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UK 2G licence fee proposals: Higher and higher

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Ofcom has been instructed by the UK government to charge the mobile operators 'full market value' for the 2G spectrum they have been using for many years, despite there being no liquid market for the spectrum

Ofcom's general approach to such an imponderable question is eminently sensible, but we disagree with the detail of their methodology on three key aspects, which makes the current proposed charges *over three times* too high in our view, effectively charging the industry a one-off tax of £4.5bn

The elevated fee levels are (perhaps) still affordable on their own, but coupled with other recent regulatory decisions the UK is in danger of being seen as a hostile regulatory environment, with negative consequences for future investment levels

In October 2013 the UK telecoms regulator Ofcom published a consultation document on the annual licence fees ('ALFs') it intends to levy on holders of 900MHz and 1800MHz 2G spectrum, which will replace the old Administered Incentive Pricing ('AIPs') spectrum fees which have been levied in the past. Responses to the consultation are due by 16 January 2014, with a final decision expected in the first half of 2014.

In this report we first consider the reasons behind the shift from AIP to ALF and some of the issues involved, next we outline Ofcom's general approach to determining the ALFs and focus on three particular areas where we believe that Ofcom has erred on the (very) high side, and finally we conclude on the potential consequences of these inflated fees on the UK mobile market.

ALFs versus AIPs

Historically, 2G spectrum fees have been levied on an AIP basis, loosely based on a methodology known as least cost alternative (LCA). This estimates the lowest cost alternative for a hypothetical mobile operator to using incremental extra spectrum, for example estimating the costs of building out new base stations to fulfill capacity requirements which could otherwise be met with a given incremental block of spectrum.

There is an obvious issue with this approach, in that if spectrum is priced at even one penny more than the full LCA value, then operators would be incentivised to return all of their spectrum apart from the minimum required to provide a

connection. Perhaps for this reason, AIPs tend to be set at a substantial discount to the estimated LCA value.

A further issue with the LCA approach is that it tends to give the same value per MHz regardless of frequency, with the implicit assumption that coverage requirements have already been met by existing operators. In reality, mobile operators are continuously upgrading base stations to the latest technology and hence extending high speed coverage, with a side effect of this that capacity is also increased, to the extent that the majority of mobile capex has remained focused on coverage/capability as opposed to pure capacity. This means that lower frequency spectrum has retained its value premium, as is regularly evidenced in spectrum auctions.

LCA calculations have only actually been formally made twice in the UK, once way back in 1996 by the economic consultants Smith-NERA, who estimated the value at £0.81m/MHz, and once by economic consultants Indepen (sic) in 2004 who estimated a value of £0.84m/MHz. For over 10 years now AIPs have been set at roughly half of these rates, with a (somewhat arbitrary) discount for 1800MHz spectrum, so that the current fees are £0.356m/MHz for 900MHz spectrum and £0.277m/MHz for 1800MHz spectrum. This results in an aggregate annual cost to the mobile operators of £65m.

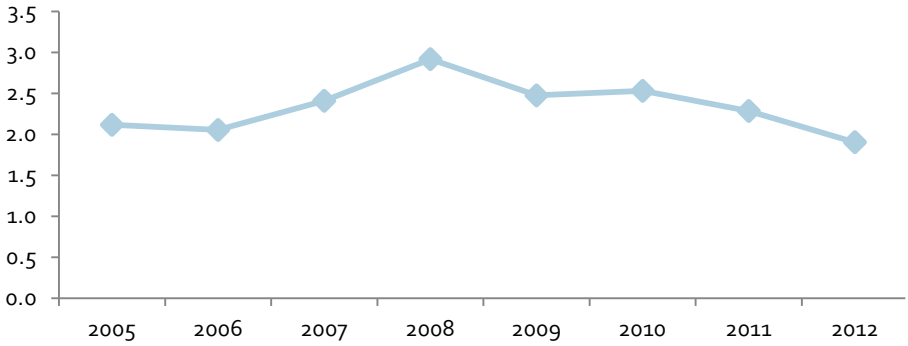
The current proposed revisions to the AIP/LCA approach date back to the Independent Spectrum Broker report of 2009, which had as one of its recommendations to government "revising AIP to reflect the full economic value of this spectrum", although there was no further guidance on how this might be done or any definition of "economic value".

