

RADIO SOCIETY OF GREAT BRITAIN



Independent Audit of Spectrum Holdings (IASH): Emerging Issues

Formal response from the Radio Society of Great Britain.

August 2005

1. About the Radio Society of Great Britain

The Radio Society of Great Britain (RSGB, www.rsgb.org.uk) is the recognised national organisation that represents the interests of the UK's 60,000 licensed radio amateurs. Formed in 1913, The Society is recognised as one of the leading organisations in the world in the field of amateur radio. It collaborates within its fellow national societies via the International Amateur Radio Union (IARU).

2. What is Amateur Radio?

Amateur radio is a science based technical hobby enjoyed by over three million people worldwide. Amateur radio is recognised by the International Telecommunication Union (ITU) as a service and is listed in the ITU Radio Regulations as the Amateur Service and the Amateur-Satellite Service. For a fuller introduction to Amateur Radio and sharing issues with the Public Sector, the reader is referred to the RSGB's earlier submission to the Spectrum Audit [1].

One important aspect of Amateur Radio we would highlight is its role for emergency communications, which complements the Public Sector Services. In the UK the Radio Amateur Emergency Network (RAYNET), established for over fifty years, is working with the CSIA unit of the Cabinet Office in response to the 2004 Civil Contingencies Act. Its groups provide cover at public events across the country every week of the year in support of those organisations named as the 'User Services' in the UK Amateur Licence [2].

3. IASH Emerging Issues Response

The RSGB welcomes the opportunity to make this submission to the Spectrum Audit Team, and looks forward to further engagement and discussion. Our response follows the questions set out in the consultation document for issues that are relevant to the Amateur Services.

We would be pleased to provide any further information or amplification of any aspect of this response.

Permission is granted for a copy of this response (and our previous one [1]) to be placed in the public domain such as on the Spectrum Audit website.

Band specific

Q1. *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?

Amateur Services currently share in a number of bands but with varying degrees of restrictions from CAA/MoD, and interference from other services. We desire enhanced protection and ideally interference-free Primary Allocations on just 5-10MHz wide blocks (on a harmonised European basis) within the microwave band (1.3-10GHz) allocations listed in Table-1. Should these Primary slots be granted, activity could be concentrated within them, and occupancy in the far wider Secondary allocations could be significantly reduced, simplifying sharing for others. These new Primary spectrum 'National Parks' could stimulate considerable Amateur interest, and incubate future generations of UK rf engineers and spectrally efficient techniques. These new Primary slots would thus have wide technical, training/educational, and socio-economic benefits for the UK as a whole.

Within the lower frequencies listed by the consultation document, the 70-70.5 MHz band is allocated to the Amateur Service on a secondary basis in the UK This band is the focus of an IARU target for harmonised use internationally.

Trials of equipment for RAYNET Emergency exercises have shown that L-Band is also ideal for rescue operations in tunnels etc., giving improved performance compared to UHF equipment in the 430MHz band. It is ironic that both the 430 and 1290MHz bands are subject to severe restrictions by some Primary Users at the expense of other government endorsed objectives. This inhibits the development, by voluntary emergency services, of rapidly deployable or standby systems. In the 1290MHz band, UK distributors are also unwilling to certify imports due to these restrictions which are suppressing market demand.

Public Sector Spectrum: acquisition and trading

Q2. *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?*

We are pleased to note that the audit does recognise that 'the market' cannot cater for all circumstances and has outlined an administrative assignment procedure. This single question covers a very large policy area. We therefore believe it should be the topic of a more specific consultation (with a longer time period as per the Ofcom 3-month process). Issues relating to safety-critical and emergency services, and civil contingencies, will need to be considered.

In this context, we wish to highlight that some emergency services (including Radio Amateur ones) are from the voluntary sector but need to inter-operate with those in the public sector. These organisations include RAYNET, RNLI, St Johns Ambulance etc. and their spectrum needs are unsuited to market mechanisms.

In the meantime, we would ask for clarification regarding 'international obligations'. There are examples in the amateur bands where international assignments have been made yet UK allocations do not reflect them, or are so restricted as to make them unusable.

Q3. 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.*

The following observations may be helpful:-

Public Sector Demand: We expect public sector organisations will naturally wish to employ higher data rates similar to those in the commercial arena. Examples may include greater use of real-time telemetry/video by the NHS/Ambulance/Emergency services and the automotive/highways sector.

Whilst we cannot comment in detail, the publicly stated goal of greater 'Network Enabled Capability' by the MoD (and probably similar by Police and Security Services) presumably creates additional demands for wireless communications, sensors and higher resolution radar.

