LMR Network Services Market Investigation

Cost of Capital Working Paper

6 May 2022

This is one of a series of consultative working papers which will be published during the course of the investigation. This paper should be read alongside the issues statement and the other working papers which accompany it. These papers do not form the inquiry group's provisional findings. The group is carrying forward its information-gathering and analysis work and will proceed to prepare its provisional findings, which are currently scheduled for

publication in June, taking into consideration responses to the consultation on the issues statement and the working papers. Parties wishing to comment on this paper should send their comments to MRN@cma.gov.uk by 20 May 2022.

The Competition and Markets Authority has excluded from this published version of the working paper information which the inquiry group considers should be excluded having regard to the three considerations set out in section 244 of the Enterprise Act 2002 (specified information: considerations relevant to disclosure). The omissions are indicated by [✂]. [Some numbers have been replaced by a range. These are shown in square brackets.] [Non-sensitive wording is also indicated in square brackets.]

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Introduction

1. The approach to assessing profitability, as set out in the CMA guidelines,[1] is to compare the profits earned with an appropriate cost of capital. In this working paper, we set out our preliminary estimates of the nominal pre-tax weighted average cost of capital (WACC) for the Airwave network. As set out in the Profitability Working Paper, we are assessing the profitability of Airwave separately over two periods: 2001 to 2019 and 2020 to 2026, with our primary focus on the second of these periods on the basis that this gives the most relevant information on the current profitability of the business and the underlying conditions of competition that have given rise to these profits. Therefore, we have estimated the cost of capital on two bases:

   (a) At the start of the "historic" or "PFI" period, ie around 1st April 2001; and

   (b) As of late 2019/early 2020, ie at the start of the "extension" period. This is the cost of capital that we consider is of primary relevance to our profitability analysis since it provides the benchmark for the "extension" period.

2. In coming to a preliminary view on the WACC of Airwave at these different points in time, we note that some elements of the WACC estimate, such as the relevant beta value and total market return (TMR) are often assumed to be stable over time, while other elements, such as the risk-free rate, the tax rate and the cost of debt are assumed to fluctuate. Our approach reflects this, with constant values being assumed for beta and TMR, based on the most up-to-date data and understanding of these parameters, while we have reflected changes in broader market costs for the other elements of the WACC.

3. In addition to estimating a WACC on the bases set out above, we have also considered the appropriateness of using a higher, hurdle rate as the benchmark against which to assess the profitability of the Airwave network. We discuss our preliminary analysis and conclusions in this respect further in paragraphs 63 to 67 below.

4. Our estimates of the WACC for the Airwave network are set out in Table 1. For the purposes of our profitability assessment, we have taken the mid-point of each of the ranges as our point estimate, ie a WACC of 8.7% (pre-tax nominal) for the historic or "PFI" period and 5.9% (pre-tax nominal) for the "extension" period.

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[1] CC3 Revised.

5. We do not consider it necessary to come to a firm conclusion on the appropriateness of applying an uplift to the historic period WACC in the form of a hurdle rate as we are not focussing on this period for the purposes of our profitability analysis. However, regardless of the appropriateness of such an uplift in the historic period, we do not accept that any such uplift should be applied to the extension period since all the initial uncertainties and risks associated with the Airwave project, which might have merited such an uplift, had long been resolved.

Table 1: CMA estimates of nominal pre-tax WACC

	Estimate for "PFI" period (as of April 2001)		**Estimate for "extension" period (as of late 2019 /early 2020)**	
	Low	High	Low	High
RFR (CPI-real)	2.5%	3.0%	-1.0%	-2.0%
Equity beta[2]	0.68	0.76	0.71	0.78
ERP	3.7%	4.5%	7.2%	9.5%
TMR	6.2%	7.5%	6.2%	7.5%
CPI Inflation	2.0%	2.0%	2.0%	2.0%
Tax	30%	30%	22%	22%
Gearing	50%	35%	50%	35%
Kd pre-tax	6.5%	6.5%	2.5%	2.5%
Kd post-tax	4.6%	4.6%	1.9%	1.9%
Ke post-tax	7.1%	8.5%	6.2%	7.5%
Ke pre-tax	9.3%	11.3%	7.4%	9.1%
WACC Pre-tax (nominal)	**7.9%**	**9.6%**	**4.9%**	**6.8%**

Source: CMA analysis

6. In carrying out our analysis, we have drawn on evidence from internal documents prepared by and for Airwave Solutions and Motorola Inc., the CMA's recent redetermination of the cost of capital for Water Companies in GB and its hearing of the Energy Appeals, together with broader market evidence.[3]

7. The remainder of this section sets out our methodology and the analysis we have conducted. As set out in the Guidelines,[4] we generally look to the capital asset pricing model (CAPM) when considering the cost of capital, and this is the approach we have adopted in estimating the cost of equity for the Airwave

[2] Note: the equity betas differ slightly due to the differing tax rates. The underlying asset beta range is the same across both time periods (a range of 0.4-0.55).
[3] See CMA Water Redeterminations PR19 and Energy Licence Modification Appeals 2021 - GOV.UK (www.gov.uk)
[4] CC3, Annex A, paragraph 16.

network. We have estimated the cost of debt with reference to corporate bond yields over the period, as well as evidence gathered from Airwave Solutions and Motorola on their costs of debt.

General approach to estimating the WACC

8. There are several factors that we have taken into account in estimating an appropriate benchmark cost of capital for the Airwave network. These include:

   (a) how to estimate the WACC – use of the capital asset pricing model (CAPM);

   (b) which cost of capital provides an appropriate benchmark – specification of the basis of the WACC;

   (c) over which time period(s) should the cost of capital be measured – at the start of the relevant period(s), or an average for the relevant period(s)? and

   (d) whether an appropriate benchmark for returns should be a simple WACC, or whether, in light of the risks associated with constructing and operating the Airwave network, it is appropriate to uplift a WACC to reflect a "hurdle rate" or the risk of loss from an innovative/uncertain investment.

