See for example page 56 of BT’s 2012 Detailed Attribution Methodology available at:

https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/DAM_2012.pdf.

⁵²¹ The main points of the appeal are summarised in July 2013 LLU WLR CC Consultation, Annex A14, paragraphs A14.16 to A14.28. BT also appealed on a point of fact which we are not discussing here as it is not directly relevant.

⁵²² Competition Commission, 2013, paragraphs 11.97-11.98, and 11.112.

and their regulated returns. The CC considered that allocations should be stable and the methods proposed by Sky and TalkTalk were not suitable.⁵²³

2014 FAMR Statement and subsequent Ofcom direction

A21.71 In the 2014 FAMR Statement we again considered the attribution of BT's cumulo costs.⁵²⁴ We noted that the VOA had told us that:

“the BT valuation model was created for the specific purpose of informing a rating valuation and was not constructed to allocate costs between service or asset types. The VOA confirmed that the calculations were generally done at an aggregate level and said that it did not consider that a disaggregation of the existing valuation model by product was possible.”⁵²⁵

A21.72 We reviewed alternative methodologies including variants of the PWNRC approach and various approaches suggested by TalkTalk and Sky. We said that any allocation method used to recover BT's cumulo costs should:⁵²⁶

- result in broadly equal per line allocations of cumulo costs to MPF and WLR lines;
- result in allocations that are broadly stable over time;
- be based primarily on the use of rateable assets, to be consistent with the rating methodology, to follow cost causality and to avoid counterintuitive results;
- be transparent, logical, and not unduly reliant on confidential data; and
- pass the benefits of changes in cumulo costs to customers through the charge control, in a way which does not rely on a spuriously precise forecast of cumulo costs.

A21.73 We concluded that we would continue to use the PWNRC method but with attributions determined by us as we did not consider BT's 2011/12 allocation of cumulo costs to MPF and WLR services was reasonable.⁵²⁷ We noted:

“the way BT allocated rebates led to an increasing proportion of non-NGA⁵²⁸ Cumulo costs being allocated to Openreach and in particular to MPF Rentals and WLR rentals and that that the current methods would lead to a discontinuity in the way cumulo cost were allocated when there was a new rating list.”⁵²⁹

A21.74 In our 2015 Directions for Regulatory Financial Reporting Statement (2015 Directions)⁵³⁰ we noted that BT was able to identify the contribution of GEA service connections, both FTTC and FTTP, to BT's cumulo RVs.⁵³¹ We made no change to the attribution of cumulo costs

⁵²³ Competition Commission, 2013, paragraphs 11.112-11.116.

⁵²⁴ 2014 FAMR Statement, Annex 26.

⁵²⁵ 2014 FAMR Statement, paragraph A26.12.

⁵²⁶ 2014 FAMR Statement, paragraph A26.3.

⁵²⁷ 2014 FAMR Statement, paragraphs A26.5 and A26.58.

⁵²⁸ Next generation access.

⁵²⁹ Ofcom, 2014, *Directions for Regulatory Financial Reporting Consultation*, paragraph 4.49, https://www.ofcom.org.uk/data/assets/pdf_file/0029/62993/consultation.pdf.

⁵³⁰ Ofcom, 2015, *Directions for Regulatory Financial Reporting Statement*, https://www.ofcom.org.uk/data/assets/pdf_file/0018/59112/statement.pdf.

⁵³¹ 2015 Directions for Regulatory Financial Reporting Statement, paragraph A4.67.

that were attributed to GEA services. However, we directed BT to change the way it attributed all non-GEA related cumulo costs so that it was consistent with the way it attributed cumulo costs for GEA services, i.e. on a PWNRC basis. We also said that the profit weights should be the relevant weighted average cost of capital for each market.⁵³²

Attribution approach for the MPF and GEA charge controls

Our proposals

A21.75 In our March and September consultations, we explained that BT's cumulo costs are currently attributed within BT's RFS via a three stage process that is consistent with our 2015 Directions:

- BT's cumulo costs are first divided into those relating to GEA services and other, non-GEA services – currently payments relating to GEA services can be separately identified;
- second, GEA related cumulo costs are attributed across GEA related components using the PWNRC approach explained above; and
- third, non-GEA cumulo costs are attributed across non GEA components again using the PWNRC approach.

A21.76 We noted that the VOA had not published numerical guidance on potential RVs for next generation access connections within Section 873 of its 2017 Rating manual.⁵³³ We asked BT if it would continue to be able to identify its payments on GEA services from 1 April 2017, the first step in the attribution methodology described above. BT confirmed that “under the new rating valuation the GEA liability is included within the main valuation and will no longer be separately identifiable as a Material Change of Circumstances (MCC).”⁵³⁴ We therefore concluded that BT would not be able to comply with our 2015 Directions from 2017/18 onwards.

A21.77 We considered two options for attributing BT's cumulo costs from 2017/18 onwards:

- a full PWNRC approach. Amounts attributable to GEA services would not first be identified but would be determined by applying the PWNRC approach to all rateable assets at the same time; and
- a continuation of the current three stage approach under which the amount of the RVs that is attributable to GEA services would be identified first.

A21.78 We noted that there were some benefits to the full PWNRC approach, most notably that it was consistent with the approach that had been reviewed and given some endorsement by the CC. However, we rejected it largely because it gave counterintuitive results. Under the current methodology MPF and WLR unit cumulo costs are much lower than those for GEA

⁵³² 2015 Directions for Regulatory Financial Reporting Statement, paragraph A4.64.

⁵³³ VOA, 2017. Section 873: Rating Manual: 2017: Next generation access telecommunications networks (NGA) <http://manuals.voa.gov.uk/corporate/Publications/Manuals/RatingManual/RatingManualVolume5/sect873/Rat-man%20Vol%205%20Sec873.html> [accessed 20 February 2018].

⁵³⁴ Email from Andy Robinson, BT, to Francis Harding, Ofcom, sent on 18 January 2017.

rental services. In contrast, a full PWNRC approach would attribute much less to GEA rentals and more to other services – for example by the end of the forecast period MPF and WLR unit cumulo costs would have been much higher than those for GEA rental services.

- A21.79 These results could be explained to some extent by the way the costs of rateable assets are attributed across GEA and other services within the access network. GEA services receive an attribution of access fibre spine and distribution costs, some attribution of shared duct costs but no D-side duct or copper costs. The great majority of access duct and copper asset costs are recovered from MPF and WLR services.
- A21.80 We considered that the full PWNRC approach may not fully reflect the increased economic value of the rateable assets resulting from the introduction of GEA services. For example, it could be argued that GEA-FTTC services increased the economic value of D-side copper as this is now able to carry FTTC traffic. This increase in value would not be captured in the full PWNRC approach as the value of these assets was measured by NRC. Even if this increase in value was captured within the NRC of D-side copper, none of it would be attributed to GEA services under the current attribution methodologies.
- A21.81 We therefore said that the full PWNRC approach may not be consistent with the principle that RVs can be considered measures of economic value, reflected by the potential profits that a hypothetical tenant could generate from the rateable assets. We expected GEA services to be at least as valuable, if not more so, than MPF or WLR services and so attract a higher share of cumulo costs.
- A21.82 With respect to the principles we set out in the 2014 FAMR Statement, our concerns were that the attribution to GEA services from adopting a full PWNRC approach might not be consistent with rating methodology; and that it appeared to produce counterintuitive results that may not be stable.
- A21.83 We therefore proposed to attribute BT's cumulo costs from 2017/18 onwards by continuing to use the existing three-stage approach. This required an estimate of what GEA cumulo costs should be in the future. We noted that the current attribution approach had resulted in an increasing share of BT's cumulo costs being attributed to GEA services,⁵³⁵ and that this was likely to be around 58% in 2016/17.⁵³⁶ This seemed high given that BT generated significant cash flows from other parts of its service portfolio, notably its copper services, such as WLR, MPF, and leased lines. This suggested the current attribution to GEA services might be too high.
- A21.84 The only evidence we had on RVs for GEA services was the guidance published by the VOA for the 2010 rating list. This recommended RVs of £18 per annum for each FTTC home

⁵³⁵ Openreach response dated 25 November 2016 to question H2 of the 20th s.135 notice.

⁵³⁶ We multiplied the VOA's £18 RV guidance for GEA-FTTC connections (referred to in paragraph A21.84) by the Openreach fibre base volumes published in "Sheet 8. Broadband, TV and lines" in the KPI data that BT publishes quarterly. We then divided this by BT's total cumulo RVs in Great Britain in 2016/17. BT's latest KPI data can be found at: <https://www.btplc.com/Sharesandperformance/Quarterlyresults/2017-2018/Q3/Downloads/KPIs/q318-KPIs.xlsx> [accessed 9 February 2018]. [3<].

connected and £20 for each FTTP home connected, with lower values, varying from £2 to £13 per annum proposed for certain rural networks in the final third. These figures were derived from the VOA's modelling and comparisons with Virgin Media's assessments.

A21.85 We noted that there were arguments for both higher or lower values for the 2017 rating list. RVs for Virgin Media's assessments from 1 April 2017 had increased compared to their 2010 list values which suggested that the 2017 RV value for an FTTC connection might be higher than £18. Conversely BT's network was older than Virgin Media's network and carried a range of different services, with some of the fibre used to provide GEA services being shared with other services. This might suggest lower values.

A21.86 We therefore proposed to estimate the RVs attributable to GEA services at £18 for each GEA-FTTC line, consistent with the VOA's 2010 guidance. We said that our approach would result in the cumulo unit costs of GEA services remaining stable whilst at the same time smoothing the impact on other services such as MPF and WLR rentals.

A21.87 Using this approach and forecasts of net replacement costs, we proposed to attribute cumulo costs across all services for input into both the top-down and bottom-up models.

A21.88 We proposed no changes to this approach in our September consultation. The impact of our revised payment forecasts was to produce unit costs for GEA and MPF rentals services in 2020/21 of £9.09 and £5.72 per line per annum respectively.

A21.89 The above proposals also led us to direct BT to change the way it attributes cumulo rates in its regulatory accounts from 2018/19. We have subsequently issued a further consultation that made similar proposals on the attribution of cumulo rates costs in 2017/18.⁵³⁷

Stakeholder responses

A21.90 We received responses from TalkTalk, Vodafone and Openreach on our proposed approach to attributing BT's cumulo costs.

A21.91 TalkTalk agreed with our overall attribution approach and with the consistent, £18 RV approach to the treatment of rates on GEA FTTC services. However, it suggested that more of BT's business rate costs should be attributed to Ethernet (leased line) services to "reduce competitive distortions" that it considered resulted from the fact that other telecoms providers pay higher non-domestic rates than BT does. TalkTalk did not propose a revised methodology to implement its suggestion.⁵³⁸

A21.92 Vodafone argued in its response to the March consultation that our attributions to MPF and GEA were too high based on its own high-level calculations that compared estimated proportions of BT's cumulo costs associated with MPF and WLR lines with the proportion of BT's wholesale revenues accounted for by these services.⁵³⁹ In response to the September consultation Vodafone accepted that revenue was not a good proxy for the

⁵³⁷ Section 7, November 2017 Regulatory Financial Reporting Consultation.

⁵³⁸ TalkTalk response to the March 2017 WLA Consultation, paragraphs 6.24-6.26.

⁵³⁹ Vodafone response to the March 2017 WLA Consultation, Volume 2, paragraph 12.17.

attribution of cumulo costs. However, Vodafone said that it was disappointed we had not attempted to show how BT's cumulo costs are attributed across products and markets in a more meaningful and transparent way.⁵⁴⁰

- A21.93 Openreach considered that the attribution approach we had proposed in the March consultation was, "in principle", reasonable. However, it was concerned that our approach to forecasting cumulo costs – and particularly the assumption of an RV of £18 per FTTC line – created uncertainty and there was "a potential risk that BT's cumulo costs might not be fully recovered". Openreach considered these uncertainties provided further reasons to consider its pass-through proposals.⁵⁴¹

Our reasoning and decisions

- A21.94 The stakeholder comments we received were broadly supportive of our overall approach. We have addressed Openreach comments about cost recovery above⁵⁴² and have also rejected its suggestion that we adopt pass-through arrangements.
- A21.95 We do not agree with TalkTalk that more of BT's cumulo rates costs should be attributed to Ethernet services. TalkTalk did not provide us with evidence that other telecoms providers pay higher domestic rates than BT and we note that a previous legal challenge on this failed.⁵⁴³ Further, attributing more costs to Ethernet services would require a departure from the PWNRC approach, on which the current attribution is based and which has been given some endorsement by the CC (now the CMA).
- A21.96 We have therefore decided to attribute BT's cumulo costs from 2017/18 onwards using the three-stage approach that we proposed in the March consultation. We consider this is the approach that is most consistent with the principles that we outlined in the 2014 FAMR. The major alternative, the full PWNRC approach, is less consistent with those principles and would result in attributions to GEA services that would be counterintuitive and may not remain broadly stable over time.
- A21.97 With respect to Vodafone's concern about the lack of transparency about the attribution of cumulo costs, we consider we have provided sufficient explanation for stakeholders to understand how these costs have been attributed. However, for greater clarity, we have set out a simplified calculation below.
- A21.98 Suppose that BT's UK cumulo RV was £900m in 2020/21, giving rise to cumulo rates costs of £450m (i.e. an overall rate in the pound of 50p) and that there were 10 million GEA-FTTC connections in that year and no GEA FTTP connections. Then in the first stage of the attribution approach we would attribute 20% of the costs to GEA services: 10m GEA-FTTC connections times an RV of £18/line gives £180m, which is 20% of £900m. We would

⁵⁴⁰ Vodafone response to the September 2017 WLA Consultation, paragraph 1.7.2.

⁵⁴¹ Openreach response to the September 2017 WLA Consultation, paragraphs 51-54.

⁵⁴² See paragraph A21.34.

⁵⁴³ See for example the EC decision that the application by the United Kingdom of the tax on non-domestic property to BT plc and Kingston Communications plc from 1995 until the end of 2005 did not constitute aid, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32006D0951> [accessed 20 February 2018].

therefore attribute £90m to GEA FTTC services (20% of £450m) and thus calculate a GEA unit cost in that year of £9 (£90m/10m GEA-FTTC connections).

A21.99 In the last stage of the calculation we would attribute the remaining £360m across all other non-GEA services using a PWNRC approach. In practice these calculations are performed within our and BT's attribution models at a component level and there are several hundred components. However, the principles of the approach are straightforward. Suppose there were only two components A and B with NRCs of the rateable assets of £600m and £500m and WACCs of 10% and 8% respectively. Then component A would be attributed £216m or 60% of the total remaining costs [$10\% \times £600m / (10\% \times £600m + 8\% \times £500m) = 60\%$] with the remaining 40% being attributed to component B. These costs would then be attributed to services as in the normal way using routing factors.

A21.100 As we noted in our September consultation stakeholders can roughly approximate how non-GEA cumulo costs are attributed across markets by using data that is published within BT's RFS.⁵⁴⁴ Assuming that land and buildings, duct, fibre and copper assets account for the majority of UK rateable assets, that all WLA fibre assets are associated with GEA services and there are few rateable assets in non-wholesale markets then Section 10 on page 97 of BT's 2017 RFS suggests that WFAEL and WLA market account for roughly 73% of the non-GEA rateable assets, BCMR services just under 16% with the remaining 11% spread across other markets. Multiplying by the relevant WACCs would produce attributions of roughly 68% for WLA and WFAEL non-GEA services, and 19% for BCMR services.

A21.101 We have also decided to adopt our March consultation proposal and estimate the RVs attributable to GEA services at £18 for each GEA-FTTC line. As we note above this is consistent with the VOA's 2010 guidance. We received no alternative evidence to consider from stakeholders. We also adopt this £18 RV assumption when estimating the MCC impacts of additional GEA connections on BT's total cumulo costs.

A21.102 The effect of these two decisions is to keep the cumulo unit costs of GEA services stable whilst smoothing the impact on other services such as MPF and WLR rentals. Under this approach there remains little difference between the cumulo unit costs for MPF and WLR services, again consistent with the principles we identified in the 2014 FAMR Statement. Below we describe below how we have implemented these decisions within our cost modelling.

The inclusion of BT's forecast cumulo costs within the charge control models

A21.103 BT's 2016/17 cumulo attribution model contains the following information for each network component:⁵⁴⁵

⁵⁴⁴ See paragraph 3.56 of the September 2017 WLA Consultation.

⁵⁴⁵ BT, 2017 Accounting Methodology Document, pages 197-200, confirmed by Openreach's response dated 13 September 2017 to question 19(a) of the 34th s.135 notice.

- NRCs split between rateable and non-rateable classes of work (CoW). The rateable CoWs are defined within BT's AMD;⁵⁴⁶
- the proportion of each relevant CoW's NRC that is rateable, as opposed to non-rateable; and
- attributions of estimates of the NRC for BT's specialised buildings (exchange buildings).⁵⁴⁷

A21.104 We have categorised each network component in this model into one of three types:

- GEA Components are those components that make up the costs of GEA services;
- Relevant Component are those components used in the top-down model that are not used to support GEA services; or
- Non-Relevant Components are other network components, such as those used to support BCMR or WBA services, that do not support GEA services or services covered by the top-down model.

A21.105 Using the data within BT's cumulo attribution model outlined above, notably the component NRC data, forecasts of NRCs from the top down model and forecasts of GEA volumes, we have attributed our forecasts of BT's cumulo costs to services using the same three-step approach that BT currently applies. The three steps which we describe in more detail below, are:

- Step 1: we attribute cumulo costs to GEA and non-GEA services in each year;
- Step 2: we calculate a per GEA rental cumulo cost for each year. It is these values that are input to the bottom-up model; and
- Step 3: we attribute all non-GEA cumulo costs across the Relevant Components using a PWNRC approach.

Step 1

A21.106 We calculate the RV attributable to GEA services in each year by multiplying our forecasts of GEA rental volumes by £18. We multiply the resulting share of the total RV attributable to GEA services by our forecasts of BT's total cumulo costs to estimate the cumulo costs attributable to GEA services and hence those attributable to non-GEA services in each year.

Step 2

A21.107 The forecasts of cumulo costs attributable to GEA services from Step 1 cover rental connections not just in commercially viable areas but also those in non-commercially viable areas. When we apply our £18 RV assumption we do so irrespective of where the connections are. We therefore calculate GEA cumulo costs per line per annum by dividing the total cumulo costs attributable to GEA services in each year from Step 1 by the total

⁵⁴⁶ BT, 2017 Accounting Methodology Document, pages 39, and 197-200.

⁵⁴⁷ Pages 197 and 199 of BT's 2017 AMD note that "Specialised Buildings" are rateable assets but that these are no longer part of BT's fixed asset base following their sale to what is now Telereal Trillium in 2001. To ensure Specialised Buildings are reflected within the attribution bases for Plant groups PG941A and PG942A BT estimates the NRC of exchange buildings and attributes these to components "in accordance with Groups Property's charges for the Occupation of Specialised Buildings".

average GEA rental volumes in that year. It is these values that are fed into the bottom-up model.

Step 3

A21.108 We attribute forecasts of BT's cumulo costs that are attributable to non-GEA services in four further sub-steps, consistent with our proposals in the March consultation, on which we received no comments. These four sub-steps are:

- a) We forecast NRCs for the rateable assets for all Relevant and Non-Relevant Components in each year of the charge control period. The assumptions we make in producing these forecasts are explained in more detail below.
- b) We multiply these forecasts of NRCs for the rateable assets by the appropriate WACC to provide forecasts of PWNRC for each Relevant and Non-Relevant Component in each year. The WACCs we apply are those described in Annex 20: from 2017/18 to 2020/21 we apply 7.9% for components used to support Openreach copper services and for other UK Telecoms components we apply a WACC of 9.0% from 2017/18 to 2019/20 and 8.9% in 2020/2021.
- c) We attribute BT's non GEA cumulo costs in each year across Relevant and Non-Relevant Components in proportion to their forecast PWNRC in that year.
- d) The cumulo costs for Relevant Components in each year are then attributed to services within the top-down model using the same usage factors that apply to those components for all other costs.

A21.109 We forecast NRCs for rateable assets for both Relevant and Non-Relevant Components in Step 3 (a) by applying various growth rates to the NRC by component within BT's 2016/17 cumulo attribution model as follows:

- For Relevant Components, we use the annual growth in NRCs from 2016/17, the base year, for that component as forecast by the top-down model. This assumes that the proportion of rateable assets for each component remains constant.
- For Non-Relevant Components, we keep the NRC the same as it was in the base year 2016/17 (i.e. flat in nominal terms). These components are not covered by the top-down model. We do not consider this a critical assumption as Non-Relevant Components cover a mix of services. Demand for some of these services, such as Ethernet Leased line services is growing: on others, such as older, traditional interface leased lines services and other narrowband services, it is falling.
- We also keep the Specialised buildings NRCs flat in nominal terms from 2016/17. We consider this is the most appropriate approach. These NRCs are now updated every year by Telereal Trillium for BT.⁵⁴⁸ The 2016/17 value was £[redacted]bn.⁵⁴⁹ It is difficult to forecast the NRCs for these buildings with any accuracy as they consist of land and buildings costs. Whereas buildings costs might decrease due to the impact of depreciation, land values are not depreciated and will be subject to fluctuations of the

⁵⁴⁸ See BT's 2017 AMD, page 197.

⁵⁴⁹ Openreach's response of 13 September 2017 to question 19(c) of the 34th s.135 notice.

property market that will vary considerably by location, geographic area and type of building.

- The total forecast NRC for each component in each year is the sum of the Specialised building NRC and the Non-Specialised building NRC.

Forecasts of Unit Cumulo costs for key rental services

A21.110 The outputs of the above process are to produce unit cumulo costs for each of the main services within the top-down and bottom-up models in each year. In 2020/21 the unit cumulo cost for GEA rental services is £9.08 per line and for MPF rental services is £5.91 per line.

A22. Sales of copper and property

A22.1 In this annex we set out our decisions on how we address the possibility that BT might sell redundant copper and property within the charge controls. For sales of copper, and property in turn, we briefly set out our March consultation proposals and then summarise stakeholder responses followed by our reasoning and decisions.

Sales of copper

A22.2 Historically, BT has received proceeds from sales of copper recovered from its core⁵⁵⁰ network where that copper was no longer required or had been replaced, generating just over £700 million net proceeds over the 6 year period from 2010/11 to 2016/17.

A22.3 In the remainder of this sub-section we discuss our decision to take account of the proceeds of copper from the E-side network within the charge control. We then discuss how we have calculated this estimate by making assumptions on the areas below:

- the weight (tonnage) of copper in the E-side network;
- the proportion of copper we expected BT to be able to extract;
- the costs of extraction; and
- the proceeds from the sale of this copper.

A22.4 We also outline how we have included the revenue from the sales of copper in our top-down model.

Taking account of the proceeds of copper within the charge control

Our proposals

A22.5 In the March consultation, we argued that the sale of copper was a predictable consequence of BT's ownership of copper cable assets and that, given its plans to switch off the PSTN in 2025,⁵⁵¹ BT should be able to recover and sell significant amounts of copper currently used to support PSTN services. We noted that this copper is currently within BT's E-side and D-side networks and within exchange buildings.

A22.6 We considered that to set prices that will send efficient pricing signals we needed to adjust BT's accounting data so that our cost estimates better reflect the forward-looking economic costs of providing network services. We argued that ignoring the residual value of the copper at the end of its use would result in copper assets depreciating too quickly,

⁵⁵⁰ "Core" means copper cables in segments of the BT network located between exchanges, excluding copper cables within the cable chamber within the exchange building and any copper cables on the main distribution frame.

⁵⁵¹ BT, *Openreach Summary of Market and Customer Insight on the ISDN2 and ISDN30 Services*, page 1.

https://www.ofcom.org.uk/_data/assets/pdf_file/0036/94797/Openreach-Summary-of-Market-and-Customer-Insight-on-the-ISDN2-and-ISDN30-Services.pdf.

thereby creating a disconnect between the asset’s accounting value and economic value. We therefore proposed to make an adjustment to recover the cost of copper scrap.⁵⁵²

- A22.7 We were only able to obtain limited information from BT on the historical extraction of copper cables within exchanges and on likely tonnages. BT also told us that this copper was difficult to extract and the timing of extraction was uncertain given there was no plan to close exchange buildings in the near future. We were therefore unable to develop robust estimates of its likely value on which we could rely.
- A22.8 Cables in the D-side network are currently required to support provision of FTTC services so we considered it was likely to be longer before these could be removed. D-side copper cables also generally had fewer pairs than those in the E-side network and so were likely to be relatively more expensive to extract, though by how much was not clear. Finally the data BT held on D-side copper assets was incomplete. Given these uncertainties, we made no proposals on the residual value of BT’s D-side copper assets for this charge control.
- A22.9 We therefore only made proposals regarding the residual amount of copper in the E-side network and estimated the net value of these from this redundant copper assets would be £110 million in 2030/31.

Stakeholder responses

- A22.10 Most stakeholders agreed that the charge control should take account of the possibility of proceeds from the sales of redundant copper.
- A22.11 [S&C] agreed that “the residual value has to be included to avoid a windfall effect”⁵⁵³.
- A22.12 TalkTalk considered it was “right that Ofcom is now explicitly adjusting the charge control to reflect the revenues that BT will earn from sales of copper scrap”.⁵⁵⁴ It proposed that the revenue generated was likely to be significant and that this approach will prevent a reoccurrence of the issue which arose regarding the core network.⁵⁵⁵
- A22.13 Vodafone considered that the approach we took was a “complex way of including a benefit that BT enjoys” and that we should instead just produce an annual average based on the historical income that BT has earned. It justified this by saying that the “only solid piece of evidence is that BT have gained £700 million from the sale of copper over the last 6 years” and that “although BT claim they have incurred contractor and internal costs of £381 million Vodafone questions the degree to which these costs truly are ‘incremental’”.⁵⁵⁶
- A22.14 In contrast Bit Commons said that “BT should be allowed to keep whatever it makes from copper removal” in order to “improve the probability of PIA working as a policy.”⁵⁵⁷

⁵⁵² We believed this was consistent with our general approach to modelling. For instance, we made ongoing network adjustments for the same reasons (i.e. so that prices reflect the economic value of the assets).

⁵⁵³ [S&C] response to the March 2017 WLA Consultation, page 7.

⁵⁵⁴ TalkTalk response to the March 2017 WLA Consultation, paragraph 8.32.

⁵⁵⁵ TalkTalk response to the March 2017 WLA Consultation, paragraph 8.33.

⁵⁵⁶ Vodafone response to the March 2017 WLA Consultation, page 62.

⁵⁵⁷ Bit Commons response to the March 2017 WLA Consultation, page 6.

Our reasoning and decisions

- A22.15 We did not receive any responses regarding our proposal not to take account of any potential proceeds within this charge control from the sale of redundant copper in the D-side network or within exchange buildings. We have decided to adopt this proposal and not to include any potential proceeds from copper in these two parts of the network.
- A22.16 We disagree with Bit Commons that BT should be allowed to retain any net proceeds it may generate from the sale of redundant E-side copper. BT has made significant proceeds from copper in the past and we therefore consider it is likely to make further proceeds in the future. Users of BT's network have contributed towards the investment of this copper and therefore we consider it is appropriate that they should benefit from potential future proceeds. In addition, by including these expected proceeds in the charge control, we are incentivising BT to realise that income in the future and clear space in its ducts for PIA services.⁵⁵⁸ The profitability of DPA is discussed within Volume 3 of this Statement.
- A22.17 We also disagree with Vodafone that we should make adjustments to BT's historical costs of extraction, which in some cases Vodafone suggests may not have been incurred, and then use this adjusted historical net proceeds as the basis for predicting future proceeds. To base net proceeds primarily on average historical income would rely on the rate of extraction being similar to that in the past, and that the difference between prices and costs of extraction would also be similar. However, as set out below, forecast copper prices are different to historical rates and the ratio of prices to costs is also not likely to be the same. The evidence provided by BT suggests that historical annual income generated from the sale of core copper would not be a good proxy for potential future annual proceeds from the sale of redundant E-side copper due to movements in the copper prices, currency fluctuations, and the different economics of extraction in different areas of the network.
- A22.18 We have therefore decided to take account of this potential income in the charge control model and adopt the approach that we proposed in the March consultation. We have estimated future net proceeds from sales of E-side copper by considering:
- the amount of copper in BT's E-side network;
 - the proportion of E-side copper that BT can extract;
 - the value of that copper (in today's prices); and
 - the cost of extracting that copper (in today's prices).
- A22.19 We acknowledge that there is significant uncertainty about the scale of any future proceeds from the sale of copper. Since this is the first time we have chosen to make this adjustment, we believe it is appropriate to adopt a cautious approach to estimating BT's potential proceeds. Several stakeholders suggested that we should adjust individual assumptions, such as the proportion of E-side copper, cost of extracting that copper and its value. We accept that there might be arguments for adjusting these individual assumptions. However, in the absence of evidence on which to determine any changes to these assumptions, we have taken a conservative approach to making any such changes.

⁵⁵⁸ Openreach's duct and pole access product, known as physical infrastructure access (PIA)

We think this is the appropriate approach when we consider all the relevant factors in the round to derive a final estimate.

Amount of copper in the access network

Our proposals

A22.20 We proposed in our March consultation, after undertaking cross checks, to use BT’s estimate of the tonnages within the E-side network. BT estimated that it had approximately 228,600 tonnes of copper and 6,300 tonnes of aluminium within the E-side network.⁵⁵⁹

Stakeholder responses

A22.21 TalkTalk considered that we had underestimated the proportion of copper in the E-side network compared to the D-side. It referred to an Openreach presentation⁵⁶⁰, which estimated the average distance of cables in the D-side (including final drop) as 530m compared to that in the E-side of 1.8km. This ratio of 1:3.4 was higher than the 1:1.5 ratio of estimates of tonnages between the D-side and E-side network that we used in the March consultation. TalkTalk stated that, given the difference between these two ratios, Ofcom should “investigate more closely the split of the total amount of copper between the E-side and D-sides of the network.” It suggested that “BT may have provided Ofcom with a figure which underestimates the volume of copper on the E-side of the network.”⁵⁶¹

Our reasoning and decisions

A22.22 To address TalkTalk’s concern that we may have understated the proportion of copper that is in the E-side network, we asked BT to provide updated data on the average length of routes in the E-side and D-side network. The table below compares these with the data set out in slide 3 of Openreach’s presentation to the British Computer Society to which TalkTalk referred in its response.⁵⁶²

Table A22.1: Average distances of copper routes in different parts of BT’s access network

Network Element	Slide 3 Openreach Presentation 2011	Estimate as of 14 th November 2017
E-side	Average 1.8km	Average 1.835km
D-side	Average 500m	Average 566m

⁵⁵⁹ March 2017 WLA Consultation, Annex 18, Paragraph A18.28

⁵⁶⁰ Openreach, 9 March 2011. *Next Generation Access – a Strategy for Volume Deployment*. <http://www.bcs.org/upload/pdf/sfisher-090311.pdf>.

⁵⁶¹ TalkTalk response to the March 2017 WLA Consultation, paragraph 8.39.

⁵⁶² Openreach, 9 March 2011. *Next Generation Access – a Strategy for Volume Deployment*. <http://www.bcs.org/upload/pdf/sfisher-090311.pdf>.

Network Element	Slide 3 Openreach Presentation 2011	Estimate as of 14 th November 2017
Final drop ⁵⁶³	Average 30m	Average 54m

Source: Openreach response to question 1a of the 41st s.135 notice

- A22.23 In its response to the s.135 notice, BT said that the averages provided in the 2011 presentation were intended only to provide an “indicative view of Openreach’s network configuration”⁵⁶⁴ and that it did not then have the inventory management system that it has now. Nevertheless, Table A22.1 shows that BT’s most recent estimates of average distances are similar to those it made previously in its 2011 presentation.
- A22.24 BT however also considered that “there is no direct correlation between the ratio of tonnage and the ratio of distances.” It argued this was because “the copper diameter of E-side pairs is less than the copper diameter of the D-side pairs.”⁵⁶⁵
- A22.25 We have confirmed BT’s assertion that E-side pairs have a smaller gauge than D-side pairs through analysis of detailed data BT provided on cables in its E-side and D-side networks.⁵⁶⁶ Further, spare pair margins⁵⁶⁷ will be different in different parts of the network. Lastly, our estimates of tonnages for the E-side and D-side network are independent: the relative tonnages have been calculated separately, not as a share of a total tonnage. Therefore, we do not believe that average lengths are a good proxy for relevant tonnage.
- A22.26 BT’s latest estimates are very similar to those provided for the March consultation. BT estimated that there were approximately 230,000 tonnes of copper and approximately 6,400 tonnes of aluminium in December 2016.⁵⁶⁸
- A22.27 Consistent with the March consultation, we have undertaken a simple cross check of BT’s estimates of tonnages. We have applied assumptions about average spare capacity in the access network,⁵⁶⁹ average distances in the E-side network and average cable gauges to the number of lines in the copper network as given in BT’s RFS. This produced a total volume of copper to which we then applied the density of copper. This approach provided E-side tonnages similar to those estimated by BT.
- A22.28 Therefore, we consider that BT’s latest estimates of E-side copper tonnages provide a reasonable basis for our assessment of future proceeds and we have used them to estimate the potential revenue that BT could earn on sales of copper.

⁵⁶³ BT noted that it records “very few final drop distances in our network inventory system and have therefore estimated this figure using the location of the final distribution points and premises.”

⁵⁶⁴ Openreach response dated 17 November 2017 to question 1a of the 41st s.135 notice.

⁵⁶⁵ Openreach response dated 17 November 2017 to question 1c of the 41st s.135 notice.

⁵⁶⁶ Openreach response dated 4 January 2017 to question 13 of the 43rd s.135 notice.

⁵⁶⁷ A spare pair margin is the proportion of copper pairs that are unused as a proportion of total pairs. Network engineers will generally install cables with more capacity than is initially required to meet future demand, to provide testing facilities and/or to be able to replace faulty pairs.

⁵⁶⁸ Openreach response dated 4 January 2017 to question 13 of the 43rd s.135 notice.

⁵⁶⁹ Copper cables are supplied with a certain number of pairs, from, say, 2 pairs up to around 800. Not all pairs will be used on each cable due to the need to have spare capacity to meet future growth and due to the modularity of these cables.

Proportion of extractable E-side copper

Our proposals

A22.29 BT was not able to recover all of its copper during its extraction from the core network. The percentage of copper it was not able to recover was called the Missing and Unrecoverable rate (MUR). In the March consultation we proposed an MUR of 40% meaning that BT should be able to extract 60% of the copper present in that part of the network.

Stakeholder responses

A22.30 TalkTalk considered that our estimate of 60% of E-side copper that could be recovered was too low and that “a more appropriate proportion would be around 75%.”⁵⁷⁰ It noted that we had based our “missing” estimates on the core network but that “E-side records are better kept because many of the cables are pressurised, and therefore monitored, and because BT has developed an itinerary [inventory] to keep track of E-side assets.”⁵⁷¹ Further TalkTalk considered “there should be effectively no E-side cable missing due to theft, as the cable is actively being used, and so any theft would be noticed as a result of its impact on customers’ services”.⁵⁷²

A22.31 TalkTalk also expected that unrecoverable copper should be at the lower end of the range of historical data given that these cables were being actively used so it expected lower rates of cable decay and risks of collapsed duct. TalkTalk therefore believed that “an appropriate but conservative range for unrecoverable E-side cable would be 20-25%”.⁵⁷³

Our reasoning and decisions

A22.32 In response to a s.135 notice, BT explained that its experience when recovering cable from its core network was that actual recoveries were lower than anticipated as some cables were missing and some were unrecoverable.⁵⁷⁴ Cables can be missing for a variety of reasons including theft or errors in data records. They might be unrecoverable due to cable decay or because their extraction would damage other cables with live traffic.⁵⁷⁵

A22.33 Ahead of the March consultation, we asked BT to provide data on its historical MUR. These are set out in the table below. These historical rates mainly reflect experience on the extraction of copper from the core network.

⁵⁷⁰ TalkTalk response to the March 2017 WLA Consultation, paragraph 8.43.

⁵⁷¹ TalkTalk response to the March 2017 WLA Consultation, paragraph 8.40.

⁵⁷² TalkTalk response to the March 2017 WLA Consultation, paragraph 8.41.

⁵⁷³ TalkTalk response to the March 2017 WLA Consultation, paragraph 8.42.

⁵⁷⁴ Openreach response dated 12 August 2016 to the 12th s.135 notice.

⁵⁷⁵ Openreach response dated 12 August 2016 to the 12th s.135 notice.

Table A22.2: National average Missing and Unrecoverable rates

National Averages	2012/13	2013/14	2014/15
Missing	21%	20%	28%
Unrecoverable	22%	26%	29%
Total	43%	45%	57%

Source: Openreach⁵⁷⁶

A22.34 BT's view was that "MUR rates, and particularly the unrecoverable rates are associated with the extraction of heavy cables and likely also to apply to other areas of the network and not just MUCJ."^{577 578} In the March consultation, we argued that missing rates should be lower on the E-side network compared to the core network. We considered there were better records of cables in the E-side network as these cables are pressurised, monitored and subject to routine testing and BT also now had a system that holds an inventory of all local assets, including copper cables. On this basis we assumed a lower MUR rate for the E side of 40% (compared to 43% - 57% for the core as shown above).

A22.35 We therefore agree with TalkTalk that missing rates are likely to be lower than those experienced when extracting from the core network due to better record keeping and less theft. We took this into account when deciding a lower MUR rate than had historically been the case.

A22.36 We are less convinced that unrecoverable rates will be lower in the E-side than in the core network to the extent suggested by TalkTalk. Core cables may also have been deployed on active routes shared with fibre cables and in these cases collapsed ducts could have been repaired making extraction of the copper cable more feasible. As such, the impact of collapsed ducts in the core and access network may be similar. Our expectation is that these cables will be extracted after the PSTN is switched off, probably in 2025. E-side cables will by then, not be operational and may not be pressurised and maintained, so again it is not clear that the risk of cable decay will be lower.

A22.37 We have no evidence to support a significantly lower unrecoverable rate assumption than we consulted on. We have therefore decided to assume that BT will be able to recover 60% of its E-side copper leading to an MUR of 40%. This equates to BT extracting around 138,000 tonnes of copper and 3,850 tonnes of aluminium.

Costs of extraction

Our proposals

⁵⁷⁶ Openreach response dated 15 November 2016 to question D1c of the 18th s.135 notice.

⁵⁷⁷ Main Underground Central Junction (MUCJ) cables are found within the core network.

⁵⁷⁸ Openreach response dated 15 November 2016 to question D1c of the 18th s.135 notice.

A22.38 In March, we proposed that the costs of extraction would be £2,800 per tonne. This was based on BT's estimates as well as analysis of the historical costs of extraction during the copper recovery programme.

Stakeholder responses

A22.39 Virgin Media agreed that we should include "the estimated cost of reclamation" in our calculation of the net profit/loss from copper.⁵⁷⁹ Vodafone questioned whether the contractor and internal costs that BT claimed it had incurred were truly incremental and considered that we should only "make allowances for actual incremental third-party costs BT can prove they have incurred."⁵⁸⁰

A22.40 Openreach noted that we had used historical extraction costs related to the extraction of the MUCJ copper cables and that "core cables differ significantly not only in their size, but in their location to E-side cables."⁵⁸¹ It gave four reasons for why it expected the cost of extracting E-side copper cables would be higher than the historical cost of extraction of MUCJ cables:⁵⁸²

- i) "Unit sizes of cables" are expected "to be much less per job on average than for the core network, so more expensive to extract per tonne."
- ii) E-side cables are generally located in the carriageway of the road and in more densely populated areas leading to potentially higher traffic management costs.
- iii) Cable locations also suggest a much higher proportion of recovery would have to take place at night, which is more expensive than daytime work.
- iv) There is a greater likelihood of the clamps required to pull cables out of the ground damaging infrastructure given "the higher number of potential cables to be extracted and the location of these cables."

Our reasoning and decisions

A22.41 We disagree with Vodafone's assertion that the costs of extraction are not necessarily incremental. Prior to the March consultation, BT set out that it had formalised the copper recovery activity and used dedicated gangs of engineers for its Core Recovery programme.⁵⁸³ These resources were managed within a separate unit within Openreach and it provided us with the historical costs of running this operation. We consider it is likely that were Openreach to extract copper from the E-side network, it would run a similar operation rather than the extraction taking place as part of business as usual, given the scale of the proposed extraction. But even if this were the case, Openreach would incur incremental costs. We therefore consider it is reasonable that Openreach will incur incremental costs in extracting redundant copper cables from the E-side network.

⁵⁷⁹ Virgin Media response to Volume 2 of the March 2017 WLA Consultation, paragraph 169.

⁵⁸⁰ Vodafone response Volume 2 of the March 2017 WLA Consultation, page 62.

⁵⁸¹ Openreach response to Volume 2 of the March 2017 WLA Consultation, paragraph 311.

⁵⁸² Openreach response to Volume 2 of the March 2017 WLA Consultation, paragraph 311.

⁵⁸³ Openreach response dated 12 August 2016 to the 12th s.135 notice.

