

King's College London Response to Ofcom Consultation on Manually Configurable White Space Devices

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Question 1: Do you agree with our assessment of the likely costs and benefits of our proposal to license MCWSDs as a transitional arrangement? Please provide any available evidence to support your response.

We broadly agree with the assessment of costs and benefits. However, we would like to emphasise that we see the allowance of MCWSDs on a PERMANENT basis to be an immense benefit. Having been leading a major trial of white space devices in the UK, we have noted that some deployment scenarios and use cases could be challenged due to interference upon the white space devices, e.g., from very distant TV transmitters that are not meant to be covering the area (see, e.g., Figure 1 and reference [1], among other publications that will appear shortly). Cases where the TV white space receive radio is above rooftop (e.g., in provision of the uplink for wide-area (mobile) broadband, provision of long-distance point-to-point links, etc.), particularly where the white space device has high sensitivity, could be affected. We have witnessed such interference, from distant TV transmitters, reducing the received SINR for such receivers by 10 dB or more in some cases—in locations where maximum power is allowed for the white space device at that height. This is without even taking into account the interference among the white space devices.

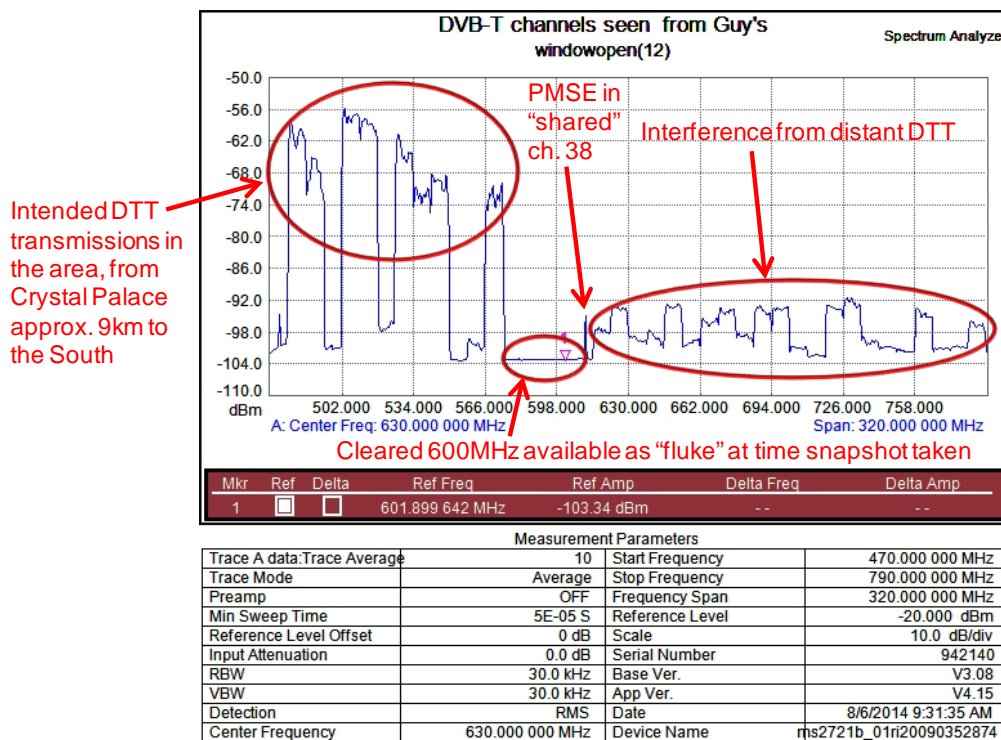


Figure 1: TV band spectrum “snapshot” from Guy’s Hospital looking South.

While still noting the immense value that TVWS can have for such deployments, and noting that likely only extremely sensitive/high calibre equipment will be affected by such interference (at least, the interference from primary systems), these observations lead us to put an enhanced emphasis on downlink, indoor, underground (e.g., providing coverage to metro trains?), and below rooftop (especially, e.g., closed area below rooftop), deployments for white space devices. In many of these cases, MCWSDs will be the only option for deployment. Moreover, we note the excellent propagation characteristics in UHF TV bands, and particularly emphasise some such indoor deployment scenarios for that reason. Given this, we believe that MCWSDs should be allowed on a permanent basis.

In response to some of the text that was provided in the consultation, we would wish to emphasise that the Eurecom device, a large proportion of which has been created by King's College London, IS capable of geolocating hence automatic operation under geolocation. However, this particular aspect could not be demonstrated to Ofcom engineers due to the need to operate it indoors in a location with a very limited view of the sky. Hence, location parameters had to be manually entered.

Question 2: If you agree that Ofcom should allow MCWSDs to operate in the UHF TV band within the TVWS framework, how long do you believe that the licensing regime would need to be in place?

