

Applying spectrum pricing to the aeronautical sector

Response to Ofcom consultation

From Nick Long

About the author

I am an expert in the field of radio communication. I have worked as a designer of radio equipment and a consultant in this field for over 30 years. I am an active member of ETSI, the European Telecommunications Standards Institute – I am currently secretary of one of the ETSI committees that develops standards for radio equipment.

I am also actively involved in European level radio regulatory affairs. I am currently the convenor of a project within CEPT, the European Post and Telecommunication Conference, on maximising spectrum efficiency.

In addition I am the owner and pilot of a UK registered light aircraft. I am also the local co-ordinator in my area for the Light Aircraft Association.

Taken together, I suggest the above makes me well qualified to comment on the Ofcom proposal.

The Ofcom Proposal

The Ofcom proposal is to introduce AIP, Administered Incentive Pricing, to licences for aeronautical frequencies. The reasoning is that raising licence fees above the administrative cost will improve spectrum efficiency by altering the behaviour of licensees. The Ofcom document makes clear that two conditions must be met.

1. AIP must be shown to work. If AIP does not result in improved spectrum efficiency, then the extra fees are just a tax and should not be imposed.
2. If AIP can be shown to work, then the fees must be set at the optimum level.

The Ofcom proposal is deeply flawed in both these respects, as I will show below.

Will AIP result in improved Spectrum Efficiency?

The mechanism by which pricing incentives might work is discussed in the Ofcom document in paras 5.18 and following.

Professor Cave argues that it requires both excess demand and the possibility of alternative use. The Ofcom response to these challenges is extremely weak. Responses from the LAA and other industry bodies adequately refute the claims of excess demand and alternative use. Instead I will concentrate on some technical aspects of spectrum efficiency.

It has to be said that aeronautical radio is running on ancient technology. There are clear and obvious inefficiencies such as:

1. Many frequencies are only used for a fraction of the time. Voice channels at many airfields are completely quiet at night and in bad weather. In the current regulatory jargon, this is “white space”.
2. Automatic broadcasts such as ATIS, AFIS, VOLMET , etc are repeated loops of voice recordings, that are only changed infrequently. This is very inefficient compared to data communication techniques.
3. Channels are wider bandwidth than necessary. The standard for voice channels is 25 kHz. The technology exists to change to 8.33 kHz channels. Data channels sterilise 50 kHz of bandwidth.
4. Sterilisation of wide geographic areas. The re-use of frequencies is extremely poor; the system relies on having very large distances between stations on the same frequency. In any other field, techniques such as selective calling or selective signalling would be used to enable closer packing.

Tackling item 3 gives an immediate improvement of a factor of 3. Taking 2, 3 and 4 together could result in a 100-fold improvement in spectrum efficiency. Item 1 is the problem of time distribution of traffic and is more difficult; there are currently no suitable techniques for dealing with this.

The point remains, though, that enormous improvements are available through the introduction of modern technology. That does not mean future technology; it just means using current techniques instead of 50 year old ones.

The problem, though, is that AIP is aimed at the end user, or licensee, and none of these options are available to him. The introduction of new technology requires international co-ordination; it is not a choice that can be made by an individual licensee.

Consider instead how a licensee can respond to AIP and what effect that can have on use of the spectrum. The choice on offer is simply between taking a licence and not taking one. In many cases, however, there is no choice; the requirement to use a

frequency comes from operational, legal or treaty conditions and is not influenced by pricing.

What is the maximum credible improvement? Let us suppose that 10% of the frequencies are given up. Suppose, optimistically, that all of these are re-allocated to new users in the UK. The difficulty of re-allocation, and the fact that it is not a perfect market, are well explained in other responses, but for now, let us assume it is possible. Suppose, again optimistically, that the traffic on each of these channels rises from near zero to the average. The end result is a 10% increase in spectrum utilisation. This is compared to the 100-fold increase in capacity that modern technology offers.

On the other hand, suppose that 10% of frequencies are given up and that new users are not found for them. Suppose also that those frequencies originally carried average traffic. The end result is a 10% reduction in spectrum utilisation. This scenario is equally credible as the 10% improvement.

(Note: There is a difference between utilisation and capacity, but it does not affect the argument. If, as Ofcom claims, but many dispute, there is excess demand, then more capacity leads to more utilisation. Also, the term efficiency is often used loosely, though increases in either utilisation or capacity are each seen as increases in spectrum efficiency.)

