Non-Confidential

Ofcom's review of annual licence fees (ALFs)

BT's response to Ofcom's consultation proposals of 13 December 2024

Date: 7 March 2025

BT Group

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Executive summary

BT welcomes Ofcom's ALF review proposals to reduce mobile industry spectrum fees to better reflect changes in technology, as well as demand and supply conditions, resulting in lower spectrum prices relevant to setting ALFs at market value. This represents a step in the right direction.

We think that the appraisal of current ALFs still does not reflect the observed changes in market value of the spectrum and therefore the proposed ALFs will not promote the optimal use of spectrum in line with Ofcom's duties.[1] We think Ofcom has made three material errors in its assessment of ALFs as set out below. Taken together these would overstate BT's ALFs by **£36m pa**, i.e. £103.5m (Ofcom proposed ALF) minus £67.5m (BT estimated ALF).

BT estimate of market value for 1800 MHz and 2100 MHz (vs Ofcom's overestimate)[2]

ALF spectrum band	BT estimated ALF (£m)	Ofcom proposed ALF (£m)	Ofcom overestimate (£m)
1800 MHz	46.7	72.9	26.2
2100 MHz	20.8	30.6	9.8
Total	**67.5**	**103.5**	**36.0**

1. Empirical evidence shows spectrum values are not constant in real terms – Ofcom's approach to setting Lump Sum Values (LSVs) therefore overstates past and future spectrum values materially

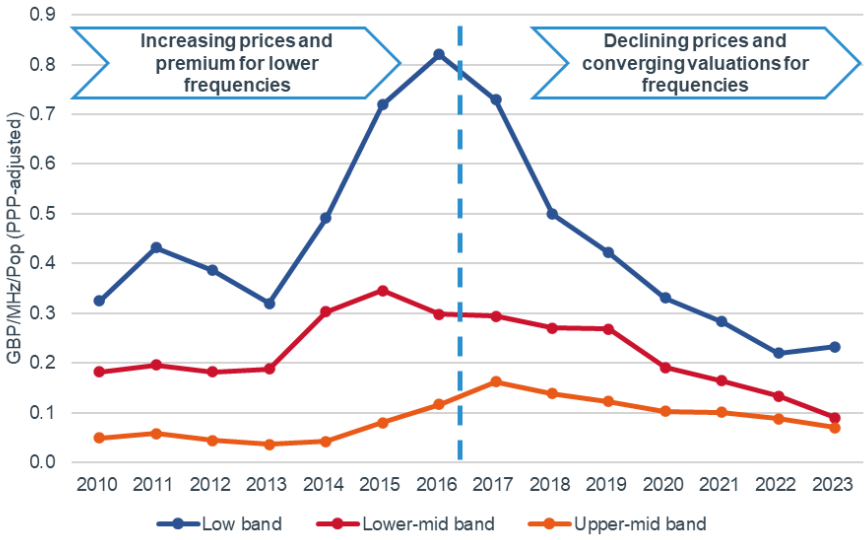
Ofcom asserts spectrum prices remain constant in real terms but provides no direct evidence of this. Based on this assertion, Ofcom takes past nominal spectrum prices and uprates them by the Consumer Price Index (CPI) to convert them into constant real terms, i.e. September 2024 prices, including the UK 2018 and 2021 auction prices. Ofcom's own direct empirical LSV benchmarks show this not to be the case: LSVs for 1800 MHz have declined significantly in real and nominal terms. This trend can be expected to continue in the future given trends in technology and in demand and supply conditions.

We commissioned an independent report from global spectrum valuation experts Aetha for their views on international, European and UK trends in spectrum values and to make clear recommendations in relation to indexation of past LSV benchmarks.

[1] The Communications Act. The Wireless Telegraphy Act 2006 also requires Ofcom to have regard to: the desirability of promoting the efficient management and use of spectrum, furthering the interests of citizens and consumers, encouraging investment and innovation, and promoting competition.

[2] Based on BT's 90 MHz holdings of 1800 MHz and 40 MHz holdings of 2100 MHz.

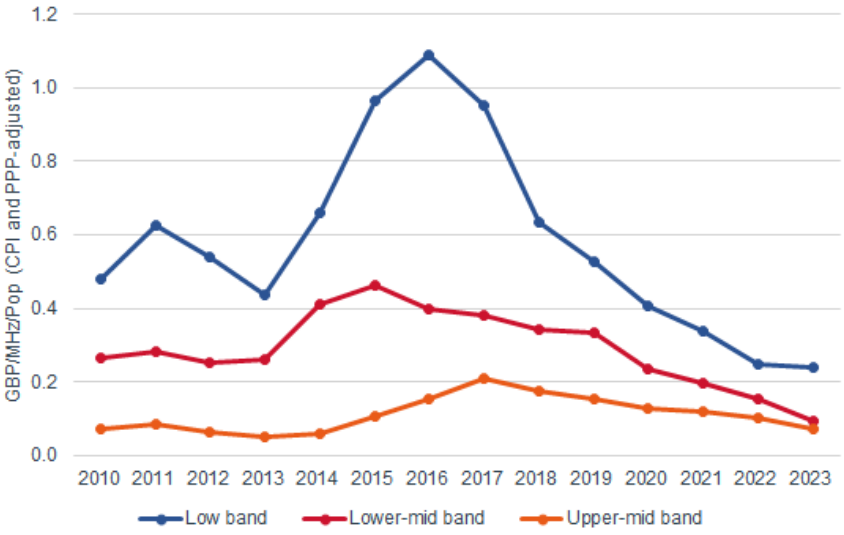
Global benchmark of auction unit prices (three-year moving average, nominal)



Source: Aetha 2025

International auctions reveal a clear downward trend in nominal spectrum prices since circa 2016, with a Compound Annual Growth Rate (CAGR) of -7% to -17%. When we further adjust the nominal benchmarks for inflation, to express them in real terms, i.e. September 2024 prices, this declining trend is even more pronounced with a CAGR of -10% to -20%.

Global benchmark of auction unit prices (three-year moving average, September 2024 prices)



Source: Aetha 2025

A similar trend is observed in European auction data, in at least real terms, sourced from Ofcom's own database with a CAGR of -5% to -10% since 2013, i.e. over the last 10 years. Ofcom's approach to inflate past UK spectrum auctions by CPI as part of its benchmarks is therefore incorrect given actual trends.

This error in approach leads to ALFs materially above market value by ~40%[3], creating barriers to trading, distorting price signals, and resulting in inefficient spectrum use and sub-optimal investment. The overstated market value will be further exacerbated over time by applying CPI indexation on a forward-looking basis. If unaddressed, this forward-looking error will lead to another misalignment review within only a few years.

BT considers Ofcom should adopt an approach of negative indexation on past LSVs of 5% pa to reflect the decline in nominal spectrum values and remain consistent with its principle of conservative assumptions in spectrum price setting. On this basis, the effect of this error compared to the correct trend of declining real-terms spectrum value over time is to overstate BT's 1800 MHz fees by **£21m pa** (based on a revised LSV of £9m per MHz) and 2100 MHz fees by **£9m pa** (based on a revised LSV of £8.5m per MHz), i.e. **£30m pa** across these holdings.

2. Ofcom should always treat functionally equivalent spectrum bands consistently in setting LSV benchmarks – it has not done this

Ofcom should apply the same approach to low-band and mid-band: this would mean normalising mid-band LSVs for functionally equivalent spectrum as it has for the low-band. Specifically:

- Ofcom itself says 1800 and 2100 MHz spectrum is functionally equivalent. The LSVs for these bands should be aligned consistent with Ofcom's proposed treatment of functionally equivalent 700/900 MHz LSVs. Doing so would decrease Ofcom's proposed £/MHz LSV of 1800 MHz spectrum from £12.7m per MHz to at most £12.0m per MHz.
- Ofcom should interpret 1800 MHz and 2100 MHz Tier 1 benchmarks more conservatively. In the case of 1800 MHz that would mean an LSV of less than £12.0m per MHz.

Given the inherently declining spectrum value set out above (we suggest proxied by a 5% pa reduction to past LSVs), normalising 1800 MHz and 2100 MHz spectrum values requires Ofcom to align its proposed 1800 MHz LSV from £9m per MHz to the Ofcom's proposed 2100 MHz LSV of £8.5m per MHz. Taken together, these errors lead to a further **£3m pa** overstatement of annualised 1800 MHz fees.

3. Ofcom is not obliged to revise the rate it uses to convert a lump sum value to an annual payment, and should only do so if there is a change in the spectrum value

Despite Ofcom's previous statements, and the Strategic Review of Spectrum Pricing (SRSP) 2010 criteria for demonstrating a material misalignment, Ofcom has not provided adequate reasoning in its consultation proposals as to why it considers a review of the annualisation rate is included within the remit of a misalignment review. This is especially the case for 2100 MHz, where Ofcom does not conclude on a material misalignment in the previous LSV set and where Ofcom has reopened the ALF determination after only three years. Re-assessing annualisation without a material change to LSVs is a dangerous precedent, undermining regulatory certainty for mobile operators when making the choice to pay a lump sum or annual fees.

There may be a case for Ofcom to revise an annualisation rate if the LSV has materially changed – this is a new 'price' which the licence holder needs to make a choice on whether to pay as a lump sum or an annual fee. However, this is not the case for the 2100 MHz band.

[3] Aetha set out spectrum values have been falling in nominal and real terms and that negative indexation of 5% pa (nominal) would be more appropriate for past LSV benchmarks. If the value of 1800/2100MHz has fallen by 5% pa since the 2021 auction, then Ofcom is currently overstating the value by ~40%.

4. Ofcom's objective in annualisation is to make an investor indifferent between a lump sum payment and annual fees: Ofcom should take better account of what investors expect inflation to be over time

Using the BoE's CPI target of 2% is not the best available proxy for investors' inflation expectations and therefore will not secure Ofcom's objective for annualisation. Instead, Ofcom should use public data to reflect both the inflation risk premium and expectations (with the latter) closer to 2.5%. It is essential to Ofcom's objectives that both CPI risks and expectations are accounted for. Not accurately reflecting investor inflation expectations will continue to drive a wedge between the annual fee and the market value of spectrum over time.

Taken together, the errors on annualisation set out in (3) and (4) above, i.e. Ofcom's proposed rate of 6.38% compared to BT's proposed rate of 6.11%, leads to a further overstatement of annual licence fees by **£3m pa**.[4]

[4] Note that the size of the error in the annualisation rate (i.e. between Ofcom's estimate of 6.38% and BT's estimate of 6.11%) is also dependent on the level of the LSV. For example, at Ofcom's proposed LSV of 12.7m per MHz the overstatement in annualisation rate is equivalent to £4.4m pa.

1 Direct evidence shows spectrum values are declining

Summary

Ofcom asserts spectrum prices remain constant in real terms but provides no direct evidence of this. Ofcom's own direct empirical LSV benchmarks shows this not to be the case: LSVs for 1800 MHz have declined significantly in real and nominal terms. This trend can be expected to continue in the future given changes in technology, and demand and supply conditions.

We commissioned an independent report from global spectrum valuation experts Aetha for their views on international, European and UK trends in spectrum values, and to make clear recommendations in relation to indexation of past LSV benchmarks.

International auctions reveal a clear downward trend in nominal spectrum prices since circa 2016. A similar trend is observed in European auction data, in at least real terms, sourced from Ofcom's own database. Ofcom's approach to inflate past UK spectrum auctions by CPI is therefore incorrect given actual trends.

The effect of this error in approach is to set ALFs materially above market value by 41%[5], creating barriers to trading, distorting price signals, and resulting in inefficient spectrum use and sub-optimal investment. The overstated market value will be exacerbated over time by applying CPI indexation on a forward-looking basis. To remedy this forward-looking error, ALFs will have to be reviewed again under the misalignment mechanism within a few years.

