Optional Specifications for Domestic Receivers

Digital Radio Action Plan Report

Our aim is to improve the quality of life for all through cultural and sporting activities, support the pursuit of excellence, and champion the tourism, creative and leisure industries.

Contents

Section 1: Foreword

1.1 Introduction

The Technology and Equipment Group (TEG) has been tasked to identify, investigate, report and make recommendations on the technology and equipment issues related to any future Radio Switchover, including both domestic and in-vehicle receivers. The priorities for TEG include the usability of radio devices, the development of a set of common specifications and testing regime to provide quality assurance to consumers. Due to the importance of digital conversion of car radios, there is a specific In-vehicle sub-Group which looks at the barriers to take-up and conversion options.

The TEG is chaired by Laurence Harrison, Technology and Market Development Director at Digital Radio UK. Membership of the TEG includes representatives from government, the BBC, Ofcom, trade bodies, manufacturers and consumer groups.

1.2 Background to Optional Specifications for Domestic Receivers Report

Under action 2.4 of the Digital Radio Action Plan, the TEG was tasked to develop recommendations for a set of optional specifications for domestic receivers, which would provide "best practice" should certain desirable technology be installed.

The TEG delivered the Optional Specifications Report in Q4 2011, which outlined a set of functions which the radio industry and consumer groups believed were important for the future technical development of digital radio in the UK. These included features of the World DMB Profile 2 such as an Electronic Programme Guide (EPG) which displays scheduled radio programmes on a screen. The Report also outlined a pause and rewind function on receivers, and Integrated Station Guides which enables both DAB and FM stations to be presented together in one station list.

Manufacturers will not be required to include the functions identified in the Optional Specification Report within a receiver, nor will they be tested for compliance against a specified test regime. Due to the changing nature of the digital radio market, the Optional Specifications Report will be reviewed annually.

In addition to the main report, the Consumer Expert Group produced reports for TEG setting out features which they believe are of importance to vulnerable consumers. The reports are annexed to the main report.

Section 2: Steering Board Decision

The Steering Board considered and agreed the Optional Specifications Report in December 2011. It was noted that the Report covered the possible additional features that could be placed in receivers, none of which will be binding.

Section 3: Optional Specifications for Domestic Receivers

Recommendations on additional optional and advanced radio receiver specifications, which provide "best practice" should optional technology be installed.

Contents

1.0 Background

1.1 Technology and Equipment Group

As part of the Digital Radio Action Plan, the Technology and Equipment Group (TEG) must identify, consider and make recommendations on the issues relating to the development of digital radio technologies and equipment. The TEG, chaired by Digital Radio UK (DRUK), comprises device manufacturers, Intellect, BBC, RadioCentre, Government, Ofcom, the Society for Motor Manufacturers and Traders (SMMT) and consumer group representatives (the Consumer Expert Group, CEG). Retailers were invited to join TEG but did not propose any representatives.

1.1 The task

Included within five key objectives, the Digital Radio Action Plan seeks to support the development of high quality and innovative radio services and new functionality.

As stated in the Digital Radio Action Plan, one of the tasks of TEG is to "make recommendations on additional optional / advanced radio receiver specifications, which would provide "best practice" should optional technology be installed." This paper considers domestic radios only, though the features detailed herewith can also be applied to in-vehicle. Due to the changing nature of the digital radio market, this paper is to be reviewed annually.

1.2 Purpose of the report

Optional specification herewith comprises a set of functions which the radio industry and consumer groups believe are key to the future technical roadmap of digital radio in the UK. It is designed to be a signpost pointing towards the future digital radio functionality landscape for manufacturers, broadcasters and other stakeholders.

There is no requirement on any organisation to include these functions within a receiver. The Optional Specification Report accompanies the Minimum Specification Report, though it will not be tested for compliance against specified test suites.

2.0 Digital radio trends

There are a number of technology and consumer/listener trends that will influence the take-up of optional specifications. Although TEG recognises the inability to predict future trends, the following is to be considered as part of understanding the likely adoption of future digital radio technology specifications.

