Response to Ofcom on

Consultation and information on technical licence conditions for 800 MHz and 2.6 GHz spectrum and related matters

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Executive Summary

This consultation document presents a distorted and incomplete picture of the facts rather than a rational discussion. Since Ofcom is generally known to be competent in this field, one can only assume this is a deliberate attempt at deception.

This response is primarily concerned with compatibility issues between 800 MHz LTE and services in 863 to 870 MHz. In that regard, the consultation is fundamentally flawed because:

- The interference analysis underpinning the consultation is wrong; it is based on incorrect assumptions.
- The discussion of technical parameters for terminal stations in section 8 is incomplete; it makes no mention of the single most important parameter.

It is vital that a proper compatibility study, involving and agreed by all stakeholders, is performed. There are standard procedures for such studies, which Ofcom appear to have bypassed in this case.

To try to set technical licence conditions before such a study is negligent and extremely dangerous. It invites a scenario in which there is serious interference to established services. The costs (financial and social) of remedying this after the event will be enormous.

Reasons why the consultation is flawed

Interference Analysis

The interference and compatibility analyses are incorrect. The studies Ofcom are relying on are flawed because.

1. **The traffic assumptions are wrong**. The interference and compatibility calculations assume the network is running at a fraction of its capacity. Ofcom are promoting LTE as the means of delivering rural broadband. The telecoms industry are publishing papers saying that as planned it does not have sufficient capacity and must be upgraded. Therefore, when promoting the benefits of 800 MHz LTE, Ofcom are assuming it will run at more than the proposed capacity, yet when considering interference issues, they are assuming it will run at less than the proposed capacity. This is blatantly misleading.
2. **The technical assumptions are wrong**. Ofcom is basing its analysis on one set of technical parameters, as set out in CEPT report 30. But the telecoms industry is working to a different set (the recently published ETSI EN 301 908). Therefore the actual equipment deployed will be higher power and have higher interference potential than assumed in the theoretical studies. This difference has been made clear to Ofcom in communications from CEPT and ETSI.
3. **The effect on victim services has been understated**. Ofcom admits there will be interference to SRDs in 863-870 MHz, including social alarms, but dismisses the effect and proposes to take no action (paras 3.5 to 3.11 in the consultation). It admits, however, "*..that actual operation may not reflect the simulation scenarios*" (para 3.9), and then gives the game away completely when among the remedies it lists the idea of "*…migration to other frequency bands*" (para 3.13). The truth is that even Ofcom's own studies show that as 800 MHz LTE is rolled out, services such as social alarms will start to fail.

Technical Parameters for LTE Equipment

There is a series of glaring omissions in the consultation document. The most important parameter affecting interference to adjacent services is the Out of Block (OOB) emissions.

Section 4, on technical conditions for 800 MHz LTE Base Stations, discusses OOB emissions falling below the LTE band, i.e. below 790 MHz. It somehow fails to mention those falling above the LTE band, i.e, above 862 MHz.

Section 8, on Terminal Stations, makes no mention of OOB emissions at all.

Para 8.6 discusses fixed or installed TS at higher power in the 2.6 GHz band. No mention is made of these at 800 MHz, but I understand these are planned by the telecoms industry as a means of delivering rural broadband.

OOB emissions from 800 MHz TS will be the main mechanism for interference to services in 863-870 MHz. Fixed or installed TS at 800 MHz are a major concern because at present there are no technical conditions proposed for these. It beggars belief that a consultation on technical conditions for LTE fails to even mention these obvious and vital issues.

An example compatibility calculation is given below in Annx A, which shows the interference situation is far worse than suggested by Ofcom.

Licence Exemption

The general conditions for a radio device to be granted “licence exempt” status are that it has a low capability for interference. (See CEPT Rec 70-03, EN 300 220, Ofcom IR2030 etc).

This is normally achieved by requiring conformity to a technical standard that sets appropriate limits on power, OOB emissions, etc.

The technical parameters proposed (in either CEPT Report 30 or in EN 301-908) for 800 MHz LTE do not result in devices with a low capability for interference.

Comments and answers to questions

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?

Only to question why OOB emissions above 862 MHz are not considered in this consultation.

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?

This is a higher power level than used in the interference analysis and modelling. The analysis needs to be repeated with the new figure.

Questions 3 to 9 are about 2.6 GHz and outside the scope of this response

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

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

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?

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?

No. Ofcom's normal policy is that exemption from licencing should only be done when the devices have a low capability to cause interference. In this case, the proposed technical parameters for terminal stations will create a high capability for interference. Therefore Ofcom should require them to be licenced.

