

Response from Brian Copsey

First I wish to thank Ofcom profusely for their thinking which has cast aside two previous taboos on spectrum sharing and look forward to similar forward thinking in the future.

Consultation question

A4.1 In this consultation we are seeking comments on three specific points. Firstly ask for comments on our assessment of spectrum demand and supply for audio links, talkback, telemetry and telecommand. Secondly we ask for comments on our sharing analysis in the bands 960-1164 MHz and 1525-1559 MHz and our conclusion that sharing is possible in both bands. If you disagree with our assessment please provide a detailed explanation supporting your response.

spectrum demand and supply for audio links, talkback, telemetry and telecommand.

In general yes I agree on the probable demand providing that existing spectrum is usable, BUT what does not appear to have been taken into account is the impact of the auction of the 2.3GHz band for LTE- TDD. Many of the telemetry and telecommand systems use the 2.4GHz ISM band and the impact of LTE systems adjacent to PMSE bands for audio links and talkback. This will become a bigger problem with the release of the 700MHz band and PPDR . In addition ITU BT.2338, page 21, identifies multi radio microphone use for even simple film and TV sets, these will require additional telemetry to coordinate

sharing analysis in the bands 960-1164 MHz

Whilst welcoming the principle of sharing in this band I believe a number of further compatibility tests require to be undertaken before the positive view taken by Ofcom can be confirmed.

1525-1559 MHz and our conclusion that sharing is possible

Agree and it should be made available immediately

A4.2 Finally we are seeking comments on our proposal to allow low power audio PMSE applications in the 960-1164 MHz band only.

Totally disagree that only the 960-1164 MHz band should be allocated it is vital to note and remember the conclusion reached by the Lamy Report: that "Member States should ensure that broadcasters and PMSE users are left no worse or no better off than they

would have been without any clearance of the 700 MHz band.”¹ It is unclear without considerable further investigation if the spectrum in the 960-1164 MHz band (please see points below) will be either usable or available. Both identified bands should be immediately allocated in order that equipment can be available on the market prior to the start of 700MHz clearance. Whilst it is clear that designs for 1525-1559 MHz are straightforward and may be available due to the German allocation’s, designs for the 960-1164 MHz band will be more complex and require a fresh start as it is not possible to stretch the current 900 MHz American designs. Spectrum management of this band will be extremely complex. Detailed plans of coverage and technical conditions are required to enable a complete picture of its use both indoor and outdoor to be understood. Further investigation building on the existing work is required into areas not perceived to have been covered in the current reports these include:

1. DME:
 - *Approximately 168 channels in UK ,3000+ in Europe*, how much actual usable spectrum?
 - Scanning DME has not been considered and could cause unacceptable interference to both outdoor and indoor PMSE
 - There are two candidate systems for LDACS in this band but only one has had its impact to spectrum availability and use considered. Both need detailed evaluation
2. There appears to be no airborne use of radio microphones , and whilst not a heavy use of PMSE it is often required for sporting and news events, how will this be addressed?
3. Please see Ofcom 4.16 below and the reference to JTIDS. It would appear that the system is used throughout UK including land based mobile and helicopter use, how much interference to PMSE will be generated and **how can coordination** be achieved?

Question 1: Do you agree with our assessment that minimal growth in demand and stability in spectrum supply means that we do not need to implement any changes to meet the ongoing requirements for talkback, audio links and telemetry and tele-command applications?

No see previous comment re 4.1, additional spectrum outside traditional ISM and SRD bands require investigation especially with the introduction of WSD, some of which may use LTE

Question 2: Do you agree with our sharing analysis which concludes that audio PMSE (low power microphones and IEMs) could co-exist with incumbent services in the bands 960-1164 MHz and 1525-1559 MHz? If not please provide specific details/evidence to illustrate your view.

In the case of 960-1164Mhz no as the points made in response to 4.2 have not yet been quantified

For 1525-1559 MHz yes and this should be made available immediately

¹ *Report To The European Commission Results Of The Work Of The High Level Group On The Future Use Of The Uhf Band (470-790 MHz.)*, Pascal Lamy, page 12, Sept 2014, http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=6721, accessed on 3 December 2015

Question 3: Do you have any comments on our proposal to allow low power audio PMSE applications (wireless microphones and IEMs) access to the 960-1164 MHz band?

Please see comments in response to 4.2

Other items which are not addressed by questions

Ofcom 3.25 *The report by Cambridge Consultants on technology evolution in the PMSE sector notes that wireless microphones and IEM equipment is now available that can use spectrum around two and a half times as efficiently as current practice for analogue transmission and three times as efficiently for digital transmission (up to eight times in restricted cases).¹⁵ Presently, this performance is offered only by top of the range equipment, but it could reasonably be expected to be available at lower cost in the next five years.*

If they are referring to equipment in excess of some 10 years old the statement may be true but current digital systems are not “more spectrum efficient” and in many cases use greater bandwidth than analogue <200KHz and digital some 600KHz. It is a general statement not backed up by facts.