BT considers Ofcom should adopt an approach of negative indexation on past LSVs of 5% pa to reflect the decline in nominal spectrum values and remain consistent with its principle of conservative assumptions in spectrum price setting.

The effect of this error is to overstate BT's 1800 MHz fees by **£21m pa** and 2100 MHz fees by **£9m pa,** i.e. **£30m pa** across these holdings.

BT's estimate of 1800 MHz and 2100 MHz LSVs (vs Ofcom's overestimate)

ALF band	Ofcom's LSV proposal (£m per MHz)	BT's LSV proposal (£m per MHz)	Ofcom's overstatement (£m) [6]
1800 MHz	12.7	9	21
2100 MHz	12	8.5	9
Total			**30**

In this section we explain why we consider Ofcom's reasoning is internally inconsistent and why the direct evidence, including that presented by Ofcom, shows spectrum values are declining in at least real terms. Instead, Ofcom should reconsider its proposal in light of its own findings and the evidence we present as follows:

- Ofcom's assertion of constant spectrum prices is inconsistent with directly observed facts

[5] Aetha set out spectrum values have been falling in nominal and real terms and that negative indexation of 5% pa (nominal) would be more appropriate for past LSV benchmarks. If the value of 1800/2100MHz has fallen by 5% pa since the 2021 auction then Ofcom is currently overstating the value by ~40%

[6] Assumes Ofcom's annualisation proposal of 6.38% ie not BT's proposals of 6.11% - see Chapter 4.

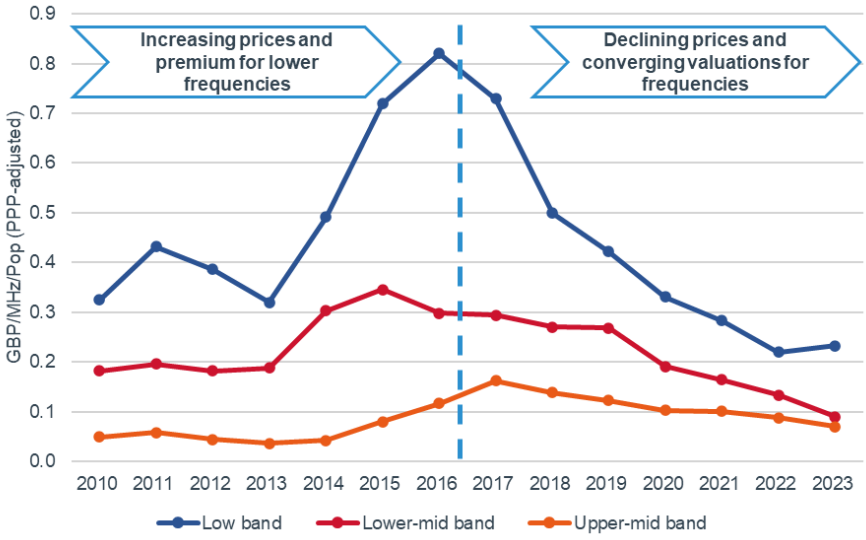
- Market conditions support this - new evidence has emerged and will continue to emerge affecting spectrum values
- Ofcom's use of indirect measures of spectrum value are therefore unnecessary, and also the wrong measures
- The effect of this error is to overstate ALFs by 41% or **£30m pa**
- We suggest instead Ofcom applies a negative indexation of -5% to past award values

1.1 Ofcom's assertion of constant spectrum values does not match observed spectrum valuations over time

BT considers that the direct evidence demonstrates that the value of spectrum has fallen in real and nominal terms and this trend can be expected to continue in the future. For instance, Aetha has analysed global evidence from their own database of spectrum prices and European evidence from Ofcom's database, focussing on awards that Ofcom believes to be most informative of spectrum value.

Aetha's global dataset encompasses 217 awards across 75 countries and reveals a clear downward trend in nominal spectrum prices since circa 2016. These benchmarks are shown in Figure 1.1 below.

Figure 1.1 Global benchmark of auction unit prices (three-year moving average, nominal)[7]



Source: Aetha (2025)

The benchmarks show a clear trend of declining spectrum prices since circa 2016. The trend is more pronounced in low bands, which has led to a convergence in value between low and mid bands. All global benchmarks show material decline across low band, lower-mid band and upper-mid band from 2018 and 2021, i.e. the most recent spectrum auctions in the UK as shown in the table below.

[7] Equivalent GBP/MHz/Pop fee for a 20-year licence, adjusted for PPP

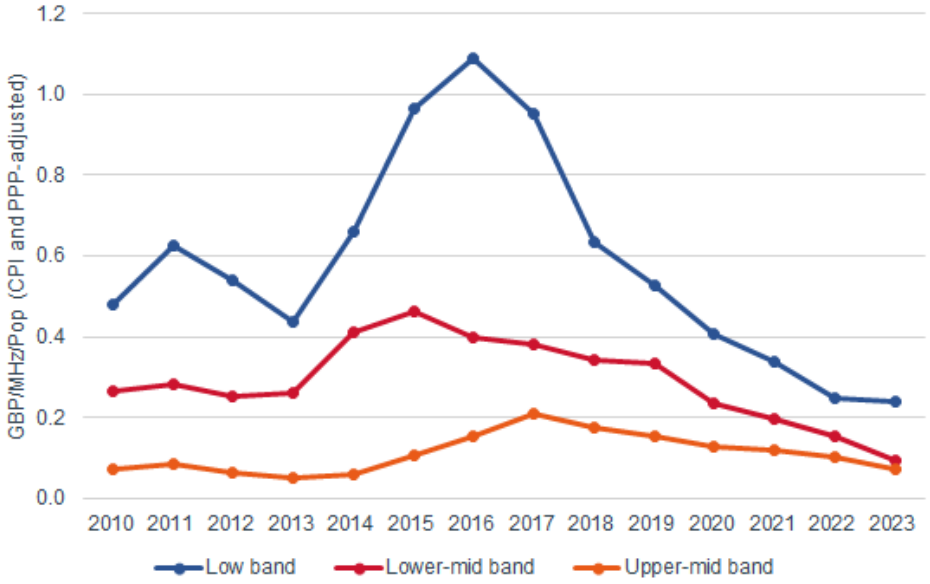
Figure 1.2 Global benchmark of auction unit prices (CAGR, nominal)[8]

CAGR (%)			
	Low band	Lower-mid band	Upper-mid band
2016-2023	(16.4%)	(15.6%)	(6.9%)
2018-2023	(14.1%)	(19.7%)	(12.5%)
2021-2023	(9.2%)	(25.8%)	(16.5%)

Source: Aetha (2025)

If we also adjust the nominal benchmarks for inflation, to express them in real terms, i.e. September 2024 prices, this declining trend is even more pronounced.

Figure 1.3 Global benchmark of auction unit prices (three-year moving average, September 2024 prices)



Source: Aetha (2025)

The global spectrum price benchmarks expressed in real terms, i.e. September 2024 prices, show an even greater average annual decline across low band, lower-mid band and upper-mid band over the same period as shown in the table below.

Figure 1.4 Global benchmark of auction unit prices (CAGR, September 2024 prices)

CAGR (%)			
	Low band	Lower-mid band	Upper-mid band
2016-2023	(19.5%)	(18.5%)	(9.9%)
2018-2023	(17.7%)	(22.7%)	(15.9%)
2021-2023	(15.6%)	(30.7%)	(21.8%)

Source: Aetha (2025)

However, when determining the ALFs, Ofcom is rightly concerned with spectrum value in Europe, which it perceives as more closely comparable with the UK. To investigate whether the global trend of declining prices

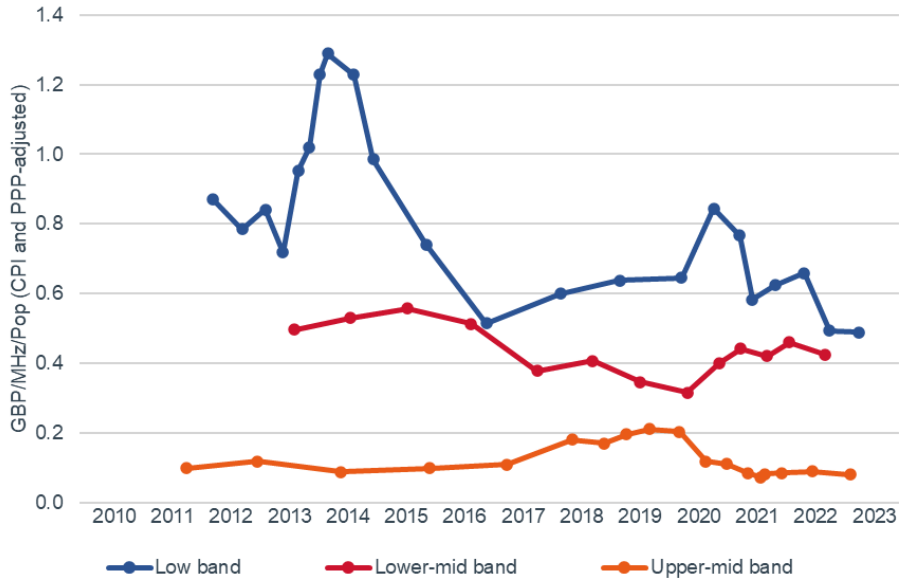
[8] Equivalent GBP/MHz/Pop fee for a 20-year licence, adjusted for PPP

is aligned with European evidence, we have also asked Aetha to analyse Ofcom's own European auction price data. The results of this analysis are shown below.

Aetha have included all auctions which are included in at least one "Tier 1" benchmark in Ofcom's consultation, which Ofcom believes are the most informative of spectrum value. Aetha have made no adjustments to the LSVs for each band/auction determined by Ofcom, except to convert them to a per MHz price. Therefore, Aetha are presenting the equivalent LSV for a 20-year licence, adjusted for both wealth (PPP) and inflation (CPI).

Limiting the sample to Tier 1 European auctions produces a relatively small data set. Aetha therefore show a five-auction, rather than three-year, moving average i.e. each data point shows the average price of a central award and the two previous and two following awards. Auctions are not evenly distributed over time, and this approach allows consideration of the density of auctions when interpreting the data. For example, it shows that there were fewer low band awards between 2015 and 2018 than between 2020 and 2023.

Figure 1.5 European benchmark of auction unit prices (five-auction moving average, September 2024 prices)[9]



Source: Aetha (2025) based on Ofcom's auction database

Figure 1.6 European benchmark of auction unit prices (CAGR, September 2024 prices)[10]

CAGR (%)			
	Low band	Lower-mid band	Upper-mid band
2013-2023	(8.9%)	(4.5%)	(9.8%)

Source: Aetha (2025)

As mentioned, there are significantly fewer data points available for comparison than in our global dataset and trends therefore suffer from more noise. However, we can observe a similar trend in both benchmarks, although the peak in low and lower-mid band prices may have occurred 2-3 years earlier than globally. For

[9] Equivalent GBP/MHz/Pop fee for a 20-year licence, adjusted for CPI and PPP

[10] Figure 1.5 plots five auction moving averages rather than yearly moving averages. We have therefore calculated the yearly moving average to estimate the CAGR in Figure 1.6.

this reason, we estimate the CAGR for global benchmarks from 2016 and for European benchmarks from 2013, i.e. 3 years earlier.

Whilst the European benchmarks provide evidence that is most directly comparable to the UK, it can only be used to demonstrate a long running trend of declining prices, and individual peaks and troughs are not meaningful, and can occur due to a small number of outliers. For example, the peak in lower mid band prices in 2021/2022 is partly driven by an 1800MHz auction in Hungary in 2021, for which reserve prices were particularly high.

Together, these datasets constitute compelling empirical evidence against Ofcom's assumption of stable real terms spectrum value. See Aetha report for more information (section 4).

We further note that Ofcom's own spectrum appraisal analysis shows that inflation tends to increase more than spectrum values, with Ofcom's most direct evidence showing lump sum spectrum values have declined over time in real terms by 29% for 900 and 1800 MHz (and 6% for 2100 MHz).

