SRSP: The revised Framework for Spectrum Pricing

Vodafone appreciates and commends Ofcom's efforts to set out a framework for spectrum pricing which is, or will be, an important and material item for many operators. Vodafone has long been an opponent of AIP for mobile spectrum and in our response we have chosen to focus of what we regard as a number of fundamental problems with the proposed AIP pricing regime. In brief, we believe that:

- AIP is just bad policy because, a priori, it produces no predictable behaviour on the part of operators which can be used to test its effectiveness.
- In any case, there is no credible justification for an AIP when spectrum trading is in place.
- In practice no regulator can ever have enough information to calculate accurately the opportunity cost of spectrum. .

We comment further on these issues below and also address some of the detail within the consultation.

No evidence of the effectiveness of AIP for mobile cellular

Ofcom sets up an ex post, apparently testable, objective for AIP in its July 2009 policy evaluation report[1] In that document Ofcom considers whether AIP has facilitated the allocation of spectrum into optimal use over the longer term "by encouraging trading or surrender of spectrum in lower value uses, and reducing excess demand for spectrum"[2][3].

In respect of the mobile sector in paragraph 8.24 Ofcom says:

> "Looking at the operators that only have access to the GSM 1800 MHz band, over time there has been a huge increase in the number of systems and users so that saturation of the GSM market may now have occurred. Here, a key achievable efficiency effect from spectrum pricing in the past (in advance of Liberalisation to facilitate choice of technology and service) might have been encouraging investment in utilisation of the spectrum, to enable increases in the numbers of citizens and consumers benefiting from early access to GSM services, such as has occurred. **Again, however, it is very difficult to ascribe particular impacts specifically to AIP, particularly as post-GSM technology and investment has begun to dominate future industry decisions"**. [Emphasis added].

[1] As a matter of principle we support a practice of critically evaluating whether regulatory measures have been successful in achieving their objectives.

[2] Paragraph 2.21 Policy Evaluation Report: AIP July 2009

[3] The objective however sits uncomfortably with Ofcom's statement in paragraph 2.56 of the current consultation "[I]n setting the AIP we are not making any explicit or implicit assumption about how current or future users should use spectrum. If is neither feasible nor necessary for us to predict exactly how spectrum users will respond". If Ofcom has no a priori view about how operators will react to AIP then how can it have a view about its effectiveness?

This is hardly a very strong endorsement of AIP in the mobile cellular sector. Ofcom suggests that spectrum pricing might have encouraged the better utilisation of spectrum although 'utilisation' is neither defined nor quantified; although Ofcom does admit that it is difficult to link this to AIP. However, in the conclusions to the report Ofcom is slightly bolder:

> "Where sunk costs and/or regulatory restrictions on the alternative use of the band mean that changes of use are constrained and so, in the short to medium term, efficiency gains are limited to optimising utilisation in existing use: we cited the example of the 900 MHz GSM band where **AIP may have encouraged utilisation and in any event does not appear to have discouraged widespread roll-out of the services concerned to citizens and consumers."**
> [Emphasis added]

Vodafone submits that this does not constitute evidence that AIP has met its objectives. The fact that operators have optimised 'utilisation' at the same time that AIP has been in existence is not evidence that the latter has played any hand in the former.[4] Similarly, Ofcom cannot say that AIP does not appear "to have discouraged widespread roll-out of the services concerned" without having a view about what roll out would have been in the absence of AIP. Even if this statement were true it hardly justifies the use of AIP because it is just a statement that AIP has caused no harm and not that it has played in facilitating the optimal use of spectrum.

When Ofcom conducts policy reviews operators can normally expect an information request asking for data and often requesting information on how individual operators have taken decisions. Ofcom could easily have asked mobile operators how the existence of an AIP has affected their network investment decisions in order to test properly whether AIP had secured its objectives; for example, we could have been asked to produce Board papers, strategy documents or meeting notes linking AIP with decisions about network rollout or utilisation. Vodafone suspects that, had this been done, then it would have revealed that the existence of AIP has played no role whatsoever in operators' decisions about network roll-out and utilisation; AIP is just a dead-weight tax. However, our assertion is easily testable and we urge Ofcom to carry out such an exercise before it reviews AIP for the mobile sector. Before embarking on a review of AIP we suggest that Ofcom embarks on such and exercise.

