A review of proposals for a PMSE band manager

A report for Arqiva

Phillipa Marks and Brian Williamson

4 September 2009

Plum Consulting, 17-19 Bedford Street, Covent Garden, London, WC2E 9HP
T: +44(20) 7868 5340, **www.plumconsulting.co.uk**

Table of Contents

Executive Summary

Plum was asked by Arqiva to review the regulatory arrangements for the PMSE band manager proposed by Ofcom. This report gives our findings.

The proposals are inconsistent with Ofcom's spectrum strategy

Ofcom's spectrum strategy envisages a long term situation in which market forces (i.e. auctions and trading) would be the norm for commercial spectrum use. A key element of this spectrum strategy was that the charges to PMSE users for access to spectrum would gradually move onto a more commercial footing.

Yet Ofcom's proposals give considerable weight to protecting PMSE users' short term interests rather than promoting efficient spectrum use and/or the longer term interests of consumers and citizens. This is disproportionate and a departure from the overall spectrum strategy.

There are excessive layers of regulation

The band manager licence is to be issued via a beauty contest in which bidders will make a number of commitments, some of which will be written into licences. The band manager's charges and service levels will be reviewed annually, they will be open to challenge by users at any time and then subject to a three year review alongside a review of AIP values.

The proposed regulatory processes are excessively intrusive with more layers of regulation than is required to achieve Ofcom's objectives. They are as, if not more, intrusive than regulation for privatised utilities and offer less assurance of cost recovery and weaker incentives for innovation and efficiency savings. This is disproportionate. Revenues for PMSE spectrum management currently amount to around £2m p.a., while those for regulated utilities are £9bn for water, £2.3bn for gas distribution and £3.5bn for electricity distribution.

The regulation is costly

Ofcom's proposals would be costly to administer, relative both to overall spectrum management costs and to the size of the PMSE sector, and would blunt incentives for efficient operation. In particular:

- The proposed annual audit will raise administrative costs and would regulate overall profits to below "normal" levels, removing incentives for efficient operation.
- User disputes could be protracted and costly because of requirements for independent adjudication and then final recourse to Ofcom. As a benchmark, the annual costs of the Broadcast Adjudicator amount to more then 50% of the annual costs to industry (i.e. JFMG costs and relevant Ofcom costs).
- Detailed cost allocations, incompatible with the objective of cost allocation which is practical and proportionate to the scale of the band manager's activities, will impose additional costs onto a sector with average annual licence fee revenues of only £20/assignment.
- There will be little if any incentive for the band manager to refarm spectrum not required for PMSE use to new uses (e.g. local TV), which must then lead to sub-optimal use of the spectrum.

FRND conditions will result in unreasonably low returns

Ofcom uses the benchmark of a competitive market to determine what is Fair, Reasonable and Non-Discriminatory, but then chooses to ignore the fact that in competitive markets investors have an expectation of making above normal returns on average over time - otherwise they would seek alternative places to invest their funds.

Flexibility in pricing where demand exceeds supply is also a feature of competitive markets (identical pricing at all times for all users is usually a by-product of regulation, not the market), yet Ofcom choose to ignore that also. In addition Ofcom's proposals for cost- rather than value based pricing for the PMSE band manager are inconsistent with its long-standing guidelines for value based pricing proposed for BSkyB's Technical Platform Services services.

An excessively low permitted return (where the return for some spectrum bands could be negative), which is inconsistent with the level of risk and uncertainty (from frequent reviews, complaints, delays to approval for non-PMSE uses), is likely to result in a lack of investment, little innovation and no leadership in developing solutions to growing spectrum demands.

And the permitted return is excessively low given the flaws in the Analysys Mason benchmarking which Ofcom has clearly signaled to users as being an appropriate basis for determining returns:

- The firms chosen provide a poor "like for like" comparison with the PMSE band manager. Differences in scale of activity, risks of illegal use and regulatory risks are not taken into account.
- Inferring normal returns from averages for a relatively short period of three years (2006-2008).

The most optimistic bidder wins beauty contests

Experience suggests that the most optimistic (not the most efficient or effective) bidder is likely to win. This risk applies particularly to the tender for the PMSE band manager, as the bidders' initial licence commitments are proposed to be subject to user scrutiny (encouraging over optimism) and then, for the licensee, to be reviewed annually (enabling renegotiation of terms and conditions).

Efficient spectrum use is not promoted

The main tool available to the band manager for incentivising more efficient spectrum use is in the charges levied on PMSE users. Ofcom proposes to set its licence fee based on estimates of the opportunity cost of spectrum. However, the approach taken to determine whether bands are likely to be congested, to estimate opportunity costs, to phase in AIP and to set final charges to users are very conservative.

This means rationing by price is unlikely to be effective and quantity rationing by the band manager will be required whenever congestion occurs resulting in difficult trade-offs between the spectrum needs of different PMSE users. The regulatory framework proposed by Ofcom gives no guidance on how this should be done, which can only lead to unnecessary complaints and, therefore, costs.

Additionally the returns anticipated by Ofcom will disincentivise the band manager from "buying in" spectrum from other owners.

1 Introduction

Spectrum used by the PMSE sector is currently managed on a day to day basis by JFMG under contract to Ofcom. Ofcom issues licences and develops policy in respect of PMSE spectrum use. The PMSE sector comprises around 2,500 licensees of varying size ranging from national broadcasters to amateur village theatrical groups. These licensees pay fees amounting to around £1.8m p.a.[1] for 90,000 assignments implying an average charge per assignment of £20. Approximately 3,200 licences were issued in the year to March 2009 with wireless microphone users accounting for around half the licences. Licence fees do not at present cover the costs of managing PMSE spectrum that are incurred by both the contractor[2] and Ofcom.

Ofcom wishes to transfer the management of the majority of frequency bands used by PMSE to a private sector band manager that could authorise use of the spectrum, buy and sell spectrum in the market, set licence fees and change the use of the spectrum it is assigned subject to obligations to protect the interests of PMSE users. Ofcom plans to charge a fee to the band manager that will in time (by 2018 at the latest) reflect the opportunity cost of spectrum.

Ofcom is conducting a second consultation on the detailed design of the PMSE band manager award[3]. This follows an earlier consultation setting out the general framework for the award[4] and a statement detailing current licence fee revenues paid by PMSE users in 2007/8[5]. The award is expected to take place in Spring 2010[6]. Ofcom proposes to award a package of indefinite spectrum licences for frequency bands that are currently used to supply PMSE services. The licences will be awarded to a single entity (the PMSE band manager) via a beauty contest based on the following criteria:

- The extent of the applicant's ability to secure efficient use of the spectrum in the award for both PMSE and other uses.
- The extent to which the applicant demonstrates an understanding of and a commitment to the needs of PMSE users.
- The financial, managerial and technical ability of each applicant to establish and maintain efficient systems and procedures to secure efficient use of the spectrum to be awarded for both PMSE and other uses.

The PMSE band manager will (at least initially) be a dominant supplier of spectrum to the PMSE sector. The second consultation proposes a regulatory framework aimed at ensuring the band manager does not abuse its market power to the detriment of PMSE licensees while still maintaining incentives for efficient spectrum use. Plum was asked by Arqiva to review the regulatory arrangements for the PMSE band manager in the context of Ofcom's overall spectrum policy, taking account of comparisons with and lessons learned from regulation of other monopoly services.

The structure of this report is as follows. Section 2 provides the policy context for the development of PMSE band manager proposals. Section 3 assesses the proposals for regulating the band manager.

[1] http://www.ofcom.org.uk/consult/condocs/bandmngr/statement/statement.pdf

[2] Contractor costs were £1.4m for the year ending December 2007. JFMG Statutory Accounts 2007.

[3] http://www.ofcom.org.uk/consult/condocs/bandmanager09/bandmanager09.pdf

[4] http://www.ofcom.org.uk/consult/condocs/bandmngr/condoc.pdf

[5] http://www.ofcom.org.uk/consult/condocs/bandmngr/statement/statement.pdf

[6] http://www.ofcom.org.uk/media/speeches/2009/july/bandmngr.pdf

Section 4 makes comparisons with other regulated sectors. Section 5 discusses AIP and demand rationing issues. Our conclusions are given in Section 6.

2 Policy context

2.1 Initial moves to a market-based spectrum policy

Over the last 10 years spectrum policy in the UK has increasingly involved the use of economic incentives (i.e. prices) to promote efficient spectrum use rather than use of administrative controls. In 1998 the government passed the Wireless Telegraphy Act which permitted the application of spectrum pricing (termed administrative incentive pricing (AIP)) and spectrum auctions having regard to the desirability of promoting the optimal use of spectrum. The Radiocommunications Agency (RA) introduced AIP with a phased transition (3 or 4 years) to fee levels that were around half estimated values for spectrum opportunity cost.[7] There was no separate fee to recover Ofcom's spectrum management costs[8], and so AIP charges are likely to reflect less than 50% of the total opportunity cost of spectrum and its management.

In 2002 an Independent Review of Radio Spectrum management was conducted by Professor Martin Cave[9] with a view to advising on principles that should govern spectrum use and actions required to ensure all users are focused on using spectrum in the most efficient way possible. The Review's overarching vision (paragraph 24) was that auctions and the trading of licences would apply where feasible and administratively set prices would apply elsewhere. It endorsed the policies of spectrum auctions and trading, and regarded pricing (i.e. AIP) as a complement to these market mechanisms for licences not assigned by auction.[10]

The Review anticipated that band managers would arise de facto as a result of allowing spectrum trading since spectrum holders would then be able to sell or lease access to frequencies to others. It also mentioned that it may be advantageous to take steps to create the conditions for band managers to emerge, for example by auctioning blocks of spectrum (that may in some cases have incumbent users) that licensees could then sub-assign. The Review recommended[11] that in the longer term

"*a significant amount of the RA's current frequency planning role be devolved to commercial spectrum management organisations. Evidence of increased intensity and flexibility of spectrum use in bands managed by such organisations suggests that there could be significant economic gains from extending this approach. The review recommends that Ofcom assign via auction a number of competing national band managers for a range of private mobile radio bands, in parallel with Ofcom's continued management of the rest of the private mobile radio spectrum. Incumbent licensees within such bands would retain their existing rights to spectrum use, and would become lessees of the commercial band manager.*"

It was envisaged that band managers may provide additional services alongside spectrum, e.g. network planning, or leasing equipment and, because they would have detailed knowledge of the needs of their users, this would provide them with the ability to assign spectrum in a way which

[7] The background is described in http://www.ofcom.org.uk/research/radiocomms/reports/policy_report/. The recommended opportunity cost values were given in "Study into the Use of Spectrum Pricing", NERA and Smith for the Radiocommunications Agency, April 1996. http://www.ofcom.org.uk/static/archive/ra/topics/spectrum-price/documents/smith/smith1.htm

[8] The Wireless Telegraphy Act only permits a single fee to be set.