Figure 1.7 Ofcom's proposed revised LSVs (in September 2024 prices) show value per MHz declining in real terms

Band	Existing LSV (£m per MHz)	Proposed LSV (£m per MHz)
900MHz	24.2	17.2
1800MHz	17.8	12.7
2100MHz	12.8	12.0

Source: Ofcom (2024), Table 2.4

Inflating all UK benchmarks by CPI when setting current spectrum values is therefore inconsistent with Ofcom's own evidence. A clear example of this inconsistency arises where Ofcom's UK reference value for 800 MHz used to set midband LSVs is inconsistent with Ofcom's conclusion of convergence of values in low band. Ofcom acknowledges the real terms fall in the 800 MHz value within the 900 MHz fee setting discussion but then argues for CPI indexation of past LSVs, including UK 800 MHz LSV, when setting fees for 1800 MHz LSVs. For instance, in relation to the 900 MHz LSV Ofcom states:

> *"Of these benchmarks, we consider the most relevant evidence is from Croatia. This is because both 800 MHz and 900 MHz for that country were auctioned in 2023. In that auction, 800 MHz sold for 3% more than 900 MHz, supporting the view that the value of sub-1 GHz spectrum has converged in recent years.[29] This ratio is categorised as pre-2015 because the UK 800 MHz auction, which we rely on to generate this LSV estimate, took place in 2013"*[11]
>
> *"For the avoidance of doubt, we do not interpret the evidence from Croatia as suggesting the forward-looking value of 900 MHz is in the region of £43.9m per MHz. This figure is generated by the model by applying the ratio of 900/800 MHz from the Croatian 2023 auction to the UK 800 MHz auction price from 2013. The relevant from the Croatia auction data is the relative value of the 900 MHz and 800 MHz spectrum"*[12]

Ofcom is acknowledging that the 800MHz spectrum value has fallen substantially in real terms since 2013. If the 800MHz spectrum value is indeed now equal to that of the 700 MHz spectrum given Ofcom's conclusion that the value of sub-1GHz spectrum has converged, then instead of the 2013 value of £33m/MHz increasing by CPI to £45m, if it instead now aligns with the current 700MHz value of £17.2m per MHz, then in real terms it has actually reduced in value by 62%

[11] The Consultation, paragraph 4.24.
[12] The Consultation, footnote 29

1.2 Market conditions support this – new evidence has emerged and will continue to emerge affecting spectrum values

Had the 2018 and 2021 auctions taken place this year, values would have been lower in real terms than the actual auctions achieved in 2018 and 2021. Above we have shown this to be likely given Ofcom's own direct evidence and direct evidence from other countries. In the following we show what factors have changed in since the most recent auctions, further underpinning the findings from direct benchmarks.

In the proposals Ofcom argues to the contrary that future technology, demand and supply conditions were factored into the unit price of spectrum by MNOs at the 2018 and 2021auctions such that the real value of spectrum can be expected to be flat (constant) since these auctions and on a forward-looking basis. For instance, Ofcom states:

> *"We expect that MNOs account for anticipated technological or commercial developments that could affect the value of spectrum when bidding in spectrum auctions, leading to real-term auction results that reflect these expectations*."[13]
>
> *"It was known in 2018...that the 700 MHz and 3.6 GHz spectrum bands were going to be made available for mobile… As such, we expect that that increase in supply of spectrum was factored into the unit values of spectrum at that time*."[14]

We disagree with Ofcom's assessment. MNOs could not have anticipated all future technological or commercial development at the time of the 2018 and 2021 auctions and therefore reflected them in the unit value of spectrum at that time. The industry's understanding of technological developments and spectrum supply have inevitably advanced significantly since the 2018/21 auctions.

In any event we consider that it does not matter what MNOs did or did not factor in determining the price they were willing to pay at auction. Ofcom's task is to estimate the price that MNOs would be willing to pay today, given what is known today about history and what historic trends and market dynamics tell us about the future.

Key changes in market conditions that could not have been factored in at the time of the 2018 and 2021 auctions are explained in the following table.

[13] Ofcom proposals, paragraph 3.54(c)
[14] Ibid, paragraph 3.56.

Figure 1.8 Key developments since the last awards that reduce spectrum values[15]

Market development	What happened? Why?	How does it affect spectrum value?
VF3 merger	Ofcom and the CMA expect the VF3 merger commitments to bring significant network capacity into the market. Moreover, when presented with competing interpretations of the impact of having significant spectrum capacity the CMA (based on Ofcom's advice) finds that VF3 will have incentives in the long run to deploy capacity leading to lower prices[16]	The CMA's own analysis suggests that the value of incremental spectrum will fall further in the long run under the merger commitments.
Technological change	In 2018, massive MIMO antennas had already been developed, and operators will have expected them to provide substantial improvements to both spectral efficiency and coverage. However, the technology had not yet been widely deployed. This had changed by the time of the 2021 auction, and operators were more confident in the performance of the technology. For further information see section 5.2 of the Aetha Report.	Today, mobile operators have even greater expectations for massive MIMO, and the technology is expected to be widely deployed in FDD bands including the 1800MHz and 2100MHz bands. This will significantly improve the capacity available from these FDD bands. We expect that this development will lower spectrum values vs 2018/2021
Spectrum demand has declined	The forward-looking technical value of spectrum is strongly dependent on expected traffic growth. While it is true that absolute traffic levels are expected to remain high, on a forward-looking basis, mobile traffic growth is slowing and is much below earlier forecasts (e.g.18% in 2024 compared with Ofcom's 2022 medium growth forecast of 40% per year to 2035). For further information on reduced traffic forecasts over time see section 5.3 of the Aetha Report.	Lower subsequent mobile traffic growth forecasts would not have been factored in at the time of the last awards and are likely to have driven down the value of spectrum.
Spectrum supply has increased		
➢ **L-Band**	On 4 February 2025 Ofcom launched a consultation on its proposals to auction the upper block of 1.4 GHz band (1492-1517 MHz) for 4G and 5G mobile use.[17] 1.4 GHz spectrum was internationally harmonised for mobile telecommunications in 2015, and 40 MHz of the band (1452-1492 MHz) is already in use by mobile network operators in the UK. The 1492-1517 MHz (i.e., 25 MHz) frequency block within the 1.4 GHz band has been identified for mobile use.	L-Band spectrum is a potential substitute for 900 MHz and 1800 MHz. The award of 25 MHz of 1.4 GHz spectrum can therefore be expected, all else equal, to further lower the value of incremental low band and midband ALF spectrum.
➢ **3.9 GHz**	In November 2023, Three made a request to Ofcom to vary the technical conditions in its existing licence for the 3.9 GHz (3925 – 4049 MHz) spectrum band to allow 5G-based FWA.[18] If granted, the licence variation will make available an additional 84 MHz of 3.9 GHz spectrum for 5G FWA services, and consequently clear up to 84MHz of spectrum in 3.5GHz that might otherwise have been used (or is being used) for FWA services	The licence variation freeing up to 84 MHz of 3.6 GHz can therefore be expected, all else equal, to further lower the value of incremental midband ALF spectrum.
➢ **U6 GHz**	On 13 February 2025, Ofcom published proposals for upper 6 GHz spectrum to be made available and shared between mobile and Wi-Fi services.[19] This new spectrum would provide a large increase in capacity for both mobile and Wi-Fi services (potentially 600 MHz available for mobile use)Ofcom describes the characteristics of the U6GHz band as similar to those of the 3.4–3.8 GHz band ie substitutable. For further information on U6GHz see section 5.1.2 of the Aetha Report.	The release of potentially 600 MHz will further lower the value of incremental midband ALF spectrum given their substitutability with midband spectrum.

[15] MNOs could not have factored in these developments at the time of the last awards. However, if Ofcom remains unconvinced, Ofcom could issue a s135 request to all MNOs to confirm this was the case.
[16] CMA Final Decision, paragraphs 1.186-1.188.
[17] Consultation: Award of the 1492-1517 MHz spectrum for mobile services - Ofcom
[18] Consultation: Optimal use of 3.9 GHz spectrum - Ofcom
[19] Consultation: Expanding access to the 6 GHz band for commercial mobile and Wi-Fi services - Ofcom.

1.3 Ofcom relies on invalid indirect evidence rather than its own valid direct evidence

Ofcom does not need to use indirect benchmarks

BT considers that where direct benchmarks for spectrum value are available, as reported in Ofcom's Table 2.4, indirect benchmarks are not necessary to determine spectrum value, and no weight should be attached to them.

Ofcom has, however, claimed that spectrum values have, and are likely to remain, flat in real terms based on indirect benchmarks including headline mobile prices changes, revenue and Earnings Before Interest, Taxes, Depreciation and Amortisation (EBITDA). However, in doing so, Ofcom is effectively setting aside its own direct evidence in Table 2.4, in favour of invalid indirect evidence. We think this is the wrong approach.

We recognise that back in 2018 direct spectrum benchmarks were limited and meaningful trends in spectrum prices were not available. In the absence of direct benchmarks in 2018 Ofcom considered indirect benchmarks such as mobile prices, revenues and EBITDA and found these were constant in real terms. This is likely to have given Ofcom confidence, rightly or wrongly, that changes in spectrum values are correlated to CPI consistent with its working hypothesis. However, even if that was a reasonable approach to take back in 2018, it is no longer reasonable given the overwhelming direct evidence on the real terms decline in spectrum prices now available. By replicating the same method applied in 2018, Ofcom has mistakenly directed itself to ignore its own valid (and substantial) direct evidence in favour of invalid indirect benchmarks.

Even if Ofcom did need to use indirect benchmarks, it has chosen the wrong ones and mis-stated evidence, e.g. using price rather than Average Revenue Per User (ARPU) trends

Moreover, to the extent indirect benchmarks can be used, Ofcom's metrics including headline mobile prices, revenue and EBITDA, are not informative, as they do not measure what they are supposed to measure: the incremental value of spectrum relevant to an ALF determination.

BT considers retail price changes are not a valid proxy for the incremental value of spectrum. Spectrum is an input into the supply of mobile services. Therefore, the value of incremental spectrum to an MNO is likely to depend on the additional profit generated through supplying mobile services with the additional spectrum and/or the avoided network costs to achieve the same service levels without the additional spectrum. Recent headline retail price increases have not translated into higher revenue or profit, nor do they bear any relationship to avoided costs. Accordingly, they are not informative of the incremental value of spectrum.

In any case, Ofcom's analysis of retail price changes is inconsistent with its own analysis and published findings on mobile prices. Ofcom states the following:

> *"To the extent that the evolution in the price of mobile services is an indicator of the value of spectrum, we consider this would be best observed directly. We note that in 2023 and 2024 all four MNOs increased their in-contract prices by more than CPI (BT/EE, Three and Vodafone increased their prices by CPI + 3.9% while VMO2 increased its by RPI + 3.9%"*[20]

However, this analysis is inconsistent with Ofcom's own mobile pricing trends, published one day prior to the ALF proposals, that shows mobile prices have fallen in real terms[21]. Ofcom finds that the average price of a basket of mobile services reflecting average use in 2024 was 5% lower in real terms than one based on average use and prices in 2023. Overall, the basket price in 2024 was 23% lower than the price of a basket of mobile services based on prices and use in 2019 in real terms, and 5% lower in nominal terms, despite average data use having almost trebled over this period. Of the six countries Ofcom compared, the UK had the

[20] The Consultation, paragraph 3.54(b).

[21] Pricing trends for communications services in the UK 2024

second-cheapest standalone mobile prices (higher than France but lower than Germany, Italy, Spain, and the US).