We note that Ofcom intends to undertake qualitative post-review evaluations to evaluate whether the AIP has had the effect that it has intended.[5] Ofcom admits that it cannot predict how users will react to fee changes and therefore there is no quantified measure of success but it outlines some other factors that it will consider. However, again it is not clear how this will be applied to mobile cellular spectrum. For example, what spectrum does Ofcom expect to see returned to it to mean that AIP has been a success?

[4] In fairness to Ofcom it does appear to admit this in its conclusions: "In Section 1 we also indicated that, based on the evidence available, it would be difficult in practice to infer whether the introduction of AIP – both from its first inception by the RA in 1998, and more recently its extension by Ofcom since 2004 – had played a predominant role (compared to other potential causal factors) to meet this objective, particularly in view of the time required for users to alter their spectrum use and of our conservative policy in setting AIP fees.

[5]

More worrying, Ofcom appears to be using an Alice in Wonderland 'heads I win, tails you lose' tactic to evaluating the effectiveness of AIP. If spectrum is returned to Ofcom and subsequently allocated to another user prepared to pay the AIP, or traded, then AIP has been a success. However, if bands remain congested then AIP has not been a success but the answer, according to Ofcom, is a higher AIP (or in Ofcom's terminology "a further fee review might be appropriate")! Vodafone would like to know, under what circumstances Ofcom would conclude that AIP has had no positive effect in achieving Ofcom's spectrum allocation objective and should be removed. If a policy review of AIP can never conclude that AIP should be removed then it is not a policy review.

No case for AIP when spectrum trading is in place

Vodafone believes that Ofcom has not made a convincing case for the co-existence of an AIP regime and spectrum trading either in this consultation or when it consulted previously in 2003. There are no credible circumstances where an AIP will improve the efficiency of spectrum allocations when the market is also subject to trading. In fact, if the AIP is set at an inappropriately high level then it will thwart trading altogether by removing any incentive to trade.

In the annex to this submission we repeat a section from our response to Ofcom's Spectrum Trading consultation on AIP in 2004. We rebut the six arguments that Ofcom deployed to justify AIP previously (some of which it repeats in the current consultation). We do not believe that Ofcom has ever adequately addressed the points that we made in our previous response.

In the attached annex we note that there are, in theory, two circumstance in which an AIP will improve efficiency of spectrum allocations, if:

(a) transaction costs are high relative to the gains from trade and higher than the administrative costs of taking back and reallocating spectrum and;

(b) bargaining between parties is inefficient.

In practice, however, an AIP will not improve the efficiency of spectrum allocation. Firstly, it is not credible to suggest that the administrative costs of taking back and reallocating spectrum will be lower than the transaction costs associated with trading (otherwise there really is no point in introducing trading) and secondly, Ofcom cannot use AIP to improve the efficiency of bargaining between parties because it cannot know the private spectrum valuations of all individual market participants.

No clear link between principles and pricing

Ofcom explains that the purpose of the document is to "consult and explain on how we propose to set spectrum charges in the future".[6] Unfortunately Vodafone believes that the document fails to achieve this for mobile telephony because it is either unclear how the generic principles will be applied in practice or the question of how to apply individual principles will be left to a case-by-case assessment of the spectrum band in question. For example:

- "We propose to take account of feasible alternative uses of spectrum as well as demand from the existing use in assessing the likelihood of current or future scarcity".[7] How will Ofcom take account of alternative uses? How will it

[6] Paragraph 1.2
[7] 1.19

identify alternative uses and how will these be weighed against existing uses? What information will Ofcom use to make these assessments?

- "We propose an increased focus on relevant market prices when setting fee reference rates"[8]. What does 'increased focus' mean? What are relevant market prices?

- In its discussion of issue 2 Ofcom states that AIP should provide a long-term signal but there is no clear explanation of what this means for AIP. If Ofcom recognises that it make take users time to migrate to a different technology or service then what does this mean for AIP? More specifically, if operators are unable, for a period, to change technology or usage then what does this mean for AIP?