One other uncertain area is the extent that the Galileo E6 band (1260-1300MHz) band which supports Commercial and Public Regulated Services will be exploited, as this may have major implications on L-Band spectrum users.

Fixed links: We are not aware of any overall public guidelines or national strategy for fixed links. Amateur organisations have experienced considerable sharing problems with MoD fixed links in relatively low frequency bands such as 430 and 1297MHz. We would be pleased if the audit team reviews links in lower bands and consider the benefits of migrating such systems to other bands that have surplus capacity.

Q4. 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.*

As per Q1 we highlight our aim to achieve exclusive Primary status for small slots in our bands on a harmonised basis. Of the applications mentioned in the consultation document, we would expect that terrestrial HDTV could see significant new demand by the general public. One area that is not mentioned is whether road vehicle telematics requires additional spectrum below 15GHz other than the small slot at 5.8GHz.

Most other demand relates to relatively short-range systems for voice/datacomms many of which patch into fixed copper/fibre networks. The existing 2/3G cellular bands, the new 2.5-2.69GHz band, 5GHz FWA/LANs should surely be sufficient for most future demands for voice/datacomms, perhaps supplemented by UWB and some 4GHz spectrum in the medium to longer term. Along with other short-range devices, we believe that there is considerable scope for frequency re-use within this large amount of spectrum, which can limit overall demand. We look forward to seeing the Detailed Demand Study. In the meantime we observe that an increasing variety of systems are chasing a relatively finite commercial market which will inevitably saturate, and place a natural limit to spectrum needs.

Q5. We would welcome views on what information Ofcom could usefully collect in furthering its role to ensure the efficient use of public sector spectrum

Ofcom handle Amateur Applications for unattended Beacons, Repeaters etc. in shared bands. Our experience is that they have sometimes not provided key information to/from Primary users, which would facilitate the initial applications and avoid the high rate of objections. Data on frequency, location, geographic screening, usage factors (with typical, rather than theoretical, maximum powers) and established sharing history should be taken into account. This could prevent overly conservative views being taken by certain Primary Public sector users. We generally would welcome any development that improves relationships and understanding between band users, facilitates applications in shared bands, as well as more regular status updates on applications submitted.

Q6. 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?*

There are no practical examples of RSA in use and we are aware of widespread industry opposition to the concept as exemplified by the responses to the recent Ofcom Radio Astronomy consultation. Given that RSA is unproven, and seems to lack general support, it may be far better, more transparent and equitable for Public Sector bodies to be licensed in a more conventional manner. This would ease comparison with commercial and civil users such as ourselves.

Spectrum Pricing

Q7. Effectiveness of Administered Incentive Pricing (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?*

If anything we have observed tighter restrictions and less sharing by MoD and CAA in the 430 and 1290MHz bands than in past years. The Amateur Services are, by international definition, non-commercial in nature and exempt from AIP [3]. We are concerned lest AIP be directly passed down in bands we share.

Rather than generating an unwieldy, bureaucratic and potentially injurious overhead, any use of AIP should be on terms where rebates may be claimed from sharing, including sharing with Amateurs.

We also note that a significant proportion of Ofcom income is now derived by AIP (noticeably £55m from MoD), which would be expected to shrink in a future with increased sharing. This leaves us concerned that resources for spectrum management, co-ordination, and interference investigations will be further undermined.

Q8. 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)*

and

Q9. 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.

Given that AIP is a fact and may be extended further, we believe it would be useful for organisations who are subject to AIP to be able to claim an increased discount or benefit from some form of 'sharing algorithm' if they pro-actively share with the Amateur Services. This may prove useful to unlocking some of the restrictions we currently face in the 430 and 1290MHz bands, and encourage a full release of the 70MHz band. It would also fit with our long-term goal of obtaining small bandwidth Primary microwave allocations.

Sharing

Q10. *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?*

The RSGB and RAYNET currently do liaise directly with public sector organisations, including MoD and the Cabinet Office. Any new body should have a duty to facilitate spectrum sharing. However, this is countered by our concern at the possibility of a longer and more complex chain of communication, what authority the new body is endowed with, and its funding source and measures of performance.

Q11. *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.*

Thorough definitions of what services are safety-critical, as opposed to essential, or just useful, would be helpful. For the moment, we have made some reasonable assumptions.

Clearly some form of Co-ordination or Command & Control is needed within safety-critical spectrum areas, so for example we consider the use of license-exempt systems to be potentially unsuitable.

Most Amateur operations are on a 'Listen before Transmit' basis (now fashionably called 'Detect and Avoid') and are narrowband in nature (i.e. <25kHz bandwidth). The Amateur Services are very aware of their responsibility when they share spectrum with other users. This is particularly true where we share within the 1290MHz Air Traffic Control Radar band (i.e. a Public Safety Service). This is a relatively rare sharing example that the audit may wish to discuss with us in more detail as we believe there are no examples of harmful interference occurring.