We think Ofcom's mobile pricing analysis is also inconsistent with third party analysis. For example, Enders Analysis reports that despite in-contract price increases of many operators being above inflation, the impact on total service revenue over the year (and hence the average amount customers pay), will be below inflation, eroded by intense competition.[22]

A better indirect measure would be profit per MHz, and this would be showing declining value

Ofcom estimates that industry profit has remained stable in real terms over 2018-2023 (Figure 3.1). However, BT thinks industry profit is not a good proxy for the incremental value of spectrum. A better measure would be profit per MHz which has decreased significantly since 2018/2021.[23] This indicates that changes in total profit are unlikely to be a good proxy for the value of incremental spectrum especially when incremental spectrum appears to largely result in operators being able to retain their existing customers/revenues rather than generating additional profits. In fact, we think that profit (EBIT) per MHz is likely to be a better indicator of the value of incremental spectrum, or equivalently, the Return on "Bandwidth" Employed (ROBE). This measure shows a significant decline the incremental value of spectrum over time.

1.4 CPI indexation of past LSVs likely overstates current market value by £30m pa

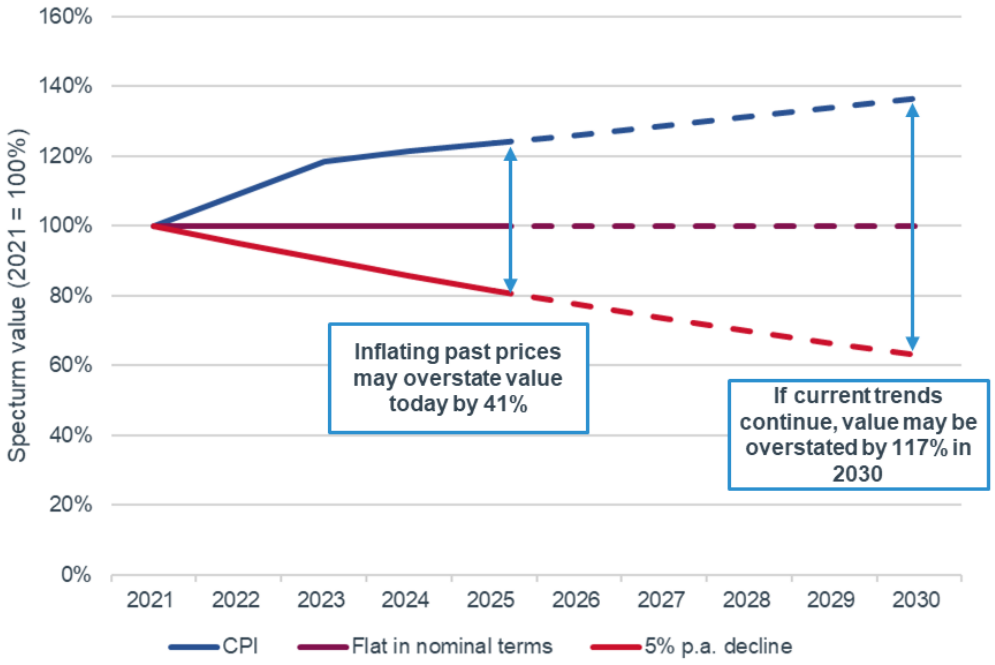
In our view, Ofcom does not consider the fact that benchmarking is inherently "backward looking" and this is highly problematic when spectrum value is falling. To illustrate the size of this problem, Ofcom has proposed inflating the 2018/2021 auction prices by ~27% and ~23% respectively. However, if spectrum prices have been falling 5% pa (nominal) since the 2018/2021 auction results, the overestimate of market value for these bands will be in the order of 40%. If spectrum value continues to decline at 5% p.a., ALFs may overstate spectrum value by 117% by 2030.

While Ofcom states that its intention is to adopt a conservative approach when setting ALFs, this is hard to reconcile with their proposed CPI indexation of past LSV benchmarks in light of evidence that spectrum prices have fallen in nominal terms in recent years as shown in the figure below. See Aetha Report for more information (executive summary and section 6).

[22] Enders Analysis (2023), Enduring price rises in prospect: UK mobile market in Q1 2023 [2023-059], p.10

[23] As the total volume of spectrum held by MNOs increases, incremental spectrum delivers less incremental network capacity. For example, if an MNO holds 100MHz of spectrum and gains 20MHz, that represents a 20% increment in capacity if all spectrum was deployed on all sites or avoids building additional sites. However, if an MNO had 200MHz of spectrum and gains 20MHz that represents only 10% capacity increase or avoids building fewer additional sites and this saves less cost. So, other things being equal, over time as MNOs hold greater amounts of spectrum, the value of an incremental MHz of spectrum should fall.

Figure 1.9 Backward-looking CPI indexation of past LSVs risks overstating market value (and forward-looking CPI compounds the error)



Source: Aetha (2025)

BT's main proposal, Option A, is to remove CPI indexation of past LSVs and instead to apply negative indexation on past LSVs of -5% pa to reflect the decline in nominal spectrum values and therefore minimise the risk of overstating market value. We also present other proposals to mitigate the risk of harm from overstating market value namely, BT's Option B and Option C.

BT's Option A: Negative indexation on past LSVs of -5% pa to reflect decline in nominal spectrum values

There is a strong case for Ofcom to take a conservative approach by applying a 5% nominal reduction to past LSV benchmarks to reflect the observed nominal decline in spectrum benchmarks (see Aetha Report). We do not think this will negatively impact the efficient use of the tradable licences and investment, and we think it would provide mitigation if in the future spectrum values reduce further in real and nominal terms.

Under Option A the conservative 1800 MHz LSV would be no greater than **£9m per MHz**

BT's Option B: No CPI indexation of past LSVs

While less conservative, BT considers removing inflation altogether could be adopted if Ofcom does not accept our Option A. It would however raise the risk of overstating market value and creating barriers to trading inefficiency and suboptimal investment.

Under Option B the 1800 MHz LSV would be **c £10m per MHz.**

BT's Option C: CPI indexation of past LSVs capped at 2% pa

While not a conservative approach, if Ofcom is nonetheless minded to apply CPI indexation of past LSVs, then Ofcom could attempt to mitigate the risk of overstating market value arising from on unusually high CPI in several years since 2021 by capping the historic CPI rate at 2%. This represents BT's least preferred option.

Under Option C the 1800 MHz LSV would be no greater than **£12m per MHz**.

2 Ofcom overstates the LSV benchmarks

Summary

While BT welcomes the significant reductions in LSVs for 1800 MHz, we think that the appraisal of current lump sum spectrum value could be further improved. Our comments on the current consultation proposals are set out below (other than the issue of whether past LSV benchmarks should be inflated by CPI, which we addressed in Chapter 1).

In the remainder of this section, we explain why:

- **Functionally equivalent 1800 MHz and 2100 MHz LSVs should be aligned,** consistent with Ofcom's proposed treatment of functionally equivalent 700/900 MHz LSVs. Doing so would decrease the proposed £/MHz of 1800 MHz spectrum from £12.7m per MHz to at most £12.0m per MHz.
- **Ofcom should interpret 1800 MHz and 2100 MHz Tier 1 benchmarks more conservatively.** In the case of 1800 MHz that would mean an LSV of less than £12.0m per MHz.
- **Ofcom's errors in estimating the LSV benchmarks lead to a further overstatement of fees of £3m pa**

2.1 Functionally equivalent 1800 MHz and 2100 MHz LSVs should be aligned, consistent with Ofcom's approach to low-band

Ofcom has aligned functionally equivalent 900 MHz with 700 MHz LSVs but not 1800 MHz with 2100 MHz LSVs. This represents an inconsistent approach which will lead to inefficient spectrum use, distortions to competition and consumer harms.

Ofcom itself recognises 1800 MHz and 2100 MHz are functionally equivalent, hence there is a good economic argument that 1800 MHz LSVs should be aligned with 2100 MHz LSVs. According to Ofcom's own assessment as set out in its Statement on 2100MHz fees in 2021:

> "*We also expect the value of the paired 2100 MHz spectrum to be relatively close to the value of the 1800 MHz spectrum given both bands are mainstream coverage bands with similar propagation characteristics and established equipment ecosystem*"[24]

On a forward-looking basis we see no difference in 1800MHz and 2100MHz value as both bands are suitable for 5G and devices support both bands. Their coverage is also similar when considering propagation characteristics of the frequency bands. Indeed, if uplink frequencies are considered - these tend to define the limits of coverage - they are much closer in frequency than is the case for 700 vs 900 MHz. As Ofcom has noted, the number of devices in which the 1800MHz and 2100 MHz bands are available is also very similar.

Given this functional equivalence, the 1800 MHz LSV should be aligned to the 2100 MHz LSVs. The difference of £0.7m per MHz proposed 1800MHz and 2100MHz fees leads to a very substantial difference in the Net Present Value (NPV) of future fees over a 20-year period, representing an artificial difference in value of the two bands that we do not recognise in reality. The right approach is to align the 1800MHz LSV with the 2100MHz LSVs.

Finally, considering the risk discussed below that the Tier 1 benchmarks are insufficiently conservative, we believe that based on the evidence of the auction data this provides a further justification for Ofcom to reduce its estimated 1800MHz LSV to at most £12m per MHz, even before considering arguments in relation to not inflating past benchmarks by CPI.

[24] Statement: Annual licence fees for 2100 MHz spectrum, December 2021, para 4.22.

2.2 Ofcom should interpret the 1800 and 2100 MHz Tier 1 benchmarks more conservatively

Setting estimated spectrum value too high risks creating a barrier to trading. As Ofcom has acknowledged in the past, the impact of getting the value wrong is asymmetric: it is preferable to under rather than overestimate the spectrum value.[25] We agree that Ofcom should focus on more recent UK benchmarks and not place weight on distance method results that rely on the UK 800 MHz benchmark. However, we think Ofcom is not being sufficiently cautious in three ways:

- A conservative approach would only focus on the most recent UK mid-band auction.
- Ofcom overvalue 1800 MHz LSV given specific and recent auction evidence.
- Ofcom has also erred in being under-cautious in the 2100 MHz LSV

A conservative approach would only focus on the most recent UK mid-band auction

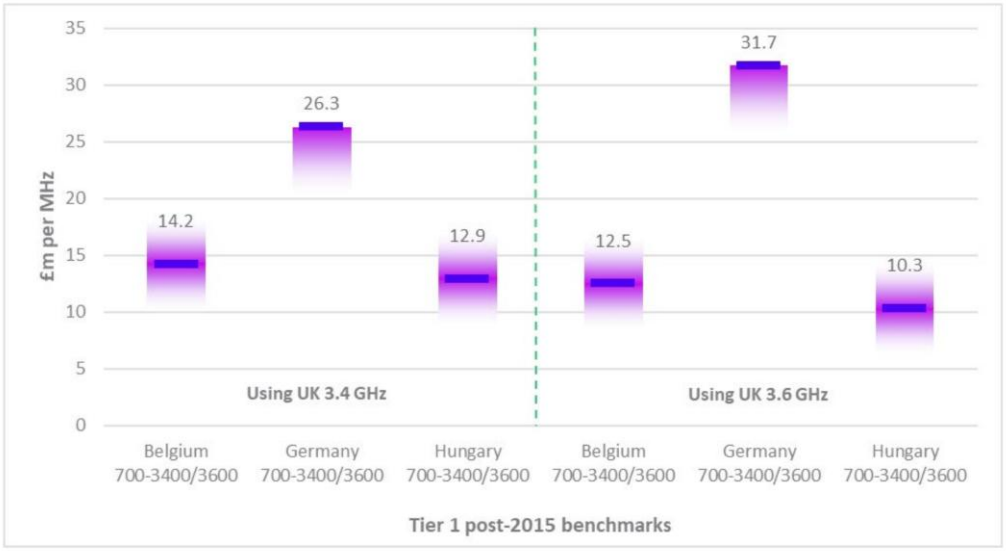
The 3.6 GHz auction benchmark from 2021 should completely supersede the 3.4 GHz benchmark from 2018. Even if, in 2018, bidders had 100% certainty that the 3.6 GHz would be awarded in 2021, it was still rational for them to value the 3.4GHz higher, as it enabled them to commence their C-Band deployment earlier (or to offer higher 5G speeds in the 2018-21 period). Therefore, in 2018, 3.4 GHz and the future 3.6 GHz were not perfect substitutes. However, after the 2021 auction, they became functionally equivalent and pretty much perfect substitutes. Therefore, when considering the 1800MHz and 2100MHz benchmarks, Ofcom should either only use UK 3.6 GHz benchmarks (which are lower on average) or at least put greater weight on those benchmarks.