Alternatively Ofcom leaves many issues to a case-by-case evaluation of the issues e.g.:

- Ofcom proposes a case-by-case assessment of the relevant timeframe.

- It is only in consulting on specific fee proposals that Ofcom will be explicit about how it intends to use market information.

- Ofcom proposes to base the trade-off between the risks of setting AIP fees to high and the risks if setting then too low compared to market value on the specific circumstances of the licence class or sector in question.

- When spectrum is tradeable Ofcom will consider the extent to which trading is expected to promote optimal use.

In general therefore we have struggled to understand how to translate Ofcom's principles into an understanding of how Ofcom intends to set spectrum charges for mobile spectrum in the future, save to say that it is clear that it intends to set an AIP.

Setting AIP in practice

Vodafone is clearly concerned that Ofcom intends to persist with a regime of spectrum pricing despite, in our view, no evidence that it has any beneficial effect in securing Ofcom's duty to ensure an optimal allocation of spectrum and no need to have AIP alongside spectrum trading. If this is the case then we submit that Ofcom should take account of the following:

The asymmetric risk of setting spectrum fees too high

Ofcom acknowledges the importance of asymmetric risk. If fees are set too high then there is the possibility investment in new networks and services will be discouraged. Conversely, if fees are set too low, then there is the possibility that a more valuable alternative use of spectrum will not secure an assignment (because an incumbent with a lower value use wishes to retain the spectrum).

However, Ofcom goes on to conclude that there should be no presumption that fees should be set conservatively.[9] Vodafone disagrees, specifically in the case of mobile

[8] 1.19
[9] 3.129

spectrum where any feasible alternative use will almost certainly have a much lower value. In paragraph 3.125 acknowledges that, if this is the case, then the risk to the benefits in the existing use by setting AIP too high will far outweigh the risk of sub-optimal allocation by setting AIP too low. It follows that AIP for mobile spectrum should continue to be set by a conservative valuation due the asymmetric risk of distorting costs for new mobile services and networks uneconomic due to over-priced spectrum.

Use of auction outcomes to calibrate AIP

Ofcom's principle 8 makes reference to using spectrum auction outcomes as an indication of the value of spectrum. Although Vodafone would not rule out this possibility, Ofcom must understand that a high degree of care must be taken in relating spectrum valuations (a) between economic, demographic and topological conditions in different countries; and (b) between different spectrum bands. Furthermore, the analysis must take account of the of auction specific factors that would effect results. For example, the recent German auctions revealed a very high value for 800 MHz (72.6c/MHz/pop), but a very low value for 1800MHz spectrum (2.5c/MHz/pop). Differences such as these are often related to the specific situations of network operators in the specific markets. In the recent German case this difference was far greater than that which could be explained by the different spectrum ranges; which of the two represents a "true" economic valuation is unclear.

How to Value Spectrum - Proposed methodology 2

Vodafone cautions against the use of "Discounted Profit (DP)" as a method for mobile spectrum, compared to the Least Cost Alternative method. Two reasons strongly caution against use of DP:

- future profits are intrinsically more difficult to forecast compared to costs;
- DP effectively appropriates all profits associated with a business case to acquire more spectrum, and so would fundamentally impact mobile network investment.

More fundamentally, we doubt whether any regulator will ever have sufficient, accurate information to be able to calculate the opportunity cost of spectrum using the DP method.

Options for planning future reviews

In para 5.8 Ofcom identifies five options for determining when a review of AIP should take place. These range from automatic review after a set term with no flexibility (Option 1), set period but with possibility of earlier review if necessary (Option 2), minimum indicative term (Option 3), review only in response to new valuation evidence (Option 4), and review only in response to new valuation evidence and subject to minimum term (Option 5).

Vodafone supports Option 5 for reasons articulated by Ofcom in the document. A minimum review period is essential to provide a degree of certainty in planning, whilst triggering reviews only in response to new evidence saves wasting time for both Ofcom and spectrum holders.

Vodafone UK
June 2010

Annex

This annex repeats section 3 of Vodafone's February 2004 response to Ofcom's Spectrum Trading consultation.

Administrative Incentive Pricing (AIP)[10].