This somewhat vague recommendation was picked up by the government, which in the Spectrum Direction in 2010 included an instruction to Ofcom to revise 2G spectrum payments to "reflect full market value", having "particular regard to the sums bid for licences in the [4G] Auction". Again, no further detail is given as to how market value should be ascertained.

Ofcom has therefore been instructed to alter the basis for spectrum payments from the current AIP/LCA basis to a market value approach. Ofcom has considered this approach previously, stating in a 2004 consultation document that "Ofcom agrees that the methodology for setting the AIP levels is not perfect", and that "Any administrative methodology will always be second best compared with prices determined by an effective and efficient market". However it goes on to state that "However, such a market does not as yet exist". It is referring here to the fact that 2G spectrum is not regularly traded between operators, and this is still the case today. Ofcom is not now being asked to use an existing transparent market price to set the fee levels, but to estimate what a hypothetical market price might be by reference to a one-off auction of different spectrum bands.

Even leaving aside for a moment the multiple estimates required, market prices change over time, and there is no obvious mechanism for Ofcom to make any future adjustments (in contrast to AIP/LCA, where equipment values etc. can be updated). Market values presumably reflect to some extent the size and profitability of the mobile industry, and Figure 1 below illustrates the extent to which this has declined since the Independent Spectrum Broker and the Government recommended revising spectrum fees, with cashflows falling 35% from their peak. There is a clear danger that any market price estimated today will be far from appropriate in a few years' time.

Figure 1: UK mobile market cashflow (£bn)



Note: cashflow is defined as EBITDA minus capex
Based on EE (and predecessor companies), O2, Vodafone and H3G
Vodafone figures are for the 12 months to March of the subsequent year
[Source: Enders Analysis based on company data]

As a final point, it is worth considering whether it might be expected that market prices are any higher (or lower) than AIPs. We would note on the one hand that AIPs are set based on a discounted estimate of *private value*, i.e. the full value of spectrum to an existing holder, whereas *market value* is determined by the value ascribed by the marginal purchaser of spectrum, which is likely to be much lower than the full private value. On the other hand AIPs are discounted from the pure LCA methodology, and furthermore do not include the value of holding any spectrum at all, only the value of marginal spectrum. It is therefore by no means certain which methodology will give the higher overall value.

Ofcom's approach

Whether moving away from AIPs is a good idea or not, Ofcom has nonetheless been obliged by government to do it, and its approach to deriving a 'full market value' of the 2G spectrum consists of two steps: firstly, determine a reasonable 'lump sum' value of the 900MHz and 1800MHz spectrum bands, based both on the outcome of the UK 4G auction and the outcomes of comparable European auctions, and secondly to convert this lump sum into an annual payment using a discount rate and assumed life of the spectrum.

Given the lack of detail in the guidance from government, Ofcom has used as its guiding principles its general duties as regards spectrum, and given that these include being consistent it has also followed its own existing spectrum pricing framework principles where relevant. Ofcom's duties include making sure that fees are objectively justified, transparent, non-discriminatory and proportionate, with promoting efficient investment and innovation and encouraging efficient use of spectrum included in the key objectives. We would note that maximising spectrum fee revenue to the government is not a stated objective, as Ofcom itself has frequently emphasised.

Ofcom's overall approach strikes us as eminently reasonable, but the devil is in the detail, and there are three details where we disagree strongly with Ofcom's conclusions: the lump sum values used, the assumption of zero terminal value, and the discount rate used. We address these factors in turn in the following sections.

