

Title:

Dr

Forename:

Paul

Surname:

Crawford

Representing:

Self

Organisation (if applicable):

What additional details do you want to keep confidential?:

No

If you want part of your response kept confidential, which parts?:

Ofcom may publish a response summary:

Yes

I confirm that I have read the declaration:

Yes

Additional comments:

Question 1: Do you have any comments on the mechanism for UK preparation for WRC-15 and the role of Ofcom in this process?:

Question 2: Do you agree with the prioritisation of the agenda items, as shown in Annex 6, and if not why?:

Yes

Question 3: Do you agree with Ofcom's general approach on WRC-15 agenda item 1.1?:

Yes

Question 4: In view of the recent developments on the 1 492 - 1 518 MHz and 5 925 - 6 425 MHz bands, what are your views on the potential identification of these bands for IMT and/or RLAN and on the mobile data applications that could make use of them? How do you believe the sharing with the fixed service and the fixed satellite services could be managed at the national level?:

Question 5: For the band 1 427 ? 1 452 MHz, do you agree that it is right to support the further consideration of the band, recognising the Ministry of Defence interest?:

Question 6: For the band 1 452 ? 1 492 MHz, which is already subject to a harmonisation measure within CEPT, do you agree that this band be supported for an IMT identification at WRC-15?:

Question 7: Recognising the UK plans to release spectrum in the 3 400 ? 3 600 MHz band, coupled with the binding European Commission Decision (for electronic communications services) in the bands 3 400 ? 3 600 MHz and 3 600 ? 3800 MHz, do you agree that these bands should be supported for both a co-primary mobile allocation and IMT identification?:

Question 8: Noting that there are a number of countries that strongly oppose the inclusions of the 3 800 ? 4 200 MHz band, do you agree that we should support the longer term consideration of this band for potential mobile broadband use?:

No

I believe it is important for high-availability satellite links due to the low impact of precipitation.

Question 9: Noting that there is currently limited international support for a co-primary mobile allocation in the band 2 700 ? 2 900 MHz, do you think that we should continue to support this band at WRC-15?:

Question 10: Do you agree that the 5 350 ? 5 470 MHz and 5 725 ? 5 925 MHz bands could provide important additional capacity for Wi-Fi and similar systems? If so, and noting the need to protect both earth observation satellites and radar systems, do you agree that sharing solutions should be considered at WRC-15? :

Provisionally yes,

but that is subject to the protection of the Earth observation systems and radar, which may prove difficult given the lack of controls possible on the placement and use of Wi-Fi equipment once released.

Question 11: Do you agree that we should oppose a co-primary mobile allocation at WRC-15 for the band 470 ? 694 MHz?:

Yes.

I believe that UHF direct broadcast of television is an important public service and changing this for countries such as the UK with a major investment in this already is an unnecessary burden on the public. In particular for pensioners, disabled, etc, who lack the funding and knowledge for frequent changes to TV hardware but rely on it for news and entertainment.

Question 12: Do you agree that the UK should continue to support harmonisation of 694 - 790 MHz for mobile broadband and an out-of-band emission limit for protection of DTT reception in an ITU R Recommendation, alongside an acknowledgement that 694 MHz should be the lower frequency boundary for the band?:

Question 13: Do you agree that any harmonisation measures for PPDR use should be sufficiently flexible to enable PPDR agencies to choose the most appropriate spectrum solutions nationally?:

Yes

Question 14: Do you have any comments on the potential use by the amateur service in the 5 250 to 5 450 kHz band?:

Question 15: Do you agree that if any allocations to the fixed satellite service in the 10-17 GHz range impose undue constraints on existing services then further studies on the demand and justification for use of the spectrum would need to be carried out?:

Yes

Question 16: Do you agree that the UK should support retaining the recognition for aeronautical radionavigation use, but equally support reviewing the limits associated with the FSS with a view to facilitating better use by the FSS?:

Question 17: Do you agree that the UK should support new primary allocations for the fixed-satellite service in the 7/8 GHz bands, with the proposed restrictions?:

Yes,
Subject to protection of existing space research services.

Question 18: Do you agree that the UK should not support new allocations for the mobile satellite service in 22-26 GHz as they are not justified and that the focus should instead be upon the continued protection of the incumbent services?:

Yes, I agree they are not justified.

Question 19: What are your views on the use of FSS spectrum allocations for UAS, recognising the shared regulatory responsibility and the safety considerations for the control of unmanned aircraft?:

My first concern is that UAS should never rely on an external radio link for safety, they should ideally be designed with the autonomous ability to navigate and avoid other craft or buildings.

My second concern is that ability of UAV to be deployed more or less anywhere, and the resulting concerns of interference to existing FSS users. It is not clear what steps will be employed to address this concern.

Question 20: Do you have any view on the need, or otherwise, to modify the restrictions that relate to the operation of ESVs in the bands 5 925 ? 6 425 MHz and 14-14.5 GHz?:

Question 21: What are your views on a potential new allocation to the maritime mobile satellite service, recognising the UK interest in the other services that make use of the bands under consideration?:

I would oppose the allocation of the 7,375 - 7,750 MHz and 8,025 - 8,400 MHz bands to the maritime-mobile satellite service.

These are currently used by many (ourselves included) for Earth observation and deep-space satellites, and we have serious reservations about the potential to avoid causing interference to the incumbent very low power signals without infeasible exclusion regions (from a maritime user's point of view).

Question 22: Do you agree that the UK should not support a proposal for additional UHF spectrum for maritime on-board communications and that narrower channels will help to increase capacity?:

Firstly I support the adoption of narrower channels as they should be fairly easy to cope with for existing 25kHz spaced radios.