All Amateur Repeater systems are to a specification agreed with Ofcom. UK amateurs have ~140 voice repeaters in the shared 430MHz band with smaller numbers in higher microwave bands including the 1.3, 2.3 and 10GHz bands. Repeaters and Beacons broadcast their callsigns and location in CW-Morse at least every fifteen minutes, making them easily identifiable to other users.

In the 1290MHz 'L-Band' there are ~40 fixed frequency systems (mainly TV Repeaters plus some Voice Repeaters and a few Beacons), with more desired and others already tested. Unattended systems have provision for shutdown within 30minutes of a request from Ofcom. The shutdown mechanism in the past has been a manual one, but in recent years remote control has been mandated and implemented for all repeaters (from HF upwards) which permits far faster shutdown times. Shutdown lists are held centrally by the RSGB and local Ofcom Spectrum Management Offices. Automated systems could be further developed if necessary. Similarly modern Amateur propagation Beacons (some of which are known to be used professionally) are capable of exploiting GPS or MSF locked crystal frequency sources making them highly accurate and capable of being discounted by modern DSP.

In our response to Q5, we advocated increased use of realistic and detailed data and parameters as being conducive to sharing, as well as historical evidence from existing systems. It would also be helpful for any co-ordination procedure or assessment software to be made available. The RSGB welcomes opportunities to be involved in any trials to assess sharing potential and actual interference levels.

Q12. *The Audit would welcome any views on the effectiveness of the current Test & Development (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.*

One area that could be made more flexible is to consider an automatic right to self-manage T&D, propagation research beacons and other forms of experimentation in Primary Allocations without prior approval by Ofcom. This could be on the basis that suitable data and/or identification signals are provided to assist co-ordination with other users.

Q13. *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?*

Our own experience shows that some objections to Amateur equipment emissions are overly conservative, despite their generally 'Listen before Transmit' nature.

Bluetooth and some WLANs feature Dynamic Frequency Selection, Transmit Power Control and 'Detect and Avoid' schemes. Software defined radios do enable cognitive techniques, but current radar is not cognitive-aware. In summary we believe these techniques are not sufficiently mature, cannot cope with the hidden terminal problems and weak signal flux receivers, and sharing with radar raises distinct issues.

Overall, there is modest scope for sharing as Amateurs have shown in L-Band, but this is restricted and we would advocate far more research in this area.

Ministry of Defence

Q14. *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 Amateur Services already co-exist with such conditions. However similar restrictions may not be attractive for commercial users who need to offer a guaranteed Quality of Service. Most end users are probably unaware of such possibilities as little mention is made of this in advertising or contracts for services, which would of course undermine the commercial offering.

Some of the current restrictions at present impede Amateur Emergency developments such as RAYNET, as well as repeaters and propagation research, and are thus inadvertently counter-productive to the overall public good.

Radar

Q15. *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?*

Introducing AIP for aeronautical radar would either compromise a Public Safety service or simply result in the cost being passed onto airline passengers, neither of which would achieve the original intention. Given that both aeronautical and maritime radar bands are internationally allocated and used by non-UK platforms within UK airspace/waters, we see that this raises many unanswered questions.

However should AIP be introduced, we refer back to our response to Q7/8/9 in which a sharing discount is built in to the pricing algorithm to reflect and encourage Amateur usage.

Q16. *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*

Using Pricing alone for radar seems far too simplistic and we support technical R&D, co-ordination etc to improve sharing within radar bands or to improve their basic spectral efficiency.

Primary Radar is inherently different from communications systems in that its performance is inversely proportional to r^4 (as opposed to r^2), and the presence of no return signal is also considered to be information. It is the radar receiver that needs most protection from interference rather than the transmitter, and the benefits that may be derived from bistatic or multistatic systems may be worth reviewing. One other possibility is to effectively ease the task on the radar receiver by deliberately increasing the radar cross-section (RCS) of sleek civil airliners using special reflectors, just as is commonplace for small boat and dinghy sailors.

Fixed links

Q17. *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*

Some pricing and equipment barriers presumably do deter operators. Consequently, noting the low commercial interest, RSGB affiliates recently requested narrow allocations for experimental access to the 28/32/40GHz bands in responses to the Spectrum Framework Review Implementation Plan.

Q18. *We would welcome views on the merits of the listed approaches to regulator intervention (for vacating fixed link bands)*

Natural wastage, five-year notices etc will not result in quick clearance of fixed links from lower bands. Approaches that pro-actively and positively facilitate migration are most likely to work.