2.1 Internet connected devices (i.e. "hybrid devices," including mobile)

More and more people are listening to Internet radio. At the time of publishing this paper, the Radio Joint Audience Research results (RAJAR Q3, 2011) showed that listening to online radio was up to 3.7% from 3.2% quarter-on-quarter and from 2.8% in Q3, 2010. It is clear that the current direction of travel in the digital radio receiver market is towards hybrid sets that include DAB, FM and IP connectivity. An increasing number of digital radio receivers are sold with IP capabilities annually in the UK. Additionally, on the broadcaster side, there are now 100 radio services which could utilize RadioDNS - a combined broadcast and internet service - in the UK.

Mobile devices (including smart phones and tablets) are a key part of this development towards internet connected devices. This has been demonstrated by recent trends: 15.8% of adults aged 15+ listened to the radio via mobile phone in Q3, 2011, up 24.2% year on year (Rajar, Q3 2011). 55% of UK iPad users listen to live radio on their iPad (Imano, May 2011).

2.2 Interactivity

Digital technology allows a far greater level of interactivity with the radio and useful benefits for consumers. Consumers, whilst using other forms of media such as TV expect functionality such as pause and rewind and the Electronic Programme Guide (EPG) and recording. As demonstrated in the recent DCMS research, "Digital Radio Switchover: Willingness to Pay and Consumer Behavior Research" (http://www.culture.gov.uk/images/publications/Digital_radio_switchover_cost_benefit_analysis.pdf), a similar expectation of pause and rewind exists for radio listeners.

Technology that allows listeners to bookmark interesting content (so-called "tagging"), series link or even cast votes on live radio debates is also being developed by industry.

These types of additional functionality could and should extend with social media and networking (i.e. Facebook, Twitter). This is already in development by several broadcasters and Radioplayer.

2.3 Visualisation

Consumers are now used to colour screens on devices (e.g. Tablets, smart phones). Technologies like RadioVis allow the delivery of relevant visuals alongside broadcast radio. This hybrid service provides benefits to the consumer as well as benefits to broadcasters.

3.0 Optional specifications

3.1 World DMB profile 2

The UK minimum specification is based on World DMB profile 1 which is aimed at receivers with a basic alphanumeric display. Profile 2 specifically targets receivers with a colour screen display.

The Receiver Profiles describe minimum functionality; the implementation of each feature in conformance with the relevant European Telecommunications Standards Institute (ETSI) standards is determined by each manufacturer and is not proscribed. ETSI is a not-for-profit organization with more than 700 member organizations drawn from 62 countries world-wide. ETSI produces globally applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and internet technologies.
The relevant ETSI technical standards are referenced in the Profile which can be seen at
http://www.worlddab.org/public_documents/WorldDMB_Digital_Radio_Receiver_Profiles.pdf

The profile includes all World DMB Profile 1 functionality, plus the following features:

3.1.1 Channel decoding

Simultaneous decoding of a minimum of four sub-channels is mandatory. Each sub-channel can contain an audio or a data service, so receiving an audio service with a slideshow might require decoding of two sub-channels simultaneously. Decoding of a minimum of 288 Capacity Units (total) is mandatory, which sets a maximum total bitrate that must be decoded in aggregate.

3.1.2 Dynamic Label + (DL+) and Intellitext

These are both advanced text data services

The existing Dynamic Label service provides text information such as track playing, now/next, news headlines, weather, sport

results, etc., but there is no machine-readable indication of what the text content is, so the listener has no choice over what information is presented to them.

DL+ allows the broadcaster to describe what the text content (or individual words within it) refers to, and this can allow the listener to filter or read only information they are interested in. DL+ is a transfer of existent functionality in FM RDS called RT+, which is used in some other European countries, but not widely implemented in the UK.

Intellitext allows the broadcaster to classify entire Dynamic Label messages, so that they can be sorted and stored on the radio by categories for listeners to browse through. Intellitext requires the broadcaster to write the text of the message in a particular structure, but otherwise does not need any additional technical function at the broadcaster end.

Intellitext was initially implemented in the UK for the 2006 World Cup by talkSPORT, and some broadcasters continue to broadcast messages in an Intellitext-compatible format.

3.1.3 Journaline

Journaline is a data service for use in DAB. It is a structured text information service, broadly akin to Teletext or Internet RSS feeds. The broadcaster transmits short-form predominately text-based information, which can be categorised, stored and browsed through a hierarchical navigation on the receiver. It has been demonstrated providing news and information services, and is integrated into a number of car-based digital radios. Journaline can be associated directly with a specific radio service, or provided as a general service not associated with any particular station.