Secondly I support the clarification and international harmonisation of the UHF bands for this, however, this may involve the allocation of more spectrum (a point that is not Ofcom's position) as I do not think it should be "reduced to fit" in total bandwidth..

Question 23: What are your views on any necessary regulatory provisions for AIS in the bands already identified for maritime use?:

I support Ofcom's position (i.e. CEPT proposed arrangements).

Question 24: Where the appropriate radio regulatory provisions are established for use in existing aviation related bands, do you agree that the UK should support regulatory conditions for the accommodation of WAIC applications?:

My concern here is not a spectrum usage point, but a concern that adopting radio on-board aircraft for anything but trivial functions is very bad from a safety point of view.

It would be fairly easy to build a jamming device for a passenger to carry (even as a "mule") and, with the increased use of plastic/carbon fibre for aircraft body construction, it may become feasible to jam a plane's systems in flight from the ground with a few kW in to a medium sized antenna.

I would like to assume these points have been considered already...

Question 25: Do you agree that the UK should support a generic radiolocation allocation in the 77.5-78 GHz band, where appropriate technical conditions are established?:

While I am concerned by the potential impact on radio astronomy and similar, I do support that the restrictions on any radio location equipment should be based on their technical characteristics and not expected usage (except where it has an impact, for example, not allowing them on balloons, etc, where they could end up pointing at sensitive sites).

Question 26: Do you agree that the UK should support an allocation across the 7 190 ? 7 250 MHz band, dependent upon the outcome of technical studies?:

Yes.

Question 27: Do you agree that is right to wait for the relevant sharing studies to mature before coming to a final position on the potential for additional allocations to the earth exploration-satellite (active) service in the 8/9/10 GHz band?:

Yes.

Question 28: Do you agree that the UK should support the CEPT position that removes the distance limitation on space vehicles communicating with orbiting manned space vehicles, whilst retaining the pfd limit to protect terrestrial services?:

Yes.

Question 29: Do you agree that the UK should support maintaining UTC as currently defined (i.e. with the inclusion of leap seconds) and that the UK should support further study around the concept of dissemination of two reference time scales?:

Yes, we should keep the leap-seconds for the following reasons:

- (1) As far as navigation services are concerned (e.g. GPS) they already cope with this by broadcasting both atomic time and the atomic-UTC offset, so it is no burden to maintain this.
- (2) For all other systems there are established methods to deal with time keeping if monotonic time is absolutely necessary, for example to perform all calculation in Terrestrial Dynamical Time as commonly used in satellite orbit prediction software.
- (3) It is also worth noting that some software used for low/medium precision navigation makes use of the assumption that UTC is +/-1 second from UT1 (as it has for the last 4

decades) and removing leap-seconds will break such systems eventually.

(4) Finally, it should be pointed out that any software (and systems) that "break" when leap seconds are inserted are actually faulty - they have not been tested for such a non-monotonic time step.

The insertion of a leap-second is not the only way in which the software's clock can step in time (faulty hardware, or network outages leading to sufficient drift in clocks are other cases) and software developers should test that such systems can recover from the impact of such time-step events as well as the correct handling of leap-seconds.

Rather than throwing away the millennia-old concept of daily time being linked to the Earth's rotation, it should be part of modern software and system testing to verify that time handling is correct for such predictable events.

Question 30: Do you have any comments on the UK approach and positions on the elements of Agenda Item 7?:

Question 31: Do you agree that any potential regulatory constraints need to be fair and proportionate on both the Cospas-Sarsat operation and users in the adjacent band?:

The long standing Cospas-Sarsat operation must be given priority over the use of the adjacent bands.

It is also worth pointing out that the Data Collection Platform that operates globally in the nearby 401-403MHz band (e.g. Eumetsat uses 402.0355MHz to 402.4350MHz to the geostationary satellites) also serves for environmental and human safety functions (e.g. Tsunami warning) and so should be protected from excessive levels of Earth-based radiation from services in adjacent bands.

Question 32: Do you have any comments on Agenda Item 9.1.2 concerning reduction of the satellite co-ordination arc?:

I would question the N/I value of 12.2dB used for this, it may be appropriate for R=3/4 QPSK and similar modulations/coding systems in the past, but it may be too little for operators of DVB-S2 that plan on using the higher MODCOD points for higher system throughput where user G/T permits it.

Question 33: Do you agree that the UK should oppose any proposal that aims at changing the provisions of the Radio Regulations in a way that gives inherent priority (i.e. coordination priority) to certain satellite systems over any other satellite system?:

Question 34: Do you have any comments on Agenda Item 9.1.4 relating to updating the RR for out of date or redundant material?:

Question 35: Do you have any view on the need, or otherwise, for additional international regulatory measures to support the use of earth stations for aeronautical and meteorological communications in the 3.4 ? 4.2 GHz band?:

Question 36: Do you agree that the UK should not support any change to the fixed and mobile definitions under Agenda Item 9.1.6?:

Question 37: Do you have any views on the CEPT position that no further work is required in respect of spectrum management guidelines for emergency and disaster relief radiocommunications?:

Question 38: Do you agree that no specific measures need to be introduced for nano and pico-satellites and that the current approach to their regulation is sufficient?:

Yes, I believe the current regulations are sufficient.

Question 39: Do you agree that the UK should support the recent regulatory developments with respect to ESOMP operation, while continuing to monitor developments?:

Question 40: Do you have any comments on Agenda Item 9.3 considering Resolution 80?:

Question 41: Do you have any comments concerning the standing agenda items?:

Question 42: Do you have any comments regarding UK positions for future WRC agenda items?:

Question 43: Are there any other possible agenda items you wish to see addressed by future WRCs?:

Question 44: Are there particular frequency bands, above 6 GHz, that should be considered for technical study in relation to the potential future agenda item addressing IMT use?: