Response to the Call For Input On
Ofcom's Review of Spectrum Fees For Fixed Links and Satellite Services

1. Comments

We wish to make clear that it appears that the commissioning of the Plum Report has been primarily to address Fixed Links spectrum usage, with PES and TES being 'tacked on', and as a result there is a serious lack of detailed and informed consideration of satellite spectrum demand. This is reflected in the comparative lack of background information on satellite compared to the high level of detail on Fixed Links.

Before we deal with the specific questions relevant to satellite spectrum usage fees within the CFI, we wish to make it clear that we remain as opposed to the principles of Administrative Incentive Pricing (AIP) being applied to UK satellite spectrum licencing as when AIP was originally introduced by Ofcom.

We strongly contest that AIP has made any impact in encouraging more efficient use of spectrum for the commercial FSS market in the UK.

Unlike Fixed Links, where the apportionment of spectrum is entirely with Ofcom and the licensee, there is an intermediary – the satellite operator - controlling usage of the satellite link through a commercial agreement. Fixed Satellite Service (FSS) earth station operators operate within two markets - spectrum availability on the ground and transponder capacity in space - thus making FSS a 'Third Party Relay Service'. In the Plum Report, it states that *"The study involved two phases […] The second phase reviewed existing AIP algorithms and factors for fixed links and PES in order to ensure that they generate incentives for licensees to use spectrum efficiently."* [1] Plum does not recognise that in the real world, AIP does not affect spectrum usage in the commercial FSS market – it is the satellite capacity cost. Perhaps Plum are unaware of the role of the satellite operator? (There is certainly no mention of the satellite operator in their Report.)

The principle of AIP as applied to satellite spectrum assumes that UK satellite earth station operators have a similar agility to move transmission frequency bands as some other potential users of spectrum in the UK e.g. Fixed Links.

However FSS frequency bands are allocated internationally and cannot be readily changed due to the long lead times involved in changing thee internationally agreed spectrum allocations, and bringing satellites into operation. Plum ignores this and makes the startlingly naive statement *"The frequency bands used by these satellite services can potentially be used by fixed links"* [2]

Spectrum efficiency is achieved through the comparatively large price charged by satellite operators for transponder capacity. Efficient use of the spectrum through the use of higher order modulation and coding techniques, along with advanced compression technologies, is encouraged through the circumstance that an earth station operator pays a commercial rate for literally every kHz used on a satellite transponder – so the more bandwidth used, the more it costs the earth station operator to transmit a signal.

To mitigate this cost to the full, the earth station operator uses every technical innovation available to reduce the bandwidth used to the absolute minimum, and thereby pay as little as possible while providing the end-user customer with the contracted service. As a result, over recent years we have seen efficiency of spectrum usage increase almost four-fold.

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[1] Plum Report - p8
[2] Plum Report – p40

Because satellite transmissions are a third party relay service, the efficiency targeted by the principle of AIP as interpreted by Ofcom is achieved by market forces. Pricing of satellite usage is on the basis of a power/bandwidth equation, and therefore it is through the dictats of the market that spectral efficiency is achieved.

There is no impact on spectrum usage from the application of AIP to the earth station licensee, only an increased overhead cost in operating the earth station.

2. Responses to Questions

We have limited our responses to only those questions relating to the satellite sector.

Question 1- ***Do you agree with Plum's view of the potential higher value alternative mobile use of the 3.6-3.8 GHz bands over the next seven to ten years?***

No. Penalising the satellite industry further by charging more for now having to share this band with Mobile services is unreasonable. The Mobile Services sector already has significant UK spectrum allocations which have not been fully made use of to date.

In addition it is our view that no further spectrum allocations for Mobile Services usage should be considered until all current allocations outside 3.6-3.8GHz have been fully utilised. Ofcom (in common with many other national regulatory agencies) has based its predictions on future mobile spectrum requirements on an ITU model which has been fundamentally and authoratively challenged.[3]

Question 3 - ***Do you agree with Plum's analysis of current and future demand of spectrum for PES and TES? Please give your reasoning.***

We do not agree with the assessment made by Plum for either current or future demand. The Plum Report is weak in quantifying PES and TES current demand for spectrum, and the future demand predictions are so imprecise as to be meaningless.

In their Report, the data provided for current usage covers predominantly C-band, with the only Ku-band data referring to the predominantly BSS-related feeder links in 12.75-13.25GHz band. There is no substantive review of PES and TES deployments in Ku-band, which is the most heavily used band in the UK (and across Europe). The only Ku-band data cited is a chart showing that in 2011 there were 355 earth station-to satellite-links, which had grown to 440 by 2014.[4] This does not define the bandwidth or total data throughput on these links, so conveys no meaningful measurement of usage. The lack of any real data on current and future demand of spectrum for satellite underlines the impression that this part of the Plum Report has been insufficiently researched.