Capital asset pricing model

9. Our Guidelines highlight that we generally use the CAPM when considering the cost of equity since this is a widely understood technique with strong theoretical foundations.[5]

10. The CAPM relates the cost of equity $E[R_i]$ to the risk-free rate (R_{rf}), the expected return on the market portfolio (R_m), and a firm-specific measure of investors' exposure to systematic risk (beta or β) as follows:

$$E[R_i] = R_{rf} + \beta(R_m - R_{rf})$$

11. If a business were entirely funded by equity, the expected return on equity could be considered to be its 'cost of capital'. However, most firms are funded by a combination of both debt and equity, such that the appropriate cost of capital to consider is the weighted average cost of debt and equity. The WACC is given by the following expression:

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[5] CC3, paragraph 116.

$$WACC = E[R_i] \times E/(D+E) + K_d \times D/(D+E)$$[6]

12. Finally, the cost of capital must take into account the effects of tax on returns to capital providers. The returns to debt holders take the form of interest payments which are usually tax-deductible. The returns to equity holders (dividends), on the other hand, are taxed. Hence, where the cost of capital is expressed 'pre-tax', the cost of equity used must reflect the fact that the actual return to shareholders will be reduced by the rate of tax. We have estimated the cost of capital on a nominal pre-tax basis:[7]

$$\text{Pre-tax WACC} = [(1/(1-t)) \times E[R_i] \times E/(D+E)] + [K_d \times D/(D+E)]$$

Specification of the basis of the WACC

13. In keeping with the theoretical basis of the CAPM, our approach seeks to estimate the WACC of the Airwave network itself, which is invariant to the larger corporate group of which it may form a part, ie we consider the relevant WACC to be that of the Airwave network rather than that of Motorola Inc. or of any previous owners, such as Macquarie or BT.

14. Our profitability analysis seeks to measure the returns earned by all sources of capital invested in the business. As these returns are measured before interest and/or tax is paid, they are not affected by the capital structure of the business.[8] However, in estimating the relevant WACC for the Airwave network, we rely on a variety of market-based evidence, which will reflect the capital structures of the businesses used as comparators. Where relevant, we have used this data to come to a view on the appropriate capital structure for the Airwave network (ie its gearing level), as well as adjusting beta estimates to ensure consistency with this conclusion on gearing.

15. We have measured the WACC of the Airwave network with reference to a range of potential comparator firms, as set out in Table 3. The choice of comparators is a matter of judgement with the range of comparators reflecting various attributes of the Airwave network, including industry (telecoms), the utility nature of the business, its geographical location etc. We invite interested parties to comment on the appropriateness of the comparators chosen.

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[6] Where D is debt, E is equity and Kd is the cost of debt.
[7] This avoids the need to adjust nominal financial information to remove the effects of inflation.
[8] The capital structure affects how earnings before interest and tax is divided between the various providers of capital.

Relevant time period

16. We are analysing the profitability of the Airwave network over the period between 2001 and 2026, with a particular focus on the 2020 to 2026 "extension" period. This period spans both the past, for which actual data is available on both Airwave's performance and the costs of capital available in the market, and the future, for which we must use forecast information with respect to both Airwave's likely profits and the expected cost of capital.

17. We note that there is some uncertainty regarding the "end date" of the analysis as the Home Office has the right to require an extension of the life of the Airwave network by providing appropriate notice to Motorola. [✂], there remains the possibility of a further extension in the case where the new LTE solution is not ready in time and/or where not all users have been able to transition to the new solution ahead of 31st December 2026. [✂].

18. In this context, we have considered two different perspectives in terms of the cost of capital for the business. First, we have considered the expected cost of capital for the 2001 to 2019 period, as assessed at the start of 2001. Second, we have considered the cost of capital Airwave may reasonably expect to apply over the extension period, ie the period from 1st January 2020 onwards.

Submissions from Airwave Solutions and Motorola Inc.

19. Motorola told us that, in the case of Airwave, well-advised parties had agreed contractual terms with reference to an agreed fair internal rate of return (IRR) for the life of Airwave, whatever that would be. The hurdle rate for the Airwave project was negotiated, set between the parties at the outset, and is well documented and understood by the parties. There were no provisions that would protect Airwave from actual returns turning out to be lower than the hurdle rate agreed *ex ante,* nor any claw-back provisions that would require Airwave to reduce prices if actual returns turned out to be higher. Motorola submitted that all that could be established through an *ex-post* assessment of profitability was whether matters had turned out better or worse for a party than expected. Moreover, for this, profitability would have to be assessed over the entire life of the project, ie 2001 to 2026.[9]

[9] Motorola's Response to Profitability Working Paper, paragraph 3.

20. Motorola has submitted that it makes no sense to use a WACC derived from a standard application of the CAPM to Airwave or Motorola, highlighting the following from the Oxera paper[10]:

"[i]n profitability assessments of realised rates of return, the relevant cost of capital is the ex ante cost of capital — i.e. the cost of capital that was used in assessing the project at inception. This is particularly important for risky projects that carried a high likelihood of failure. The ex ante cost of capital has to be adjusted upwards to capture the inherent risk (the result is commonly known as a hurdle rate). When a competition authority is assessing returns that have been realised, a comparison of the realised rate of return with an ex post cost of capital that does not reflect the risk of failure of the project could lead to an overstatement of profitability."[11] (Emphasis added by Motorola)

"*it is common to see companies marking up the cost of capital when setting 'hurdle rates' (i.e. required returns) to appraise individual projects or investment plans … This premium accounts for project-specific risks, which are not reflected in the company's cost of capital generated by the CAPM approach or other asset pricing models. One clear example where a mark-up is applied is for large investment projects with a high degree of asymmetric risk, i.e. when there is a relatively large downside risk of failure compared with the likelihood of success. The CAPM and other models do not capture such asymmetric risk."* (Emphasis added by Motorola).[12]

21. Motorola submitted that, in this case, there should be no dispute about the appropriate benchmark as the parties discussed and agreed on a target IRR at the outset, and one which compares very favourably to other government projects for which data is available. The IRR agreed between the parties is set out in a financial model[12] put into escrow that would be used to assess the reasonableness or otherwise of potential future variations of charges. This model specifies a real, post-tax target IRR of [✂]% (nominal pre-tax: [✂]%).[13]

Other evidence gathered from Airwave Solutions and Motorola Inc.

22. In addition to considering Motorola's submissions, we also reviewed a range of internal documents collected from Motorola/Airwave which set out views on the relevant cost of capital for Airwave.