There are currently no UK broadcasters using Journaline.

3.1.4 Electronic Programme Guide (EPG) and recording

An EPG is an on-screen guide to scheduled radio programmes, allowing:
- The display of schedules at varying levels of detail for programmes from a range of services
- The display of schedules, with programmes and events ordered into particular groups
- Navigation and selection of services and programmes
- Searching through current and future programme listings

Two profiles have been defined in the ETSI standard:
- "Basic", that is a subset of the whole EPG specification and is meant for simple, low-cost receivers that have limited memory and display capabilities.

- "Advanced", including the complete EPG specification

Some radios already have EPG functionality built in to them. This requires support from broadcasters who need to broadcast full EPG data for their content so that it can be displayed to the listener. This data includes:
- Service Information (the structure and organisation about a broadcast channel and its associated services
- Programme information (programmes on one or more services for a defined time period)
- Group information (put programmes into groups. It is useful for series or theme classification)

If the receiver has storage capabilities such as an SD memory card then timed recordings of individual programmes, or of groups of programmes and themed or similar programming can be made. Series linking of radio programmes is also possible but not yet implemented by industry.

EPG is broadcast on a number of multiplexes in the UK. Please note, this section references a 7-day EPG.

3.1.5 Slideshow

Slideshow adds synchronised visual content (slides) to radio broadcasts on DAB. The transmission of the slides typically requires an additional 10-15% of capacity in addition to the audio service.

Slideshow services have been provided by some broadcasters, but their growth has been restricted by a number of factors. There have been relatively few radios with colour screens, in some cases capacity is too restricted to include the service, and in others the cost of the purchasing the additional capacity to transmit slideshow has not yet been commercially justified.

Please note, some broadcasters are publishing their Slideshow services on IP using the RadioVIS specification (see section 3.4.1).

3.1.6 Binary Format for Scenes (BIFS)

BIFS is part of the MPEG-4 video specification, and was originally intended to create overlays and simple graphic based local interactivity for video services. It is a relatively complex process to author content, requiring specialist tools, and the receiver side decoders are also relatively complex.

Some French broadcasters have demonstrated concepts based on BIFS, but there are no commercially launched services on digital radio in any country.

3.1.7 Broadcast Website

Enables the transmission of complete web sites for offline use in a digital radio receiver, which needs to be equipped with web browser software. Besides linked HTML pages, also multimedia elements like images, animated graphics, mp3 files or videos can be offered. Broadcast Websites can link to resources on the Internet (such as email, social networking, streaming video/audio) when the radio has an IP connection.

Because of the Broadcast Website's high demand on decoder resources and user interface functionality on the receiver side, combined with quite high bandwidth requirements for multimedia content, the application is not widely used at present - neither in terms of receiver nor in broadcaster support.

It is foreseeable that Digital Radio will be included in devices that already have a competent, contemporary, web browser, such as mobile phones and tablet devices. As broadcast websites can transfer any arbitrary multimedia content, it would be possible to transmit quite functional and attractive web content over Digital Radio, probably as a gateway to IP delivered services.

3.1.8 Service Following

This allows cross-referencing to other modes of reception of the same programme, such as FM, DRM, AM and other DAB ensembles. Receivers allowing this function will automatically switch to other modes of reception if the current one becomes unavailable (e.g. when leaving the coverage area). This functionality could be important for mobile products like hand-held receivers.

Service following is key within the context of in-vehicle, where it is possible for drivers to drive out of a DAB coverage area and thus need the device to seamlessly find the same station in another mode.

3.2 World DMB profile 3

Profile 3 is aimed at products with a colour screen capable of displaying video. The relevant ETSI technical standards are referenced in the Profile that can be seen at http://www.worlddab.org/public_documents/WorldDMB_Digital_Radio_Receiver_Profiles.pdf

The profile includes all World DMB Profile 1 functionality, plus the following features:

3.2.1 Channel decoding

Decoding of a minimum of 432 Capacity Units (total) is mandatory.

3.2.2 Video

H.264/MPEG-4 Part 10 or AVC (Advanced Video Coding) is a standard for video compression, and is currently one of the most commonly used formats for the recording, compression, and distribution of high definition video.