- A22.42 We asked BT to update its estimates of the costs of extracting a tonne of scrap material from the network that it had provided to us for the March 2017 consultation. BT provided these costs broken down by copper extraction charges, planning and field costs, metal merchant charges, traffic management costs, and transport costs. These costs were [§<] to those BT had provided previously. We have therefore decided to retain our previous assumption of the cost of extraction of £1,400 per tonne of scrap material.⁵⁸⁴
- A22.43 Each tonne of scrap includes waste material, such as PVC insulation, as well as copper. Historically the annual average percentage of each tonne of material extracted that was copper has ranged from 41%-56%.⁵⁸⁵ We have decided to retain the assumption used in the March consultation, that copper represents 50% of the weight of the extracted material. On this basis, BT's estimates indicate that extraction would cost around £2,800 per tonne of copper extracted. As we did in the March consultation, we completed a cross check using historical data provided by BT to confirm that this is consistent with BT's actual incurred costs in extracting a tonne of copper.⁵⁸⁶
- A22.44 BT has argued that the economics depend on the weight of copper that can be extracted per day which in turn depends on the average cable size across the E-side network.⁵⁸⁷ As discussed above, Openreach identified four factors in its response to the March consultation that it considered would make the potential costs of extracting E-side copper cables higher than in the core network. We asked BT to provide information which would enable the impact of these four factors to be quantified. However, BT was not able to do so and noted the examples were based on the expert knowledge of relevant employees and "not on any specific documents or any detailed calculations."⁵⁸⁸
- A22.45 We note that traffic management costs, one of the factors Openreach cited, are currently a small proportion of the total costs.⁵⁸⁹ Therefore, even a significant increase in these costs would make little difference to the overall cost estimates. We accept that there may be other factors that might in principle make costs of extraction higher in the E-side than they have historically been in the core network. However, we have no evidence to support making an adjustment to our forecast extraction costs. We therefore consider that our updated estimate of the costs of extracting a tonne of copper remains appropriate.

Proceeds from the sale of copper

Our proposals

- A22.46 In the March consultation, we used the average copper price over the year to end February 2017, converted from dollars to pounds using the daily exchange rate. We then applied a

⁵⁸⁴ Openreach response dated 17 November 2017 to question 2 of 41st s135 notice.

⁵⁸⁵ Openreach response dated 13 January 2017 to question 5 of the 23rd s135 notice and Openreach's response dated 17 November 2017 to question 2 of the 41st s135 notice.

⁵⁸⁶ March 2017 WLA Consultation, Annex 18, paragraphs A18.46-48.

⁵⁸⁷ Openreach response dated 15 November 2016 to question D2 of the 18th s135 notice.

⁵⁸⁸ Openreach response dated 17 November 2017 to question 3 of the 41st s135 notice.

⁵⁸⁹ Openreach response dated 17 November 2017 to question 2 of the 41st s.135 notice.

discount to market factor of 5% to reflect that the scrap copper is of a lower grade and so attracts a lower price.

Stakeholder responses

- A22.47 [X] believed we should be attempting to forecast what the copper price would be in 2030.⁵⁹⁰ It considered that the global decommissioning of telecommunications networks may increase liquidity and the massive industrial expansion in Asia and China may decrease liquidity. They also believed that we should have forecasted how the asset may appreciate. It argued “there had been no attempt to consider if the asset will appreciate (likely) or depreciate (less likely) other than the use of RPI.”⁵⁹¹
- A22.48 Vodafone argued that we should use historical income to forecast future potential proceeds: “a simple way to include this benefit would be to divide the £700 million by 6 years to create an annual average and project this forward.”⁵⁹²
- A22.49 Openreach agreed that proceeds “will be a function of the Discount to Market (DTM) factor, the London Metal Exchange (LME) price and the \$ exchange rate” and that these are “volatile parameters”. Openreach did not provide an alternative approach but suggested we should apply a large degree of caution due to the scope for significant forecast error.⁵⁹³

Our reasoning and decisions

- A22.50 Copper is sold on the London Metal Exchange and is priced in USD (\$). Therefore, the copper value in GBP (£) is closely linked to the value of the pound against the dollar. Because of the downturn of the pound over the last two years, the value of copper in £ has increased significantly. In the March consultation, we considered that the most recent market price might not be a good indicator of future proceeds because we were concerned about the impact of any short-term fluctuations in copper prices and exchange rates. We therefore proposed to use a copper value based on a one-year average price. We said we would update our estimate for the statement.
- A22.51 In addition, the London Metal Exchange market price is that for high grade copper. Prices for recovered or scrap copper will be lower. We therefore proposed to apply a discount to market (DTM) factor to reflect the difference between the pure copper price and the price of scrap copper.
- A22.52 BT provided us with historical DTM rates that it had experienced which ranged from 2-14%.⁵⁹⁴ We proposed to apply a 5% discount to the market price, which reflected the weighted average of the historical DTM factors provided by BT.

⁵⁹⁰ [X] response to Volume 2 of the March 2017 WLA Consultation, page 8.

⁵⁹¹ [X] confidential response to Volume 2 of the March 2017 WLA Consultation, page 8.

⁵⁹² Vodafone response to the March 2017 WLA Consultation, page 62.

⁵⁹³ Openreach response to the March 2017 consultation, paragraphs 313-314.

⁵⁹⁴ Openreach response dated 15 November 2016 to question D2b of 18th s.135 notice.

- A22.53 The only comment we received on our proposals was from [X] who said we should have attempted to forecast the likely price of copper in 2030. We have already noted that this is hard to estimate with any precision and that we believe our approach is reasonable for this charge control. The fact the copper price has fluctuated over the last year between \$5,400 per tonne and \$7,400 per tonne demonstrates the volatility in the price and the difficulty of the forecasting task.⁵⁹⁵ The forecasts we have been able to obtain tend to be fairly flat⁵⁹⁶, and therefore we do not consider it would be appropriate for us to produce forecasts in the absence of forecasts from expert sources. We think it would be disproportionate to devote resources to attempt to forecast a price that experts seem unable to do with any reliability. We consider it preferable to adopt the approach set out above.
- A22.54 We recognise that there has been a significant movement in the price of copper over the past year, both due to the copper price ranging from \$5,400 and \$7,400, and the changing value of the pound against the dollar. These movements have led us to consider whether we should use a longer period for averaging. Using a longer averaging period would result in a lower value of copper due to the higher value of the pound, but it is not clear to us that this changing averaging period would produce a more robust estimate. We do not know if the relatively low value of the pound over the last year is a temporary phenomenon or represents the pounds new trading range. By using an averaging period of a year, we strike a balance between avoiding the worst of the currency fluctuations and using up-to-date data on the level of the exchange rate and price of copper. To illustrate this, the highest exchange rate for the year to January 2018 was \$1.43 whereas the lowest rate over the year was \$1.21, with the average being \$1.30.
- A22.55 We have therefore decided to adopt the proposal we made in March. The average price per tonne of copper for the year to the end of January 2018 (converted from dollars into pounds at the daily exchange rate) is £4,841.⁵⁹⁷ This is significantly higher than the average price for the year to February 2017 of £3,863 that we used for the March consultation. This reflects the volatility of both the copper price and the value of GBP against the USD.
- A22.56 We then apply the DTM factor to this price. This produces a final revenue of copper of £4,603 per tonne of copper. It is this rate that we have used when estimating BT's net proceeds.
- A22.57 Based on the above assumptions we estimate that BT could generate net proceeds of around £240 million. Our top-down model takes account of these potential proceeds. This reflects our expectation that BT will be able to extract and sell a proportion of its E-side copper network once the PSTN is switched off sometime after 2025.

⁵⁹⁵ Standard & Poor, February 2018.

⁵⁹⁶ See for example <https://knoema.com/prujshc/copper-prices-forecast-long-term-2017-to-2030-data-and-charts>. The forecast increase in price is relatively modest at just over 1% per annum.

⁵⁹⁷ Standard & Poor, February 2018.

A22.58 In constructing this estimate we have excluded any potential proceeds from any aluminium extracted. The average price per tonne of aluminium for the year to the end of January 2018 was £1,551 before any discount to market,⁵⁹⁸ much lower than the copper price. Proceeds from aluminium may therefore be much closer to extraction costs. Further, aluminium tonnages are much lower than those for copper and so would lead to only limited proceeds.

Approach to adjusting costs

Our proposals

A22.59 In March, we proposed to take account of these potential proceeds by including a constant, real terms, annual adjustment (a “negative cost”) in annual cost forecasts assuming that these assets will be sold in 2030.

Stakeholder responses

A22.60 TalkTalk disagreed with our approach of calculating the annual adjustment up until 2030. As BT is planning to switch off the PSTN in 2025, TalkTalk proposed that we “should make the adjustment for all years up to 2025; doing otherwise risks BT being able to over recover for its copper scrap value, as there could be some time period where there are no customers using products based on E-side copper, but where an adjustment is still being applied to the notional ‘pricing’ of these unused products”.⁵⁹⁹

A22.61 TalkTalk agreed that it was appropriate to estimate that revenue from copper scrap would be realised in 2030, given the need for a period between the E-side copper becoming unused and its removal from the network. However it suggested that “the present value of the copper should be returned to consumers over the period from the 2018 charge control coming into effect and PSTN switch off in 2025.”⁶⁰⁰

A22.62 Openreach considered that it would “not be very complicated to reflect the subsequent adjustment in Net Replacement Cost (NRC) in its calculations but would improve the consistency of the adjustment with how it models other costs”⁶⁰¹.

Our reasoning and decisions

A22.63 We have considered how best to reflect the residual value of copper in an ongoing network in our cost modelling. One option would be to reset the copper assets to a revised depreciation profile that reflects the net realisable value of the asset declining to the residual value rather than to zero. This change reduces the annual depreciation charge, but inflates the MCE, thereby increasing the capital charge included in our cost calculations. Such an approach better reflects the economic value of the assets and is consistent with our modelling approach. However, in practice, this approach risks overstating the NRC of

⁵⁹⁸ Standard & Poor. Febraury 2018.

⁵⁹⁹ TalkTalk response to the March 2017 WLA Consultation, paragraph 8.44.

⁶⁰⁰ TalkTalk response to the March 2017 WLA Consultation, paragraph 8.44.

⁶⁰¹ Openreach response to the March 2017 WLA Consultation, paragraph 315.

the copper asset as it would include the residual value of unused copper (i.e. copper beyond the end of its economic life).

A22.64 We agree with Openreach that there may be alternative ways to model the adjustment but not necessarily that doing so by adjusting Net Replacement Costs (NRCs) is preferable. For the reasons given above we believe there are risks with adjusting NRCs, in particular we note that there is a risk of allowing a return on redundant copper assets. Furthermore, we consider the impact of our approach can be easily calculated from the CPI-X model whilst alternative approaches, such as adjusting NRCs, may have a less transparent impact on our charge controls. We therefore consider that our approach is preferable to the approach suggested by Openreach.

A22.65 We have therefore decided to adopt the approach that we proposed in March. This approximates the effect of adjusting the revised depreciation profile and economic value of the assets for the economic life of the assets, as follows. We:

- assume the E-side copper is recovered and sold once the PSTN has been switched off, some time after 2025. We have assumed that sales will occur in 2030;
- calculate the future net proceeds by reference to the estimate of net proceeds calculated above, increased in line with RPI (being the inflation factor applied to copper assets, as set out in Annex 12);
- calculate the present value of the future proceeds, using the relevant WACC; and
- include a constant, real term, annual adjustment (a “negative cost”) in our annual cost forecasts, so that the present value of the annual adjustments between the start of the charge control and the projected disposal date is equal to the present value of the future proceeds.

A22.66 We agree with TalkTalk that this leads to a risk that BT may over-recover in the period between the PSTN being switched off and 2030, the date we assume the revenue is realised. However, the switch off of PSTN will be a complex project and there may be a risk that the target date of 2025 will not be met. Further to this, we have assumed during this adjustment that all other services such as standard broadband will also be switched off at this date, however, this may not be the case.

A22.67 We have made this adjustment for the purposes of this charge control. If we were to undertake another charge control we would review and update any assumptions.

A22.68 We discuss the scale of this adjustment further in Annex 12.

Sales of property

Introduction

A22.69 In this section, we consider whether, and how, our cost calculations should be adjusted to reflect future profits and losses from sales of properties that BT considers surplus to requirements. In summary we have decided:

- Not to reflect future proceeds in our cost modelling; and

- To direct BT to change the way it attributes any future proceeds within its RFS to be consistent with how we would have adjusted this attribution if there had been proceeds in our base year.

Our proposals

Future profits from sales of properties

A22.70 In the March Consultation we considered whether we should make adjustments to our base data and cost modelling to reflect any future proceeds from sales of properties. We proposed not to do so in this charge control due to difficulties in predicting these gains (or losses) with any reliability.

Attribution from the sale of properties

A22.71 In our March consultation we said that it was important that BT's regulatory accounting system include information that would allow the sales of property and the attribution of these sales to be monitored and reviewed in future charge controls.

A22.72 We noted that BT's profits or losses from sales of property are included in operating costs within BT's Regulatory Financial Statements and were attributed to the Retail Residual business. Cartesian had raised concerns about this attribution within its 2015 Report "BT Costs Allocation Review". We had then discussed the attribution within the June 2015 and November 2015 CAR Consultations, though we had not made any decisions on these attributions as part of the 2016 BCMR Statement.

A22.73 We remained of the view that the current attribution method employed by BT for the sale of property was neither objective nor consistent. We proposed that the attribution of these profits and losses should be consistent with the way the "underlying costs" for the type of property that was sold are attributed. We proposed that underlying costs should mean rent for Telereal Trillium owned buildings and depreciation for BT owned buildings.⁶⁰²

A22.74 In principle, we made this adjustment within the 2015/16 base year model. However, in practice no adjustment was made because there were no such sales in 2015/16.

Stakeholder responses

A22.75 Openreach agreed that it would be "inappropriate to attempt to estimate future property sales" as this would be at best highly speculative and further agreed that it is "most likely that profits and losses from the sales of property will be low or zero in the near future"⁶⁰³ It reiterated BT's response to the CAR consultation noting "it did not agree in principle with Ofcom's proposal in relation [to] profits and losses arising for sales of property"⁶⁰⁴.

⁶⁰² See March 2017 WLA Consultation, Volume 1, Table 10.6.

⁶⁰³ Openreach response to the March 2017 WLA Consultation, paragraph 317.

⁶⁰⁴ Openreach response to the March 2017 WLA Consultation, paragraph 318.

A22.76 No other stakeholders responded to our consultation on this issue.

Our reasoning and decisions

Future profits from sales of properties

A22.77 BT sold Keybridge House for £90 million in September 2014⁶⁰⁵ and a “profit of £67m on the disposal of a surplus building in London” was reported in BT’s 2014/15 statutory accounts.⁶⁰⁶ A disposal of this magnitude however appears to be the exception. Profits and losses from sales of property by BT have, historically, been low. BT has not reported any such similar gains in its statutory accounts since 2012/13.

A22.78 Using our formal powers we requested information from BT on its forecast profits or losses from the sales of property. This confirmed BT’s assertion above that it was not expecting to receive significant profit or loss from the sale of property in the near future.⁶⁰⁷

A22.79 This may not continue to be so in the future. We noted in the June 2015 CAR consultation that “While it is currently expensive to remove local exchanges from the network, changing technology including fibre deployment in the local network may change the underlying economics.”⁶⁰⁸ Indeed some network rationalisation of BT’s local exchange portfolio seems likely in the long run: “BT plans to move out of the majority of its exchanges in the medium term. BT has explained that leases on its exchanges typically run until 2031 and that its goal is to serve all voice customers by an IP to the premises solution by 2025 mitigating the need for >4,000 exchanges.”⁶⁰⁹

A22.80 There is then an argument that we should consider future property proceeds in the same way as we do future sales of redundant copper. However we remain of the view set out in our March consultation that it is currently difficult to predict future gains or losses from sales of properties with any reliability. The main reasons for this are:

- It is difficult to predict which properties would be sold and when and how much for, given property price fluctuations and geographic variations in property prices.
- This difficulty is exacerbated by the current contractual arrangements that BT has with Telereal Trillium, which owns the majority of BT’s properties. Most of these have a minimum lease term of 30 years from December 2001.⁶¹⁰ Any disposals prior to December 2031 are subject to a profit sharing deal. “Upon BT’s vacation of assets, Telereal Trillium seeks to realise value from the properties, often enhancing value by obtaining planning permission for change of use or redevelopment. BT is aligned in this

⁶⁰⁵ Evening Standard, 2014. <http://www.standard.co.uk/business/business-news/bt-eyesore-sold-for-90m-to-be-turned-into-luxury-flats-9714317.html>. [accessed 14 March 2017].

⁶⁰⁶ BT’s Financial Results 2015, page 7. <https://www.btplc.com/News/ResultsPDF/q415-release.pdf>. [accessed 14 March 2017].

⁶⁰⁷ Openreach’s response dated 17 November 2017 to question 4 of the 41st 135 notice.

⁶⁰⁸ June 2015 CAR Consultation, paragraph 9.35.

⁶⁰⁹ 2016 BCMR Statement, Annex 28, paragraph 3.38.

⁶¹⁰ Telereal Trillium website, Case Study: BT, <http://www.telerealtrillium.com/about-us/case-studies/bt>.

objective as value enhancements are shared between the parties.”⁶¹¹ Any profit or loss from these properties may therefore only be a small percentage of the sales and is likely to vary from property to property.

- It is also unclear what arrangements will be in place at the expiry of the current 30 year deal with Telereal Trillium.

A22.81 Given these uncertainties we do not consider it appropriate to attempt to estimate future property sales. We agree with BT that such an exercise would be highly speculative and have decided not to make adjustments to our base data or cost modelling for any future proceeds from sales of property within this charge control. We are therefore treating any profits or losses from future sales of properties differently to how we treat future proceeds from redundant copper for this charge control.

A22.82 However, we may consider making adjustments similar to those we are proposing on sales of copper in future if there was greater certainty about future proceeds, for example if an exchange closure programme had been agreed.

Attribution from the sale of properties

A22.83 Given the potential for BT to make significant property disposals in the future we continue to believe that it is important that its regulatory accounting system includes information that allows these sales of property and their attribution to be monitored and reviewed in the context of future charge controls.

A22.84 Currently profits or losses from the sale of non-leasehold properties are included in operating costs within BT’s Regulatory Financial Statements and are attributed to the Retail Residual business.⁶¹²

A22.85 We consulted on this attribution within the November 2015 CAR Consultation.⁶¹³ We considered BT’s attribution was not objective as it appeared to benefit it unfairly. We proposed that BT should allocate these disposal proceeds in the same way that the underlying costs for that type of property are attributed.⁶¹⁴ BT, supported by its consultants FTI and Deloitte, disagreed with our proposals, while TalkTalk and Vodafone supported them.⁶¹⁵ However, we made no decisions on these attributions in the 2016 BCMR Statement.

A22.86 We consider that the attribution method employed by BT for the sale of property is neither objective nor consistent. We have not received any evidence that changes our view that the attribution of these profits and losses should be consistent with the way that the

⁶¹¹ Buildings which are deemed surplus to operational requirements and which are vacated by BT are then developed and “value enhancements are shared between the parties”. Telereal Trillium website, Case Study: BT, <http://www.telerealtrillium.com/about-us/case-studies/bt>.

⁶¹² See the description of the “W” OUC base on page 92 BT’s 2017 AMD.

⁶¹³ November 2015 CAR Consultation, paragraphs 6.1-49.

⁶¹⁴ See March 2017 WLA Consultation, Annex 18, paragraphs A18.70-18.73.

⁶¹⁵ For more details see March 2017 WLA Consultation, Annex 18, paragraphs A18.74-18.80.

“underlying costs” are attributed. We have therefore decided to adopt our March 2017 proposals and direct BT to change the way that it attributes Sales of Property.

These directions are discussed further in Annex 8. In principle, we make this adjustment within the 2016/17 base year model. In practice though the adjustment has no impact on costs as our analysis of BT’s annual report and accounts and AFIs indicate there were no such sales in 2016/17.

A23. Ancillary services

A23.1 In this annex we set out our decisions on certain MPF, LLU⁶¹⁶ and GEA ancillary services. In Tables A23.1 and A23.2 below we set out a summary of our decisions including, for each service/basket, details of the cost standard we have used in setting our charge controls. We also set out details of the charge controls for the market review period (as well as the current annual charge for comparison).

A23.2 In the remainder of this annex we briefly set out our proposals from our consultations, summarise stakeholder responses, and set out our reasoning and decisions for each of the following services in turn:

- MPF New Provides;
- GEA New Connections;
- MPF Migrations;
- GEA Migrations;
- GEA Bandwidth Modify;
- MPF and GEA Cancel/Amend/Modify;
- MPF Standard Line Test;
- LLU Ceases;
- GEA Ceases;
- LLU Co-mingling and Tie Cables baskets;
- GEA Cablelink services and VLAN moves applied to GEA Cablelink;
- MPF and GEA Optimisation and Repair services; and
- Abortive Visit Charges.

⁶¹⁶ LLU means cases where the charge control is applied to MPF and SMPF ancillaries.

Table A23.1: LLU (MPF and SMPF) ancillary services charge controls

Basket/service	Cost standard/ charge control decision	Current charge (nominal)	Charge control for 2018/19	Charge control for 2019/20	Charge control for 2020/21
MPF Single Migration	LRIC	£30.26	£26.32	CPI-9.2%	CPI-3.0%
MPF Bulk Migration	LRIC	£20.97	£18.91	CPI-7.5%	CPI-2.9%
MPF New Provides Basket	FAC	Various	CPI-14.1%	CPI-8.7%	CPI-3.0%
MPF Soft Cease	Flat nominal cap	£0	£0	£0	£0
SMPF Soft Cease	Flat nominal cap	£0	£0	£0	£0
Hard Ceases Basket	FAC	Various	CPI-21.1%	CPI-12.5%	CPI-4.3%
Special Fault Investigations	FAC	Various	CPI-15.2%	CPI-9.3%	CPI-2.8%
Time Related Charges	FAC	Various	CPI-15.2%	CPI-9.3%	CPI-2.8%
LLU Tie Cables basket	FAC	Various	CPI-1.0%	CPI-1.9%	CPI-3.4%
LLU Co-mingling New Provides and Rentals services basket	FAC	Various	CPI+30.4%	CPI+12.6%	CPI-4.8%
MPF Standard Line Test	Flat real cap at current charge	£3.93	£4.05	CPI-0%	CPI-0%
Cancellation of MPF orders	Alignment of charges with GEA Bandwidth Modify to 40/10	£10.28	£7.01	CPI-23.5%	CPI-5.6%
Amend MPF orders	Alignment of charges with GEA Bandwidth Modify to 40/10	£10.28	£7.01	CPI-23.5%	CPI-5.6%

Sources: Output from our control module. Openreach's price list [accessed 31 January 2018]

Table A23.2 GEA ancillary services charge controls⁶¹⁷

Basket/service	Cost standard/ charge control decision	Current charge (nominal)	Charge control for 2018/19 (nominal)	Charge control for 2019/20	Charge control for 2020/21
PCP ⁶¹⁸ Only Install 40/10	LRIC	£49	£46.51	CPI-5.1%	CPI+0.5%
Start of Stopped Line 40/10	LRIC	£11	£4.57	CPI-38.0%	CPI+0.8%
FVA with GEA (FTTP) 40/10 Connection	Flat real cap at current charge	£117	£120.51	CPI-0%	CPI-0%
GEA (FTTP) 40/10 Transition Connection	Flat real cap at current charge	£92	£94.76	CPI-0%	CPI-0%
GEA (FTTC and FTTP) CP to CP Migrations	LRIC	£11	£4.57	CPI-38.0%	CPI+0.8%
GEA (FTTC and FTTP) ceases	Flat nominal cap	£0	£0	£0	£0
1 Gbit/s GEA Cablelink	FAC	£790	£525	£525	£525
10 Gbit/s GEA Cablelink	FAC	£1,800	£1,050	£1,050	£1,050
VLAN moves applied to GEA Cablelinks	Alignment of charges with GEA Bandwidth Modify to 40/10	£11.25	£7.19	CPI-22.5%	CPI-5.5%
GEA Bandwidth Modify - to 40/10	FAC	£11.25	£7.19	CPI-22.5%	CPI-5.5%
GEA 40/10 Cancel/Amend/ Modify – to 40/10 – CRD	Alignment of charges with GEA Bandwidth Modify to 40/10	£11.25	£7.19	CPI-22.5%	CPI-5.5%
GEA 40/10 Cancel/Amend/ Modify - Regrading	Alignment of charges with GEA Bandwidth Modify to 40/10	£11.25	£7.19	CPI-22.5%	CPI-5.5%
Superfast Visit Assure	Flat nominal cap at current charge	£130	£130	£130	£130

Sources: Output from our control module. Openreach's price list [accessed 31 January 2018]

MPF New Provides

A23.3 MPF New Provide service variants are requested by telecoms providers when a new customer connection is required. Telecoms providers spent approximately £86m in 2015/16, and £76m in 2016/17 in total on MPF New Provide services.⁶¹⁹

Our proposals

A23.4 In our March consultation, we proposed a basket charge control for MPF New Provides covering five services.⁶²⁰ In our September consultation, we proposed a basket charge control for MPF New Provides at FAC that included the following seven services in response to Openreach's response to our March consultation:⁶²¹

- MPF Standard New Provide;
- MPF Stopped Line Provide (MPF SLP);
- MPF Working Line Takeover (MPF WLTO);
- MPF SLP Left in Jumpers (LIJ);
- MPF WLTO LIJ;
- MPF Tie Pair Modification (three working day lead time Re-termination); and
- MPF Tie Pair Modification (Multiple Re-termination).

A23.5 We also proposed individual sub-caps for each MPF connection service in the basket of the form CPI-X+7.5%, in particular, CPI-26.2%+7.5% in 2018/19; CPI-15.2%+7.5% in 2019/20; and CPI-4%+7.5% in 2020/21.

Stakeholder responses

A23.6 We received one stakeholder response on our proposed basket charge control for MPF New Provides, from Openreach. It said that it agreed with:

- FAC as an appropriate cost standard for the MPF New Provides basket;⁶²² and
- the move of Tie Pair modification services to the MPF New Provides basket, and that the X-levels calculated for the MPF New Provides basket should not be impacted by this move as Tie Pair modification services are immaterial.⁶²³

⁶¹⁷ The charge controls on GEA (FTTP) ancillaries only apply in areas where the respective FTTP rental is also charge controlled. The exceptions to this are the charge controls for GEA (FTTP) CP to CP Migrations, GEA (FTTP) ceases, GEA Cablelink and VLAN moves applied to GEA Cablelink, which apply in all areas regardless of the existence of a charge control on FTTP rentals. The details of the charge controls for all ancillary services are set out below in this annex.

⁶¹⁸ Primary Cross Connection Point.

⁶¹⁹ BT's 2017 RFS, pages 31 and 34.

⁶²⁰ These five services were: MPF Standard New Provide, MPF Stopped Line Provide, MPF Working Line Takeover, MPF SLP Left in Jumpers, and MPF WLTO LIJ.

⁶²¹ In its response to our March consultation, Openreach suggested that we move two MPF Tie Pair Modifications services into the MPF New Provides basket because MPF Tie Pair Modifications have similar jumpering activity to the other services in the MPF New Provides basket (Openreach response to the March 2017 WLA Consultation, Volume 2, paragraph 78). Openreach stated that it could manage relative prices more appropriately by including similar services in the same basket.

⁶²² Openreach response to the March 2017 WLA Consultation – Volume 2, paragraph 74.

⁶²³ Openreach response to the September 2017 WLA Consultation, paragraph 121.

Our reasoning and decisions

- A23.7 We consider that there is merit in putting MPF Standard New Provide, MPF SLP, MPF WLTO, MPF SLP LIJ, MPF WLTO LIJ, MPF Tie Pair Modification (three working day lead time Re-termination) and MPF Tie Pair Modification (Multiple Re-termination) together in the MPF New Provides basket because there is a degree of substitution between some of the services in some circumstances, some of the services are largely comparable in terms of engineering activity, and share common costs.⁶²⁴
- A23.8 The MPF New Provides basket will allow services with similar activities like MPF Tie Pair Modifications and MPF SLP or MPF WLTO to have their charges aligned in the future. MPF Tie Pair Modification services have previously been included in the “Other LLU ancillaries basket”. As such, we do not have specific cost data for these services. However, given the similarity between these services and those in the MPF New Provides basket, we think it is appropriate to control these services on a similar basis by including them in the same basket. Based on the relatively low revenues of MPF Tie Pair Modification in 2015/16, representing less than [X] of the MPF New Provides basket (see Table A23.3 below), we do not consider this will affect the X-value of the MPF New Provides basket in any material way.
- A23.9 In Section 2 we discuss our approach to the recovery of common costs for non-rental services. We consider that FAC is the appropriate cost standard for MPF New Provides as the circumstances in which we consider BT should only be allowed to recover the LRIC of a service (e.g. reduce barriers to switching and, ultimately, promote competition) do not apply to the services in the MPF New Provides basket. We note a FAC cost standard for the MPF New Provides basket is consistent with our decision in the 2014 FAMR Statement.
- A23.10 We consider that the constraints we are imposing, i.e. the overall basket control plus a sub-cap on each and every charge within the MPF New Provides basket, will operate to prevent BT setting inappropriate charge differentials for the following reasons:
- first, services in the MPF New Provides basket are potentially substitutable and if there is a relative increase in the charge for one service, the charge for the alternative services must adjust accordingly so that the overall basket constraint is satisfied.
 - second, we have imposed sub-caps at CPI-X+7.5% (see Section 3 for a discussion on our principles of basket design) which will limit the rate of change in individual charges and, coupled with the overall basket control, restrict the scope to game the controls via the differential between charges in the basket.
- A23.11 Our decision to implement a basket charge control for MPF New Provides at FAC including seven services is shown in Table A23.3 below.

⁶²⁴ September 2017 WLA Consultation, paragraph 4.83. Openreach response to the March 2017 WLA Consultation, Volume 2, paragraph 75.

Table A23.3: The MPF New Provides basket

Basket	Services	CPI-X controls		
		2018/19	2019/20	2020/21
MPF New Provides £[X]m	MPF Standard New Provide £[X]m MPF SLP £[X]m MPF WLTO £[X]m MPF SLP LIJ £[X]m MPF WLTO LIJ £[X]m MPF Tie Pair Modification (three working day lead time Re- termination) £[X] MPF Tie Pair Modification (Multiple Re-termination) £[X]	CPI-14.1%	CPI-8.7%	CPI-3.0%

Sources: 2015/16 total revenues in square brackets. Revenues for MPF SLP LIJ and MPF WLTO LIJ from Openreach's response dated 26 January 2017 to follow up question 2 relating to the 19th s.135 notice; the remaining revenues from BT's 2016/17 WLA Compliance Statement (confidential to BT). The CPI-X values are the output from our control module.

A23.12 We note that these controls imply a nominal charge in 2020/21 which lies outside the range in the September 2017 Consultation. We have investigated and found that the key drivers of this result are that outturn 2016/17 costs were higher than those we previously forecasted, and the contribution to the MPF New Provides basket from SLG payments is now greater. Both of these changes reflect the use of more recent information and hence we consider them to be appropriate.

GEA New Connections

A23.13 There are three FTTC connection services:

- PCP Only Install: a BT engineer makes a connection at the street cabinet installing the jumper cable required to connect the FTTC fibre network to the D-side copper network;
- Start of Stopped Line (SoSL): a software-only exchange connection requiring no engineering activity; and
- Managed Engineer Install: a BT engineer makes a connection at the street cabinet if required and installs the modem at the customer premises.

A23.14 There are three FTTP services and the respective connections:⁶²⁵

⁶²⁵ Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPrices.do?data=Po3KnmqvCgPyVFu37aLXldpyYOJW58IEU3a1hFsXScqDWVqEbA2PDIT5Y2OhxKy>, sections "5.1.3 Generic Ethernet Access (FTTP)" and "5.1.4 Fibre Voice Access" [accessed 26 January 2018].

- a) FVA combined with FTTP;⁶²⁶
- b) transition service; and
- c) data service.

Our proposals

- A23.15 In our March consultation, we proposed to charge control the following two FTTC connection services for the GEA 40/10 FTTC:
- PCP Only Install for 40/10 FTTC at LRIC; and
 - SoSL for 40/10 FTTC at LRIC.
- A23.16 We considered that a charge control on these services should impose a constraint on the charge for Managed Engineer Install, a separate FTTC connection service, to the extent that there is a degree of substitution between the services.
- A23.17 We believed that our approach to setting FTTC connection charge controls at LRIC was also applicable for FTTP connection charges. We did not propose to charge control FTTP connections for service speeds other than the anchor at 40/10.
- A23.18 We proposed a flat nominal cap for the connection charges of:
- FVA combined with FTTP 40/10 at the current charge level, £117; and
 - FTTP 40/10 transition service at the current charge level, £92.

Stakeholder responses

- A23.19 We received two stakeholder responses on our proposed charge controls for GEA new connections.
- A23.20 TalkTalk discussed FTTC connections services and said that:
- Managed Engineer Install should be charge controlled because there was likely to be limited substitution from Managed Engineer Install to PCP Only Install. It said that this was because Managed Engineer Install was required by vulnerable customers who need assistance during the installation process; and
 - it would be profitable for BT to set the charge of Managed Engineer Install above the costs of providing the service.⁶²⁷
- A23.21 Openreach also responded on FTTC connections services and said that:

⁶²⁶ Openreach also provides a service of remote activation of subsequent service on existing FTTP Optical Network Termination (ONT) at premises, at a charge of £25 (<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=z5O0C27SrMPpkIBPtmdCiS%2B9aKzcV8vZVWPIHzNATBZ6rNZujnCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D> [accessed 26 January 2018]). FVA can be configured and activated remotely with a one-day lead-time, where there is an existing FTTP ONT at the premises. This applies to consumers that initially request an FTTP data only service and subsequently wish to activate FVA. Openreach's web-site at <https://www.openreach.co.uk/orpg/home/products/super-fastfibreaccess/fibrevoiceaccess/fibrevoiceaccess.do> [accessed 26 January 2018].

⁶²⁷ TalkTalk response to the March 2017 WLA Consultation, paragraphs 5.21-5.26.

- it agreed with FTTC 40/10 connections at LRIC as it would encourage migration to superfast broadband;
- we should create a GEA connections basket (similar to MPF New Provides basket) rather than separate controls for different connection services because this would ensure appropriate price and cost alignment over time and allow it to promote efficient consumption of different connection services; and
- charges for FTTC SoSL and MPF (SoSL and WLTO) LIJ should be aligned because these were similar services in terms of engineering activity.

A23.22 Openreach also discussed FTTP connections and said we should not have a price cap, but a fair and reasonable obligation instead. Nonetheless, it said that if we believed that a price cap would be appropriate, then it should be real and not nominal.⁶²⁸ Also, Openreach said that the case for the deployment of FTTP was very sensitive to price and the incentive to roll out to new areas would be severely restricted if the overall price was not allowed to flex to take account of the higher costs of increasingly unattractive commercial opportunities. Furthermore, it said that it might need to rebalance its allocation between connection and rental prices to encourage demand.⁶²⁹

Our reasoning and decisions

FTTC New Connections

A23.23 We have decided to set separate individual charge controls for PCP Only Install and Start of Stopped Line when used to access the GEA 40/10 service. We have decided that these controls should be set at LRIC.⁶³⁰ We have decided not to set charge controls on PCP Only Install and Start of Stopped Line when used to access other bandwidth variants. This is because:

- We remain of the view that a LRIC cost standard, rather than FAC, encourages the migration to superfast broadband services which is consistent with our objectives of preserving investment incentives (see Section 2).
- Basket controls may be used when there is a common cost to be allocated across services as in the case of the MPF New Provides basket (which is set at FAC). However, in the absence of common costs to be recovered through this set of services, the benefit of a basket control is lessened.

⁶²⁸ Openreach said that in choosing between a real or nominal price cap it would encourage us to assess inflationary impacts at the latest possible date. Openreach said that it believed this would support real rather than nominal caps. Openreach response to the March 2017 WLA Consultation, Volume 2, paragraph 16.

⁶²⁹ Openreach response to the March 2017 WLA Consultation, Volume 2, Figure 7, page 25; and paragraphs 115-121.

⁶³⁰ While we are charge controlling these FTTC connection services at LRIC only when used to access the GEA 40/10 service, we have not allocated any common costs to PCP Only Install and Start of Stopped Line services regardless of the speed of the FTTC service (the common costs will be recovered via main rental services). This is because Openreach will likely come under pressure to reduce to LRIC the charges for all speeds of these FTTC connection services, as otherwise telecoms providers could order a new FTTC connection at 40/10 (at the charge controlled price) and then pay for a bandwidth modify to another bandwidth.

- If we set a basket control at LRIC for FTTC new connections, we expect it would be likely to result in both PCP Only Install and Start of Stopped Line charges being set at their respective LRIC. Otherwise, Openreach would need to set the charge of at least one of the services in the basket below (above) LRIC, which would force Openreach to make a loss (profit) on that service. Such an outcome would be inefficient because to achieve allocative efficiency, charges should reflect the additional resources used to provide a service, i.e. its LRIC.⁶³¹

A23.24 As noted above, FTTC connection charge controlled services will be at LRIC to facilitate migration from copper to fibre, in contrast to MPF LIJ services which will be charge controlled in the MPF New Provides basket at FAC (i.e. we are implementing different cost standards for GEA and MPF connection services). Openreach pointed out that FTTC SoSL and MPF SoSL/WLTO LIJ are similar in activity. However, we consider this is appropriate in these circumstances given that those services are not close substitutes for each other as they use distinct technologies associated with different services. Hence, the price difference does not necessarily need to reflect the incremental cost difference.

A23.25 We have decided not to implement a charge control for Managed Engineer Install with CP Device. This is because:

- a) The volumes for Managed Engineer Install are relatively low and decreasing.⁶³² We expect the percentage of new GEA connection volumes that is Managed Engineer Install to decrease from [X]% in 2017/18 to [X]% in 2020/21 for internal BT volumes and from [X]% in 2017/18 to [X]% in 2020/21 for external volumes. Assuming that the charge for Managed Engineer Install remains at £99 (current charge), we forecast that the total revenue in 2020/21 should decrease to c. £[X]m.⁶³³
- b) A telecoms provider should be able to replicate to some extent Managed Engineer Install by using PCP Only Install as well as sending its own engineer to the customer premises.
- c) The charge controlled 40/10 PCP Only Install service should still exercise some degree of constraint over Managed Engineer Install given that the two services usually share a key component (a BT engineer making a connection at the street cabinet).

A23.26 We therefore do not agree with TalkTalk and believe that it would be disproportionate to impose a charge control on Managed Engineer Install. We also note that the general SMP remedies will apply to Managed Engineer Install, including fair and reasonable charges, offering customers a protection against high prices.

FTTP New Connections

⁶³¹ See Section 2 on allocative efficiency.

⁶³² For example, [X].

⁶³³ WLA volumes model.

A23.27 To prevent Openreach from circumventing the charge control on GEA 40/10 FTTP rentals, we have decided there should be a charge control on the respective FTTP connections to a 40/10 service in geographies where the charge control on FTTP rentals is in force. However, Openreach’s responses to our information requests⁶³⁴ and BT’s AFIs⁶³⁵ suggest that there is a significant degree of variability, and thus uncertainty, on FTTP connections costs which makes a cost-based charge control difficult to implement.⁶³⁶

A23.28 In reaching our decision on FTTP new connections, we have considered Openreach’s response that the case for the deployment of FTTP was very sensitive to price and the incentive to roll out to new areas would be severely restricted if the overall price was not allowed to flex to take account of the higher costs of increasingly unattractive commercial opportunities.⁶³⁷ Given the uncertainty on BT’s FTTP connection costs and the lack of another similar service with known costs that could be used as a proxy, our view is that a flat real cap at current charges (i.e. CPI-0%) is appropriate. This approach offers a degree of protection to FTTP consumers against price rises (in real terms), while simultaneously mitigating the risk of under-recovery for BT when compared to a flat nominal cap (i.e. CPI-CPI).

A23.29 Given the current low volumes and low materiality of revenues associated with FTTP connections,⁶³⁸ we consider that it would not be proportionate to build a complex model for this specific FTTP service at this time. As the rollout of FTTP is at an early stage and will vary depending on Openreach’s choice of location, any modelling attempt would be potentially subject to large inaccuracies. We are implementing cost reporting obligations on BT’s FTTP connections (see Annex 8) to ensure that accurate cost information will be available for future market reviews.

A23.30 We have therefore decided to set the following controls in geographies where a charge control on FTTP 40/10 rental applies:⁶³⁹

- a flat real cap for the connection charge of FVA in combination with FTTP 40/10 at the current charge, £117;⁶⁴⁰ and

⁶³⁴ Openreach response dated 2 October 2017 to question 8 of the 36th s.135 notice.

⁶³⁵ BT’s 2015/16 and 2016/17 AFI.