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[10] Motorola's Response to Profitability Working Paper, paragraphs 36-39.
[11] Assessing profitability in competition policy analysis (oxera.com), paragraph 7.9., paragraph 7.9.
[12] Assessing profitability in competition policy analysis (oxera.com), paragraph 7.28.
[13] Motorola's Response to Profitability Working Paper, paragraph 38.

23. Goldman Sachs prepared a valuation report for Motorola in February 2015 in advance of the acquisition of Airwave.[14] This report estimated a WACC for the Airwave business of [✂]% and used a range of between [✂]% and [✂]% in the valuation work that it carried out. We understand that these figures are post-tax, nominal WACC estimates.[15] See Figure 1 for details of each element of the WACC calculation.

24. We note that this is equivalent to a pre-tax nominal WACC of [✂]% (using the [✂]% tax rate assumed by Goldman Sachs).

Figure 1: Goldman Sachs WACC estimates for Airwave

[✂]

25. Motorola carries out an impairment review each year, including with respect to the Airwave business. In the review dated 31st December 2020,[16] a discount rate of [✂]% was used in order to value the Airwave business, with sensitivity analysis applying a range of [✂]% to [✂]% ie 1% higher or lower than this point estimate. We understand that these figures are nominal, post-tax estimates. In its 2018 Impairment Review, Motorola stated that:

These cashflows have been discounted using a discount rate [✂]% *which is consistent with prior year in the absence of any market economic factors or company specific factors that are deemed to be impacting to the Airwave discount rate over the last 12 months. We believe this to be a prudent discount rate for Airwave cashflows which are contracted and therefore very low risk and would therefore be attractive to investors who are seeking low risk low return investments.*[17]

26. Finally, the "PFI" model[18], prepared around 2000 when negotiating the original PFI contract for the development of the Airwave network, contained a real, post-tax discount rate of [✂]%. This is approximately equivalent to a nominal, pre-tax WACC of just over [✂]% (using the 30% tax rate in effect at the time and an inflation assumption of 2.0%).

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[15] We note that the [✂] cost of debt and the [✂] TMR implied by Goldman Sachs' estimates suggests that these figures are nominal rather than real given actual costs of debt and the usual level of TMR estimates. For example, Dimson, Marsh and Staunton estimate that total returns on UK equity markets over the last 120 years has been approximately 5-7% in real terms. Therefore, a TMR of just under 9% suggests that this is a nominal estimate. See Credit Suisse, Global Investment Sourcebook, 2021.

CMA approach to identifying comparator companies

27. This section sets out the CMA's methodology to select an appropriate comparator sample for Airwave as the basis for our calculations of beta and gearing.

28. We drew on the analysis undertaken by Goldman Sachs for Motorola. This identified 15 potential comparator firms, 10 of which it considered to be "key peers" (see Figure 2 below). We reviewed this list of firms and found many of the "key peers" to be relevant comparators. However, we reasoned that Centrica was a less relevant comparator than some of the other firms listed, given that its portfolio of activities includes upstream oil and gas exploration and energy market trading.

29. Our preliminary view is that most weight should be placed on the UK utilities as comparators due to the following similarities with the Airwave business:

    (a) First, they are largely natural monopoly / network businesses with the accompanying barriers to entry and therefore faced limited or no competition;

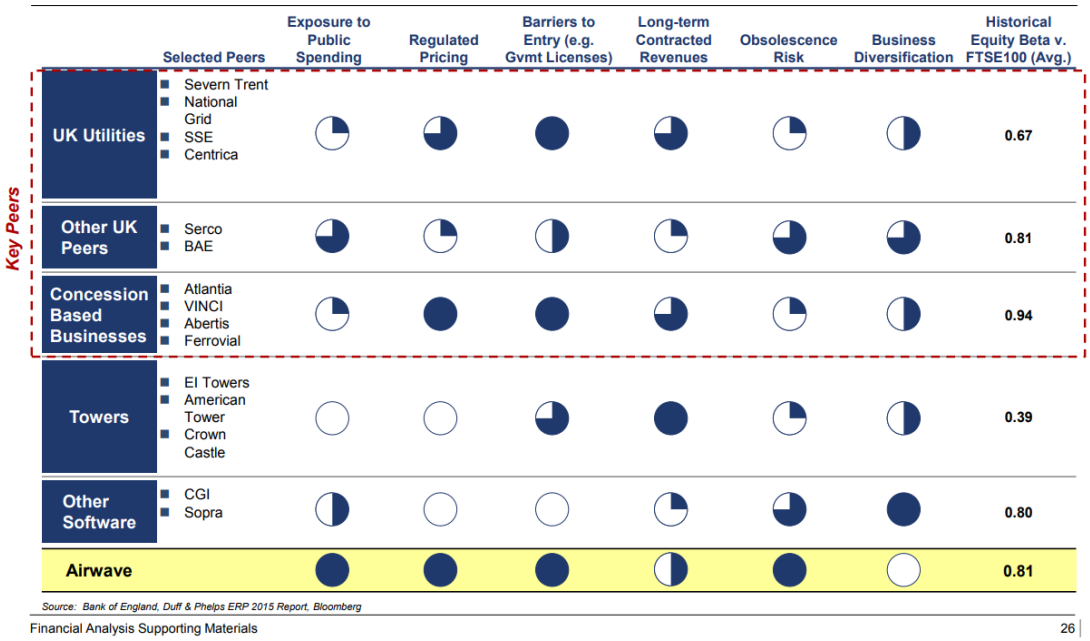
    (b) Second, they benefit from revenues which are inflation-indexed, with limited exposure to changes in customer demand across the economic cycle due to the essential nature of the products/services they provide; and

    (c) Third, the main risk faced by these businesses is managing costs in developing and operating their networks over time and ensuring that certain levels of service are maintained (in order to avoid penalties).

30. In addition to these factors, we note that Airwave also has the benefit of very limited risk of bad debts due to the nature of its customer base.

31. In this context, we considered that United Utilities should also be included as a relevant UK utility comparator.

Figure 2: Goldman Sachs analysis of comparator firms to Airwave



Source: Goldman Sachs Opinion Letter, prepared for Motorola Inc, December 2015

32. The full list of comparators we have considered is set out in Table 3 below.

CMA estimation of WACC

33. This section sets out the analysis that we have undertaken to estimate the components of the WACC calculation, which includes both generic and industry-specific components. The former comprise the risk-free rate (RFR), the total market return (TMR) and the tax rate; the latter comprise beta, gearing and the cost of debt.