3.3 Pause and rewind

Some digital radios already on the market have the capability to pause and rewind live radio. In the recent report for DCMS "Digital radio switchover: Consumer research to inform the cost benefit analysis" (http://www.culture.gov.uk/images/publications/Digital_radio_switchover_cost_benefit_analysis.pdf), the consumers' willingness to pay for pause and rewind was second only to sound quality. Manufacturers are implementing this feature, but there are currently no standards, and implementation will vary (e.g. how long the user can rewind for)

3.4 RadioDNS

The RadioDNS (Domain Name System) is a global project made up of commercial and public broadcasters, software companies and consumer electronics manufacturers. RadioDNS creates patent-free open standards to link together broadcast radio and the internet, allowing hybrid DAB/Internet radios to use broadcast radio for audio and the internet for related content such as text, visuals and Electronic Programme Guides (EPG) and new functionality such as tagging/book-marking content you like.

There is support across the UK radio industry and manufacturing sector for RadioDNS and it is likely to form the core of hybrid radios in the future, giving the user a richer experience of digital radio through more content and a greater level of interactivity.

UK members of RadioDNS include the BBC, Global, Absolute, GMG, Bauer, Frontier and Imagination technologies.

3.4.1 RadioVIS

RadioVIS is a way of adding text and visuals synchronised to the radio programme. It is a port of the DAB Dynamic Label and

DAB Slideshow functionality allowing them to be carried over the Internet, rather than over DAB. This allows broadcasters to launch services without having to commit to DAB capacity, but migrate them to DAB Slideshow if/when the demand warrants using the broadcast platform.

RadioVIS is currently in production on a number of devices. RadioVIS services are available from over 100 different broadcasts in the UK from Global Radio, Absolute Radio, G-Media customers like Planet Rock and JACK fm.

3.4.2 RadioTAG

RadioTAG allows you to 'tag' bits of the radio you find interesting. Whether it's your favourite song, an interesting news story, or just something the presenter said that you thought was amusing. It's then up to the broadcaster to keep those tags and to let you interact further with that content when you've the time.

For Broadcasters, the return path that RadioTAG provides allows more direct interaction with the listener and could allow commercial broadcasters to increase revenues through, for example, more tracked and targeted advertising.

There are potentially several uses for radio tagging (song downloads, 'preference selection' etc) and it is a relatively and cost effective feature to implement. Thus UK broadcasters and manufacturers are developing their tagging strategy. Please note, ownership of the tags is unrelated to the technology specification and dealt with on a case-by-case basis.

3.4.3 RadioEPG

RadioEPG is an electronic programme guide that also allows a "universal station preset" which can find a station on either broadcast radio or by using IP streaming. RadioEPG is a port of, and enhancement to, the DAB EPG specification to use the Internet, so broadcasters can provide a "thin" service via broadcast, but a deeper and more searchable service via IP. RadioEPG also extends the concept of Service Following to allow a radio to automatically switch between FM, DAB and Streaming Audio to maintain the service being received. Some broadcasters already cross-publish their EPG on both DAB EPG and RadioEPG.

More information including the specifications and costs can be seen at http://radiodns.org/

3.5 The Internet Media Device Alliance (IMDA) Profiles

The IMDA is a global collaboration of broadcasters, manufacturers and service providers. The IMDA has developed

a set of profiles that for the first time will make streaming internet radio as simple and consistent to use as possible.

There are currently two open, interoperable specifications available to industry. Neither of these are currently being implemented in the UK.

1) IMDA Service Identification - The Service Identification describes a way for a broadcaster, or media organisation, to expose their data to a hardware or software solution (e.g. aggregator) run by a third party in a standardised way

2) IMDA Device Profiles – Defines a minimum set of features such as playlist formats and defines a protocol to allow compliant devices to stream from Shoutcast streaming servers. Compliant devices can self-certify against these specifications and carry an IMDA logo
More information including the specifications and costs can be seen at http://www.imdalliance.org/

3.6 Sound innovation

In the recent report for DCMS "Digital radio switchover: Consumer research to inform the cost benefit analysis" (http://www.culture.gov.uk/images/publications/Digital_radio_switchover_cost_benefit_analysis.pdf), sound quality was the feature of digital radio with the highest willingness to pay attached to it by listeners. There are a number of areas where specifications relating to sound quality are emerging or are available.