1800MHz Values

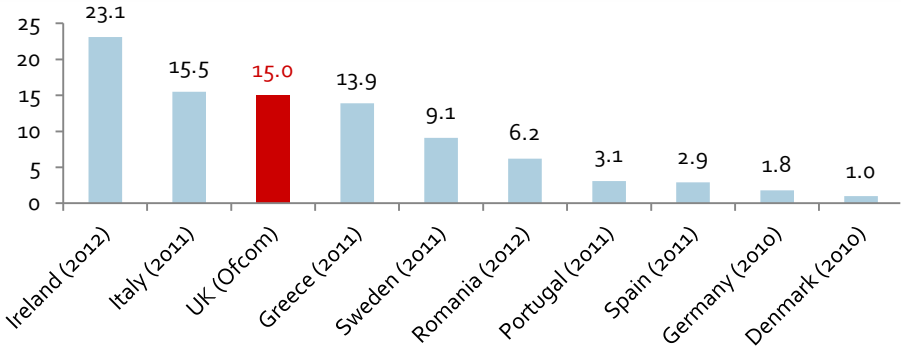
Ofcom first considers 1800MHz values from auctions held in the EU since 2010, excluding those where it is particularly problematic to assign values to individual bands. We show the benchmarks used by Ofcom below in their entirety (we would have probably excluded Romania, but otherwise the benchmarks are the appropriate ones in our view).

Figure 2: European auction results 2010-13 (£m/MHz UK equivalent)

Country	Year	800MHz	900MHz	1800MHz	2.6GHz
Austria	2010	-	-	-	1.8
Belgium	2011	-	-	-	4.5
Denmark	2010	10.1	2.4	1.0	9.5
France	2011	34.3	-	-	5.2
Germany	2010	50.1	-	1.8	1.5
Greece	2011	-	31.4	13.9	-
Ireland	2012	58.6	35.7	23.1	-
Italy	2011	48.3	-	15.5	3.5
Portugal	2011	36.1	24.1	3.1	2.4
Romania	2012	21.8	24.9	6.2	2.5
Spain*	2011	-	17.2	2.9	-
Spain**	2011	31.4	24.4	-	3.1
Spain***	2011	-	25.4	-	-
Sweden	2011	14.3	-	9.1	9.7
Average		**33.9**	**23.2**	**8.5**	**4.4**
UK	**2013**	**29.9**	**-**	**-**	**5.0**

*First Spanish auction in which the largest operators were prevented from bidding
**Second Spanish auction all operators included but with spectrum caps
***In November one lot is re-auctioned with relaxed spectrum caps
[Source: Ofcom]

Figure 3: 1800MHz auction pricing (£m/MHz adj. for UK POPs)



[Source: Ofcom]

It is fairly clear looking at Figure 3 that Ofcom's lump sum estimate of £15m/MHz for 1800MHz is towards the upper end of the range, with only two auctions above Ofcom's figure and seven below. The straight average is £8.5m/MHz, and the average weighted by population is £6.9m/MHz, both around half that of the Ofcom figure.

Ofcom manages to conclude that £15m/MHz is a reasonable figure through a complex feat of mental gymnastics involving defining evidence as being of 'greater weight' and 'lesser weight', and examining both relative and absolute values, to the extent that their final chart includes three different versions of the Italian value, but no values at all from Portugal, Spain, Germany or Denmark, the four countries with the lowest auction benchmark values.

The danger with subjectively rating evidence as being more or less important is that bias towards the number you were expecting to find can easily creep in. Ofcom ignored the 1800MHz auction in Germany, for example, because:

"*…there is some evidence of a lack of excess demand for 1800 MHz spectrum [in the German auction], and the results imply a UK value for 1800 MHz below the UK LRP for 2.6 GHz spectrum, which we do not consider plausible*"

We would note that in Ofcom's first point, a "lack of excess demand" is another way of saying that the price was low, and the second point merely repeats that the price was low relative to another benchmark. If Ofcom ignores evidence of low price points, then it is not really gathering evidence at all, merely selectively finding data that agrees with a pre-conceived notion.

Ofcom's pre-conceived notion of an appropriate 1800MHz value appears to come from the UK 800MHz/2.6GHz auction results, which we now consider.

There were no explicit prices paid for individual bands in the UK auction, with all winners paying a single sum for all of their spectrum winnings, but Ofcom commissioned a consultancy to produce a 96 page report estimating the implied values for individual lots using various econometric techniques. The conclusions of this report agree fairly closely with our own estimates derived from simultaneous equations (published the day after the auction results were released, see ***UK 4G spectrum auction: Mostly rational [2013-015]***), so we would broadly agree with the base numbers that Ofcom uses, i.e. £29.9m/MHz for 800MHz spectrum and £5.0m for 2.6GHz spectrum.