Risk free rate

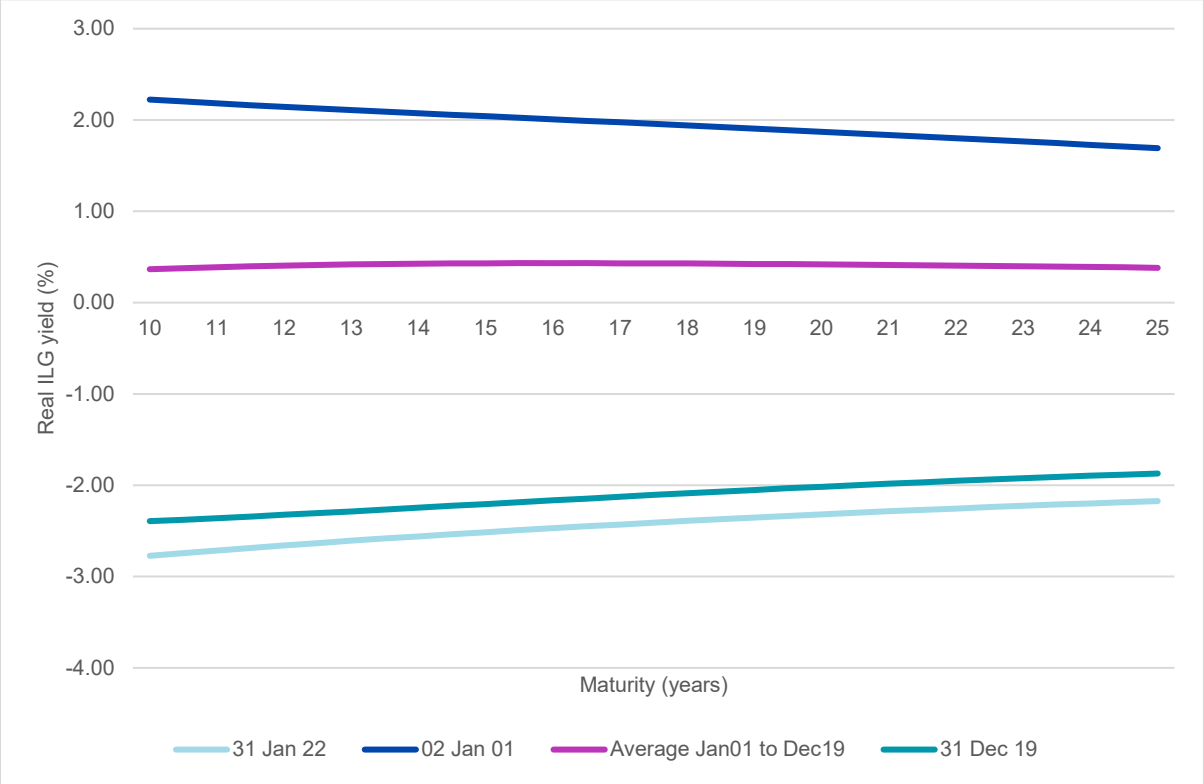
34. In order to estimate the risk-free rate applicable over the period of our investigation, we have focussed on UK index-linked gilt yields, which have negligible default and inflation risk.

35. We consider long-maturity gilts to be most relevant to the RFR in the cost of equity since equities also have long (indefinite) maturity. Therefore, we have considered yields on gilts with a maturity of between 10 and 25 years. Figure 3 shows real gilt yields as of the start of January 2001 (approximately the start of the relevant period), as of the end of December 2019, as well as the average over the period between these two dates. We have also included a line showing yields as of the end of January 2022 (ie the current level).

36. This evidence demonstrates that ILG yields have declined by around four percentage points since 2001. As of January 2001, gilt yields were

approximately 2%, while by December 2019, they had declined to around -2%. Yields have declined further, to around -2.5%, by January 2022. The average for the 2001 to 2019 period was approximately 0.4%.