3.6.1 High quality sound over IP

UK broadcasters are starting to offer high-quality sound services on certain programmes streamed over the internet to the PC. Currently, the two ways that this is being done are:

1)
- A wide dynamic range (no over-all compressors or multi-band processors after the craft sound balance)
- Not mono
- 320kb/s AAC
- Linear editing / production / playout system only
- Lines from special "high quality" events to be appropriate quality - we use 512kb/s APTX or better

2)
- Fully Lossless Audio Codec (FLAC) 1410kbps VBR
- Currently these services are being referred to as HD-Sound and Full HD and work is ongoing to try and

establish a common industry minimum standard for HD-sound delivered over the internet

3.6.2 Surround sound

There are a small number of UK consumers who have a surround sound device, either through their television or IP-connected device. There are no surround sound services currently broadcast, but UK broadcasters are considering this for niche content.

3.6.3 Dynamic Range Control (DRC)

The dynamic range of an audio programme signal is the range between the highest and the lowest useful programme signal level. The problems associated with programmes having a wide dynamic range, and with achieving a satisfactory loudness balance between different parts of the radio programme (such as speech or music) can be solved to an extent by DRC. DRC can do this by making the quite bits louder and the loud bits quieter.

Most receivers have the capacity to enable DRC. However, consumers are not aware of it and it is not the default functionality as part of radio factory settings.

3.7 Integrated Station Guide (ISG)

An ISG is a software-enabled feature that allows FM and DAB radio stations to be presented together in one station list. This has the potential advantage of taking away the need for the listener to manually move between FM and DAB and would ensure that, post switchover, all stations are presented on an equal footing.

However, no open standard currently exists for an ISG. It is likely that ISGs will remain a USP of both silicon providers (software development) and manufacturers (user-Interface).

There is interest within industry in principle to implement ISG, but the technology is still under development.

3.8 Accessibility and Usability

The Consumer Expert Group (CEG) submitted the report "Digital Radio Accessibility: priority areas for older and disabled people" to the TEG in April 2011 (redrafted October 2011).

The CEG comprise of:
- Roger Darlington (Chair)
- Gretel Jones, Age UK (Vice Chair)
- Leen Petré, Royal National Institute for Blind People

- Robert Clark, Voice of the Listener and Viewer
- Margaret Grainger, British Wireless for the Blind Fund (BWFB)
- Alison Hopkins, Consumer Focus
- Tim Leech, WaveLength
- Susan Marks, Citizens Advice
- Ruth Myers, Telecommunications Action Group (TAG)
- Katie Waller, Which?
- Carole Garfield, Rural Community Council
- Roy Staines, Sense
- Laura Matthews, Royal National Institute for Deaf People
- Gordon Dury, Voice of the Listener and Viewer
- Monica Rivers, Mencap

The report highlights important design features and functionality for older people and people who have problems with dexterity, sight, hearing, and comprehension. See Annex A for this paper in full.

The document "aims to better inform the digital radio manufacturing industry about the digital radio equipment needs of older and disabled people, hence sharing existing knowledge and saving the industry the expense of doing their own user research on specific user groups."

As stated in the Digital Radio Action Plan Analysis of Accessibility Issues report (December 2011), several of the features prioritized by the CEG are likely to be available on the UK market. See Annex B for this paper in full.

3.8.1 Text-to-speech

Providing text-to-speech (TTS) functionality for a digital radio can be of great help to (visually) disabled people. Such speech functionality may be integrated in the receiver or may be external to the receiver in a separate device. It is also recognised that a successful implementation of TTS could be an attractive feature for mainstream listeners.

Within TEG a document has been developed by consumer groups, manufacturers and Digital Radio UK, which details the implementation of text-to-speech functionality for a (broadcast) receiver with text-to-speech system. Such a system may be one device, i.e. a receiver with an integrated text-to-speech generator, or may be two devices, i.e. a receiver interfacing with an external text-to-speech device. The document describes what shall or may be supported by the receiver with text-to-speech system to achieve useful functionality for the user. The document specifically targets DAB radio receivers. Furthermore it describes the required basic behavior for a DAB Radio text-to-

speech combination in an "essential" profile, but also provides for enhanced profiles. It also gives a short introduction into the basic problems of visually impaired people.

See Annex C for this paper in full.

