Call for input:
Licence Exempt spectrum use In the 2400 MHz band

Joint response from the Radio Society of Great Britain, UK Microwave Group, Amsat-UK and BATC.

June 2013

Introduction

This response is a joint one to the above Ofcom document from the Radio Society of Great Britain (RSGB, www.rsgb.org.uk) and its national affiliates who have microwave spectrum interests - Amsat-UK (www.uk.amsat.org), UK Microwave Group (UKuG, www.microwavers.org), and the British Amateur Television Club (BATC, www.batc.org.uk).

RSGB is recognised as one of the leading organisations in the world in the field of amateur radio. It collaborates with its fellow national societies via the International Amateur Radio Union (IARU) through IARU Region-1 (www.iaru-r1.org).

Amateur radio is a science based technical hobby enjoyed by over three million people worldwide. From a statutory point of view it is fully 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.

As noted in the call, the amateur services have ITU secondary allocations in the 2300 and 2400 MHz bands. This response focuses on the 2400 MHz band, including the 2390-2410 MHz band edge where we foresee issues that may seriously affect both licence exempt capacity and the co-existence of licensed services.

RSGB, Amsat-UK, UKuG & BATC, June 2013

General Comments

We appreciate that there is a distinct dilemma between the nominal regulatory status that exempt devices operate on a non-interference non-protected basis; and the considerable value that they support in the 2400MHz band (possibly the highest value of any exempt band). We also note Ofcom's duties:-

- Ensuring the optimal use of the electro-magnetic spectrum
- Ensuring that a wide range of electronic communications services – including high speed data services – is available throughout the UK

The latter point could also be viewed as ensuring current services remain available. Whilst not wishing to replicate material from the separate Amateur 2.3/3.4GHz consultation it is worth noting that the 2400 MHz band is home to more than such exempt use - which we discuss first below prior to 2.3-2.4GHz co-existence concerns

Amateur Service

In the UK, usage of the 2400MHz band by radio amateurs includes a number of Ofcom-licensed ATV Repeaters outputs. These are largely wideband FM-based although migration to narrower bandwidth Digital-ATV is envisaged (based on an adaptation of DVB-S QPSK.). Other uses include adapted Wi-Fi equipment for longer range datalinks. A potential option would be for Ofcom to facilitate DATV migration into adjacent spectrum such as 2390-2400 or 3400-3410 MHz, with consequential benefits for both ATV enthusiasts and local Wi-Fi users.

Amateur Satellite Service

The amateur satellite service is restricted to the 2400-2450MHz range. Whilst in principle bidirectional, the majority of usage is for space-to-earth downlinks and these tend to be coordinated towards the lower end of the band. Further information regarding current characteristics can be Draft CEPT Report 201 (on MBANS in 2400MHz) and a recent IARU-R1 Vienna paper (VIE13_C5_32 on '2400MHz Amateur Satellites'). In addition DATV equipment is ready and due to launch in August on the HTV-4 supply flight to equip the European Columbus module of the International Space Station. This will provide DATV downlinks at 2422 and 2437 MHz[1] for amateur and educational use.

Concerns re Future Interference/capacity

Uniquely in the UK, the 2390-2400MHz band might be retained by existing incumbents, but this may not be the general case across the European area (as currently being considered within CEPT FM52).