In summary: The improvements in spectrum utilisation, capacity or efficiency to be expected from applying AIP to aeronautical end users are either negative or vanishingly small in comparison to the improvements that could be made by introducing established modern technology.

The conclusion therefore is that the case for applying AIP has not been made.

If AIP is to be applied, what is the optimum pricing?

Ofcom discusses this in section 6. Approach 2a is based on opportunity cost in turn based on the cost of moving to 8.33 kHz bandwidth. The choice of moving to 8.33 kHz is not in the power of the end user, and if such a move were made, only a small fraction of the cost would fall on him. Ofcom rightly rejects this approach, but prefers instead Approach 2b.

Approach 2b is to equate the aeronautical world with the Business Radio world and apply the pricing structure that Ofcom has developed there. The two worlds, however, are not comparable. An aeronautical user has a radio for very different reasons to a business user. The pattern of communication, aircraft talking in turn to a series of ground stations, is different from either point to point or PMR radio. The amount of information transferred is not comparable. The two worlds are completely different; it is not a valid comparison. Furthermore there is no prospect of interchange or trade off between the two services and there is therefore no justification for copying the price structure from one to the other.

If, and it is a big if, incentive pricing is to be applied, then the obvious approach is to try to determine what level of pricing creates the desired incentive. For this, we should look at the economy of the aeronautical user, not at some other separate economy.

The Ofcom thesis is that there are under-utilised frequencies and price signals should be used to encourage licensees to give them up in favour of others who would use them more. Probably the most representative example of a licence is for an air-ground communication frequency, as at least one is used at almost every airport and airfield in the country. Ofcom proposes to raise this licence fee from £100 pa to £2,600 pa.

Large international airports might not notice, but that is not where the price signal is targeted. More numerous than the large airports are the many smaller airfields, licensed and unlicensed, with grass or tarmac runways, from which the bulk of general aviation flies.

To the economy of these smaller airfields a figure of £2600 is not so much a signal as a broadside. A figure of £260 would be sufficient to get their attention.

In summary: Ofcom has not appreciated the significant difference between the aeronautical world and the business radio world. As a result it has used an invalid model in calculating the proposed fees. The proposed fees are an order of magnitude larger than can be justified.

Progressive Pricing

Again, the caveat applies that incentive pricing should only be considered if incentive pricing is going to work, but there are other approaches that do not appear to have been considered.

One of these is progressive pricing. This helps to avoid the charge that it is just a revenue raising exercise while still creating the incentives. It also avoids the financial collateral damage to the end users at the margins.

An example would be to set the first licence fee at each airfield below the administrative cost, say £25, in order to promote the use of radio on the grounds of safety, and then to set any further frequencies at the same airfield at a premium rate, say £500.

I recommend that such a scheme be considered as an alternative to the Ofcom proposals. It has the following advantages.

1. It provides significant pricing incentive without burdening all users with excessive fees.
2. It avoids the risk of small airfields giving up radio altogether.
3. It can be made revenue neutral.

4. It avoids the charge that the real motivation is revenue raising rather than spectrum efficiency.
5. It avoids situations where money could be seen as being put before safety.
6. Even if it does not increase spectrum efficiency, it is unlikely to lower it, which is a risk with the Ofcom proposal.

Modern Technology

It was shown above that the real improvements in spectrum efficiency would come from modernising the technology used in aeronautical communications. I recommend that instead of pursuing AIP, Ofcom should work with other national regulators and with aviation authorities to speed up this process.

Overall Summary

The Ofcom proposals for applying AIP to aeronautical frequencies should be rejected.

- It will not work – i.e., it will not have what is claimed to be the desired effect, improving use of the spectrum.
- Even if it had a chance of working, the fee structure that Ofcom has proposed is clearly wrong. It is based on an incorrect model and many of the fees are an order of magnitude higher than can be justified.

Finally, it is worth quoting from para 6.21 of the Ofcom consultation document:

.....the risk to citizens and consumers from setting fees too high should be given greater weight than the risk from setting fees too low. That is because the potential effects of setting fees too high includes the possibility that spectrum will be vacated by efficient users, and new users will not occupy that spectrum (whether for the existing use or a new use) on a timely basis.

I recommend that this part at least be adopted.

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