Figure 3: Yield curves on UK index-linked gilts, 2001 to 2022

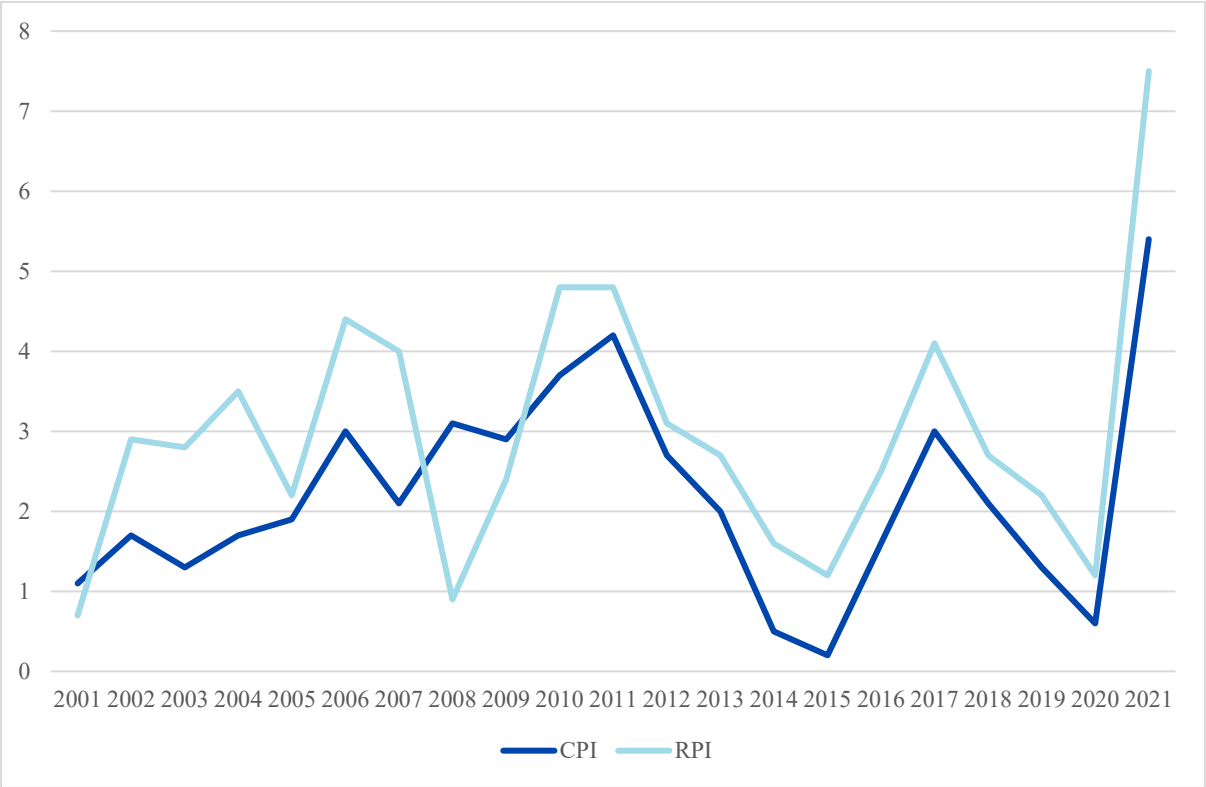


Source: Bank of England, real spot yield curve data.
Note: The three lines show yields on 2 January 2001, 31 January 2022 and the average yields covering the 21 years between January 2001 and January 2022.

37. ILGs are indexed to RPI inflation rather than CPI inflation, with the latter widely considered to be a better measure of price changes in the economy.[19] Figure 4 shows these two inflation measures from 2001 to 2021. CPI has averaged 2.2% over this period, while RPI has average 3.0%, ie the 'wedge' between the two measures has been approximately 0.8 percentage points. However, this differential is expected to increase slightly in the future, with the Office for Budget Responsibility (OBR) forecasting a difference of 0.9 percentage points in the next few years.[20]

[19] See UK Consumer Price Statistics: A Review – UK Statistics Authority for a full discussion of the relative merits of RPI and CPI inflation.
[20] Office for Budget Responsibility (December 2019) Forecast evaluation report, pp20–21 Box 2.3.

Figure 4: RPI and CPI inflation, 2001 to 2021



38. On this basis, we consider that an investor at the start of the period, ie around 2001, would have expected a CPI-real RFR of between 2.5% and 3.0%[21] for the expected life of the Airwave network. However, steep declines in ILG yields over that period suggests that the CPI-real RFR investors would have experienced was between 1.0% and 1.5%.[22]

39. We note that future changes in yields curves are uncertain. However, the current level of yield curves suggests that the CPI-real RFR is likely to be lower than the average level between 2001 and 2019, and possibly significantly so. For the period from 2020 to 2026, therefore, we consider an CPI-real RFR of approximately -1.0 to -2.0%% is broadly reasonable.

Total market return and equity risk premium

40. The ERP is the additional return that investors require to compensate them for assuming the risk associated with investing in equities rather than in risk-free assets. When seeking to understand what the ERP was over a historical period of time, it is necessary to identify the returns which investors expected

[21] These figures are equal to the 1.7% to 2.2% range of yields shown in Figure 3 as of January 2001 uplifted by 0.8% to allow for the difference between CPI and RPI inflation.
[22] These figures are equal to the average 0.4% yield shown in Figure 3 for the 2001 to 2019 period uplifted by 0.8% to allow for the difference between CPI and RPI inflation.

to make on the market (the “Total Market Return” or “TMR”) and deduct the relevant RFR (as estimated above).

41. There are two types of approach that can be used to estimate the TMR. Historical methods seek to derive the TMR from a long run of data on realised returns on equities. Forward-looking approaches seek to estimate the expected TMR based on either the reported expectations of market participants or the TMR implied in asset prices at the start of the period.

42. There is no universally accepted method for deriving the TMR or the ERP. Both concepts are concerned with investors’ ex-ante expectations of returns, which are largely unobservable. The academic literature on the subject is large and can be categorised into three types:

(a) Studies that assume that historical realised returns are equal to investors’ expectations (‘historical ex-post approaches’).

(b) Studies that fit models of stock returns to historical data to separate out ex-ante expectations from ex-post good or bad fortune (‘historical ex-ante approaches’).

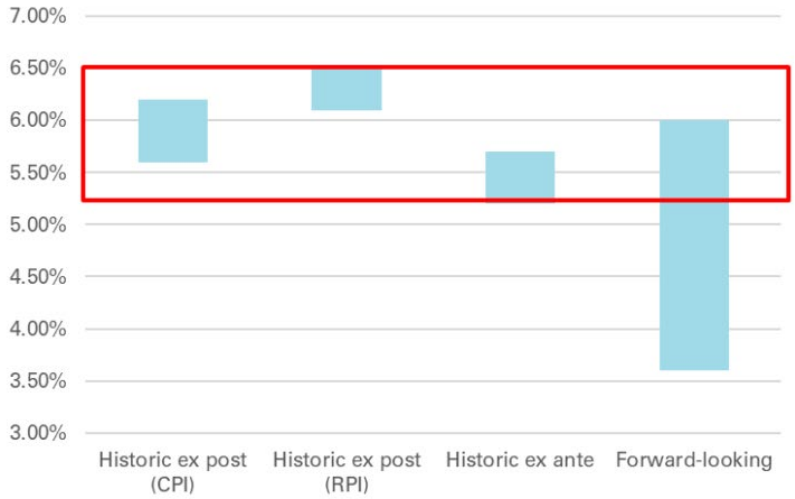
(c) Studies that use current market prices and surveys of market participants to derive current forward-looking expectations (‘forward-looking approaches’).

43. All of the above methods have a large degree of uncertainty associated with them, and any answers from these analyses require a large number of assumptions and significant amounts of judgement.

44. The CMA recently assessed the evidence on TMR in detail in its Ofwat PR19 price redeterminations.[23] It concluded that a (CPI-)real TMR range of 6.15%to 7.46% was appropriate, with a mid-point of 6.8%. A summary of its analysis is set out in Figure 5 below.