[9] http://www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf

[10] The issue of applying market mechanisms to Government spectrum use was addressed in 2005. Some use of auctions and trading was thought possible and spectrum pricing was recommended. http://www.spectrumaudit.org.uk/final.htm

[11] Para 99, http://www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf

increased the efficiency of spectrum use. There would also be advantages for the RA/Ofcom in that they could leave many detailed assignment procedures to band managers, and focus instead on more strategic goals, and on ensuring that competition was not distorted as a result of trading.

2.2 Ofcom's spectrum strategy

The Communications Act 2003 (and paving legislation) established Ofcom and gave it duties (amongst many others) to ensure the optimal use of radio spectrum under its management and to have regard to the availability of spectrum; and current and future demand for spectrum, and to the desirability of promoting[12]:

- Efficient management and use of the spectrum.
- Economic and other benefits arising from its use.
- Development of innovative services.
- Competition in electronic communications services.

Ofcom's strategy for managing radio spectrum in the medium and long term was presented in its 2004 Spectrum Framework Review (SFR)[13]. This strategy involved increasing use of market forces wherever this was judged to be in the best interests of the consumer-citizen. The strategy built on previous policy decisions and affirmed:

- The use of auctions to assign cleared spectrum.
- The continued use of administrative incentive pricing (AIP).
- The progressive introduction of spectrum trading and liberalisation between 2004 and 2007 *(sic)*.

The strategy was intended to be consistent with Ofcom's regulatory principles, including:

- Operating with a bias against intervention.
- Striving to ensure interventions will be evidence-based, proportionate, consistent, accountable and transparent.
- Seeking the least intrusive regulatory mechanisms to achieve policy objectives.

In the long term market mechanisms were expected to apply to around 70% of the spectrum. The SFR also placed emphasis on the encouragement of licence exempt spectrum applications where they promoted the overall objective of optimal spectrum use (thought to be around 7% of the spectrum in the long term).

Ofcom's view was that the most appropriate policy stance was to increase clarity over time for spectrum users while retaining its ability to vary rights under certain conditions, including market failure. Competition issues that arise as a consequence of spectrum trading are to be addressed through normal competition law[14].

[12] These objectives are also given in the 1998 Wireless Telegraphy Act.

[13] http://www.ofcom.org.uk/consult/condocs/sfr/

[14] http://www.ofcom.org.uk/consult/condocs/sec/statement/statement.pdf

2.3 Band managers

In contrast to the Cave Review, the SFR did not envisage a specific role for band managers that bought, leased and sold spectrum. Ofcom observed there was little evidence from countries where trading had been implemented that band managers would emerge. It concluded that, while it would not rely on this model as a mechanism for introducing a spectrum market, nor would it wish to prevent its emergence[15]. Ofcom noted that overlay auctions, band managers or continued Ofcom management may have a role in shared bands where trading might be overly complicated. The spectrum used by PMSE is arguably a case in point.

There are now a number of frequency bands where companies have bought spectrum which they may lease to others and so become band managers (e.g. Transfinite is offering such a service at 28GHz)[16]. In addition there are plans to formalise the Ministry of Defence's (MoD's) spectrum holdings (through the grant of Recognised Spectrum Access) and this will give it the legal instruments required to lease or sell spectrum to third parties. The MoD's AIP charge is also projected to rise rapidly and this will give it strong incentives to behave more like a commercial spectrum manager.

This development is particularly important for the PMSE sector, as it regularly "borrows" spectrum from the MoD at no cost to support temporary periods of peak spectrum demand (e.g. at sporting or other events). It seems likely that the price of this spectrum will rise from its current level (of zero). There is also the risk that some of the MoD spectrum currently used by PMSE could be reassigned to higher value uses. Ofcom has proposed[17] that, before the new MoD arrangements are in place, it will set fees for PMSE use of the MOD managed bands. These fees will be charged to the band manager and not the MoD.

2.4 The Digital Dividend Review (DDR)

As part of the DDR Ofcom developed proposals for a PMSE band manager that would be consistent with the following objectives:

- Protecting the interests of PMSE users.
- Promoting efficient spectrum use.

Ofcom places a high weight on the first of these objectives though its statutory duties relate to promoting efficient spectrum use and the longer term interests of consumers and citizens and not the interest of particular industry sectors.

2.4.1 Assigning PMSE licences

Consistent with policy for other frequency ranges in the DDR Ofcom considered the possibility of auctioning UHF frequency bands used by PMSE[18]. This approach was rejected because of the risk of co-ordination failure amongst PMSE users, meaning that they would fail to aggregate their demand to

[15] P34, Strategic Framework Review

[16] http://www.transfinite.com/content/spectrum1.html

[17] Para 8.34, http://www.ofcom.org.uk/consult/condocs/bandmngr/condoc.pdf

[18] http://www.ofcom.org.uk/consult/condocs/pmse/pmse.pdf

bid for spectrum in an auction (because of the high transaction costs of co-ordinating this demand). To address this market failure Ofcom has proposed the licensing of a private sector PMSE band manager that would be appointed by a beauty contest. While the band manager proposal addresses the co-ordination issue it leads to another market failure problem, namely the creation of a monopoly supplier of PMSE spectrum[19] which could require price and service level regulation to protect the interests of PMSE users and their final customers.

2.4.2 AIP

PMSE users do not currently pay opportunity cost prices for their spectrum access. The issue of providing the sector with appropriate incentives for efficient spectrum use also needed to be addressed as part of the arrangements for a PMSE band manager. Ofcom concluded that the solution would be to:

- Increase prices towards market rates gradually so that users' ability to access spectrum was not suddenly reduced.
- Put in place a band manager that would have some flexibility in price setting but that would be subject to some regulatory control over prices.

The gradual phase in of AIP was seen by Ofcom as creating a bridge between the current position of the PMSE community and a future market-based approach. The application of AIP to the band manager's spectrum access was regarded by Ofcom as creating incentives for efficient spectrum use for both the band manager and PMSE users[20].

2.4.3 Changes in the assignment of frequency bands

There are two other initiatives associated with the DDR that have an impact on PMSE spectrum use and the future PMSE band manager, namely:

- Plans to clear channels 61-69 of existing users as part of the digital dividend[21]. In particular PMSE users will be moved from Channel 69 to Channel 38 by the end of 2012. Incumbent users will be compensated for some of the costs they will incur. The funding arrangements are under consultation and the timetable for the migration is uncertain[22].
- Proposals to permit use of licence exempt cognitive devices in the interleaved UHF spectrum subject to the protection of DTT and PMSE users from harmful interference. There are a number of technical issues to be resolved in this area, which a future PMSE band manager will need to engage with in order to protect access to this spectrum for PMSE users.

In addition, certain frequency bands will be taken out of normal PMSE use to provide capacity for the 2012 Olympics. These bands may be managed by Ofcom and not the PMSE band manager. Ofcom has published a draft spectrum plan for consultation and this will evolve over the period up to the

[19] The possibility of multiple band managers was considered but it was concluded that this would not solve the monopoly issue as many users are locked into using a specific band in the short term at least.

[20] Para 8.26, http://www.ofcom.org.uk/consult/condocs/bandmngr/condoc.pdf

[21] http://www.ofcom.org.uk/consult/condocs/800mhz/statement/

[22] http://www.ofcom.org.uk/consult/condocs/pmse_funding/

Games[23]. This policy creates uncertainty and potentially increases costs/reduces income for the PMSE band manager (who will be appointed in 2010). In particular:

- It reduces the spectrum available for normal day to day PMSE use which will continue throughout the Games (and related events). The PMSE band manager may lose income if demand from its customers cannot be accommodated in which case illegal use may increase. The band manager may also incur significant additional costs in co-ordinating its customers use with that planned for the Games.
- It raises questions about Ofcom's view of the competence of the band manager. It may also lead to further intervention for other major special events, for example the 2014 Commonwealth Games, meaning that the Government takes over the rights to spectrum assigned to the PMSE band manager on a case by case basis in order to discharge its international obligations[24]. It is unclear at present whether any compensation will be paid to the band manager for such temporary loss of its spectrum and the disruption to PMSE licensees.

2.5 Summary

The Cave Review and Ofcom's SFR both envisaged a long term situation in which market forces (i.e. auctions and trading) would be the norm for commercial spectrum use. The proposal for the appointment of a PMSE band manager by beauty contest and the development of a regulatory regime where the interests of PMSE users are to have priority over securing optimal spectrum use is a departure from the overall spectrum strategy.

Ofcom's rejection of assigning PMSE spectrum by auction and its proposals for creating a PMSE band manager with market power has created a situation in which market failure could occur in the absence of regulation. Two consultations on the band manager award have proposed regulatory arrangements that are intended to address this market failure. In the next section we consider whether these arrangements best meet Ofcom's objectives in respect of promoting efficient spectrum use as well as protecting PMSE users. In doing this we consider whether the proposals are proportionate and comprise the least intrusive intervention to achieve these policy objectives taking account of the scale of the band manager's activities, the starting position in respect of PMSE use and charges, and the regulatory uncertainties faced by the band manager.

[23] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf
[24] For example the 2014 Commonwealth Games.