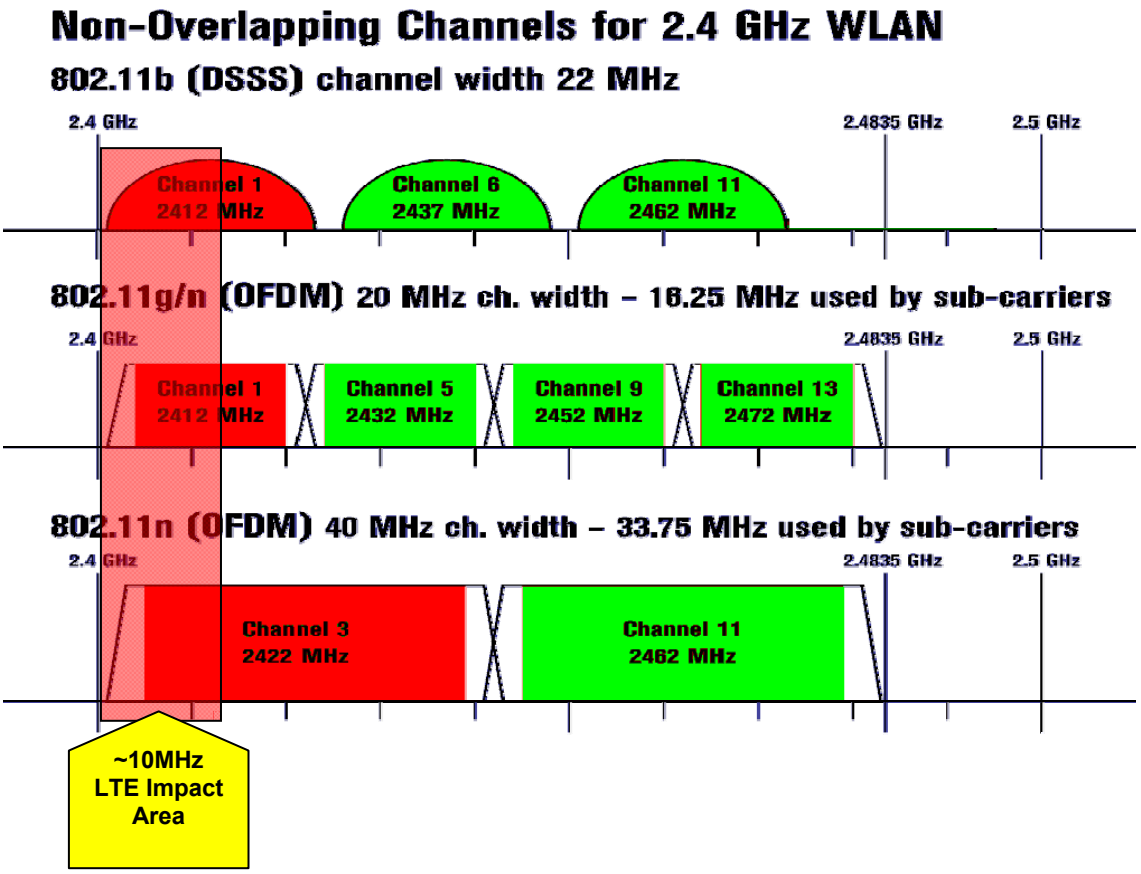
In conjunction with our fellow Societies and IARU Region-1 we have a number of concerns regarding LTE in the 2.3GHz band. The one we focus on in this submission is operation and co-existence at the 2400MHz band edge where we believe there is the potential for LTE to cause considerable interference and loss of capacity in adjacent 2400MHz spectrum.

ECC CEPT Reports 172/201 and some band plans in other countries such as the USA and parts of Asia indicate that 10MHz overlap is involved, or effectively a 10MHz wide gap has been left at 2390-2400 to mitigate it. The latter may be termed a 'guard band' but that should not be viewed as wasted spectrum if it continued to be available to lower density usage by incumbents including amateur radio. Other benefits of such a 'guard band' might include lower cost harmonised 2.3GHz equipment that has greater roaming potential and avoids significant impact on the lower 2400MHz band edge and Wi-Fi.

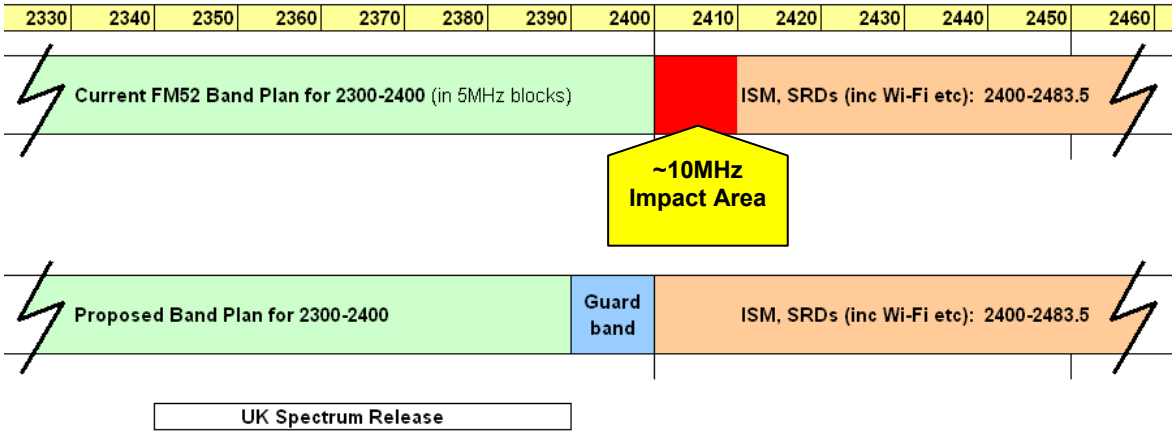
[1] Detailed info re ISS DATV is at: http://www.ariss-eu.org/Ham%20TV.pdf