Ofcom then takes the simple average of these two values, i.e. £17.5m/MHz, and incorporates this as "important evidence" (and, we suspect, is subconsciously biased towards this value when doing its international benchmarking analysis). We do not fully understand why Ofcom takes a simple average as opposed to at least doing linear interpolation (which would give a figure of £16.1m/MHz), but in any case we believe that taking any linear approach is incorrect, as there is no reason to think that spectrum values vary linearly with frequency.

To delve a little deeper, spectrum value is affected by three qualities – the amount of spectrum (*capacity value*), as more spectrum can carry more data, the general area of the frequency of spectrum (*coverage value*), as lower frequency spectrum propagates further hence coverage costs are lower, and the specific frequency of the spectrum (*band value*), in terms of the availability and cost of network and handset equipment using attractive technologies based at that frequency.

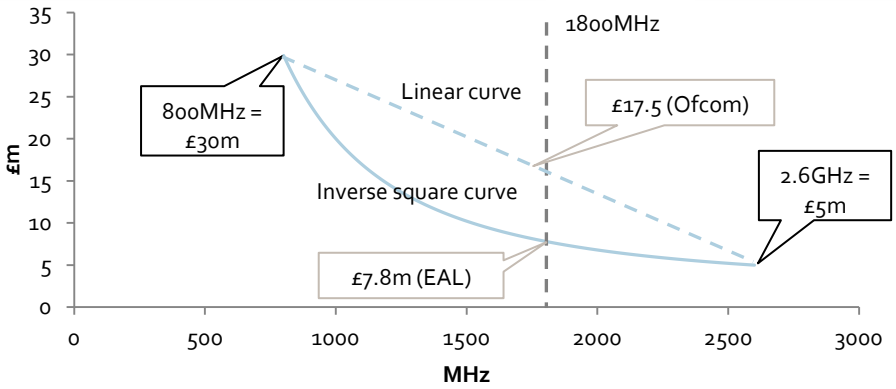
Putting aside the specific frequency band issues (which we discuss later in the context of 900MHz), the more general frequency-related value should therefore relate to the coverage area potential of a particular frequency, which (roughly) varies with the inverse square of the frequency (the propagation *distance* varies

with the inverse of the frequency, therefore the *area* varies with the inverse square).

A very simplistic (but still more robust than simple average) assumption to model the 1800MHz spectrum value would therefore be to assume an inverse square relationship with a residual (due to the capacity value), solving for unknowns using the actual values for 800MHz and 2.6GHz from the UK auction. Using this approach yields a value of £7.8m/MHz – less than half the value derived from taking a simple average.

We illustrate the two approaches in the chart below – note that because the inverse square relationship produces a pronounced curve, the value at the mid-point is considerably lower than with linear interpolation.

Figure 4: UK spectrum values versus frequency modelling



[Source: Enders Analysis based on Ofcom]

Ofcom admittedly does actually consider whether it should take a more sophisticated approach, and even refers to an academic paper which recommends an inverse exponential function as the best fit (which would give an even deeper curve than our approach). However, it rejects this on the basis that it does not have a "strong basis", preferring the simpler approach. While it is hard to find a "strong basis" for any approach, a simple average approach has *no basis at all* – there is no reason to believe that spectrum value is linearly proportional to frequency.

We would note that both our analysis of the absolute international benchmarks and our analysis of the UK auction results suggest a figure of around £7m-£8m/MHz for 1800MHz spectrum. Note also that the UK auction values for both 800MHz and 2.6GHz were roughly in line with the international benchmark averages, implying that the £7m-£8m/MHz figure works well from a relative benchmark perspective as well.

900 MHz values

Estimating the value for 900MHz should be more straightforward given its very similar technical characteristics to 800MHz spectrum. However, the relationship between 800MHz values and 900MHz values varies wildly in recent EU auctions (see Figure 5 below), from a massive 76% discount in Denmark to a 14% premium in Romania.