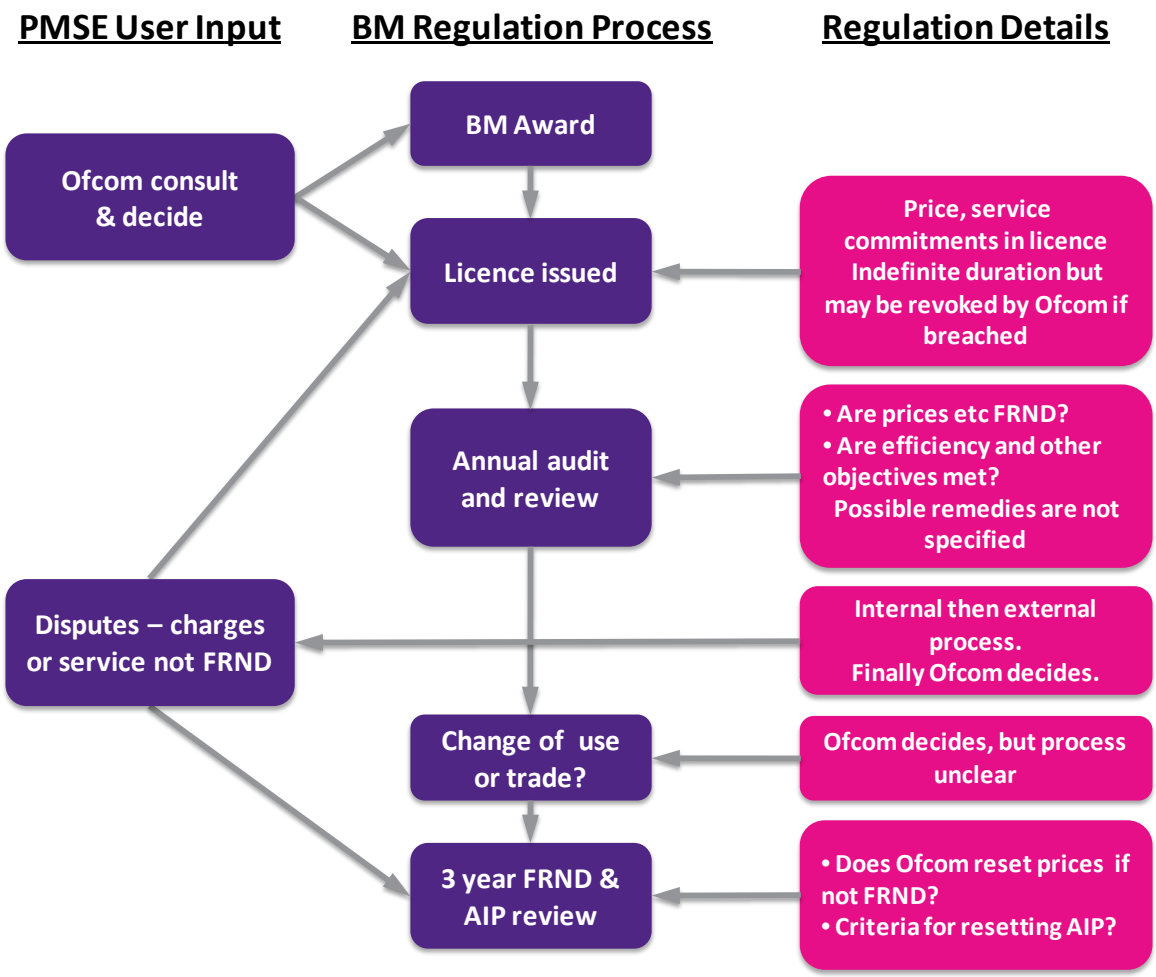
3 Regulation of the PMSE band manager

3.1 Introduction

The PMSE band manager will be a monopoly supplier of spectrum for some PMSE applications for the near future at least and could therefore charge monopoly prices for spectrum access. To guard against this possibility Ofcom has proposed a regulatory framework aimed at protecting PMSE users through performance reviews and requirements for fair, reasonable and non-discriminatory (FRND) pricing and service levels. The framework is also intended to have features that will promote efficient spectrum use.

Our understanding of the regulatory process proposed by Ofcom is shown in Figure 3-1 and the stages are discussed in the sections below.

Figure 3-1: Ofcom's proposed framework for awarding and regulating the PMSE band manager



Source: Plum analysis

3.2 Unfounded optimism wins beauty contests

The band manager licence is to be issued via a beauty contest in which bidders will make a number of commitments, some of which will be written into licences. It is well known from experience with tenders for franchises for many services[25] that there is a risk that the most optimistic (not the most efficient or effective) bidder is likely to win, particularly if they anticipate that they would be able to renegotiate the terms and conditions in later years[26].

This risk applies particularly to the tender of the licence for the PMSE band manager, particularly as the bidders' initial licence commitments are proposed to be subject to user scrutiny (encouraging over optimism) and then, for the licensee, to be reviewed annually.

To counter this problem there needs to be a credible threat of licences being terminated when licence conditions are not met.

3.3 Competitively determined prices through the band manager award

Ofcom considered and rejected the possibility of applying *ex ante* price controls to the band manager on the grounds that it has insufficient information to set such controls. This begs the question of how Ofcom will judge the "best offer" in the beuty contest for the PMSE band manager licences. However, in the initial beauty contest bidders are asked to provide plans showing:

- How costs are allocated at band level and to individual assignments[27].
- Prices (price structures and charges) for the first 3 year period of the licence down to the level of individual assignments.
- Service levels for PMSE users including KPIs.

Bidders proposed prices and service levels are expected to comply with FRND requirements (ex ante). The winning bidder will then be required to develop an initial set of prices and service levels based on its tender proposals and these will be published in advance of starting operations[28]. If the implied prices lead to significant increases for certain classes of PMSE users then Ofcom will moderate this impact through adjustments in the licence fee it charges to the band manager. As the resulting prices and service levels are in effect determined through a competitive process they are likely to be superior to any prices/service levels set in advance through regulation[29]. We note that for the bid process to have integrity bidders must expect that if they win their final price and service level commitments will be written into licences and enforced.

If the published prices are to become licence commitments then the proposed annual audits and the possibility of users disputing charges are redundant and/or excessive levels of regulation, in the sense

[25] The seminal paper in this area is: Franchise bidding for natural monopolies – in general and with respect to CATV, O Williamson, Bell Journal of Economics, 7, pp73-104, 1976.

[26] This is one reason why lump sum auctions are increasingly used to assign spectrum licences.

[27] p35 http://www.ofcom.org.uk/consult/condocs/bandmanager09/bandmanager09.pdf. Paras 7.10-7.15 http://www.ofcom.org.uk/consult/condocs/bandmngr/condoc.pdf

[28] Para 3.26-3.29, Second consultation document.

[29] While the licence bids will not change dynamically in response to short term market changes, nor would regulated charges and service levels.

that they undo competitively determined outcomes. The only additional mechanism that is required is one in which the band manager can request a change to the licence conditions if extraordinary circumstances occur (similar to a price control re-opener as exists in regulated utilities), given that Ofcom has the power to revoke the band manager's licences for PMSE use with one year's notice.

Thus the band manager award process provides an opportunity to fix prices and service levels for the first three years of the licence. This makes regulatory intervention aimed at resetting prices/services in the first three years redundant other than in exceptional circumstances. This suggests that Ofcom's FRND test should only apply at the initial licence award and subsequent three yearly reviews.

3.4 Annual audit – an annual price control?

Ofcom has proposed that a focused annual audit of the band manager's performance will be undertaken by an independent third party. In principle the purpose of the audit is to ensure licence commitments are met[30]. It will cover technical efficiency and performance in respect of the band manager's obligations to PMSE users. In practice the audit is to have particular regard to:

- Evidence of above normal profits.
- Evidence PMSE users willing to pay posted prices have been unreasonably denied access to spectrum.
- Evidence of PMSE users not being able to afford spectrum access and have no available alternatives.
- Evidence of poor service levels that have impaired PMSE's ability to operate.

The audit will be published together with a review undertaken by Ofcom.

There are three aspects of these proposals that appear problematic:

- The band manager could be compliant with its licence commitments but still be found to have breached the criteria applied in the annual review.
- The interpretation of affordable spectrum access is not defined.
- Profits are regulated (not prices) and there is asymmetry in the regulation of profits that implies regulated returns overall will be below "normal" levels.

3.4.1 Potential conflict with licence commitments

Such conflicts could occur for example if the band manager found an unanticipated way of reducing its costs or there was an unanticipated increase in demand such that it earned above normal profits while meeting its licence commitments in terms of price and service levels. If the band manager has its profits reduced by regulatory intervention in these circumstances, then any incentives for making efficiency improvements will have been removed.

This suggests that the annual audit should have a much narrower scope than that envisaged by Ofcom. It could for example be limited to a data reporting exercise so that a consistent set of data is available for the three year review.

[30] Paras 9.44-48, First consultation.

3.4.2 Affordability

At present PMSE charges do not cover costs overall and individual charges are unlikely to be cost reflective except by chance. So charges to some user groups are likely to be significantly lower than the costs of managing their spectrum use. In addition no AIP is charged at present. Taken together these factors suggest that fees should rise for some users. Whether these users will be able to afford these fees is not known but it is quite possible some users will not, in the sense that they may reduce their spectrum use, switch to using the spectrum illegally or cease PMSE activities. The elasticity of demand in response to price changes is not known with any certainty and this causes problems for judging what comprises an affordable price[31]. Also the wide range of PMSE user organisations means that what is affordable to one organisation (e.g. a broadcaster) may not be affordable to another (e.g. a local amateur theatre company).

The basic problem is that FRND prices (at the level of the individual assignment as proposed by Ofcom) may not offer the protection for PMSE users that Ofcom wishes to see in place. It is important that Ofcom undertakes empirical examination of this issue in advance of the band manager award, so that its advice on FRND is consistent with the outcome it is wishing to achieve. It is also important that the new regime does not result in significant illegal spectrum use as a result of price increases. Enforcement is problematic given the temporary and local nature of some PMSE use but Ofcom should plan for increased enforcement action to counter the possibility of greater illegal use of PMSE frequencies. This will also be necessary to reduce the risk of revenue loss to the band manager and the implied risk of increased charges for other licensed PMSE users[32].

A reduction in use or no use by some incumbent users when prices better reflect opportunity cost – both the opportunity cost of the spectrum and of the administrative resources associated with managing the spectrum – promotes efficiency. Spectrum may be released for other higher value users (where it is congested) and resources used to manage their spectrum could be released for other higher value purposes. In assessing what constitutes affordable use Ofcom will need to balance the needs of specific incumbent PMSE users against these efficiency considerations if it is to act in the long term interests of consumers and citizens.

3.4.3 Asymmetric profits regulation

The annual audit will have regard to evidence of above normal profits. In other words there is the possibility that profits will be reduced to normal levels on an annual basis. In the utility sector this is termed rate of return regulation. The poor incentive properties of rate of return regulation are well understood and it is for this reason that it has been replaced by RPI-X price caps[33]. We note the proposals for the band manager provide incentives for the band manager to inflate the cost base because higher returns can then be made[34].