Plum, having stated that "… *spectrum available in Ku band (11/14 GHz) is fully assigned to satellites in use and it is not possible to place any more satellites into the orbital arc without causing interference"* [5], then concludes that "*Spectrum use by satellite earth stations has not grown appreciably in the last 3 years"* [6] as if the satellite sector demand remains relatively static. It is static because of the constraint of satellite capacity availability, as they acknowledge. There has been an increase in demand for satellite throughput across Europe but operators have used technology to achieve what Ofcom have sought – maximised the efficiency of use of that spectrum capacity.

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[3] LS Telecom - *Mobile Spectrum Requirement Estimates: Getting The Inputs Right*
[4] Plum Report – p41
[5] Plum Report – p45
[6] Plum Report – p48

This efficiency of use of that spectrum has meant that, for instance, HDTV contribution signals can be transmitted in much narrower bandwidths than was the case three years ago. This is due to the spread of MPEG-4 H.264 technology combined with the use of DVB-S2 modulation. As an example of the bandwidth saving, a few years ago it was necessary to use a full 36MHz transponder to transmit MPEG-2/DVB-S HD signals for HDTV contribution. This has now generally halved to 18MHz, or even less particularly for TV news contribution - not due to the influence of AIP, but because using MPEG-4 and DVB-S2 results in halving of the cost of the satellite bandwidth.

Question 13 - ***What are your views on the proposed revisions to the PES algorithm and the TES ratio? In particular, do you agree we should use the relative denial areas to reflect the difference in opportunity cost between PES, TES and fixed links? Do you have any other suggestions for improvement?***

The UK PES and TES licence fees are already amongst the highest in the European Union. The overall effect of the changes suggested by Plum is to increase PES [7] and TES [8] fees by a further 56-64%.

There is no justification for this increase whatsoever. Since the aim of AIP is to increase spectrum efficiency, for the reasons already outlined, the increase of fees is not going to improve overall spectrum efficiency.

Instead it is an unavoidable spectrum tax which cannot be mitigated by making adjustments to spectrum usage as envisaged by Ofcom's application of the principles of AIP, namely moving to a frequency band with a lower opportunity cost.

The only such band available is Ka-band, and that poses a whole new set of issues unrelated to the actual frequency band, but instead related to the 'third party' (the satellite operator) - so conveniently ignored in the Plum Report.

There should be no inclusion of a location factor in the PES or TES formulas as it is not relevant to the majority of satellite spectrum available.

The current application of AIP should be eliminated, and instead the administration of spectrum licences should be on a Cost-Based Fees basis. As defined in the Plum Report, cost-based fees are *"Fees charged to spectrum licensees that are set by Ofcom and are intended to reflect spectrum management and administrative costs. These fees apply in cases where spectrum is not scarce or in excess demand and therefore the use of AIP is not appropriate."* [9] - which exactly describes spectrum currently allocated to the majority of FSS. The bottleneck restricting demand is not the scarcity of spectrum; it is the satellite availability over the UK enabling the use of the spectrum.

The predominant band for satellite uplinks in the UK is still Ku-band. There is no opportunity for mobile usage in this band currently as the band is internationally allocated for satellite usage on either a primary or secondary basis, and Fixed Links are the only other possible main occupant in parts of this band. Plum has focussed on C-band, and the fact that mobile is an alternative usage to satellite, but we reiterate that mobile should fully utilise their existing allocations.

The frequency band 13.75-14.3GHz is allocated to FSS on a Primary basis under the UK Frequency Allocation Table.

Ofcom have previously made clear that they do not propose to make any new allocations for Fixed Links in the 14.25-14.5GHz band, and Fixed Link occupancy in this band is declining.

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[7] Plum Report – p92
[8] Plum Report – p90
[9] Plum Report – p139

Question 14 - ***Do you agree that the benefits of implementing geographic pricing are sufficiently high to warrant us considering this further? Should we look at both where mobile is, and is not, an alternative use? Do you have ideas on how this could be implemented?***

For satellite there is little relevance in associating the potential value of the spectrum against mobile. Mobile is not an alternative in the predominant Ku-band; it is not relevant in relation to geographic pricing and the use of satellite except in part of the C-band.

Question 15 - ***Do you have any comments to make on any issues related to next steps and implementation?***

As previously noted, it is clear that the Plum Report has failed to seriously examine the satellite element of this fees review, with vague data and a failure to understand how satellite links operate.

We would encourage Ofcom to very carefully consider input from all satellite sector respondents and use their input rather than the conclusions in the Plum Report to guide their spectrum fee policy in setting TES and PES fees.

To reiterate, AIP is not relevant to FSS, and instead licence fees based on the actual cost of processing licences should be explored as a fairer way to licence the UK satellite earth station market.

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