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| Title: | Ofcom’s Public Sector Spectrum Release, award of the 2.3-3.4GHz spectrum |

Ofcom’s Public Sector Spectrum Release, award of the 2.3-3.4GHz spectrum

Late response on behalf of the UK Children’s FM working group.

Executive summary.

* The proposed sale of the 2.3-2.4GHz spectrum has failed to take into account the 10 million adults with hearing loss, 1 in 6 of the population, plus 45,000 deaf children in the UK.
* The assertion that there is minimal interference is based on a model that fails to understand the implications of permanent deafness. Children do not gain adult like hearing abilities (for example to listen in noise) until their late teens. Deaf children may never gain such abilities. Any level of interference is significant and has lifelong implications. Deaf children rely on radio amplification for access to speech in any poor listening environment, including schools. Interference with such systems has lifelong implications for this group of vulnerable children. Any additional effort required to listen reduces cognitive effort for other areas and places limits on deaf children.
* Deafness potentially isolates individuals and reduces their quality of life. The use of hearing aid technology currently offers more opportunities than at any other time in history. Assistive listening devices (ALD) offer access to wider society and to the workplace. Interference with such devices, reduces access to society and the opportunities this brings and is likely to result in poor hearing aid compliance.
* Lack of use of amplification has been estimated to equate to 22Billion Euros in the UK, rising to 213 Billion Euros across Europe (Shield, 2006).
* It is recognised that any interference would be dependent on the proximity of a mobile phone, primarily those using 2.3-2.390 GHz, to an ALD system. This interference will not only affect ALDs but will also affect Bluetooth devices, wifi, digital streamers and hearing aids/CI which communicate using the 2.4-2.483 GHz frequencies. It is noted that Ofcom believe the probability of such interference is low. However, if mobile phones are deployed at home, in schools and public settings the probability of interference rises with each additional phone being used. The effect of this is that it discriminates against any individual using an ALD or associated equipment..
* The current 790-862MHz and other allocated spectrum is not used efficiently as infrastructure cannot, currently, be shared. In some areas only 10% of the allocated spectrum is utilised.
* The 2.4- 2.483 GHz spectrum is of vital importance to a range of users worldwide this includes a group who currently have no protection in this respect, deaf children and adults using ALD. This offers previously unheard of opportunities to use hearing aid technology. Loss of this would be catastrophic and actively discriminate against this group of individuals in direct opposition to the Public Sector duty in the Equality Act 2010.
* Ofcom should withdraw the sale of this part of the spectrum.

Ofcom’s Public Sector Spectrum Release, award of the 2.3GHz (and 3.4GHz) recognises that the main beneficiaries will be mobile phone companies. In respect of deaf individuals, estimated to be more than 10 million in the UK (Action on Hearing Loss) and in excess of 55 million across Europe (Hearit), they will be placed at a significant disadvantage. It is noted that Duties under the Communication Act 2003,3.10 section 3 provides Ofcom’s principal duty to further the interests of citizens in relation to communication matters. Ofcom further state that “We do not consider that our proposals to award the 2.3 and 3.4 GHz spectrum is likely to impact on one group of stakeholders as opposed to another.” In fact the proposal has potential to significantly discriminate against any deaf individual who uses an Assistive Listening Device (ALD). The number of individuals this would affect equates to one in six of the UK population, with 3.7 million of working age, 6.3 million of retirement age and 356,000 with combined hearing and vision loss. It is estimated this will rise to 14.5 million individuals by 2031 (Action on Hearing Loss). In respect of 45,000 children with a permanent degree of hearing loss, the potential interference that would arise from mobile phones using 2.3GHz spectrum would be devastating.