Annex A: Digital Radio Accessibility: priority areas for older and disabled people

Features and target groups identified by the Consumer Expert Group on Digital Switchover

July 2011

Introduction

As background to this paper, the CEG wants to remind the reader of the "universal design" approach.

The "universal design" approach is well documented both at UK level and internationally in various design and standardisation reports (including CEN/CENELEC). It emphasises that all the features that facilitate usability would seem to be of benefit for everyone, as well as being an essential feature for those groups with specific accessibility needs. Problems with dexterity[1], sight, hearing, and comprehension (including a lack of familiarity with how to operate digital devices) affect millions of people who will benefit from a minimum specification that takes these issues into account.

However, generally product design does not yet incorporate these elements. For example, the general lack of product design that suits older people is referenced in the recent research report The Consumer Marketplace in an Ageing Society, Research by ILC-UK for Age UK October 2010[2].

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[1] Note that dexterity problems can be caused by a range of conditions such as carpal tunnel, arthritis, diabetes, just to name a few.

[2] http://www.ilcuk.org.uk/files/pdf_pdf_155.pdf

Because of the lack of a universal design approach, the CEG decided to list the specific features that would make digital radio devices more accessible. The purpose of this document is threefold, with both short, medium and long term goals:

1. The short term goal of the document is to inform the planned 2011 analysis by the Technology and Equipment Group under the Digital Radio Action Plan of the market trends regarding accessibility. This analysis should take the list of features from this document and give a RAG status to indicate whether they are likely to be delivered by the market or not. This overview should be presented to the Digital Radio Action Plan policy group. It should also indicate for each feature whether further industry implementation guidelines need to be developed to increase clarity should manufacturers wish to implement them.

2. With respect to the medium term, the document aims to better inform the digital radio manufacturing industry about the digital radio equipment needs of older and disabled people, hence sharing existing knowledge and saving the industry the expense of doing their own user research on specific user groups. The document has been informed by an initial feedback session with industry representatives, and requirements have been grouped and phrased more clearly following their feedback.

3. Finally, the further and longer-term purpose of the paper is to give the government a list of the features that any equipment that would be part of a targeted digital radio switchover help scheme should have. This follows up on the CEG recommendation that such a help scheme would be necessary, following the experience of digital TV switchover.

This resulting document covers the main digital radio equipment features that will improve accessibility for older users, users with cognitive and memory issues, users with dexterity problems, users with restricted mobility, blind and partially sighted users and deaf and hard of hearing users.

The requirements listed are based on specific research or on the professional opinions of CEG member organisations, built through their experience of working with specific user groups. This paper also gives an indication of the target populations for the different features that are listed. Annex 1 refers to the research reports that have been published that are relevant for this area. Annex 2, 3, 4 and 5 list relevant facts and figures about the population of older and disabled people.

For the benefit of all consumers we would hope for a good level of sound quality from all radios and good battery life for portable sets to ensure that digital radio is an attractive option for consumers.

Suggestions for generalist usability requirements are listed for completeness *in italics*.

1. Buttons

1.1 The device shall have the option to easily store and preset radio stations via buttons, with a sufficient number of presets (at minimum 5) and the retention of these presets when batteries are taken out of the radio or the radio is taken off its mains connection.

This requirement benefits blind and partially sighted people, older people, users with dexterity problems and users with cognitive and memory issues

1.2. The physical properties of button design shall make buttons easily identifiable for the user (such as tactile markings, large size, logical groupings, using different shapes and well spaced out button layout);

This requirement benefits blind and partially sighted people, older people, users with dexterity problems and users with cognitive and memory issues.

1.3. The position of the controls shall not negatively impact the stability of the radio.

This requirement benefits older people, people with dexterity problems and blind and partially sighted people.

1.4. The button colour and button labels shall have a strong tonal contrast in strong contrasting colour. (e.g. yellow controls on charcoal equipment)

This requirement benefits blind and partially sighted people and older people with sight loss.

1.5. The button labels shall be positioned unambiguously in relation to their button.

This requirement benefits and partially sighted people, older people with sight loss, and people with dexterity problems.

1.6. Button labels and symbols for identical functions shall be consistent across manufacturers' and equipment ranges.

This requirement benefits people with cognitive disabilities and people with memory problems.

1.7 The device shall have a tactile or audible indication of button presses via tactile depression or audible clicks.

This requirement benefits older people, people with a restricted sense of touch, and blind and partially sighted people.