Ofcom overvalue 1800 MHz LSV given specific and recent auction evidence

BT considers that in looking at Ofcom's Tier 1 benchmarks for 1800 MHz LSVs in Figure 4.2 it is not right to conclude that a conservative value of 1800 MHz LSV would be £12.7m. There is no justification to suppose the 1800 MHz value should be higher than the average of the Hungarian auction results (£10.3m per MHz, £12.9m per MHz), i.e. £11.6m per MHz, or higher than the Belgian auction result of £12.5m per MHz. Setting 1800 MHz at £12.7m per MHz puts UK value above 2 of the 6 auction data points. We do not consider this is a conservative approach. A value less than £12.0m/MHz would be justifiable from the evidence as representing a conservative estimate.

[25] Ofcom stated in 2018 "*We agree with the MNOs that setting ALFs above market value would not secure the optimal use of spectrum, and that there is a greater risk to optimal use of spectrum from setting fees above market value than below*", paragraph 5.69, statement-annual-licence-fees-900-mhz-and-1800-mhz.pdf. In its current proposals Ofcom states that it takes a conservative approach based on its method established in previous ALF decisions "*We take a conservative approach to interpreting the evidence to reflect the asymmetry of risk as between the effects on spectrum efficiency from inadvertently setting ALFs either above or below market value, given the uncertainty about the correct estimates for market value*." Footnote 17, Consultation: Review on Annual licence fees

Figure 2.1: 1800MHz post 2015 price benchmarks (Fig. 4.2 of the consultation document)

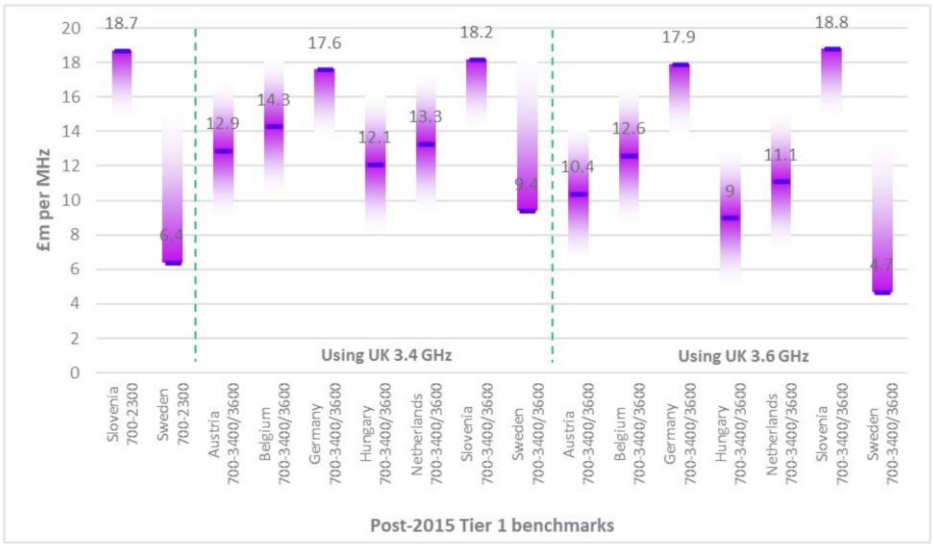


Source: Ofcom

Ofcom has also erred by being under-cautious in the 2100 MHz LSV

BT's comment on Ofcom's Tier 1 benchmarks for 2100 MHz LSV in Figure 4.4 (reproduced in Figure 2 below) is similar to that of 1800 MHz in that the interpretation of the data does not seem to be particularly conservative. There is significant risk that UK benchmarks are too high as spectrum values have not increased over time with CPI. And in the case of the low-band reference, the 800 MHz UK reference value is anyway too high given Ofcom's acknowledgement that low band spectrum values have converged and the 800 MHz value has therefore fallen. A conservative interpretation of the evidence would suggest an LSV of substantially less than £12m per MHz.

Figure 2.2: 2100MHz post 2015 price benchmarks (Fig. 4.4 of the consultation document)



Source: Ofcom

2.3 Ofcom's errors in estimating the LSV benchmarks lead to a further overstatement of fees of £3m pa

By not aligning functionally equivalent 1800 MHz and 2100 MHz and not taking a sufficiently conservative approach to interpreting tier 1 benchmarks, Ofcom overstates the 1800 MHz LSVs by at least £0.7m per MHz, resulting in an additional **£4m pa** overstatement of the 1800 MHz fee. If Ofcom additionally agrees with BT's proposal in Chapter 1 to apply a 5% pa reduction to past LSVs, the overstatement of the 1800 MHz LSV becomes £0.5m per MHz, i.e. £9m per MHz vs 8.5m per MHz or an additional **£3m pa** overstatement of the 1800 MHz fee and a cumulative overstatement of the 1800 MHz and 2100 MHz combined fees of **£33m pa**.

Including BT alignment of functionally equivalent 1800/2100 MHz LSVs (vs Ofcom overestimate)

ALF band	Ofcom's LSV proposals (£m per MHz)	BT's LSV proposal (£m per MHz)	Ofcom's fee overstatement (£m) [26]
1800 MHz	12.7	8.5	24
2100 MHz	12	8.5	9
Total			**33**

[26] Assumes Ofcom's annualisation proposal of 6.38%, i.e., not BT's proposals of 6.11% - see Chapter 4.

3 Annualisation

Summary

Despite Ofcom's previous statements, and the SRSP criteria for demonstrating a material misalignment, Ofcom has not provided adequate reasoning in its consultation proposals as to why it considers a review of the annualisation rate is included within its ALF misalignment review. Further, even if there were a case for Ofcom to revise the annualisation rate if the LSV has changed, there does not appear to be a material misalignment in the LSV for 2100 MHz which Ofcom has reopened after only three years.

In this section we explain why:

- **Annualisation is not a reason to carry out a material mis-alignment review**: Ofcom did not make any reference to annualisation being a reason to conduct a misalignment review when it set out this process in the SRSP
- **It is not legitimate therefore to update an annualisation rate unless there is a material misalignment**. Ofcom has found no such misalignment in 2100MHz and so should not be re-opening the pricing decision.
- **Resetting fees based on updated annualisation creates risks and does not meet Ofcom's objectives, including to promote stability** – the ALFs for 2100 MHz were set by Ofcom only three years ago in 2021.
- **There may be a case for Ofcom to revise the annualisation rate where the LSV has become misaligned** (as this is a new 'price' which the licence holder needs to be made indifferent between paying now or in the future). However, this is not the case for the 2100 MHz band.

Annualisation is not a reason to carry out a material mis-alignment review

Ofcom did not make any reference to annualisation as being a reason to conduct a misalignment review when it set out this process in the SRSP. To determine if there is material misalignment, Ofcom identified the following as relevant in the 2010 SRSP[27]:

- Are there anticipated changes that will affect the supply of, or demand for, relevant spectrum in:
  - Congestion levels
  - Major spectrum releases or technological developments
  - Expectations of a regulatory change that will affect the value of spectrum
  - Evidence from spectrum prices
- Is there evidence that a fee change would increase the efficiency of use?

The SRSP criteria relate primarily to changes to spectrum value, and drivers of changes in spectrum value such as technological developments, and changes in demand and supply conditions –it makes no mention of the annualisation rate (including cost of debt or WACC). This suggests that the policy intention of the misalignment mechanism is not related to the annualisation rate and, therefore, Ofcom did not need to revise it. Put another way, if changes in the cost of debt or WACC were treated as justifying changes in ALFs, then ALFs would be revised frequently, which is clearly not the policy intention.

It is not legitimate therefore to update an annualisation rate unless there is a material misalignment

Ofcom has not adequately explained why it has reopened a review into the 2100 MHz spectrum band other than to remark "*As a result of the commonalities in the formula we use to set ALFs, we have decided to begin a review of all of the ALFs we currently charge (that is, ALFs for 900 MHz, 1800 MHz and 2100 MHz spectrum).*" [28]

[27] SRSP, para 6.38

[28] Ofcom launches review of spectrum licence fees - Ofcom

As previously mentioned, the 2100 MHz ALF review was conducted only 3 years ago[29] and was not requested by any MNOs as part of this current misalignment review.

The evidentiary thresholds set out in Ofcom's SRSP (the predominant document governing the principles for misalignment reviews by Ofcom into AIPs and, by extension, ALFs), do not appear to be satisfied, noting the 6% proposed reduction for the 2100 MHz LSV is relatively small compared to the c 30% reductions for 900 and 1800 MHz LSVs. Ofcom has not provided a robust explanation as to why it has decided to revise the annualisation rate in the absence of a material misalignment in the LSV other than to say *"the [annualisation] rate used in our 2021 statement does not reflect market conditions today."*[30] Therefore, it is unclear whether Ofcom is giving proper consideration to the principles under which regulatory activities should be transparent, proportionate and targeted only at cases in which action is needed, as part of its principal duty.[31]

Consequently, this may potentially undermine MNOs' trust and confidence in Ofcom's decision-making and risks impacting the relationships between Ofcom and MNOs. We consider that Ofcom should not have reopened a review into the 2100 MHz spectrum band for these reasons, and not least because Ofcom does not appear to have met the evidentiary thresholds it set out in its SRSP, as mentioned previously.

Resetting fees based on updated annualisation creates risks and does not meet Ofcom's objectives to promote stability

We consider that Ofcom's approach to reopening 2100 MHz is unlikely to be consistent with, or promote, Ofcom's own objectives and therefore represents a risk of harmful long-term outcomes. In this regard we note that Ofcom has previously made a firm commitment regarding predictability of ALFs reviews to promote Ofcom's objectives of stability and certainty. Specifically, Ofcom stated:

> *"We therefore conclude, and as most responses agreed, that we will, in future, give explicit weight to the advantages of stability in promoting efficient investment decisions and in reducing potential inhibition of efficient trades."*[32]*:*
>
> *"We would therefore be unlikely to review ALFs in the next five years save in very exceptional circumstances and would also propose to retain them beyond that date unless there were grounds to believe that a material misalignment had arisen between the level of these fees and the value of the spectrum, in keeping with our general policy on fee reviews. Moreover, to date, we have only reviewed and adjusted AIP-based fees in other spectrum bands in limited circumstances."*[33]

Reopening ALFs in spectrum bands set relatively recently, and the resulting revisions of annualisation rate, produces uncertainty which is likely to be harmful to the industry. Increased uncertainty over the value of future ALF liabilities can lead to frictions in spectrum trading (e.g. agreement between buyer and seller on the value of the trade in ALFs spectrum) and impair investment in complementary network assets, ultimately compromising the market's efficiency. MNOs will be negatively affected by the financial unpredictability of ALF levels that are subject to relatively sudden change.

Frequent reviews could trigger greater risks of strategic bidding (demand reduction) in future auctions, e.g. L-Band. In placing offers, bidders are likely to internalize the effect that increasing auction prices could have on ALFs and shade their bids, which would risk an inefficient allocation of the spectrum.

The reopening of the 2100 MHz band is, therefore, contrary to Ofcom's previously held views that stability and certainty of ALF levels are important for MNOs and of benefit to them.[34] Indeed, changing 2100 MHz ALFs so

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[29] The statement by Ofcom was published 13 December 2021 Statement: Annual licence fees for 2100 MHz spectrum

[30] Para. A5.3 of the Consultation Response.