The regulatory approach taken in the annual audit is asymmetric in the sense that upsides on profits (i.e. above normal profits that arise either by chance or as a result of the band manager's actions) are capped and downsides are not. Importantly the cap on profits will be applied at the level of classes of

[31] In this regard we note that Analysys Mason's consultations with PMSE users over the impact of AIP did not appear to provide any useful information on price impacts. http://www.ofcom.org.uk/consult/condocs/bandmanager09/report2.pdf

[32] These users would have to bear an increased proportion of common costs.

[33] See for example, "Regulatory Reform", Armstrong, Cowan and Vickers, MIT Press, 1994.

[34] It is assumed that demand is not elastic, otherwise the case for regulating at all would be weak.

use and/or the individual assignment. So even if profits are at a “normal” level overall, with some uses yielding above normal returns and others yielding below normal returns, the band manager could find areas where above normal returns are made have their prices reduced and so profits overall fall below normal levels.

This feature of the regime increases regulatory risk and is likely to make the band manager particularly risk adverse when it comes to making expenditures which have an uncertain return. This in turn increases the market determined level of "normal returns" and so the cost of providing PMSE band manager services.

3.5 Disputes – asymmetric regulation?

Users will have the opportunity to dispute charges or service levels on the grounds that they may not meet FRND requirements. The band manager must put in place an external independent dispute resolution (IDR) procedure that will examine disputes if they cannot be resolved internally. If the IDR cannot resolve disputes to the user's satisfaction then they may appeal to Ofcom for a final decision. The complaints will be assessed against licence commitments based on forecasts of costs[35] and the dispute procedure is intended to address whether these commitments have been breached[36].

Users who are underpaying or getting above normal service levels will not complain. If all prices are not fully cost reflective (so some users underpay while others over pay relative to an FRND benchmark) then disputes will likely result in a loss of net income for the band manager, assuming a dispute settled in favour of a user cannot open up the possibility for the band manager to apply for a compensating offset in other users’ charges. If this is the case it will be imperative for the band manager to start operating with fully cost reflective charges (as judged against its forecasts).

Experience from, say, interconnection disputes suggests that if users have the backstop of appeal to the regulator (i.e. Ofcom in this case) then disputes are likely to end up there unless users have strong incentives not to pursue cases to this point. Such incentives may be given by users bearing the costs of disputes (their own costs and possibly also those incurred by the band manager and/or Ofcom). In principle those who benefit should pay and this may be the individual user or a wider class of users if the finding has more general application. It is not clear what Ofcom regards as acceptable practice in this area.

However, we note that in the case of broadcast transmission, the Broadcast Adjudicator’s costs are paid for by the regulated service provider (Arqiva) and its budget for 2009/10 amounts to £610k for operations (and £470k for contingency) –this is more than 50% of the annual costs to industry (i.e. JFMG costs and relevant Ofcom costs), for an industry with far fewer customers than the PMSE sector[37]. The current average revenue per assignment is £20 (and £720/licensee) suggesting that even with a relatively speedy resolution of disputes (say involving 2 man days of effort) the costs of disputes could comprise a significant cost burden for the band manager relative to its overall income. Ultimately this cost will be paid for by PMSE users – possibly on some kind of averaged basis.

It is questionable whether this is in the long term interests of all PMSE users and their customers.

[35] Paras 3.50-3.51 Second consultation document.

[36] Para 4.139 Second consultation document.

[37] http://adjudicator-bts.org.uk/documents/OTABTS_Report_apr09jun09.pdf

3.6 Change of use – weak incentives?

Ofcom envisages that "*if the value PMSE users place on spectrum (i.e. the price they are willing to pay) is less than the value other users could generate from the spectrum (the opportunity cost), those other users should gain access*"[38].

However, all proposals from the band manager to trade spectrum (e.g. to sell to a third party whether for PMSE or non-PMSE use) or to lease it to a non-PMSE user will be subject to Ofcom approval[39]. The procedure by which Ofcom reaches a decision is unclear in the sense that the time frame for a decision and whether it goes to consultation are not yet specified. The main criterion applied to judge whether non-PMSE use will be permitted or not is "*part of any approval process would include the band manager demonstrating that it could otherwise meet its obligations to PMSE users*"(para 3.65).

A key issue here is the forecast period Ofcom will use to judge whether non-PMSE use could be detrimental to PMSE users. For example, it may be that a frequency band currently has little or no PMSE use but there could be a PMSE sector requirement in future. PMSE users may argue the band should be reserved for them (we note it may be costless for them to secure this reservation if a zero AIP is charged), even though the future requirement is highly uncertain. In a market environment such issues would be solved by the band manager taking account of the PMSE and non-PMSE users' willingness to pay for the spectrum at the time a non-PMSE demand is identified. Constraints on the band manager mean that such a price rationing solution is unlikely to be feasible until 2018, after which a market approach may apply.

The need for approval for non-PMSE use will inevitably introduce additional costs and delays relative to similar transactions the buyer or lessor may undertake with other spectrum licensees. This will reduce demand for the band manager's spectrum relative to an unregulated situation and would also reduce the incentive on the band manager to pursue such opportunities. The terms and conditions applied to non-PMSE use of the frequency bands will not be subject to FRND requirements and so we presume that the band manger will be permitted to retain any net revenues from approved non-PMSE use in perpetuity[40]. This means that the band manager will need to account separately for non-PMSE costs and revenues, so that these do not get inadvertently attributed to PMSE use in either the annual or the three yearly reviews.

Reducing the incentive on the band manager to seek out non-PMSE use for spectrum otherwise left fallow will lead to sub-optimal use of the spectrum made available by Ofcom to the band manager. It may also have a considerable detrimental impact on some sectors, for example local TV (where potential operators that fail to secure interleaved spectrum when offered for auction by Ofcom would ordinarily then turn to the band manager).

In summary we conclude that incentives for the band manger and non-PMSE users to exploit under used frequency bands appear weak, while PMSE users will have incentives to try and block changes that risk their future spectrum access and offer them no direct benefit and thus add cost and delay to the process.

[38] Para 4.3, Second consultation document.

[39] Para 3.67 Second consultation document.

[40] Paras 3.12, 4.40-4.72 Second consultation document.

3.7 The three yearly review

At the proposed three yearly review:

- The FRND approach is reviewed.
- The band manager's performance is assessed and prices are reset. It is not clear how the price reset will occur and whether at this point Ofcom is effectively putting in place a price cap.
- AIP levels that will apply over the next 3 year period are reset by Ofcom.

Ofcom expects that efficiency gains would not be immediately passed on to PMSE users, though they will benefit in time. The longer the time lag the greater the efficiency incentive. The consultation document is unclear about how long the band manager may keep any efficiency gains but we note that a three year period would be short relative to other regulated industries in which five year price controls are the norm and where savings are kept for a full five year period regardless of when they are made (see Section 4). Ofcom has not explained why PMSE users should benefit from supplier efficiency gains more quickly than consumers of energy or water.

The level of AIP set by Ofcom will affect demand for spectrum by PMSE users. A view on the demand response will need to be factored into the resetting of the fees charged by the band manager to recover its administrative costs. While demand elasticities are highly uncertain at present, information should be revealed as charges and AIP are increased over time.

The way AIP is reset interacts with the band manager's incentives to innovate in spectrum use either through more intensive use by PMSE or by introducing compatible non-PMSE use. Both of these actions could increase the opportunity cost of spectrum. If AIP is reset to reflect these changes then the incentive to make the changes in the first place will be dulled, if not removed altogether towards the end of the three year review period.

It is generally the case that changing spectrum use is a slow process because of complementary investment in infrastructure and other systems. For example, Ofcom has typically given notice periods of up to 7 years when refarming frequency bands. This suggests that there should be long lags between changes in spectrum use initiated by the band manager and the recalculation of AIP taking account of these changes in spectrum use. Otherwise the band manager will have little incentive to make efficient changes in spectrum use.

In summary we suggest that Ofcom provides continuing incentives to the PMSE band manager for efficient spectrum use and management by introducing a rolling incentive mechanism[41] ideally with a lag of five rather than three years. There should also be lags in AIP adjustments in order to preserve the band manager's incentives to innovate in spectrum use.

3.8 FRND principles

Ofcom proposes to regulate access and charges for spectrum assigned through the band manager award using FRND principles. It interprets this as meaning[42]:

- Terms and conditions similar to those expected in a competitive market.

[41] http://www.aviationreg.ie/_fileupload/Image/PR_AC2_PUB11I_ANNEX15.pdf

[42] http://www.ofcom.org.uk/media/speeches/2009/july/bandmngr.pdf

- Cost based pricing, where the basis for cost allocation would be included in the licence bid[43] and form part of the licence commitments[44].
- No discrimination towards specific users and, in particular, no discrimination based on willingness or ability to pay.
- No excessive pricing judged against the benchmark of returns earned in comparable activities.

3.8.1 Fair and reasonable charges

Prices will be judged by Ofcom to be fair and reasonable if:

- They are cost based (using a fully allocated cost methodology) and costs have been reasonably incurred[45] i.e. are associated with provision of a product or service and result from cost minimisation.
- They result in the band manager making normal returns which are likely to be measured by return on sales for other firms undertaking similar activities in competitive markets[46].

Ofcom uses the benchmark of a competitive market to determine what is fair and reasonable. However, in competitive markets investors must have an expectation of making above normal returns on average over time otherwise they will seek alternative places to invest their funds. If incentives to invest in new services and/or make cost reductions are to be preserved then the band manager will need to have some time period over which it may keep above normal returns. The annual reviews and possibility of disputes by users at any time both suggest that these time periods will be very short which will considerably reduce incentives for innovation.

Cost reflective pricing

Ofcom recognises that competitive markets are characterised by value based pricing but has a strong preference for cost reflective pricing at the level of the individual assignment, using fully allocated costs. Total costs would be allocated to bands and within bands costs would be allocated to individual assignments based on important cost drivers.[47] It is expected that common costs would be allocated based on an equi-proportionate mark-up. In this regard we understand that around 80% of JFMG's costs are fixed, in the sense that they do not vary with the number of licences or assignments, in part because of automation of many functions through on-line purchase of licences. This means that the level of tariffs for different licence classes could be largely driven by the attribution of variable costs which comprise only 20% of total costs. This approach to cost allocation is unlikely to be efficient (see Section 3.8.2 below).