Annex A: Compatibility between 800 MHz LTE and SRDs

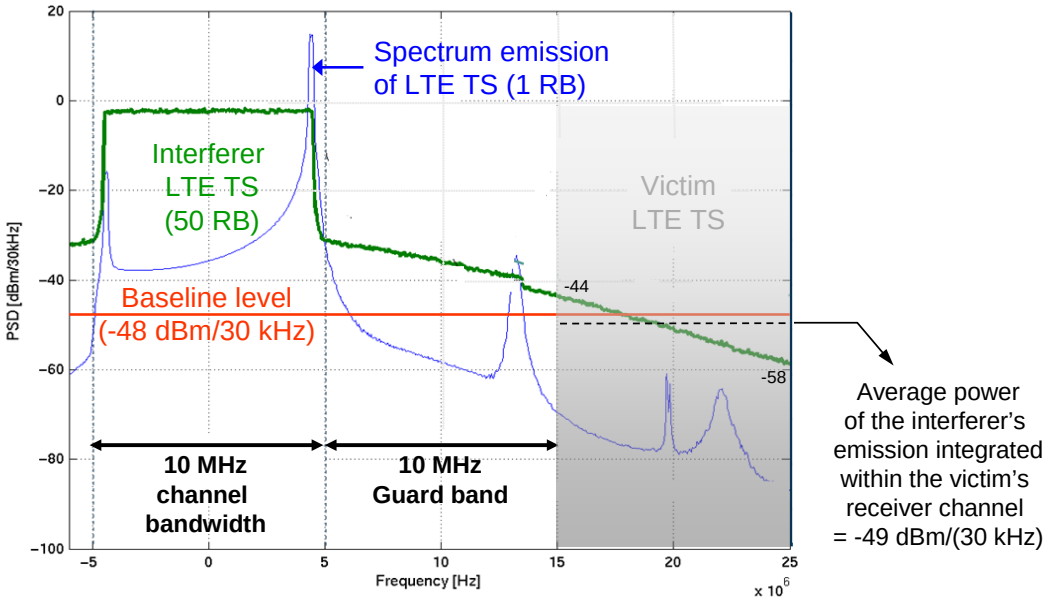
One of the concerns is the possible interference to SRDs operating in the 863-870 MHz band. This is discussed in the report from the ETSI-CENELEC Joint Working Group and in CEPT Report 30.

These and other documents are available in a public access area on the ETSI server: **http://docbox.etsi.org/Etsi_Cenelec/PUBLIC%20FOLDER%20on%20DD/.**

There are many types of SRDs in the 863-870 MHz band. This Annex considers interference into an alarm system. This example is chosen because:

a) alarm systems are narrow band and operate at 869 MHz, therefore would be expected to be among those devices least affected by 800 MHz LTE
b) wireless alarms are recognised by Ofcom to have a high social and economic value.

CEPT Report 30, Figure 5, shows an emissions mask for a handset TS, which is reproduced below. This is an assumed Block Edge Mask (BEM) when operating with 1 RB and 50 RB.



This BEM indicates that a TS in the top 10 MHz block will put an out of band emission of approx –40 dBm into a 15 kHz receiver bandwidth at 869 MHz. This would happen all across the SRD band if it were running 50 RB, or on certain channels if it were running 1 RB.

The recently published Harmonised Standard for LTE handsets, EN 301 908-13, however, sets different parameters. This permits –11.5 dBm/1 MHz emissions at 869 MHz. If this were evenly spread as noise it would be –21.5 dBm in 100 kHz or –29.7 MHz in a 15 kHz bandwidth.

By contrast I note that under EN 300 220 an alarm system at 869 MHz is only permitted OOB emissions into the LTE band of –54 dBm/100 kHz, an imbalance of over 32 dB.

Separation Distance from Alarm Systems

Using the Minimum Coupling Loss technique, the separation distance required between an operating LTE handset (EN 301 908-13 specification) and an SRD alarm system can be calculated.

A typical alarm receiver has a sensitivity of –112 dBm and a bandwidth of 15 kHz. An interfering signal of –120 dBm will result in an erosion of margin of 6 dB, or a factor of 2 reduction in reliable range. To keep the LTE out of band emission below this a path loss of 90 dB is required. This equates to a free space separation distance between the LTE handset and the alarm receiver of 900 m.

The situation with the fixed or portable TS is less clear. These are proposed to operate up to +35 dBm and the technical standards that will be applied are as yet unknown. If the out of band emissions scale in proportion to the power, then a separation distance of 3.6 km is required.

Note these separation distances may seem large compared to those in other scenarios. They arise because of a combination of alarms operating at low signal levels and the very high out of band emissions of LTE TS.

Improved signalling for Alarm systems

Ofcom acknowledges the threat to alarms, but propose to do nothing to mitigate it. Instead they suggest (paragraph 3.13) that alarm manufacturers provide their own solutions *"such as ensuring social alarms use more robust signalling mechanisms"*.

It is worth considering just how much improvement is needed. In practice, the minimum separation distance that could be enforced between an alarm receiver and a LTE TS is 5 m. A handset at that range would put –75 dBm into the input of the alarm receiver. In order to continue operating as before, the alarm system would have to improve by 45 dB, or become 32,000 times "more robust".

As with most things, some technological improvement is possible, but this is unrealistic.