Q19. *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*

The 2005 Ofcom Plan states that ~£5m per annum is available via the Spectrum Efficiency Scheme. Ofcom's website gives very little detail on this. We would welcome more open and transparent access to the scheme and its results, plus an opportunity for public comment as to its research priorities and value.

RSGB and its affiliates such as UK Microwave Group, BATC and Amsat-UK would welcome collaboration with measurement exercises to provide firm data to support sharing, propagation research etc.

International

Q20. 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

We would prefer Ofcom to remain firmly engaged in international bodies.

Amateur Services have allocations that generally flow down from ITU/WRC and are planned in more detail by IARU on a harmonised basis. Like many services, they cross international borders (even at microwave frequencies). Long range communications are regularly achieved by terrestrial based Amateurs in the microwave bands. Global ranges are inherently achieved the Amateur Satellite Service, and specialist techniques such as Earth-Moon-Earth reflection paths.

For any band release to be successful, be it for amateurs or anyone else, it needs to be on an internationally harmonised basis. This would facilitate equipment manufacture, international agreements, interference issues etc. We observe that the Audit has taken a very UK-centric view on bands, some of which are the subject of international treaties (European, UK-USA, NATO etc). Whilst the scope for international releases is potentially slower, UK-only releases may not be well supported by industry, or welcomed by the UK's international partners.

It would also be helpful if the audit considered how it sees itself, its aims and the frequency list fitting with EU and other International initiatives - for example on Wireless Access Platforms for Electronic Communications Services (WAPECS) which is currently subject to consultation by the EU Radio Spectrum Policy Group (RSPG).

RSGB August 2005

REFERENCES

- [1] "IASH: A review of access to and demand for Public Sector Spectrum - Formal response from the Radio Society of Great Britain", RSGB, 10-April-2005.
- [2] Ofcom BR68 Amateur Radio Licence, Paragraph 12(1) – The latest list of 'User Services' comprises:- Any UK Police force, Fire & Rescue service or Ambulance trust, HM Coastguard, Local Authority Emergency Planning Officers, any health authority, any government department, British Red Cross, St John Ambulance, St Andrew's Ambulance Association, WRVS, Salvation Army, and any utility service.
- [3] "Consultation on a proposal to reform amateur radio licensing (Of 243) - A lighter, electronic licensing process", Ofcom Consultation, 26-May-2005

[3], **Section-7 - AIP and Amateur Radio**

'Amateur radio frequency bands are shared by radio amateurs, there being no exclusive use. Many bands are also shared with other radio services. In addition, the amateur radio service is not intended for commercial benefit. For these reasons, Ofcom does not believe that Administrative Incentive Pricing is appropriate for amateur radio licences.

During 1999 the previous regulator (the Radiocommunications Agency) issued a consultation document entitled "Spectrum Pricing: Implementing the Third Stage and Beyond". This consultation made reference to a separate study in which Smith and NERA confirmed the view that Administrative Incentive Pricing would not be appropriate in the context of amateur radio.'

Table-1: Notable Shared Amateur Bands

Band, MHz	Amateur Allocation Status	Comment
70.0-70.5	Secondary	Ex-PMR band, shared with MoD
430-440	Secondary with Regional and Power restrictions (Primary elsewhere in Europe)	MoD freeze on Repeaters and Data nodes since Feb-2002 inhibits sharing and use.
1240-1325	Secondary	Shared with CAA/Radars (and Galileo in future) Amateur Voice and TV Repeaters regularly incur MoD/CAA objections
2310-2450	Secondary Users must accept interference from ISM users	Shared with Home Office, MoD, Commercial, WiFi etc. The Amateur Satellite service has to share within the 2400-2450 WiFi section
3400-3475	Secondary	Shared with MoD and Commercial systems
5650-5680 5755-5765 5820-5850	Secondary Users must accept interference from ISM users	Fragmented into 3 sub-bands. EU17* & EU23** Largely ignored Amateur Satellite allocations also very restricted and fragmented 5.65-5.85GHz continuous available in other European states
10000-10125 10225-10475	Secondary	Restrictions from MoD etc on Beacons, Repeaters etc 10-10.5GHz available in other European states

***EU17:** In the sub-bands 3400-3410MHz, 5660-5670MHz, 10.36-10.37GHz, 10.45-10.46GHz the amateur service operates on a secondary basis. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these sub-bands in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.

****EU23:** In the sub-bands 5660-5670MHz (earth to space), 5830-5850 MHz (space to earth) and 10.45 -10.50GHz the amateur-satellite service additionally operates on a secondary and non interference basis to other services. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these allocations in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.

NOTE: The Amateur Satellite Service operates in similar bands but with a more restricted set of allocations.