A specific cost allocation issue on which greater clarity is required, concerns the costs incurred by the band manager in purchasing spectrum in the market, an activity which JFMG frequently undertakes for certain events to meet demand which otherwise could not be met by the supply of spectrum under the current contract. This spectrum would be purchased by the band manager to meet anticipated future

[43] Paras 3.26 and 4.141-4.143

[44] Para 3.20-3.21.. Ofcom chooses the band manager based on its commitments in these respects

[45] Paras 4.37-4.69

[46] Para 4.96-4.107

[47] p 31, http://www.ofcom.org.uk/consult/condocs/bandmanager09/bandmanager09.pdf

PMSE demands. It is possible the prices paid could be above the AIP based licence fee levied by Ofcom. Issues which need to be resolved are:

- How would Ofcom judge that spectrum purchases were reasonably incurred? Would prior approval be required?
- Over what time period might the costs of spectrum purchases be recovered?
- Who should pay for incremental costs of spectrum, where these exceed the existing costs? All users whose demand creates congestion or only incremental users? Economic efficiency considerations suggest the former.

Ofcom recommends the approach taken to cost allocation should be practical and proportionate to the scale of the band manager's activities. At first sight this seems to contradict Ofcom's preference for detailed cost allocations – an approach which we understand is not used to set current fees. The industry will therefore bear additional costs associated with the implementation of a detailed cost allocation methodology. While these costs may not be unduly large they need to be viewed in the context of average annual licence fee revenues of only £20/assignment.

Reasonable returns

So what level of returns will be considered normal or reasonable for the band manager? Ofcom has determined that the band manager's business is characterised by low capital investment and so opts for a return on sales measure of profitability. Ofcom commissioned Analysys Mason (2009)[48] to examine returns in other comparable sectors. This study examined data for 2006-2008 from 18 companies. The annual values for each firm show considerable variation (often by a factor of two) and there is also a wide variation in average annual returns across the companies (1-18%).

While the firms are all from the ICT sector *in the widest sense* they vary considerably in size and capital intensity and almost all are regarded as operating in very competitive sectors as evidenced by market share data[49]. As such all the annual returns can be considered in some sense normal for competitive markets. The variations in annual returns suggest that a much longer time period than 3 years would be required to obtain a representative view of "normal" or adequate returns.

The comparability of the firms chosen by Analysys Mason requires further examination. We observe that they differ from the PMSE band manager in the following respects:

- They all have revenues much greater than those likely for the PMSE manager – the smallest is 3 times as big and the largest 4,000 times as big as JFMG's turnover. This in itself raises question marks about the appropriateness of the comparisons.
- Only one of the companies quoted operates in a regulated sector – namely BT Retail with returns of 10-12%– and as such arguably provides a better benchmark than the other firms.
- Very few of the companies have duties and responsibilities, including high levels of service, comparable to JFMG.

[48] Benchmarking study: return on sales for the PMSE band manager, 14 May 2009, Analysys Mason.

[49] We note that markets where firms enjoy high market shares are not necessarily uncompetitive because there may always be the threat of entry if firms do not perform well.

- The PMSE band manager may need to go to the market to buy additional spectrum to meet PMSE users' requirements (see the discussion of future demand in Section 5.2). The cost of this spectrum could amount to many millions of pounds i.e. multiples of the band manager's annual turnover. None of the companies in the Analysys Mason sample faces the possibility of having to invest in the purchase of inputs that could be valued at many times the level of annual turnover, and the risks of not being able to recover these costs.
- The companies typically have the opportunity for a competitive response to market changes whereas the band manager has little flexibility to act.
- None of the companies faces the same problems of illegal use which are difficult to monitor and police.

In summary we conclude that:

- The sample of firms chosen to derive benchmark returns provides a poor "like for like" comparison with the PMSE band manager. Differences in scale of activity and regulatory risks need to be taken into account.
- Inferring normal returns from averages for a relatively short period of three years (2006-2008).

Consequently it would be unsafe for Ofcom to rely on the proposed return on sales which could be so low as to discourage innovation and risk-taking, and may also undermine the competitive process for selection of the band manager and ultimately the long term sustainability of the PMSE sector.

3.8.2 Non-discrimination

Ofcom's proposals for cost based pricing and equi-proportionate mark-ups are intended to be non-discriminatory. However, they risk being unduly intrusive (and so costly to implement) and inefficient. Issues that are not addressed by Ofcom but that need to be considered are:

- Is cost reflectivity at the level of an individual assignment an appropriate competitive benchmark?
- What if discrimination is present in current prices? Is this to be completely unravelled?
- What will be the impact of equi-proportionate mark-ups on demand and illegal use?
- What are the costs of putting in place the detailed cost allocation procedures that Ofcom regards as desirable? Are they proportionate to the objective Ofcom is seeking to achieve?

In respect of the first point we observe companies in many competitive markets sell products and services at prices that are averaged across product groups and locations for practical and marketing reasons. Also equi-proportionate mark-ups are not always a feature of competitive markets – rather common costs are often recovered based on demand responsiveness (or demand elasticities[50]) as this results in higher overall demand and as a consequence a more economically efficient outcome[51]. Such considerations could also apply in the case of PMSE where fixed common costs are a high proportion of total costs and users are heterogenous – that is there is likely to be considerable variation in demand responsiveness depending on the nature of the user (e.g. national broadcaster vs amateur theatrical producer). Demand based pricing could both expand the market and avoid potential problems with illegal spectrum use. The main challenge here will be finding objective

[50] Termed Ramsey pricing, where common costs are allocated based on the inverse elasticity of demand.

[51] This is particularly the case in sectors where fixed/common costs are a high proportion of total costs e.g. in transport sectors.

measurable indicators of demand elasticity. Even though the extent to which such indicators exist is unclear, we do not think the band manager should be prohibited from using them i.e. Ofcom should take a flexible approach in its interpretation of what constitutes non-discrimination based on real world competitive benchmarks.

In other regulated sectors FRND has been viewed as consistent with a move away from detailed cost based pricing:

- Ofcom has published FRND principles in relation to Sky set top boxes which includes the principle that, in addition to cost causation common costs may be recovered as follows:
  - "*Where costs incurred are of benefit to more than one TPS customer then they should be recovered from each TPS customer in a way that takes due account of the benefits derived by TPS customers from those costs being incurred*." [52]
  - For smaller channels a fixed fee may be appropriate: "*a fixed fee for an EPG listing may potentially be a reasonable charging methodology for smaller broadcasters that earn relatively low incremental revenues from being available on DSat*".
- CAA allows recovery of NATS en-route air traffic control services costs according to the square root of aircraft weight and distance flown – arguably a proxy for price elasticity.
- Ofcom guidance to the Office of the Adjudicator Broadcast Transmission Services[53] sets out a number of principles, in particular in relation to FRND prices it stated that[54]
  - "*It seems reasonable that, if all services were offered at the same time their common costs should be spread across all of them. However, other considerations may imply that in some cases, Arqiva will recover its common costs more effectively from only a subset of services or, at least, not equally from all services*." (Paragraph 4.21.)

  In practice Arqiva recovers joint common site specific costs (nationally averaged) via wind loading and square metre allocations, where the former may to some extent approximate charging according to the inverse elasticity of demand rather than cost causation.

Hence in other sectors Ofcom has long interpreted FRND as being consistent with recovery of common costs on the basis of demand based factors/the benefits received by users. This approach has been determined by considerable analysis, is accepted by operators and users, and underpins the regulated access to BSkyB's Technical Platform Services (TPS) amongst other activities. Ofcom's guidelines on FRND should be common across all the sectors it regulates, otherwise there may be implications far beyond PMSE. This implies that the band manager should not be limited to cost based pricing.

3.9 Conclusions

Our conclusions concerning Ofcom's proposals for licence award and regulation of the PMSE band manager are as follows:

[52] http://www.ofcom.org.uk/consult/condocs/tps/summary/

[53] http://adjudicator-bts.org.uk/

[54] http://www.ofcom.org.uk/consult/condocs/arqiva/

- There is a risk the most optimistic (not the most efficient or effective) bidder is likely to win, given the incentive on bidders to make commitments likely to win user support when the bids are open for critique, plus the opportunities to reopen licence commitments on an annual basis. To counter this problem there needs to be a credible threat of licences being terminated when licence conditions are not met.
- The band manager award process provides an opportunity to fix prices and service levels for the first three years of the licence. This makes regulatory intervention aimed at resetting prices/services in the first three years redundant other than in exceptional circumstances. The proposed annual reviews and opportunities for user disputes should be removed.
- Furthermore,
  - The proposed annual audit will raise administrative costs, introduce rate of return regulation which will remove incentives for efficient operation and regulate overall profits to below "normal" levels (because profits at the level of individual assignments that are above normal will be removed and those that are below normal will not be adjusted).
  - User disputes which could be protracted and costly in part because of requirements for independent adjudication and then final recourse to Ofcom. We note that the annual costs of the Broadcast Adjudicator amount to more than 50% of the annual costs to industry (i.e. JFMG costs and relevant Ofcom costs),.
- There will be little if any incentive for the band manager to innovate in improving the efficiency of PMSE use or in refarming spectrum to non-PMSE use because of the possibility of delays arising from PMSE user complaints and annual reviews reducing returns (on PMSE use) to below normal levels in a relatively short time period.
- At the three year review we suggest that Ofcom provides incentives to the PMSE band manager for efficient spectrum use and management by introducing a rolling incentive mechanism[55] ideally with a lag of five rather than three years. There should also be lags in AIP adjustments in order to preserve the band manager's incentives to innovate in spectrum use.
- Ofcom uses the benchmark of a competitive market to determine what is fair, reasonable and non-discriminatory. However, in competitive markets investors must have an expectation of making above normal returns on average over time otherwise they will seek alternative places to invest their funds. In addition competitive markets are often characterised by price discrimination in order to recover fixed costs.
- Ofcom's preference for detailed cost allocations – an approach which we understand is not used to set current fees – appears to conflict with its view that cost allocation should be practical and proportionate to the scale of the band manager's activities. It will impose additional costs on the sector which need to be viewed in the context of average annual licence fee revenues of only £20/assignment.
- The use of inappropriate comparators for setting benchmark returns, arising from an inappropriate characterisation of the PMSE band manager activity and ignoring the regulatory risk contained in Ofcom's band manager proposals. The approach to deriving benchmark returns needs to be revisited as:

[55] http://www.aviationreg.ie/_fileupload/Image/PR_AC2_PUB11I_ANNEX15.pdf

  - The sample of firms chosen to derive benchmark returns provides a poor “like for like” comparison with the PMSE band manager. Differences in scale of activity and regulatory risks need to be taken into account.
  - Inferring normal returns from averages for a relatively short period of three years (2006-2008), and then forecasting into a severe recession which has hit the media sector especially hard, is unlikely to give reliable estimates.
- Ofcom’s FRND proposals for the PMSE band manager are not consistent with the approach to value based pricing proposed for BSkyB’s TPS services.

