

Question 1: Do you agree with Ofcom's proposal to exempt users of Citizen's Band (CB) radio (and other related applications such as Community Audio Distribution) from the need to possess a Wireless Telegraphy Licence.

The BBC has no reason to disagree with this proposal and appreciates the need to find a suitable spectrum allocation to house Community Audio Distribution Systems (CADS) whilst protecting other spectrum users from harmful interference. However, we note the apparent similarity between the function of CADS and broadcasting so the principle of Citizen's Band communication that 'users are generally able to avoid interference from other users by choosing an alternative channel ...' is probably not applicable to CADS use. Consequently, any proliferation of CADS use of the Citizen's Band allocations in an area would have the potential to impair the utility of the Citizen's Band for its intended use by the general public.

Question 2: Do you agree with Ofcom's proposals to permit the use of 'Micro' FM transmitters in the UK, and to authorise that use by licence exemption.

The BBC appreciates the advantage in principle of authorising for licence-exempt use low-power Band II transmitters constructed strictly to a common European type-approval regime and 'CE' marked. However, the chosen maximum ERP of 50 nW is neither sufficiently small to avoid creating interference to broadcast reception nor sufficiently large to guarantee that such 'Micro' FM transmitters will actually work as intended in areas where Band II is utilised intensively, such as London. The intended use of 'Micro' FM transmitters in vehicles presents the likelihood of them being left radiating signals on frequencies used for broadcasting (having been tuned elsewhere to what appeared to be a 'clear' frequency). In the planning of broadcast transmissions in Band II, frequencies have generally not been left 'clear' deliberately for such an application so there is no universal solution to this dilemma.

An EBU document BMC 976 (B/EIC 121, dated 29 April 2005), titled 'SRDs: Relevant Protection Criteria for Terrestrial FM Sound Broadcasting' provides references for the relevant planning parameters and considers, implicitly, the case of a 'Micro' FM transmitter (as an SRD = Short-Range Device) used in a road vehicle causing interference to receivers in other vehicles. The minimum usable field strength at the rural limit of service for stereo reception is 54 dB μ V/m at 10 metres above ground level (AGL). Applying 12 dB 'height loss' the minimum usable field strength is 42 dB μ V/m at the normal height of car radio antennas; about 1.5 m AGL (hereafter in this section all field strengths will be given for this height). The required protection ratio for continuous co-channel interference from another FM radio transmission is 45 dB so the maximum tolerable interference field strength for a single interferer is -3 dB μ V/m. For an interfering source 10 metres away from the victim receiver, its maximum tolerable ERP would then be 0.001 nW. In contrast, for the proposed ERP of 50 nW the minimum separation from a victim receiver would need to be about 2.2 kilometres in free space. The same EBU document suggests the maximum interfering ERP should be a further 10 dB smaller (i.e. 0.0001 nW) to 'ensure that additional interference from SRDs does not cause more than 0.5 dB degradation of the VHF/FM planning limits'. The limit-of-service field strength in urban areas is 6 dB greater, and the interfering signal may be somewhat attenuated on passage through the vehicle windows, but neither of these affects the conclusion of excessive interference potential.

Considering a 'Micro' FM transmitter as the source of a wanted signal, its ERP of 50 nW would yield a field strength of about 58 dB μ V/m at a location 2 metres away in free space. When used inside a car, it may achieve this order of field strength at the (external) receiving antenna. If the receiving installation is designed to work down to the rural limit of service minimum field strength of 42 dB μ V/m then, in isolation, this arrangement would yield adequate signal-to-noise ratio with some 16 dB in hand. However, whatever 'clear'

frequency is chosen for the 'Micro' FM transmitter is likely to be polluted with broadcast signals beyond their limits of service, especially in the major cities where most available frequencies are in use. Most probably in urban areas, any frequency not occupied by a broadcast signal within its limit of service will contain an aggregate of signals with an effective field strength smaller than the limit-of-service value (48 dB μ V/m) by less than the required 45 dB protection ratio – making that frequency unavailable for normal planning.

For the most optimistic case, where the protection ratio for a broadcast signal is just met, the effective interference field strength would be 3 dB μ V/m. To achieve 45 dB protection ratio for the 'Micro' FM transmitter and car radio combination would require a maximum effective interference field strength less than 13 dB μ V/m so there would be a 10 dB margin against inadequate signal-to-interference ratio. However, in the worst case the effective interference field strength could be almost 48 dB μ V/m yielding a signal-to-interference ratio of only 10 dB (i.e. 35 dB short of the required protection ratio). Variation between these limiting cases is inevitable during a journey so consistent operation on the move seems unlikely. Another exacerbating issue in urban areas is the blight of pirate radio signals occupying frequencies that might otherwise appear 'clear'.

This treatment has neglected adjacent-channel (and potentially second-adjacent-channel) interference, but that would only reinforce the same conclusion.

Furthermore, conventional circuit design principles dictate that an oscillator to produce a VHF signal with adequately low phase noise will generate a power of at least 1 mW. Assuming a transmitting antenna coupling factor (i.e. fractional 'gain') in the region of -20 dBd, the oscillator signal would need to be attenuated by a further 23 dB in order to achieve the 50 nW ERP. In such a case very effective screening would be needed to prevent radiation from the oscillator circuitry exceeding that from the intended antenna. A related question is how achievement of no more than 50 nW ERP would be demonstrated by manufacturers. Clearly, measurement of 'conducted' power from the oscillator would be grossly inaccurate and, in an urban area where Band II is used extensively for broadcasting, measurement of the radiated power would require a very well-screened test enclosure.