Ofcom asserts that trading and administrative incentive pricing (AIP) are complementary mechanisms for promoting the efficient use of spectrum.[11] Accordingly, Ofcom currently intends to apply AIP to all WT licences (with the exception of auctioned spectrum) in parallel with spectrum trading and liberalisation.

1.1. Vodafone believes that there is no case for an AIP regime alongside spectrum trading other than to pay for the administrative costs of spectrum management. An AIP set above this level only has validity if it offers incentives to use spectrum efficiently over and above that provided by the incentives inherent in a market mechanism. Vodafone submits (and demonstrates below) that there are no credible circumstances under which this will occur. As a consequence, AIP will act simply as a tax on spectrum users and, at worst, it will seriously undermine the incentives to trade.

1.2. In this section, Vodafone comments on the six arguments that Ofcom lists in support of this position on AIP.

Argument 1: Trading alone will not lead to an efficient outcome if markets for spectrum are thin

1.3. The consultation document states that experience from Australia and New Zealand indicates the possibility of a "relatively thin market for some classes of spectrum, at least initially", and that in these cases, trading alone is unlikely to be sufficient to ensure efficient spectrum use (para. 8.6.4)[12,13]

1.4. It is not obvious why a lack of trading in Australia and New Zealand necessarily implies that trading would be thin in the UK. Indeed, Ofcom itself appears to question this, stating that:

> "It may be conservative to apply this experience [i.e. of trading in Australia] directly to the UK, given the UK's much higher levels of spectrum congestion in many areas of the spectrum."[14]

1.5. In general, the volume of trading in a market will reflect the frequency with which profitable trading opportunities arise. Trading will occur if three conditions are met simultaneously:

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[10] This section draws on work done by Frontier Economics on behalf of Vodafone.

[11] Spectrum Trading Consultation document (Ofcom, November 2003), para. 8.6.4.

[12] Evidence in fact shows that there were around 2,000 spectrum trades in 2001-2 in Australia. See Radiocommunications Authority: Implementing Spectrum Trading – a consultation document (July 2002).

[13] If Ofcom believes that 'thin' markets justify the imposition of an AIP then it is surprising that it is not also proposing a 'sunset clause' under which as the volume of trades increases the AIP scheme falls away.

[14] See Spectrum Consultation Document, para. B.3.11, and also para. B.5.3..

(a) there are potential gains from trade (i.e. the existing allocation is inefficient in the sense that the economic value derived from spectrum could be increased by reallocating spectrum from lower to higher value uses or users);

(b) the potential gains from trade exceed the transaction cost of trading; and

(c) buyers and sellers can successfully realise potential gains from trade through bilateral bargaining.

1.6. It follows therefore that trading may be limited (or "thin") if any of the following holds:

(a) there are no/limited potential gains from trade. This could occur, for example, if the existing allocation is efficient, and if relative valuations are stable over time;

(b) transactions costs are high relative to the potential gains from trade;

(c) bargaining between buyers and sellers is inefficient (in the sense that some potential gains from trade in excess of transactions costs are not fully realised).

Trading limited by lack of gains from trade

1.7. If trading is thin because there are no potential gains from trade, then there is clearly no efficiency role for AIP alongside trading, since the current allocation is by definition efficient.

Trading limited by high transaction costs

1.8. If trading is limited by high transaction costs, then introducing AIP alongside trading could in theory improve efficiency relative to trading alone but only where the administrative costs associated with taking back and re-issuing spectrum are less than normal transaction costs in the market.

1.9. To see this, consider an example where there is one unit of spectrum, which is currently held by firm 1 (the seller). Assume that firm 1's private value for this spectrum is 1, and firm 2's (the buyer) private value is 2. The potential gain from trade in this example is 1 (the buyer's valuation less the seller's valuation). Assuming that the cost of trading is ½ (and that bargaining is efficient), a trade will occur with an associated social benefit of ½ (given by the realised gain from trade less the trading cost). If the cost of trading is greater than 1, however, no trade will occur. In this case, an AIP can in theory lead to an efficiency gain if this induces firm 1 to surrender the spectrum to the regulator, who then reallocates this to firm 2. This would give rise to a positive social benefit provided the realised gain from trade of 1 is greater than the cost of setting and enforcing the administrative price, plus the cost of reallocating the spectrum to firm 2.