In summary Ofcom has proposed a complex regulatory regime that guarantees below normal returns to the band manager and offers incentives to inflate its cost base. The complexity will also raise the band manager’s costs and the many layers of regulation blunt incentives for efficient spectrum use. This cannot be said to be in the best short or long term interests of the PMSE sector or final consumers and citizens and inconsistent with Ofcom’s primary duty of ensuring efficient use of spectrum.

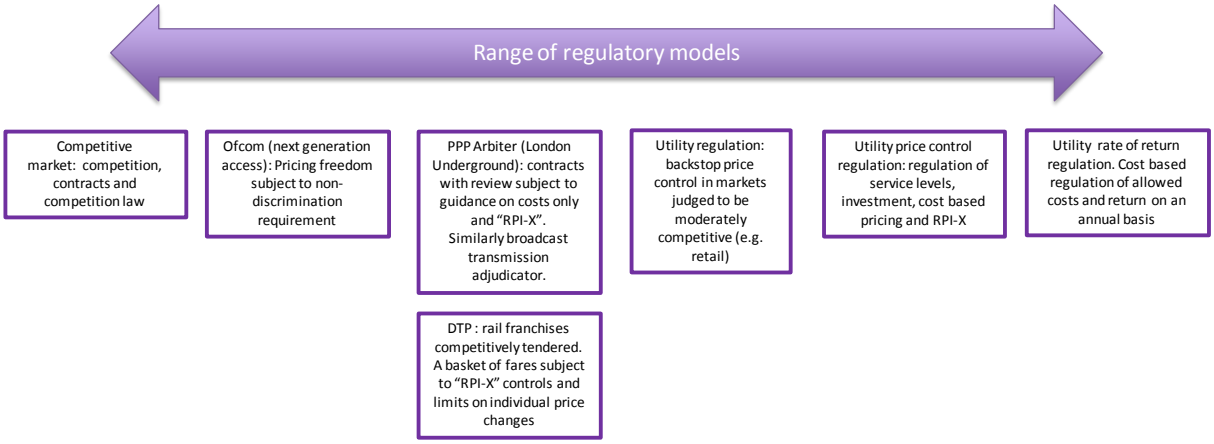
4 Comparison with other regulated industries

4.1 Introduction

In practice regulators of monopoly services apply a range of approaches where there is concern in relation to market power. Generally there is an attempt to incorporate incentives for investment, innovation and efficient resource allocation when designing regulation aimed at controlling potential abuse of market power. However, it is also recognised that where possible the minimum of regulation should be applied, since regulation necessarily involves a degree of second guessing of efficient outcomes, which tends to blunt incentives.

The range of regulatory models that could be applied is given in Figure 4-1.

Figure 4-1: Range of regulatory arrangements



In this section we consider three examples of different regulatory approaches in situations where there is concern about the potential exploitation of market power and make comparisons with the regulatory arrangements proposed for the PMSE band manager. The three examples fall into the following categories:

- Regulation of new services where the investment is private – next generation access.
- Regulation of privatised services that already exist - utilities.
- Regulation of services where there is franchise bidding – passenger rail services.

4.2 Next generation access

Ofcom, in considering regulation of next generation access for new built and over-lay investment, has been cautious about applying cost reflective price controls.[56] The reason for this is that such controls

[56] This is particularly the case for so called "active" services as opposed to passive infrastructure inputs. Ofcom. http://www.ofcom.org.uk/consult/condocs/nga_future_broadband/statement/

would require a lot of information in a situation which is new and where costs are either not known or are not common knowledge and where demand is highly uncertain.

Importantly, it is recognised that investors need the freedom to test the market and experiment, and that prices that reflect value may improve the prospects for efficient and timely investment compared to prices that simply reflect costs. In relation to overlay investment the existence of a lower grade broadband service offered over copper is seen as sufficient discipline on pricing, alongside a requirement that competitors be offered access to next generation broadband networks on the basis of equivalence i.e. they are offered access on the same terms and at the same prices as BT's own downstream services.

While this situation does not bear a close relation to that for PMSE, we note that some issues in relation to cost and demand uncertainty arise for the PMSE band manager. This raises the question of whether some kind of benchmark price might be applied rather than direct regulation. The obvious benchmark is the set of price and service commitments published by the winning bidder (albeit subject to the "optimistic bidder" scenario discussed above) at the start of the licence period as these will be competitively determined, and as such should be regarded as meeting a competitive benchmark (i.e. be FRND).

4.3 Privatised utilities

4.3.1 Networks

In long established utility industries such as water, gas and electricity distribution networks a different approach to regulation is adopted. The key elements of this approach are as follows:

- Overall revenues do reflect actual costs otherwise the business could not attract investment funds.
- An RPI-X price control is set every five years. The nature of the price controls has changed over time, with increasing complexities added to provide incentives for efficient operation and investment, rolling adjustment mechanisms, explicit terms for capital requirements and incentives for meeting service level targets[57]. For example, to provide incentives for innovation once the price control is set a company may outperform the price cap and a formula applies that ensures that no matter when savings are made between reviews, savings are in effect kept for the full five years (via the addition of an incentive allowance to prices at the next review).
- A high degree of averaging across customers is the norm. For example, customers of a given water company pay the same amount for water – either as an annual fixed charge or per unit charge on a metered basis – regardless of the differences in costs in serving them. Individual customer charges are not necessarily "cost reflective". Similarly, electricity price controls have been set since privatisation not to be purely cost reflective, but to also allow flexibility to reflect

[57] The regimes are reviewed in "Pipes and Wires, National Audit Office, 2002; The UK Model of Utility Regulation, CRI Proceedings 31, April 2003.

factors such as customers' willingness to pay for improved service, the cost of carbon, expected risk, and scope for out/under performance over the five years[58]

- There is no opportunity for individual customers to dispute their charge. In effect the regulator acts on behalf of customers at the periodic review every five years.

By contrast the PMSE band manager will be subject to periodic (3 yearly) price and service level regulation by Ofcom, charges and service levels will be subject to an annual review *and* its customers will be able to dispute their charges. The incentives under these arrangements will be much weaker than those applied to regulated monopoly networks.

Revenues for PMSE spectrum management currently amount to around £2m p.a.. While they may increase in future they will still be very small compared to

- Water sector revenues at around £9bn p.a. for England and Wales [59].
- Gas distribution network revenues for Great Britain which were £2.3 bn[60] in 2007/8.
- Electricity distribution network revenues for Great Britain were £3.5bn[61].

The price regulation proposed for the PMSE band manager is however more intrusive than that for these regulated utilities. This appears disproportionate given the sums at stake and the considerable difference in benefit to society between, on the one hand, the regulation of energy and water supply and, on the other hand, the regulation of the supply of spectrum to PMSE users .

4.3.2 Retail supply - gas and electricity

After privatisation of the gas and electricity supply markets, Ofgem set maximum price controls, all of which were removed in stages between 2000 and 2002. Since then, Ofgem has kept the energy supply market operation under continuous review but has not set any further price controls, limiting any intervention to recommendations or media campaigns. Ofgem's Energy Supply Probe in October 2008[62] and the consultations stemming from it leading up to new regulation in June 2009[63], however, has resulted in a partial form of price controls. The probe found instances of differential pricing, specifically:

- Geographic. "In-area" customers were charged significantly higher prices than comparable "out-of-area" customers. Although the cost differential was found to be only £3 per year, the price differential was £30 - the average net margin earned on an in-area customer was £36 a customer per year more.

---

[58] Ofgem. Electricity Distribution Price Control Review – Initial Proposals. 3 August 2009. http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR5/Documents1/Initial%20Proposals_1_Core%20document.pdf

[59] http://www.water.org.uk/home/policy/positions/finance-and-investment/overview-2009.pdf

[60] Ofgem. Gas Distribution Price Control Review – Final Proposals. http://www.ofgem.gov.uk/Networks/GasDistr/GDPCR7-13/Documents1/final%20proposals.pdf

[61] page 104, table 7.7 http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR5/Documents1/Methodology%20and%20Initial%20Results%20document.pdf

[62] Ofgem. Energy Supply Probe – Initial Findings Report. 6 October 2008. http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Energy%20Supply%20Probe%20-%20Initial%20Findings%20Report.pdf

[63] Ofgem. Addressing undue discrimination – Decision document. 26 June 2009. http://www.ofgem.gov.uk/MARKETS/RETMKTS/ENSUPPRO/Documents1/Addressing%20Undue%20Discrimination.pdf

- Product. Suppliers received higher margins on electricity supply than on gas, enabling former electricity incumbents to increase prices for standalone electricity customers while remaining competitive with British Gas in the dual fuel segment of the market.
- Types of payment. Pre-payment customers were charged higher prices than standard credit customers. Online prices were often significantly lower at first but changed rapidly afterwards and non-concurrently with other prices. There was a lack of transparency towards these changes.

Ofgem has argued that this price differentiation was too significant and unjustified and has therefore resulted in "undue discrimination", thus disproportionately harming vulnerable customers. In order to address this concern, they have decided to implement two new licensing conditions[64], one to address non-cost reflective differentials in payment methods and one to prohibit "undue discrimination".

The test for undue discrimination will be whether a supplier has offered materially different terms and/or conditions of supply to different groups of customers which cannot be objectively justified, as determined by Ofgem. When considering "materiality", Ofcom will consider timing (changing with a "reasonable" amount of time), scale and degree of impact on consumer (if it impacts on a "significant" number of consumers), and the detriment to vulnerable groups (should be "minimised"). This new regulation will thus require electricity and gas suppliers to implement a common, more cost-reflective methodology in their charges for customers although it will still allow them some flexibility within these controls.

Again the comparison with the proposals for the PMSE sector is instructive. For PMSE cost reflective prices are required at the level of the individual assignment rather than for groups of customers and there is no explicit test for materiality.

4.4 Passenger rail services

Passenger rail services are supplied under franchises which are periodically tendered[65]. A base service specification is provided by the Government and priced options are invited from bidders. The franchise contract is awarded to the bidder offering the best proposition in terms of price (i.e. minimum subsidy or maximum payment) and service reliability. Rail franchises have a duration of 5-8 years.