Collectively, these factors could contribute to a future scenario in which compliant, CE-marked, 'Micro' FM transmitters fail to meet customer expectations but less carefully designed, non-compliant, higher-powered 'grey' imports do. If their use in vehicles were to proliferate, albeit illegally, this could give rise to excessive sporadic interference to reception of broadcast FM radio.

If Ofcom proceeds with permitting the use of 'Micro' FM transmitters in the UK by authorising their licence-exempt use, the BBC would suggest a review after an introductory period (of one year, for example) to consider any reported cases of interference and how these have been resolved, and to consider whether there is then any need to revise the maximum ERP.

Question 3: Do you agree with Ofcom's proposals to exempt users of High Density Fixed Satellite Services (HDFSS) terminals from the need to possess a Wireless Telegraphy Licence.

The BBC agrees with these proposals and welcomes the prospect of this additional option for delivery of broadcast television and other services to the home in areas not served by terrestrial delivery.

Question 4: Do you agree with Ofcom's proposals to exempt users of Inmarsat GAN terminals from the need to possess a Wireless telegraphy Licence.

The BBC agrees with these proposals and welcomes the prospect of simplified access to such communication links, that may be used by journalists for example.

Question 5: Do you agree with Ofcom's proposals to make available the frequency 24.05-24.25 GHz for use by short range radar (including automotive applications) devices on a licence-exempt basis.

The BBC makes no comment in this case.

Question 6: Do you with Ofcom's proposals to make available the band 2.4 GHz-2.4385 GHz for movement detection systems.

The BBC makes no comment in this case.

Question 7: Do you with Ofcom's proposals to remove the need for users of most radar level gauge equipment to possess a Wireless Telegraphy Licence.

The BBC makes no comment in this case.

Question 8: Do you agree with Ofcom's proposals to exempt users Digital PMR 446 from the need to possess a Wireless telegraphy Licence.

The BBC agrees with these proposals and welcomes the prospect of improved intelligibility by use of the digital variant of PMR 446. Indeed, any application of digital technology offering distinct improvements that is embraced by the public has potential to reinforce the public message about the benefits of digital technology in general.

Question 9: Ofcom would welcome comments on it proposals to implements these changes concerning short range devices.

The BBC would comment on the proposed addition of the band 148.5 to 1600 kHz for 'inductive applications' at a 'radiated level' of -5 dB μ A/m at 10 metres from the source. Domestic broadcast receivers for the long- and medium-wave bands commonly use antennas sensitive to the magnetic component of the incident electromagnetic field (*viz* ferrite rod and loop antennas) and the magnetic field radiated by an 'inductive application' such as an inductive loop communication system operating in either of these frequency bands has the potential to cause interference to reception of broadcast radio signals. Therefore, if the use of such systems is to be offered on a licence-exempt basis it is important that their interference potential is brought to the attention of the users (e.g. as part of the type-approval process by requiring a warning to be printed on the source equipment).

The minimum (electric) field strength at the planned limit of service in the medium-wave band is 2 mV/m, corresponding to a magnetic field strength of 5.3 μ A/m or 14.5 dB μ A/m. The required protection ratio for co-channel interference with similar amplitude modulation but different programme material is 27 dB so the maximum tolerable magnetic field strength of the interference is -12.5 dB μ A/m. The magnetic field radiated outside a small loop decays with $1/r^3$ where r is the radial distance from the centre of the loop in either the radial or axial direction. On the other hand, the magnetic field radiated by a long straight wire decays radially with $1/r$. For a practical inductive loop system covering an area of many square metres, the magnetic field outside the loop will decay following a law between $1/r$ and $1/r^3$. In the worst case of a very large system, applying a $1/r$ law, -5 dB μ A/m (or 0.56 dB μ A/m) at 10 metres corresponds to the required -12.5 dB μ A/m (or 0.24 μ A/m) at a separation of 23.7 metres (i.e. 10 metres multiplied by the ratio 0.56/0.24). This distance would need to be maintained between the inductive-loop conductor and a victim receiver operating at the limit of service in order to maintain adequate protection against interference. For a more-optimistic case involving decay following $1/r^2$, for example, the result would be 15.4 metres.

The limit of service field strength in the long-wave band is 5 mV/m so the interference potential would be reduced correspondingly.

A similar comment may apply to the inclusion of 'Medical and Biological Applications' operating between 300 kHz and 30 MHz with a 'radiated level' of 9 dB μ A/m at 10 metres. However it is not clear from the consultation document what type of modulation would be used in this case and this could change the potential for interference to broadcast services.

Question 10: Ofcom would welcome comments on its proposals to implement EC Decision 2005/928/.

The BBC makes no comment in this case.

Question 11: Ofcom would welcome comments on its proposals to implement EC Decision 2005/513/.

The BBC agrees with these proposals and welcomes the prospect of harmonisation with the European marketplace for innovative solutions to business networking, as may be used in offices for example.

Question 12: Ofcom would welcome comments on any of the minor changes set out in this chapter and any other broader issues in relation to its approach to licence-exemption.

The BBC makes no comment in this case.

Additional comments

The BBC welcomes the opportunity to be able to comment on these proposals.