1.10. There are two potential problems with using AIP in this way:

(a) first, if the regulator sets a spectrum price that is too high, then efficiency could be harmed. In the above example this would be the case if the spectrum price were above 2 so that neither firm want to use the spectrum;

(b) second, efficiency will be reduced if the cost of administering the AIP mechanism exceeds the potential gain from trade. In the above example, this would occur if the transaction cost is greater than 1 (so that no trade occurs), the AIP is equal to 1.5 (so that spectrum is surrendered and reallocated to firm 2), but the cost of the AIP mechanism exceeds 1 (the economic benefit from reallocating the spectrum). More generally, the unrealised gain from trade in a market will be equal to the transaction cost.

1.11. In theory, all trades that generate gains from trade greater than the transaction cost will be made (assuming that bargaining is efficient). It follows that AIP will only improve the efficiency of trading alone if the incremental cost of the AIP mechanism is less than the transaction cost of trading (since this is equal to the potential gain from trade that could be realised by introducing AIP in parallel with trading).

1.12. The average incremental cost of the AIP system will reflect the cost of setting administrative prices and reassigning surrendered spectrum (taking back spectrum, consulting on what to do with it, reviewing the consultation, issuing further consultations, receiving lobbying from interested parties, discussing options with government, making new regulations etc. etc.). Both of these activities are complex and resource intensive, and the costs are therefore likely to be significant. The transaction cost of trading will depend upon a number of factors, including the cost of negotiation, and any administrative or advisory costs that are incurred (e.g. to register a trade).

1.13. The relative size of these costs is ultimately an empirical matter. A priori, it would, however, seem extremely unlikely that the average incremental cost of the AIP system would be higher than the transactions cost of trading[15] unless transaction costs are especially high, particularly if the majority of spectrum is expected to be traded rather than surrendered. This is because the fixed costs of the AIP system would then only be spread over a small volume, which would increase the average incremental cost per transaction.

1.14. Furthermore, it seems reasonable to suppose that the transaction costs of trading will be lower than those associated with the administrative allocation of spectrum because it is the stated aim of Ofcom that the trading market should operate efficiently. It seems paradoxical to justify the imposition of an AIP on the basis that Ofcom will implement trading in a manner such that the market participants are burdened with relatively high transactions costs.

Trading limited by inefficient bargaining

1.15. Ofcom refers to a paper by Myerson and Satterthwaite (M&S). M&S demonstrate that bargaining may not realise all of the potential gains from trade, even in the absence of transaction costs.[16] This can occur when buyers are sellers have incomplete information about each other's valuations. In the example considered above, this would correspond to a situation in which firm 1 only knows

[15] Ofcom explicitly recognises that *"AIP is expensive to administer, as it requires regular reviews"* para. 8.6.3.

[16] Roger Myerson and Mark Satterthwaite (1983): "*Efficient Mechanisms for Bilateral Trading"*, Journal of Economic Theory, 29, 265-281.

that firm 2's value is between zero and 3, and likewise firm 2 only knows that firm 1's value is between zero and 2.

1.16. In this type of incomplete information setting the seller has an incentive to overstate his true valuation, in the hope of obtaining a higher price. The buyer of course has the opposite incentive, and will understate his true valuation to try and obtain a lower price. M&S show that this kind of strategic behaviour can result in a failure to trade, even where the buyer's true valuation is greater than that of the seller (i.e. a trade is efficient).

1.17. If trading is limited by incomplete information, then AIP could in theory increase efficiency. However, there is again a risk that AIP could reduce efficiency and discourage trading. Indeed, the problem of setting the "correct" AIP to take into account incomplete information is arguably even more difficult for the regulator than is the case for transaction costs. The impact of incomplete information in the M&S model on the volume of trading will depend on the degree of uncertainty about valuations, and also on the extent to which valuations are more or less symmetric. There is no obvious way for the regulator to estimate this accurately, since it requires information about the beliefs that (potential and actual) holders of spectrum have about each other's valuations, which is clearly not observable or readily measurable.