⁶³⁶ From BT’s 2015/16 and 2016/17 AFIs, the FTTP connection unit FAC is in the range of £[3<](in 2015/16) to £[3<] (in 2016/17), while Openreach’s data provided in response to question 8 of the 36th s.135 notice suggest a direct (incremental) cost of c. £[3<] for FTTP connections in 2016/17.

⁶³⁷ Openreach response to the March 2017 WLA Consultation, Volume 2, paragraph 120.

⁶³⁸ In 2016/17, BT reported [3<] FTTP external connections and c. [3<] internal FTTP connections. Openreach response dated 13 September 2017 to question 2 of the 34th s.135 notice.

⁶³⁹ Given our decision to not control the 40/10 FTTP “data product variant” rental charge, we therefore decided not to control the respective FTTP connection charge for consistency. Also, we decided not to charge control “Remote activation of subsequent service on existing FTTP ONT at premises” because: (i) we are setting a charge control on FVA in combination with FTTP 40/10, which will act as a competitive constraint to some extent; and (ii) for a consumer with an FTTP data only service, an alternative to FVA’s remote activation is the ability for the consumer to make VoIP calls via a router connected to the internet.

⁶⁴⁰ The CPI-0% cap should commence in the first year of the control to reflect changes in cost from 2017/18 (when the charge was at £117) to 2018/19, rather than setting a cap at £117 in 2018/19, which does not reflect inflation from 2017/18. The CPI measure for the period of twelve months ending on 31 October 2017 (which is consistent with the period used for the CPI calculation in the legal instruments) is 3%.

- a flat real cap for the connection charge of FTTP 40/10 transition service at the current charge, £92.⁶⁴¹

MPF Migrations

A23.31 MPF Migration is one of the services offered by Openreach⁶⁴² that allows consumers to switch between telecoms providers, and telecoms providers to manage the capacity of their exchange-based estate. High migration charges at the wholesale level, if passed through to retail customers, may increase customers' switching costs and reduce competition between telecoms providers. We have highlighted the importance of switching costs on competition in previous consultations and statements on customer switching.⁶⁴³

A23.32 There are two MPF Migration services: Single and Bulk Migrations. The total revenue for MPF Single Migrations was around £20.5m in 2015/16 and 2016/17, while for MPF Bulk Migrations increased from £1.3m in 2015/16 to £1.9m in 2016/17.⁶⁴⁴

Our proposals

A23.33 In our March consultation, we proposed to:

- set MPF Single Migration charges using LRIC; and
- align the charges of MPF Bulk Migrations using their volume-weighted average LRIC.

A23.34 For both Single and Bulk MPF Migration charges we proposed that the difference between FAC and LRIC (which we estimate to be generally small) should be recovered from MPF rental charges on an equivalent per line basis.

Stakeholder responses

A23.35 We received one stakeholder response on our proposals, from Openreach, which said that:

- In determining whether to apply a LRIC standard, we should take into account unintended negative consequences, such as inappropriate overconsumption of services driving up its costs, and telecoms providers focusing competition on customers willing

<https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7g7/mm23> [accessed 26 January 2018]. The cap for the connection charge of FVA in combination with FTTP 40/10 in the first relevant year is thus $£117 \times (1 + \text{CPI}) = £117 \times (1 + 0.03) = £120.51$.

⁶⁴¹ For the same reasons explained in the previous footnote, the cap for the connection charge of FTTP 40/10 transition in the first relevant year is thus $£92 \times (1 + \text{CPI}) = £92 \times (1 + 0.03) = £94.76$.

⁶⁴² Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=Wk%2B2hSVL2knF5F0Ve%2F1N8zj9r0QWsrM3Qpmu5FcPTOYIMnGHsqdC0vzO163bJmh34D91D7M0q8u%2FIISgtIFAKw%3D%3D> [accessed 26 January 2018].

⁶⁴³ 2012 Consumer Switching Consultation, paragraph 1.4,

<http://stakeholders.ofcom.org.uk/binaries/consultations/switching-fixed-voice-broadband/summary/condoc.pdf>. 2013 Consumer Switching Statement, paragraph 1.2,

https://www.ofcom.org.uk/data/assets/pdf_file/0033/76569/consumer_switching.pdf.

⁶⁴⁴ BT's 2017 RFS, pages 31 and 34.

to switch while being less dynamic in relation to existing subscribers by setting a migration price at LRIC and a new connection at FAC, as was the case for MPF.⁶⁴⁵

- Single and Bulk Migration prices should be set at FAC, i.e. consistent with our proposals for hard ceases. This is because MPF Migrations and Hard Ceases were not predominately driven by end customer activity; rather they were mainly used by telecoms providers to manage their exchange-based estate. Openreach cited the example of when, in 2014, Sky took over the broadband asset base and customers of O2, and used MPF Migrations to move its customers from its ex-BE Unlimited PoPs to its Sky PoPs.⁶⁴⁶

Our reasoning and decisions

A23.36 We have considered Openreach’s concerns on potential negative consequences related to the implementation of a LRIC standard for MPF Migrations:

- First, setting charges at LRIC is consistent with allocative efficiency (see Section 2), therefore, we consider that it is unlikely that a LRIC standard would lead to inappropriate overconsumption. Moreover, even if it did, BT would be able to fully recover any incremental costs due to any such overconsumption.
- Second, with MPF Migration charges at LRIC (rather than FAC), in principle, competition between telecoms providers will intensify as subscribers may switch telecoms provider at lower cost. We consider that this is likely to make consumers, including existing subscribers, better off, as telecoms providers may be unable to perfectly identify consumers that are willing to switch from those that are not, and have a greater incentive to offer better deals to keep their subscribers. Also, telecoms providers still have an incentive to supply consumers regardless of whether they are gained via migration from a losing provider, or via an MPF standard new provide (for which the charge is set at FAC).

A23.37 We have considered Openreach’s argument for MPF Migrations at FAC given that in some circumstances those services are used for network re-arrangements like MPF hard ceases, which we have decided to charge control at FAC (see paragraph A23.94 below). Nevertheless, we have decided to implement our proposal to set separate controls for MPF Single and Bulk Migrations at their respective LRIC by the end of the control period, for the following reasons:

- First, there are competition benefits arising from aligning MPF Single Migrations to LRIC as it decreases switching costs between telecoms providers.
- Second, in some circumstances there is a degree of substitution between MPF Single and Bulk Migrations, thus setting the charges of both at LRIC will ensure that the price differential corresponds to incremental cost differential by the end of the charge control period, which promotes productive and allocative efficiency; and

⁶⁴⁵ Openreach response to the March 2017 WLA Consultation, Volume 2, paragraphs 70-71.

⁶⁴⁶ Openreach response to the March 2017 WLA Consultation, Volume 2, Figure 3, page 21; and paragraphs 80-82.

- Finally, we note that the difference between LRIC and FAC for MPF Migrations in 2020/21 is low given the low level of common costs allocated to these services. Therefore, in practice, the cost standard choice for MPF Migrations is unlikely to have a material impact on their charges. Also, the total cost that BT is allowed to recover is neutral to the cost standard used for MPF Migrations, i.e. a change from LRIC to FAC for MPF Migrations would result in an equivalent cost reduction in the MPF rentals leaving BT indifferent to the common cost re-allocation.

A23.38 This approach is consistent with our decisions in the 2014 FAMR Statement, the way BT has priced MPF Single and Bulk Migrations in the past, and our decisions regarding GEA Migrations (discussed below).

A23.39 We note that the controls for both Single and Bulk Migrations imply nominal charges in 2020/21 which lie outside the ranges in the September 2017 Consultation. We have investigated and found that, as in the case of MPF new provides explained above, the key drivers of this result are that outturn 2016/17 costs were higher than those we previously forecasted, and the contributions from SLG payments. In the case of MPF bulk migrations this service did not previously attract SLG costs because we assumed no volumes by the end of the charge control period. However, as explained in Annex 10, we have updated our forecast of MPF bulk migration volumes based on Openreach data. Both of these changes reflect the use of more recent information and hence we consider them to be appropriate.

GEA Migrations

A23.40 A GEA Migration (from telecoms provider to telecoms provider) charge is incurred when an existing GEA customer wishes to move from its current telecoms provider to another provider while retaining the GEA service. BT reported total revenue for GEA Migrations of £1.8m in 2015/16, increasing to £4.4m in 2016/17.⁶⁴⁷

Our proposals

A23.41 In our March consultation, we proposed to charge control all GEA Migrations to minimise the costs of switching. Lower switching costs are generally likely to be in customers' interests since they help strengthen retail competition. This was particularly important given Openreach's high share of GEA connections⁶⁴⁸ and our expectation that a significant proportion of fibre retail customers will, over the market review period, continue to be customers of BT's retail divisions. In this context, BT has a strong incentive to maintain GEA Migration charges at an excessive level.

⁶⁴⁷ BT's 2017 RFS, pages 31 and 34.

⁶⁴⁸ BT's share of all FTTC lines was of [§<] % in 2016/17 (WLA volumes model).

A23.42 We considered that GEA Migration charges should continue to be set at LRIC and, thus, not include a contribution to common costs. We proposed to allow Openreach to recover the FAC-LRIC difference from the respective main rentals.⁶⁴⁹

Stakeholder responses

A23.43 We received one stakeholder response on our proposed charge control for GEA Migrations, from Openreach. It said that it understood the rationale for setting GEA Migrations at LRIC.⁶⁵⁰ Moreover, it said that GEA Migrations and FTTC Start of a Stopped Line should be priced at a similar level because both have similar costs, noting that we proposed very different X-values for these services.

Our reasoning and decisions

A23.44 We have decided to maintain our proposal, and charge control GEA Migrations for all services (regardless of the speed) at LRIC because: lower switching costs are generally likely to be in customers' interests since they help strengthen retail competition and so GEA Migration charges should not contribute to common costs.

A23.45 This is particularly important given Openreach's high share of GEA connections and our expectation that a significant proportion of fibre retail customers will continue to be customers of BT's retail divisions during the charge control period.

A23.46 We also note that this approach is consistent with our decision for MPF Migrations (see paragraph A23.36 above) and our previous decisions for migrations services (e.g. see paragraphs 4.83-4.89 in the 2014 FAMR Statement).

A23.47 The charge control on GEA Migrations applies both to FTTC and FTTP regardless of the speed of the service and geography, i.e. it applies to all speeds and all geographical areas. This is consistent with our policy to facilitate switching and, ultimately, competition within and across networks (see Section 2).

A23.48 With regard to Openreach's response, we proposed different X-values for GEA Migrations and FTTC Start of a Stopped Line because the charges in force set by Openreach at that time were significantly different. At the time of our March consultation, Openreach charged GEA Migrations at £11, and FTTC Start of a Stopped Line at £32.52. Openreach decreased the charge for FTTC Start of Stopped Line to £11 on 1 July 2017, aligning it with GEA Migrations.⁶⁵¹ As a result of this charge alignment, we have also aligned the X-values of the charge controls for GEA migrations and FTTC Start of a Stopped Line.

⁶⁴⁹ This approach was consistent with our proposals for PCP Only Install and Start of Stopped line connections at LRIC (construed as migrations from copper to fibre).

⁶⁵⁰ Openreach response to the March 2017 WLA Consultation, Volume 2, Figure 7, page 25; and paragraphs 122-123.

⁶⁵¹ Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=0RlviN9gWGKtCdDGaQ8lFObCjmFDJOVDZEidKC%2F1wh1Z6rNZuinCs99NbIKJZPD9hXYmiiXh6wrCQm97GZMyQ%3D%3D> [accessed 22 December 2017].

GEA Bandwidth Modify

A23.49 This service is used when a telecoms provider wishes to change the GEA speed provided to a customer (i.e. the customer either upgrades or downgrades). GEA bandwidth changes do not require an engineer to visit the local exchange or cabinet.⁶⁵²

Our proposals

A23.50 We proposed to set the charges for GEA bandwidth changes from any other speed to the charge controlled 40/10 GEA service at FAC (estimated £6.74).⁶⁵³

Stakeholder responses

A23.51 We received two stakeholder responses on our proposals.

A23.52 Openreach agreed with our proposed charge control on GEA Bandwidth Modify to the 40/10 speed, and said that there should be an obligation to offer fair and reasonable charges on GEA bandwidth modify to other speeds.⁶⁵⁴

A23.53 TalkTalk said that:

- GEA Bandwidth Modify to 40/10 should be charged at LRIC (rather than FAC) to facilitate switching and competition;⁶⁵⁵
- the FAC estimate for GEA Migration, used to set GEA bandwidth changes, was too high;
- the FAC for GEA Migrations in BT's RFS has reduced from £10.34 in 2014/15 to £5.74 in 2016/17 as volumes have grown rapidly;
- given the strong forecast growth in GEA volumes the FAC for GEA Migrations might be £3 to £4 in 2020/21, not the £6 that we had proposed;⁶⁵⁶ and
- the charge control for bulk versions of a number of GEA software services, including GEA Bandwidth Modify, should be charged at a discount compared to the respective singleton charge.⁶⁵⁷

Our reasoning and decisions

A23.54 We considered whether it would be appropriate to use a LRIC cost standard for GEA bandwidth changes to 40/10 on the basis that a low charge may mean that the 40/10 GEA service provides a more effective constraint on prices of services at other bandwidth variants. However, in our judgement, a charge control based on FAC provides sufficient protection to ensure the 40/10 GEA charge control is effective.

A23.55 As GEA bandwidth changes are a change of service speed for an existing customer, prices above LRIC do not inhibit switching between telecoms providers in the same way as price

⁶⁵² Openreach's response dated 17 June 2016 to section H of the 7th s.135 notice.

⁶⁵³ Bottom-up model LRIC estimate for GEA software services for 2020/21 plus an allocation of common costs.

⁶⁵⁴ Openreach response to the March 2017 WLA Consultation, Volume 2, paragraph 128.

⁶⁵⁵ TalkTalk response to the March 2017 WLA Consultation, paragraph 5.38.

⁶⁵⁶ TalkTalk response to the September 2017 WLA Consultation, paragraph 4.34.

⁶⁵⁷ TalkTalk response to the September 2017 WLA Consultation, paragraph 4.37.

above LRIC for services like GEA Migration. As such, we do not believe that the pricing of GEA bandwidth changes has a material impact on competition, therefore it is not necessary to price the service at LRIC.

- A23.56 In relation to TalkTalk’s response on the FAC level for GEA Migrations (used to set GEA bandwidth changes), we have updated the data in our cost modelling for GEA Migrations since our March consultation resulting in a FAC of c. £5.50 in 2020/21, rather than the c. £6.30 previously proposed. We note that this implies a nominal charge in 2020/21 which lies outside the range in the September 2017 Consultation, but consider the use of the updated data to be appropriate.
- A23.57 We investigated whether there are cost savings for BT associated with the process of bulk GEA Bandwidth Modify compared to doing an equivalent number of multiple single GEA Bandwidth Modify. We have not found evidence of cost savings for BT associated with processing bulk GEA Bandwidth Modify orders compared to multiple single GEA Bandwidth Modify orders.⁶⁵⁸ Therefore, we do not consider that bulk GEA Bandwidth Modify services should be discounted compared to an equivalent process of multiple singleton GEA Bandwidth Modify orders.
- A23.58 We have decided to implement our proposal of a charge control on singleton GEA Bandwidth Modify to 40/10 at FAC.

MPF and GEA Cancel/Amend/Modify

- A23.59 When a telecoms provider wishes to cancel, amend or modify an MPF or GEA order it is likely that it will have to choose one of the four services provided by Openreach for that purpose.⁶⁵⁹

Our proposals

- A23.60 In our March consultation, we proposed to require alignment of charges between GEA Cancel/Amend/Modify and the MPF equivalents which we had proposed to charge control in the Other MPF ancillaries basket.⁶⁶⁰ In our September consultation we instead proposed to individually control, at FAC, the charges for the four Cancel/Amend/Modify services provided by Openreach:⁶⁶¹

⁶⁵⁸ Openreach said that it “can confirm that there is no cost differential between delivering software activities, whether they are ordered in bulk or multiple singleton orders.” Openreach’s response dated 4 January 2018 to question 20 of the 43rd s.135 notice.

⁶⁵⁹ The services are the following (total revenues for 2015/16 in square brackets): (i) Cancellation of MPF orders for Provide, Migration, Working Line Takeover, Modification of Amend £[<]m; (ii) Amend orders. Allowable change to MPF Order £[<]m; (iii) GEA Cancel/Amend/Modify – CRD Amend; and (iv) GEA Cancel/Amend/Modify – Regrading £[<]m including both GEA services (iii) and (iv). Sources: BT’s LLU WLR Confidential Compliance Statement 2016-17; and BT’s response dated 2 September 2016 to question 27 of the s.135 notice dated 18 August 2016.

⁶⁶⁰ March 2017 WLA Consultation, Volume 2, paragraph 3.9.

⁶⁶¹ These are the names of the services as listed on the Openreach price list at <https://www.openreach.co.uk/orpg/home/products/pricing/loadPricing.do> [accessed 22 December 2017].

- Cancellation of MPF orders for Provide, Migration, Working Line Takeover, Modification of Amend;
- Amend orders. Allowable change to MPF Order;
- GEA Cancel/Amend/Modify – CRD Amend, order notes amend, order cancellation, Care Level, etc, where telecoms providers use it to access a GEA 40/10 service; and
- GEA Cancel/Amend/Modify – Regrading of existing upstream or downstream speed, both at point of sale and in-life etc, where telecoms providers use it to access a GEA 40/10 service.

A23.61 Given the absence of FAC information for the services listed above, we proposed to use our FAC estimates for GEA bandwidth changes (the charge for which is based on GEA Migrations) as a proxy.⁶⁶² We said that we would expect the cost of GEA bandwidth changes to be a reasonable proxy for these services as they only require software changes to be made and hence are similar in nature.

Stakeholder responses and submissions

A23.62 We received three stakeholder responses on our proposed charge controls for MPF and GEA Cancel/Amend/Modify services.

A23.63 Openreach said that it agreed with our proposals. The charges for these services should be aligned because the underlying costs were similar. Moreover, it agreed that using the FAC for GEA bandwidth changes as a proxy was appropriate.⁶⁶³

A23.64 TalkTalk said that:

- The charges for these services were not based on the FAC costs attributed in BT's 2017 RFS. It said that in BT's 2017 RFS (p. 33), the unit FAC for VULA migrations was £5.74. However, in our March consultation, the charge control for GEA Bandwidth modify – to 40/10 (at FAC) would result in a unit price above £6.50. Given the strong forecast growth in GEA volumes, TalkTalk suggested that the FAC might be £3 to £4 in 2020/21, rather than the £6.50.
- The FAC of GEA CP-CP Migrations, which informs the FAC calculation for GEA Bandwidth Modify to 40/10, is 2.4 times the LRIC,⁶⁶⁴ which appears excessive.
- We must require Openreach to identify the FAC attributed to the GEA service changes and set out a cost-based charge control or deduce the excess margin from the cost of other products. If Openreach was unable to identify the cost, then we should assume that it was zero.
- We must ensure that GEA service changes costs were not recovered from other WLA ancillary services and transparently explain how we got to that conclusion.

⁶⁶² In the September 2017 WLA Consultation (paragraph 1.7) we proposed to align the charges for these cancellation, modification and amendment services to the GEA bandwidth modify services. However, we note that the charge for GEA bandwidth modify services is effectively based on the FAC for GEA Migrations.

⁶⁶³ Openreach response to the September 2017 WLA Consultation, paragraphs 124-126.

⁶⁶⁴ TalkTalk said that for GEA CP-CP migration FAC was £6 and LRIC was about £2.50 (derived from the March 2017 WLA Consultation, Volume 2, Table 4.6). Common cost allocation is FAC less LRIC.

- We should charge control bulk versions at a discount in relation to singleton charges.⁶⁶⁵

A23.65 Vodafone said that:

- By charging excessively, Openreach could limit a telecoms provider's ability to offer a high-quality retail offering. It said that it believed these services should be priced at LRIC.
- Openreach previously charged 20p per migration for bulk bandwidth changes (software only). However, Openreach has increased these charges and currently prices bulk changes higher than single charges. In light of previous charges and the fact that these services only involve a software change, Vodafone considered that 20p should cover Openreach's incurred costs, unless it could prove that the incurred cost was higher.
- It submitted a Statement of Requirements to Openreach requesting that the price of modifying orders be reduced to a more cost reflective level. However, Openreach responded that this was being reviewed by Ofcom as part of the market review process.
- It would like us to ensure such charges are based on cost and reflect the scale of the intervention required.⁶⁶⁶

Our reasoning and decisions

A23.66 We have decided to implement our proposal of individual charge controls at FAC for:

- Cancellation of MPF orders for Provide, Migration, Working Line Takeover, Modification of Amend;
- Amend orders. Allowable change to MPF Order;
- GEA Cancel/Amend/Modify – CRD Amend, order notes amend, order cancellation, Care Level, etc, where telecoms providers use it to access a GEA 40/10 service;⁶⁶⁷ and
- GEA Cancel/Amend/Modify – Regrading of existing upstream or downstream speed, both at point of sale and in-life etc, where telecoms providers use it to access a GEA 40/10 service.⁶⁶⁸

A23.67 We have considered whether it is appropriate to set the level of a cost based charge control at LRIC or FAC. If these charges acted as a barrier to switching telecoms providers or migration to GEA services, we could have considered it more appropriate to charge these services at LRIC. However, the reasons we have used to set the level of some charge controls at LRIC do not apply to these services (see Section 2). We therefore consider it is appropriate to set the level of the charge control for these modification services at FAC. This is consistent with our approach to the cost standard for other ancillary services charge controlled at FAC (e.g. VLAN moves for GEA Cablelink, GEA Cablelink, GEA bandwidth changes to 40/10).

⁶⁶⁵ TalkTalk response to the September 2017 WLA Consultation, paragraphs 4.28-4.38.

⁶⁶⁶ Vodafone response to the September 2017 WLA Consultation, pages 9-10.

⁶⁶⁷ For clarity, this charge control does not apply to FTTP in geographies where FTTP 40/10 rental is not charge controlled.

⁶⁶⁸ For clarity, this charge control does not apply to FTTP in geographies where FTTP 40/10 rental is not charge controlled.

- A23.68 Given the absence of FAC information for the services listed above, we use the 2016/17 FAC for GEA Migrations as a proxy and apply forecasting assumptions,⁶⁶⁹ which we think is reasonable as all these services only require software changes to be made and hence are of a similar nature. Therefore, we do not think that the charge controls that we decided to implement for these services will result in excessive prices (margins).
- A23.69 The unit FAC for GEA Migrations fell significantly in 2016/17. We captured the new cost information by updating our base year to be 2016/17, rather than 2015/16, and as explained above consider this appropriate despite it suggesting nominal charges in 2020/21 outside the range in the September 2017 Consultation. We consider it appropriate to capture any further changes in unit FAC based on our service volume forecasts (see Annex 10), treatment of GEA common costs, and forecasts of bottom-up LRIC.
- A23.70 We consider these GEA ancillary services to require similar activities and we would expect the attribution methodology in the RFS to ensure that similar activities would face consistent attributions of costs.
- A23.71 We do not agree with TalkTalk's view that we should assume a cost of zero where BT is unable to provide us with data as BT should be able to recover its efficiently incurred costs, and the FAC for GEA Migrations is a reasonable proxy for the FAC forecasts of these MPF and GEA Cancel/Amend/Modify. The similarity of these services, and costs reported in BT's RFS for 2016/17 for GEA Migrations indicate there are costs incurred on these activities and we should allow them to be recovered (even if we set these charges to zero we would have to allow BT to recover the costs from other services). We therefore do not agree we should assume costs to be zero.
- A23.72 In relation to Vodafone's view regarding charges for bulk bandwidth changes, it considered that 20p per migration should cover BT's incurred costs, unless BT could prove that the incurred cost was higher. However, currently BT prices bulk changes higher than single changes. We note that:
- a) BT's bulk tool charge at £0.20 per bandwidth modify gets paid on top of the singleton charge, rather than to replace it. The charge reflects telecoms providers' use of BT's own software tool for processing orders in bulk;⁶⁷⁰ and

⁶⁶⁹ The unit FAC level for GEA Migrations for 2016/17 is derived in our top-down model, based on the 2016/17 RFS. This is then forecasted forwards based on the bottom-up LRIC and our estimation of how common costs will change based on volumes, efficiency, and inflation.

⁶⁷⁰ Openreach response dated 4 January 2018 to question 19 of the 43rd s.135 notice.

- b) the bulk took charge at £0.20 per bandwidth change has not changed since May 2016.⁶⁷¹ The reason why bulk bandwidth changes were previously costing a total of £0.20 per migration was that the Bandwidth Modify charge was subject to a special offer which meant it was free until November 2016,⁶⁷² increasing to £11.25 afterwards.⁶⁷³ As such, a charge of £0.20 per change would have applied on bulk orders until November 2016 and increased to £11.45 (i.e. £0.20 + £11.25) afterwards.

A23.73 We have decided to charge control only the singleton service of GEA Bandwidth Modify to 40/10, rather than both the singleton and bulk services, because:

- we have not found evidence of cost savings for Openreach associated with bulk software services compared to processing equivalent multiple singleton orders;⁶⁷⁴
- the bulk charge reflects telecoms providers' use of Openreach's own software tool for processing orders in bulk; and
- a charge control on bulk charges does not seem appropriate because telecoms providers can use alternatives. For example, we note that some telecoms providers [X] have developed their own tool to submit bulk software services, and there remains the option of making multiple singleton orders.⁶⁷⁵

MPF Standard Line Test

A23.74 MPF Standard Line Test is a software service to check whether the line is operating correctly. In 2015/16, BT reported total revenue of [X] (£0 - £1m) for MPF Standard Line Test.⁶⁷⁶

Our proposals

A23.75 In our March consultation, we proposed an "Other MPF Ancillaries" basket control covering five services, including MPF Standard Line Test. In our September consultation,

⁶⁷¹ See Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=0RlviN9gWGKtCdDGaQ8IFO bCjmFDJOVDZEidKC%2F1wh1Z6rNZujnCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D> [accessed 16 February 2018].

⁶⁷² See BT's special offer at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=ngULSei%2FAaQz5yg3QvVQ N8k%2FK%2F8KMu%2FNid%2F2Ck5ec%2BrmMIIIOOG7b%2F12AmPFLBERe6YShZ82RgLOGLSH2e9%2Bmw%3D%3D> [accessed 12 January 2018].

⁶⁷³ See Openreach's price list

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=0RlviN9gWGKtCdDGaQ8IFO bCjmFDJOVDZEidKC%2F1wh1Z6rNZujnCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D> [accessed 12 January 2018].

⁶⁷⁴ Openreach said that it "can confirm that there is no cost differential between delivering software activities, whether they are ordered in bulk or multiple singleton orders." Openreach response dated 4 January 2018 to question 20 of the 43rd s.135 notice.

⁶⁷⁵ Openreach response dated 4 January 2018 to question 20 of the 43rd s.135 notice. However, we note that we might be concerned if we see charges for Openreach's bulk bandwidth changes rising markedly in future. In particular, if Openreach could overcharge for its use, on the basis that external telecoms providers do not have the volume to develop their own bulk tool, and so either have to use Openreach's bulk tool at a high charge or make multiple singleton orders.

⁶⁷⁶ BT's LLU WLR Confidential Compliance Statement 2016-17.

we proposed to remove this basket⁶⁷⁷ and set an individual charge control on MPF Standard Line Test. Given that we were not able to obtain FAC information for the individual service, we proposed to set a flat real cap for the MPF Standard Line Test.⁶⁷⁸

Stakeholder responses

A23.76 We received one stakeholder response on this subject. Openreach⁶⁷⁹ agreed with our proposal of a flat real cap on MPF Standard Line Test. Also, it suggested that the CPI-0% cap should commence in the first year of the control to reflect changes in cost from 2017/18 (with a charge of £3.93) to 2018/19.

Our reasoning and decisions

A23.77 In principle, we would set a charge control on MPF Standard Line Test control at FAC. We do not consider that a LRIC standard would be appropriate because the service does not impose barriers to switching between telecoms providers.

A23.78 However, given the absence of FAC information for this service,⁶⁸⁰ we have decided to implement a flat real cap at £3.93 (current charge),⁶⁸¹ i.e. CPI-0%. In our view this is appropriate because:

- given the relatively low and declining volumes and revenues associated with MPF Standard Line Test,⁶⁸² we consider that it would not be proportionate to build a complex model for this specific service at this time;
- pursuant to the 2014 FAMR Statement, MPF Standard Line Test was previously charge controlled as part of the “Other LLU ancillary services” basket⁶⁸³ and thus the current charge at £3.93 should be broadly aligned with FAC; and
- a flat real cap is likely to avoid a risk of under-recovery for BT, while simultaneously offering customers a protection against price rises in real terms.

⁶⁷⁷ We proposed to move MPF Tie Pair Modifications and MPF Tie Pair Modification to the MPF New Provides basket and also set individual charges on Cancellation of MPF orders for Provide, Migration, Working Line Takeover, Modification of amend, Amend orders. Allowable change to MPF Order.

⁶⁷⁸ Given that the current charge of MPF Standard Line Test is £3.93, a flat cap in nominal or real terms would make little difference in absolute terms.

⁶⁷⁹ Openreach response to the September 2017 WLA Consultation, paragraph 123.

⁶⁸⁰ “Within the RFS, multiple products from the Openreach Price List are reported together under the RFS services. There is no disaggregation for the identified products available below this level for FAC, DSAC or LRIC and therefore we cannot provide the service cost information at the desired level.” Openreach response dated 1 September 2017 to question 3b) of the 35th s.135 notice.

⁶⁸¹ Openreach’s price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=Wk%2B2hSVL2knF5F0Ve%2F1N8zj9r0QWsrM3Qpmu5FcPTOYIMnGHsqdC0vzO163bjmh34D91D7M0q8u%2FIISgtIFAKw%3D%3D> [accessed on 22 December 2017].

⁶⁸² The total revenue for MPF Standard Line Test has decreased from more than £[><]m in 2013/14 to less than £[><]m in 2015/16 (BT’s LLU WLR Confidential Compliance Statement 2016-17).

⁶⁸³ The full list of services of the “Other LLU ancillary services” basket can be found in Annex 29 of the 2014 FAMR Statement.

A23.79 We agree with Openreach’s suggestion that the CPI-0% cap should commence in the first year of the control to reflect changes in cost from 2017/18 (when the charge was at £3.93) to 2018/19, rather than setting a cap at £3.93 in 2018/19,⁶⁸⁴ which does not reflect inflation from 2017/18.⁶⁸⁵

A23.80 We have also decided to impose cost reporting obligations on BT regarding this service, to ensure that accurate cost information will be available for future market reviews (see Annex 8).

LLU Ceases

A23.81 Cease services can be split into two types:

- soft cease (also known as flexi cease) services which cease the service in software but leave physical infrastructure in place and so are largely record keeping services; and
- hard cease services which are for jumper recovery (i.e. physical removal of a jumper from the Main Distribution Frame (MDF)) and which should only occur once the relevant soft cease has been executed (i.e. the line is ceased via software, but jumpers remain in place). Openreach reported total revenue for LLU hard cease services of £35.3m in 2015/16 and £25.7m in 2016/17.⁶⁸⁶

A23.82 Where a telecoms provider wishes to disconnect a service, but is content to leave the cabling in place, it would normally only use a soft cease service (which involves only an update to records, not engineering activity). Most singleton ceases are soft ceases, involving no jumper recovery.⁶⁸⁷

Our proposals

LLU Soft Ceases

A23.83 In our March consultation,⁶⁸⁸ we proposed to set the charges for the two services in relation to LLU soft ceases, MPF and SMPF⁶⁸⁹, at zero. The FAC of MPF soft ceases would be recovered across all MPF line rental charges. For SMPF soft ceases, Openreach would have the pricing flexibility to recover the costs associated with these services from other SMPF services.

⁶⁸⁴ Condition 7A.2(d), Annex 5 – Draft Legal Instruments, September 2017 WLA Consultation.

⁶⁸⁵ The CPI measure for the period of twelve months ending on 31 October 2017 (which consistent with the period used for the CPI calculation in the legal instruments) is 3%.

<https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7g7/mm23> [accessed 26 January 2018]. The cap for MPF Standard Line Test in the first relevant year is thus $£3.93 \times (1 + \text{CPI}) = £3.93 \times (1 + 0.03) = £4.05$.

⁶⁸⁶ BT’s 2017 RFS, pages 31 and 34.

⁶⁸⁷ July 2013 FAMR Consultation, Volume 2, paragraph 4.165.

⁶⁸⁸ March 2017 WLA Consultation, paragraphs 3.86-3.87.

⁶⁸⁹ SMPF is a declining service. We think that telecoms providers should face low barriers in their process of switching away from SMPF. BT is able to recover the costs related to SMPF soft ceases from other non-charge controlled services, such as WLR rentals.

- A23.84 We considered that it was important that barriers to soft cease activities were minimised. By setting soft cease charges to zero, we would make it possible for all customers to switch telecoms provider without incurring unnecessary costs.
- A23.85 The imposition of an LLU cease charge at the retail level may deter customers from switching providers. We have previously explained that cease charges such as Early Termination Charges imposed by telecoms providers could adversely affect competition and customer switching, and that these charges are not transparent to customers. We have highlighted the importance of switching costs on competition in previous consultations and statements on customer switching.⁶⁹⁰

LLU Hard Ceases

- A23.86 In the March consultation,⁶⁹¹ we proposed to impose a FAC-based charge control on the LLU Hard Ceases basket.
- A23.87 We considered that the FAC of MPF hard ceases should be recovered through the “MPF MDF remove Jumper Order Singleton/Bulk Charge” services and that the FAC of SMPF hard ceases should be recovered through the “SMPF MDF remove Jumper Order Singleton/Bulk Charge” services.
- A23.88 We also proposed to keep an alignment of charges between MPF hard cease services and their SMPF equivalents, since services with broadly similar engineering activity should be charged the same. We noted that in 2016/17 less than 3% of MPF rentals and more than 86% of SMPF rentals were internal to BT.⁶⁹² This suggested that in the absence of our proposed alignment of charges, BT may have an incentive to concentrate the charge increases on MPF hard cease services in the Hard Ceases basket.

Stakeholder responses

- A23.89 Openreach agreed with our proposal for these services, noting that FAC was the appropriate cost standard for hard ceases since the activity does not create any barrier to switching.⁶⁹³ No respondent raised concerns on our proposals regarding LLU ceases.

Our reasoning and decisions

LLU Soft Ceases

- A23.90 We have decided to set MPF Cease and SMPF Cease charge controls at zero. We expect the FAC for MPF ceases to already be incorporated within 2016/17 MPF FAC. Openreach will

⁶⁹⁰ 2012 Consumer Switching Consultation, paragraph 1.4.

<http://stakeholders.ofcom.org.uk/binaries/consultations/switching-fixed-voice-broadband/summary/condoc.pdf>; 2013 Consumer Switching Statement, paragraph 1.2.

https://www.ofcom.org.uk/_data/assets/pdf_file/0033/76569/consumer_switching.pdf.

⁶⁹¹ March 2017 WLA Consultation, paragraphs 3.79-3.85.

⁶⁹² BT's 2017 RFS, page 31.

⁶⁹³ Openreach response to the March 2017 WLA Consultation, Volume 2, paragraphs 80-82.

be able to recover the costs related to SMPF soft ceases from other non-charge controlled services, such as WLR rentals. We have taken this decision for the following reasons.

- First, to mitigate the risk that telecoms providers will levy cease charges in retail markets and so raise barriers to switching. The imposition of an LLU cease charge at the retail level may deter consumers from switching telecoms providers. We are concerned that high Early Termination Charges could adversely affect competition and consumer switching. In particular, we are concerned that cease charges may not be transparent to consumers when choosing between telecoms providers.
- Second, unlike hard cease services, there is no engineering activity for soft ceases and consequently the incremental costs of the cease activity are relatively low.⁶⁹⁴

A23.91 We note that this approach is consistent with our decision for LLU soft ceases in the 2014 FAMR Statement.

LLU Hard Ceases

A23.92 Hard ceases involve removing jumpers from the MDF that would otherwise remain in place after customers switch. LLU Singleton Jumper removal services are used by telecoms providers when they require BT to physically disconnect cabling they use to connect a copper line to their equipment. This is normally done when the telecoms provider needs space for other services or BT requires the telecoms provider to rationalise the frame space that the telecoms provider uses. Jumper removal services can be a termination cost that telecoms providers face when a customer switches to a new supplier that could be passed onto customers.

A23.93 In 2015/16 and 2016/17, LLU hard cease services continued to be purchased in significant volumes.⁶⁹⁵ Maintaining an LLU Hard Ceases basket that is distinct from other LLU ancillaries should reduce the scope for Openreach to game basket controls.

A23.94 In principle, we consider that unnecessary barriers should not be imposed in relation to ceasing and therefore moving away from MPF or SMPF services. We have conducted an assessment as to whether a FAC or LRIC cost standard would be appropriate for the Hard Ceases basket.

A23.95 In our view, FAC of MPF hard ceases should be recovered through the “MPF MDF remove Jumper Order Singleton/Bulk Charge” services, and the FAC of SMPF hard ceases should be recovered through the “SMPF MDF remove Jumper Order Singleton/Bulk Charge” services. This is because:

- First, the circumstances where a charge control at LRIC would be appropriate (see Section 2) do not apply to hard ceases.
- Second, the difference between LRIC and FAC for the Hard Ceases basket is low given the low level of common costs allocated to this basket. In practice, the cost standard

⁶⁹⁴ 2014 FAMR Statement, paragraph 4.136.2.

⁶⁹⁵ BT’s 2017 RFS, pages 31 and 34.

choice for the charge control on hard ceases is unlikely to have a material impact on their basket control.

- Third, it limits the burden of regulation by ensuring that Openreach can recover its efficiently incurred costs allocated to LLU hard ceases without the need for a potentially complex common cost reallocation to MPF and SMPF main rentals.

A23.96 Therefore, we have decided to maintain our proposed approach to regulating LLU hard ceases by having a basket for the LLU Hard Ceases based on FAC. We note that this approach is consistent with our decision in the 2014 FAMR Statement.

A23.97 We have also decided to align charges between MPF hard cease services and the SMPF equivalents, i.e. services that involve broadly similar engineering activity should be charged the same.⁶⁹⁶ In 2016/17 c. 2% of MPF rentals were internal to Openreach, while for SMPF rentals more than 86% were internal to Openreach.⁶⁹⁷ This suggests that in the absence of an alignment of charges, there would be an incentive for Openreach to concentrate any charge increases on MPF hard cease services in the Hard Ceases basket.

GEA Ceases

A23.98 When an end customer wishes to cease the fibre broadband service and revert to MPF, SMPF or ISDN, Openreach may send an engineer to remove jumpers at the cabinet. Openreach has suggested that this only happens in a small number of GEA FTTC ceases, so most ceases do not require an engineer to visit the local exchange or cabinet.⁶⁹⁸ Jumpering activity could also be done as part of a new connection (by removing an existing jumper and providing a new jumper).

A23.99 There is no GEA equivalent to a telecoms provider ordering an LLU hard cease. For both FTTC and FTTP, the telecoms provider does not have tie cables specific to the end user.⁶⁹⁹ As such, GEA hard ceases would be general network or operational costs incurred by Openreach.

Our proposals

A23.100 In our March consultation, we proposed to set all GEA cease charges at zero and allow BT to recover the associated costs from the respective main rentals:

- f) to minimise migration costs and promote switching at the retail level; and

⁶⁹⁶ Specifically, the charge for MPF MDF Remove Jumper Order Singleton Charge must be aligned with SMPF MDF Remove Jumper Order Singleton Charge, and the charge for MPF MDF Remove Jumper Order Bulk Charge aligned with SMPF MDF Remove Jumper Order Bulk Charge.

⁶⁹⁷ BT's 2017 RFS, page 31.

⁶⁹⁸ Openreach response dated 17 June 2016 to section H of the 7th s.135 notice.

⁶⁹⁹ VULA provides access to Openreach's NGA network (GEA services) in a way that is similar to how LLU provides access on the Current Generation Access network (MPF and SMPF services). However, rather than providing a physical line, VULA provides a virtual connection that gives telecoms providers a direct link to end users and provides flexibility over how this link is integrated into their network and product offerings.

g) because the incremental costs of a GEA cease are low.

Stakeholder responses

A23.101 Openreach said that it did not disagree with the adoption of MPF cease principles for GEA, but asked us to ensure that the costs related to GEA hard ceases were reflected in the charge controls on the rentals of FTTC 40/10, rather than recovered within FTTC Connections.⁷⁰⁰

Our reasoning and decisions

A23.102 With regards Openreach's response, in principle, we accept that where there is engineering activity to remove jumpers, BT should be able to recover these costs if they are efficiently incurred. However, we would expect that in many cases this could be efficiently done as part of the engineering work associated with a new connection. Thus, we expect these costs are generally already included in connection costs. We note that it is rare for a consumer to cease an SFBB service to move back to SBB (see Volume 1).

