Addendum to Weightless Response to Ofcom Consultation
"TV white spaces: Approach to co-existence"

Weightless would like to raise a key concern regarding the combination of the power limits for PMSE and DTT protection into a single limit measured in a 100 kHz bandwidth, as defined in section 3.34 of the Technical Report.

We do not have any issue with the protection of PMSE by defining a power limit measured in a 100 kHz bandwidth, which we agree is appropriate given the typical modulation bandwidth used by PMSE. However, we do have major concerns over the conversion of the power limit for DTT protection from an 8 MHz measurement bandwidth to a 100 kHz bandwidth.

The reason for our concern is that this conversion can substantially limit the available transmit power for a WSD that is using a fraction of the channel bandwidth, even in the absence of any PMSE. In practice, the availability of White Space channels at reasonable transmit power levels can be very limited in some locations due to the number of DTT transmitters in the locality, so for frequency planning and spectrum efficiency reasons it is important to be able to sub-divide a given channel such that reduced bandwidth allocations can be provided to different WSDs. This is particularly the case for M2M communication systems such as Weightless that do not require high date rates so can reasonably operate with a reduced bandwidth.

Unfortunately, the formulation of Equation 3.2 in section 3.34 of the Technical Report severely penalises any reduction in transmit modulation bandwidth, because the available transmit power is reduced in proportion with the bandwidth even when the limiting factor is DTT protection rather than PMSE protection. This is a serious issue for the Weightless M2M system, since the available transmit powers and number of available channels is already a major constraint.

We also do not entirely see the logic of the current approach, as it seems to imply that the P_1 value that is passed to the WSD is redundant as the P_0 value will always be more limiting (and actually no realistic modulation could fill the entire channel bandwidth with a flat PSD, even without the more serious concern of what happens when the channel bandwidth is sub-divided).

We would like to propose a modified approach in which $P_{WSD\text{-}PMSE}$ (for PMSE protection, so in a 100 kHz bandwidth) and P_1 (for DTT protection, so in a 8 MHz bandwidth) are the two values passed from the WSDB to the WSD, rather than P_0 and P_1 (in which case the calculation of P_0 in equation 3.2 is no longer required). This does not appear to be any more complex, since there are still two parameters being passed to the WSD, and it retains all the logic in the protection ratio derivations for each of PMSE and DTT.

The WSD knows the nature of its modulation (e.g. the modulation bandwidth), so can perform the correct combination of these two limits to form the single overall power limit that is guaranteed to meet both underlying protection limits. Again, this is not significantly more complex to implement than the existing scheme, given that the existing scheme still requires the WSD to map the P_0 limit in 100 kHz to an overall power limit based on the nature of the modulation being used. The result of this approach is that both underlying protection limits are satisfied, within the original measurement bandwidths in which they are derived, and this avoids placing a much tighter maximum power constraint on a system that is using a fraction of the channel bandwidth for frequency planning and spectrum efficiency reasons.