Price signals may be inaccurate in thin markets

1.18. One benefit of spectrum trading is that the prices at which trades are made reveals information to market participants on the market value of spectrum. This information can assist buyers and sellers of spectrum, and can therefore promote spectrum efficiency. In thin markets the reliability of price signals may be low, however, and hence there may be a concern that this could undermine efficiency. In theory, it might be possible to set an AIP to "correct" the prevailing market price so that it better reflects the true marginal value of spectrum. However, this would require the regulator to have accurate information on private marginal values of spectrum users, which as noted above, is highly unlikely.

Argument 2: Trading alone may not be efficient if the value of spectrum is appreciating, or if spectrum holders attach a high option value to spectrum ownership

Appreciating spectrum values

1.19. Ofcom states that without AIP there may be little or no economic cost of holding spectrum if the value of spectrum is appreciating. This is incorrect when spectrum is tradeable. The economic cost of spectrum is given by the holder's opportunity cost, which is equal to the best price that the holder could obtain by selling the spectrum immediately. Accordingly, unless spectrum is in excess supply there will always by an economic cost of holding tradeable spectrum.

1.20. When the value of spectrum is expected to appreciate this may reduce the incentive to sell. The holder of spectrum must trade-off the gain from selling today against the present value of retaining the spectrum (and possibly selling at some point in the future). If the latter exceeds the former, then the holder will not sell the spectrum. Conversely, if the holder's discount rate is higher than the rate of increase in the market value of spectrum, then the holder will sell the spectrum, even if the price is rising.

1.21. Given this, it is not clear why Ofcom believes that an appreciation in spectrum values would mean that trading alone would not lead to an efficient outcome.

Option values

1.22. An option value can arise if a holder of spectrum anticipates that its own private value of spectrum could increase in future, for example due to a potential new technology that could, if successful, create a profitable market opportunity. Spectrum holders will take into account the option value of spectrum when considering whether to sell spectrum, and this could give rise to unused spectrum[17]. In particular, spectrum holders trade-off the gain from selling today against the present value of retaining the spectrum (including any option value component). This is quite consistent with efficient behaviour in principle, since option values imply that the non-use of spectrum is valuable at a given point in time in order to retain control over the future use of spectrum. Given this, AIP would not increase efficiency relative to trading alone, as Ofcom state.

Argument 3: Holders of spectrum may not consider the opportunity cost of spectrum in deciding whether to sell spectrum

1.23. It is possible that this may be true for budget-constrained organisations, such as government or not-for-profit entities (or those organisations that expect any income from sales to be offset by reductions in future grants, e.g. BBC, radio astronomers, MoD, police, etc) although Ofcom does not present any evidence to this effect. It is unlikely to be true for most commercial organisations however. As a consequence, this argument (assuming it is true) does not support the general imposition of AIP for all categories of spectrum user. Instead it is an argument for imposing AIP on those organisations whose spectrum usage is dictated by cash costs rather than opportunity cost.

Argument 4: AIP can reflect the social value of spectrum better than trading

1.24. In principle, externalities (such as interference) can be dealt with either by defining property rights appropriately, or via a pricing mechanism such as AIP. The comparative ability of AIP versus trading to internalise externalities due to the social costs and benefits of spectrum therefore depends on the definition of spectrum property rights. In addition, the regulator must be able to estimate accurately the value of social externalities in order to adjust properly the AIP.

1.25. A key aspect of the proposed spectrum trading regime is that there will be an administrative process for controlling undue interference.[18] Given this, it is unclear what other potential externalities Ofcom has in mind that could be internalised through AIP.

1.26. A further point is that the nera-Smith methodology is designed to provide AIP's that reflect the marginal private value of spectrum, and there is no provision to account for any social externality.

Argument 5: Trading and pricing are complementary since, even if spectrum prices are set too low, trading can allow users to reach an efficient outcome

[17] Where leasing is possible, high option values would not necessarily result in unused spectrum, as holder's could profitably lease spectrum to other users on a temporary basis.
[18] Spectrum Trading Consultation, para. 6.5.2.

1.27. Ofcom note that spectrum prices have been set conservatively to avoid the high cost of under usage if spectrum were to be overpriced. As a consequence, the potential efficiency that can be achieved under AIP alone is limited.