[31] s.3(3)(a) of the CA 2003

[32] Ofcom, SRSP 2010, paragraph 6.27

[33] Ofcom, ALFs for 900 MHz and 1800 MHz, 2018 Statement, paragraph 5.65

[34] 'This is not to say that we do not recognise the importance of a level of stability in fee levels to licensees…' (paragraph 4.106 of the SRSP); 'We consider that there is benefit to licensees in having some certainty over what fees will be over the longer-term…' (paragraph 5.65 of Ofcom's decision on ALFs for 900 MHz and 1800 MHz)

soon after they were set would signal an increased regulatory risk going forward and negatively affect the balance between risks and benefits of Ofcom's approach to ALFs reviews.

The 2100 MHz spectrum band was set recently by Ofcom in 2021 (only 3 years ago). There is an apparent divergence between Ofcom's stated views to promote stability and certainty, and its proposed approach. Accordingly, it is unclear whether Ofcom is having regard to the principle of consistency, as required as part of its principal duty.[35]

There may be a case for Ofcom to revise the annualisation rate if the LSV has changed

We recognise that when resetting ALFs, i.e. a new 'price', the licence holder needs to be made indifferent between paying now or in the future. For this reason, we consider that an argument can be made for revising the annualisation rate where the LSV is materially misaligned. However, this is not the case for the 2100 MHz band.

[35] s.3(3)(a) of the CA 2003

4 Investor expectations of CPI

Summary

Where Ofcom resets the annualisation rate, it must do so in way that makes investors indifferent between paying a lump-sum fee and paying an annual fee. However, an annualisation rate can only do that if it reflects investors' expectations of CPI, rather than the BoE target.[36]

Market evidence suggests that investors expect CPI to average 2.5% over the long-term (as discussed later in this section) – materially above the 2% target - and it has a cumulative impact over time thereby driving a misalignment between ALFs and market value of spectrum over time. As a result, the annualisation fee proposed by Ofcom underestimates the inflation compensation required by investors to expose themselves to inflation (as Ofcom indexes ALF payments to outturn CPI) and does not reflect Ofcom's objective to make investors indifferent between a lump-sum and an annual payment.

Ofcom's annualisation rate spreads the LSV over 20 years using an ALF profile that is flat in real terms so that each year the annual payments increase by actual (not forecast) CPI. MNOs' inflation expectations at the point of valuation are therefore a significant factor as to whether they will have a preference for an LSV or an ALF, as this is what will drive the fluctuation in the payments they have to make over time, affecting the present value of these future cash out-flows.

If MNOs expect CPI inflation to be on average higher than Ofcom's forecast over the 20-year period, then their incentive to pay the LSV versus the annual fee is distorted. In order for this to be addressed, the annualisation rate must be derived using total inflation compensation (i.e. including both the correct measure of inflation expectation + risk premium). Ofcom's objective is to specifically capture the perspective and expectations of an investor, which may differ from economic forecasters or institutions such as the Bank of England (BoE) or independent analyst firms.

In this section we explain why we disagree with Ofcom's assessment that the BoE's CPI target is the best available proxy for investors' inflation expectations and suggest an alternative approach.

- **Inflation has a significant impact on ALF values** and undermining investors' inflation expectations will continue to drive a wedge between the annual fee and the market value of spectrum over time.
- **Ofcom has accounted for the inflation risk premium, i.e. variability in the expected value, but not investors' expectations.** MNOs will require both to be accounted for to be indifferent between ALFs and the LSV. This is called "total inflation compensation" and represents the combination of the inflation risk premium and expectations.
- **Ofcom should use public data to reflect both the inflation risk premium and expectations.** It is essential to Ofcom's objectives that both CPI risks and expectations are accounted for.

4.1 Inflation has a significant impact on ALF values

Ofcom aims to convert the LSVs into an equivalent annual rate by spreading the lump-sum over 20 years, using an ALF profile that is flat in real terms (i.e. by indexing the payment streams to outturn inflation each year).[37] This means that MNOs will bear inflation risk, but they will also have expectations as to how these payments will increase over the period. If MNOs expect that inflation will actually be higher than 2% on average then they will view there to be a misalignment between the Present Value (PV) of ALFs and the LSV.

When Ofcom last reviewed an annualisation rate for ALFs in 2021,[38] inflation had generally averaged near the 2% BoE target since it came into effect in 2003, with economic cycles above and below target. However, the market has since entered a period of instability and the inflationary environment facing an investor today is fundamentally different to that of 2021.

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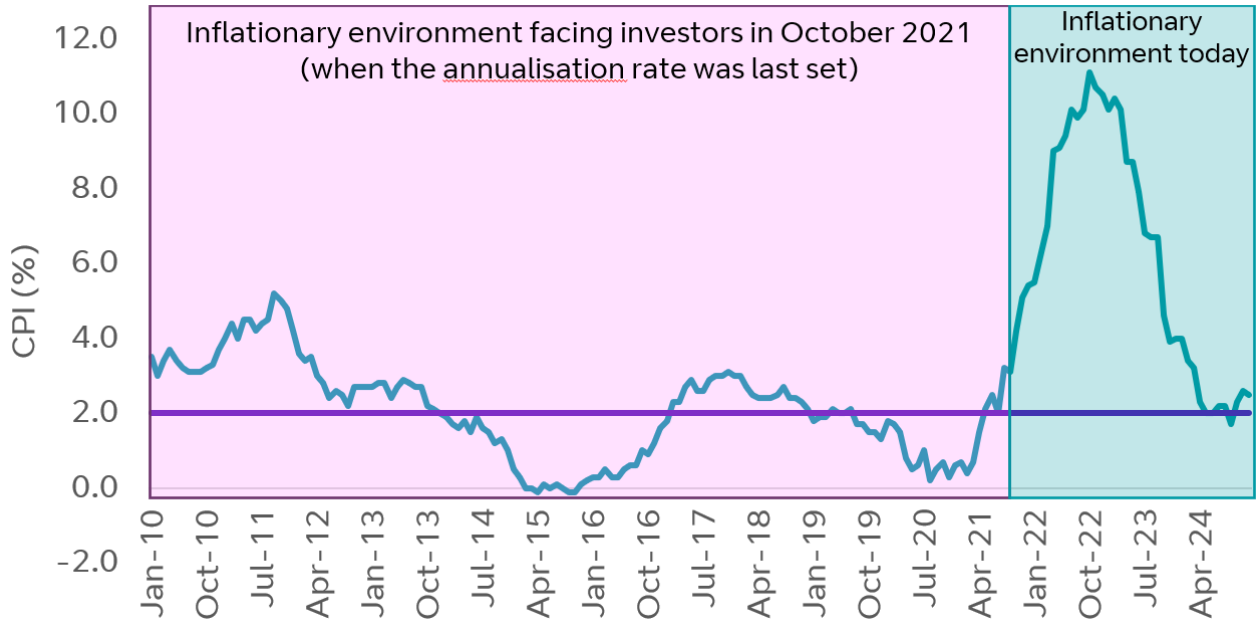
[36] The Consultation, paragraph A5.2 "…*use a discount rate at which the present value of the annual payment stream equals the lump-sum value paid today, and which will in principle leave licensees indifferent between paying ALFs and paying the LSV*"

[37] The Consultation, A5.2-A5.4.

[38] Statement: Annual licence fees for 2100 MHz spectrum - Ofcom

Figure 4.1: CPI inflation against 2% target, 2010-2024



Source: ONS

Figure 4.2: Average of CPI inflation over 5 and 10-year averaging periods from end of 2021 against the end of 2024

	As of end 2021	As of end 2024
5-year average	2.1%	4.5%
10-year average	1.8%	3.0%

Source: ONS

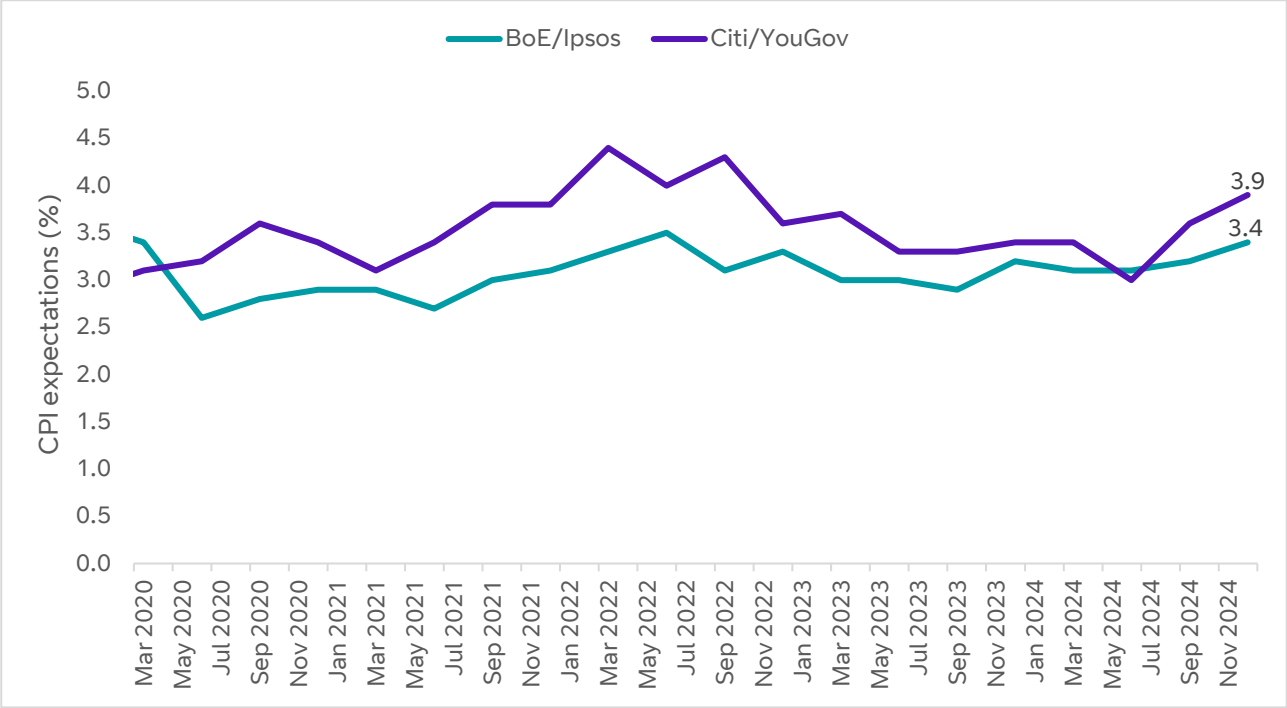
In 2021, CPI inflation had averaged near the Bank of England target for the previous 10 years, leading Ofcom to apply a small inflation risk premium of 0.1% and maintain the assumption of 2% forecast CPI inflation, which Ofcom states is its own long-term view of inflation.[39]

CPI inflation has now averaged 3.0% over the last 10-15 years and 4.5% over the last 5 years, in sharp contrast to the stable periods prior to 2021. In the Condoc, Ofcom has proposed that inflation risks have increased, but not inflation expectations, despite Ofcom's objective to "reflect market conditions today".[40] This is an inconsistency in approach, where Ofcom uses market-based evidence for the other key determinants of the annualisation rate, but not the CPI forecast where Ofcom uses its own internal view rather than that of investors.

Inflation expectations for CPI have steadily increased since 2020, remain elevated, and are showing signs of rising again.

[39] Annexes 1-5: Annual licence fees for 2100 MHz spectrum, A4.21.
[40] The Consultation, paragraph A5.3.

Figure 4.3: UK household CPI inflation expectations over the medium-term (5-10 years)



Sources: BoE/Ipsos Inflation Attitude Survey and Citi/YouGov

The BoE inflation attitude survey shows that households' CPI inflation expectations in five years' time averaged 2.9% in 2020, 3.2% in 2024 and is currently at 3.4%.[41] An increase of 0.3-0.5%. Correspondingly, the Citi/YouGov survey which measures households' CPI inflation expectations over the next 5-10 years averaged 3.5% in 2024 against 3.2% in 2020, and has since shown a significant increase to 3.9%.[42] The BoE's Decision Maker Panel (DMP) survey (which surveys business' expectations of CPI over the next three years) was 2.8% in the three months to January 2025, a 0.2% increase over the three months to October 2024,[43] but this survey has only run since May 2022 so there is no earlier comparator.

