

SCF Associates Ltd

OFCOM spectrum audit

Annex B

Consultation Questions Comments

Responding to the consultation

Basic Principles guiding replies to the consultation questions

It may be useful when judging future usage patterns of devices accessing the radio spectrum that the each of questions posed here is viewed from the perspective of a specific set of tenets, possibly somewhat different to those employed traditionally:-

1. As spectrum becomes shareable with modern signal processing it is becoming less useful to consider it as a piecemeal distribution of specific segments. Furthermore it is dynamically assignable with the advent of cognitive and software defined radio.
2. However, it could well be put forward that this view of a shareable continuity might be mitigated by protected bands for certain specific usages where it can be clearly shown that even low interference at key times might be life threatening. There are very few of these. One example might be ILS/MLS. In these cases, usage of the band would be restricted to a sole application. Such exclusion cannot be justified for those applications that only sustain life-supporting services but do not threaten life by momentary absence or slight degradation - for instance SSR/ASR, or met radar, or VOR/DME.
3. Behind all our comments is the assertion that UK and European industrial strength is more important than short-term repairs to UK public sector deficits.
4. Many of the intrinsic assumptions behind Administered Incentive Pricing and market views of spectrum (pursued as a move away from spectrum regimes which are based on administrated command and control) see it see it as a field of wheat, a parcel of land - a commodity to be traded. But is it more valuable to the economy than that, just a taxable good?¹

Band specific

1. To judge potential demand, we would welcome views on the bands highlighted – listed in Annex C and detailed in the chapters on Ministry of Defence, Aeronautical and Fixed Links. Would possibilities for
 - (i) sharing (including time limited and ad hoc sharing) or
 - (ii) freed up bandwidth in these bands be of interest to other users?Are there other bands the Audit should examine?

SCF Associates Ltd reply:-

i) **FOR SHARING** - Sub-divisions in all bands in question should be examined for parts that may be used and/or aggregated into unlicensed spectrum territory (**FREE sharing**) – especially for ad hoc sharing; NB some bands may have to be wide or else tolerant of openness to shared signals of low power/unit frequency for sharing signals with extensive frequency domain side lobes, for instance in

¹ This is the question we are currently considering in a comparison of the three economic models of spectrum allocation and which we hope to report soon.

the case of some UWB technologies. Note that the key problem is more one of the perceptions of the incumbent controlling stakeholders than real issues of signal identification, if sharing with low power density spectrum signals, i.e. dBMs of $<10E-5$ watt/ Hz. This would also call for certification of equipment and suitable type-testing.

ii) All bands in light of coming technology advances- with a perspective of 5-10 years for all AWTs (see IPTS/JRC/EC, MEWTAD final report September 2005).

NOTA: in the light of recent digital signal processing techniques and others stretching back over some 40 years, the questions of spectrum overlap and sharing may need to be far more seriously, widely and deeply addressed.

Public Sector Spectrum: acquisition and trading

2. Do you agree that public bodies should in general expect to meet future spectrum needs through the market? Are the process and criteria outlined a suitable means of deciding whether an administrative assignment should be made if this is not possible?

Adding to public sector costs through charging for spectrum is highly questionable, on public sector budgetary grounds, especially if avenues are open in the unlicensed stretches of bandwidth, for free usage, with suitable sharing and security measures. Moreover competing for spectrum in a commercial market will have a pressure-cooker effect on the scarcity rent impacts of applying markets to spectrum, driving speculative pricing for secondary market resales.

Moreover, where public bodies are meeting a collective need that cannot be met by commercial market forces, for instance in emergency services, then the question is not one of paying a market price. It is a question of how little spectrum is sufficient. And then policing the bandwidth for:-

1. assuring that the range of bandwidth allocated is still necessary in the light of technology's continued advances in the specific technical domain employed (e.g. digital trunked radio for police forces)
2. ensuring robust signal processing techniques are in place to allow the degree of sharing decreed (may be zero sharing, but unlikely)

Previous large-scale spectrum auctions have not always been positive for the UK supply-side of the economy or for technological progress. So applying commercial market forces to a publicly owned commodity cannot be said to be successful. Markets learn. The exercise may not be repeatable. See the paper "Is fourth Generation mobile nirvana, or nothing" for a first hand exposition of the impacts of the UK 3G auctions. [Info Vol 6, No. 1, Aug. 2004]

3. Public sector demand: We would also welcome input into this consultation on likely future demand in the public sector and fixed links areas we have covered in this document.

