BBC

Introduction

The BBC welcomes the opportunity to respond to this consultation on the technical licence conditions for 800 MHz and 2.6 GHz spectrum and related matters. Some of the issues relating to this consultation overlap with Ofcom's consultation on "Coexistence of new services in the 800 MHz band with digital terrestrial television", as the technical licence conditions proposed in this consultation will have a direct effect on DTT interference. Given this, our response to this consultation should be considered alongside the points made in our response to the parallel consultation on DTT coexistence. In addition, depending on the outcome of the DTT coexistence consultation, we believe a new consultation on technical licence conditions might be necessary.

Question 1: Do you have any comment on the proposal to apply the limits defined in Case A of Commission Decision 2010/267/EU for out-of-block emissions from base stations into all frequencies in the range 470 to 790 MHz, as set out in Table 4.4?

We note the out of block limits defined in Commission Decision 2010/267/EU are based on the recommendations of the CEPT SE42 study chaired by Ofcom which published its findings in CEPT Report 30. This study concerned itself with the least restrictive technical conditions for mobile base stations, taking into account the selectivity performance of DTT receivers. Report 30 clearly states *"it should be understood that block edge masks do not always provide the required level of protection of victim services and in order to resolve the remaining cases of interference additional mitigation techniques would need to be applied".* These mitigation options are the subject of Ofcom's parallel consultation which includes the results of technical studies to assess the interference generated to DTT by LTE deployment.

Ofcom's coexistence studies have concluded that additional limits on out of block emissions are necessary to manage the interference problem. For its modelling, Ofcom have assumed an additional roll off in the BS out of block (OOB) emissions of 10dB per 8MHz TV channel and even with this additional constraint, the interference to DTT is very significant. Without this additional OOB restriction, additional mitigation techniques like receiver filtering will not be effective and at least 750 thousand homes will lose their DTT reception. Given this, we feel the OOB assumptions used in Ofcom's simulations should be the baseline requirement, with additional geographical restrictions to protect TV reception of CH59 and CH60, wherever possible.

Whilst we note that Ofcom indicate that their proposed limits do not take account of any additional restrictions required for co-existence with DTT, we do not feel it would ever be appropriate to use Ofcom's proposed limits for any 800MHz base station. Use of the Case A limits would pollute the adjacent DTT band unnecessarily, render other mitigation measures significantly less effective, and make future changes or additions to the DTT network substantially more difficult.

We therefore propose the following limits, as already deemed appropriate and used by Ofcom in its coexistence studies:

Frequency range of out-of-block emissions	Condition on base station in-block EIRP, P dBm/10MHz	Maximum mean out-of-block EIRP	Measurement Bandwidth
782 to 790 MHz (TV CH 60)	64 ≥ P ≥ 59	0 dBm	8 MHz
	36 ≤ P < 59	(P-59) dBm	8 MHz
	P < 36	-23 dBm	8MHz
774 to 782 MHz (TV CH 59)	64 ≥ P ≥ 59	-10 dBm	8 MHz
	36 ≤ P < 59	(P-69) dBm	8 MHz
	P < 36	-33 dBm	8MHz
768 to 774 MHz (TV CH58)	64 ≥ P ≥ 59	-20 dBm	8 MHz
	36 ≤ P < 59	(P-79) dBm	8 MHz
	P < 36	-43 dBm	8MHz
760 to 768 MHz (TV CH 57)	64 ≥ P ≥ 59	-30 dBm	8 MHz
	39 ≤ P < 59	(P-89) dBm	8 MHz
	P < 39	-50 dBm	8MHz
752 to 760 MHz (TV CH 56)	64 ≥ P ≥ 59	-40 dBm	8 MHz
	49 ≤ P < 59	(P-99) dBm	8 MHz
	P < 49	-50 dBm	8MHz
470 to 752 MHz (TV CH ≤55)	P ≤ 64	-50 dBm	8 MHz

Note the BEM roll off is limited to -50dBm/8MHz channel. This corresponds to a received I/N of -11dB at the DTT receiver (-98dBm noise floor) for the CEPT reference geometry with 64dB isolation and with all 3 licensees radiating. Under these circumstances the co-channel interference to DTT from the 3 LTE blocks would be -50 -64 +5 = -109dBm. This I/N is considered sufficiently low to protect DTT reception at the edge of the broadcast cell.