Deaf Children

Research evidence has demonstrated that early identification of hearing loss when accompanied with very early consistent use of personal hearing aids provides the best opportunity for children with permanent hearing loss to acquire spoken language (Yoshinago-Itano, 1999; Moeller, 2000; Nathani et al., 2007). Leibold et al., (2007) note “In order to hear and understand complex sounds, including speech the peripheral auditory system must provide the brain with adequate sensory representations of the basic properties of sound (2007, pp36). By the age of one year, provided a child has access to good quality sounds, can resolve the intensity, frequency and temporal aspects of speech. Children are inexperienced listeners and children with permanent childhood deafness face considerably more difficulty (Wightman et al., 2003).

The nature of hearing loss is that it results in not only loss of power but also loss of specific frequency information. Hearing technology does not restore normal hearing although if well fitted, maintained and worn consistently amplification can provide deaf children with access to speech and language. There is evidence that sounds which produce little or no interference for adults, result in information masking for infants and young children (Bargones and Werner, 1994; Lufti et al., 2003). Hearing aids work optimally at a distance of 1-2 metres; children naturally learn by overhearing (Ahktar, 1995) and in social settings such as shopping with parents, car journeys, at the park, play group or nursery where the challenges of distance and background noise mean hearing aids alone are not optimal. It has been demonstrated that pre-school deaf children gain significantly using radio aids (Gabbard, 2005; Mulla and McCracken, 2014). The National Deaf Children’s Society and the UK Children’s FM working group recommend that radio aids are provided for all children who use hearing devices such as hearing aids, cochlear implants or Bone Anchored Hearing Aids (NDCS, 1998). For those children with the profoundest hearing loss the use of cochlear implants now offers opportunities to access speech unheard of in other generations (Archbold, 2010). Cochlear implants and hearing aids are used with radio aids to overcome the issue of distance, this is where any inference would be detrimental to the child’s development. Radio aid systems have a usable range of at least 30m and it is not unusual for them to be used over distances of at least 20m in a typical school situation.

Over 86% of all deaf children at school are in oral settings (CRIDE, 2014) where they rely on radio amplification to access the curriculum. All children are affected by adverse acoustics (Hicks and Tharpe, 2002; Sheilds and Dockerell, 2003, Jamieson et al., 2004; Howard et al., 2010). Those with a permanent hearing loss are significantly more affected. Any degree of interference that affects radio aid technology has a potentially devastating effect on deaf learners. It is inappropriate and inaccurate to make judgements about the potential effects of interference to listening based on adult models/experience. Hearing infants and children have difficulty in separating and selectively attending to target sounds in the presence of noise (Leibold et al, 2007).

Deaf children face a considerably harder task as they need to rely on amplification to access the sounds of speech. Radio aids provide a direct audio link to a child’s hearing aids; it is this technology that will be affected if the 2.3GHz spectrum is sold off. The evidence offered by Ofcom that inference is minimal is meaningless when considering deaf children. Permanent hearing loss results not only in a loss of power but in a loss of discrimination, where any degree of interference is likely to be problematic. Very early identified deaf children are unable to identify interference as they are reliant on a consistent auditory signal to develop spoken language. Failure to capitalise on this potential in the early years has lifelong implications for every child. Early language skills have been demonstrated to impact on later literacy levels (Colins et al., 2007), literacy underpins access to the whole curriculum. For school age deaf children any interference has further implications, additional effort required to listen when there is interference means there is less cognitive effort available for other tasks (Sarampalis et al.,2009: Dockrell and Shield, 2003). Use of ALDs and associated technology in secondary settings which is vital to overcome background noise and distance is reliant on the technology consistently working optimally. Any interference will compromise deaf learners and may mean the ALD and associated equipment is rejected. Once a child rejects a radio aid it becomes increasingly hard to support inclusive practice as the pace delivery of the curriculum at secondary level makes it significantly harder to ensure a deaf child can cope and increasingly unlikely they will reach their academic potential. Hearing children do not gain adult listening skills until their late teens (Sanes, 1998) For children who have a permanent degree of hearing loss this maturation is likely to be over a longer period.