1.8. The device shall come with a remote control.

This requirement benefits people with restricted mobility and if the remote control is well designed it can be a good alternative for blind and partially sighted people.

1.9. The device shall have the facility, or can be adapted, to function with only a single (on/off) button.

This feature benefits people with Alzheimer's and with certain cognitive impairments

2. Display

2.1. The physical properties of the text display (including good colour contrast and size) shall make it more readable.

This requirement benefits blind and partially sighted people, older people with sight loss, users with dexterity problems and users with cognitive and memory issues.

2.2. Moving text on the display can be displayed in a stationary mode.

This requirement benefits people with dyslexia, learning disabilities, memory and sequencing problems.

3. Sound

3.1 The equipment shall offer the user the ability to adjust the tone to suit personal hearing loss through tone control button (or 'speech enhance' tone or equaliser setting)

This requirement benefits hard of hearing people.

4. Functionality

4.1. The interface software design shall be such that it minimises the number of steps a user has to take to control the device and it maximises simplicity of user interaction with the device.

This requirement benefits blind and partially sighted people, including older people with sight loss.

4.2. The device shall have a headphone socket.

This requirement benefits people with hearing loss, or who spend long periods of time confined to bed.

4.3 The instruction manual should be clear and logical and set-up procedures including connecting the lead, positioning the aerial, tuning and adjusting the volume should be simple.

4.4. Navigating menus, setting presets and using EPGs and record functions should be simple and intuitive

5. Audible feedback

5.1. The device shall provide voice output (speech feedback to confirm button presses or function alternations as well as voice output reading out information on the text display.)

This requirement benefits blind and partially sighted people and some people with cognitive disabilities.

6. Usability of radios with dedicated functions

6.1 Portable radios - manipulating the aerial and inserting and removing batteries should be simple, requiring minimum force and dexterity.

Portable units should have a suitable handle/grip for lifting and carrying. The unit should feel well-balanced in transit.

6.2 Bedside radios – in addition to easily accessible and programmable alarm, snooze and sleep functions, the display should be dimmable to a level suiting the individual for dark ambient conditions while remaining readable.

Annex 1 of CEG paper: Published research reports about accessibility of digital radio

Freeman, J. (2008). Are you really listening? The equipment needs of blind and partially sighted consumers for accessible and usable digital radio. (http://www.gold.ac.uk/media/i2_RNIB_AreYouReallyListening.pdf)

British Wireless for the blind fund (2010). Report: attitudes and opinions from Blind and Partially Sighted people into the digital switchover.

Annex 2 of CEG paper: facts and figures about sight loss - information provided by RNIB

How many people in the UK are living with sight loss?

"**Almost two million people in the UK are living with sight loss.**" (1)

This means that almost two million people have a sight problem which has a serious impact on their daily lives. That's about one person in thirty. The figure is made up of people who are registered blind and partially sighted, and all the other people whose sight problems have a significant impact on daily activities.

Not all of these people can be registered as blind or partially sighted.

The two million includes people whose vision is just better than the levels which qualify for registration. It also includes people

who are awaiting or having treatment such as eye injections, laser treatment or surgery which may improve their sight. And it includes people whose vision loss could be improved by wearing correctly prescribed glasses. These people are living with significant sight loss, and some have vision which is equivalent to people who are partially sighted or blind. However because their situation could be improved, they cannot be registered as blind or partially sighted.

How many people in the UK are registered as blind or partially sighted?

"**370,000 people are registered blind or partially sighted in the UK.**"

- 309,000 in England

- 36,000 in Scotland

- 18,000 in Wales

- We estimate 7,000 are people registered in Northern Ireland.

  (3, 4, 5)

  182,000 people are registered blind and 181,000 are registered partially sighted.

Every day in the UK

"**Every day 100 people in the UK start losing their sight.**" (7)

"**Every 15 minutes someone in the UK begins to lose their sight.**" (7)

Who does sight loss affect?

"**Sight loss affects people of all ages. As we get older we are increasingly likely to experience sight loss.**"

- 22 per cent of people aged 75 and over experience sight loss

- 53 per cent of people aged 90 and over experience sight loss

- 63 per cent of people with sight loss are female, 37 per cent are male.

How does sight loss relate to people from black and minority ethnic communities?