A23.103 In line with our approach to LLU soft ceases (discussed above), we do not think that cease charges are appropriate for GEA ceases, and so all costs incurred should be recovered through the main rental (or through a connection charge, for example in the case of a jumper removed at the time of a new connection).⁷⁰¹

A23.104 We have decided to maintain our proposal to set GEA ceases at zero. This applies to all GEA ceases, regardless of the nature (FTTC/ FTTP) or speed of the GEA service and geographic area. We consider that this will be effective in promoting switching, and ultimately competition across networks in all geographic areas.

LLU Co-mingling and Tie Cables baskets

A23.105 Co-mingling services from Openreach offer telecoms providers (who are purchasers of LLU, either MPF and SMPF) a Point of Presence (PoP) for compliant equipment at a MDF site. These services typically include the cost to Openreach of installing, operating and maintaining equipment and accommodation that allows other telecoms providers external to Openreach to use LLU. These services include PoP-related New Provides and Rental services.⁷⁰²

A23.106 Tie cable services allow telecoms providers to connect their equipment in an Openreach exchange to gain access to the copper access network for LLU (to MPF and SMPF). These

⁷⁰⁰ Openreach response to the March 2017 WLA Consultation, Volume 2, paragraph 123.

⁷⁰¹ LLU hard ceases are offered to telecoms providers and allow them to re-arrange and remove cabling to optimise the frame space used in a local exchange. However, with VULA (GEA services) telecoms providers have a virtual connection to end users, which does not require them to manage any cabling and/or space in a local exchange.

⁷⁰² The full list of each individual ancillary service in the Co-Mingling New Provide and Rentals basket can be found in the Annex to Condition 7A in the Legal Instruments of this Statement.

services include the Handover Distribution Frame (HDF) in a telecoms provider's co-mingling space and services that connect the HDF to the MDF.⁷⁰³

A23.107 BT reported for 2016/17 a total revenue of £37.7m for Co-mingling New Provide and Rental services which are used exclusively by external telecoms providers, and £18.8m for Tie Cables (£13.1m internal versus £5.7m external), which was a decrease from £45.7m and £25m respectively in 2015/16.⁷⁰⁴

Our proposals

A23.108 We proposed to retain the existing FAC cost standard for the Co-mingling (New Provides and Rentals) basket and Tie Cables basket (see the 2014 FAMR Statement, paragraph 4.2) and to allow Openreach to recover the full costs of providing these services. We did not consider that it would be appropriate to set charge controls for either of these baskets at LRIC or on the basis of other cost standards.⁷⁰⁵

Stakeholder responses

A23.109 Openreach responded on this topic and agreed with our proposals.⁷⁰⁶

Our reasoning and decisions

A23.110 Services in these baskets are vital for the provision of MPF services and without a charge control, Openreach would be able to increase prices and distort competition in its favour, impacting on the effectiveness of MPF regulation.

A23.111 Turning to the cost standard for the charge control, we remain of the view that it would not be appropriate to set charge controls for these baskets at LRIC or to set the charges in either basket to zero. This is because the conditions under which we would consider a LRIC cost standard, or zero, do not apply in this case (e.g. services that impose barriers to switching).⁷⁰⁷

A23.112 We have therefore decided to implement our proposal and charge control both the Co-mingling (New Provides and Rentals) and Tie Cables baskets at FAC.⁷⁰⁸ This is consistent with the 2014 FAMR Statement.

⁷⁰³ A co-mingling space is the space in the Openreach exchange where the telecoms provider locates its equipment to provide LLU services. The HDF is located within the co-mingling space and is the demarcation point between the Openreach network and the telecoms provider's equipment, where Openreach hands LLU connections to the telecoms provider. The full list of each individual ancillary service in the Tie Cables basket can be found in the Annex to Condition 7A in the Legal Instruments of this Statement.

⁷⁰⁴ BT's 2017 RFS, pages 31 and 34.

⁷⁰⁵ See our principles for choice of cost standard in Section 2. We did not consider that the services in the Co-mingling New Provides and Rentals or Tie Cables baskets were key to the competitive process, for example in supporting customer switching between telecoms providers. We also did not propose to set charge differentials between substitute services at LRIC that might give incentives for cost minimisation.

⁷⁰⁶ Openreach response to the March 2017 WLA Consultation, Volume 2, paragraph 74.

⁷⁰⁷ See Section 2 for the conditions under which we would consider implementing a LRIC cost standard.

⁷⁰⁸ In Annex 12 we discuss the modelling for the Co-mingling (New Provides and Rentals) basket and the Tie Cables basket.

A23.113 In terms of the level of the controls we note that for both Co-Mingling and Tie Cables they imply nominal charges in 2020/21 which lie outside the ranges in the September 2017 Consultation. We have investigated this and in the case of Co-Mingling it is due to the use of updated data, as explained in Annex 12, which we consider to be appropriate. For Tie-Cables the use of outturn 2016/17 costs reduces the misalignment between revenues and costs that we observed in the September 2017 Consultation, meaning that such significant reductions in revenues are no longer necessary.

GEA Cablelink and VLAN moves applied to GEA Cablelink

A23.114 GEA Cablelink is an Ethernet connectivity product used to interconnect Openreach's GEA FTTC and FTTP networks to a telecoms provider's network.⁷⁰⁹ GEA Cablelink is available in two bandwidth variants, 1 Gbit/s and 10 Gbit/s, with the 10 Gbit/s service launched in 2016.⁷¹⁰

A23.115 GEA Cablelink is an essential service for those wishing to provide fibre and full-fibre services over BT's FTTC and FTTP networks. Telecoms providers are likely to need to buy more GEA Cablelinks as their customer bases grow, as demand for higher bandwidths increases and as data usage increases.

A23.116 The two GEA Cablelink services currently only levy one-off connection charges, with no recurring rental charges.

A23.117 VLAN Moves are used to move customer traffic within and between a telecoms provider's GEA Cablelinks at a given headend location⁷¹¹ in order to make the most efficient use of available capacity, thereby maximising available bandwidth for customers.

A23.118 In the 2014 FAMR Statement we did not set controls on the level of any GEA Cablelink or VLAN Moves charges. However, these services were covered by BT's access obligations, and its obligation to provide a GEA service. BT is not currently required to report volumes, revenues or costs for GEA Cablelink, or for VLAN Moves applied to GEA Cablelink. In 2016/17, the total revenue was £[redacted]m for GEA Cablelink ([redacted]% external to BT), and c. £[redacted]m for VLAN Moves applied to GEA Cablelink ([redacted]% external to BT).⁷¹²

A23.119 Openreach's NGA programme is continuing to develop (for instance, we note its NGA2 and Fibre First programmes). This may result in the evolution of the existing 1 Gbit/s and 10

⁷⁰⁹ GEA Cablelink is a distinct service from Ethernet Cablelink, with the latter providing dark fibre connectivity between a telecoms provider's equipment to its network within a BT building, or between two locations within the same BT building. There are also outdoor variants of Ethernet Cablelink that have no equivalent to GEA Cablelink, which is an entirely indoor service.

⁷¹⁰ Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=0RlviN9gWGktCdDGaQ8lFObCjmFDJOVDZEidKC%2F1wh1Z6rNZujnCs99NbIKJZPD9hXYmiiXh6wrCQm97GZMyQ%3D%3D> [accessed 22 December 2017].

⁷¹¹ A headend location is a BT building that hosts the GEA FTTC and/or GEA FTTP headend equipment, principally the OLT, to which telecoms providers interconnect their networks using GEA Cablelink. Headend locations are also referred to as fibre exchanges or parent exchanges in the context of GEA services.

⁷¹² Openreach response dated 1 September 2017 to question 3 of the 35th s.135 notice.

Gbit/s GEA Cablelink products to new services offering greater functionality and/or higher bandwidth options. However no final decisions on such plans have been taken by Openreach at the time of writing.⁷¹³

Our proposals

March 2017 WLA Consultation

A23.120 In our March consultation⁷¹⁴ we proposed a charge control on GEA Cablelink to make the GEA 40/10 rental control effective (if GEA Cablelink were not subject to a charge control, BT would be able to increase GEA Cablelink prices and offset the effect of a charge control on GEA 40/10 rental services). In the absence of specific cost information for GEA Cablelink, we proposed imposing flat nominal caps, based on the prevailing charges at the time.

A23.121 We believed that a flat nominal price cap would at least allow BT to recover its LRIC for each service, on the basis that BT was unlikely to have set and held prices below LRIC. Furthermore, given the nature of the inputs required to produce the GEA Cablelink services, we did not expect the incremental costs to rise over the charge control period.

A23.122 In the case of VLAN Moves, we considered that a charge control was necessary to ensure telecoms providers did not face excessive costs in re-arranging traffic to make the most efficient use of their GEA Cablelink services. In the absence of specific cost information, a cost-based charge control could not be set, therefore we proposed a flat nominal cap equal to the charge at the time of £15 per VLAN Move.

September 2017 WLA Consultation

A23.123 On 8 September 2017, BT announced price reductions for GEA Cablelink, to become effective from 6 October 2017. For the 1 Gbit/s service, the one-off connection charge was reduced from £2,000 to £790, and for the 10 Gbit/s service the connection charge was reduced from £10,000 to £1,800. There remained no rental charges.⁷¹⁵

A23.124 In our September consultation we explained that we had received more information from BT,⁷¹⁶ along with cost estimates from TalkTalk as part of their response to the March

⁷¹³ November 2017 Ethernet Product and Commercial Group meeting, slides 66-67, dated 21 November 2017.

⁷¹⁴ March 2017 WLA Consultation, Volume 2, paragraph 3.233.

⁷¹⁵ See Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=0RlviN9gWGKtCdDGaQ8lFObCjmFDJOVDZEidKC%2F1wh1Z6rNZuinCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D> [accessed 22 December 2017] and announcement: <https://www.openreach.co.uk/orpg/home/updates/briefings/super-fastfibreaccessbriefings/super-fastfibreaccessbriefingsarticles/nga02917.do> [accessed on 22 December 2017].

⁷¹⁶ BT provided volumes and revenues for 2014/15 and 2015/16 in its response dated 9 September 2016 to the s.135 notice to BT dated 18 August 2016, templates "Q25-GEA Actuals" and "Q27-NGA Other Actuals"; actual revenues and volumes for both the 1 Gbit/s and 10 Gbit/s GEA Cablelink services and VLAN Moves for GEA Cablelink for the period 2012/13 to 2016/17 were provided in its response dated 17 August 2017 to questions 1, 2 and 3 of the 35th s.135 notice.

consultation, which together contributed to our assessment of appropriate charges for GEA Cablelink.

A23.125 In our September 2017 WLA Consultation⁷¹⁷ we still considered a charge control on GEA Cablelink was necessary, for the reasons set out in the March consultation. We identified FAC as the most appropriate level of charges. We proposed to make a starting charge adjustment to align charges to FAC, and that BT's price reductions announced in September 2017 were more consistent with the FAC data we had obtained from BT.⁷¹⁸ However, given our analysis of BT's updated data was ongoing at the time of the September consultation, we proposed a range of starting charges with BT's recently announced prices setting the upper bound of the ranges:

- 1 Gbit/s GEA Cablelink, connection charge range of £500 – £790; and
- 10 Gbit/s GEA Cablelink, connection charge range of £1,000 – £1,800.

A23.126 We proposed a flat real cap over the charge control period and, in order to prevent BT circumventing the proposed charge controls associated with connections on GEA Cablelink services, we also proposed a cap on the respective rental charges of zero.

A23.127 Turning to VLAN Moves, on 1 July 2017, BT decreased the price of VLAN Moves from £15 to £11.25, bringing it into alignment with other GEA software-only services. We proposed requiring charges for VLAN moves be aligned with the charges for GEA Bandwidth changes to 40/10, which we also proposed to control at FAC. We proposed requiring BT to report costs and revenues for these services separately within its RFS so that we have better cost information in the future.

Stakeholder responses

A23.128 We received four stakeholder responses on our proposed charge controls for GEA Cablelink and VLAN Moves in the September 2017 WLA Consultation.⁷¹⁹

A23.129 Openreach said that it:

- Agreed with our preference for a FAC rather than a LRIC-based charge control for GEA Cablelink connections in the event that a charge control was imposed, but had a preference for no charge control and only a fair and reasonable pricing obligation. It noted that setting GEA Cablelink connections at LRIC and recovering common costs across GEA main rentals would not incentivise adoption of GEA services, nor would it promote competition or encourage investment.
- Agreed with our proposals for a flat real price cap over the charge control period, though their preference was for a starting charge equal to the current connection prices, followed by a glide to FAC, if necessary, rather than imposing a starting charge adjustment to FAC followed by a flat real cap.

⁷¹⁷ September 2017 WLA Consultation, paragraph 4.11.

⁷¹⁸ BT provided updated FAC data for GEA Cablelink in its response dated 17 November 2017 to question 2 of the 40th s.135 notice.

⁷¹⁹ In the September 2017 WLA Consultation we addressed all responses to the March 2017 WLA Consultation, and we do not address those again here.

- Disagreed with our proposal to cap GEA Cablelink rentals at zero because Openreach was considering new products with a rental charge but lower connection charges.
- In response to our zero-rental proposal, proposed an alternative of balancing connection and rental charges to equal the current connection charges over a five-year period, which it suggested could assist smaller telecoms providers.
- Agreed with setting VLAN Moves at FAC and that 'GEA Bandwidth Modify charges to a GEA 40/10 service' represents a suitable proxy of the level of the charge.⁷²⁰

A23.130 Sky said that:

- the proposed charge control was still too high given the evidence submitted by other stakeholders; and
- we had not reflected any future efficiency in the charge control. Sky considered that costs should be forecasted to be lower and to reduce over the course of the charge control period.⁷²¹

A23.131 TalkTalk said that:

- It agreed with our overall approach of a FAC, cost-based charge control, with a CPI-X%;
- we should set the initial charges based on our best estimate of FAC, rather than use BT's current price as an estimate;
- the difference in price between the 1 Gbit/s and 10 Gbit/s services should equal the incremental cost difference to ensure efficient choice between these potentially substitutable products;⁷²²
- rather than imposing a flat real cap (CPI-0%), the X-value for GEA Cablelink could be based on the X-value for Tie Cables at -3.8% (in 2020/21), which similarly connect between BT's equipment and telecoms providers' equipment within an exchange (albeit using copper rather than fibre), or a greater value considering that scale economies might be expected with GEA Cablelink where they would not be in the case of Tie Cables; and
- telecoms providers who have purchased circuits in the past should be granted a refund because Openreach charged all rentals upfront through the connection charge.⁷²³

A23.132 Vodafone said that:

- BT had informed telecoms providers of the limited available exchange capacity for GEA Cablelink, and that as a result they needed to be very efficient with the quantity and utilisation of available capacity, which implies greater use of VLAN Moves by telecoms providers in order to optimise service quality for end customers; and
- given these constraints, it believed that GEA Cablelink and VLAN Moves should be charged on the basis of LRIC.⁷²⁴

⁷²⁰ Openreach response to the September 2017 WLA Consultation, paragraph 116.

⁷²¹ Sky response to the September 2017 WLA Consultation, paragraphs 22-23.

⁷²² TalkTalk estimated in its response to the March 2017 WLA Consultation that the incremental cost difference between the 1 Gbit/s and 10 Gbit/s GEA Cablelink services was about £3<.

⁷²³ TalkTalk response to the September 2017 WLA Consultation, paragraphs 4.6-4.12.

⁷²⁴ Vodafone response to the September 2017 WLA Consultation, section 1.8.

Our reasoning and decisions

GEA Cablelink

A23.133 In order to support the effectiveness of the charge control we are introducing on GEA 40/10 rental services, we have decided to introduce individual cost-based charge controls on the connection charge for the 1 Gbit/s and 10 Gbit/s GEA Cablelink services.⁷²⁵

A23.134 We have decided to set the level of these charge controls at FAC. GEA Cablelink is an essential pre-requisite service for GEA FTTC and GEA FTTP, the costs for which are recovered by telecoms providers across all their fibre service customers. Pricing GEA Cablelink at LRIC and re-allocating common costs to GEA rentals would not change the total cost to fibre service customers, and therefore the likely take-up. Other reasons for considering a LRIC-based charge, in particular to promote competition and encourage investment, do not apply in the case of GEA Cablelink.

A23.135 Vodafone's preference for GEA Cablelink to be charge controlled at LRIC due to an apparent shortage of capacity at headend exchanges does not meet the criteria for applying a LRIC-based charge control, as set out in Section 2.

Data provided to us on the cost of GEA Cablelink

A23.136 As a result of the March and September consultations, and in response to specific requests for information we have made to Openreach, we have gained a better understanding of the constituent costs of GEA Cablelink services. Openreach provided us with an analysis of the cost of GEA Cablelink which grouped costs into the following cost categories⁷²⁶:

- direct equipment costs for SFPs (small form-factor pluggable lasers) and fibre optic cable⁷²⁷;
- direct labour costs for planning and installation; and
- various ancillary costs, derived from the RFS.

A23.137 In BT's cost analysis, the direct equipment and labour costs were converted to estimated FACs by the use of 'Uplift for FAC' metrics, based on pre-existing analogous metrics:

- SFP used the 'GEA DSLAM & Cabinets' metric;

⁷²⁵ The alternative of a basket control applied to the two GEA Cablelink connection charges could be gamed by BT and would not ensure a price ratio consistent with the LRIC ratio to promote productive efficiency (see Section 3, heading on "Weighting price changes and consideration of additional controls within baskets").

⁷²⁶ BT provided volumes and revenues for 2014/15 and 2015/16 in its response dated 9 September 2016 to questions 25 and 27 of the s.135 notice dated 18 August 2016; actual revenues and volumes for both the 1 Gbit/s and 10 Gbit/s GEA Cablelink services and VLAN Moves for GEA Cablelink for the period 2012/13 to 2016/17 were provided in Openreach response dated 17 August 2017 to questions 1, 2 and 3 of the 35th s.135 notice; actual and forecast revenues for both the 1 Gbit/s and 10 Gbit/s GEA Cablelink services and VLAN Moves for GEA Cablelink for the period 2008/09 to 2017/18 were provided in Openreach response dated 18 September 2017 to question 8 of the 36th s.135 notice; and actual costs for 2016/17 for GEA Cablelink were provided in Openreach response dated 27 October 2017 to the 40th s.135 notice.

⁷²⁷ GEA Cablelink is comprised of a terminated fibre optic cable and a 1 Gbit/s or 10 Gbit/s SFP laser, as appropriate to the service. All other network equipment, such as the layer 2 Ethernet switch into which the SFP would plug, are considered part of the GEA FTTC or FTTP access network, the costs for which will be recovered through the rental charge for the GEA FTTC or FTTP service.

- fibre used the ‘LLU Tie Cables’ metric;
- planning direct labour cost assumed to be an overhead and left unchanged; and
- installation direct labour cost was also left unchanged.

A23.138 The constituent FACs were then converted to estimated LRICs with individual LRIC to FAC ratios. We use the LRICs for 1 Gbit/s and 10 Gbit/s GEA Cablelinks for the purposes of our common cost reallocation between the two services as discussed further below.

Our approach to estimating the cost of GEA Cablelink

A23.139 Given that BT does not separately report GEA Cablelink in its RFS, there is a lack of certainty regarding the appropriate treatment of certain costs, in particular regarding the level of FAC uplift. There is also significant uncertainty associated with the forecasted volumes of GEA Cablelink services over the charge control period.⁷²⁸

A23.140 Given these uncertainties, which could potentially result in the GEA Cablelink FAC being above or below BT’s estimates, we make a series of simplifying assumptions as it is not clear to us that taking a different, more complex approach would result in a more accurate and robust estimate of costs.

A23.141 Our starting point is Openreach’s approach to estimating the FAC of GEA Cablelink, then we reallocate common costs between the 1 Gbit/s and 10 Gbit/s GEA Cablelinks. We have:

- Reviewed BT’s direct costs – we have used Openreach’s 2016/17 direct costs, which we consider reasonable, except for 10 Gbit/s SFP lasers which showed a large price drop between 2016/17 and future years.⁷²⁹ We have therefore used the price for future years.
- Used the ‘Uplift for FAC’ metric and LRIC to FAC ratios in 2016/17 provided by Openreach to estimate FAC and LRIC based on the direct costs. We have assumed these ratios remain constant over the charge control period.⁷³⁰
- Calculated common costs as the difference between LRIC and FAC (as calculated above) and allocated common costs between the 1 Gbit/s and 10 Gbit/s services based on the LRIC ratio of the two services, consistent with the EPMU approach we have adopted for common cost allocation between the MPF and GEA 40/10 rental services. In the absence of service volume forecasts from Openreach for GEA Cablelink connections over the charge control period, we estimated the volumes using a proxy of the growth in headline bandwidth across the entire GEA FTTC and GEA FTTP residential end customer base over the same period.⁷³¹

⁷²⁸ Openreach does not currently produce forecasts for GEA Cablelink, with the task of estimating such forecasts made more challenging by the introduction of the 10 Gbit/s GEA Cablelink service in 2016/17, resulting in a lack of trend data.

⁷²⁹ Openreach response dated 10 November 2017 to question 8 of the 40th s.135 notice.

⁷³⁰ Openreach response dated 17 November 2017 to question 2 of the 40th s.135 notice.

⁷³¹ Volume forecasts for GEA Cablelink were only available up to 2017/18, as detailed in Openreach response dated 1 September 2017 to question 2 of the 35th s.135 notice.

A23.142 The LRIC ratio between 1 Gbit/s and 10 Gbit/s services is of approximately 2. We note that a cost increase of a factor of 2 between these services is consistent with our observation of pricing for commercial 1 Gbit/s and 10 Gbit/s services.⁷³²

A23.143 Given the reduction in GEA Cablelink charges since 2016/17 (resulting from our analysis), we note that the impact of further analysis to refine the charges is likely to be minimal relative to overall GEA revenues. As such, we have not carried out further detailed analysis to consider whether other ‘Uplift for FAC’ and LRIC to FAC ratios more accurately capture the particular characteristics of the GEA Cablelink services.

A23.144 We assume that the FAC for each of the GEA Cablelink services does not change significantly over the charge control period, due in part to the countervailing effects of labour and general cost inflation versus efficiency savings.^{733 734}

Our implementation of a charge control on GEA Cablelink services

A23.145 With BT’s current costs for GEA Cablelink below its prices for the service,⁷³⁵ and in order to incentivise early investment, we have decided to impose a starting charge adjustment at the level of FAC in 2020/21, with a flat nominal cap for the duration of the charge control.⁷³⁶ We do not agree with BT’s rationale for applying a glidepath to the charge control, for the reasons set out in Section 3.

A23.146 Based on this analysis, we have decided to set a flat nominal cap⁷³⁷ from 1 April 2018 to 31 March 2021⁷³⁸ for the:

- connection charge of 1 Gbit/s GEA Cablelink at £525; and
- connection charge of 10 Gbit/s GEA Cablelink at £1,050.⁷³⁹

⁷³² See Section 2. To incentivise efficient choices between the 1 Gbit/s and 10 Gbit/s services (i.e. productive efficiency), we have allocated common costs on the basis of the LRIC ratio for the GEA Cablelink services. For example, a LRIC ratio of 3 means that the incremental cost of GEA Cablelink 10 Gbit/s is three times as much the incremental cost of GEA Cablelink 1 Gbit/s. Thus, in the absence of common costs, for telecoms providers that wish to buy capacity up to 3 Gbit/s it is less expensive to buy multiple 1 Gbit/s Cablelink, while for telecoms providers that wish to buy capacity above 3 Gbit/s it is less expensive to buy one 10 Gbit/s GEA Cablelink. We considered that the price ratio should not be affected by the common cost allocation.

⁷³³ The efficiency treatment takes account of paragraph 23 of Sky response to the September 2017 WLA Consultation.

⁷³⁴ The SFP laser costs were provided for the entire charge control period; optical fibre cable costs were only provided up to 2016/17 and are assumed to be static over the charge control period; labour and other RFS costs were extrapolated from 2016/17 using labour uplift and efficiency metrics.

⁷³⁵ Openreach response dated 17 November 2017 to question 2 of the 40th s.135 notice.

⁷³⁶ Flat nominal caps are consistent with our modelling cost exercise in nominal terms (i.e. it includes inflation) for GEA Cablelink connections. In our March 2017 WLA Consultation we considered flat nominal caps for GEA Cablelink connections, however for different reasons than those we are considering in this Statement.

⁷³⁷ In considering the FAC, we have used our efficiency and labour inflation metrics, which results in the FAC not changing significantly over the charge control period.

⁷³⁸ The period of application of the charge control is consistent with the scope of our market review.

⁷³⁹ Both of the GEA Cablelink charge controls will apply to GEA FTTC and GEA FTTP in all geographies, because the service might be used simultaneously for GEA FTTC and GEA FTTP services.

A23.147 We have also decided to set rental charges of both 1 Gbit/s and 10 Gbit/s GEA Cablelink at zero (as per current charges), for the purpose of supporting the effectiveness of the GEA Cablelink connection charge controls set out above.⁷⁴⁰

A23.148 Finally, we consider it is appropriate to require BT to report costs and revenues for GEA Cablelink separately within its RFS so that we have accurate financial information in the future. We discuss this and other regulatory financial reporting obligations in Annex 8.

VLAN Moves applied to GEA Cablelink

A23.149 We consider that the cost of GEA Bandwidth changes should be a good proxy for VLAN Moves as they are both similar in nature, only requiring software changes to be made. Furthermore, Openreach said it agreed with us that bandwidth modify represents a suitable proxy for VLAN Moves.⁷⁴¹

A23.150 We proposed in our September 2017 WLA Consultation and have now decided that the appropriate cost standard for these services should be FAC as the circumstances where we consider LRIC is appropriate do not apply here (see Section 2). We have decided to implement this by requiring charges for VLAN Moves to be aligned with the charges for GEA bandwidth changes to 40/10 which we also control at FAC.⁷⁴² We note that this approach is consistent with other services used for network optimisation rearrangements (e.g. in the Hard Ceases basket).

A23.151 In addition, we consider it is appropriate to require BT to report costs and revenues for VLAN Moves applied to GEA Cablelink separately within its RFS so that we have accurate financial information in the future. We discuss this and other regulatory financial reporting obligations in Annex 8.

Our approach to pricing for new GEA Cablelink and VLAN Moves services

A23.152 In the event that Openreach introduces new GEA Cablelink or VLAN Moves services within the charge control period, such as those associated with the NGA2 network, we note that:

- a) While the new GEA Cablelink or VLAN Moves services co-exist with the current NGA1 GEA Cablelink and VLAN Moves services that are subject to the above charge controls, the new services would be subject to our general remedies, including the requirement for Openreach to provide network access at fair and reasonable charges. In this particular case, in considering whether charges, terms and conditions are fair and reasonable we would take into account whether charges are cost reflective, including charges incurred by providers when moving from existing services to new services.

⁷⁴⁰ We note that the SMP Conditions do not prevent Openreach from offering payment options on their connection charges such as payment in several instalments for smaller telecoms providers.

⁷⁴¹ Openreach response to the September 2017 WLA Consultation, paragraph 116.

⁷⁴² For the avoidance of doubt, the charge control for VLAN Moves will apply to both GEA FTTC and GEA FTTP in all geographies. The reason this applies to all geographies is for consistency with the charge control for GEA Cablelink.

- b) Should Openreach replace the current GEA Cablelink and VLAN Moves services with new GEA Cablelink and VLAN Moves services, respectively, during the charge control period, such a situation is likely to amount to a material change to the charge controlled GEA Cablelink and VLAN Moves services. Should this be confirmed to be the case, the charge controls for the GEA Cablelink and VLAN Moves services being replaced would apply to the new services, subject to any reasonable adjustment as Ofcom may direct.⁷⁴³ In practice, we would expect Openreach to approach Ofcom prior to replacing the services so that Ofcom may assess whether an adjustment is appropriate in the circumstances and consult on any proposals.

MPF and GEA Optimisation and Repair services

TRCs and SFIs

A23.153 Time Related Charges (TRCs) refer to engineering services where the work is not covered by BT's terms of service.⁷⁴⁴ They are charged for MPF and GEA services on a per-visit or per-hour basis for an engineer and can vary depending on when the work takes place, e.g. inside or outside normal business hours.⁷⁴⁵ These charges largely relate to the cost of an engineer's time (including direct and indirect costs). BT reported for TRCs a total revenue of £37.6m both in 2015/16 and 2016/17.⁷⁴⁶

A23.154 Special Fault Investigations (SFIs) are services requested by telecoms providers to further investigate faults on an MPF or SMPF service where the standard line test reports "OK", i.e. no fault has been found.⁷⁴⁷ The service is sold in individual modules with investigative work carried out at various points between (and including) the exchange and customer premises/wiring.⁷⁴⁸ We understand that the cost of SFI work is largely based on direct and indirect labour engineering time charged on an hourly incremental basis, and end-user or exchange visit costs where applicable. BT reported for SFIs a total revenue of £32.9m in 2015/16 and £38.5m in 2016/17.⁷⁴⁹

Other GEA Optimisation and Repair services

⁷⁴³ See Condition 7B.6 in the Legal Instruments in Annex 33. Additional SMP Conditions (e.g. Conditions 8 (Publication of a Reference Offer), 9 (Notification of charges and terms and conditions) and/or 10 (Notification of technical information)) may apply depending on the relevant circumstances. See Section 6 of Volume 1 for further information on the general SMP remedies we are imposing.

⁷⁴⁴ Description of BT's Time Related Charges available at

<https://www.openreach.co.uk/orpg/home/products/serviceproducts/timerelatedcharges/timerelatedcharges.do> [accessed 20 December 2017].

⁷⁴⁵ Openreach's price list

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=pBzHTRfO4GXC12qz7DCzqUP54d5RrQ9TQD%2BRDuYwQUEIMnGHsqdC0vzO163bJmh34D91D7M0q8u%2FIISgtIFAKw%3D%3D> [accessed 20 December 2017].

⁷⁴⁶ BT's 2017 RFS, pages 31 and 34.

⁷⁴⁷ Description of BT's SFIs available at <https://www.openreach.co.uk/orpg/home/products/serviceproducts/sfi2/sfi2.do> [accessed 20 December 2017].

⁷⁴⁸ The modules being: Base, Network, Frame, Internal wiring, Internal equipment, Coop, and Frame direct.

⁷⁴⁹ BT's 2017 RFS, pages 31 and 34.

A23.155 BT also provides other GEA optimisation and repair services which we discuss in turn:

- Superfast Visit Assure (SFVA);
- Fibre Broadband Boost;
- GEA in-tariff and premium repair – SML2, 3 and 4;
- Superfast Recharge; and
- Remote Assure (multicast only).

A23.156 SFVA is used when an end customer has a problem with their fibre service and the standard GEA line test result is “OK”. Like Fibre Broadband Boost and SFIs, the service aims to improve the speed and reliability of a customer’s broadband. The engineer can work on the customer’s premises to determine the location and nature of the issue including review and replacement of wiring and termination points (if an undetected issue in the Openreach domain is the cause, e.g. jumper issue at the cabinet, the telecoms provider will not be charged).⁷⁵⁰ SFVA is currently priced at £130.⁷⁵¹ Total revenue for SFVA [£], with external revenues representing 47% to 57% of the total revenue.⁷⁵²

A23.157 The context in which SFVA might be used by telecoms providers is largely the same as for an MPF SFI or TRC (MPF or GEA): some of the work carried out on this service can only be undertaken by BT. Moreover, in advance of the visit to the customer’s premises, telecoms providers do not know whether any work required will be on BT’s network or beyond the Network Terminating Equipment (NTE).

A23.158 Fibre Broadband Boost is used when customers have a problem with their fibre service and the standard GEA line test result is “OK”. Similar to SFVA, it aims to improve the speed and reliability of the customer’s broadband, but it offers additional facilities to SFVA, for example the telecoms providers can specify additional components (e.g. carry and replace telecoms provider’s provided devices).⁷⁵³ The total revenue for Fibre Broadband Boost is 100% internal to BT and [£].⁷⁵⁴

A23.159 GEA in-tariff and premium repair – SML2, 3 and 4 are used if a customer has a problem with their fibre service. The standard SML2 offers a fix by the end of the next working day including Saturdays at no extra charge, while SML3 (at £37.20 per year) offers a fix more

⁷⁵⁰ Openreach response dated 6 March 2017 to question 1 of the 25th s.135 notice.

⁷⁵¹ Openreach’s price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=0RlviN9gWGKtCdDGaQ8IFO bCjmFDJOVDZEidKC%2F1wh1Z6rNZujnCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D> [accessed 18 December 2017].

⁷⁵² Openreach response dated 1 September 2017 to question 3 of the 35th s.135 notice.

⁷⁵³ Openreach response dated 6 March 2017 to question 1 of the 25th s.135 notice.

⁷⁵⁴ Openreach response dated 13 July 2017 to question 6 of the 27th s.135 notice.

rapidly than SML2, and SML4 (at £48 per year) more rapidly than SML3.⁷⁵⁵ Total revenues for GEA SML3 and 4 have been low in previous years.⁷⁵⁶

A23.160 Superfast Recharge is used to improve the speed of a GEA-FTTC installation where a new customer's actual speed is less than predicted within 28 days of a self-install. BT engineers can work on: customer wiring/equipment; BT network (customer's premises); BT external network; and/or Frames.

A23.161 Remote Assure (multicast only) is used to remotely check, and if necessary repair, the configuration of the Multicast VLAN at each point in the network, and will check the flow of traffic to ensure that traffic is being presented correctly. Remote Assure (multicast only) is currently priced at £50,⁷⁵⁷ and its total revenue has been below £50k both in 2014/15 and 2015/16.⁷⁵⁸

Our proposals

MPF Optimisation and Repair services

A23.162 In our March consultation, we proposed to impose separate charge controls for MPF TRCs and SFIs and to require that any replacement service(s) for existing MPF TRCs and SFIs remain within the scope of our charge controls.

A23.163 We considered that FAC was the appropriate cost standard because the reasons that we have used to set the level of the charge controls for some ancillary services at LRIC (e.g. reduce barriers to switching and, ultimately, promote competition) do not apply to TRCs and SFIs.

GEA Optimisation and Repair services

A23.164 In our March consultation, we proposed:

- a FAC-based charge control to TRCs in relation to GEA services; and
- flat nominal caps at the current charges to SFVA at £130, and Fibre Broadband Boost at £159. We proposed to require that any replacements of these services were also within the scope of our proposed price regulation.⁷⁵⁹

A23.165 We proposed not to impose price caps on:

⁷⁵⁵ Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=to6u3F12FmH4GL92i3NosR9iCKrrD%2FZpzK1a%2FvJOccNZ6rNZujnCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D> [accessed 22 December 2017].

⁷⁵⁶ Total revenue (per year) for GEA SML3 and 4 was below £[><]m in 2014/15 and 2015/16. Openreach response dated 6 March 2017 to question 1d) of the 25th s.135 notice.

⁷⁵⁷ Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=BGsObZmZkXxTeKZ%2B1TUSB%2FvP446MIFzyWzwkT4Sjy%2FhZ6rNZujnCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D> [accessed 22 December 2017].

⁷⁵⁸ Openreach response dated 6 March 2017 to question 1.d) of the 25th s.135 notice.

⁷⁵⁹ This was intended to prevent BT from being able to game the proposed charge controls by introducing new Optimisation and Repair services.

- GEA SML3 and 4 (as we considered there was a competitive constraint from SML2's charge control);
- Superfast Recharge (as these services were launched during 2015/16 and total revenue was relatively low, thus it was still unclear whether a charge control was required); and
- Remote Assure (as this was a service for multicast only and we were not proposing to charge control multicast).

A23.166 Finally, we proposed all the remaining charges related to GEA Optimisation and Repair services would be subject to the general SMP remedies we proposed, i.e. price notification, no undue discrimination, fair and reasonable terms, conditions, and charges.

Stakeholder responses

A23.167 We received two stakeholder responses on our proposed charge controls for Openreach's Optimisation and Repair services.

A23.168 Openreach said that:

- In case of a charge control on TRCs and SFIs, it agreed that FAC was the correct cost standard but believed that the hourly rates that we proposed for TRCs and SFIs were understated, which would result in BT being unable to recover its efficiently incurred costs.
- We should set a control on the average task times across SFIs rather than on the individual timings for each module control. This was because the timing per module was not readily available on its system, created complexity in the setting of charges and reporting of costs.
- It disagreed with setting the price in 2018/19 on a fixed task time that cannot be amended for three years because it believed more flexibility would be beneficial to allow these services to evolve.
- Charge controls on GEA TRCs were unnecessary and disproportionate because the current charges (not under a charge control) were already at the proposed level.
- Superfast recharge, remote assure, Fibre Broadband Boost and SFVA should not be charge controlled as they were not reasonably required for the provision of FTTC services. However, if these services were to be charge controlled, Openreach said that they should be under a price cap at current prices in real terms.
- It was not clear that Ofcom had met the necessary statutory requirements to impose new price controls on GEA optimisation and repair services on Openreach, in particular, whether these complied with sections 47 and 88 of the Act, including: that such conditions were objectively justifiable and proportionate, and establishing that there was a relevant risk arising from price distortion.⁷⁶⁰
- It disagreed with our definition of the MPF SFI hourly charge set out in a clarifications and corrections document (20 April 2017)⁷⁶¹ for calculating the MPF SFI charges, and

⁷⁶⁰ Openreach response to the March 2017 WLA Consultation, Volume 2, paragraphs 133-147.

⁷⁶¹ Clarifications and corrections to the WLA Market Review consultation document of 31 March 2017, https://www.ofcom.org.uk/_data/assets/pdf_file/0017/101078/wla-market-review-200417.pdf.

instead said that the MPF SFI hourly charge should be calculated in accordance with the TRC for an additional hour (8am to 5pm on a Working Day). Also, it said that the initial draft of the legal instrument in the March 2017 WLA Consultation cross-referred to Supplementary Charges (Per Hour) Non-Working Day, which was correct. This was because, while this was the charge for additional hours out of hours work (currently £52.80), this was the same value as the current hourly cost of labour. Alternatively, Ofcom could refer to the Additional Line Shifted, as this service reflects one hour of labour at FAC.⁷⁶²

A23.169 TalkTalk said that:

- We should acquire sufficient information to be able to set a reasonably accurate FAC-based charge control for SFVA and Fibre Broadband Boost. Also, it said that a flat nominal cap was unlikely to lead to prices at cost by the end of the control period, although it was more appropriate than not imposing a charge control at all.
- SFI charges should be based on their LRIC, rather than FAC, because a FAC-based charge control allowed a profit margin for Openreach, which would incentivise it to allow fault rates to rise and to not repair faults effectively.⁷⁶³

Our reasoning and decisions

MPF Optimisation and Repair services

A23.170 We have considered whether Openreach's TRCs applied to MPF are likely to be constrained by potential competition. This depends on whether it would be realistic for non-Openreach engineers to undertake the work. In the case of repairs, Openreach will not charge TRCs if the fault was found to be on Openreach's network and can only be repaired by a Openreach engineer. This is because the visit and repair are part of normal service delivery. Openreach will charge TRCs if:

- the fault is found to be not on Openreach's network (and could be repaired by a non-Openreach engineer)⁷⁶⁴; or
- the fault is on Openreach's network, but the damage has been caused by the end customer (only a Openreach engineer can make the repair).

A23.171 The higher the proportion of visits where a fault is found on Openreach's network, the less economical it would be to send a non-Openreach engineer.

A23.172 It is difficult for telecoms providers to know in advance of an engineer's visit whether any charges would be applied or not. As telecoms providers do not know for certain whether TRCs will be charged, this tends to make it unlikely to be economical to send a non-Openreach engineer because of the risk that the fault could be repaired as part of Openreach's normal service delivery.

⁷⁶² Openreach response to the September 2017 WLA Consultation, Volume 2, paragraphs 138-140.

⁷⁶³ TalkTalk response to the March 2017 WLA Consultation, paragraphs 5.16-5.20 and 5.39.

⁷⁶⁴ The fault may or may not be repaired by the BT engineer depending on whether prior authorisation has been given by the telecoms provider, but a charge will anyway be made for the visit.

A23.173 Telecoms providers can try to determine with the end customer whether the fault is likely to be on Openreach's network through diagnostic tests. However, even if no issue is found, there can still be faults on the Openreach network. For example, a line may pass the diagnostic check where there is an intermittent fault.

A23.174 Furthermore, the evidence suggests that it is difficult for telecoms providers to identify the location of a fault with sufficient accuracy as the remote diagnostic tests and processes, while informative, do not categorically specify whether the fault is on or off Openreach's network. Similarly, while in-home checks with the customer can be useful, they may not always conclusively ascertain whether the work needed is on or off Openreach's network. Moreover, we understand that line test errors can happen, which may undermine telecoms providers' confidence in their accuracy.

A23.175 In theory many of these services can be provided by any engineer. However, the practical difficulties of assessing whether a non-Openreach engineer could carry out the work means it is unlikely to be economical to use non-Openreach engineers and that these services are not contestable.

A23.176 We consider that the situation with SFIs is broadly similar to that of TRCs. Some of the work undertaken on SFIs can only be undertaken by Openreach (that is, work on Openreach's network). Moreover, in advance of the visit to the customer's premises, telecoms providers do not know whether any work required will be on Openreach's network or beyond the NTE. We therefore consider that similar reasoning for TRCs is likely to apply to SFIs, and that Openreach's SFI charges are also unlikely to be constrained sufficiently by competition from other providers.