Figure 5: 900MHz discount evidence				
Country	**Year**	**800MHz**	**900MHz**	**900MHz discount**
Denmark	2010	£10.1m	£2.4m	76%
Ireland	2012	£58.6m	£35.7m	39%
Portugal	2011	£36.1m	£24.1m	33%
Romania	2012	£21.8m	£24.9m	-14%
Spain	2011	£31.4m	£25.4m*	19%
Average		**£31.6m**	**£22.5m**	**29%**

*November 2011 re-auction of one lot with relaxed spectrum caps
[Source: Enders Analysis based on Ofcom, DotEcon]

There are (arguably) two main reasons for this variation:

- In none of the auctions above were the 900MHz spectrum blocks the same size, overall quantity and auctioned under the same conditions as the 800MHz spectrum blocks, and so the prices could have varied due to these factors as opposed to underlying market value reasons
- While 900MHz and 800MHz are very similar bands in a physics sense, they do have different equipment compatibility so may have different *band values* as described earlier. Specifically, 800MHz, 1800MHz and 2.6GHz are all compatible with most current or planned 4G equipment, but 900MHz is not, arguably significantly reducing its value to a new entrant. Existing 2G operators would still value the spectrum, but dependent on current capacity/demand dynamics, which would vary considerably by operator hence explaining the variance in auction values

The result of our simple value versus frequency model for 900MHz spectrum is £24.1m/MHz, but this should (arguably) be discounted to take account of the second of the factors mentioned above.

The auction results above imply a value of £22.5m/MHz taking the average of the absolute values, or taking the average 900/800 discount (29%) applied to the UK 800MHz figure gives £21.3m/MHz.

Ofcom concludes that the lump sum value for 900MHz should be £25m/MHz, as with 1800MHz using selective evidence from the auctions. This is a fairly reasonable figure, but taking account of all of the evidence we would put a best estimate at the slightly lower £22m/MHz.

Terminal value

A key element of converting the lump sum values for the spectrum bands to ALFs is the terminal value assumed – in other words, deciding how much of the lump sum value relates to the first 20 years, and how much thereafter.

Ofcom's initial perspective was that because the licences bought at auction had an initial 20 year term, it would be logical to assume no terminal value beyond this term. However, technically the licences are actually of indefinite term, but with ALFs potentially payable after the 20 year term is over (but not before). It is

therefore possible that some of the lump sum value relates to the period beyond the initial term, reflecting perhaps the value in establishing a long term market position in new services enabled by the spectrum, with the operators assuming that this value would not be charged for again in ALFs.

One of the mobile operators argued to Ofcom that in the 4G auction it did indeed ascribe a value to the spectrum beyond the initial licence term (despite knowing that ALFs may apply thereafter), and that this is common practice in auctions, and calculated that this value represented between one third and two thirds of the total value of the packages for which it bid. Prima facie, it therefore makes sense to discount the lump sum values by this amount before spreading them over 20 years to calculate the ALF.

Ofcom however rejects this approach, arguing that because ALFs *might* apply after the initial 20 year term, and these *might* be set at market values, then the market value of the spectrum (in a lump sum sense) at the end of 20 years must be zero, therefore (*in theory*) all of the market value relates to the first 20 years. Ofcom accepts that there might be some *private* value to the licences beyond 20 years, so it may affect initial bidding strategies, but it argues that there is no *market* value beyond 20 years, so it does not affect the actual values resulting in the auction.

While this argument has a certain elegance to it, it is highly theoretical, and entirely dependent on a number of 'mights'. Ofcom assumes these points to be true on the grounds of "simplicity", but if they are not true (or even if there is a perceived chance by auction participants that they are not true) then Ofcom's argument breaks down completely, so we do not view simplicity as being sufficient justification.

Ofcom also argues that it is "appropriate to maintain consistency between licences awarded in the 4G auction and ALF licences", and therefore the full auction value should be included in the first 20 years of ALFs, as both forms of licence attract ALFs after the initial 20 year period. Again this argument is quite persuasive, but it is again dependent on the assumption that market value ALFs apply in full after 20 years with certainty in any scenario (which would make the terminal value zero in any case from Ofcom's earlier argument), and this is an assumption too far in our view.

The reality of auctions is that outcomes are highly dependent on the animal spirits of the participants involved, and if the operators assumed a terminal value in their bidding strategy, it is likely that the results were proportionately influenced by this regardless of underlying economic theory.

While Ofcom may well take the view that the operators should not have included a terminal value, perhaps because they should have assumed a full market value ALF after the initial 20 year licence period, this is irrelevant; Ofcom is gathering evidence as to the market value of spectrum over a 20 year period, and if some of the auction value did not relate to this it should be excluded.

We believe that it would be entirely reasonable of Ofcom to ask all of the operators for further evidence of the inclusion of a terminal value in the assumptions behind their bids, but if it is subsequently satisfied that terminal values were a factor in bidding strategies it should include this factor in its ALF calculations. In our alternative ALF calculation later on in this report we have

assumed that the terminal value represented 33% of the 4G auction values, the lower end of the range disclosed.

Cost of capital

The final step in determining an appropriate ALF is to convert the 20 year lump sum into 20 annual payments, using an appropriate discount rate. Ofcom has proposed that the ALF payments rise each year in line with an inflation index (rather a peculiar choice given that mobile revenue and cashflow are currently declining in nominal terms), so the relevant discount rate should be in real terms.

As its chosen discount rate, Ofcom has decided to use an estimate of the weighted average cost of capital of a hypothetical UK mobile operator stating that "we think that the systematic risk associated with the 4G spectrum…would also be consistent with the systematic risk of a hypothetical UK mobile-only operator".

In our view Ofcom has confused the discount rate appropriate for discounting the *benefits* of the mobile spectrum, and the discount rate appropriate for discounting the spectrum payments themselves. Clearly benefits such as revenues from new services have a fairly high level of risks associated, as these extra revenues might not materialise to the extent envisaged; however, **the spectrum payments themselves have to be made to keep the spectrum**, so are effectively risk-free from the operators' perspective. To give a fairly close analogy, if an operator is choosing whether to take out a finance lease or buy a piece of equipment in cash, it judges the value of the interest rate implicit within the finance lease based on its cost of debt, not on the WACC of the benefits of the equipment.

Equally from Ofcom's perspective, by charging annual payments as opposed to an upfront licence fee it is effectively lending the licence holder money, and has to judge the riskiness of this loan to determine an appropriate interest rate. There is in theory some risk to the payments not being made, as an operator may choose to return the spectrum and cease making the payments. This is however unlikely, as the private value of the spectrum to an existing holder is likely to be much higher than the market value as represented by the ALFs, so even if both values vary considerably in the future, a return of spectrum is unlikely. Furthermore, even if spectrum is returned, the loss to Ofcom may be limited if it is able to rapidly re-allocate the spectrum at full ALF rates.

In another context – deciding whether there is asymmetric risk in setting ALFs too high – Ofcom makes this very point itself, stating that "the private valuations associated with the licences to which we are applying ALF are likely to be considerably higher than the level of ALFs that we are proposing". Ofcom argues that the difference is so high that the risk of spectrum being returned and then lying fallow for a period of time is effectively worth ignoring, and so it does not have to deliberately undervalue the ALFs to avoid this risk. Ofcom cannot have it both ways – either there is a significant risk or there is not.

Taking Ofcom's view of there being a negligible risk to the payments, the appropriate discount rate is the risk-free rate, or the yield on 20 year gilts (there is also a reasonable argument to use a hypothetical UK mobile operator's cost of debt, but given that there are examples of mobile operators actually going bankrupt without returning or selling their spectrum, even this is likely too high).

At the time of writing this yield is 3.5% in nominal terms, or 1.0% in real terms assuming 2.5% inflation.

There is of course an irony here, in that we are arguing in this report that Ofcom is dramatically overestimating the ALFs, and if we are correct in this then there actually is a significant risk of spectrum being returned. However, any approach should implicitly assume that it is itself correct, so we believe our argument still stands.

As a last factor in converting the lump sum to annual payments, Ofcom assumes a 'tax adjustment factor', which adjusts for the differing tax treatment of annual spectrum fees and lump sum auction payments. This is not an unreasonable approach, but we have two technical issues with it: (i) spectrum which is bought at an auction increases a company's asset base, allowing it to potentially borrow more, which brings an additional tax shield perhaps compensating for the reduced licence cost tax shield, and (ii) timing-related tax benefits are dependent on a particular operator's tax position, which Ofcom should not presume in our view. Furthermore, we do not regard adjusting for inconsistencies in the UK tax regime as part of Ofcom's role, so we have excluded this adjustment from our estimated calculation below.