Ofcom 3.4 For audio PMSE, their report⁹ noted that there is:

- *No demand for higher audio quality than is presently available because current sound quality is regarded as being as good as necessary*

From ITU BT.2338, page 21,:

5.1 Considerations on future perspectives for audio SAB/SAP

Developments in the film, TV and theatre world are requiring ever increasing sound quality and density (i.e. additional radio microphones to pick up atmosphere/environment) from radio microphones. This is coupled with increased use of both radio microphones and IEM in all forms of multimedia platforms resulting in a conundrum of reducing spectrum availability and higher performance requirements.

I believe the ITU report; the outcome of a multinational effort reflects the reality of the situation

Ofcom 3.19 In addition to the actions outlined above the European Commission has mandated EU Member States to make available the 800 MHz and 1800 MHz duplex gaps under its PMSE Implementing Decision 2014/641/EU. The Decision instructs Member States to make available the bands 823-832 MHz and 1785-1805 MHz for wireless audio PMSE equipment and therefore provides long-term certainty of access to this spectrum. We made this spectrum available in March 2015 and PMSE users are encouraged to make full use of these bands to help offset the loss of access to the 700 MHz band.

However these bands are subject to restrictive licences and

- 1785 - 1805 MHz: Not available in Northern Ireland as the band was awarded in 2007 under the coordinated auction of spectrum between Ofcom and ComReg
- 1800 - 1805 MHz: Not available within 10 km of Oakhanger, (SU776357), Colerne (ST808717) and Menwith Hill (SE210560).
- Not available airborne

Ofcom 4.6 The three main applications currently operating in the band are Distance Measuring Equipment (DME), Secondary Surveillance Radar (SSR) and the Joint Tactical Information Distribution System (JTIDS). Tactical Air Navigation (TACAN) is a navigation system used by military aircraft which provides the user with a distance and bearing from a ground station. It was agreed by the Ministry of Defence that this system is sufficiently similar to DME and does not need to be treated separately. Therefore we do not refer to TACAN further and apply the results and conclusions for DME to TACAN

OFCOM 4.16 The nature of the technology used by JTIDS i.e. a spread-spectrum signal, and the sensitivity of its operational deployment suggests technical sharing is not possible even on a coordinated basis. However, the use of JTIDS is typically in remote areas and above 10,000 feet, therefore away from areas where PMSE use is likely. In addition, the Frequency Clearance Agreement between the CAA and MOD limits the use of JTIDS in the presence of civil aviation and these areas also align closely with those of high PMSE demand. Therefore the use of JTIDS does not constrain spectrum availability where it is needed for PMSE.

JTIDS is used throughout UK including land based mobile and helicopter use, how much interference to PMSE will be generated and **how can coordination** be achieved?

Ofcom 5.2 However, of the two bands we consider that the 960-1164 MHz band is the most suitable for low power audio PMSE applications. The reasons for proposing this band are that it:

- provides a greater amount of accessible spectrum;
- is closer (in spectrum terms) to the current preferred band for PMSE at 470-790 MHz; and
- the long term prospects for continuing access are extremely good. The nature of aeronautical use in this band means that it is extremely unlikely there would be any

significant changes to the allocation, or services within, the band beyond those we have already identified i.e. LDACS.

Please see attached presentation, two systems but high power and filling in gaps, how much spectrum left and how much pollution of band and for how long?

- *provides a greater amount of accessible spectrum;*

Little detail to back up this statement and proportion of outdoor use not given

is closer (in spectrum terms) to the current preferred band for PMSE at 470-790 MHz

Either band will require new R&D and equipment aerials etc.

***Ofcom 5.3** In particular, the latter point above addresses the need for long term stability in any new band. Our preference for this band significantly reduces the risk of competition for spectrum access that could threaten PMSE access in the future*

Given the points raised above for the 960-1164 band this statement will need consideration after further compatibility work has been carried out

Other major Considerations

- Whilst both bands are attractive, if they are UK or England Wales and Scotland only they will not be attractive to manufacturers without major subsidies
- Whilst Ofcom has influence with CAA ,major resources will be required to convince ICAO
- Will Ofcom commit sufficient resource to enable adoption of these bands in Europe and Worldwide?

Proposals for the next Steps

1. Allocate both bands to enable equipment to be developed prior to 700MHz clearance
2. Discuss with Government subsidizing the R & D
3. No 700MHz clearance until equipment is available, failure to do this will damage the UK entertainment industry
4. Cooperate with manufacture's to carry out the compatibility tests identified in the response
5. Accepting the difficulties' involved a detailed maps should be produced showing actual availability of spectrum and a second or overlaid map with the impact of both LDACS