A23.177 Consequently, and in line with our conclusions in the 2014 FAMR Statement, we do not consider these services are sufficiently contestable. Therefore, there is a risk that Openreach could charge excessively high prices and telecoms providers would have little option but to pay. We believe that Openreach's ability to excessively price and distort competition should be constrained.

A23.178 We have decided to impose separate charge controls for MPF TRCs and SFIs and to require that any replacement service(s) for existing TRCs and SFIs remain within the scope of our charge controls.

A23.179 We have decided to apply the charge control to each TRC applied to MPF and each SFI charge component separately because:

- An average task time compliance, as suggested by Openreach, would give Openreach flexibility to exploit the control in its favour, and to the disadvantage of external telecoms providers.⁷⁶⁵
- The individual SFI charge controls do not prevent Openreach from launching new SFI services during the charge control period. Condition 7C.6 of the legal instruments sets

⁷⁶⁵ For example, during the control period, BT would be able to decrease the time for tasks falling in volume, while increasing the time for tasks growing in volume in a way that would comply with the time control (on average) but expanding the SFI expenditure to telecoms providers, in particular, the external ones.

that the engineer time in relation to SFIs will be determined by Openreach as at 1 April 2018 as being required by an engineer in order to complete the corresponding SFI. This will give an opportunity to Openreach to update its SFI's engineer times and respective services. But even if Openreach does not change the activities covered in the SFI services and the respective engineer time on 1 April 2018, it will be entitled to launch new SFI services afterwards. In that case, the existing charge controlled services will pose a competitive constraint on the charges for any new services that Openreach may wish to launch in the future. Our SFI charge controls will be reviewed as part of the next market review, where we will take account of any new services launched by Openreach.

A23.180 We note that our decision is consistent with our 2014 FAMR Statement.

A23.181 TRC and SFI charges do not impose unnecessary barriers to switching. As such, in line with the principles that we have set out, we consider that FAC, rather than LRIC, is the appropriate cost standard to use in setting the charge control.

A23.182 Given the similar nature of the services, we have decided to align SFI charges with the equivalent reported TRC costs.⁷⁶⁶ Specifically, we consider that SFI charges should be made up of the following components:

- SFI visit component charge: only incurred where a visit charge is included in the module, and will be equal to the visit charge element in the TRC Standard Chargeable Visit on a normal working day.⁷⁶⁷
- SFI hourly component charge: which is equal to the equivalent hourly TRC cost on a normal working day. We agree with Openreach that the SFI hourly charge should be the same as the Supplementary Charges (Per Hour) Non-Working Day and the charge for Additional Line Shifted (currently aligned at £52.80). That response is consistent with our proposal in our clarifications and corrections document (20 April 2017) for 2018/19.⁷⁶⁸ For 2019/20 and 2020/21, we will apply the X-levels derived for TRCs and SFIs as a whole (see Annex 12), which will allow the charges to remain aligned. This approach is consistent both with Openreach's response to our September consultation and our clarifications and corrections document (20 April 2017) because we are implementing the same X-levels for all TRCs and SFIs.

A23.183 The SFI module charges should equal the SFI hourly component charge multiplied by the average duration to complete each module (rounded to the nearest penny). Where the module includes a visit element,⁷⁶⁹ the SFI visit component charge will be added to the module price.

⁷⁶⁶ See Annex 12 for further details on the derivation of the charge controls for TRCs and SFIs.

⁷⁶⁷ The TRC visit component is equal to the Standard Chargeable Visit charge minus the Additional Hour charge on a normal working day.

⁷⁶⁸ Clarifications and corrections to the WLA Market Review consultation document of 31 March 2017, https://www.ofcom.org.uk/_data/assets/pdf_file/0017/101078/wla-market-review-200417.pdf. See the table entitled "Proposed charge controls for TRCs and SFIs (base case)", where the 2018/19 charge controls for MPF SFI hourly charge, Supplementary Charges (Per Hour) Non-Working Day, and Additional Line Shifted are aligned at £46.46.

⁷⁶⁹ The SFI modules that include a visit element are: Base Module, and Frame Direct Module.

A23.184 While we are setting the maximum hourly (and visit) rate in an SFI module, Openreach will have discretion over the average module duration that ultimately informs the module price. Openreach will be required to ensure its SFI module prices on 1 April 2018 reflect its best estimate of average module durations and the SFI hourly component charge (with or without the SFI visit component charge, as discussed above), but will not be permitted to make subsequent revisions to the module duration during the review period. This is to incentivise efficiencies in reduced task times during the charge control period (as this would have no downward impact on the charges, and so Openreach would keep any gains over the period).

A23.185 Our approach potentially gives Openreach a high degree of flexibility over starting SFI prices as it is ultimately in control of its average module duration estimates and so could overstate the time taken to complete a module. However, we have incorporated in the SMP condition for SFIs that the amount of time determined by Openreach as being required by an engineer in order to complete the corresponding module (used to calculate the SFI prices) must be fair and reasonable. We consider that this provides protection from Openreach unduly overstating SFI module durations so as to increase the module prices. Further, the legal conditions provide Ofcom with a power of direction to determine the average module duration for the purposes of the SFI charge control. This is consistent with our approach in the 2014 FAMR Statement.⁷⁷⁰

A23.186 In relation to TalkTalk's issue that a FAC-based charge control would incentivise Openreach to allow fault rates to rise and not repair them effectively, we set out our decisions to address Openreach's incentives to invest in network quality in the 2018 QoS Statement. Those decisions also address Openreach's potential incentive to underinvestment in network quality as a means to expand the demand for TRCs and SFIs which are controlled at FAC (above incremental cost) and, ultimately, over-recover the common cost allocated to these services.

A23.187 We cover the modelling issues for TRCs and SFIs, including those raised by stakeholders and summarised above, in Annex 12. Table A23.4 below summarises our charge controls for MPF TRCs and SFIs.

⁷⁷⁰ 2014 FAMR Statement, Volume 1, paragraph 18.172.

Table A23.4: Charge controls for MPF TRCs and SFIs

Service	Current charge (£ nominal) ⁷⁷¹	Form of control	Charge control for 2018/2019 (£ nominal)	Charge control for 2019/20	Charge control for 2020/21
Standard Chargeable Visit (8am to 5pm on a Working Day)	£96.11	CPI-X	£83.57	CPI-9.3%	CPI-2.8%
Standard Chargeable Visit (Saturday or outside 8am to 5pm on a Working Day)	£117.76	CPI-X	£102.39	CPI-9.3%	CPI-2.8%
Standard Chargeable Visit (Non-Working Day)	£139.40	CPI-X	£121.21	CPI-9.3%	CPI-2.8%
Additional Hour (8am to 5pm on a Working Day)	£43.29	CPI-X	£37.64	CPI-9.3%	CPI-2.8%
Additional Hour (Saturday or outside 8am to 5pm on a Working Day)	£64.94	CPI-X	£56.47	CPI-9.3%	CPI-2.8%
Additional Hour (Non-Working Day)	£86.60	CPI-X	£75.30	CPI-9.3%	CPI-2.8%
Supplementary Charges (Per Visit) (Saturday or outside 8am to 5pm on a Working Day)	£26.40	CPI-X	£22.95	CPI-9.3%	CPI-2.8%
Supplementary Charges (Per Visit) (Non-Working Day)	£52.80	CPI-X	£45.91	CPI-9.3%	CPI-2.8%

⁷⁷¹ See Openreach price list for “Time Related Charges (Including Shifts)”: <https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=pBzHTRfO4GXC12qz7DCzqUP54d5RrQ9TQD%2BRDuYwQUEIMnGHsqdC0vzO163bJmh34D91D7M0q8u%2FIISgtIFAKw%3D%3D> [accessed 31 January 2018].

Service	Current charge (£ nominal) ⁷⁷¹	Form of control	Charge control for 2018/2019 (£ nominal)	Charge control for 2019/20	Charge control for 2020/21
Supplementary Charges (Per Hour) (Saturday or outside 8am to 5pm on a Working Day)	£26.40	CPI-X	£22.95	CPI-9.3%	CPI-2.8%
Supplementary Charges (Per Hour) (Non-Working Day)	£52.80	CPI-X	£45.91	CPI-9.3%	CPI-2.8%
Internal and External Shifts	£105.60	CPI-X	£91.82	CPI-9.3%	CPI-2.8%
Additional Line Shifted	£52.80	CPI-X	£45.91	CPI-9.3%	CPI-2.8%
MPF Special Fault Investigation 2 (SFI 2) – Hourly Charge	£52.82 ⁷⁷²	CPI-X	£45.91	CPI-9.3%	CPI-2.8%
MPF Special Fault Investigation 2 (SFI 2) – Visit Charge	£52.82 ¹⁴⁷	CPI-X	£45.93	CPI-9.3%	CPI-2.8%

Source: Output from our control module. Openreach's price list [accessed 31 January 2018]

GEA Optimisation and Repair services

GEA TRCs

A23.188 The analysis that we have set out above for MPF TRCs is directly applicable for TRCs in respect of GEA services and does not require repetition. We have decided to apply a FAC based charge control to each TRC and our analysis for MPF TRCs is directly applicable for TRCs in relation to GEA services. For the avoidance of doubt, the TRCs charge control does not apply to FTTP lines in geographies where FTTP main rentals are not charge controlled. Also, in response to Openreach, we consider that the charge controls on GEA TRCs satisfy the legal tests set out in the Act and would be in accordance with our legal duties for similar reasons as for MPF TRCs, which were charge controlled in the 2014 FAMR Statement and are being charge controlled again for this charge control period (see our discussion on the legal tests in Section 5).

⁷⁷² The actual charge applied by BT for this service is not publicly available, as this is a component of bundled services. We have instead provided in this table the applicable charge control for 2016/17, which was £52.82 and expired on 31 March 2017.

Superfast Visit Assure

A23.189 As for MPF SFIs and TRCs, in practice, SFVA is not contestable, and we therefore consider it necessary to constrain Openreach's ability to price excessively. We note that over the last three financial years (2014/15 to 2016/17), the SFVA revenues have been growing with 47 to 57% coming from external telecoms providers. However, given the relatively low volumes and materiality of revenues associated with SFVA, we consider that it would not be proportionate to build a complex model (subject to a degree of uncertainty as is intrinsic to any modelling activity) for this specific service at this time.

A23.190 SFVA does not impose barriers to switching and as such a LRIC cost standard would not be appropriate. On the one hand, we would expect the SFVA cost to increase with inflation, on the other hand, the current price may be above cost, and there may be cost efficiencies that would drive the price down in a competitive market. However, given the lack of detailed cost information,⁷⁷³ we have decided that a flat nominal cap at £130, i.e. CPI-CPI, is appropriate because:

- broadly comparable services to SFVA, e.g. TRCs and MPF SFIs, with current charges controlled at FAC, have broadly comparable charges to SFVA;⁷⁷⁴ and
- we implicitly assume an X-level equal to CPI, which in December 2017 was at 3%.⁷⁷⁵ This is broadly comparable to the underlying cost trend associated with other broadly similar services such as MPF SFIs over the charge control period.⁷⁷⁶

A23.191 For the avoidance of doubt, the SFVA charge control does not apply to FTTP lines in geographies where FTTP main rentals are not charge controlled. Also, we have decided to impose cost reporting obligations on Openreach regarding SFVA to ensure that accurate cost information will be available for future market reviews.⁷⁷⁷

A23.192 Also, in response to Openreach, we consider that the charge control on SFVA satisfies the legal tests set out in the Act and would be in accordance with our legal duties for similar reasons as for MPF SFIs and TRCs, which were charge controlled in the 2014 FAMR Statement and are being charge controlled again for this charge control period (see our discussion on the legal tests in Section 5).

Fibre Broadband Boost

⁷⁷³ Openreach said that it "cannot provide the service cost information at the desired level". Openreach response dated 1 September 2017 to question 3 of the 35th s.135 notice.

⁷⁷⁴ For example, the current charge for MPF Special Fault Investigation 2 (SFI2) - Base module is £125.46. Also, the current charge for Standard Chargeable Visit (Visit plus up to 1 hour's work) is between £96.11 and £139.40 depending on the time and day of the week, while the charge for an Additional Hour is between £43.29 and £86.60. Openreach's price list available at <https://www.openreach.co.uk/orpg/home/products/pricing/loadPricing.do> [accessed 22 December 2017].

⁷⁷⁵ <https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7g7/mm23> [accessed 26 January 2018].

⁷⁷⁶ See Table A12.11 for the adjusted X-values for SFIs from 2018/19 to 2020/21. The average X-value across the three years is around -4.5%, which we use as a reference point for SFVA. However, there is a degree of uncertainty on the X-values for SFIs. Also, we note that there may be reasons to consider the cost of SFVA above MPF SFIs (e.g. the average work for SFVA may take longer than the average work for an MPF SFI, or specific training may be required for an engineer to do SFVA). In our view, a flat nominal cap strikes the right balance between the risk of under-recovery for BT and protecting consumers against excessive prices.

⁷⁷⁷ We discuss this and other regulatory financial reporting obligations in Annex 8.

A23.193 While Fibre Broadband Boost is an ancillary service that forms part of the WLA market and should be subject to our general SMP remedies, we have decided that it would not be proportionate to charge control Fibre Broadband Boost alongside SFVA because:

- There is a degree of substitution between Fibre Broadband Boost and SFVA, i.e. the former offers additional facilities to the latter, for example the telecoms providers can specify additional components (e.g. carry and replace telecoms providers' devices). Thus, the price cap on SFVA (i.e. the service without additional components) will act as an anchor and constrain the price of Fibre Broadband Boost.⁷⁷⁸
- External revenues for SFVA are much more significant than for Fibre Broadband Boost, which are currently 100% internal.⁷⁷⁹

A23.194 We consider that the general SMP remedies, including fair and reasonable charges (see Section 6 of Volume 1), are sufficient to provide protection for customers against high prices for Fibre Broadband Boost.

A23.195 While Openreach provides a description of the Fibre Broadband Boost service on its website,⁷⁸⁰ the terms and price of the service are only available upon enquiry. Openreach said that both Fibre Broadband Boost and Superfast Recharge are supplied under bespoke contracts which enables telecoms providers to tailor the products to their specific needs and as such the prices are not contained within the Openreach price list.⁷⁸¹ Openreach should ensure that the terms of access for this service are sufficiently transparent to other telecoms providers.

GEA in-tariff and premium repair

A23.196 We have decided that it would not be proportionate to charge control GEA premium repair – SML3 and 4 because by charge controlling GEA 40/10 rentals we are also charge controlling GEA in-tariff SML2,⁷⁸² which acts as an anchor to SML3 and 4, and because of the low materiality of the premium services. We note this is also consistent with our previous decisions in the 2014 FAMR Statement, e.g. for WLR we decided to charge control the Basic line rental but not the Premium line rental.

Superfast Recharge

⁷⁷⁸ Openreach response dated 6 March 2017 to question 1 of the 25th s.135 notice. Also, the view that there are alternative services to Fibre Broadband Boost (e.g. SFVA) was supported by other telecoms providers (TalkTalk's letter dated 30 November 2017; Vodafone's e-mail dated 19 January 2018; and Sky's e-mail dated 16 January 2018).

⁷⁷⁹ BT's Fibre Broadband Boost description is publicly available at <https://www.openreach.co.uk/orpg/home/products/serviceproducts/broadbandboost/broadbandboost.do> [accessed 22 December 2017].

⁷⁸⁰ See <https://www.openreach.co.uk/orpg/customerzone/products/serviceproducts/broadbandboost/productdescription/description.do> (login required) [accessed 12 February 2018].

⁷⁸¹ Openreach response dated 13 July 2017 to question 6c) of the 27th s.135 notice.

⁷⁸² SML2 is included in GEA rental services by default.

A23.197 While Superfast Recharge is an ancillary service that forms part of the WLA market and is subject to our general SMP remedies, we have decided that a charge control on Superfast Recharge would not be proportionate because:

- it is a relatively recent GEA service launched during 2015/16;⁷⁸³ and
- the revenue and volumes are low and falling. The total revenue [\pounds], while Openreach volume forecasts are [\pounds] from 2017/18 to 2020/21.⁷⁸⁴

A23.198 We consider that the general SMP remedies, including fair and reasonable charges, are sufficient to provide protection for customers against high prices for Superfast Recharge.

A23.199 The price of Superfast Recharge is not currently available on the Openreach price lists.⁷⁸⁵ Openreach should ensure that the terms of access for this service are sufficiently transparent to other telecoms providers.

Remote Assure

A23.200 We have decided that a charge control on Remote Assure (multicast only) would not be appropriate because we are not imposing charge controls on Multicast for GEA Product (rentals and respective ancillary services). In our view, at this point in time Multicast for GEA Product is not an essential service for broadband provision as telecoms providers may adopt different approaches for concurrent streaming.⁷⁸⁶ Instead, to the extent multicast is reasonably necessary for the provision of network access, the general SMP remedies are the most appropriate form of regulation for Multicast for GEA Product, including Remote Assure (multicast only).

Summary

A23.201 We have decided to:

- apply a FAC based charge control to each MPF and GEA TRC, and our analysis for MPF TRCs is directly applicable for TRCs in relation to GEA services;⁷⁸⁷
- apply a flat nominal cap at the current charge, £130, to SFVA;⁷⁸⁸ and
- not apply a charge control to the other GEA optimisation and repair services, which will be subject to the general SMP remedies, including fair and reasonable terms, conditions, and charges.

⁷⁸³ Openreach response dated 6 March 2017 to question 1d) of the 25th s.135 notice.

⁷⁸⁴ Openreach response dated 13 July 2017 to questions 4-6 of the 27th s.135 notice.

⁷⁸⁵ Openreach GEA FTTC price list [accessed on 12 February 2018]:

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=0RlviN9gWGKtCdDgaQ8IFO bCjmFDJOVDZidKC%2F1wh1Z6rNZujnCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D>; Openreach GEA FTTP price list [accessed on 12 February 2018]:

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=M80QNeH46o4g6JKGD604v TypQOKfNn%2Beo6vmovhAOBZZ6rNZujnCs99NbIKJZPD9hXYmijxH6wr%0ACQm97GZMyQ%3D%3D>.

⁷⁸⁶ Multicast is more useful to telecoms providers with a sufficiently large customer base that consumes the same linear content (e.g. IPTV). Even in such cases telecoms providers may use unicast as an alternative to multicast.

⁷⁸⁷ For the avoidance of doubt, the TRCs charge control does not apply to FTTP lines in geographies where FTTP main rentals are not charge controlled.

⁷⁸⁸ For the avoidance of doubt, the SFVA charge control does not apply to FTTP lines in geographies where FTTP main rentals are not charge controlled.

Abortive Visit Charges

A23.202 An Abortive Visit Charge (AVC) is applied where an appointment is agreed for work at a customer's site and the engineer arrives within the appointment slot but is unable to carry out the work at, or gain access to, the customer's site. Currently, AVCs are not charge controlled, and Openreach charges £90 for an AVC, which has not changed since August 2013.⁷⁸⁹

Our proposals

A23.203 In the September consultation, we said we continued to consider that AVCs should not be subject to a charge control. We said that it was likely that the price for this service was set to incentivise telecoms providers to ensure that their customers are at home for the agreed time and it was likely to be difficult to observe the opportunity costs for the other activities that the engineer might have been doing absent the appointment.

A23.204 We said that customers would be protected by the general SMP remedies if implemented, i.e. price notification, no undue discrimination, fair and reasonable terms, conditions and charges. Also, we proposed cost reporting obligations on Openreach's AVCs.

Stakeholder responses

A23.205 We received four stakeholder responses on our proposals for AVCs. Openreach agreed that there was no need for a charge control on AVCs, while Sky, TalkTalk and another telecoms provider were in favour of a charge control.

A23.206 Openreach said that:

- AVCs needed to be sufficiently high (above cost) to prevent inefficient use of engineering resource; and
- AVCs were linked to the payment made for Missed Appointments. The linkage between the two items were understood by the industry and historically no issues have been raised with the value of these items.⁷⁹⁰

A23.207 Sky said that:

- the current charge at £90 did not seem cost-oriented, while assessing these costs can be no more difficult than assessing other engineering costs, which Ofcom does routinely;
- AVCs can incentivise telecoms providers and consumers to not miss or abandon visits by engineers, but this was likely to persist even where the charge is more reflective of costs; and

⁷⁸⁹ Openreach's price list at

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=GkB126nkZeU8iCLzoNC7laDd6sNMGW33hRaUUitTutA4IMnGHsqdC0vzO163bJmh34D91D7M0q8u%2FIISgtlFAKw%3D%3D> [accessed 18 December 2017] for further detail.

⁷⁹⁰ Openreach response to the September 2017 WLA Consultation, paragraphs 161-164.

- high profits on AVCs will incentivise Openreach to levy this charge excessively for its financial gain.⁷⁹¹

A23.208 TalkTalk said that:

- the cost (or opportunity cost) of a missed appointment was no more difficult to assess than the cost of a repair or provision job of a certain length given that an AVC was simply another use of engineering resource (albeit a rather inefficient one);
- other SMP remedies than a charge control would not effectively protect consumers from excess charges since they did not prevent Openreach from over-recovering;
- it was not acceptable that Openreach over-recovered its costs due to Openreach's inadequate cost information;
- telecoms providers should not have to submit disputes to demonstrate that the AVC level is plainly inefficient;
- if the charge was not set at cost, then the excessive profit (i.e. revenue less FAC costs of AVC including WACC) should be deducted from the cost of other products by reducing those products' common cost allocations; and
- we should confirm that the capitalised AVC cost is not recovered against another rental charge.⁷⁹²

A23.209 [X] said that:

- it would urge us to introduce a charge control on AVCs; and
- AVCs were in many cases passed on to the consumer, particularly in the residential market, and could act as a disincentive to request an engineering visit, which could lead to long resolution times for line faults.⁷⁹³

Our reasoning and decisions

A23.210 The Table A23.5 below sets out the revenue, FAC and Revenue-FAC differential for AVCs from 2014/15 to 2016/17.

Table A23.5: Revenue, FAC and Revenue-FAC for AVCs

AVCs (£m)	2014/15			2015/16			2016/17		
	Int	Ext	Total	Int	Ext	Total	Int	Ext	Total
Revenue	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
FAC	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]
Revenue-FAC	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]	[X]

Source: Openreach's response dated 1 September 2017 to question 3 of the 35th s.135 notice

⁷⁹¹ Sky response to the September 2017 WLA Consultation, paragraphs 2.4-2.8.

⁷⁹² TalkTalk response to the September 2017 WLA Consultation, paragraphs 1.2, 4.23-4.27.

⁷⁹³ [X] response to the November 2017 Regulatory Financial Reporting Consultation, page 5.

- A23.211 Table A23.5 above shows that the total AVC revenues (and volumes), as well as the differential Revenue-FAC, are relatively low and decreasing.⁷⁹⁴ This suggests that the concern over potentially excessive AVCs is lower now than at the time of publication of our 2014 FAMR Statement, when we also decided not to charge control AVCs. Furthermore, the data published in BT's 2016 and 2017 RFS regarding new external (WLR and MPF) connections and the volumes for external AVCs reported by Openreach (in response to question 1 of the 35th s.135 notice) show that the ratio of AVCs to new provisions ordered by external telecoms providers is small and decreasing.⁷⁹⁵
- A23.212 Reallocating common costs as TalkTalk suggested would put static efficiency ahead of dynamic efficiency in a way that we do not find appropriate considering our objectives set out in Section 2, in particular to preserve the investment incentive faced by BT as well as by its competitors. Moreover, we do not think that it would be proportionate to set a charge control on AVCs as it is broadly under customers' control to avoid AVCs. For this reason, we do not agree that AVCs could act as a disincentive to request an engineering visit, as suggested by a telecoms provider (paragraph A23.206 above).
- A23.213 Sky (paragraph A23.204 above) said that Openreach could levy AVCs excessively. However, given that AVCs should be driven by customer behaviour, Openreach cannot charge for AVCs whenever it wants, or incentivise end customers to miss an appointment.⁷⁹⁶
- A23.214 High AVCs (above cost) give further incentive to customers to prevent inefficient use of engineering resource. We consider that the general SMP remedies, including fair and reasonable charges, are sufficient to provide protection for customers against high prices. We note this approach is consistent with our previous decisions, in particular the 2014 FAMR Statement.
- A23.215 We have decided to impose cost reporting obligations on BT regarding AVCs (see Annex 8) even though this charge is not subject to a charge control. This publication will allow stakeholders to compare the cost of AVCs against the charges they pay. When setting AVCs, we expect that Openreach complies with the general SMP remedies, including fair and reasonable charges, and if there is evidence suggesting otherwise we will be able to investigate and consider taking action.

⁷⁹⁴ See WLA volumes model. Our understanding is that BT currently capitalises AVC costs. This means that the AVC cost (FAC) in Table A23.5 above are potentially inaccurate, as the costs will reflect historical capitalised AVCs. We will therefore require BT not to capitalise the costs incurred on AVCs. See Annex 8 for further details. Despite the above, we can observe that both the external and total AVC revenue is relatively low and decreasing. [3<]

⁷⁹⁵ In 2014/15 there were 241,119 new WLR external connections (BT's 2016 RFS, page 35) and 2,107,287 MPF New Provide external services (BT's 2016 RFS, page 41), but only [3<] external AVCs (Openreach response dated 1 September 2017 to question 1 of the 35th s.135 notice). This means that even if all external AVCs were purchased for new external customers, less than [3<]% of those external customers required an AVC in 2014/15. In 2016/17 there were 130,494 new WLR external connections (BT's 2017 RFS, page 37) and 2,090,584 MPF New Provide external services (BT's 2017 RFS, page 31), but only [3<] external AVCs (Openreach response dated 1 September 2017 to question 1 of the 35th s.135 notice). This means that even if all external AVCs were purchased for new external customers, less than [3<]% of those external customers required an AVC in 2016/17.

⁷⁹⁶ If telecoms providers have a concern that Openreach may levy AVCs when it should not apply, i.e. when there was not effectively an abortive visit, this is an issue on the process of how Openreach raises AVCs, and how telecoms providers verify the abortive visit. This issue is independent of the AVC level.

A24. Risk to BT's cost recovery from mixed usage

- A24.1 This annex considers the potential effects of relaxing usage restrictions of the PIA remedy on BT's ability to recover its costs from regulated services in the business connectivity markets. In doing so, we consider the extent to which our generic mixed usage rule is likely to mitigate impacts in such markets.
- A24.2 Relaxing usage restrictions will allow telecoms providers to use PIA for business connectivity services in certain circumstances. This may have the effect of increasing competitive pressure on some of Openreach's business connectivity wholesale active products. As a consequence, Openreach might see a reduction in its leased lines volumes, which could affect BT's ability to recover its costs from regulated products.
- A24.3 In the 2016 PIA Consultation, we illustrated the potential cost recovery implications by identifying the regulated services which may come under greater competitive pressure, and the costs associated with these services that might theoretically be at risk.⁷⁹⁷ Several stakeholders commented on our methodology to illustrate possible impacts. A number of stakeholders thought that we were overestimating the cost recovery at risk and observed that BT has consistently over-recovered costs in recent years. Conversely, Openreach said that we were not truly reflecting the risks to Openreach's cost recovery, and made detailed comments on our assumptions.
- A24.4 In the April 2017 DPA Consultation, we updated our illustrative figures to reflect the cost recovery impact of a generic mixed usage rule, and to take account of stakeholders' comments. As well as considering our own estimate of the relevant services at risk and their associated costs, we presented Openreach's estimate based on different assumptions as a sensitivity. We also sought to reflect Openreach's concern that telecoms providers could substitute a disproportionately large number of leased lines by targeting a limited number of high density areas. Specifically, we assumed that telecoms providers using PIA would target exchange areas with the highest percentage of non-residential premises first.
- A24.5 A small number of stakeholders commented on our updated analysis presented in the April 2017 DPA Consultation:
- a) Openreach repeated its argument that we had not truly reflected the risk to its cost recovery, claiming that our estimate incorrectly identified the relevant services at risk and their associated costs.⁷⁹⁸ Openreach also argued the impact on cost recovery if telecoms providers target areas of high density could be greater than we estimated, and presented illustrative evidence in support of this.⁷⁹⁹

⁷⁹⁷ We also explained that whether usage restrictions were removed completely, or only partially (i.e. mixed usage) is likely to have some bearing on the proportion of volumes that are subject to greater competitive pressure and therefore the actual impact on BT's cost recovery.

⁷⁹⁸ Openreach response to the April 2017 DPA Consultation, paragraph 369.

⁷⁹⁹ Openreach response to the April 2017 DPA Consultation, paragraph 374.

- b) TalkTalk considered that the mixed usage rule would not pose any meaningful risk to BT's overall cost recovery and noted that we could monitor this through the market review period.⁸⁰⁰ [3<] agreed that the impact on the active leased line market would be minimal within the review period.⁸⁰¹ Zayo said that we had failed to "take into account the incremental revenues Openreach will receive from an overall growth in the fibre market caused by the requirement for small cell network densification and the requirement to backhaul high bandwidth mobile services".⁸⁰²

A24.6 We have updated our illustrative figures of the potential cost recovery impact of a generic mixed usage rule to take account of stakeholders' comments. In what follows, we present our reasoning and decisions on:

- the regulated services which could come under increased competitive pressure due to relaxing usage restrictions in the local access area; and
- the extent to which a mixed usage rule would limit telecoms providers' ability to target customers of business connectivity services, including density considerations.

Relevant services at risk and their costs

A24.7 In the 2016 PIA Consultation, we sought to identify the regulated services which we thought may come under greater competitive pressure as a result of relaxing usage restrictions, and the unavoidable costs associated with these services that might theoretically be at risk, based on BT's volumes and costs in 2014/2015.⁸⁰³ We considered an extreme case, in which all regulated leased line services identified as being at risk are replaced by leased lines supplied by telecoms providers using PIA. The steps in our approach were as follows:

- a) BT's fully allocated costs (FAC) of regulated services in the business connectivity markets totalled £917m in 2014/15.⁸⁰⁴

⁸⁰⁰ TalkTalk response to the April 2017 DPA Consultation, paragraph 3.8.

⁸⁰¹ [3<].

⁸⁰² Zayo response to the April 2017 DPA Consultation, page 7.

⁸⁰³ In estimating the pool of cost that could be potentially at risk, we relied on BT's Regulatory Financial Statements (RFS) 2014/15, containing data on regulated services in the business connectivity markets, and their fully allocated costs. We supplemented RFS information with additional information which BT regularly reports to Ofcom (AFI-C3). We identified the set of services that would be at risk, and the costs that could be avoidable, to arrive at our illustrative figures. Given that the analysis was based on 2014/2015 data, we took into account the regulatory framework in force at that moment (as per 2013 BCMR Statement).

⁸⁰⁴ The estimation is based on the FAC attributed to services in BT's Regulatory Financial Statements. It therefore excludes support services (e.g. excess construction charges).

- b) We assumed that Traditional Interface (TI) circuits would be unlikely to become under greater competitive pressure if we were to relax usage restrictions. This assumption was based on the conclusions in past BCMRs including the 2016 review, that newer generation services were not a substitute for these legacy services.⁸⁰⁵ This left the FAC of Multiple Interface (MI) and Alternative Interface (AI) services.⁸⁰⁶
- c) We explained that not all of the FAC attributed to these MI and AI services would be at risk since the FAC includes certain costs that could be avoided in the event that Openreach loses a leased line to a telecoms provider using PIA. For the purpose of this exercise, we excluded the FAC of active equipment.⁸⁰⁷ We divided the remaining costs into costs that are common across markets, which are likely to be unavoidable, and other allocated costs, which most likely comprise a mix of avoidable and unavoidable costs. Common costs were calculated as FAC minus DLRIC. Other allocated costs were calculated as DLRIC minus the FAC of Ethernet electronics. We said that we expect the relevant set of costs at risk to include the common costs but only a proportion of the other allocated costs.
- d) We excluded the cost corresponding to services which are used to provide fixed backhaul connections. This is because telecoms providers would not be allowed to use PIA to build fixed backhaul connections given our view that any changes to usage restrictions should remain bounded by the existing wholesale local access area (i.e. between a network termination point and a local access node). Therefore, we excluded the costs associated with pure backhaul services (Ethernet Backhaul Direct, Backhaul Extension Services and Main Links), as well as a proportion⁸⁰⁸ of the costs associated with other leased lines services reflecting the extent to which they are used for backhaul purposes.⁸⁰⁹

A24.8 Based on these assumptions, we estimated that the costs corresponding to the pool of services that might in theory be at risk if PIA was used to replace all leased lines would

⁸⁰⁵ TI services are valued for their high-quality service characteristics, but the majority are low bandwidth (2Mbit/s and below) and low cost relative to other leased lines. Given the declining trend in TI services and relatively low price, we assumed that rivals to BT will not enter the market to provide low bandwidth TI services using PIA.

⁸⁰⁶ The MI and AI markets defined in BCMR 2013 were replaced by the market for Contemporary Interface Symmetric Broadband Origination Services (CISBO) in BCMR 2016. See footnote 116 of BCMR 2016.

⁸⁰⁷ We used information of Ethernet electronics in tables 8.7.2, 8.8.2 and 8.9.2 of BT's 2014/2015 RFS to obtain total FAC corresponding to electronics of the AI and MI regulated services (£177m).

⁸⁰⁸ We used a database that Ofcom built as a part of the BCMR 2016 review to identify the percentage of Openreach's services which are used for connectivity between network nodes. The database is based on an inventory of all Openreach's leased lines and network sites from all telecoms providers collected during the BCMR 2016 consultation process through various information requests. The database specifies, for each circuit end, whether it is connecting a customer or a network site. We used this data to obtain the percentage of circuits which were connecting two network sites (i.e. without a customer end) for each of the services specified above. Specifically: 7% of 10/100 Mbit/s AI lines, 18% of EAD LA 1Gbit/s, 38% of EAD other 1Gbit/s, 19% of WES 1Gbit/s, 45% of WDM services and 40% of WES above 1Gbit/s were excluded.

⁸⁰⁹ Openreach requested further clarification as to how we calculated the costs associated with backhaul services (£248m). The FAC of these services was £288m. However, as the costs associated with Ethernet electronics for these services had already been subtracted in the previous step, we added this back based on the per service figures available in BT's 2014/2015 RFS, to avoid subtracting the same costs twice.

range between £174m (common costs) and £243m (common costs and other allocated costs) per year.

- A24.9 In its response to the 2016 PIA Consultation, Openreach challenged a number of assumptions and presented illustrative figures based on an alternative set of assumptions.⁸¹⁰
- a) Openreach argued that telecoms providers using PIA would target TI users as well, which would accelerate migration from TI to AI circuits. It considered that this may not lead to complete replacement of the TI circuit base, but should be expected to increase substitution. Openreach assumed that 50% of the costs associated with TI lines would be at risk.⁸¹¹
 - b) Openreach disagreed with the way we computed common costs and argued that electronic equipment costs were not fully avoidable. In particular, Openreach argued that unless restrictions are in place to limit customers switching before the asset life of the equipment has expired, these costs would still be at risk. Openreach assumed that only 50% of electronic equipment FAC should be treated as avoidable. In addition, given that DLRIC is a measure of long run incremental cost which does not factor in short-term issues, Openreach proposed to consider 20% of DLRIC as common costs (rather than “other allocated costs”). Openreach also argued that LRIC may be an alternative measure of incremental costs, rather than DLRIC.⁸¹²
 - c) Openreach disagreed that Main Links would not be used in the Wholesale Local Access Area, and assumed 50% of the costs of those services would be at risk. Openreach argued that a large portion of current Main Link functionality relates to the transmission between the copper serving exchange serving the customer site at one end of the active circuit, to a neighbouring exchange.⁸¹³
- A24.10 Based on this alternative set of assumptions, Openreach presented revised illustrative figures which estimated the pool of costs at risk in the range of £[<] and £[<] per year.⁸¹⁴
- A24.11 In the April 2017 DPA Consultation, we considered both our own estimate of the pool of costs at risk (see paragraph A24.8) as presented in the 2016 PIA Consultation and, as a sensitivity, we considered the alternative pool of costs presented by Openreach (see paragraph A24.10).

⁸¹⁰ “Our illustration highlights that by correcting the four assumptions within the Ofcom analysis, the estimated cost recovery at risk could increase by [<]%. This demonstrates the sensitivity of these parameters and that systematic understatement could radically underestimate the cost recovery risks to Openreach and its wider customer base.” Openreach response to the 2016 PIA Consultation, paragraph 350.

⁸¹¹ Openreach response to the 2016 PIA Consultation, paragraphs 344 and 346.

⁸¹² Openreach response to the 2016 PIA Consultation, paragraphs 344 and 346.

⁸¹³ Openreach response to the 2016 PIA Consultation, paragraphs 344 and 346.

⁸¹⁴ Openreach said that there were further assumptions which must also be reviewed to provide a more representative picture of risk. Openreach provided just one example relating to the cost of regulated services – the possibility that telecoms providers would target high density, high value areas with minimal investment, and putting a disproportionate amount of fixed and common cost recovery at risk. We present our updated views on this below.

A24.12 In response to the April 2017 DPA Consultation, Openreach did not propose an updated figure for the relevant pool of costs at risk, however, it again challenged our assumptions about the relevant services at risk and their costs.⁸¹⁵

Our reasoning and decisions

A24.13 We recognise that our estimates are illustrative and acknowledge that there is uncertainty around the impact of the use of PIA to replace leased lines and the effect this will have on BT's cost recovery. However, since these are illustrative estimates of the total pool of costs associated with services at risk in the extreme case where PIA is used to replace leased lines across the UK as a whole (which is highly unlikely, especially given our proposal to adopt the mixed-use approach) we do not think it necessary to produce precise estimates.

A24.14 Nevertheless, we set out below our views on Openreach's specific arguments set out in response to the 2016 PIA Consultation:

- a) As explained in the April 2017 DPA Consultation, we do not accept Openreach's assumption that 50% of TI circuits would be at risk. Customers already have the option of substituting TI circuits for other services (including those offered by Openreach), such as Ethernet or broadband products. Although it is possible that having additional options based on use of PIA could influence migration rates, we would expect any impact to be small.⁸¹⁶ Moreover, even if migration rates were to increase slightly, some of these customers could migrate to FTTP connections. Such migration would be possible under the pre-existing usage restrictions. Therefore, while we acknowledge that the additional impact from mixed usage may not be zero, we do not consider it would be material.

⁸¹⁵ Openreach response to the April 2017 DPA Consultation, paragraph 369. Openreach again disagreed with; our assumptions that excluded 100% of costs associated with TI services, active equipment and Main Links.

⁸¹⁶ In the 2016 BCMR Statement, we concluded that the rate of migration from TI to Ethernet services was unlikely to be strongly influenced by movements in relative prices. See paragraph 5.35 of 2016 BCMR Statement, Volume 1.

- b) We acknowledge that electronic equipment assets could become stranded if a customer switched to a PIA-based provider before the cost of the asset is fully recovered.⁸¹⁷ Therefore, we recognise that some proportion of electronic equipment costs may be unavoidable if the PIA remedy were to increase the number of customers switching. However, suppliers and customers are often reluctant to replace existing lines, and PIA may only be primarily used where a new leased line is required.⁸¹⁸ We also note that minimum contract lengths and early termination charges would mitigate the risks associated with customers switching to PIA-based providers within their minimum contract term and that the costs that would be unavoidable decreases over time as the assets depreciate.⁸¹⁹ Moreover, as explained in paragraph A24.7 above, our estimate of other allocated costs most likely comprise a mix of avoidable and unavoidable costs. Therefore, the estimate of the pool of costs at risk set out in the 2016 PIA Consultation is likely to overstate unavoidable costs from other sources that would, in practice, be avoidable. This would mitigate the amount by which we have overstated avoidable electronic equipment costs.
- c) We acknowledge that some proportion of Main Links could be subject to PIA-based competition and therefore, some proportion of the associated costs could be at risk of non-recovery. This is because Main Links are an integral part of leased lines that extend beyond the serving exchange, and so these would also be subject to PIA-based competition.

A24.15 There is clearly uncertainty around the impact of the use of PIA to replace leased lines and the particular costs that would be relevant or unavoidable with respect to mixed usage PIA. Therefore, as in the April 2017 DPA Consultation, we refer to both estimates: our own illustrative estimate of the pool of costs as presented in the 2016 PIA Consultation; and Openreach's assumptions, as a more extreme upper-bound of the relevant pool of costs.⁸²⁰ While we consider these costs are illustrative, we think they are reasonable high-level indications for the purposes below. Table A24.1 summarises both figures.⁸²¹

⁸¹⁷ This could occur if the customer switches after their minimum contract period expires but earlier than the period over which BT depreciates the costs of these assets.