Impact and conclusions

We show in Figure 6 below the impact of our methodological differences on Ofcom's proposed unit ALF charges, which have a very material impact, with our estimated rate nearly three times lower for the 900MHz band, and over four times lower for the 1800MHz band.

We have not proposed any further discount to take account of the asymmetric risk issue that we discussed earlier, on the grounds that in using a risk free discount rate we are assuming negligible risk of spectrum being returned, but we would note that if a risk free rate is not used, it would be appropriate to consider including this.

Figure 6: Annual licence fee calculation

	Spectrum (MHz)	Ofcom proposals	EAL estimates
Lump sum market value (£m)	900	25.0	20.0
	1800	15.0	7.5
Terminal value proportion		0%	33%
Lump sum 20yr value (£m)	900	25.0	13.4
	1800	15.0	5.0
Real post tax discount rate		4.2%	1.0%
ALF/MHz/year (£m)	900	1.99	0.81

1800	1.19	0.28

[Source: Enders Analysis estimates]

We show in Figure 7 below the impact of the various spectrum pricing levels on the aggregate charges for each of the operators.

Figure 7: Spectrum fee impact by operator

	EE	O2	Vodafone	H3G	Total
£m					
Current AIP charges	24.9	15.6	15.6	8.3	64.5
Ofcom's proposed ALFs	107.1	83.1	83.1	35.7	308.9
EAL's estimated ALFs	25.2	31.4	31.4	8.4	96.5
% of operator cashflow					
Current AIP charges	3%	2%	3%	7%	3%
Ofcom's proposed ALFs	13%	12%	14%	30%	14%
EAL's estimated ALFs	3%	5%	5%	7%	4%

Note: cashflow is defined as EBITDA minus capex
[Source: Enders Analysis based on Ofcom, company data]

Note that Ofcom's proposed ALFs would result in a nearly five times increase in aggregate spectrum fees, whereas our calculation yields an increase of under 50%, with virtually no increase in 1800MHz fees but 900MHz fees roughly doubling. We would argue that this makes sense in a move from the discounted private value AIP/LCA methodology to the market value orientated ALF methodology; market values are more driven by the value that new owners put on spectrum, and for new owners low frequency spectrum is relatively more valuable (as network roll out is faster and cheaper).

We would also note that Ofcom's proposed ALF charges are a very significant amount of money in absolute terms, albeit affordable at present, being in aggregate 14% of industry cashflow, and over 30% of H3G's cashflow. In value terms, the increase in payments over the next 20 years is worth £4.5bn (discounting at the risk free rate, as argued earlier), nearly twice the amount paid in the 4G auction for roughly the same amount of spectrum.

The mobile operators have predictably argued that setting spectrum fees at such high rates will have dire consequences, both in terms of the high level of risk of spectrum being returned and then lying fallow for a period of time, and the reduced incentive for mobile operators to invest heavily in networks, predicting lower investment levels, increased consumer pricing or both.

Ofcom makes good points against these arguments, but does not fully negate them in our view. On balance, we do not expect any spectrum to be returned even at Ofcom's inflated ALF levels, but we do accept that there is a significant risk of this over the coming years if industry cashflows continue to decline. In terms of investment, Ofcom is correct in arguing that spectrum fees are in some sense a 'sunk cost', and should not directly affect operators' decisions about capital investment (assuming spectrum is not returned), according to microeconomic theory at least. However, investment decisions are not always driven by microeconomic theory.

In reality, pan-European telecoms groups tend to decide upon a group capex budget at a pan-European level, and then allocate it to countries based on individual market requirements and opportunities. The danger to UK mobile investment levels is that given the (proposed) ALF decision and a number of other recent Ofcom decisions[1], the UK is seen as a hostile regulatory environment, and capex budgets are thus diverted elsewhere. If Ofcom was being harsh but fair we might conclude 'so be it'; but given that Ofcom appears to be being both harsh and unfair, we would urge them to reconsider.

[1] As discussed in ***UK mobile market Q3 2013: Flattening out [2013-111]***

About Enders Analysis

Enders Analysis is a research and advisory firm based in London. We focus on the media, entertainment, mobile and fixed telecoms industries, with a special focus on new technologies and media, and we cover all sides of the market, from consumers and leading companies to regulation. For more information see www.endersanalysis.com. Contact us at info@endersanalysis.com.