For certain geographical locations, typically CH60 TV areas, further restrictions to OOB (17dB) will be required in line with the mitigation approach defined in Ofcom's coexistence study and proposed in Table 6.3 of the coexistence consultation document.

Frequency range of out-of-block emissions	Condition on base station in-block EIRP, P dBm/10MHz	Maximum mean out-of-block EIRP in 8MHz measurement bandwidth		
		Block A	**Block B**	**Block C**
782 to 790 MHz (CH 60)	64 ≥ P ≥ 59	-17 dBm	-28 dBm	-40 dBm
	49 ≤ P < 59	(P-76) dBm	(P-87) dBm	(P-99) dBm
	36 ≤ P < 49	(P-76) dBm	(P-87) dBm	-50dBm
	P < 36	-40 dBm	-51 dBm	-50 dBm
470 to 782 MHz (CH 21- 59)	64 ≥ P ≥ 59	-27 dBm	-38 dBm	-50 dBm
	47 ≤ P < 59	(P-86) dBm	(P-97) dBm	-50 dBm
	36 ≤ P < 47	(P-86) dBm	-50dBm	-50 dBm
	P < 36	-50 dBm	-50 dBm	-50 dBm

Further details on the precise geographical locations where the additional restrictions are required should be made available to the potential licensees of the spectrum as part of the award process and auction.

Since broadcast network operators may wish to further develop their DTT networks over time, compulsory coordination requirements may also be necessary.

Question 2: Do you have any comment on the proposal to set an in-block emission limit of 61dBm/(5 MHz) for base stations in the 800 MHz band?

We note from the technical report the direct link between EIRP and the number of households affected by interference. We therefore expected base station power reductions in certain geographical areas to be a very important mitigation tool. We are surprised to note that Ofcom has instead chosen to license 3x the power[1] used in the impact analysis as this will substantially increase the level of interference to DTT households, typically by a factor of 2.4 using Ofcom's own model[2].

Whilst we note that Ofcom indicate that their proposed limit does not take account of any additional restrictions required for co-existence with DTT, we do not feel it would be generally appropriate to use Ofcom's proposed EIRP limit for 800MHz base stations. Use of the proposed limit would pollute the adjacent DTT band unnecessarily, render other mitigation measures significantly less effective, and make future changes or additions to the DTT network substantially more difficult. We therefore strongly urge Ofcom to revert to the value of 59dBm/(10 MHz) for the technical licence conditions, as used throughout their technical studies. Ofcom have argued that there may be cases (such as provision of deep indoor coverage in rural environments) where the proposed higher limit is needed – we believe that if this can be argued to be appropriate, and unlikely to have a significant impact on DTT reception, this could be agreed on a case-by-case basis by prior consultation with relevant MCFN operators and DTT multiplex operators.

If it is necessary that the TLCs specify the maximum EIRP allowable i.e. 64 dBm/10 MHz, then there must also be a robust process to persuade MNOs to deploy lower EIRPs more generally. Ofcom has suggested that a 'tariff' mechanism could be imposed, whereby use of high EIRPs or poor OOB performance would attract additional costs for the MNOs. Whilst we believe that these ideas are worth developing, we are very concerned that 64 dBm will be enshrined in the TLCs long before any method of regulation is agreed and consequently the expectation will be the use of the higher powers.

Furthermore, we anticipated a requirement to carefully coordinate DTT and mobile networks to manage the interference problem. It is well understood that the permitted EIRP levels to prevent interference are a function of the DTT deployments at a particular location, and a "one size fits all" approach cannot be used. Given the narrow guard band (1MHz) between DTT channel 60 and LTE licence A, it seems inevitable that the EIRP for licence A will require restrictions compared to licence B and C in order to manage the interference to DTT.

[1] The technical licence conditions quote 61dBm/5MHz instead of 64dBm/10MHz, however the two specifications are equivalent.