Any additional challenges in accessing the spoken word that resulted from mobile phone interference directly places a deaf child at risk, contravening the UN Convention on Rights of the Child, article 23 (3)

 *“Recognizing the special needs of a disabled child, assistance extended in accordance with paragraph 2 of the present article … shall be designed to ensure that the disabled child has effective access to and receives education, training, health care services, rehabilitation services, preparation for employment and recreation opportunities in a manner conducive to the child’s achieving the fullest possible social integration and individual development, including his or her cultural and spiritual development….”*

No consideration has been given to this group of children who are recognised as being vulnerable and who would be very significantly disadvantaged if the 2.3GHz spectrum was sold off.

Deaf adults.

Adults spend an average of 70% of their time engaged in some sort of communication, of this an average of 45% is spent listening compared to 30% speaking, 16% reading and 9% writing (Adler, R. et al. 2001). The majority of adults with hearing loss have a loss acquired post-lingually. Kochkin (2002), in reporting results of the MarkeTrak VI survey, found that, of 1764 hearing aids users, 66% reported improvement in their overall quality of life due to their hearing aids. Increasingly advances in hearing aid technology mean they are used with other ALD to improve access. Any reduction in quality of sound arising from interference is likely to result in less use or no use of amplification. There is a recognised issue with adult compliance with using hearing aids yet non-use of aids is recognised as being a major economic burden. Shield (2006) estimated that untreated hearing loss costs Europe 213 billion euros per year, figures of the same magnitude have been estimated for the USA and Australia. Even slight interference on ALD will negatively impact deaf adults and make take up of amplification less likely resulting in very significant costs to national Governments, the UK cost is estimated at 22 Billion Euros.

The cost to every individual with hearing loss is also important to consider. In adults, the areas most affected by hearing loss are reported to be social life, ability to join in groups, relationships at home, feelings about self, self-confidence, a sense of safety, relationships at work, a sense of independence, mental and emotional well-being and mental ability (Kochkin, 2002). Thus hearing loss affects quality of life. Hearing aid technologies now offer more flexibility than ever before making it possible to interface with other technology. It is this flexibility which provides adult hearing aid users with the potential to access information, speech in noise and a ‘normal’ life. Interference, however minor for a hearing adult, is a major issue for any individual with hearing loss. This means investments in technology and quality of life are likely to be negatively affected.

It is recognised that any interference would be dependent on the proximity of a mobile phone, primary those using 2.3-2.390GHz to an ALD system. It is noted that Ofcom believe the probability of such interference is low. However, if mobile phones are deployed at home, in schools and public settings the probability of interference rises with each additional phone being used. This effect of this discriminates against any individual using an ALD. It will negatively impact on Bluetooth devices, wifi, digital streamers and hearing aids/CI which communicate using the 2.4-2.483 GHz frequencies The use of repeaters in schools and public buildings, to enhance the reception of 2.3 GHz would add further interference with harmful implications for deaf individuals. Every individual has the right to access society, education and to have an equal chance to develop. The selloff of the 2.3 GHz spectrum is not based on need for additional spectrum. A major issue is the lack of ability to share infrastructure and optimise use of the current 790-862 MHz and other allocated spectrum. It is a matter of urgency that consideration is given to those who would be affected by such a sell off.

Regarding the Public Sector Equality Duty in the Equality Act 2010: the aim of the duty is to advance equality into the day-to-day business of public bodies*.* It is intended to accelerate progress towards equalityplacing a responsibility on them to consider how they can work *“to tackle systemic discrimination and disadvantage*.”

Section 149 of the Act imposes a duty on 'public authorities' and other bodies when exercising public functions to have due regard to the need to:

a) eliminate discrimination, harassment, victimisation and any other conduct that is prohibited by or under the Act

b) advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it

c) foster good relations between persons who share a relevant protected characteristic and persons who do not share it.

Given due consideration of the negative impact this sell off would have on a vulnerable group within society Ofcom should withdraw the sale of this part of the spectrum.

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Action on Hearing loss: [www.actiononhearingloss.org.uk](http://www.actiononhearingloss.org.uk)