Increases in rail fares are regulated and capped by the Secretary of State for the markets where operators are likely to have a high degree of market power, such as weekly season tickets and commuter fares[66]. These fares account for around 60% of rail revenues, where total fare revenues are £6.7 billion. Regulated fares were capped at RPI – 1% on annual increases until 2003, when the Strategic Rail Authority conducted the first review of rail fares[67] since privatisation and adjusted the cap to RPI + 1%. These fares are regulated by means of fares baskets for which there is a set

[64] Ofgem. Addressing Undue Discrimination – Final Proposal. 15 April 2009. http://www.ofgem.gov.uk/Markets/RetMkts/ensuppro/Documents1/Addressing%20undue%20discrimination%20-%20final%20proposals.pdf

[65] http://www.dft.gov.uk/pgr/rail/passenger/franchises/aguidetotherailwayfranchisep3326?page=1#a1003

[66] Department for Transport. Delivering a Sustainable Railway. July 2007. http://www.dft.gov.uk/about/strategy/whitepapers/whitepapercm7176/hitepapersustainablerailway1.pdf

[67] Strategic Rail Authority. First review of rail fares since privatisation: Fares must keep pace with investment. 19 June 2003. http://www.dft.gov.uk/press/releases/sra/2003a1/2003a/treviewofrailfaressincep1290.pdf

maximum average fare, but within the baskets individual fares can be varied by up to 5% above the basic rate in any given year. The flexibility to vary individual fares will be removed in 2010[68].

The Government initially rescued failing passenger rail franchisees but has abandoned this policy though it now shares revenue risk with franchisees. However, despite these changes there have been two failures of franchisees on the East Coast Mainline in the last 3 years[69]. Most recently National Express has handed back its franchise on the East Coast mainline. It agreed to pay £1.4bn over the life of the franchise (2007-2015) with payments rising from £85m/year to £395m/year. It now faces a penalty of £32m. The two successive failures are suggestive of overly optimistic bidding and insufficient incentives to moderate this behaviour. This experience is indicative of need to pay careful attention to the design of franchise award processes and contracts so that bidders face incentives not to overbid or to walk away from contracts if they underperform.

In a similar way, the approach proposed for the PMSE band manager involves a prior competition to be the band manager and price regulation where market power issues exist, though rail franchisees appear to have more flexibility than the PMSE band manager. Potential overbidding issues arise in the context of the PMSE band manager award but have not been explicitly recognised in Ofcom's proposals. What would Ofcom do if its band manager failed due to 'Optimistic Bidder' syndrome?

4.5 Conclusions

Looking at the different regulatory approaches in the UK a wide range exists, as illustrated in Figure 4-2. The proposed approach to PMSE is at the more intrusive end of the range, with frequent review and limited opportunity to benefit from efficiency gains. This does not seem appropriate given the scale of the sector and the competitive determination of prices and service levels through the tender of the spectrum licences.

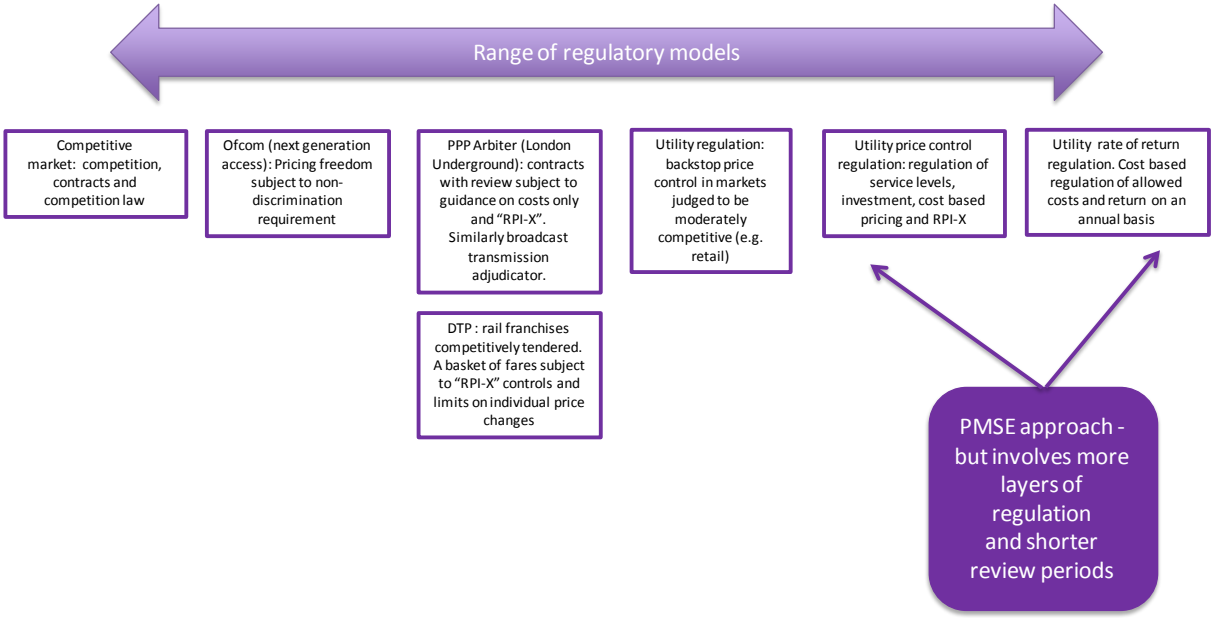
In this section we have considered three approaches to regulation, and have seen that they involve relatively little regulation in relation to next generation access and rail fares, and more intrusive regulation for the privatised utilities. Under the latter there is a strong assurance of cost recovery for owners, reasonable opportunities to benefit from outperformance and no opportunity for customers to individually "cherry pick" their terms and conditions or complain.

While the proposals for the PMSE band manager do not initially involve an *ex ante* price cap (though they may after 3 years), a de facto cap is set by the band manager's licence commitments (determined competitively) and then this may be tightened through annual reviews and as a result of customer complaints. We therefore conclude that the current proposals for the regulation of the PMSE band manager are as, if not more, intrusive than those for the privatised utilities and offer less assurance of cost recovery and weaker incentives for innovation and efficiency savings. This is disproportionate given that revenues for PMSE spectrum management currently amount to around £2m p.a., while those for regulated utilities are £9bn for water, £2.3bn for gas distribution and £3.5bn for electricity distribution.

[68] http://news.bbc.co.uk/1/hi/business/8206942.stm

[69] http://business.timesonline.co.uk/tol/business/industry_sectors/transport/article6616645.ece

Figure 4-2: Regulation of PMSE band manager vs other regulatory arrangements



A further consideration in relation to the PMSE band manager is the efficient allocation of spectrum. In this regard, the appropriate comparison is not necessarily with a regulated infrastructure owner where there is a problem of monopoly[70], but with someone owning and potentially trading spectrum where the problem is one of spectrum scarcity. The situation in relation to the PMSE band manager is different from that of a regulated infrastructure provider in the following ways:

- First, there is a prior contest to see who the manager will be.
- Second, one of the key considerations is ensuring the efficient allocation and reallocation of spectrum over time. For the band manager to engage in activities that achieve this outcome it must be able to retain a substantial fraction of any gains from trading spectrum to support continued investment in the development activities that sustain efficient spectrum use.

The proposed approach appears to treat the problem as though it were entirely a problem of monopoly (though without providing incentives for efficient operations via retained profits) rather than a problem of ensuring efficient service provision and efficient allocation of spectrum. In other words insufficient weight is given to Ofcom's duty to promote efficient spectrum use. A further observation could be made that if spectrum is scarce, this should be a short term problem where the solution is largely in Ofcom's hands.

[70] The problem with monopoly is that a monopolist has an incentive to under-supply and over-price. The lack of market benchmarks may also make it difficult for a monopolistic owner to monitor management's performance and provide strong incentives for efficient operations.

5 Actions to promote efficient spectrum use

5.1 Introduction

The creation of the band manager activity has the potential to lead to more efficient spectrum use through incentives to:

- Transfer spectrum to higher value PMSE users through the price incentives given by AIP.
- Transfer spectrum to higher value non-PMSE users, as the net revenues are unregulated.
- Make more intensive use of PMSE bands through better spectrum management, where this results in an increase in net returns.
- Acquire new spectrum in the market to support future PMSE uses.

As we have discussed in Section 3, regulatory arrangements aimed at protecting PMSE users blunt these incentives including:

- Requirements for Ofcom approval of all transfers of spectrum to non-PMSE uses.
- Regulation of returns to "normal levels" potentially at the level of individual assignments and potentially on an annual basis – both of which could result in below normal returns in aggregate.
- Lack of clarity concerning the treatment of spectrum purchases to meet PMSE demand.

AIP is expected to give an incentive to the band manager for the transfer of spectrum to higher value uses or its return to Ofcom. We note that in principle AIP is redundant here as a private sector band manager should have strong financial incentives to transfer spectrum to higher value uses and potentially sell surplus spectrum rather than return it to Ofcom (both actions would increase its revenues and so returns). AIP could however address issues of windfall gains which a band manager not subject to AIP (or any other payment for its spectrum licences such as an auction payment) is likely to enjoy given there is excess demand for a number of PMSE bands. In this section we discuss Ofcom's proposals for AIP, for final charges to users, and for the way the band manager will be allowed to ration spectrum demand, should excess demand occur.

5.2 AIP proposals

AIP estimates for the bands assigned to the band manager have been calculated using the following steps:

- Identifying bands where there is either excess demand from PMSE use or from an alternative use of the spectrum in 2010. A snapshot at 2010 was used in order to provide a cautious view of AIP[71].
- For those bands where there is excess demand the marginal benefit of an incremental block of spectrum to the relevant type of user was estimated.
- The marginal benefit estimates were adjusted down for uncertainty in the case of PMSE and geographic restrictions whether these applied to other uses.

[71] Chapter 6, Analysys Mason

- Taking a probability weighted average of the marginal benefits, where the weights are judgements of the probabilities that the use would occur.

5.2.1 Nature of demand and opportunity cost

Ofcom refers to the sporadic nature of PMSE spectrum use (in time and by geography) and how this means congestion may only occur for relatively short periods of time at specific locations. They state that this "*may often lead us to ascribing the opportunity cost of zero to that same spectrum*" (paragraph 6.23).

We do not understand how Ofcom reaches this conclusion. The reasoning is not given in the consultation document. We observe that if use is denied at a particular point in time or at a specific location then the opportunity cost of the spectrum will not be zero because the spectrum has value to the user denied access. Denial of access to the spectrum will mean that the user will either have to reduce output (or quality), incur additional costs in order to maintain output or lose flexibility in its spectrum use. In all cases there is a loss of value implying a positive opportunity cost for the spectrum. To estimate the own use opportunity cost the nature of the loss needs to be assessed and its cost estimated.

