

## **The Weightless SIG's Response to the Ofcom Consultation: The Future Role of Spectrum Sharing for Mobile and Wireless Data Services**

### *Summary*

The Weightless SIG welcomes the opportunity to respond to Ofcom on the topic of licence-exempt spectrum access. Our overall message is that machine-to-machine (M2M) communications is a critically important capability for the UK, but requires a high certainty of spectrum access, which can only be achieved by Ofcom providing clear guidance on white space availability and consistently delivering against this.

### *Response*

M2M communications is a critically important capability for the UK. It can provide substantial growth with forecasts of 1% improvement in GDP per year cumulative over 20 years. It can ease societal problems such as the aging population, global warming and congestion. It can stimulate innovation such as companies like Neul and ARM. It can provide a better society for all from smart cities to smart traffic systems. With forecasts of 50 billion connected devices by 2020, M2M will be by far the fastest growing and most important user of radio spectrum into the next decade. Ensuring that it can be deployed quickly and successfully should be of the highest priority to regulators and Governments.

M2M is not just smart metering and short-range RFID communications as the Ofcom consultation seems to suggest in places. There are hundreds, if not thousands, of M2M applications and the only way to accommodate these is to build general-purpose networks that can handle a range of different applications. This is exactly what the Weightless standard has been designed to achieve. The converse – a separate network for metering, for vehicle telemetry, for healthcare, for parking applications, etc, is clearly nonsensical and would massively disadvantage the UK. We strongly recommend that Ofcom do not provide spectrum just for smart metering, but work to ensure that general-purpose networks can be deployed across the UK. This means providing spectrum access sufficient and suitable for a wide range of applications. This fits well with Ofcom's general approach to technology and usage neutrality in the provision of radio spectrum.

While M2M is forecast to deliver huge growth, it should be remembered that any network in its infancy will be vulnerable to risks and uncertainties. Companies are careful about making large investments in networks and will defer these if there is significant uncertainty. At present, Weightless network operators cannot justify large investments in prime radio spectrum and need to work with licence-exempt spectrum in order to prove the concept and the demand. But licence-exempt spectrum comes with major risks and Ofcom need to do all they can to alleviate these.

White space access is very promising – it offers significant amounts of prime spectrum and enhances the efficiency of use of spectrum. It is one of the most promising ways to access Governmental spectrum holdings. However, to provide the certainty needed for investment regulators need to commit to providing more white space over time, rather than reducing it in order to auction spectrum. Ofcom has consistently signalled that it will reduce white space whenever it can, through

auctioning spectrum, reserving it for local TV, refarming it with a bias towards provision of spectrum to mobile network operators, giving preference to PMSE applications and adopting conservative rules where access can be granted. International organisations such as the ITU have taken a similar approach with their focus on refarming 700MHz and lack of recognition for the uncertainty and issues this causes to those trying to invest in white space technology and networks. While Ofcom say that white space access is important to them, the signals and actions they take indicate the opposite.

Waiting for DSA technologies to emerge before signalling increased non-licensed spectrum access will not work – as can be seen at present with interest in TV white space stalling as regulators delay, consider reducing UHF spectrum or adopt ever more conservative rules of access. Without a strong signal from Ofcom that white space access will be nurtured, promoted and extended to other bands there is a serious risk that manufacturers and operators will conclude investment in this area is premature and will seek other approaches.

Ofcom have suggested that new approaches to DSA might bring improvements over the currently proposed rules for white space access to TV bands. We do not believe that there are any better approaches to white space and licence-exempt access than geo-location. “DSA” does not have any new techniques available to improve operation or reduce interference other than standard concepts such as frequency hopping and listen-before-transmit. Relying on new technologies is inappropriate at this stage unless specific technologies can be identified and their improvement quantified.

Better protection against interference between sharing users can be enabled if only network operation (as opposed to consumer self-provisioned operation) is allowed in white space. Network operators can then coordinate with each other using agreed codes of conduct and overall band management is much more viable. In any case, geo-location much favours network access. Hence, we suggest Ofcom consider only allowing network operators to access white space spectrum.

Ofcom have asked whether other bands might be useful for M2M communications and postulated that sharing with military users might enable small cells in city centres. We note that band proliferation can add substantially to device costs which are critical for M2M devices. Global harmonisation is also important in achieving economies of scale. So while the additional spectrum bands might be of use it would be preferable to concentrate on the existing bands, especially the TV white space, which has global harmonisation and is the basis for the design of many existing standards. We also point out that the size of the cell depends on the link budget and that for technologies such as Weightless that make use of spreading, extended range can be achieved for the same low-power transmission. Hence, Ofcom should not make assumptions as to likely cell sizes.

### *Conclusions*

Database access to spectrum has huge potential - both in the short term as a way of enabling general-purpose M2M networks in TV white space, and in the longer term as enabling more flexible and efficient access to multiple bands of spectrum. However,

to encourage the investment and innovation needed now to start the process Ofcom needs to strongly signal its intent to nurture DSA, to prioritise it over conventional approaches and not to treat it as an interim solution until bands can be auctioned. White space activity is currently at a cross-road and could be destabilised unless there is strong regulatory encouragement. Now is the time that decisive leadership from Ofcom and Government could make a difference.

*Answers to relevant questions*

Q7: Which frequency bands are likely to be most useful for M2M?

M2M bands need to be low-frequency, globally harmonised, widely available and low cost (at least initially). The TV bands fit these characteristics well apart from availability which can be poor in some areas. Finding ways to ensure greater geographical availability of the white space TV bands would be the best way ahead to enabling rapid deployment of M2M networks.

Q8: Should access to these bands be licensed or license-exempt?

Our preference is for flexible “light licensing” approaches that allow simple, low-cost access initially but enables a move towards reservation and possible acquisition over time.

Q9: Is tiered access to spectrum appropriate?

This ties in with our answer to Q8. Some flexible, or tiered approaches, could be ideal for M2M. This could enable network operators to purchase increased access rights as their business grows. It might also enable different bearers within the network to offer different levels of quality of service based on underlying spectrum access. Quite how this might be implemented will require discussion, flexibility and evolution.

Q10: Could DSA approaches in the future offer a better quality of service?

Beyond the use of a geo-location database and standard scheduling and interference-avoidance techniques in networks (eg frequency hopping, sectorisation and frequency planning across cells) we are not aware of any DSA techniques which would offer significant gains while being sufficiently low-cost to implement within M2M systems. For example, smart antennas seem unlikely to play a significant role in M2M solutions. Therefore, we do not anticipate further gains from “DSA” technology beyond those already envisaged.

Q11: Barriers to cost-effective sensing.

We do not perceive any role for sensing in an M2M network where the M2M devices are under the control of a central network management system.

Q12: Over what timescales could DSA become a mass-market technology?

This depends on the definition of DSA. Geo-location database access as implemented within Weightless could become mass-market within the next 1-3 years. We are not aware of any other DSA techniques that would be of use.

Q13: What role should Ofcom play to promote DSA?

Ofcom should make it clear that it is committed to DSA access and does not see it as something to be fitted in to what remains after bands have been cleared and auctioned. Ofcom should commit to white space access as a core part of the TV UHF band such that if cleared spectrum becomes available it should be left for white space access. Ofcom should be prepared to take greater risks with interference from white space devices to the licensed user, understanding that the database control allows it to rapidly reconfigure access parameters should interference actually occur.

Q14: Any other views?

See the main response to the consultation earlier. In particular, Ofcom's commitment to DSA is not sufficient at present to encourage innovation, device development and network deployment. Ofcom risks stifling DSA by not being prepared to give it sufficient certainty of spectrum access.