⁸¹⁸ For example, in the BCMR 2016, we considered that there were significant barriers to switching which limit the willingness and ability of telecoms providers to switch existing circuits in the short term. We assumed significantly lower proportions of BT's existing circuits would switch to a dark fibre access product compared to new connections. BCMR Final Statement 2016, Annex 33, paragraph A33.11, A33.109 to 111 and Table A33.1. See also paragraphs 4.495-4.496 of 2016 BCMR Statement.

⁸¹⁹ In addition, a proportion of Openreach's circuits will already be passed the point at which the electronic equipment assets are full depreciated. We note that in the BCMR 2016 Final Statement, the asset life of BT's equipment, including the active electronics, is around five years (BCMR 2016 Final Statement, Annex 33, paragraph A33.286).

⁸²⁰ For the avoidance of doubt, this does not imply that we accept all of the assumptions used by Openreach. For example, we disagree that a material proportion of TI services would be at risk as a result of mixed usage PIA.

⁸²¹ Our estimates, when updated with 2015/2016 RFS and AFI-C3 data do not change significantly. Common costs are £185m and other allocated costs are £66m per year. We also checked how results would change when using LRIC rather than DLRIC. Openreach provided LRIC information per regulated as a response to the WLA s.135 notice issued on February 20, 2017. However, there is no significant difference between the LRIC and the DLRIC of the services under consideration (DLRIC and LRIC differ more in the case of backhaul services). For 2015/2016, the difference is around £1m in total.

Table A24.1 Illustrative figures of the pool of costs at risk based on RFS 2014/2015

	Ofcom's pool of costs at risk	Openreach's pool of costs at risk
Common costs	£174m	£[X]
Other allocated costs	£69m	£[X]
Total	£243m	£[X]

Proportion of leased line services within network footprint

A24.16 Under the mixed usage rule, telecoms providers will only be able to use the PIA remedy to provide leased lines in the context of a network deployment primarily used to provide broadband services. Therefore, the natural constraints on build rates associated with mass market broadband deployments mean that only a proportion of leased lines would be within reach of a PIA-based network in the short-term.

A24.17 In the April 2017 DPA Consultation, we sought to reflect Openreach's argument that telecoms providers could substitute a disproportionately large number of leased lines by targeting a limited number of high density areas.⁸²² To account for this, we assumed that networks using PIA would target areas with a higher concentration of leased lines. Therefore, we assumed that telecoms providers will serve exchange areas with the highest percentage of non-residential premises first.⁸²³

A24.18 In response to the April 2017 DPA Consultation, Openreach disagreed with our assumption that telecoms providers would deploy to complete BT exchange areas, and cover all domestic and non-domestic premises within those areas. Openreach argued that instead, telecoms providers could target the "best" mixed streets within an exchange area, i.e. those with both residential and non-residential premises on, and avoid the residential areas.⁸²⁴ ⁸²⁵ Consequently, Openreach argued that PIA-based networks could pass a higher number of businesses for a given number of residential premises, than we had estimated.

A24.19 Openreach also argued that our use of non-residential premises as a proxy for leased line demand was flawed.⁸²⁶ Openreach presented an alternative illustrative analysis, which replicated our exchange-level analysis using circuit ends of Openreach wholesale leased

⁸²² Openreach response to the 2016 PIA Consultation, paragraph 352.

⁸²³ We sorted exchanges by decreasing proportion of non-residential delivery points and assumed that telecoms providers will meet the forecasts of residential premises by targeting areas with a high proportion of non-residential delivery points. We obtained the proportion of non-residential delivery points per exchange as: non-residential delivery points divided by total delivery points. We excluded PO boxes from the calculations. We included exchange areas which exclusively or primarily serve businesses.

⁸²⁴ Openreach response to the April 2017 DPA Consultation, paragraph 371.

⁸²⁵ Openreach provided an illustrative map of an exchange area showing the locations of residential and non-residential premises, which it argued demonstrated that particular 'mixed' streets could be targeted.

⁸²⁶ Openreach response to the April 2017 DPA Consultation, paragraph 372.

lines to proxy leased line demand, instead of non-residential premises.⁸²⁷ This analysis suggested a more concentrated distribution of leased lines and, therefore, a higher number of circuit ends passed for the relevant numbers of residential premises. [X].⁸²⁸ Openreach's alternative figures are presented in Table A24.2 below.

Table A24.2 Percentage of Openreach circuit ends

	% of residential premises passed	% of non-residential premises passed (Ofcom illustration)	% of circuit ends passed (Openreach illustration)
Year 1	0.2%	2.4%	6.7%
Year 2	0.7%	4.7%	11.5%
Year 3	3.7%	11.5%	23.0%
Medium term	10%	22.0%	[X]%
Long-term	40%	57.4%	[X]%

Source: Openreach response to the April 2017 DPA Consultation, Figure AC.3

Our reasoning and decisions

A24.20 In light of Openreach's response, we consider that an exchange based analysis of wholesale leased line circuit ends⁸²⁹ may be a better proxy for current leased line demand than non-residential premises. This is because not all non-residential premises take a leased line service.⁸³⁰ We have therefore used Openreach's dataset on the number of Openreach circuit ends passed to update our illustrative estimates of the number of leased line customers that could theoretically be within reach of a network built using PIA.⁸³¹

A24.21 As outlined in Section 5, we have updated our forecasts for the number of premises passed by networks utilising PIA across the review period.⁸³²

⁸²⁷ Openreach response to the April 2017 DPA Consultation, paragraphs 372 to 373.

⁸²⁸ Openreach response to the April 2017 DPA Consultation, paragraph 373.

⁸²⁹ A circuit is a leased line between two delivery points. Each delivery point is the end of a circuit. These delivery points can either be where the leased line terminates to the customer or a network site.

⁸³⁰ A significant proportion of non-residential premises are likely to take a broadband service, for example a specific business broadband with faster speeds.

⁸³¹ Openreach response to question 39.a of the s135 notice dated 12 October 2017.

⁸³² Based on forecasts provided by telecoms providers, we estimate that approximately [X] premises will be passed by other telecoms providers using a mixture of PIA-based and end-to-end build by the end of this review period. As this comprises some end-to-end build, the number of premises (and corresponding area) covered by network deployed using PIA could be considerably smaller (we estimate the equivalent number of premises passed using 100% PIA to be around [X]). Nevertheless, given we are estimating an illustrative upper bound for the risk to BT's cost recovery from relaxing usage restrictions, we use the larger figure of [X] premises. We note that this figure will include some non-residential premises which take broadband services.

A24.22 Similar to the April 2017 DPA Consultation, to reflect the possibility that networks using PIA would target areas with a higher concentration of leased lines, we adopt the conservative assumption that telecoms providers will serve exchange areas with the highest percentage of circuit ends first.⁸³³

A24.23 Table A24.3 shows the results of this illustrative analysis. On this basis, our revised estimates show that a PIA-based network could in theory reach up to [X]% of circuit ends by the end of the review period.⁸³⁴ However, as the geographic reach of PIA-based networks increases in the longer term, telecoms providers exhaust those areas with the highest concentration of circuit ends and the proportions become more balanced.⁸³⁵

Table A24.3 percentage of circuit ends covered

	% of residential premises passed	% of circuit ends passed
Year 1	[X]%	[X]%
Year 2	[X]%	[X]%
Year 3	[X]%	[X]%
Medium term	10%	[X]%
Long-term	40%	[X]%

A24.24 As circuit ends are more concentrated than non-residential premises, the proportion of leased lines that could theoretically be within reach of a mixed use PIA-based network is larger than we presented in the April 2017 DPA Consultation.

A24.25 Nevertheless, we consider that these figures very much represent an upper bound of the proportion of leased lines that could theoretically be within reach of a mixed use PIA-based

⁸³³ We sort exchanges by decreasing proportion of circuit ends and assume that telecoms providers will meet the forecasts of residential premises by targeting areas with the highest proportion of circuit ends. The proportion of circuit ends is calculated as the number of circuit ends divided by the number of circuit ends plus the number of residential delivery points.

⁸³⁴ We have taken a conservative approach and used the proportion of residential premises that could be passed at the end of each year. We note that at any given point in each year, this value would be lower and therefore the proportion of circuit ends would be lower.

⁸³⁵ We have cross-checked these figures (and the figures set out in Openreach's response) which are based on Openreach's circuit end data with figures calculated in the same way but using a database of circuit ends that we built as part of the 2016 BCMR (the same database referred to in A24.7d). To do this, we mapped the total number of customer circuit ends (for BT) to each exchange area. We then combined this with our dataset of total residential premises per exchange area and sorted our dataset by decreasing proportion of circuit ends to calculate the proportion of Openreach customer circuit ends that would be within the reach of a PIA-based network for each relevant percentage of residential premises passed. We also used the total number of customer circuit ends for all telecoms providers to sort exchange areas, reflecting the fact that this may be a more relevant driver of where to invest than just BT's customer circuit ends. We find that these cross-checks do not lead to materially different results.

network. This is because we would not expect a PIA-based provider to deploy a network in exactly the way assumed above. This is for the following reasons:

- a) Our analysis assumes that a PIA-based provider selects exchange areas based on the density of leased line demand. Under the mixed usage rule, however, telecoms providers will only be able to use the PIA remedy to provide leased lines in the context of a network deployed with the purpose of primarily delivering broadband services. Given the high incremental cost of deploying residential broadband, it seems likely that a PIA-based provider will be strongly influenced by the demand for broadband services, or the overall demand (i.e. for broadband and leased line services), in a given area,⁸³⁶ which would reduce the proportion of leased lines that would be passed, compared to our estimates.⁸³⁷
- b) A number of exchanges that would be targeted under our deployment assumptions are small, predominantly rural, exchanges. Our analysis assumes that it is in the interest of telecoms providers to serve these areas because they have a high density of leased line customers. This may not be the case in practice, since, a telecoms provider may be likely to also consider other factors such as their small absolute size, widely distributed premises and their remoteness. Therefore, PIA-based providers may rather target larger, densely populated, contiguous urban areas, with a lower proportion of leased lines, which would reduce the proportion of leased lines that would be passed, compared to our estimates.

A24.26 In relation to Openreach's argument that telecoms providers would not deploy to complete BT exchange areas, we acknowledge that a telecoms provider could, to some extent, be more selective of areas it deploys its network than our exchange-level analysis estimates. In particular, we recognise that a telecoms provider is unlikely to deploy to every residential premises in an exchange area. However, we consider the approach above to be reasonable to estimate an upper bound on the proportion of leased lines that could theoretically be within reach of a PIA-based network. This is because very targeted deployments are unlikely to be consistent with our mixed usage rule.⁸³⁸ In addition, while the location of deployments may be smaller than exchange areas, we do not believe this means that our overall approach is underestimating the risk to BT's cost recovery. For

⁸³⁶ We also note that the proxy for leased lines used in this analysis reflects only the current level of demand for leased line services, whereas a telecoms provider may also consider the location of potential future demand. As explained in Section 2, there is uncertainty over how demand for leased line services will change in the future.

⁸³⁷ If exchanges are ranked by the decreasing number of residential premises, a telecoms provider would cover a significantly lower proportion of leased lines. For example, by the end of the review period a telecoms provider would be within reach of only around [3<] % of leased lines, compared to [3<] % of leased lines when targeting high-density exchange areas first.

⁸³⁸ As explained in Section 2, our overall objective in imposing the mixed usage PIA remedy is to stimulate scale investment in broadband networks, to promote downstream competition. It follows from this that, as a general principle, we would only expect our usage rule to be met where this primary purpose is clear from the available evidence and where the inclusion of non-broadband services is clearly secondary to that primary purpose. In particular, we would expect to reject network deployments that are leased line deployments which seek to include an element of broadband supply in an attempt to meet our usage rule.

example, as explained above, there are a number of reasons why our deployment assumptions are likely to overestimate the number of leased lines covered.

Impact on cost recovery in this review period

- A24.27 In the April 2017 DPA Consultation, we estimated that in this review period the costs at risk would be less than £5m per year on average according to our figure for the pool of costs at risk, and less than £[3<]m per year on average when considering Openreach's alternative figure.
- A24.28 In the following, we present our updated illustrative estimates of the possible impact on cost recovery in this review period, in light of our decisions on the pool of costs at risk and the percentage of leased line services that could be within reach of a PIA-based network.
- A24.29 We use a similar approach as in the April 2017 DPA Consultation. We apply our estimate of the percentage of leased lines services that could be within reach of a PIA based network (described in Table A24.3) to the total pool of costs at risk to provide a high-level indication of the impact on cost recovery of mixed usage. So, for example, if 5% of leased lines are estimated to be within reach of a PIA-based network, we assume that 5% of the pool of costs would be at risk at most.⁸³⁹
- A24.30 It is highly unlikely that all leased lines within an area where a mixed-use network was rolled out would be switched to PIA-based alternatives. BT has advantages compared to a telecoms provider using PIA to deploy a network. For example, as a result of its ubiquitous network, BT benefits from having a fibre connection to buildings in many cases, whereas a PIA-based provider would have to deploy fibre to connect customers, placing the PIA-based provider at a disadvantage. Moreover, suppliers and customers are often reluctant to replace existing lines, and PIA may only be primarily used where a new leased line is required.⁸⁴⁰ We also note that there is likely to be a delay between the construction of a network in new areas, marketing this to potential customers and those customers' contracts ending and so being available to switch.
- A24.31 Therefore, we would only expect Openreach to lose a proportion of the services that we have identified to be at risk. As in the April 2017 DPA Consultation, for the purposes of this illustrative analysis, we assume that BT would lose a third of the lines within the PIA-based competitors' footprint. No stakeholder argued that this assumption was too low for the purposes of considering the potential impact on cost recovery over this review period. Three argued this was an unrealistically aggressive assumption for the short-term, given

⁸³⁹ We note that this methodology does not imply that costs are similar across geographies, but rather that a similar amount of cost would be recovered by each leased line of a given bandwidth. We also note that our illustration of network reach incorporates differences in density.

⁸⁴⁰ For example, in the BCMR 2016, we considered that there were significant barriers to switching which limit the willingness and ability of telecoms providers to switch existing circuits in the short term. We assumed significantly lower proportions of BT's existing circuits would switch to a dark fibre access product compared to new connections. BCMR Final Statement 2016, Annex 33, paragraph A33.11, A33.109 to 111 and Table A33.1. See also paragraphs 4.495-4.496 of 2016 BCMR Statement.

switching costs.⁸⁴¹ We note that Openreach adopted this assumption in its own illustrative analysis.⁸⁴² Therefore, we remain of the view that this is a reasonable upper bound for the proportion of the services at risk which Openreach could lose, particularly bearing in mind that there are barriers to switching and BT has advantages over a new PIA based provider (as discussed in the paragraph above).

A24.32 Our illustrative figures in the short-term, i.e. across this review period, are presented in Table A24.4 below. These figures are based on the total relevant pool of costs (i.e. common costs and “other allocated costs”⁸⁴³) we identified in the 2016 PIA Consultation (£243m per year), and the alternative figure presented by Openreach (£[X] per year).

Table A24.4 Illustrative cost at risk

	% of circuit ends passed	Based on Ofcom pool of costs at risk	Based on Openreach pool of costs at risk
Year 1	[X]%	£[X]	£[X]
Year 2	[X]%	£[X]	£[X]
Year 3	[X]%	£[X]	£[X]

A24.33 These illustrative figures suggest that the impact of mixed usage could be up to approximately £16m per year on average, according to our figure of the pool of costs at risk. This represents around 2% of the total costs recovered through regulated business connectivity services in the 2014/15 RFS.⁸⁴⁴ Using Openreach’s alternative pool of costs at risk, the impact could be up to approximately £[X] per year on average, which represents around [X]% of the total costs recovered through regulated business connectivity services, as of the 2014/15 RFS. To be clear, these figures are our estimates of the potential upper bound impact on BT’s cost recovery and not our estimates of the impact we would expect in practice.

A24.34 As noted, these estimates are indicative and do not take into account other factors that could affect Openreach’s cost recovery, some of which might point to a smaller impact and others to a larger impact.⁸⁴⁵ For example:

- the figures do not take into account the fact that the purchase of the PIA product would provide some degree of compensation for the common costs associated with

⁸⁴¹ See Three response to the 2016 PIA Consultation, paragraph 2.18.

⁸⁴² In its response to the April 2017 DPA Consultation, paragraph 374, Openreach noted that we have not provided evidence as to why this is an appropriate figure.

⁸⁴³ For the purpose of this illustrative exercise, we take the conservative assumption that all costs falling in the category “other allocated costs” would not be avoided.

⁸⁴⁴ We have looked at how our estimate of the cost at risk would change if we considered LRIC as a measure of avoidable costs. In this case, the average cost shortfall would reduce to £10.8m per year.

⁸⁴⁵ See also the other points noted at paragraph A24.9.

the leased lines that are assumed to be displaced, hence the expected impact on Openreach cost recovery will be less than the amounts indicated;

- the figures above do not take into account migration trends, and thus the relevant set of lines at risk might be different than the ones identified in the analysis. The above analysis uses BT's costs based on its installed base of leased lines circuits in 2014/15, so it will not reflect these changes;
- the analysis does not consider the extent to which incentives to build leased lines based on expected pricing trends of leased lines could limit the share of connections at risk; and
- the analysis does not take into account the extent to which BT may acquire new leased lines customers, providing some degree of compensation for the common costs associated with the leased lines that are assumed to be displaced.⁸⁴⁶

A24.35 However, we consider that these figures give a reasonable high-level indication of the order of magnitude of upper bound impact on BT's cost recovery that might arise under the mixed-use approach to relaxing the usage restriction.

Impact on cost recovery in the longer term

A24.36 In the April 2017 DPA Consultation, we explained that the percentage of leased lines that might be replaced with PIA-based products in the long-term is likely to be greater, as it is possible that telecoms providers using PIA could deploy to more areas and therefore reach a larger proportion of Openreach's current customers.

A24.37 Although impacts in the longer term are subject to greater uncertainty, for the purposes of illustration, we applied the same methodology above assuming BT were to lose a third of its leased lines customers in the relevant geographic areas in the medium term (10% of residential coverage) and the long-term (40% of residential coverage). However, in these scenarios we assumed only common costs are at risk on the basis that long run incremental costs are likely to be avoidable in the long run. Our estimates in the April 2017 DPA Consultation showed that the cost at risk would be £13m in the medium term and £33m in the long-term, according to our figure for the pool of cost at risk. Using Openreach's alternative figure for the pool of costs at risk, the corresponding figures were £[X] and £[X] respectively.

A24.38 In its response to the April 2017 DPA Consultation, Openreach provided an alternative illustrative estimated impact in the medium and longer term. However, in calculating this, Openreach used its upper bound estimate of the total pool of costs at risk (£[X]), rather than only common costs.⁸⁴⁷ [X].⁸⁴⁸ Using this approach, Openreach's alternative estimated

⁸⁴⁶ For example, overall leased line demand could increase over time. This could be due to growth in business demand, or demand for leased lines required to support the densification of 4G and the delivery of 5G services. BT is likely to be in a strong position to compete for this additional demand, given its established presence in the leased line markets and ubiquitous network.

⁸⁴⁷ Openreach response to the April 2017 DPA Consultation, paragraph 374.

⁸⁴⁸ Openreach response to the WLA s.135 notice issued on 12 October 2017, Question 40.

impact of cost recovery was £[X] in the medium term and £[X] in the long-term.⁸⁴⁹

Openreach noted that if it were to follow our methodology and use its own lower bound of the pool of costs at risk, i.e. its own estimate of the common costs, the impact is £[X] and £[X] in the medium and long-term, respectively. [X]⁸⁵⁰

A24.39 We disagree that it is appropriate to use the upper bound pool of costs in assessing the impact in longer term. We consider the other allocated costs to be avoidable in the long-term, and therefore only common costs are relevant to the long-term impact.

A24.40 For the purposes of illustration, we have updated our estimates of the impact on cost recovery in the longer term, in light of our decisions on the pool of costs at risk and the percentage of leased line services that would be within reach of a PIA-based network. We have applied the same methodology above assuming BT were to lose a third of its leased lines customers in the relevant geographic areas affected in the medium term (10% of residential coverage) and the long-term 40% of residential coverage).⁸⁵¹ As in the April 2017 DPA Consultation, in these scenarios we assume only common cost is at risk on the basis that long run incremental costs are likely to be avoidable in the long run.

A24.41 Table A24.5 below illustrates the extent of possible cost recovery impacts in the longer term. This shows that, the impact for a PIA-based network reaching 40% of residential premises could be up to approximately £[X] per year according to our pool of costs at risk, which represents around [X]% of the total costs recovered through regulated business connectivity services in the 2014/15 RFS. Using Openreach's alternative pool of costs at risk, the impact could be up to approximately £[X], which represents around [X]% of the total costs recovered through regulated business connectivity services in the 2014/15 RFS.

Table A24.5 Illustrative cost at risk in the longer term⁸⁵²

	% of circuit ends passed	Based on Ofcom pool of costs at risk	Based on Openreach pool of costs at risk
Medium term	[X]%	£[X]	£[X]
Long-term	[X]%	£[X]	£[X]

⁸⁴⁹ Openreach response to the April 2017 Consultation, Figure AC.4

⁸⁵⁰ [X]. Openreach response to the WLA s.135 notice issued on 12 October 2017, Question 40. Our approach is to estimate the potential impact on BT's cost recovery that could result from allowing mixed usage. In doing so, we have adopted a number of conservative assumptions, i.e. assumptions which we think, overall, are likely to overstate the impact.

⁸⁵¹ We note that the proportion of leased lines that may be lost in the longer term is highly uncertain. [X] Openreach response to the April 2017 DPA Consultation, footnote 85. Even if hypothetically the proportion of leased lines lost were two-thirds, the impact for a PIA-based network reaching 40% of residential premises would be twice that set out in Table A24.5, i.e. around [X]% or [X]% of the total costs recovered through regulated business connectivity services in the 2014/15 RFS depending on which pool of cost at risk is used.

⁸⁵² We note that the figure presented in the medium term is lower than our estimated impact in year 3. The reason for this is that our medium and longer-term impacts only consider the common costs to be relevant, whereas we consider the total pool of costs to be relevant in the short term, i.e. within this review period.

A25. Asset cost component calculation

A25.1 This annex explains the detailed steps of the methodology we use to allocate costs per unit of each PIA product. This is based on the methodology adopted by Openreach to derive rental charges following imposition of the remedy in 2010.

A25.2 The calculation comprises of two key parts:

- First, the regulatory cost base is calculated for each type of PIA asset (i.e. single bore spine duct, 2 bore spine duct, 3+ bore spine duct, lead-in duct, manholes, joint boxes, and poles).
- Second, the regulatory cost base of each type of PIA asset is allocated to each unit of the relevant PIA rental product (e.g. the regulatory cost base of 1 bore spine duct is allocated to each metre of single bore spine duct rental).

Regulatory cost base

A25.3 The regulatory cost base of each type of PIA asset is an annual amount of costs attributed to that type of asset. Asset costs include return on capital, depreciation (net of holding gains) and overheads. They are calculated as follows:

- Return on capital is based on the 2016/17 current cost accounting (CCA)⁸⁵³ mean⁸⁵⁴ net replacement cost (NRC) of the relevant asset base as per the RFS, multiplied by the weighted average cost of capital (WACC) for Openreach Copper business in the final year of this control period (7.9%).⁸⁵⁵
- Depreciation includes historical cost accounting (HCA)⁸⁵⁶ depreciation and supplementary depreciation (reflecting the impact of CCA re-valuation) as per the 2016/17 RFS.
- Holding gains⁸⁵⁷ are based on the 2016/17 CCA mean NRC of the relevant asset base as per the 2016/17 RFS, multiplied by a normalised view of the annual increase in the regulatory asset value based on the expected annual increase in the Retail Price Index (RPI) over the review period (2.91%).⁸⁵⁸ A normalised view of the holding gain has been

⁸⁵³ Under CCA, assets are re-valued annually to their current cost.

⁸⁵⁴ We use the mean value of the asset base, as per the updated version of Openreach's PIA pricing model provided to Ofcom on 12 August 2016. This is a change from the original calculation in 2011 which was based on the closing value of the asset base. We consider using the mean value more appropriate, as it better reflects the amount of capital employed throughout the period.

⁸⁵⁵ See Annex 20. We use the estimated WACC for the final year of this control period (2020/21) as most of the rental volumes during this control period are expected in the final year.

⁸⁵⁶ Under HCA, assets are carried at their historical cost.

⁸⁵⁷ Holding gains represent an increase in the value of the asset base due to the annual CCA re-valuation. It is subtracted from the regulatory cost base in the year when it arises, but will lead to an increase in the regulatory cost base in the following years through supplementary depreciation and higher return on capital (through a higher value of mean NRC).

⁸⁵⁸ Openreach explained that under the current methodology, holding gains are based on the increase in the Retail Price Index (RPI). Openreach explained that the increase in RPI provides a "normalised" view of the holding gain, rather than the actual view which can vary significantly from year to year. Openreach noted that using RPI is consistent with the fact that the gross replacement cost of the duct and copper assets is calculated on an indexed historic basis using RPI. Openreach

used because the actual view from the regulatory asset value (RAV) model can be subject to large adjustments.⁸⁵⁹

- Overheads are based on the 2016/17 CCA RFS and include the operating costs directly attributed from the general ledger to duct/copper activity/plant groups, as well as costs indirectly attributed to duct/copper activity/plant groups through other activity/plant groups.⁸⁶⁰

Duct, manholes and joint boxes

- A25.4 The costs of the relevant asset base for duct, manholes and joint boxes are based on the RAV adjusted⁸⁶¹ CCA costs of the Class of Work “LDD” (Local Distribution Duct) as per the RFS, which includes duct, manholes, joint boxes and cabinets.
- A25.5 Overheads are based on the CCA value of operating costs directly and indirectly attributed to the duct Activity Groups from the ledgers, excluding the duct costs themselves.
- A25.6 The regulatory cost bases of all spine duct, manholes, joint boxes and lead-in duct are split out of the Class of Work “LDD” costs in proportion to their gross replacement cost (GRC). The regulatory cost base of all spine duct is further split between single bore spine duct, 2 bore spine duct and 3+ bore spine duct based on their relative GRC. The GRCs are estimated as follows:
- GRC estimates for duct, manholes, joint boxes and cabinets are based on Openreach’s bottom-up valuation using 2012/13 prices and September 2015 volumes. GRC estimates for single bore spine duct, 2 bore spine duct and 3+ bore spine duct are based on Openreach’s bottom-up valuation carried out in 2009/10. Within the total value of duct, the valuation of single bore duct includes spine duct and some, but not all, lead-in duct. However, it is not possible to identify how much lead-in duct is included or separate this out.⁸⁶² In the absence of more granular data, we assume that the GRC of single bore duct as estimated in the bottom-up valuation is fully attributable to spine duct (i.e. it does not include any lead-in duct).⁸⁶³

response to question 11b of the WLA s.135 notice issued 27 January 2017; Openreach response to question 29 of the WLA s.135 notice issued on 16 June 2017.

⁸⁵⁹ Openreach response to question 11b of the WLA s.135 notice issued on 27 January 2017.

⁸⁶⁰ For example, the costs of vehicles and associated services are first recovered in line with transfer charges, which are at commercial rates, and then further attributed based on previously allocated pay and return on assets. Openreach response to question 11d of the WLA s.135 notice issued on 27 January 2017.

⁸⁶¹ In the 2009/10 RFS Openreach changed its valuation methodology of its post-August 1997 duct, which had the effect of increasing the valuation by around £1.9bn. Since Ofcom had not accepted the new methodology, Openreach made an additional RAV adjustment to estimate what the value of the RAV would have been had the methodology not changed. The “RAV adjustment” in the model represents the adjustment to the RAV cost stack required to re-value the post-August 1997 assets to a valuation based on rolling forward the previous methodology. See Openreach response to question 6c of the WLA s.135 notice issued on 27 January 2017.

⁸⁶² Openreach explained that its bottom-up (“absolute”) valuation methodology relies on information in BT’s network inventory system (PIPeR), which records some, but not all lead-in duct. Openreach response to question 14c of the WLA s.135 notice issued on 16 June 2017.

⁸⁶³ This leads to potential over-allocation of costs to duct relative to manholes and joint boxes, and to single bore spine duct relative to 2 bore spine duct and 3+ bore spine duct. However, we consider this assumption to be preferable to the alternative assumption that lead-in duct is fully reflected in Openreach’s bottom-up valuation. This is because we expect

- The GRC of lead-in duct is then estimated separately, by multiplying the GRC per metre of single bore spine duct by an estimate of the route length of lead-in duct. The GRC of single bore spine duct per metre is calculated by dividing the GRC of single bore spine duct by the route length of single bore spine duct. The GRC of single bore spine duct is based on the GRC of single-bore duct, as explained above. Similarly, the route length of single bore spine duct is based on the route length of single bore duct, which includes some, but not all lead-in duct, although it is not possible to identify how much lead-in duct is included or separate this out.⁸⁶⁴ The total length of lead-in duct is not available from Openreach's systems.⁸⁶⁵ The estimated length of lead-in duct is based on a proxy estimate which is commonly used or referred to by the Openreach Chief Information Officer team and/or Competition Finance team, and is based on the total duct distance between each underground distribution point and its next underground jointing chamber, as recorded in Openreach's PIPeR database.⁸⁶⁶

Poles

- A25.7 The costs of the relevant asset base for poles are based on the CCA costs of the Class of Work "LDC" (Local Line Copper Distribution Cable) as per the RFS, which includes poles as well as other Openreach copper access assets. The pole costs are split out from the copper assets in proportion to their GRC, as estimated in a bottom-up valuation carried out in 2009/10.⁸⁶⁷
- A25.8 Overheads are based on the CCA value of operating costs and include cost items identified as specifically relating to poles (for example, pole testing and pole renewals) as well as items attributed to the Class of Work "LDC". Items attributed to the Class of Work "LDC" are split based on either the share of total copper maintenance costs attributable to poles or in proportion to the GRC estimates referred to in the previous paragraph.

that only a relatively small proportion of lead-in duct is actually reflected in Openreach's bottom-up valuation. In particular, Openreach told us that BT did not record lead-in duct infrastructure in its inventory systems in the past and therefore as paper records were migrated over time to the PIPeR system these data omissions would have also applied to the new system. Additionally, the capture of new lead-in data would only have been improved from approximately 2001 as swept tees were used in the Openreach network and recorded in the PIPeR system. Given that 2.8 million new homes were built in the period 2001 to 2016, even if all lead-ins for all these new homes were fully recorded in PIPeR this would represent only approximately 10% of UK properties. In reality, total new homes built would be expected to exceed homes connected to the Openreach network because not every new home is served by Openreach. See Openreach response to questions 19a and 20 of the 2nd WLA s.135 notice issued on 21 December 2017.

⁸⁶⁴ Openreach response to question 12b of the WLA s.135 notice issued on 16 June 2017.

⁸⁶⁵ Openreach response to question 19a of the 2nd WLA s.135 notice issued on 21 December 2017.

⁸⁶⁶ Openreach response to questions 21a and 22 of the 2nd WLA s.135 notice issued on 21 December 2017.

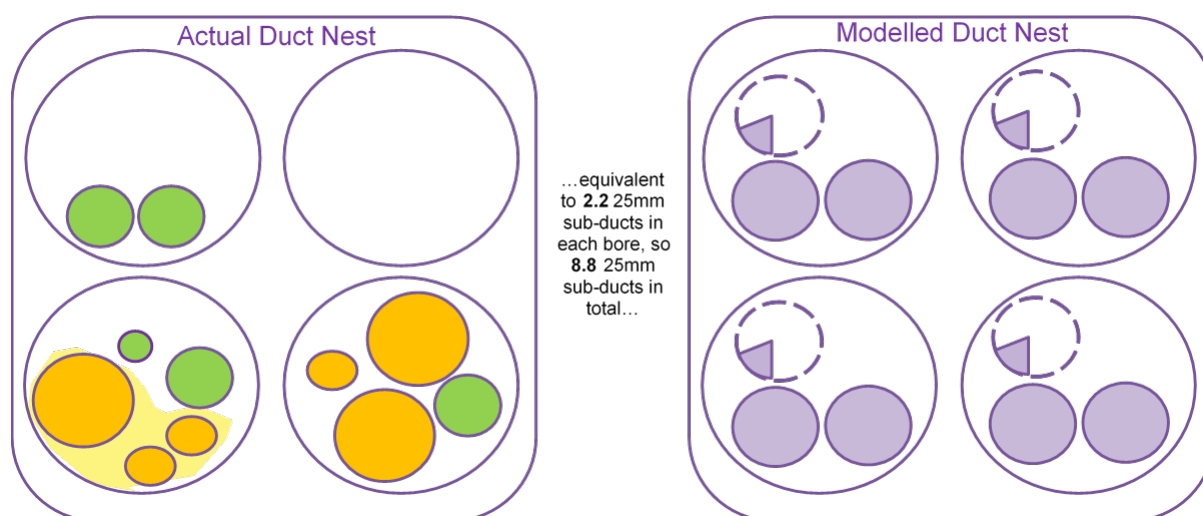
⁸⁶⁷ In 2009/10 Openreach used an "absolute valuation" methodology to value its Copper Cable assets (Class of Work "LDC"). This methodology was based on a count of assets multiplied by the latest replacement costs for the materials themselves and the cost of construction was calculated from standard task times multiplied by standard labour rates. Openreach response to question 7b of the WLA s.135 notice issued on 27 January 2017.

Allocation of regulatory costs per unit of PIA products

Spine duct

- A25.9 The regulatory cost base of each type of spine duct (single bore spine duct, 2 bore spine duct and 3+ bore spine duct) is divided by the average number of 25mm diameter sub-duct equivalents in that duct type as of January 2018. The resulting portion of the regulatory cost base is then allocated per metre of duct based on the route length for each type of duct as of July 2016. The duct route length analysis for the different numbers of bores relies on data from the PIPeR system, which includes some, but not all of lead-in duct.⁸⁶⁸
- A25.10 The average number of 25mm diameter sub-duct equivalents is a national average for each type of duct and is based on actual usage of space by BT cables and sub-ducts, converted into the equivalent space occupied by 25mm diameter sub-ducts.⁸⁶⁹ Figure A25.1 illustrates how the actual duct fill is normalised into 25mm diameter sub-duct units for a duct nest of four bores.⁸⁷⁰ As the average number of 25mm diameter sub-duct equivalents is calculated using information from BT's physical network inventory system, the duct occupancy figures for single bore duct include both single bore spine duct and lead-in duct. In the absence of more granular data, we assume the duct occupancy figure for single bore duct is representative of single bore spine duct.

Figure A25.1: Illustration of normalisation of actual duct fill into 25mm sub-duct units



Source: Openreach: "Ofcom Discussion – PIA Pricing Approach", 17 February 2011. BT's physical infrastructure records do not actually indicate which cable is in which bore. Figures are illustrative.

⁸⁶⁸ Openreach response to question 12b of the WLA s.135 notice issued on 16 June 2017. As above, in the absence of more granular data, we assume that the duct route length of single bore duct is fully attributable to single bore spine duct (i.e. it does not include any lead-in duct). As noted above, we expect that only a relatively small proportion of lead-in duct is actually reflected in the duct route length of single bore duct.

⁸⁶⁹ Openreach response to question 4 of the WLA s.135 notice issued on 27 January 2017.

⁸⁷⁰ Openreach response to question 40 of the WLA s.135 notice issued on 6 March 2017; Openreach response to question 26 of the WLA s.135 notice issued on 16 June 2017.

A25.11 Finally, the regulatory cost allocated per metre of a 25mm sub-duct equivalent in each type of spine duct is capped at 50% of its regulatory cost per metre of duct.

Lead-in duct

A25.12 The regulatory cost base of lead-in duct is allocated per metre of duct based on the route length, which is estimated separately (see above in A25.6).⁸⁷¹

A25.13 Under Openreach's current methodology, the cost allocation reflects the average number of 25mm diameter sub-duct equivalents in single-bore duct. However, as this is unlikely to be representative of the actual usage of lead-in duct and given that the occupancy figure for lead-in duct is not separately available, we consider this step is inappropriate (we explain this further in Section 5).

A25.14 Unlike spine duct, there is no cap applied to the regulatory cost per metre of lead-in duct.

Manholes and joint boxes

A25.15 The regulatory cost base of manholes and joint boxes is allocated to manhole/joint box entries and exits, as well as cable coil and in-line splice hosting. Most telecoms providers are assumed to both enter and exit a manhole or a joint box, in which case they will be charged for each entry and exit. However, in some circumstances, Openreach would charge a hosting fee, as well as a charge for entry/exit in the manhole/joint box. Therefore, there is a risk of over-recovery of costs by Openreach that would arise from telecoms providers paying for both entry and hosting, which is mitigated by reducing the regulatory cost base of manholes/joint boxes by 2%.⁸⁷²

A25.16 The respective scaled down regulatory cost base of manholes and joint boxes is then allocated to each manhole/joint box based on the number of manholes/joint boxes as of July 2016.⁸⁷³

Manhole and joint box entries

A25.17 The regulatory cost per manhole/joint box is divided by the expected number of entries/exits per manhole/joint box. The expected number of entries/exits per manhole/joint box is equal to the current average number of 25mm sub-duct equivalents

⁸⁷¹ We note that Openreach's previous estimate, used in the 2011 model, was based on a different approach and was about 22% higher. Given the absence of a reliable estimate, we carried out a sensitivity analysis, using Openreach's latest estimate +/-50%. This has an impact on the calculated per unit cost of duct-related assets of +/-5%. On this basis, we consider that using Openreach's current estimate is appropriate for this review period.

⁸⁷² Openreach response to question 22 of the WLA s.135 notice issued on 16 June 2017.

⁸⁷³ We note that the number of joint boxes has increased significantly compared to Openreach's original PIA pricing model, which may be due to: (i) the PIPeR data being incomplete in 2011, consisting of ~1,000 out of ~5,500 exchanges; (ii) identification of joint boxes being problematic in 2011 whereas there is now a specific attribute that can be used within the PIPeR data source; and (iii) new joint boxes being built. Openreach response to question 14 of the s.135 notice issued on 27 January 2017.

assumed to be crossing a manhole/joint box multiplied by three, to reflect an assumption of average telecoms providers' usage of manholes/joint boxes under PIA.⁸⁷⁴

- A25.18 Because of their size, joint boxes are typically connected with smaller duct nests and manholes are typically connected with larger duct nests.⁸⁷⁵ Therefore, the current average number of 25mm sub-duct equivalents assumed to be crossing joint boxes is based on the average number of 25mm sub-duct equivalents occupied in ducts with 1-4 bores, as of January 2018. The current average number of 25mm sub-duct equivalents assumed to be crossing manholes is based on the average number of 25mm sub-duct equivalents occupied in ducts with 3+ bores, as of January 2018.

Hosting of cable coils and in-line splices

- A25.19 The cost allocation per medium-sized cable coil hosted in a manhole is based on 11.5% of the regulatory cost per manhole, reflecting the assumed share of a manhole space occupied by a medium-sized cable coil.⁸⁷⁶ This is a working assumption adopted in the absence of PIA usage information.⁸⁷⁷
- A25.20 The cost allocation per medium-sized cable coil hosted in a joint box is based on 33% of the regulatory cost per joint box, reflecting the assumed share of a joint box space occupied by a medium-sized cable coil, and multiplied by four, reflecting the assumption that only large joint boxes can host cable coils and that the cost of a large joint box is four times the cost of an average joint box. These are working assumptions adopted in the absence of PIA usage information.⁸⁷⁸
- A25.21 The cost allocations per medium-sized cable coil are scaled down by 50% for a small cable coil and up by 50% for a large cable coil. These are working assumptions adopted in the absence of PIA usage information.⁸⁷⁹
- A25.22 The cost allocations per in-line splice are assumed to be equal to the cost allocations per medium-sized cable coil.
- A25.23 Subsequent to the August 2017 DPA Consultation, Openreach carried out illustrative calculations of the space occupied by a cable coil and an in-line joint in a particular type of joint box and in a manhole of particular dimensions.⁸⁸⁰ In light of these calculations, the above assumptions fall within a broad range of values that appear reasonable, although there is a relatively high level of complexity in determining the usage of space, especially for manholes. In the absence of data about the actual usage of space, we consider the

⁸⁷⁴ Openreach response to question 41a of the WLA s.135 notice issued on 6 March 2017.

⁸⁷⁵ Subsequent to the August 2017 DPA Consultation Openreach carried out an analysis which estimates the number of bores entering or leaving a chamber to be [3<] per joint box and [3<] per manhole. Openreach response to question 24 of the 2nd WLA s.135 notice issued on 21 December 2017.

⁸⁷⁶ Openreach's updated PIA pricing model, sheet 'JB & MANHOLE PRODUCT COST', cell J40.

⁸⁷⁷ Openreach response to question 27d of the WLA s.135 notice issued on 16 June 2017.

⁸⁷⁸ Openreach response to questions 27a-c of the WLA s.135 notice issued on 16 June 2017.

⁸⁷⁹ Openreach response to question 28 of the WLA s.135 notice issued on 16 June 2017.

⁸⁸⁰ Openreach response to question 25 of the 2nd WLA s.135 notice issued on 21 December 2017.

above assumptions to be a reasonable basis for calculating the PIA rental charges in this review period.