1.28. Given this, it is true to say that trading is complementary to AIP as Ofcom states. The converse is not true, however. If trading is in place, and is not significantly impaired by high transaction cost or inefficient bargaining (see above), then spectrum pricing does not increase the efficiency achieved under trading alone. As noted above, AIP could in theory complement trading if there are high transaction costs or inefficient bargaining, but only if the regulator has sufficient information on users' private spectrum values to set the "correct" level of AIP.

1.29. The new EU regulatory framework sets up a clear choice for NRAs in how they choose to optimise spectrum use. The rationale for spectrum trading is set out at Recital 19 of that Directive:

> "Transfer of radio frequencies can be an effective means of increasing efficient use of spectrum, as long as there are sufficient safeguards in place to protect the public interest, in particular the need to ensure transparency and regulatory supervision of such transfers."

1.30. Spectrum trading achieves this objective because it ensures that there is an opportunity cost of holding spectrum so that it will be transferred to those undertakings that value it most highly.

1.31. If a particular NRA chooses not to use spectrum trading to achieve this allocative efficiency, Article 13 of the Authorisation Directive provides that: Member States may allow the relevant authority to impose fees for the rights of use for radio frequencies "which reflect the need to ensure the optimal use of these resources." Member States shall ensure that such fees shall be objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose and shall take into account the objectives in Article 8 of the ["Framework Directive"]. The Authorisation Directive makes clear that "such fees should not hinder the development of innovative services and competition in the market."[19] Vodafone submits that AIP in addition to trading cannot be objectively justified since it there is a risk that it will actually hinder the development of trading and therefore innovative services and competition. AIP and trading together create a situation of "double jeopardy" where a spectrum holder is penalised first by the opportunity cost of holding that spectrum and then again by AIP. This will distort the market in spectrum and will not ensure its optimal use as required by the directive.

1.32. Furthermore, retaining AIP in conjunction with spectrum trading goes against the existing UK legislation which specifically ensures that spectrum pricing cannot be used as a form of taxation. Indeed, the 1998 Act ended the statutory requirement for licence-fee regulations to be approved by the Treasury. As operators will already pay the opportunity cost of retaining spectrum through trading, AIP will function as nothing more than an additional tax on spectrum users.

Argument 6: AIP captures the opportunity cost of marginal spectrum but not the scarcity value of blocks of spectrum

[19] Recital 32 to the Authorisation Directive.

1.33. Under the nera-Smith methodology the AIP is set to reflect the marginal private value of spectrum. As noted by Ofcom, this may not provide an incentive to reallocate whole blocks of spectrum. Trading can help here since the unit price can be adjusted to reflect the volume of spectrum offered. For this reason, trading complements AIP. The converse is not true, however.

Summary

1.34. Vodafone believes that a convincing case for the co-existence of an AIP regime and spectrum trading has not been made. In theory an AIP will improve efficiency of spectrum allocations if:

(a) transaction costs are high relative to the gains from trade and higher than the administrative costs of taking back and reallocating spectrum and;

(b) bargaining between parties is inefficient.

1.35. In practice, Vodafone suggests that an AIP will not improve the efficiency of spectrum allocation. Firstly, it is not credible to suggest that the administrative costs of taking back and reallocating spectrum will be lower than the transaction costs associated with trading (otherwise there really is no point in introducing trading) and secondly, Ofcom cannot use AIP to improve the efficiency of bargaining between parties because it cannot know: the private spectrum valuations of all individual market participants.

1.36. Furthermore, notwithstanding the fact that AIP will do nothing to improve the efficiency of spectrum allocation it would well strangle the trading market at birth if it is set too high by undermining the gains from trade. This is exacerbated by the fact that not only will the regulator lack sufficient information to set the theoretically correct level of AIP but also that these rates will adjust with a 4-5 year lag. The advent of trading and liberalisation will undoubtedly affect the opportunity cost of spectrum and if opportunity costs decline through the increased supply of spectrum then AIP risks distorting the liberalised market because it will be set too high. Paradoxically, if AIP is linked quickly to observed trading prices then it could discourage both trading and innovations that raise the value of existing spectrum.