The BoE also analysed inflation swaps and found that "[t]he measure remains above its 2010–19 average [...], with intelligence from market contacts suggesting this reflects perceptions of some continuing upside risk from inflation persistence in light of developments in services CPI inflation and pay growth."[44]

In effect, households and businesses have elevated and increasing inflation expectations in the short to medium-term. If unaccounted for in the annualisation rate, this has a cumulative impact over time and will continue to drive a wedge between annual fees and the market value of spectrum over time.

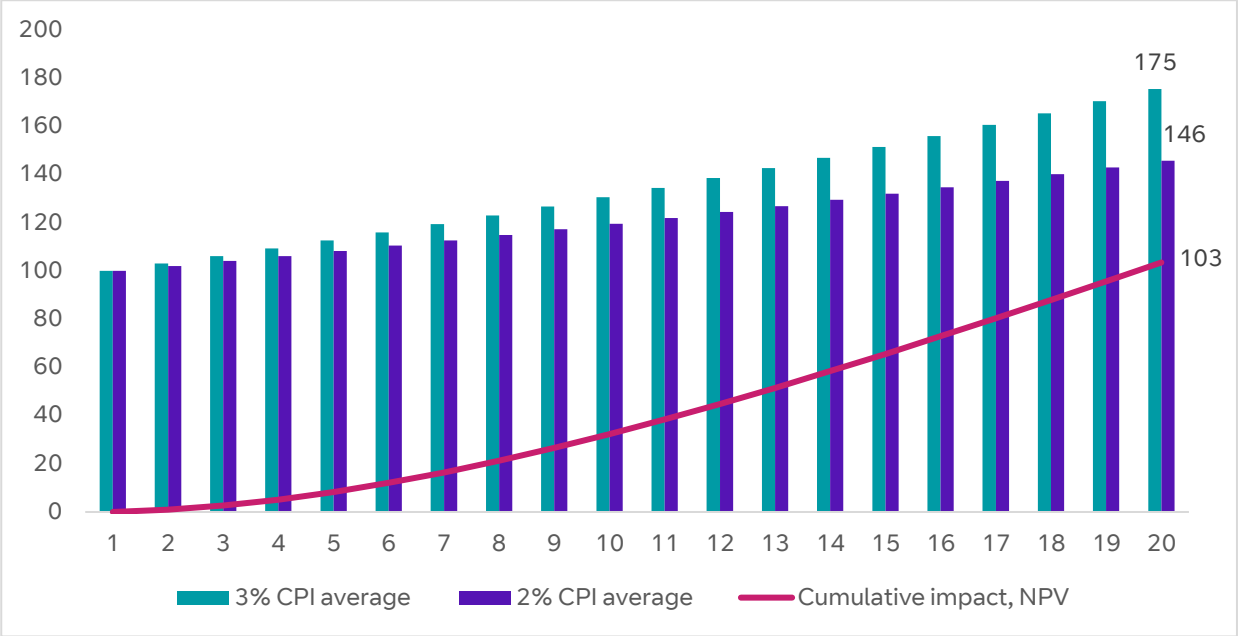
[41] Bank of England/Ipsos Inflation Attitudes Survey - November 2024 | Bank of England.

[42] Historical data series is available for Chart 2.25 in section 2.6 of the BoE's Monetary Policy Report - February 2025 | Bank of England.

[43] Monthly Decision Maker Panel data - January 2025 | Bank of England

[44] See section 2.6 of the BoE's Monetary Policy Report - February 2025 | Bank of England.

Figure 4.4: 3% average CPI drives a £30m divergence between annual fees and spectrum value over 20 years (over £100m in excess payments on a PV basis)[45]

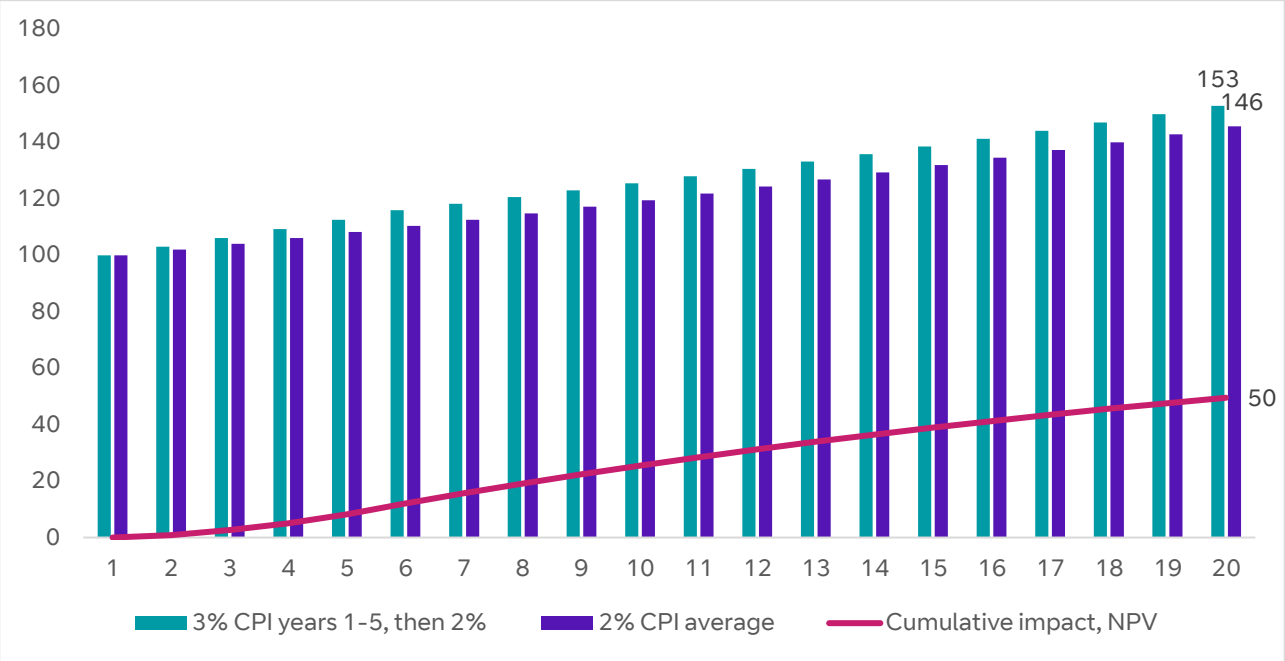


The figure shows an illustration of how high inflation or expectations can distort the PV of ALFs relative to the LSV and market value of spectrum. The effect is also cumulative, with high increases in ALFs carried into annual payments in future years. If investors expect inflation to continue in line with historical trends (3% average), this would have the effect of creating a strong preference for a lump-sum relative to an ALF (all else held constant).

Surveys of inflation expectations are limited in that they tend to be relatively short-term focused and tend to be driven by the Bank of England's short-term policy objectives. There is no survey of investor long-run expectations, or indeed an average over a 20-year period. However, the significance of the short-term surveys is that they can capture the direction of travel of investor and household expectations, which is currently increasing, and they will affect how investors assess the PV of an inflation-indexed annuity. Even if Ofcom were to maintain its long-run assumption for CPI, the effects of short-term inflation alone have a significant effect on ALFs that must be accounted for. Using the same illustration again, but assuming only 5 years of high inflation in years 1-5 (so that years 2-6 are indexed to 3% and then 2% thereafter), even short-term inflation effects can be shown to have a significant impact on ALFs.

[45] A WACC of 7.1% (pre-tax, nominal) is used to derive the NPV in line with Ofcom's preliminary determination in the Condoc. As ALFs are currently paid in 10 monthly instalments throughout the year, the cash flows are discounted to each mid-year for simplicity (i.e. year 1 is 0.5 and year 2 is 1.5).

Figure 4.5: 3% average CPI for only five years drives a £7m divergence between annual fees and spectrum value over 20 years (£50m in excess payments on a PV basis)



The illustration shows that even short-term inflation expectations have a significant effect on the PV of ALFs. Even if investors only expect CPI inflation to average 3% in years 1-5 creates, this is an average equivalent rate of 2.3% over the 20-year period. Therefore, Ofcom should increase its forward-looking CPI assumption to represent the current climate alone, even before long-term expectations of inflation are considered.

Whilst the surveys can provide context, they are not as informative as market-derived measures of inflation expectations such as inflation swaps or breakeven inflation rates (discussed in detail in the section). This is because "price-derived expectations are likely a more accurate reflection of true expectations than survey-based measures".[46] The same issue applies to professional forecasters who tend to "average close to the 2% inflation target".[47]

Academics deriving inflation expectations from American inflation-protected securities (known as TIPS) show this divergence between surveys and professional forecasters and how investors are actually willing to put money at risk.[48]

[46] Bank of England Staff Working Paper No. 1,109, page 8.
[47] Ibid.
[48] The Increase in Inflation Compensation: What's Up? - San Francisco Fed

Figure 4.6: US 10-year expected CPI inflation, market-derived versus forecasts based on surveys

Source: Jens Christensen, FRBSF Economic Letter

The figure shows how professional forecasts based on surveys (the green and yellow lines) tend to be relatively stable over time, whereas investors are more responsive to economic shocks and, at least since 2015, have maintained inflation expectations significantly above target and forecasts (red line). Inflation expectations here are based on econometric models that remove inflation and liquidity risk premiums to derive the expectation component.

For Ofcom's objective, what is relevant is not what an individuals' objective view of long-term inflation is (such as central bank targets or surveys), but the rate at which "investors are willing to put money behind their opinions".[49] This is what we call the required "total inflation compensation" and this is how Ofcom should be reflecting long-term inflation expectations.

4.2 Ofcom's stepped method accounts for the inflation risk premium (i.e. variability of the expected value), but not investors' expectations

Ofcom has accounted for the inflation risk premium, but not investors' expectations, and MNOs will require both to be accounted for to be indifferent between ALFs and the LSV. This is called "total inflation compensation" and represents the combination of the inflation risk premium and expectations.

Whilst investors' CPI inflation expectations cannot be directly derived from market data, investors' total required inflation compensation is readily available. This is the additional yield that investors require to hold nominal assets (that are exposed to inflation) rather than inflation-indexed assets (which are protected from inflation) and are calculated as the difference between a nominal bond and an index-linked bond. For example, if a 10-year nominal gilt has a yield of 4% and a 10-year inflation-index linked gilt has a yield of 1% then the total inflation compensation for the 10-year period is approximately 3%.

[49] Bank of England Staff Working Paper No. 1,109, page 8.

One market-based measure of inflation compensation is the breakeven inflation rate which is often simply viewed as investors' inflation expectations. However, breakevens have both an inflation expectation component and a risk premium component.

Equation 1: *breakeven inflation = inflation expectations + inflation risk premium*

Therefore, inflation expectations can be rewritten as:

Equation 2: *inflation expectations = breakeven inflation rate – inflation risk premium*

Whilst each component is not directly measurable and cannot be precisely split from the breakeven inflation rate, which portion is attributed to which category is relatively negligible as long as investors' required total inflation compensation is represented in Ofcom's annualisation rate. It is the total inflation compensation that investors require to be ambivalent between a nominal and an index-linked asset or payment stream and the total is measurable - at least in RPI-terms.

We provide an illustrative example of how this would work under one of our proposed options in the next section (4.3).

4.3 Ofcom should use public data to reflect both the increased inflation risk premium and expectation

There are several ways in which Ofcom could approach representing investors' inflation expectations other than the BoE target. We recognise the challenge that there are no CPI-indexed assets available to directly infer investors' CPI inflation expectations and that any approach will contain a measure of uncertainty. However, there is enough public data available to produce a range to represent this uncertainty from which a point estimate can be selected. The minimum of the range under consideration would be markedly above the 2% target, and hence still result in a materially more accurate measure of inflation expectations than Ofcom's proposal.