[23] CMA PR19 Redetermination - Final Report

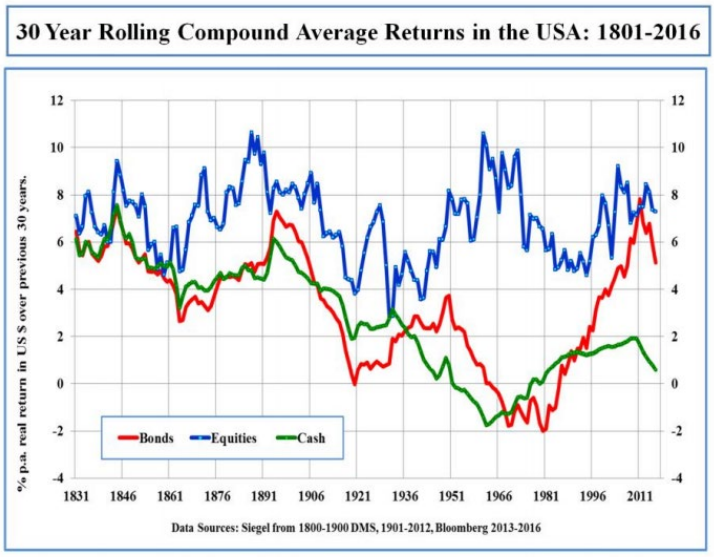
Figure 5: CMA analysis of evidence on TMR (RPI-real), PR19



Note: All figures in this chart are "RPI-real". To achieve an equivalent "CPI-real" estimate, these figures should be increased by approximately 1 percentage point.

45. We note that the market evidence provides some support for the view that the TMR is more stable over time than the ERP (see Figure 6 below). As a result, we do not believe that a different TMR should be applied at different points over the lifetime of the Airwave network and consider that the CMA's assessment for the PR19 redetermination remains appropriate for this market-wide element of the cost of capital. We have included this range in our preliminary WACC estimates.

Figure 6: Compound average real returns on bonds, equities and cash in the USA between 1801 and 2016



Source: UKRN Report 2019, Figure 4.4

Tax Rate

46. The corporation tax rates applicable over the period are set out in Table 5. The average tax rate for the period as a whole is 25%, with rates at 30% around 2001, and expected to be 22% (on average) from 2020 to 2026. We have used these figures in our WACC estimates.

Table 5: UK corporations tax rates (historic & forecast)

	2001	2002	2003	2004	2005	2006	2007	2008	2009
%	30	30	30	30	30	30	30	30	28

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
%	28	26	24	23	21	20	19	19	19	19

	2020	2021	2022	2023	2024	2025	2026
%	19	19	19	25	25	25	25

Source: Main rates for all profits except ring fence profits from HMRC.

Equity betas

47. The beta of an asset measures the correlation between the volatility of the returns on the asset and the returns on the market as a whole, or the exposure of the firm to systematic or 'non-diversifiable' risk. It is in return for assuming this (market) risk that investors require an (equity risk) premium over the risk-free return.

48. The beta value of a listed firm can be directly estimated as the covariance between the stock's returns and the market's returns, divided by the variance of market returns. However, when estimated in this way, the beta value reflects the full range of activities undertaken by a listed business and, as a result, may differ from the beta of the relevant activities for the purposes of our investigation.

49. Within a CAPM framework, changes in gearing affect equity betas. Hence, it is necessary to adjust for gearing differences in order to make comparisons between equity betas. We do this by calculating the asset beta, ie the beta at zero gearing. In this section, we first set out the range of beta estimates that we have collected on our sample of comparator firms.

Beta estimates

50. The betas of the listed comparator companies are shown in Table 3 and have been calculated on a daily, weekly and monthly basis over the last 10 years.[24] For UK-listed firms, we have estimated their betas against the FTSE All-Share index, while for overseas-listed businesses, we have estimated their betas against the broadest home-country index available.

51. Our sample of firms as a whole has an average asset (or unlevered) beta of between 0.52 to 0.57. The UK utility comparators as a group have significantly lower average betas than the other firms. Within this Group, SSE, which had material unregulated revenues over the last 10 years, has a materially higher beta than the other UK utilities. The pure-play regulated firms had asset betas of between 0.25 and 0.35, while SSE's beta was around 0.4 to 0.6.

Table 2: Levered and unlevered betas of comparator firms (last 5 years)

	Levered beta			Unlevered beta		
Company	*Daily*	*Weekly*	*Monthly*	*Daily*	*Weekly*	*Monthly*
Severn Trent	0.59	0.62	0.56	0.32	0.34	0.31
National Grid	0.61	0.60	0.39	0.37	0.36	0.24
United Utilities	0.60	0.63	0.50	0.30	0.32	0.25
SSE	0.86	0.83	0.58	0.61	0.59	0.41
Average UK Utilities	*0.67*	*0.67*	*0.51*	*0.40*	*0.40*	*0.30*
Serco	0.86	0.89	0.81	0.71	0.73	0.67
BAE	0.89	0.91	1.01	0.80	0.82	0.92
Atlantia	0.84	0.83	0.91	0.51	0.50	0.55
VINCI	1.17	1.09	1.01	0.90	0.83	0.77
Ferrovial	0.80	0.82	0.77	0.62	0.64	0.60
Average others	*0.91*	*0.91*	*0.90*	*0.71*	*0.71*	*0.70*
Average all	***0.80***	***0.80***	***0.73***	***0.57***	***0.57***	***0.52***

Sources: Refinitiv
*Betas have been unlevered using the following formula: Unlevered Beta = Levered Beta / (1 + ((1 – Tax Rate) x (Debt/Equity))), where the tax rate used is the average statutory corporate tax rate in UK.[25] The tax rates used are set out in Table 4. The levered beta is also called the equity beta; the unlevered beta is also called the asset beta.