Poles

- A25.24 The regulatory cost base of poles is divided by the total number of poles as of January 2018, to give a regulatory cost per pole.
- A25.25 This regulatory cost per pole is split between cable attachments (90%), cables up poles (3%) and manifolds (7%). Openreach was unable to confirm the basis for these specific proportions. However, it explained that this split incentivises a more efficient use of its poles by telecoms providers. For example, if a telecoms provider wishes to connect several homes to a distribution point (DP) pole, it will be incentivised to use pole top equipment to aggregate incoming cables, rather than attaching several independent incoming cables to the DP pole. Based on these percentages, if a telecoms provider is to attach three or more cables, it incurs lower rental charges if it uses pole top equipment.⁸⁸¹ We consider this to be a reasonable basis for setting the percentage split for cables up poles relative to manifolds. With respect to the percentage split for cable attachments, it is not obvious that a different value would result in a more appropriate apportionment of the regulatory cost base of poles. On this basis, we consider maintaining the above percentage split to be a reasonable way of apportioning the regulatory cost base of poles for this review period.

Cable attachments

- A25.26 There are two different types of cable attachments depending on the number of end-users connected: single-premises attachments and multi-premises attachments. The allocation of costs is performed for each type of attachment.
- A25.27 Some types of poles are only used to carry single-premises attachments. These are ‘pure’ DP poles and ‘pure’ feeder poles. Similarly, cable poles are only used to carry multi-premises attachments. There are also ‘mixed’ DP poles and ‘mixed’ feeder poles that carry both single- and multi-premises attachments.
- A25.28 The calculation of costs allocated per each type of cable attachment is developed in two steps. First, the regulatory costs are allocated per each type of cable attachment based on the average number of those attachments per pole calculated for ‘pure’ poles only (i.e. ‘pure’ DP poles and ‘pure’ feeder poles for single-premises attachments and cable poles for multi-premises attachments). Second, the costs allocated per attachment are adjusted to avoid over-recovery due to the additional attachments on ‘mixed’ poles. The detailed steps are described below.
- A25.29 The regulatory costs per pole allocated to cable attachments are divided by the expected average number of single-premises cable attachments per pole, which is based on the average number of single-premises cable attachments per pole on pure DP and pure

⁸⁸¹ Openreach response to question 30 of the WLA s.135 notice issued on 16 June 2017.

feeder poles (i.e. excluding mixed poles) as of January 2018. PIA attachments are assumed to be fully substitutional to Openreach's existing attachments.⁸⁸²

A25.30 Separately, the same regulatory costs per pole allocated to cable attachments are divided by the expected average number of multi-premises cable attachments per pole, which is based on the average number of multi-premises cable attachments per pole on cable poles (i.e. excluding mixed poles) as of January 2018, increased by one attachment per pole, reflecting the expected additional PIA attachments. The uplift by one attachment per pole is applied as multi-premises PIA attachments are not assumed to be fully substitutional to Openreach's existing attachments.⁸⁸³

A25.31 A preliminary total cost recovery is calculated as the sum of:

- A preliminary cost recovery for single-premises attachments based on the above cost allocation per single-premises attachment multiplied by the total number of those attachments on all poles, including mixed poles, as of January 2018; and
- A preliminary cost recovery for multi-premises attachments based on the above cost allocation per multi-premises attachment multiplied by the expected total number of those attachments on all poles, including mixed poles. This is based on the total number of multi-premises attachments on all poles, including mixed poles, as of January 2018, which is scaled up by the ratio of the expected increase in the average number of attachments per cable pole.

A25.32 The cost allocations per single- and multi-premises attachment calculated above are then scaled down by the ratio of the regulatory cost base of cable attachments to the preliminary total cost recovery.

Cables up poles

A25.33 The regulatory costs per pole allocated to cables up poles are divided by the average expected number of those attachments per pole. This is based on the estimated total number of cables up pole as of January 2018, scaled up by 80% and divided by the total number of all poles, reflecting the expected additional PIA cables up pole. The 80% uplift recognises that cable up a pole attachments may not be substitutional to Openreach's existing attachments and that Openreach poles also carry transmission cables (hence a 100% uplift is not appropriate).⁸⁸⁴ The estimated total number of cables up pole as of January 2018 is based on the total number of poles as of that date multiplied by the average number of cables up pole per pole as of 2011.⁸⁸⁵

⁸⁸² As such, no uplift is applied to number of single-premises cable attachments per pole. Openreach's original PIA pricing model, sheet 'Pole Allocations'.

⁸⁸³ Openreach's original PIA pricing model, sheet 'Pole Allocations'.

⁸⁸⁴ Openreach response to question 41c of the WLA s.135 notice issued on 6 March 2017.

⁸⁸⁵ Openreach told us that an updated figure for cables up pole is not available. Openreach suggested estimating the updated number of cables up pole based on the updated total number of poles multiplied by the average number of cables up pole per pole as of 2011. Openreach response to question 18a of the WLA s.135 notice issued on 16 June 2017.

Manifolds

A25.34 The regulatory costs per pole allocated to manifolds are divided by the average expected number of those attachments per pole. This is based on the total number of manifolds as of January 2018, scaled up by the total number of DP poles as of that date, reflecting the expected additional PIA manifolds. The uplift by the total number of DP poles recognises that PIA manifold attachments may not be substitutional to Openreach's existing attachments, assuming one additional manifold for each existing copper DP pole.⁸⁸⁶

⁸⁸⁶ Openreach response to question 41d of the WLA s.135 notice issued on 6 March 2017.

A26. Calculation of the financial limit

- A26.1 As set out in Section 4 of Volume 3, we have decided to apply a financial limit to the costs of network adjustments included in the scope of the PIA network access obligation. These costs will be recovered from all products in markets in which BT has SMP that use Openreach's physical infrastructure (including PIA).
- A26.2 This annex sets out our approach and calculations relevant to determining the level of the financial limit.

Analysis to inform an appropriate financial limit

- A26.3 Our approach to calculate the level of the financial limit has been to assess evidence relating to the incidence of network adjustments as part of telecoms providers' network deployments and assess the costs relevant to those adjustments.
- A26.4 We consider that the overall incidence of network adjustments is likely be driven by both distance (i.e. length of network deployment) and the number of premises passed. Therefore, we have grouped network adjustments into two categories: These are:
- adjustments driven per kilometre (network adjustments up to the distribution point); and
 - b) adjustments driven per premises passed (network adjustments on lead-ins and associated physical infrastructure).
- A26.5 We have sought to estimate the average incidence of each type of adjustment being required, and the average cost associated with making that adjustment.
- A26.6 In determining the likely incidence of each type of adjustment, we have wherever possible based our assumptions on the assumptions Openreach itself uses when planning a full-fibre network.⁸⁸⁷ We recognise that access seekers may have different approaches to planning and deploying networks and therefore the adjustments they require, and decisions about if they are in scope of the remedy will evolve as their approaches change. Therefore, we accept that actual implementation costs may vary depending on deployment scenarios, geography, and other factors, from the modelling assumptions we have used.
- A26.7 We have used Openreach's PIA price list for ancillary activities, notified on 23 June 2017 and effective from 1 October 2017, as an estimate of the associated average cost.⁸⁸⁸
- A26.8 We note that in CityFibre's response to the August 2017 DPA Consultation it suggested that we could increase accuracy by using actual costs rather than the ancillary price list.⁸⁸⁹ The

⁸⁸⁷ We recognise that Openreach's assumptions are a function of Openreach's network architecture and how it has chosen to calibrate its assumptions internally. Clearly, other network designs could have greater or less flexibility in this regard.

⁸⁸⁸ Openreach response to question 2b of the WLA s.135 notice issued on 16 June 2017.

⁸⁸⁹ CityFibre response to the August 2017 DPA Consultation, paragraphs 1.1.8 and 5.2.3.

PAG also suggested that the ancillary price list was not based on evidence so should not be used.⁸⁹⁰ We disagree, as there needs to be consistency between the prices used to set the financial limit and prices used to determine whether the financial limit has been exceeded. Openreach will determine whether the financial limit for a given PIA order has been exceeded by using the relevant ancillary activity charges to calculate the aggregate costs of network adjustments requested. Therefore, we should use these same charges as the basis for the financial limit calculation.⁸⁹¹

- A26.9 We recognise that if the ancillary prices were to change, and the financial limit was not changed to reflect these new prices, this may undermine the role of the financial limit. We have considered whether to introduce a mechanism where the financial limit would automatically be updated to take into account any changes in ancillary prices.⁸⁹² However, the level at which we have set the financial limit is not solely the product of a mechanical calculation but involves a degree of regulatory judgement to balance the risks associated with setting the limit too high or too low. Therefore, we do not believe it would be appropriate to introduce a mechanism where the level of the financial limit would automatically track ancillary charges, given we cannot predict how ancillary charges might change. Instead, we have reserved direction making powers to adjust the financial limit if it proves necessary.⁸⁹³

Adjustments driven per kilometre

Repair of blocked or damaged duct (excluding ducted lead-ins)

- A26.10 In Section 2, we set out our conclusions on the scope of BT's network access requirement in relation to making network adjustments relevant to the repair of blocked or damaged duct.
- A26.11 In that section, we explain that network adjustments are those that involve making a permanent change to the physical infrastructure. As such, the removal of obstructions that prevent the use of existing infrastructure that is otherwise in good working order, will fall outside of the BT's network access requirement.
- A26.12 Our conclusions in that section are relevant to calculating the financial limit and specifically the calculation of the incidence of duct repairs since, for example, unblocking ducts via desilting should be excluded from the calculation.

⁸⁹⁰ PAG response to the August 2017 DPA Consultation, paragraphs 83-84.

⁸⁹¹ We note that PIA ancillary charges are subject to a basis of charges condition which requires that these prices reflect their underlying costs. Openreach's new PIA prices for a number of ancillary activities are set at a level equal to the Excess Construction Charges price (regulated under the business connectivity market review) for the corresponding activity, plus an additional 10%.

⁸⁹² We note that not all ancillary charges related to network adjustments feed in to our financial limit calculation.

⁸⁹³ We have also considered whether to include in our calculation an assumption about how these prices might change over this review period. We could, for example, assume ancillary charges follow the General Building Costs Index. However, we consider that this is unnecessary. This is because setting the level of financial limit is not a precise exercise and any such assumption is unlikely to have a material impact on the level of the financial limit in this review period.

- A26.13 In the August 2017 DPA Consultation, we did not consider the removal of obstructions separately from other types of repairs (e.g. repairing collapsed ducts), but instead grouped these into a single calculation that contributed to the level of the financial limit.
- A26.14 Therefore, consistent with our conclusions in Section 2, we have sought further information from Openreach about the build programmes on which we based our assessment in the August 2017 DPA Consultation relating to the incidence of each type of repair. This was so that we could exclude the incidence of non-permanent repairs (i.e. obstruction removals) from our calculation of the financial limit. However, Openreach confirmed that the data previously supplied and used to inform our calculations in the August 2017 DPA Consultation did not include duct clearance activities.⁸⁹⁴ Therefore, we have continued to use the data we used in the August 2017 DPA Consultation as an input into our analysis.
- A26.15 In our August 2017 DPA Consultation, our analysis indicated an average incidence of between 1 and 2 duct blockages per kilometre.
- A26.16 In response to our August 2017 DPA Consultation, Openreach agreed that the data used to inform our analysis supported this range. Flomatik, citing its industry experience, considered the incidence of duct blockages to be a little higher than that used within the calculation.⁸⁹⁵ CityFibre provided information on its experience from using PIA in Southend, stating that it experienced an incidence of 3.4 duct blockages per kilometre from [X] of PIA use.⁸⁹⁶
- A26.17 Our view is that the Openreach data set we used to inform our analysis, which is based on adjustments for 78 build programmes (predominantly FTTC) covering 6% of its total duct network, is likely to present a more reliable basis on which to predict an average incidence than the CityFibre data set which is much more limited in size.
- A26.18 Therefore, in calculating the incidence of duct repairs we have maintained the approach proposed in the August 2017 DPA Consultation with one change. We have continued to rely on the information used in our August 2017 DPA Consultation, relating to Openreach's 78 build programmes. However, in reviewing our calculations, we have decided to include information relating to a build programme that was excluded from our analysis in our August 2017 DPA Consultation (on the basis that it was an outlier in the data, with a much higher incidence of repairs than other programmes and unrepresentative).
- A26.19 The evidence we are now including relates to an Openreach full-fibre provisioning programme (specifically fibre build from the last known point in the network that fibre runs to (for example a FTTC cabinet) to the edge of a customer's property). We are including this information since Openreach has explained that full-fibre provision programmes are more likely to utilise existing duct (than FTTC programmes) and so a higher number of blockages may be associated with these programmes. This contrasts with

⁸⁹⁴ Openreach response to question 1 of the WLA s.135 notice issued on 23 October 2017.

⁸⁹⁵ Flomatik response to the August 2017 DPA Consultation, page 3.

⁸⁹⁶ CityFibre response to the August 2017 DPA Consultation, paragraph 6.2.1.

the other programmes analysed that more frequently involve the laying of new duct. As such, we consider the information is relevant to our calculation of the financial limit.⁸⁹⁷

- A26.20 We have considered whether the data relating to Openreach’s full-fibre provisioning programme alone should be relied on in the calculation of our financial limit; i.e. whether information relating to Openreach’s FTTC programmes should be excluded altogether from our analysis. However, the full-fibre programme is limited in scale, comprising of just 16km of cable. Therefore, we are concerned that the sample information would be too limited to be used on its own in our calculations.⁸⁹⁸ Our view is that the data for the full-fibre programme should be included within our overall analysis i.e. in a sample of 79 programmes. The dataset which comprises of adjustments required for 78 predominantly FTTC build programmes and the full-fibre provisioning programme (jointly covering 6% of Openreach’s total duct network), is likely to present a more reliable basis on which to inform our analysis.⁸⁹⁹
- A26.21 The inclusion of the full-fibre provisioning programme in our analysis has marginally increased the average incidence of duct blockages compared to our estimate in the August 2017 DPA Consultation. Our updated analysis indicates that there is an average incidence of between 1 and 2 ([>]) duct blockages per kilometre.⁹⁰⁰
- A26.22 In its response to the August 2017 DPA Consultation Openreach suggested that rather than use the figures derived from Openreach’s PIA price list to estimate an average cost for repairs of between £490 and £990 ([>]) per kilometre⁹⁰¹, we should consider its estimate of costs based on actual repairs requested by PIA users in the past year.⁹⁰² As noted above, our view is that there needs to be consistency between the costs used to set the financial limit and costs used to determine whether the financial limit has been exceeded. Any other approach is unlikely to provide a reasonable level of stability and predictability for telecoms providers and undermine the effectiveness of the remedy. We have therefore maintained the approach proposed in the August 2017 DPA Consultation.
- A26.23 To calculate the average cost of duct repairs per kilometre, we have multiplied our estimate of the incidence of duct repairs per kilometre, by the expected cost per repair using information from the PIA price list.⁹⁰³ We have calculated the average cost for duct

⁸⁹⁷ Openreach response to question 20 of the WLA s.135 notice issued on 30 November 2017.

⁸⁹⁸ We note that the figure is much higher than the figure assumed in Openreach’s modelling.

⁸⁹⁹ Openreach response to question 6 of the WLA s.135 notice issued on 12 June 2017.

⁹⁰⁰ In the April 2017 DPA Consultation we noted that Openreach implicitly assumes it will encounter 2.23 duct blockages per kilometre on the D-side of its network in its own fibre-to-the-cabinet and fibre-to-the-premises business modelling. In the August 2017 DPA Consultation we analysed a broader data set of 79 build programmes which results in a weighted average incidence of 1 to 2 ([>]) duct blockages per kilometre, after the removal of the full-fibre programme which was a clear outlier. It should be noted that the number of blockages per kilometre can vary depending on scenario, geography, etc. Openreach response to question 6 of the s.135 notice issued on 12 June 2017.

⁹⁰¹ This is the simple average of the PIA price for ‘Blockage clearance (initial)’ and ‘Blockage clearance (subsequent)’ per blockage, rounded to two significant figures.

⁹⁰² Openreach response to the August 2017 DPA Consultation, paragraph 98.

⁹⁰³ This is the simple average of the PIA price for ‘Blockage clearance (initial)’ and ‘Blockage clearance (subsequent)’ per blockage £493.45. Openreach. *Physical Infrastructure Pricing, Ancillary Activities - Price List*.

repairs to be between £490 and £990 (£[£<]) per kilometre.⁹⁰⁴ This represents a slight increase to our estimate in the August 2017 DPA Consultation as a result of an increase in our estimates of the incidence of duct repairs per kilometre.

Relieving capacity constrained chambers to facilitate additional ducts being installed

- A26.24 In Section 2, we set out our conclusions on the scope of BT's network access requirement in relation to making network adjustments to relieve capacity constrained chambers for the purposes of allowing additional ducts to be installed.
- A26.25 In the August 2017 DPA Consultation, we proposed that this network adjustment was in scope of BT's network access requirement. To calculate its contribution to the financial limit we estimated the incidence of additional chambers being required using information Openreach uses in its own fibre-to-the-cabinet and fibre-to-the-premises business model. In its model, Openreach assumes that it would need to install between 0.5 and 1 ([£<]) new jointing chambers per kilometre when deploying fibre in the E-side segments of its network (i.e. between its local exchanges and its street cabinets).⁹⁰⁵ In its response to the August 2017 DPA Consultation, Openreach said that the assumption used was not representative of PIA customers' requirements. It referred to information indicating that over the past year it had received requests for 8 new junction boxes over approximately 400km of PIA duct usage.⁹⁰⁶ While Openreach accepted its information was related to limited volumes it also noted it related to actual PIA usage.⁹⁰⁷
- A26.26 We have decided not to use the information put forward by Openreach, regarding the incidence of new chambers for PIA users, in estimating our financial limit, given it is based on a relatively small sample of overall use. It may therefore not be representative of network adjustments relevant to PIA being used for larger scale network rollouts (which we would expect to tend towards that found as part of Openreach's fibre-to-the-cabinet and fibre-to-the-premises deployment). In addition, as Openreach noted, the previous PIA remedy needed improvement, and therefore the difficulty access seekers have encountered in using PIA may have distorted the number of adjustments they have sought from Openreach.

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=%2BDv%2Bc9B8jITi5t3ObgmQQkgPp7N1FyAmTcwIXCnmJclZ6rNZujnCs99NbIKJZPD9hXYmijxH6wrcQm97GZMyQ%3D%3D>

⁹⁰⁴ To aid readability we have rounded to the nearest pound in the text.

⁹⁰⁵ Openreach response to question 8 of the WLA s.135 notice issued on 16 June 2017. In the absence of other information, we assumed that Openreach's assumption (which related to chamber enlargements for all reasons) would be representative of the frequency of chamber enlargements to accommodate additional ducts in the E-side of Openreach's network, and that it would also be representative of these adjustments in the d-side of Openreach's network (from cabinet to boundary of customers' premises) as the factors which drive this adjustment are likely to be the same. We note that as this is a modelling assumption, actuals may vary significantly depending on deployment scenarios, geography etc.

⁹⁰⁶ Openreach response to the August 2017 DPA Consultation, paragraphs 121-122.

⁹⁰⁷ Openreach response to the August 2017 DPA Consultation, paragraph 122. After gathering further information from Openreach, we learnt that its response on this point to the August 2017 DPA consultation was based on the lower number of an estimated 215km of built network, rather than an estimate of 430km of reserved duct. Openreach response to question 19a of the WLA s.135 notice issued on 30 November 2017.

- A26.27 We have decided to rely on the information found in Openreach's fibre-to-the-cabinet and fibre-to-the-premises deployment business model to estimate the incidence of Openreach being required to relieve capacity constrained chambers for the purposes of allowing additional ducts to be installed.
- A26.28 In calculating the financial limit, we have assumed that a telecoms provider would need to install between 0.5 and 1 (½) new jointing chambers per kilometre in building fibre-to-the-cabinet or fibre-to-the-premises.
- A26.29 We have calculated the average cost of installing a jointing chamber at £1,850 (per jointing chamber). This has been derived from the prices of installing a 'New medium carriageway box' and 'New medium footway box' as published on the Openreach PIA price list. We convert this estimate into an average cost of enlarging chambers per kilometre. We estimate an average cost of enlarging chambers of £1,295 per kilometre.⁹⁰⁸

Adjustments driven per premises passed

Relieving capacity pinch-points in spine duct which connects to lead-in duct

- A26.30 In Section 2, we set out our conclusions on the scope of BT's network access requirement in relation to making network adjustments to relieve 'pinch points' that might occur close to the distribution point where the existing copper lead-in cables converge. We explain that Openreach could relieve the congestion by installing footway boxes along the spine duct so that the congested sections of duct can be bypassed.
- A26.31 In our August 2017 DPA Consultation, we calculated that the contribution of these network adjustments to the financial limit by assuming an incidence of 0.5 additional (small) footway boxes being needed per underground distribution point. We estimated an average cost of £880 per footway box (as per the PIA price list).
- A26.32 Openreach suggested that our estimate of the incidence of additional footway boxes being needed was too high. Firstly, Openreach argued the requirement for a new footway box would be driven by choice of network architecture as opposed to an underlying issue with capacity.⁹⁰⁹ Secondly, Openreach noted that some swept-tee lead-ins are connected to 'rider ducts', running in parallel to the main spine duct. These rider ducts only contain lead-in cables and therefore are less likely to be congested (than lead-ins connected to spine ducts which may contain other cables). Accordingly, this would reduce the number of additional joint boxes that would be required under its network access requirement.⁹¹⁰
- A26.33 Our view is that Openreach's first contention ignores that central to our calculations is the assumption that access seekers would follow Openreach's existing network architecture,

⁹⁰⁸ We have taken the average of the PIA price for a 'New medium carriageway box' and for a 'New medium footway box', and weighted it by the proportion of national duct corresponding to carriageway (13%) and footway or soft surfaces (87%), following our analysis of the model submitted by Openreach in response to question 25 of the WLA s.135 notice issued on 6 March 2017. These were modelling assumptions used by Openreach and are not directly linked to deployment actuals.

⁹⁰⁹ Openreach response to the August 2017 DPA Consultation, paragraphs 124-126.

⁹¹⁰ Openreach response to the August 2017 DPA Consultation, paragraphs 127-131.

by deploying their distribution point or manifold either at the same location as Openreach's copper distribution point or immediately upstream of it. Therefore, in our calculations, we have sought to determine the minimum number of additional footway boxes that would be required, on average, to relieve pinch points in spine-duct which serves lead-in ducts. Given the basis of our approach, we do not agree that Openreach's point supports lowering the frequency of additional footway boxes in our calculation of the financial limit.

- A26.34 We sought further information from Openreach regarding both the use of rider ducts in its network architecture and the volume of lead-ins that are served by rider ducts. Openreach explained that it is unable to provide the actual number of lead-ins that are connected to rider ducts. However, it estimated that 1.9m premises served by swept-tee lead-ins are connected to rider ducts. This estimate is based on the volume of new build properties connected to Openreach's network since 2001, when swept-tees were introduced nationally (and the inference that almost all of these were connected to rider ducts).⁹¹¹
- A26.35 Openreach's information and explanation highlighted that our August 2017 DPA Consultation was incorrect to characterise all ducted underground lead-ins as being served by swept-tees. Prior to the introduction of swept-tees, ducted underground lead-ins were connected to spine ducts by various methods including using small footway boxes.⁹¹² However, Openreach was unable to provide detailed information relating to the incidence of various solutions and how they were used. Openreach explained that the solution would have varied by region, geotype and developer.⁹¹³
- A26.36 Nevertheless, we have lowered the estimate used in our August 2017 DPA Consultation relating to the number of premises that may be impacted by pinch points in spine duct, by excluding those premises which are likely to have been served by a rider duct.
- A26.37 We continue to consider that there is a risk of pinch points close to the distribution point where ducted underground lead-ins are connected to spine duct using small footway boxes. Moreover, in the absence of further information, we assume that with exception of ducted lead-ins connected to rider duct, all remaining ducted lead-ins are connected to spine duct using a small footway box.
- A26.38 Our analysis indicates that in many cases there would be sufficient spine duct capacity from the distribution point to accommodate a second set of lead-in cables for a fibre

⁹¹¹ Openreach response to question 2(d) of the WLA s.135 notice issued on 23 October 2017. Openreach was unable to provide information as to where these swept-tees are located, the number of swept-tee connections per distribution point and whether they are served by rider ducts.

⁹¹² Openreach response to question 3 of the WLA s.135 notice issued on 30 November 2017. Openreach explained that various methods were used to connect lead-ins.

⁹¹³ Openreach response to question 3 of the WLA s.135 notice issued on 30 November 2017. Openreach provided information on the most common types of chambers used for underground distribution points recorded in their planning database. However, this data excluded chambers that are used to connect ducted lead-ins to spine ducts, but that do not contain distribution points. Therefore, this additional information does not help us to understand further if an existing footway box (which might not be considered as a distribution point) would be present which would mitigate the need for an additional footway box.

network and hence no additional footway boxes would be necessary.⁹¹⁴ Our analysis also indicates that only in exceptional circumstances would more than one additional footway box be required per distribution point.⁹¹⁵ Therefore, we have decided to maintain the approach set out in the August 2017 DPA Consultation. Our view is that a reasonable estimate of the incidence of additional footway boxes required per distribution point would fall between 0 and 1. We have therefore assumed a figure of 0.5 additional footway boxes per distribution point, at an average cost of £880, from the PIA price list.⁹¹⁶

A26.39 Noting that 17% of premises are served by underground ducted lead-ins (excluding those served by rider ducts)⁹¹⁷, and that on average a distribution point serves 6.2 premises⁹¹⁸, we have derived an average cost estimate for additional footway boxes of £12 per premises passed.

Relieving capacity constrained chambers (i.e. junction boxes and manholes)

A26.40 In Section 2, we set out our conclusions on the scope of BT's network access requirement in relation to making network adjustments relevant to enlarging chambers, where these have insufficient space to accommodate extra equipment (e.g. fibre splitters).

A26.41 In Section 4, we conclude that the costs of these network adjustments should be included in the financial limit.

A26.42 In the August 2017 DPA Consultation, we used assumptions from Openreach's own business modelling relating to its fibre-to-the-cabinet and fibre-to-the-premises deployment to inform our estimates of the likely incidence of this network adjustment for the purposes of calculating the financial limit.⁹¹⁹ In its fibre-to-the-cabinet and fibre-to-the-premises deployment business modelling, Openreach has assumptions relating to the likelihood that a chamber has insufficient capacity to accommodate the three types of passive components that are typical in a Gigabit Passive Optical Network (GPON)⁹²⁰, and

⁹¹⁴ We use the modelling assumptions provided by Openreach in its response to the WLA s.135 notice issued on 27 January 2017 that the average number of premises per underground Distribution Point (DP) is 6.2. Our analysis indicates that there would typically be sufficient space in the spine duct to accommodate fibre final-drop cables where no more than 10 premises are served by the DP and there are no other cables in the spine duct.

⁹¹⁵ Our analysis suggests that two or more footway boxes would be required only where 12 or more premises are served by the DP, or where cables other than final-drop cables occupy a significant proportion of the spine duct capacity.

⁹¹⁶ We have taken the PIA price for 'New small footway box'.

⁹¹⁷ Using the modelling assumptions set out in Openreach's updated PIA pricing model, provided in its response to the s.135 notice issued on 27 January 2017, we assume that the number of underground lead-ins is 7.6 million. This is calculated using the assumed number of underground distribution points (1.2 million) multiplied by the assumed average number of premises per distribution point (6.2). After removing 11% of underground lead-ins which Openreach estimates to be direct buried, this leaves 6.8 million ducted lead-ins. We also removed 1.9m premises served by rider ducts from this total, leaving 4.9m ducted lead-ins. This is divided by our assumption of the total number of premises nationally, 28 million (this figure comes from Openreach's presentation to Ofcom on 23 March 2011, titled "Ofcom Discussion – PIA Pricing"), to give a proportion of premises served by ducted lead-ins. It should be noted that the 28 million premises include all points that the copper access network serves including buildings, mobile masts, power substations, traffic light controls etc.

⁹¹⁸ Openreach response to question 21b] of the WLA s.135 notice issued on 21 December 2017.

⁹¹⁹ These assumptions were taken from version 12.1 of Openreach's fibre-to-the-cabinet and fibre-to-the-premises deployment business modelling model.

⁹²⁰ The passive components of Openreach's Gigabit Passive Optical Network (GPON) architecture comprise: (i) primary splitter node, housing passive optical splitters used to join a single upstream fibre to multiple downstream fibres; (ii)

the number of adjacent chambers that could be utilised in each case before additional chamber capacity is required.⁹²¹

- A26.43 In our August 2017 DPA Consultation, we estimated the average cost of these network adjustments to be £8.40 per premises passed. This was based on an average cost of a chamber at £880 (using information published in Openreach’s PIA price list).
- A26.44 Openreach raised questions about the validity of our assumptions and calculations for the financial limit, as these had been based on information included in version 12.1 of its fibre-to-the-cabinet and fibre-to-the-premises deployment model rather than the current version (version 13).⁹²²
- A26.45 We have examined version 13 of Openreach’s fibre-to-the-cabinet and fibre-to-the-premises business model. We note that the main difference between the two models is that version 12.1 specifies the dual-split GPON blown fibre network architecture described above, whereas the current version specifies a single-split GPON ‘connectorised’ network architecture.⁹²³
- A26.46 Openreach also informed us that the network architecture assumptions we had used for the financial limits calculations were inconsistent with the network architecture described in version 12.1 of its model. This was because we had assumed that splitter distribution points would serve up to 8 premises, whereas Openreach’s model assumes they serve up to 32 premises.
- A26.47 In light of Openreach’s comments, we have updated our assumptions to reflect Openreach’s current network design in two respects. Firstly, we assume that a splitter DP would serve up to 32 premises, but would be configured to serve 28 premises rather than our initial assumption of 8. Secondly, we have updated our network architecture assumptions for primary splitters, splitter DPs and manifolds to reflect Openreach’s assumption that spare capacity would be left in all nodes for future growth.⁹²⁴

splitter distribution point, housing passive optical splitters providing a second layer of fibre sharing; and (iii) manifold, joining blown fibre ducts from customer premises to a single upstream blown fibre duct. Telecoms providers are likely to have some flexibility to choose the location of the passive components of their networks, and might be able to select adjacent chambers if their first choice of chamber has insufficient space, within distance constraints.

⁹²¹ For primary splitter nodes Openreach assumes 60% of chambers have insufficient capacity and up to five adjacent chambers could be used; for splitter distribution points Openreach assumes 40% of chambers have insufficient capacity and up to three adjacent chambers could be used; and for underground manifolds Openreach assumes 12.5% of chambers have insufficient capacity and up to two adjacent chambers could be used. Openreach ‘Modelling Rules & Costs’, Version 13, December 2017. We note that as the incidences of blocked chambers are modelling assumptions, actuals may vary significantly depending on deployment scenarios, geography etc. We also note that the assumptions about flexibility to use alternative chambers are a function of Openreach’s network architecture. Clearly, other network designs could have greater or less flexibility in this regard.

⁹²² Openreach response to the August 2017 DPA Consultation, paragraph 138.

⁹²³ This has the same passive components as the dual-split architecture described above but has splitters only at the primary splitter node and uses connectorised cables rather than blown fibre for some network segments.

⁹²⁴ Openreach response to question 8 of the WLA s.135 notice issued on 16 June 2017.

- A26.48 We have updated our estimates accordingly⁹²⁵ to calculate an average cost for these network adjustments of £4 per premises passed.⁹²⁶ This is based on an average cost of £880 per chamber, based on the PIA price list.⁹²⁷
- A26.49 Openreach also argued that there are likely to be alternative options if a PIA customer requires additional chamber space to occupy its components. In particular, the telecoms provider could (i) locate equipment in another chamber; (ii) enlarge an existing chamber; or (iii) build a new chamber adjacent to an existing chamber and link the two chambers. Openreach stated that PIA users are “very likely” to use alternative options instead of requesting adjustments.⁹²⁸
- A26.50 We agree that access seekers could seek to use alternative options, such as locating their equipment in adjacent chambers, since this could reduce their network deployment timescales. As noted above, our assumptions are based on Openreach’s fibre-to-the-cabinet and fibre-to-the-premises modelling assumptions and are therefore aligned with Openreach’s assumptions in this regard. The assumed incidence of chamber construction takes account of the use of adjacent chambers. Costs are based on new chamber construction (because we believe that Openreach assumes that enlargement costs are generally comparable).

Financial limit

Setting a financial limit on a per kilometre basis

- A26.51 As explained in Section 4, we have decided to set a single financial limit which applies to the total number of kilometres of spine duct requested as part of a particular PIA order. Therefore, we have converted our average cost estimate for network adjustments driven by premises passed to a cost per kilometre.
- A26.52 In our August 2017 DPA Consultation, we proposed to derive the conversion ratio by dividing the total route length of spine duct in Openreach’s network (451,000 km) by the number of premises it serves (28 million), giving an average of 16 metres of duct per premises passed.⁹²⁹
- A26.53 Openreach raised concerns over the conversion ratio used to convert the per premises passed components into a limit defined in terms of the number of metres of duct

⁹²⁵ Our consultation assumptions were that primary splitters ultimately serve 128 premises, splitter distribution points serve 8 premises and underground manifolds serve 8 premises (for the 49% of premises served by underground lead-ins). To reflect assumptions used by Openreach, our amended assumptions are that these nodes serve 108, 28 and 6 premises respectively. We calculate the incidence as $(0.6^5 \div 108) + (0.4^3 \div 28) + (0.125^2 \div 6) \times 49\% = 0.0043$ per premises passed. We note that in practice, a network designed in accordance with Openreach’s planning might achieve somewhat lower ratios. Our estimate therefore represents an upper limit for Openreach’s network architecture.

⁹²⁶ In the August 2017 DPA Consultation we proposed an average cost of £8.40 per premises passed.

⁹²⁷ We have taken the PIA price for ‘New small footway box’ of £881.50.

⁹²⁸ Openreach response to the August 2017 DPA Consultation, paragraphs 137-138.

⁹²⁹ The figure for the total length of duct is a modelling assumption set out in Openreach’s updated PIA pricing model, which it provided in its response to the WLA s.135 notice issued on 27 January 2017.

requested. In its response, Openreach estimated that there was between 30 to 60 metres of duct per premises passed depending on geotype.⁹³⁰

- A26.54 After seeking further information from Openreach, we established that the total metres of duct used in Openreach’s estimate was not directly comparable with our estimate as Openreach’s figure included lead-in ducts. Focussing specifically on spine duct, our analysis of Openreach’s estimate indicated a lower length of spine duct of between 6 to 32 metres, with an average of 15.7m duct per premises passed.⁹³¹
- A26.55 Openreach also suggested that we should derive the conversion ratio by dividing the total route length of its duct network (451,000 km) by the number of ducted lead-ins (6.8 million), giving an average of 68 metres of duct per premises passed. We have not adopted this suggestion because the adjustment costs relate to network elements that serve all underground lead-ins, as well as network elements upstream of overhead distribution points. As such, they are relevant to all premises, not just those served by underground ducted lead-ins. We therefore consider that the appropriate measure to use to derive the conversion factor is the total number of premises served by the Openreach network and the total length of Openreach’s network excluding lead-in ducts. Furthermore, given that Openreach has not recorded lead-in duct infrastructure in its inventory systems in the past, and therefore the length of its lead-in networks is unknown, it would prove difficult to include the length of lead-in ducts in our calculations.⁹³²
- A26.56 Since our August 2017 DPA Consultation, we have calibrated our estimate against Virgin Media’s duct network. Prior to its Project Lightning network expansion, Virgin Media had an average of 15.2m of cable per premises passed.⁹³³ Although the network architectures of Virgin Media and Openreach are different, and Virgin Media is mostly focused in urban areas, we believe that as the only other large scale residential network in the UK this is a relevant benchmark.
- A26.57 We have therefore decided to maintain our conversion ratio of 16m of spine duct per premises passed. The average aggregate costs associated with the adjustments identified earlier in this annex are £51 per premises passed. Using our 16m figure this is converted to a cost of £3,171 per kilometre.

⁹³⁰ Openreach response to the August 2017 DPA Consultation, paragraph 142.

⁹³¹ Openreach response to question 1 of the WLA s.135 notice issued on 30 November 2017.

⁹³² Openreach response to question 19 of the WLA s.135 notice issued on 21 December 2017; Openreach response to the August 2017 DPA Consultation, paragraph 142. This included an implicit estimate for the length of lead-in duct per premise, split by geo-type, but Openreach was unable to ascertain the basis of these estimates. Openreach response to question 1 of the WLA s.135 notice issued on 30 November 2017.

⁹³³ Virgin Media, 2008. *Annual Report*, page 15. “Our cable network in the U.K. currently passes approximately 12.6 million homes in our regional service areas as well as passing a significant number of businesses in these areas. The network utilizes a combination of optical fibre and coaxial cable, and has an overall length of approximately 202,000 kilometres. This includes over 192,000 kilometres which are owned and operated by us and approximately 10,000 kilometres of optical fibre and coaxial cable routes which are leased from other network owners.”

Uplifting the financial limit to allow for above average, normal adjustments

A26.58 We have considered whether our average estimate of the costs of network adjustments relevant to the financial limit should be adjusted, and if so, by how much, to recognise the distribution of network adjustments costs above the average. We have considered whether provision should be made for those adjustments which are not included, but may or may not be in scope depending on the context.

A26.59 In the August 2017 DPA Consultation, we proposed to apply up to a 50% uplift to our estimate of the average network adjustment cost per kilometre. Based on our analysis of available information relating to the distribution of network adjustments costs, we considered that this would likely be sufficient to capture the typical, or normal, in-scope adjustment costs without necessarily including costs that might be considered exceptional. We also considered that a 50% uplift would provide some allowance within the financial limit for those adjustments which may or may not be in scope depending on case specifics.⁹³⁴

A26.60 In response to our August 2017 DPA Consultation, Openreach challenged our proposal to apply up to a 50% uplift to our estimate of the average cost of adjustments, stating that it was too simplistic and noted that:⁹³⁵

- a) Some contributing components of the financial limit may not have a distribution of costs or incidences. To be included in an overall distribution of costs, the distribution of each contributing component's costs should be worked out and then summed.⁹³⁶
- b) Some contributing components' costs had been vastly overstated in the base case.⁹³⁷
- c) Openreach referred to an internal 20% threshold that it uses which means that where actual costs exceed planned costs by 20% there is a requirement for the work to be re-approved. Openreach argued that an appropriate and conservative approach would be to use a 20% uplift, rather than a 50% uplift, for calculating the financial limit.⁹³⁸

A26.61 Openreach suggested that a more cautious approach would be more reasonable, more proportionate, lead to a lower financial limit, which would reduce the risk of inefficient network build, and prevent a material impact on Openreach resources.⁹³⁹

A26.62 We have sought further information relevant to the 20% figure that Openreach refers to in its response. Our understanding is that this threshold is used as a financial control measure on some projects. Where the costs of network adjustments relevant to a project exceed

⁹³⁴ August 2017 DPA Consultation, paragraph 4.45.

⁹³⁵ Openreach response to the August 2017 DPA Consultation, paragraph 143.

⁹³⁶ Openreach response to the August 2017 DPA Consultation, paragraph 144.

⁹³⁷ Openreach response to the August 2017 DPA Consultation, paragraph 143.

⁹³⁸ Openreach response to the August 2017 DPA Consultation, paragraph 145.

⁹³⁹ Openreach response to the August 2017 DPA Consultation, paragraphs 146-147.

this threshold, then depending on the level of delegated authority, further spend may need re-approval.⁹⁴⁰

- A26.63 Our view is that although this threshold is used for the purposes of Openreach’s own financial controls, it is not directly relevant to the uplift that should be used in setting a financial limit in the context of supporting a network access obligation.⁹⁴¹
- A26.64 In its response to the August 2017 DPA Consultation, CityFibre indicated that from its experience of using DPA in Southend, the cost of activities which may or may not be in scope, depending on case specifics (category B activities), will be approximately £ 6,011 per kilometre⁹⁴². Accordingly, it argued that the proposed financial limit (with uplift) was too low to have any significant impact on a telecoms provider’s incentives to use DPA.⁹⁴³
- A26.65 We note that CityFibre’s estimates were based on network adjustments it assumed would be in-scope and would encounter when accessing Openreach’s ducts in Southend. In examining CityFibre’s evidence, we make the following observations. Firstly, CityFibre assumed that network build covering three additional categories would always be in scope.⁹⁴⁴ Our view is that assuming these adjustments are in-scope, regardless of the case specifics, CityFibre is likely to have over-estimated their significance. Secondly, CityFibre’s Southend trial is indicative of a relatively small-scale network deployment, in one particular area. As such, it may have atypical characteristics that are not representative of larger scale network deployments. Therefore, our view is that it would be inappropriate to use the information provided by CityFibre to determine the uplift to the financial limit.
- A26.66 In Section 2, we have clarified what type of network adjustments are likely to be in scope, reducing the need to make provision in the financial limit for those adjustments which are not included in our modelling, but may be in scope depending on the context. Furthermore, we recognise that our modelling may have included adjustments that may be out of scope depending on the context. Noting these factors we have not included an allowance for adjustments that may be in scope depending on case specifics.