[2] See paragraph 1.4, Ofcom Technical Report: "Technical analysis of interference from mobile network base stations in the 800 MHz band to digital terrestrial television", 10 June 2011

Question 3: Do you agree with the proposed conditions on antenna placement that would permit the use of the alternative block-edge mask for restricted unpaired blocks? If not, please explain your reasoning and your alternative proposals, bearing in mind the need to remain consistent with the framework provided in Commission Decision 2008/477/EC.

Question 4: Meeting the conditions on the use of the alternative block edge mask for restricted TDD blocks would require certain licensees to share information about the locations of their base stations. Do you agree with this proposed approach?

We have not studied these proposals in depth and are unable to comment.

Question 5: We welcome comments on stakeholders' preference for the dedicated or hybrid options for low-power shared access as discussed above.

Low power access to the spectrum is essential to support the so called "fixed mobile" applications where the mobile terminal is located indoors. Attempts to provide high capacity coverage deep indoors will prove unsuccessful or inefficient due to high building penetration losses which typically restrict the quality of broadband received indoors. We support initiatives to promote deployment of high efficiency LTE femto cells as this offers the greatest potential for improving fixed mobile reception, which is considered a very important use case. Alternative approaches based on WiFi technology in unlicensed bands suffer with congestion, poor MAC efficiency, increased terminal cost and impact on terminal battery life.

Question 6: We welcome comments on the appropriate frequency placement for low-power spectrum blocks.

The BBC has an interest in improved mobile broadband and has developed services like iPlayer and bbc.co.uk for some mobile platforms. We therefore welcome the initiative to facilitate low power shared spectrum blocks as this could potentially enable deployment of femto cells or similar technologies for broadband wireless access within buildings and public spaces. This small-cell approach is likely to be far more effective in enabling broadband access to the so called "fixed mobile" use case where potentially large numbers of users are accessing the internet deep indoors where coverage from traditional base stations is likely to be marginal or poor. Femtocell technology has great potential to address this important use case, but deployment has been difficult in the 3G band as a consequence of the traditional licensing arrangements. In the UK, only Vodafone have promoted a limited deployment of femto cells, and other operators with less available spectrum have been unable to deploy the technology at all.

We note that Ofcom is developing proposals to exploit unused spectrum through alternative location based licensing approaches and feel these technique would also be appropriate to the mobile band. The mobile operators have over 550MHz of spectrum available to them and inevitably this is not always fully utilised and there will be considerable "white space". Unused spectrum, where operators have chosen not to deploy carriers in all of their licensed channels could be made available for femto applications through geolocation databases. Since location services are already implemented using mobile technology, we feel mobile technology would be a good match to the geolocation approach. A technology neutral approach would also allow 2.6GHz and 2.1GHz white space to be used for other applications such as PMSE through the band manager. We note that the spectrum plans for the London Olympics will make full use of the 2.6GHz bands and that staging such an event will be almost impossible in future unless more flexible licensing approaches are adopted.

Question 7: Do you agree with our proposed technical licence conditions for low-power access?

Question 8: We welcome comments from stakeholders on the additional restrictions and technical measures we have outlined for the management of interference under the hybrid approach, and the technical licence conditions that would be necessary to implement them.

Question 9: Do you agree that a Code of Practice on Engineering Coordination, as outlined, is the appropriate approach to manage the coexistence between low-power licensees?

These issues are best resolved by the mobile operators.

Question 10: Do you agree that we should proceed with the approach that terminal stations complying with the relevant technical parameters be exempted from the requirement for individual licensing?

This would appear to be usual practice for mobile TS equipment. However we feel it would be prudent to delay this for 800MHz TS equipment until the interference mechanisms affecting SRD equipment and CATV are better understood. We note that ERA report 2011-0299 on SRD characteristics states *"At the time of the study there were no "real" LTE 800 MHz UE devices on the market and so simulated emissions were used to assess the potential for interference. As a consequence, considerable caution must be exercised in drawing any firm conclusions from the test findings until further information becomes available on 800 MHz UE behaviour."* Given this, we feel any conclusions on UE interference, particularly with regard to SRDs are premature and exempting UE devices from individual licensing would carry a significant risk.