Preservation of Capacity in the 2400MHz Band

The impact of adjacent 2300MHz LTE on WLAN Capacity without a 'guard band' is indicated by the effective loss of Wi-Fi channels coloured red below. The amateur satellite service (and narrowband / EME in some other countries) which uses the 2400MHz edge would also be impacted. In addition other technologies such as Bluetooth and Zigbee would also be faced with reduced channel capacity and/or higher power consumption (and no 5GHz alternative). So far FM52 has not considered this co-existence issue, nor has there been any formal liaison with other CEPT bodies such as SRD/MG / SE24 – which we would encourage Ofcom to consider.



Current FM52 Band Plan and Mitigation by Proposed 'Guard Band'



Questions and Answers

In addition to our prime concerns we also provide some additional information with respect to the questions in the call document:-

> ***Question 1:*** *Are there uses not covered in the market study with equipment characteristics or uses that are likely to make that use susceptible to interference from LTE?*
>
> *If so, please answer the following questions for each identified additional LE use in the 2400 MHz band:*
>
> *1.1 What is the type of application? and*
>
> *1.2 What is the nature of use? (i.e. how is it used? in what environment/s?)*

We note that the market study document is orientated around ground based applications. However a number of our members have interests in license-exempt airborne use including balloons, radio controlled models etc. We also note that new developments such as Google-Loon also foresee airborne use as well. (at 20km altitude it is an example of a High Altitude Platform)

IARU Region-1 participated in medical networks (MBAN) studies in CEPT SE24. The resulting draft ECC Report 201 indicates usage in hospitals, ambulances and home-based care.

IARU-R1 is also engaged with additional studies in the 5GHz band where we have particular interests around 5760 and 5840 MHz. It is clear that whilst 5GHz Wi-Fi and Wireless Industrial Applications (SE24-WI39) are emerging, that the increased building attenuation is quite limiting. In any case Bluetooth, Zigbee etc do not have 5GHz versions, so the new 5GHz band should not be wholly viewed as substitute spectrum for 2.4GHz.

> *1.3 What is the extent of use (please give an indication of regularity of use and number of units in use in the UK and/or expected future extent of use, if applicable).*
>
> *1.4 What is the range of use? (i.e. what is the typical distance between the receiver and transmitter?)*

We have no specific information but would estimate that the larger free-space line-of-sight distances for airborne use may partly compensate for their relatively low numbers.

> *1.5 What are the RF characteristics of the transmitter (i.e. power levels, occupied bandwidths) and what are the relevant technical standards that this product complies with?*
>
> *1.6 What are the RF characteristics of the receiver? (e.g. minimum sensitivity, blocking levels, adjacent channel rejection) and could these be improved if they were found to suffer interference?*
>
> *Please include details of equipment manufacturer make and model, if applicable.*
> *We are particularly interested in any uses not covered by the second report which have widespread usage*

> ***Q2.*** *Do you have further information about uses covered in the reports?*
> *If so, please answer the questions 1.1 to 1.6 as appropriate for each identified use.*

The Logica-CGI Band Audit report omits licensed amateur and amateur satellite service use, whilst noting licensed use by PMSE and Fixed-Wireless Access (and airborne exempt usage).

> ***Q3.*** *Do you have any further comments in relation to the report/s?*

It might have been useful to draw on usage/device statistics from either Wi-Fi Alliance, other industry sources, or from household surveys, regarding exempt device number estimates. One can easily imagine that an average household may have several devices in 2.4GHz (broadband router, tablets, smartphones, consoles, laptops etc), as well as some providing ‘hotspot’ services.