Requires examination of demand in the light of new radio developments and usages with non-cellular mobile, WLANs, WMANs, etc :-

- Advances in usage of AWTs by non-operator centric bodies, e.g. for municipal nets - so that what is the 'public sector' may expand
- Use of fixed links may expand for low-cost backhaul from new AWTs- again unlicensed conditions would apply

4. Commercial market intelligence: In order that we do not overlook important future requirements below the 80% of users that our demand study is examining, we would be interested to hear views on likely future commercial demand, specifically those which may fall below the scope of the commercial study.

Examine AWT market – will drive both users and operators. See for instance :

- For socio-economic demand factors – EC/JRC/IPTS (<http://fms.jrc.es>)

- EC/JRC/IPTS Mapping European Wireless Trends and Drivers reports WP2B-1, WP2B-2, WP2B-3

5. We would welcome views on what information Ofcom could usefully collect in furthering its role to ensure the efficient use of public sector spectrum

Perform socio-economic study of future uses of radio.

Examine AWT market – will drive both users and operators. See for instance :

- Again review the socio-economic demand factors – EC/JRC/IPTS (<http://fms.jrc.es>) for reports and methodology for demand analysis, as one EU input to ITU's WRC-07 spectrum management debate for the global spectrum allocation in 2007
- EC/JRC/IPTS Mapping European Wireless Trends and Drivers reports WP2B-1, WP2B-2, WP2B-3

6. Licensing: We would be interested in views on the treatment of the Crown. Do you agree with the idea of using Recognised Spectrum Access (RSA) to define the rights of bodies covered by Crown immunity and enable tradability?

Exceptions would need to be clearly justified on purely economic grounds. There seem to be none.

Spectrum Pricing

7. Effectiveness of AIP:

- Do you agree that AIP should remain a primary mechanism for achieving efficient use of public sector spectrum?
- Do you think there is merit in these or other alternative mechanisms to achieve efficient use of public sector spectrum, in addition to or instead of AIP?
- How is this affected by Ofcom's proposals to move to greater market management of the spectrum?

AIP (as suggested 1996, Smith-Nera) is one market pricing method for assigned bandwidths and across allocation usages by measuring marginal benefits. However the larger question is whether even in areas of market- style management of spectrum, if a socio-economic balance is not called for. This is not new - see for instance OECD, 1992, L.Benzoni, E.Kalman (ENST), *Information computer communications policy-33 "The economics of radio frequency allocation"*. The key balance here is laid out in the seminal paper, from Telecommunications Policy, *The radio spectrum and the organisation of the future: new allocation approaches*, Feb 1996; which reviews auction mechanisms- and is interesting for consideration of impacts of 3G auctions in Europe.

Thus there is merit in alternative more balanced mechanisms to achieve efficient use of public sector spectrum, instead of AIP. Other techniques are explored in more recent studies of far wider analyses of spectrum allocation and assignment mechanisms – see for instance the FMS work mentioned above and also analysis of new work on the economics of analogous software regulation policy to be published [details on application].

8. Do you agree that there is merit and potential benefit in exploring changes in AIP:

- To ensure the prices are kept up to date and reflect the current alternative use (e.g. bands currently charged as fixed which may be suitable for future mobile use)
- To better reflect the real 'spectrum value curve' in and outside prime bands (c.f. band factor applied to commercial fixed links which is not applied to MoD fixed spectrum)
- To provide a stronger incentive to public bodies to make more efficient use of their holdings (e.g. disposal or sharing; accounting changes that could best tie costs directly to use)

There is merit in pursuing complete alternatives, not modifications.