⁹⁴⁰ Openreach does not have an internal equivalent to the concept of some network adjustments being in-scope and others are out of scope for the purposes of internal cost control.

⁹⁴¹ Openreach operates a series of authorisation processes when there is a cost variance from an original business case. Further authorisation is conditional on the approver satisfying themselves that the lowest cost solution is being used and that the business case has been completed correctly. According to documentation provided by Openreach, if the request for approval is within 20% of the maximum authorisation level of a layer 6 manager for a business as usual programme, a financial audit is required. Openreach response to question 21 of the WLA s.135 Notice issued on 30 November 2017.

⁹⁴² CityFibre also noted that the cost of in-scope Category B adjustments would be over 70% more (£[3<]) using Openreach’s prices. CityFibre response to the August 2017 DPA Consultation, paragraph 6.3.3.

⁹⁴³ CityFibre response to the August 2017 DPA Consultation, paragraphs 5.2.6 to 5.2.7 and 6.3.3.

⁹⁴⁴ CityFibre proposed that new network build would be in scope when it was for CityFibre’s own requirements, where PIA would not be a viable alternative; where CityFibre has decided to install underground duct, but the Openreach alternative was aerial; and where Openreach duct had insufficient capacity, was collapsed or filled with redundant cable. CityFibre response to the August 2017 DPA Consultation, paragraph 6.3.1.

Distribution data to inform the uplift for in-scope adjustments

A26.67 In response to the August 2017 DPA Consultation, Openreach suggested that as part of estimating the uplift in our financial limit calculations, we consider the distribution of costs relevant to each type of network adjustment.

A26.68 We have therefore re-examined our analysis of the distribution of costs, by analysing available data for each of the adjustments we consider to be in-scope of the access remedy, to further inform our understanding of the possible boundary between normal and exceptional adjustments.

- a) *Repair of blocked or damaged duct (excluding ducted lead-ins)*: We obtained information from Openreach relating to 79 build programmes, covering 6% of Openreach’s duct network.⁹⁴⁵ Our analysis of this information suggests that there is a wide variance in the incidences of blockages across build programmes. However, we have been unable to assess the distribution of blockages per kilometre within each programme since this information is not available (the data only provides an average incidence per programme). Therefore, we have been unable to compile evidence relating to the distribution of blockages that is not influenced by the size of the programme.⁹⁴⁶
- b) *Relieving capacity constrained chambers (i.e. junction boxes or manholes)*: Information on spare capacity in joint boxes and manholes is not held by Openreach and therefore we are unable to construct a distribution of the incidence of this network adjustment.⁹⁴⁷
- c) *Relieving capacity pinch-points in spine duct which connects to lead-in duct*: Information on the available capacity in joint boxes and manholes is not held by Openreach. Information on the occupancy of spine/rider ducts between distribution points and lead-in duct is not held either, as Openreach has not historically kept records of lead-in ducts. We are unable to construct a distribution of the incidence of this adjustment.⁹⁴⁸

A26.69 Our view is that available data does allow us to determine a lower bound of the financial limit, which as explained above, would be the average cost of adjustments of £3,171 per km. However, we do not believe that we can, with sufficient reliability, derive the boundary between normal and exceptional adjustments, and therefore the uplift to the financial limit, by using the available distribution data for in-scope adjustments.

⁹⁴⁵ 24,900km of Openreach’s 451,000km network. Openreach response to question 6 of the WLA s.135 Notice issued on 12 June 2017.

⁹⁴⁶ Our examination of the data available indicated a relatively wide distribution of blockages per programme, with several programmes encountering less than 1 blockage per km, several programmes encountering more than 3 blockages per km, and some outliers encountering much higher incidences than this.

⁹⁴⁷ Openreach response to question 8 of the WLA s.135 notice issued on 12 June 2017.

⁹⁴⁸ Openreach response to question 7a of the WLA s.135 notice issued on 12 June 2017.

Data on the distribution of capacity constrained duct sections by BT local exchange areas

A26.70 As noted in the August 2017 DPA Consultation, data is available relating to the distribution of capacity constrained duct sections by BT local exchange areas. Although this data is not directly relevant to in-scope adjustments, we consider that it is reasonable to assume that there will be a correlation between the distribution of capacity constrained ducts, and the requirement for chambers to be extended to accommodate new ducts or chambers unable to accommodate additional equipment. Our view is that chambers are more likely to need extending where exiting ducts are full.⁹⁴⁹ Our analysis indicates that there is a relatively narrow variance relating to the proportion of congested duct per exchange area.⁹⁵⁰

Conclusion

A26.71 We have considered the available information and stakeholder comments and have exercised our judgement and concluded that 50% is an appropriate uplift.

A26.72 In the absence of further information, we note that the available data suggests that there may be a wide variation of normal adjustments. From this, we have concluded that it is reasonable to apply an uplift of 50% to the average costs of network adjustments. This results in a financial limit of £4,757 per km (or £77 per premises passed).

A26.73 Recognising the nature of the modelling exercise we have followed we have decided to set the financial limit at £4,750 per kilometre. In setting the financial limit at £4,750 per km (or £77 per premises passed), we observe the following:

⁹⁴⁹ We used this data in the August 2017 DPA Consultation, noting that our analysis of current available network records (taken from a snapshot from Openreach's records) found an average of 10% of duct sections are capacity constrained at a national level. Uplifting this average by 50% would give a threshold of 15%. We found that the significant majority (92%) of BT local exchange areas have less than 15% of duct sections which are capacity constrained. It should be noted that network records do not necessarily record all network features, which will vary widely between different geographic regions (and within regions). Local Occupancy level will also likely vary according to geographic area. August 2017 DPA Consultation, footnote 126.

⁹⁵⁰ Our analysis showed that distribution of exchanges had an average of 11.3% with a standard deviation of 6%, and that 95% of exchanges have 20% or less red duct sections. Based on this, we believe that the boundary between normal and exceptional exchanges could be between 17% and 22% of red ducts, indicating that an uplift range of between approximately 50% and 100% would be sufficient to ensure all normal adjustments were included. This analysis was conducted using information provided as part of Openreach's response to question 6 of the WLA s.135 Notice issued on 12 June 2017, in addition to Openreach's response to question 10 of the WLA s.135 notice issued on 16 June 2017. Approximately 15% of BT's records do not have any RAG status information about duct utilisation and have been excluded from this analysis. A minority of duct records appear in our analysis to be incorrect, apparently having distances that are far longer than would occur in practice. We have excluded from our analysis all records with a duct length of over 2km. For the purposes of this analysis, we have assumed that these exclusions do not skew the results. Our analysis shows that since the average duct length per end premises is broadly the same for most exchanges, it is appropriate to assess the distribution of 'red' ducts per exchange, even though each exchange differs in size. Our analysis shows that there is only a weak relationship between exchange size (measured by number of premises) and the proportion of red ducts. ($R^2 = 0.0229$). Therefore we believe it is appropriate to assess the distribution of 'red' ducts per exchange, even though the number of red ducts in each exchange differs.

- a) Although stakeholders responded with a wide range of preferred financial limits, including TalkTalk (£15,000 per km)⁹⁵¹ and Openreach (which suggested that the average cost of adjustments is approximately £1,500)⁹⁵², no stakeholder has provided substantial quantitative data to support their response.
- b) Openreach suggested a limit based on existing duct and pole access orders. Our view is that this evidence is indicative of access seekers operating under a financial limit effectively set at zero, and only relates to activities carried out by Openreach on an access seeker's behalf (i.e. it excludes activities carried out by access seekers themselves). We therefore consider that the information is not suitable for determining a future financial limit, given the limited use of PIA to date and the exclusion of network adjustments that may have been carried out by telecoms providers, but not recorded in the Openreach data.⁹⁵³
- c) Various industry estimates suggest that the cost of building a network to provide broadband services is broadly between £350 (using Openreach's ducts, but excluding Openreach's contribution of network adjustment costs) and £500 (when self-built) per home passed. Therefore, a financial limit of £77 per home passed is substantial compared to the cost of building.⁹⁵⁴
- d) Finally, it would be possible to revisit the level of the financial limit, by reopening the charge control, if new evidence was found that suggested it had been set too low.

Table A26.1: Financial limit for network adjustments

	Financial limit
Financial limit per kilometre	£4,750 per km

A26.74 The implementation of this financial limit is set out in our SMP conditions in Annex 33.

Implementing the financial limit across orders

A26.75 Below we consider how the financial limit should be allocated within or across orders.

A26.76 In the August 2017 DPA Consultation, we considered that the financial limit should be based on the scale of the deployment using PIA, and applied to each order on a per

⁹⁵¹ TalkTalk response to the August 2017 DPA Consultation, paragraph 3.3.

⁹⁵² Openreach response to the August 2017 DPA Consultation, paragraph 156.

⁹⁵³ This is because under the 2010 PIA remedy access seekers paid for all adjustments. Openreach response to question 45 of the WLA s.135 notice issued on 12 October 2017; Openreach response to question 16 of the WLA s.135 notice issued on 30 November 2017. Openreach also confirmed that their records of adjustments requested by access seekers using their ducts and poles, excluded adjustments carried out directly by access seekers themselves as these are not reported to Openreach. Therefore, Openreach are unable to estimate an overall total of adjustments required. Openreach response to question 19 of the WLA s.135 notice issued on 30 November 2017.

⁹⁵⁴ In addition, as discussed in Section 4, we consider it very plausible that the benefits would outweigh the costs if the financial limit were reached.

kilometre basis. We proposed that the financial limit should apply in aggregate to all reasonable adjustments within scope.

- A26.77 In response to our proposals, Openreach suggested the financial limit could be implemented by assessing the financial limit for each access seeker across its aggregate annual PIA orders, based on the access seeker's forecasts for the year ahead. Openreach claimed this approach would allow extra flexibility without driving up overall costs, and reduce the need for an uplift. Openreach argued that this would provide it with better certainty of the scale of funds required to be allocated to support PIA-driven network adjustments.⁹⁵⁵
- A26.78 Our view is that if Openreach wanted to assess its maximum financial exposure in relation to network adjustment requests, this could be derived using information relating to forecast usage of PIA orders across all accredited PIA users. Notwithstanding this, our view is that it would be inappropriate to implement the financial limit through forecast usage since this could incentivise over-forecasting by telecoms providers. Therefore, we consider it is important to base the financial limit on the actual length of ducts ordered rather than forecast.⁹⁵⁶
- A26.79 In addition, our understanding is that telecoms providers plan network deployments primarily on an area by area basis, rather than on an annual basis. Therefore, an annual financial limit may undermine the remedy's effectiveness due to this additional complexity where network deployments overlap for two or more years. We therefore do not agree with Openreach's suggestion that the financial limit should be set on an annual basis.
- A26.80 Nevertheless, we have further considered the process of how the financial limit should be applied. We note that access seekers are unlikely to request access to lead-in ducts as part of the initial build phase (this may be due to, for example, wayleave access issues). This raises the risk that if an order is defined as consisting of the kilometres of duct ordered at a single point in time, an access seeker that subsequently orders lead-ins which require in scope adjustments will find these are not captured within the financial limit.
- A26.81 We have therefore concluded that for the purposes of applying the financial limit, an individual order should be defined to include both the duct and chambers in the initial order, as well as any lead-ins that are subsequently ordered which are contiguous to the duct requested in the initial order.⁹⁵⁷ This means that the financial limit associated with a specific order will be available beyond completion of the initial build phase where this

⁹⁵⁵ Openreach response to the August 2017 DPA Consultation, paragraph 148.

⁹⁵⁶ There is also a risk that setting a financial limit on the basis of an annual forecast may increase the complexity of how this limit might operate. For example, if an access seeker discovers its first order requires more adjustments than expected, it may cancel further orders. Remedying this risk would in effect lead to the financial limit being assessed on a per order basis.

⁹⁵⁷ For example, Openreach's current price list includes a provision for assessing add-on orders which are contiguous to an existing facility. Openreach, *Physical Infrastructure Pricing – Duct Products*, Note 1.

<https://www.openreach.co.uk/org/home/products/pricing/loadProductPriceDetails.do?data=%2BDv%2Bc9B8jITi5t3ObgmQQunDOtFN1wXfL4zxAgntdRZ6rNZuinCs99NbIKJZPD9hXYmijxH6wrCQm97GZMyQ%3D%3D>

relates to using lead-ins associated with a section of spine duct, or a distribution point, relevant to the initial order.

- A26.82 In our August 2017 DPA Consultation, we proposed that the financial limit should be based on the scale of the deployment using PIA. In its response to the August 2017 DPA Consultation, Openreach queried if the financial limit threshold would be pro-rated to the order length, noting that this may be administratively onerous.⁹⁵⁸ Although Openreach acknowledged that a per order basis may be more straightforward than other ways to group access requests and their associated adjustments, it questioned how it would define the number of kilometres ordered.
- A26.83 Our view is that since PIA orders largely comprise of sections of ducts, each of which has a defined length, the total length of duct requested per order is straightforward to identify. We therefore disagree that pro-rating is administratively complex, and conclude that the financial limit threshold should be pro-rated to the length of duct within a specific order.⁹⁵⁹
- A26.84 Openreach also argued that PIA customers may place orders in such a way that the limit is never exceeded by scattering orders geographically and distorting the average cost per kilometre, thereby maximising the level of network adjustments Openreach would need to fund. For example, having surveyed routes, an order could be composed of routes with above average costs balanced with below average costs which would keep the average cost per kilometre for the order within the threshold, therefore undermining Ofcom's proposed per order cap. Openreach considered that a process to implement a financial limit would be unworkable if PIA customers sit on orders whilst they build up network adjustment requests and assess how the orders interact with their financial limits; or alternatively, trigger adjustment orders piecemeal making tracking highly complex.⁹⁶⁰
- A26.85 Our aim is to promote the deployment of competing networks at scale, which is likely to require telecoms providers to be able to place large orders containing numerous sections of duct.
- A26.86 Our view is that the risk of telecoms providers having sufficient information to compose an order in the way described by Openreach is limited. This is because although some network adjustments may be identified following a survey, others will only be identified by the access seeker at the point of deploying its network (i.e. installing its fibre). Accordingly, telecoms providers will have imperfect knowledge of the likely incidence of network adjustments in relation to the ducts within any order. Finally, while we acknowledge that Openreach will need to track network adjustments against an order, we do not accept that this is highly complex. Our view is that processes can be developed to accommodate this.
- A26.87 In response to the August 2017 DPA Consultation, Openreach also suggested that the financial limit could be based against a particular end to end route.⁹⁶¹ We have considered this suggestion but do not think it would be appropriate, given there may not always be a

⁹⁵⁸ Openreach response to the August 2017 DPA Consultation, paragraph 154.

⁹⁵⁹ The total length of duct ordered would exclude any lead-in duct.

⁹⁶⁰ Openreach response to the August 2017 DPA Consultation, paragraph 153.

⁹⁶¹ Openreach response to the August 2017 DPA Consultation, paragraph 154.

clear end to end route. For example, when building a typical multi-premises network to provide broadband services, there is no single route from A to B; instead, like a tree and its branches, a network may have one start point extending to multiple end points. Therefore, determining the end to end route for the purposes of applying the financial limit would be complex, uncertain and impractical.

A26.88 We have concluded that the financial limit should be based on the scale of the deployment using PIA, and applied to each order on a per kilometre basis. This should apply in aggregate to all reasonable adjustments that fall within scope, including any lead-ins that are subsequently ordered, which are contiguous to the duct requested in the initial order.

The cost of addressing insufficient capacity for overhead lead-ins

A26.89 As explained in Section 4, we have decided that the costs of making these types of adjustments should be treated differently from other network adjustments, and that such costs should instead be recovered from all products in the market in which BT has SMP without limitation.

A26.90 We have therefore estimated the likely average cost of these adjustments for the purpose of understanding the implications for Openreach's cost recovery. Our position in the August 2017 DPA Consultation was that it is necessary for Openreach to relieve congestion on capacity constrained distribution poles used to carry overhead lead-ins.⁹⁶²

A26.91 In Section 6 we concluded that in relation to Openreach's pole infrastructure, where it is included under the access obligation in making the infrastructure 'ready for use', Openreach would need to:

- a) Ensure that a pole is safe and useable by a telecoms provider. Where a pole does not meet this requirement, it should be replaced or repaired.
- b) Install a 'steel ringhead' on a pole which does not have one.
- c) Ensure that a pole has space for a telecoms provider's connection box or other apparatus to be installed.

A26.92 In response to the August 2017 DPA Consultation, Openreach explained that there are various complexities surrounding pole capacity that we failed to consider and that our assessment was inaccurate. For example, it commented that it is inaccurate to assume the costs associated with replacing a dropwire in the context of PIA is similar to a simple dropwire replacement task, remarking that to do so understated the costs involved. Furthermore, it criticised our analysis for ignoring the relevance of other factors (such as the radial distribution of dropwire) when calculating the capacity of a pole.⁹⁶³

⁹⁶² In our August 2017 DPA Consultation we included alongside distribution poles, which act as the distribution point for overhead lead-ins, feeder poles, which are used to carry lead-ins beyond the distribution point, and mixed poles, which have at least one of these functions.

⁹⁶³ Openreach response to the August 2017 DPA Consultation, paragraph 167.

- A26.93 Openreach also commented that it did not feel it needed to critique our calculations and assumptions of its financial exposure to pole adjustments in detail, as it considered them to be based on inaccurate and incomplete scenarios.⁹⁶⁴ Furthermore, it believed that detailed operational issues would need to be reviewed as part of the development of the Reference Offer, before firm conclusions can be drawn.⁹⁶⁵
- A26.94 In line with our conclusions in Section 2 and Section 4 we have updated our assumptions and calculations to reflect our conclusions relating to Openreach being required to make pole adjustments to understand the implications for Openreach's cost recovery.
- A26.95 We have estimated an average cost to relieve congestion on capacity constrained poles that carry overhead lead-ins, by considering: (i) defective poles that are unable to have additional equipment attached to them and (ii) all other poles carrying overhead lead-ins.
- A26.96 Openreach has informed us that 3.3% of its poles are defective and are unable to have additional equipment attached to them.⁹⁶⁶ It has also informed us that 3.18 million of its poles carry dropwires.⁹⁶⁷ We have estimated that to replace poles that carry dropwires but are unable to carry additional equipment would cost £3.71 per premises passed.⁹⁶⁸
- A26.97 For the remaining 96.7% of poles that carry dropwires, we have assumed that 12% of poles⁹⁶⁹ could not accommodate an additional half of the wires currently installed, and therefore will need replacing with larger poles by Openreach.⁹⁷⁰ To replace these would cost £12.95 per premises passed.⁹⁷¹ Therefore, the total cost per premises passed to ensure Openreach is able to provide capacity on its poles is £16.66.

⁹⁶⁴ Openreach response to the August 2017 DPA Consultation, paragraph 172.

⁹⁶⁵ Openreach response to the August 2017 DPA Consultation, paragraph 169.

⁹⁶⁶ To obtain this figure we have analysed data provided by Openreach in its response to question 1c of the 1st WLA s.135 notice issued on 30 November 2017 and Openreach response to question 15a of the WLA s.135 notice issued on 12 October 2017.

⁹⁶⁷ Openreach response to question 11b of the s.135 notice issued on 21 December 2017. We have assumed that only poles that are used for dropwires are relevant as we consider it unlikely that telecoms providers will require additional capacity on poles that are exclusively used for cable attachments, as these tend to be in more rural areas and are less likely to be capacity constrained.

⁹⁶⁸ We have calculated the cost of replacing defective poles that are unable to have additional equipment attached to them thus: 3.3% of poles will need replacing, and the cost of replacement will be £980 per pole. To convert this into a per premises passed cost we have divided this result by 28m: $3.3\% \times 3.18\text{m} \times £980 / 28\text{m} = £3.71$ per premises.

⁹⁶⁹ Information provided by Openreach on 21 September 2016 at the Passive Infrastructure Working Group indicates that 7% of distribution poles have no capacity to take any further dropwires. In addition, Flomatik has provided us with information which indicates that 12% of distribution poles could not accommodate an additional half of the wires currently installed. Flomatik response to the 2016 PIA Consultation, page 6; Flomatik response to question 1 of the WLA s.135 notice issued on 9 March 2017.

⁹⁷⁰ We acknowledge that Openreach has a number of options when creating capacity on a pole. We have assumed that Openreach will replace capacity constrained poles with a larger pole, rather than remove a dropwire or install a new product such as a hybrid dropwire. In Openreach's response to the August 2017 DPA Consultation it remarked that there are various complexities surrounding pole capacity that we failed to consider and that our assessment was inaccurate. For example, it commented that it is inaccurate to assume the costs associated with replacing a dropwire in the context of PIA is similar to a simple dropwire replacement task, remarking that to do so understated the costs involved. Furthermore, it criticised our analysis for ignoring the relevance of other factors (such as the radial distribution of dropwire) when calculating the capacity of a pole. We have addressed these remarks by assuming the pole would simply be replaced.

⁹⁷¹ We therefore calculated this cost thus: $12\% \times (3.18\text{m} \times 96.7\%) \times £980 / 28\text{m} = £12.95$ per premises passed.

A27. Glossary

4G: Fourth generation of mobile telephony systems, including the LTE technology standard.

5G: The term used to describe the next generation of wireless networks beyond 4G LTE mobile networks. 5G is expected to deliver faster data rates and better user experience.

Access Charge Change Notice (ACCN): A contractual notification, issued by BT, of a change to the price of a regulated network access service.

Access network: The part of a telecoms provider's network that connects customers' premises to the telecoms provider's Local Access Node, which in the case of BT is the local exchange.

Additional Financial Information (AFIs): Detailed financial information provided in confidence to Ofcom as part of BT's Regulatory Financial Statements.

Anchor pricing: An approach that bases charge control modelling on the cost of existing technology rather than that of any new technology that might be adopted during the control period.

Ancillary services: Services that facilitate the use of network access services.

Asset volume elasticity (AVE): The percentage increase in capital costs required to expand a network to support a 1% increase in volume.

Asymmetric digital subscriber line (ADSL): A technology that enables data transmission over copper telephone lines at download speeds of up to 24Mbit/s.

Bandwidth: The rate at which data can be transmitted. Usually expressed in bits per second (bit/s).

Basket: A term used in relation to the structure of charge controls, where the charge control is applied to the total revenue from a group of services in a given year, subject to a specified compliance formula.

BCMR: Business Connectivity Market Review.

BDUK: Broadband Delivery UK.

BEREC: Body of European Regulators for Electronic Communications.

Broadband Boost (BBB): A chargeable diagnostic and repair service provided by Openreach.

BT: British Telecommunications plc.

BT Consumer: A division of BT concerned with the consumer retail market.

BT Wholesale & Ventures: The division of BT which provides wholesale services to telecoms providers.

Business support systems (BSS): Computer systems used by telecoms providers to support the provision of wholesale and retail services.

Capital expenditure (Capex): The firm's investment in fixed assets.

CAT: Competition Appeal Tribunal.

Charge control: A control which sets the maximum price that a telecoms provider can charge for a particular product or service (or basket of products or services). Most charge controls are imposed for a defined period.

CMR: Ofcom's Communications Market Reports.

Co-location: The provision of space at a BT MDF site that enables another telecoms provider to locate equipment within that MDF site in order to connect to BT and purchase LLU services.

Co-mingling services: The provision of space and associated services at a BT MDF site where the equipment space is shared by BT and other telecoms providers.

Common costs: Costs which are shared by multiple services supplied by a firm.

Competition Commission (CC): Closed from 1 April 2014, its functions have transferred to the Competition and Markets Authority.

Competition and Markets Authority (CMA): An independent public body that has competition law powers which apply across the whole of the economy.

<https://www.gov.uk/government/organisations/competition-and-markets-authority>.

Compound annual growth rate (CAGR): Year-on-year smoothed annualised growth rate.

Connected Nations Report: An annual report published by Ofcom showing the availability and quality of broadband across the UK.

Consumer Prices Index (CPI): The official measure of inflation of consumer prices in the UK.

Contractual Delivery Date (CDD): A date agreed between Openreach and a telecoms provider for the provision of a service.

Copper Rearrangement (CuRe): Re-arrangement of the copper connection between customers and the exchange to provide a new or upgraded PCP, in order to allow those customers to be connected to an FTTC cabinet.

Core network: The backbone of a communications network, which carries different services such as voice or data around the country.

Cost orientation: The principle that the price charged for the provision of a service should reflect the underlying costs incurred in providing that service.

Cost volume elasticity (CVE): The percentage increase in operating costs for a 1% increase in volume.

Cumulo rates: The business (non-domestic) rates paid by BT on the rateable network assets within its cumulo rating assessment. The main network rateable assets are physical infrastructure assets such as duct, poles, manholes, street cabinets, copper and fibre cables and exchange buildings. Switching and multiplexing equipment are not rateable assets. It is called a cumulo rating assessment because all the assets are valued together.

Current cost accounting (CCA): An accounting convention, where assets are valued and depreciated according to their current replacement cost whilst maintaining the operating or financial capital of the business entity.

Customer Premises Equipment (CPE): Equipment on a customer's premises, which is not part of the telecommunications network and which is directly or indirectly attached to it.

D-side: Distribution side. The segment of BT's access network between the PCP and Distribution Points.

Data Over Cable Service Interface Specification (DOCSIS): An international telecommunications standard that permits cable TV networks to support broadband internet access services.

DCMS: Department of Culture, Media and Sport.

Digital Local Exchange (DLE): The telephone exchange to which customers are directly connected, often via a remote concentrator unit.

Digital Subscriber Line (DSL): A family of technologies generically referred to as DSL or xDSL, used to add a broadband service to an existing phone line provided using a pair of copper wires (known as a twisted copper pair).

Digital Subscriber Line Access Multiplexer (DSLAM): A network device, located in a telephone exchange or street cabinet, that provides broadband services to multiple premises over the copper access network using DSL technologies.

Disposals (Disp): The assets that the firm disposes of (e.g. an asset that becomes fully depreciated or an asset that the firm sells) over the course of the financial year.

Distribution Point (DP): A flexibility point in BT's access network where final connections to customer premises are connected to D-side cables. Usually either an underground joint or a connection point on a pole where dropwires are terminated.

Downstream BT: BT's downstream operations, by which we mean BT Wholesale & Ventures, BT Consumer or any other downstream operation owned or operated by BT.

Dropwire: An overhead cable, connecting BT's access network to a customer's premises.

Duct and Pole Access (DPA): A wholesale access service allowing a telecoms provider to make use of the underground duct network and the poles of another telecoms provider.

Ducts: Underground pipes which hold copper and fibre lines.

E-side: Exchange side. The segment of BT's access network between telephone exchanges and PCPs.

EAB: Equality of Access Board.

EAO: Equality of Access Office.

Early Life Failure (ELF): a fault with a telecoms service within up to 30 calendar days of installation.

Early Termination Charge (ETC): The total fee that will be charged for early termination of a contract or agreement.

EC: European Commission.

Equi-proportionate mark-up (EPMU): An approach to allocating common costs to products proportionally to the product's share of total LRIC.

Equivalence Management Platform (EMP): A set of operational support systems and associated processes put in place by Openreach to support the implementation of EOI.

Equivalence of Inputs (EOI): A remedy designed to prevent BT from discriminating between its competitors and its own business in providing upstream inputs. This requires BT to provide the same wholesale products to all telecoms providers including BT's own downstream divisions on the same timescales, terms and conditions (including price and service levels) by means of the same systems and processes, and includes the provision to all telecoms providers (including BT) of the same commercial information about such products, services, systems and processes.

ERP: Equity risk premium.

Ethernet: A packet-based technology originally developed for use in Local Area Networks (LANs) but now also widely used in telecoms providers' networks for the transmission of data services.

EU5: A group of five countries in the European Union: France, Germany, Italy, Spain, and the UK.

Exchange: The BT telephone exchange, to which customers are directly connected.

FAMR: Fixed Access Market Review.

Fault Volume Reduction programme (FVR programme): An Openreach investment programme which aims to reduce the volume of faults.

FCS: Federation of Communication Services.

Fibre-To-The-Cabinet (FTTC): An access network structure in which optical fibre extends from the exchange to a cabinet housing broadband equipment such as a DSLAM, located close to a PCP. The remaining part of the access network from the cabinet to the customer is usually copper wire but could use another technology, such as wireless.

Fibre-To-The-Premises (FTTP): An access network structure in which the optical fibre network runs from the local exchange to the customer's house or business premises. The optical fibre may be point-to-point – there is one dedicated fibre connection for each home – or may use a shared infrastructure such as a GPON. Sometimes also referred to as Fibre-to-the-home (FTTH), or full-fibre.

Fibre Voice Access (FVA): A voice access service provided by Openreach using its FTTP deployment.

Financial capital maintenance (FCM): An approach to CCA in which an allowance is made within the capital costs for the holding gains or losses associated with changes over the year in the value of the assets held by the firm. In contrast to OCM, the FCM approach seeks to maintain the financial capital of the firm, and hence the firm's ability to continue financing its functions.

Fixed wireless access: An access service where the connection between the network and the equipment located at the customer premises is provided over the radio access medium.

Full Time Equivalent (FTE): A measure of resources or work, defined by reference to the capacity of a full time employee. An FTE of 1 is equivalent to one full time employee.

Fully allocated cost (FAC): An accounting approach under which all the costs of the company are distributed between its various products and services. The fully allocated cost of a product or service may therefore include some common costs that are not directly attributable to the service.

G.fast: A DSL standard that supports higher bandwidth transmissions than ADSL and VDSL technologies, often over short copper lines.

Generic Ethernet Access (GEA): Openreach's wholesale service providing telecoms providers with access to its FTTC and FTTP networks in order to supply higher speed broadband services. The GEA service meets BT's obligation to provide VULA.

Gigabit Passive Optical Network (GPON): A fibre access network architecture where part of the network is shared by multiple customers.

Glidepath: A series of steps from a point of origin to a target. For example, a series of steps from a starting price in a charge control to the price at the end of the control.

GM areas: A geographic area which is the responsibility of an Openreach General Manager.

Gross Replacement Costs (GRC): The cost of replacing an existing tangible fixed asset with an identical or substantially similar new asset having a similar production or service capacity.

Handover Distribution Frame (HDF): An internal wiring frame provided within an LLU operator's equipment area where tie cables are terminated and cross connected to the LLU operator's exchange equipment.

Holding gains and losses: The change in the value of the underlying assets used by the company over the course of the financial year.

Hull Area: The area defined as the 'Licensed Area' in the licence granted on 30 November 1987 by the Secretary of State under Section 7 of the Telecommunications Act 1984 to Kingston upon Hull City Council and Kingston Communications (Hull) plc (KCOM).

In Life Fault (ILF): a fault with a telecoms service that occurs after the ELF period has expired.

Input price changes (IPC): Changes in the prices of the underlying inputs to costs. This includes changes to assets prices and changes to operating costs.

Internet Protocol (IP): Packet data protocol used for routing and carriage of messages across the internet and similar networks.

Internet Service Provider (ISP): An organisation that provides internet access services.

ISDN2: A type of digital telephone line service that provides 2 lines over a common digital bearer circuit. These lines provide digital voice telephony, data services and a wide range of ancillary services. It is primarily used by smaller businesses.

ISDN30: A type of digital telephone line service that provides up to 30 lines over a common digital bearer circuit. These lines provide digital voice telephony, data services and a wide range of ancillary services. It is primarily used by larger businesses.

Latency: A measure of delay in a telecommunications network, typically the transmission time for a packet of data to traverse the network.

Leased Line: A permanently connected communications link between two premises dedicated to the customer's exclusive use.

Local Loop: The access network connection between the customer's premises and the local serving exchange, usually comprised of two copper wires twisted together.

Local Loop Unbundling (LLU): A process by which a dominant provider's local loops are physically disconnected from its network and connected to competing providers' networks. This enables operators other than the incumbent to use the local loop to provide services directly to customers.

Long Reach VDSL (LR-VDSL): LR-VDSL uses VDSL technology but makes use of the frequency ranges assigned to both ADSL and VDSL, and utilises higher signal power. LR-VDSL also uses vectoring to minimise the impact of cross-talk and interference, which would otherwise reduce the speed available to customers.

Long Run Incremental Cost (LRIC): A measure of the change in the long-run total costs of the firm that arises from the provision of a discrete increment of output.

LRIC+: Long run incremental costs plus a share of common costs.

Long-term Evolution (LTE): A 4G mobile technology standardised by 3GPP. LTE is the predominant 4G technology used in the UK.

Main Distribution Frame (MDF): An internal wiring frame where local loops are terminated and connected to exchange equipment by jumpers.

MBORC: Matters beyond our (BT's) reasonable control. A *force majeure* clause in Openreach's contacts.

MDF Block: The MDF consists of blocks, each MDF block providing the termination points to facilitate the connection of local loops with the required network elements.

MDF Jumper Cable (Jumper): A jumper is a flexible pair of copper wires. A jumper provides the connection between local loop copper pairs and exchange equipment connected to the MDF. The MDF blocks provide appropriate connectors that facilitate the connection and removal of jumpers.

Mean capital employed (MCE): BT's definition of Mean Capital Employed is total assets less current liabilities, excluding corporate taxes and dividends payable, and provisions other than those for deferred taxation. The mean is computed from the start and end values for the period, except in the case of short-term investments and borrowings, where daily averages are used in their place.

Metallic Path Facility (MPF): The provision of access to the copper wires from the customer premises to a BT MDF that covers the full available frequency range, including both narrowband and broadband channels, allowing a competing provider to provide the customer with both voice and/or data services over such copper wires.

Minimum Contract Period (MCP): The amount of time a telecoms provider or consumer must remain in a contract before being able to cancel it.

Modified Greenfield Approach: An approach to analysing markets, where we consider a hypothetical scenario in which there are no *ex ante* SMP remedies in the market being considered or in any markets downstream of it.

Multiple Service Access Node (MSAN): A network device which provides telephony and broadband services over copper and/or fibre access networks.

Net Replacement Costs (NRC): Gross replacement cost less accumulated depreciation based on gross replacement cost.

Net Current Assets (NCA): A measure of the amount of capital being used in day-to-day activities by the company. It is equal to the current assets less current liabilities.

Network Terminating Equipment (NTE): Equipment located at the customer premises that is the termination point of the network and provides the customer interface.

Next Generation Network (NGN): A network that uses IP technology in the core and backhaul to provide all services over a single platform.

NICC: A technical forum for the UK communications sector that develops interoperability standards for public communications networks and services in the UK. It is an independent organisation owned and run by its members. Ofcom participates in NICC as an observer.

NMR: Narrowband Market Review.

NRA: National Regulatory Authority.

Ofcom: The Office of Communications.

Office of the Telecommunications Adjudicator (OTA2): An independent body that facilitates discussion between telecoms providers on operational issues related to new and existing telecoms products and services.

ONS: The Office of National Statistics.

Openreach: The access division of BT established by Undertakings in 2005.

Operating capability maintenance (OCM): A CCA convention, where the depreciation charge to the profit and loss account relates to the current replacement cost of the firm's assets, taking account of specific and general price inflation. As the name suggests, the OCM approach seeks to maintain the operating capability of the firm.

OCM depreciation (OCM dep): The reduction in value (as measured by the NRC) of the assets over the course of the financial year associated with the reduction in the asset's remaining life.

Percentage of New Connections (PNC): This percentage is equal to the number of new connections divided by the number of line rentals

Physical Infrastructure Access (PIA): A regulatory obligation under which BT is required to allow telecoms providers to deploy networks in the physical infrastructure of BT's access network.

Primary Cross Connection Point (PCP): A street cabinet (or equivalent facility) located between the customer's premises and BT's local serving exchanges, which serves as an intermediary point of aggregation for BT's copper network.

Prioritisation Rate (PR): A throughput or transmission rate agreed upon between a network operator and a customer, for which the network operator provides priority for that customer's traffic over other, lower priority traffic.

Rate of Return (RoR): The ratio of money gained or lost (whether realised or unrealised) on an investment relative to the amount of money invested.

Regulatory Financial Statements (RFS): The financial statements that BT is required to prepare by Ofcom. They include the published RFS and Additional Financial Information provided to Ofcom in confidence.

Return On Capital Employed (ROCE): The ratio of accounting profit to capital employed.

Senior Operations Manager (SOM): A geographic area which is the responsibility of an Openreach Senior Operations Manager.

Service Level Agreement (SLA): A contractual commitment provided by Openreach to telecoms providers about service standards.

Service Level Guarantee (SLG): A contractual commitment by Openreach to telecoms providers specifying the amount of compensation payable by Openreach to a telecoms provider for a failure to adhere to an SLA.

Service Management Centre (SMC): The contact point in Openreach for telecoms providers requesting LLU, WLR and other services.

Service Maintenance Level 1 (SML1): A repair service contract offered by Openreach for fault repair by the end of the next working day plus one day (excluding Saturday) after the acceptance of faults by Openreach.

Service Maintenance Level 2 (SML2): A repair service contract offered by Openreach for fault repair by the end of the next working day (including Saturday) after the acceptance of faults by Openreach.

Shared Metallic Path Facility (SMPF)/Shared Access: The provision of access to the copper wires from the customer's premises to a BT MDF that allows a competing provider to provide the customer with broadband services, while BT continues to provide the customer with conventional narrowband communications.

Significant Market Power (SMP): The significant market power test is set out in European Directives. It is used by National Regulatory Authorities (NRAs), such as Ofcom, to identify those telecoms providers which must meet additional obligations under the relevant Directives.

Single Order Generic Ethernet Access (SOGEA): A product Openreach is intending to launch that enables the provision of wholesale superfast broadband without the need to also purchase WLR or MPF.

Small and Medium Sized Enterprises (SME): Businesses with 249 or fewer employees.

Special Faults Investigation (SFI): A chargeable fault investigation product from Openreach.

Stand Alone Costs (SAC): An accounting approach under which the total cost incurred in providing a service is allocated to that service.

Standard broadband (SBB): A broadband connection that can support a maximum download speed of less than 30Mb/s.

Statement of Requirements (SoR): A mechanism by which telecoms providers can request Openreach to provide a service, which should meet guidelines published by Openreach on information required for it to consider the request.

Strategic Review of Digital Communications (Strategic Review): A document Ofcom published in February 2016 which set out a ten-year vision for communications services in the UK.

Sub-Loop Unbundling (SLU): Like local loop unbundling (LLU), except that telecoms providers interconnect at a point between the exchange and the customer, usually at the cabinet.

Superfast Broadband (SFBB): A broadband connection that can support a maximum download speed of between 30Mbit/s and 300Mbit/s.

Telecoms provider: A person who provides an electronic communications network or provides an electronic communications service.

The Act: The Communications Act 2003.

Tie Cable: A cable that connects equipment to the MDF.

Time-Related Charges (TRCs): Time Related Charges are raised by Openreach to recover costs incurred when Openreach engineers perform work not covered under the terms of the Openreach standard service.

Traffic Prioritisation: The process of characterisation of data packets and allocation to appropriate priority queues, for transmission over a data network, to facilitate the effective use of network resources and the provision of Quality of Service.

UKSA: UK Statistics Authority.

Ultrafast Broadband (UFBB): We currently take ultrafast broadband services to be those that offer a minimum download speed of 300Mbit/s or more. Over time we expect ultrafast technologies to evolve towards providing gigabit speeds and above – 1000Mbit/s or more.

USO: Universal Service Obligation.

Vectoring: A performance improvement technique that reduces the effect of crosstalk on copper lines. It is based on the concept of noise cancellation via the co-ordination of line signals.

Very-high-bit-rate digital subscriber line (VDSL): DSL technologies offering superfast broadband speeds. On Openreach's FTTC network which uses VDSL technology, services of up to 80Mb/s downstream and 20Mb/s upstream are currently offered. VDSL, in this Statement, refers to all generations of the technology.

Virtual Local Area Network (VLAN): A subdivision of the capacity within the network allowing individual traffic streams to be managed. VLANs are used within Openreach's GEA service to separate each user's data traffic through the Openreach network.

Virtual Unbundled Local Access (VULA): A regulatory obligation requiring BT to provide access to its FTTC and FTTP network deployments which allows telecoms providers to connect at a local aggregation point and are provided a virtual connection from this point to the customer premises.

Voice over Internet Protocol (VoIP): The method of carrying voice calls on fixed and mobile networks by packetizing speech and carrying it using IP.

Weighted Average Cost of Capital (WACC): The cost of funds used for financing a business.

Wholesale Fixed Analogue Exchange Line (WFAEL): A narrowband analogue access connection between a customer's premises and a local exchange.

Wholesale Line Rental (WLR): The service offered by Openreach to other telecoms providers to enable them to offer retail line rental services in competition with BT's own retail services.

Wholesale Local Access (WLA): The market that covers fixed telecommunications infrastructure, specifically the physical connection between customers' premises and a local exchange.

WiFi: A short range wireless access technology that allows devices to connect to the internet. These technologies allow an over-the-air connection between a wireless client and a base station or between two wireless clients.