52. As discussed in paragraph 29, we consider that it is appropriate to place more weight on the UK utility comparators given their numerous similarities to the Airwave business. Therefore, our preliminary conclusion is that an asset beta of between 0.4 and 0.55 is appropriate for the Airwave business. The lower

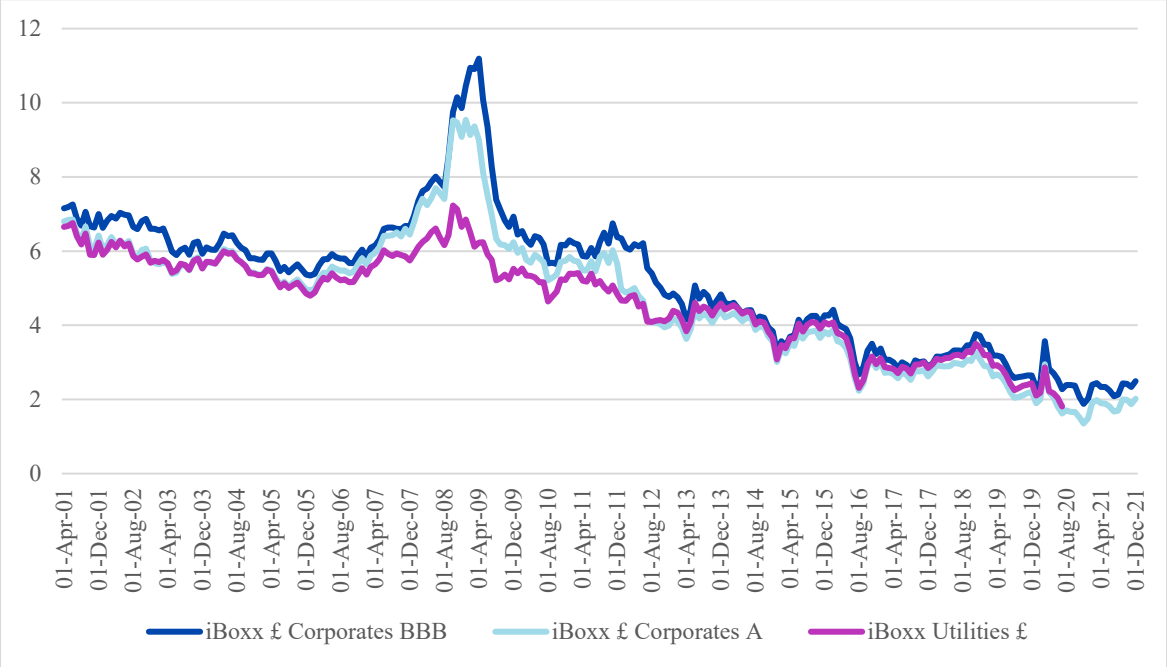
[24] We have focussed on longer-term beta estimates given the extended time period of our analysis. We also estimated betas over the last 2 and 5 years as a cross-check and noted that there was significant consistency between these estimates and those calculated over the last 10 years.
[25] Professor Alan Gregory affirms that under ADMP approach and "instant re-balancing" tax rates are irrelevant. We therefore use the average UK rate from the 5-year period between 2014 and 2018 to unlever equity betas and then re-lever the outturn assets beta range.

end of this range reflects the average asset beta of UK utility comparators (when measured on a daily and weekly basis)[26], while the upper end of this range reflects the average of all the comparators as a whole. When combined with gearing of between 35% and 50% (see paragraph 55 onwards), this gives an equity beta of around 0.7 to 0.8. The upper end of this range is the same as the equity beta of [✂] used by Goldman Sachs in its WACC estimate.

Cost of debt

53. In order to come to a view on an appropriate cost of debt for the Airwave network, we have collected data on yields on UK corporate bonds with investment-grade credit ratings over the relevant period as shown in Figure 7.[27] We consider that this credit rating is consistent with both the ratings of the comparator companies we have considered when estimating beta for Airwave and with our gearing estimate.

Figure 7: Corporate bond annual yields, 2001 to 2021



Source: IHS Markit, CMA analysis

54. The average yields are set out in Table 2. We compared these figures with the debt costs of [✂]% used by Goldman Sachs in their valuation of the Airwave business (see Figure 1). We note that the yields on these indices were around 3.5% in 2016, albeit yields were around 3 percentage points

[26] We note that monthly asset betas are materially lower for UK utilities, averaging around 0.30.
[27] Yield is calculated from iBoxx GBP Liquid Corporates Large Cap Index available on Markit.

higher as of 2001, while the current costs of debt are around 1 percentage point lower.

Table 3: Average corporate bond yields

	iBoxx Corp A	iBoxx Corp BBB	iBoxx Utilities
Av. yield 2001[28]	6.5%	6.9%	6.4%
Av. yield 2001 to 2019	5.0%	5.5%	4.8%
Av yield 2019 to 2020	2.1%	2.7%	2.5%

55. On this basis, we consider that a nominal cost of debt of approximately 6.5% was appropriate as of the beginning of the historical period, ie around 2001, and a debt cost of approximately 2.5% is appropriate for the period from January 2020 onwards.

Gearing

56. We considered both the analysis undertaken by Goldman Sachs for Motorola, as well as the gearing of comparator firms in coming to a view on the appropriate gearing assumption for the Airwave business.

57. Goldman Sachs assumed gearing of between [✂]% and [✂]% in its valuation of the business.

58. Table 4 shows the average gearing of the comparator group of firms over the last decade. The UK utilities as a group have higher average gearing than the other firms in the sample, with gearing of between 35% and 55%. The gearing of the other firms varies materially across the group but averages around 25%.

Table 4: Gearing levels of the comparator firms (%)

Company	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average
Severn Trent	52.5	51.6	47.8	47.5	48.0	50.7	56.5	50.3	54.0	46.2	**50.5**
National Grid	45.0	43.0	38.9	40.8	44.6	44.3	49.9	45.7	50.1	51.8	**45.4**
United Utilities	55.9	56.4	49.6	50.4	53.5	56.5	59.7	55.1	56.9	51.3	**54.5**
SSE	27.9	30.8	27.6	24.5	31.3	35.4	46.1	40.0	38.1	33.6	**33.5**
UK utilities avg	***45.3***	***45.4***	***40.9***	***40.8***	***44.4***	***46.7***	***53.0***	***47.8***	***49.8***	***45.7***	
Serco	20.6	23.3	39.9	21.0	8.3	14.6	19.2	9.7	25.5	28.2	**21.0**
BAE	6.6	7.5	6.9	10.7	9.2	8.5	11.3	15.6	17.6	17.1	**11.1**
Atlantia	53.0	43.1	40.6	34.1	36.2	31.9	40.5	63.2	68.4	55.8	**46.7**
VINCI	41.0	30.7	36.6	29.0	27.8	23.6	27.8	29.4	31.8	26.3	**30.4**
Ferrovial	41.3	37.8	34.4	30.5	31.6	24.8	23.8	19.7	18.3	15.8	**27.8**
Other firms avg	***32.5***	***28.5***	***31.7***	***25.1***	***22.6***	***20.7***	***24.5***	***27.5***	***32.3***	***28.6***	

[28] This has been calculated as the 9-month average from April 2001 to December 2001.