9. The Audit therefore thinks it is worth exploring the possibility of introducing a system of 'freehold rents' or 'retainers' for bands which the MoD is not currently using but continues to hold a right to reclaim and would welcome views on the economic rationale for and possible level of such a charge.

Tread most carefully. Additional scarcity rents could stifle innovation and hence usage, especially in the 2 - 9 GHz bands. Judicious prudence might indicate open spectrum.

Sharing

10. Would the existence of a third party intermediary to facilitate sharing between public sector organisations and other public/commercial bodies be likely to increase the possibilities afforded by sharing? What roles should such a body have? Would individual users find it useful to be able to negotiate over sharing/trading arrangements either directly with the MoD or organisation acting on their behalf?

Better would be an 'Open-Spectrum' Guardian and Ombudsman who looks both at spectrum allocation and equipment from the point of view of sharing.

11. The Audit team would welcome any views on how existing users can be assured that sharing will not compromise ongoing safety-critical or essential use, including through equipment standards, testing, management of liberalisation and appropriate operational and technical parameters.

Standards on power emission and failure modes with type testing leading to certifications.

Behaviour on failure is the particularly sensitive point.

12. The Audit would welcome any views on the effectiveness of the current T&D licence regime and how this might be improved. It would also welcome views from existing users on how much flexibility here would be considered reasonable.

No comment – except that as Test and Development licences are granted on a non-interference basis (if they cause interference to other users they must cease transmitting immediately) they may be used on a test basis for investigating spectrum sharing. What is 'interference' needs to be defined in this case – not just that a signal can be seen on a spectrometer.

13. The Audit team are interested in the potential for more sharing in the bands used by the public sector. Are there techniques or services in which you believe there is particular potential? For example, what are your views on the technological, operational and economic feasibility of sharing between radar and other technologies?

A serious investigation is worthwhile, especially for military techniques (such as chirp radar) with the migration of military target detection and signaling techniques into civilian use. The investigation needs to be on a case by case basis. It should look at all usages including space based applications.

Ministry of Defence

14. What impact does the possibility of restrictions to be imposed in a time of civil emergency have on the attractiveness of sharing MoD spectrum?

The advantages of new AWTs may well outweigh the capabilities in cost, coverage, latency, resilience, roll-out delay and security of current services in times of a civil emergency, especially for Mesh systems. For example, see the discussion of combined AWT network operations for civil emergencies in the EC/IPTS/JRC MEWTAD report, of security as a driver, report WP2B-1.

Radar

15. Do you agree with the principle that AIP should be introduced for (i) aeronautical and (ii) maritime navigation radar? If so what are your views on the best way to determine and impose AIP charges on radar?

As for reply 9.

16. Do you think there is scope through means other than pricing (e.g. technical regulations, better co-ordination) to enhance the utilisation and economic efficiency of radar bands.

As for reply 9 and 13; reply 12 is relevant, especially on interference.

Fixed links

17. The Audit team would like to hear from any prospective band managers who have considered band management in a fixed links band, to hear views on potential barriers

Technical study required

18. We would welcome views on the merits of the listed approaches to regulator intervention

More study required. Analysis of regulator intervention in South Korea² and elsewhere to stimulate innovation and economy could be could be instructive.

19. We would welcome views on whether a Technology “Spend to Save” scheme would be of benefit, and views on the Spectrum Efficiency scheme generally, including whether its scope could usefully be expanded

As for reply 18.

International

20. We would welcome views on whether the issues highlighted accurately represent those likely to be key at an international level in taking forward the Audit’s interests as outlined in this consultation document.

Certainly the issues here reflect on many touched on at an RSPG and ITU level. However :-

- **The ITU level seems more concerned with new mobile radio services (‘B3G’) and potential markets, and also perhaps with AWTs at the short range as much as the longer ranges.**
- **Careful attention is now paid to socio-economic demand profiles going forward, in CEPT, EU and ITU.**
- **There seems to be much debate around ‘open spectrum’ (unlicensed bands) especially in the USA.**

² IPTS/JRC/EC MEWTAD report WP2C, AWT case study of South Korea