We consider Ofcom should use one of two potential approaches:

- **Option A:** Derive investors' total required total inflation compensation rates, allocating a portion to risk premium and expectation (as set out in the section above). This option will more accurately reflect how investors trade and bear inflation risk and it is the most closely aligned option to Ofcom's objectives.
- **Option B:** A simpler approach that produces a similar result to option A is to use the midpoint (2.5%) of long-term historical CPI inflation (3%) and the BoE target (2%).

Ofcom did not accept our proposal to simply use the historical long-run value as a proxy for investors' forward-looking inflation expectations,[50] continuing to cite that the BoE target as the best available measure. However, we do not agree with Ofcom that investors would ignore historic actuals in considering the extent to which outturn inflation may differ from the BoE target. Historical evidence and forward-looking market expectations represent two salient long-run data points that are available to investors and taking the midpoint of these bounds is a simple and more reasonable proxy for expectations than the target in isolation.

Taken in the round, option A and option B produce the same value and provide strong evidence for Ofcom to uplift their CPI forecast to 2.5%. This would reduce the annualisation rate to 6.11% (*ceteris paribus*) and further reduce the ALFs by **£3m pa** from our proposed LSVs.

The steps below show how Ofcom could approach option A in more detail, and Appendix B to this report provides the technical evidence for breakeven inflation rates and the challenges that come with quantifying inflation expectations (namely, that market-derived measures of inflation expectations are RPI-based and include a risk premium component).

However, as discussed in Appendix B, these challenges can be mitigated by simply representing the current market data of total inflation compensation as an increment over the long-run BoE target which Ofcom uses as a baseline. This figure for total compensation can then be approximated into the risk premium and expectation component.

We propose that Ofcom should consider the following approach:

1. Use the midpoint of the 12-month average of 10yr and 20yr breakeven inflation rates

[50] See "Option D" in our September response, page 10.

2. Use the OBR's RPI forecasts to derive the implied total inflation compensation rate over long-run baselines (expectation + risk premium) between a lower and upper bound
3. Select a point estimate within that range
4. Split the total inflation compensation rate into a risk premium and expectation using Ofcom's existing derived estimates (as also explained in section 4.2 above).

This methodology is illustrated in the table below.

Figure 4.7: Methodology to derive investors' inflation expectations

	Metric	Value	Notes/Sources
1	Long-run breakeven inflation rate	3.5%	Midpoint of the 12-month average of 10yr and 20yr breakeven RPI inflation rates, shown in Appendix B.
2	OBR's long-term RPI forecast	2.4-2.9%	The OBR's previous long-term RPI forecast was 2.9%, which has since changed to 2.4% in line with CPIH. As this change is ongoing and RPI won't converge with CPIH until 2030, the potential rage produced by these two measures is 2.4-2.9%.[51]
3.1	Implied total required inflation compensation, RPI-based, upper bound	1.1%	Breakeven inflation rate – current long-run forecast
3.2	Implied total required inflation compensation, RPI-based, lower bound	0.6%	Breakeven inflation rate – previous long-run forecast
3.3	Implied total required inflation compensation	0.85%	Midpoint of the lower and upper bound
4	**Implied inflation expectation above long-run forecasts**	**0.45%**	**Total inflation compensation – Ofcom's estimate of the CPI inflation risk premium**

Whilst there is no perfect methodology to derive inflation expectations and risk premiums, the above approach benefits from being transparent, market-based and objective. It also meets both of Ofcom's objectives of reflecting investors' total inflation compensation rather than just the risk premium (which is required to make an MNO indifferent between an ALF and an LSV), and by taking a conservative measure within the range generated.

Ofcom aims to take a conservative measure near the bottom of the range implied by market data because "[a]s CPI is less volatile than RPI, we think a CPI inflation risk premium would be below an RPI inflation risk premium".[52] The approach above meets Ofcom's objective to be conservative by including a lower bound in the estimation that represents investors' required RPI-based inflation compensation for a short period (approximately half of the 10-year gilt and a quarter of the 20-year gilt). Applying equal weight to the lower bound would likely understate the long-run compensation required by investors as the inflation compensation should arguably be weighted more toward the upper bound as this is the current long-run assumption.

Therefore, taken in the round, we believe that: given Ofcom's objective to reflect investors' expectations in the current environment, the asymmetric risk of misalignment from underestimating inflation expectations, the implications of high inflation expectations in the near-term alone, and the elevated inflation compensation rates in the market, warrants a significant uplift to Ofcom's CPI forecast to 2.5%.

[51] The long-run difference between RPI and CPI inflation - Office for Budget Responsibility
[52] The Consultation, paragraph A5.23.

5 Implementing fees

This consultation sets out proposals to inflate fees each year by the ratio of (i) the CPI index available on the 30th of September prior to when charges are due; and (ii) the CPI index value for September 2024[53].

Currently BT's 1800MHz fees are revised in October each year and our 2100MHz fees in January of each year. The consultation proposals appear to suggest that the calculation of the fee increases only uses September CPI data when setting the increase for both bands, but the increase would be implemented on different dates for each band (i.e. October for 1800 MHz and January for 2100 MHz).

Our position is that Ofcom should not increase fees by CPI, but should hold these constant, as it does for many other licence classes, including the 32GHz Spectrum Access licences where fees were set recently.

We consider Ofcom's approach to increasing mobile spectrum fees annually by CPI to be inconsistent with AIP for all non-mobile spectrum, for which Ofcom has offered no rational. For instance, in the 412 MHz licence fee determination simply states: "*Consistent with our approach to setting annual licence fees for spectrum (other than mobile spectrum), the Business Radio fee is fixed in nominal terms and not adjusted for inflation. We are adopting the same approach and keeping the 412 MHz annual licence fee fixed in nominal terms.*"[54]

In terms of payment of the fees, currently Ofcom allows these to be paid in 10 instalments. We welcome Ofcom's subsequent consultation proposals[55] that were published shortly before the close of the present consultation in which an option to pay in 12 monthly instalments is proposed. We will respond separately to Ofcom's further consultation on the mechanics of fee payments.

[53] Consultation document at para 7.9.

[54] See Statement: Proposal to apply Administered Incentive Pricing for the 412–414 MHz, paired with 422–424 MHz, frequency bands. Footnote 66.

[55] https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/consultation-on-proposals-for-implementing-revised-alfs-and-notice-of-proposal-to-make-regulations/main-documents/consultation-on-implementation-and-regulations.pdf

Appendix A Why spectrum values are falling – Aetha Report

See Aetha Report attached.

Appendix B Deriving inflation expectations from breakeven inflation rates

Breakeven inflation rates are a robust and transparent means of deriving investors' inflation expectations, but there are two challenges that come with isolating CPI inflation expectations from breakeven rates.

1. As Ofcom notes, "the lack of CPI-indexed gilts means it is not possible to directly infer the level of CPI inflation being built into returns."[56]
2. Breakeven rates comprise both an expectation component and a risk premium component.

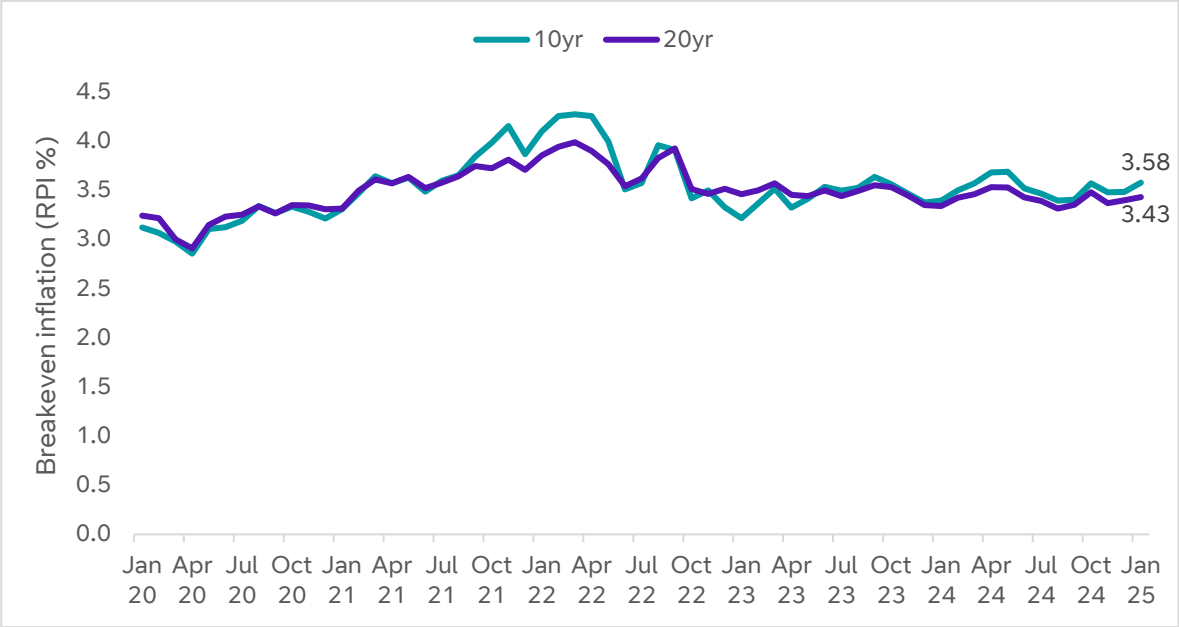
However, these challenges can be mitigated through simple steps that are established methodology among academics and central banks. The prevalence of research and data on the RPI-CPI wedge is such that the "long-term RPI expectations can be transformed to estimates of long-term CPI expectations via a constant adjustment. In other words, we could approximate long-term CPI inflation expectations by subtracting a constant wedge [...] from the measure of RPI inflation expectations."[57] This statement is from a 2015 BoE staff paper and shows how the approach suggested in section 4.3 to infer CPI expectations using the wedge is established methodology.

Furthermore, as discussed in section 4.2, the challenge in isolating the risk premium and the expectation component respectively is negligible as long as the total inflation compensation is represented.

Therefore, despite the challenges, there is enough public evidence available for Ofcom to generate a range of potential outcomes that represents inflation compensation from which a point estimate can be selected, even if on a conservative basis. Ofcom's current estimate of total inflation compensation of 0.4% is below even the bottom of the range implied by market data.

The BoE publishes the breakeven inflation rates for the UK and these have increased steadily since 2020, peaking during the significant inflation of 2022 and 2023, and have shown signs of increasing again.

Figure B1: 10-year and 20-year breakeven inflation rates, RPI-based, Jan 2020 – Jan 2025



Source: Bank of England, UK instantaneous implied inflation forward curve

[56] 2015 Statement, annexes_9-13.pdf, A10.46.
[57] Bank of England Staff Working Paper No. 551, page 15.

The chart shows the latest RPI breakeven inflation rate is 3.5% on average over the next 10-20 years and has consistently been around this level for the past two years, despite the gradual decline in inflation over the same period.

It is public knowledge that RPI is set to converge with CPIH in 2030 which is forecasted to be a lower index than current or historical RPI values: the OBR's previous long-run forecast for RPI was 2.9% and this is now 2.4%.[58] Investors will therefore be pricing in lower inflation into inflation-indexed assets from 2030 onwards which means that while breakeven inflation rates have remained relatively constant over the last few years, the total required inflation compensation has been increasing relative to long-run OBR and BoE forecasts.

Whilst the inflation-indexed gilt market is in a period of change, investors will be pricing in an average RPI forecast between this range as they expect RPI/CPIH to average closer to CPI in the long-term. While calculating the precise price may be spurious, the range under consideration is not and this is the range that we have used to derive the total inflation compensation in figure 4.7.

[58] The long-run difference between RPI and CPI inflation - Office for Budget Responsibility

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