Average	***38.2***	***36.0***	***35.8***	***32.1***	***32.3***	***32.3***	***37.2***	***36.5***	***40.1***	***36.2***

Source: Refinitiv and CMA analysis.

59. On this basis, we have used a range of gearing of between 35% and 50%, with the upper end of this range based on the UK utilities comparators and the lower end reflecting the average for the group as a whole. This mirrors our approach to the beta range, as set out above, and places slightly more weight on the UK utilities as comparators.

60. Our range is slightly lower than that adopted by Goldman Sachs [✂].

Conclusions on WACC

61. Our WACC estimates are between 7.9% and 9.6% as of 2001 (mid-point of 8.7%), declining to between 4.9% and 6.8% (mid-point of 5.9%) by the end of 2019. All figures are stated on a pre-tax nominal basis.

Table 5: CMA estimates of WACC

	Estimate for "PFI" period (as of April 2001)		**Estimate for "extension" period (as of late 2019 /early 2020)**	
	Low	High	Low	High
RFR (CPI-real)	2.5%	3.0%	-1.0%	-2.0%
Equity beta[29]	0.68	0.76	0.71	0.78
ERP	3.7%	4.5%	7.2%	9.5%
TMR	6.2%	7.5%	6.2%	7.5%
CPI Inflation	2.0%	2.0%	2.0%	2.0%
Tax	30%	30%	22%	22%
Gearing	50%	35%	50%	35%
Kd pre-tax	6.5%	6.5%	2.5%	2.5%
Kd post-tax	4.6%	4.6%	1.9%	1.9%
Ke post-tax	7.1%	8.5%	6.2%	7.5%
Ke pre-tax	9.3%	11.3%	7.4%	9.1%
WACC Pre-tax (nominal)	**7.9%**	**9.6%**	**4.9%**	**6.8%**

Source: CMA analysis

62. We note our WACC estimates for the "extension" period are in line with the range estimated by Goldman Sachs at the time of Motorola's acquisition of

[29] Note: the equity betas differ slightly due to the differing tax rates. The underlying asset beta range is the same across both time periods (a range of 0.4-0.55).

Airwave from Macquarie, and slightly below those used by Motorola for its impairment reviews, although, as noted above, Motorola has stated that its estimates for that purpose are conservative. Our WACC estimate as of 2001 is above the later estimates and sits around [✂] percentage points below the WACC included in the PFI model.

The relevance of hurdle rates

63. As set out in paragraph 21, Motorola submitted that, for the purposes of our profitability analysis, we should take into account the hurdle rate that was agreed between Airwave and the Home Office when the original PFI was signed, ie the [✂]% post-tax real / [✂]% pre-tax nominal WACC.

64. We recognise that prior to construction, there would have been some uncertainty over the costs Airwave would incur in developing the network and, therefore, over the returns that it could expect to make. We note that this uncertainty was reflected in the original price agreed between Airwave and the Home Office, which appears to have targeted a (higher) "hurdle rate" rather than a standard WACC for Airwave. Moreover, we observe that it transpired that the costs of developing/building the Airwave network were significantly higher than originally envisaged, albeit not sufficiently so to result in a loss for Airwave.[30]

65. It is less clear to us, however, that around 2001 there was, as Oxera describes, *a relatively large downside risk of failure compared with the likelihood of success*. We do not have evidence to inform us as to the relative probability of success and/or failure associated with the Airwave project.

66. Regardless of whether a higher hurdle rate should be used as the benchmark against which to assess profitability over the 2001 to 2019 period, however, we do not agree with a number of aspects of Motorola's submission. In particular:

    (a) The price/revenues reflected in the PFI model[31] may not be the same as the competitive price given the limitations of the original tender.[32] As a

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[30] This is reflected in the fact that Airwave earned an IRR which was slightly above its own WACC estimate, as set out in the PFI model, and below the "hurdle rate" reflected in the price agreed between Airwave and PITO.
[31] The IRR figure put forward by Motorola was taken from the "PFI" model, which underpinned the original PFI agreement between the Home Office and Airwave. We note that the PFI model that has been provided by Motorola is not a complete model but rather a summary of outputs. [✂] We would have liked access to the full model in order to critically assess how the various figures were built up. Without it, we can place only limited reliance on this "model".
[32] For example, see: Public Private Partnerships: Airwave - National Audit Office (NAO) Report. This report notes that [t]*he procurement itself was hindered by a lack of competition when all but one of the original bidders withdrew.*

result, the IRR implicit within the model may not reflect the actual / competitive hurdle rate for such an investment; and

(b) The PFI model and therefore the "hurdle rate" that it contained only related to the initial investment in the network to provide services to the police forces. It did not cover subsequent investments to provide additional resilience to the police forces, or to provide services to the ambulance or fire & rescue services, or to any other sharer organisations. We observe that the risks of extending an existing network to provide such services, including an extension to the originally-agreed lifetime of the network, are significantly lower once the original network had been developed. Therefore, we find that these activities would be more appropriately remunerated at the standard WACC of the business.

67. In summary, our current view is that it is unclear whether or not a hurdle rate should be used as the benchmark against which to assess the profitability of Airwave over the 2001 to 2019 period. Given that we are not focussing on this period for the purposes of our analysis, we do not consider that we need to come to a firm view on this point. However, our preliminary conclusion is that it is not appropriate to apply a hurdle rate to any "extensions" to the original network, either in terms of extending services to additional customers, or extending the original life of the network. Once a national network had been rolled out and was functioning effectively, meeting the needs of the original customers (ie police forces), it is clear that the risks of failure were substantially mitigated. Therefore, we find that the appropriate benchmark for our assessment of profitability between 2020 and 2026 is the WACC, as set out in Table 5 above, ie 4.9% to 6.8%, with a mid-point of 5.9%.