We STRONGLY agree that Ofcom should allow MCWSDs to operate in the UHF TV band within the framework. Moreover, we believe that Ofcom should allow licensed MCWSDs on a PERMANENT basis. This is because, in some very interesting deployment scenarios for white space devices (e.g., indoor, underground—metro systems, etc.), MCWSDs will be the only deployment option. This should also be read in conjunction with our response to Question 1.

Question 3: If you agree that Ofcom should allow MCWSDs to operate in the UHF TV band within the TVWS framework, when do you believe it would be appropriate to conduct a review to assess whether there is an ongoing need to license MCWSDs?

We believe a review process is not necessary. MCWSDs should be allowed on a permanent basis. However, for the purpose of Ofcom making a decision should it believe that a review process is necessary, we believe that only 2-3 years will be needed. This is because we believe white space device deployments will quickly accelerate around completed standards such as IEEE 802.11af.

Question 4: Do you agree with the proposed terms of the draft licence as set out in Annex 5 and as discussed below?

Broadly agree.

Question 5: Do you think it would be beneficial for the licensing regime for MCWSDs to cover both masters and slaves?

Yes. However, we wish to point out that such an arrangement would require the slave devices to be connected to the Internet (hence, not be slave devices?), or have some other form of link (non-white space) already present to the master device. In fact, we think it likely that in practical deployments there will be very little, if any, difference between master and slave white space devices should the

slave white space devices also be manually configurable. We believe users will simply choose to operate only master MCWSDs for this reason.

Question 6: Do you agree that our licensing regime should only apply to type A devices?

Do not necessarily agree. Through specifying, for example, location bounds, it is possible to define a license in a way that can be compatible with Type B devices. Moreover, a protocol might be designed by the manufacturer that places Type B devices under control of a Type A device, where the Type A device confirms that the Type B devices are still within the license bounds (e.g., by signal strength as one example), with the required confidence. This confirmation could also be done automatically/periodically by the Type B device itself in a reliable and responsible way that doesn't require GPS-based geolocation, e.g., through licensee-approved fixed indoor RFID equipment being used by the devices to recognise their locations, or through recognising the signal strength or signal propagation times from known licensee-approved Type A devices (also encompassing, e.g., perhaps triangulation).

Hence, we see the regime as being reliably applicable also to Type B devices, and the constraint to Type A devices as being a somewhat unnecessary restriction. This is particularly to be read in the context that the device licensees will be legally responsible for the compliance of their devices, so will ensure that whichever solution is chosen for Type B compliance with license bounds will be reliable.

Question 7: Do you agree with our approach to allow a number of MCWSDs under the control of a single licensee to be subject to a single licence?

Strongly agree with this. We might recommend that Ofcom keep a record of each individual MCWSD that is allowed under the license, however, this information should anyway be visible to Ofcom under the framework for active white space devices, via the Unique ID and WISDIS.

Question 8: Do you agree that the proposal for specific licence terms will mitigate the risks posed by the use of MCWSDs?

Broadly agree.

Question 9: Do you consider the proposed licence terms are appropriate and proportionate?

Yes.

Question 10: Do you have any comments on our proposal to require applicants for licences to deploy MCWSDs to supply details of their QA process on application?

Agree with the proposal. It is very important to ensure that such QA is sufficient.

Question 11: Do you agree with the proposed technical conditions of the draft licence?

Broadly agree. We might recommend that constraints on access to additional parameters aside from the Unique ID apply, or other checks, however, we note that there will be a legal requirement on the licensee, who will be identifiable by the Unique ID and other database-registered information.

Hence, we expect that the licensee will take care to avoid his/her equipment being maliciously tampered with or otherwise misused or erroneously deployed.

Question 12: Do you have any comments on the proposed duration for this licence?

We think this is reasonable.

Question 13: Do you have any comments on our proposed licence fee of £1,500?

We believe this fee is too high. We believe it risks being self-defeating in the sense that it may discourage the initial development and deployment of MCWSDs or white space devices in general. We believe a fee of perhaps a couple of hundred pounds at most to be appropriate. Or, an alternative solution could be to somehow gauge the fee by the ability to pay, e.g., to make it proportional to a company's net profit if the company can provide proof of its net profit. Otherwise, a fixed fee could be assumed.

Question 14: Do you have any comments on our proposed five year minimum notice period for revocation for spectrum management reasons?

This seems reasonable.

Question 15: Do you believe there is likely to be an ongoing need for white space devices that allow some level of manual configuration? Please give reasons for your answer.

Yes, we STRONGLY believe there to be a need. Please refer to answers to Questions 1-3, for example.

Question 16: Do you believe there is merit in exploring allowing enhanced operation through a licensing regime in the future and if so what additional capabilities should be allowed?

Yes, we strongly believe that this should be allowed. However, it should be phased in in an incremental way that doesn't in any way disrupt the devices under the current framework. This is, in any case, very easy to do.

References

[1] O. Holland, *et al.*, "Some Initial Results and Observations from a Series of Trials within the Ofcom TV White Spaces Pilot," IEEE VTC 2015-Spring, Glasgow, UK, May 2015.

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