It is important to emphasise that just because excess demand occurs for relatively short time intervals and in specific locations the opportunity cost is not necessarily low. For the use that is denied may be of very high value. Peak load pricing of access to many resources (e.g. electricity, airport slots, seats on trains) reflects this fact.

5.2.2 Demand assessment

Market prices are forward looking in the sense that they embody information about future demand and value. In principle, AIP estimates should also be forward looking in the sense that they should take account of available information on anticipated demand growth (positive or negative) that may arise for example from technology change, economic growth, relative price changes, the availability of substitutes etc. Only assessing PMSE demand in 2010 is likely to give a misleading picture of future demand and hence spectrum opportunity cost, as considerable growth in PMSE demand in a number of bands is already anticipated[72]. This growth is caused by the refarming of some bands historically used by PMSE, general sector growth and the advent of high definition and 3-D video formats.

For example, one surprising result reported by Ofcom, is that there is no congestion for PMSE use at 2GHz (and so zero opportunity cost in two of the three 2 GHz bands) [73] . Considerable additional demand for these frequencies seems likely to come from the known future closure of 2.6 GHz and 3.5 GHz for PMSE use. Quotient Associates (2006)[74] found that "*There will be substantial shortages of spectrum in the range 2-10 GHz arising from increased use of video links and digital transmission*". In addition, in its July 2008 consultation (para 8.42) Ofcom found that 70% of the 2GHz band was congested and this was likely to mean that some users would either have to use 7GHz spectrum or satellite to meet their needs for wireless cameras.

[72] http://www.ofcom.org.uk/consult/condocs/ddr/reports/quotient_associates.pdf

[73] Para 6.46 – Ofcom suggest that at 2 GHz no equipment rendered unusable, because of the wide tuning range of the equipment means other frequencies could be used. This is not the conclusion reached by Analysy Mason.

[74] Op. Cit.

A summary of the findings from Analysys Mason's analysis of demand and potential alternative uses of the 2GHz band is as follows.

	Marginal benefit for PMSE	Possible alternative use	Marginal benefit in alternative use	Opportunity cost conclusion
2GHz low	£1020/MHz[75] – high demand	Fixed links	0 – no excess demand likely	0 – estimate in own use is thought to be low and as such could be zero within likely margins of error
2 GHz mid	£1020/MHz[76] – high demand	Wireless telecoms	£5m	229k (assumes low probability of use by wireless telecoms)
2GHz high	0 – low demand	Fixed links	0 – no excess demand likely	0

Analysys Mason successively reduce the value of the 2 GHz low band from their initial calculated values. Two arbitrary downward adjustments are made:

- The originally calculated number is reduced to 20% of its value on the grounds that the initial calculation is likely to be an overestimate.
- The resulting value is regarded as small and uncertain and so it is concluded that the value is around zero.

Concerning the second point we note that while the value of around £1,000/MHz is small a much lower value per MHz was obtained for the 7 GHz band (£178/MHz) and it is not proposed that this is set equal to zero.

5.2.3 Implications

The net result is that AIP estimates reported by Ofcom are likely to be below actual opportunity cost and so will have little impact on rationing demand in those bands where excess demand is anticipated. Furthermore the estimates derived will be phased in over time. While erring on the low side clearly supports Ofcom's desire to protect PMSE users from disruptive price changes it is unlikely to support Ofcom's duty to promote optimal spectrum use. It also means that the band manager will have to use non-price approaches to ration demand (see section 5.4).

5.3 Final charges to PMSE users

Ofcom proposes that final charges to users should be set as follows:

- Where AIP is zero, charges should reflect the costs of spectrum management.

[75] 20% of the calculated value of £5,100/MHz was taken, p68.

[76] 20% of the calculated value of £5,100/MHz was taken, p68.

- Where AIP is non-zero, charges should equal AIP less a reasonable estimate of the band manager's operating costs on the grounds that the latter are already included in the opportunity cost estimate because the spectrum is already managed.

Leaving aside issues raised in the previous section concerning the AIP calculations, we note that Ofcom's assertion that the opportunity cost calculations already include spectrum management costs is in some cases questionable. For example, in the case of the UHF band the estimates are based on auction results from a variety of countries some of which charge additional annual fees to cover spectrum management costs. Also estimates for PBR are based on the costs of moving to a less congested frequency band - spectrum management costs will be incurred in both congested and uncongested bands.

Where AIP is applied the administrative issue of how Ofcom determines the spectrum management costs that will be deducted from its AIP charge needs to be decided. Aggregated and disaggregated approaches are considered. The aggregated approach involves more approximations and so incentives are blunted but it is simpler to calculate and so should have less administrative burden. Given that AIP values are set very conservatively and the band manager will have flexibility over the way fees are structured[77] any approximations at this stage would seem unlikely to have a major effect on incentives. This suggests an aggregated approach may be preferable.

5.4 Rationing demand

In frequency bands where excess demand from PMSE or other uses is anticipated the proposed charges to users will be below the estimated opportunity cost. Ofcom considers the use of short term price measures to choke off excess demand but concludes "*this would distort the pricing objectives we set out in our AIP phasing proposals*"[78]. Instead it favours quantity controls (at least for the first 3 years of the band manager's operations) that would be imposed by the band manager. Ofcom expects these controls to be administered in a "*fair manner... that enables most PMSE users to deliver their services at a reasonable quality level*"[79] even though this is recognised to be less efficient than price rationing. This proposal is made on the grounds that it better promotes protection of PMSE users and this objective is again given more weight than Ofcom's duties in respect of optimal spectrum use.

Ofcom does not specify the approach the band manager may use to control demand but notes some options including first come first served, authorisations proportional to demand and case by case assessment[80]. There are problems with all three approaches:

- The short comings of the first come first served approach where there is excess demand are well known – it leads to users hoarding spectrum in case future access is denied.
- If authorisations were proportional to demand then all users would clearly have an incentive to over state their requirements in the knowledge these would be cut back - further exacerbating the apparent congestion problem.

[77] Para 3.34

[78] Para 3.37

[79] Para 3.38

[80] Para 4.89

- A case by case assessment would drive up the band manager's costs, introduce uncertainty as to whether the requirements for non-discrimination had been met, and would therefore be likely to drive up complaints (and hence incur additional costs).

We anticipate that the band manager is going to be in a difficult situation here given that all users may dispute its decisions and it has the rather vague requirement to act in the interests of the PMSE sector which gives no guidance as to how to make trade-offs between the interests of different PMSE users.

We therefore suggest Ofcom reconsiders its conclusion that non-price means should be used to ration demand, on the grounds that:

- This will not promote efficient spectrum use (because of hoarding and perverse incentives on users to overstate their requirements),
- This (by definition) cannot satisfy all users' requirements (because there is excess demand).
- This could lead to additional administrative costs if the band manager's decisions are disputed.

5.5 Conclusions

The main tool available to the band manager for incentivising more efficient spectrum use by the PMSE sector is in charges levied on PMSE users. A major element of these charges will be the band manager licence fee set by Ofcom. Ofcom proposes to set this fee based on estimates of the opportunity cost of spectrum. However, the approach taken to determining whether bands are likely to be congested, the approach to determining opportunity costs, the long phase in periods and the approach to setting final charges to users are all very conservative. This means that rationing by price is unlikely to be effective and quantity rationing by the band manager will be required whenever congestion occurs. In doing this the band manager will have to make difficult trade-offs between the spectrum needs of different PMSE users. The regulatory framework proposed by Ofcom gives no guidance on how this should be done.

Given the potential for disputes brought by users who are denied spectrum access (on FRND grounds) this aspect of Ofcom's proposals makes the band manager proposition even less attractive to potential bidders. It is also directly counter to the general thrust of Ofcom's spectrum strategy in which price signals are intended to replace administrative decisions in order to promote optimal spectrum use.

We therefore suggest Ofcom reconsiders its conclusion that non-price means should be used to ration demand, on the grounds that:

- This will not promote efficient spectrum use (because of hoarding and perverse incentives on users to overstate their requirements),
- This (by definition) cannot satisfy all users' requirements (because there is excess demand).
- This could lead to additional administrative costs if the band manager's decisions are disputed.

6 Possible way forward

We have concluded that the proposed arrangements for the regulation of the PMSE band manager:

- Appear to be at variance with Ofcom's statutory duties in respect of promoting the interests of consumers and citizens, because of the high weight given to the short term interests of the PMSE sector.
- Will contribute little to promoting efficient spectrum use because incentives to innovate in changing spectrum use, through price or non-price means, are blunted by regulation aimed at protecting PMSE users.
- Involve too many layers of regulation. A less intrusive approach would take competitively determined licence commitments as the basis for price and service levels for the initial three years of the licence. A user dispute mechanism would not then be necessary and annual reviews could be limited to data collection.
- Are likely to involve a considerable administrative burden associated with the derivation of cost reflective prices to the level of individual assignments, the setting up of external independent dispute procedures and the prospect of regular annual performance reviews.
- Are disproportionate given the small scale of the cost base being regulated (i.e. around £2m p.a.).

More generally the proposals do little to advance a market-based approach to spectrum management. On the contrary, they may inhibit the further transfer of Ofcom's day to day spectrum management activities to the private sector.

To address these issues we suggest that Ofcom considers the following much simpler approach to dealing with the problem of monopoly:

- Use the commitments made in the band manager tender process as the basis for the charges covering spectrum management costs and for service levels for the first three years of the licence. This is a better competitive benchmark than one derived by Ofcom second guessing whether costs and returns have been reasonably incurred.
- Remove the option for users to dispute charges and service levels. This is now redundant. Incentives for efficient operation would be strengthened as adequate returns could be earned.
- Remove the requirement for independent adjudication, which adds an unnecessary layer of costs.
- Collect annual information on the band manager's costs, charges and service levels as part of monitoring compliance with licence commitments at the annual review, but do not reopen the initial licence commitments.
- Apply a rolling incentive mechanism when resetting AIP and spectrum management charges at the three year review.

This approach provides protection to PMSE users while keeping administrative costs down, and gives the band manager incentives for efficient operation.

Otherwise there seems little to be gained by moving from the status quo position in which the private sector undertakes day to day management of frequency bands allocated to the PMSE sector. For the low initial levels of AIP will do little to incentivise efficient spectrum use and the administrative controls

around the transfer of spectrum to non-PMSE use mean few spectrum use efficiency gains can be expected in the first three years of the band manager licence.