"**People from black and minority ethnic communities are at greater risk of some of the leading causes of sight loss.**" (1, section 2.2.3)

The black population has a greater risk of developing age-related macular degeneration (AMD) compared to the white population aged under sixty whereas the white population has a greater risk of developing AMD in the later years of life.

Overall Asian people are at lower risk than white people of developing AMD.

Asian people have a greater risk of developing cataracts compared to the black population and white population.

Black and Asian populations have a greater risk of developing diabetic eye disease compared to the white population.

The risk of glaucoma is much higher for the black population compared to the white population.

The white population has the greater risk in developing refractive error compared to the black population.

What are the main causes of sight loss in adults?

"**The five leading causes of sight loss in the UK are refractive error, age-related macular degeneration, cataract, glaucoma and diabetic retinopathy.**"

- 16.7 per cent of people with sight loss have age-related macular degeneration

- 13.7 per cent have cataract

- 5.3 per cent have glaucoma

- 3.5 per cent have diabetic retinopathy

- 53.5 per cent have sight loss equivalent to partial sight or blindness due to refractive error. (Uncorrected refractive error is a correctable form of sight loss.)

- 7.4 per cent have other eye diseases.

Over 50% of sight loss can be avoided.

This is based on the number of people whose sight could be improved by wearing correctly prescribed glasses or having the right treatment.

What are the main causes of blindness in adults?

It is estimated that 218,000 people had severe sight loss (blindness) in the UK in 2008.

The leading causes of the severe sight loss of this group are:

- 50.5 per cent of people were blind due to AMD

- 12.5 per cent due to cataract

- 16.6 per cent due to glaucoma

- 8.7 per cent due to diabetic retinopathy

- 2.1 per cent due to refractive error

- 9.7 per cent due to other eye diseases.

Realities of sight loss

"Only 8 per cent of registered blind and partially sighted people were offered formal counselling by the eye clinic, either at the time of diagnosis or later."(8)

"20 per cent of people say they do not recall receiving any visit from social services in the year after they registered as blind or partially sighted." (8)

"48 per cent of blind and partially sighted people feel 'moderately' or 'completely' cut off from people and things around them." (9)

"In the year after registration, less than a quarter (23 per cent) of people who lost their sight say they were offered mobility training to help them get around independently." (8)

"15 per cent of registered blind and partially sighted people say that they do not do any leisure activities outside of their home." (10)

"Over 95 per cent of publications never become available in large print, audio or braille. It's unacceptable that blind and partially sighted people are missing out." (11)

"66 per cent of registered blind and partially sighted people of working age are not in employment." (12)

"Registered blind or partially sighted people with a degree or higher still only have the same chance of getting a job as someone with no qualifications in the general population." (12)

"43 per cent of registered blind and partially sighted people say they would like to leave their home more often." (10)

"Older people with sight loss are almost three times more likely to experience depression than people with good vision." (13)

Future sight loss

"**The number of people in the UK with sight loss is set to increase dramatically over the next 10 years.**"

"It is predicted that by 2020 the number of people with sight loss will rise to over 2,250,000."

"It is predicted that by 2050 the numbers of people with sight loss in the UK will double to nearly four million."

The prevalence of sight loss increases with age, and the UK population is ageing. In addition there is a growing incidence in key underlying causes of sight loss such as obesity and diabetes. This means, that without action, the numbers of people with sight problems in the UK are likely to increase dramatically over the next 25 years.

Defining sight loss

Partial sight and blindness can impair the sharpness or clarity of our vision (visual acuity), our ability to detect objects to either side, above or below the direction in which we are looking (visual fields), contrast and colour vision.

The practicalities of sight loss vary for each individual. While someone might have problems seeing small details on a television screen, others might find it difficult to make out the buttons on a remote control and a very small minority will be unable to see the screen at all.

Some people with sight loss read large print books, some might use a magnifier to read a short newspaper article, others may not be able to read a poster on the bus or advertising hoarding. Others cannot read any print and may use braille or audio versions where available.

Some people can recognise a friend across the road while others use a person's voice or clothes to help them recognise a friend in the same room.

Some people with sight loss recognise a shop from its window display. Other people with sight loss need assistance to find out what is for sale, read price labels or offers, locate products or the till.

In medical terms, there are measures used to describe visual acuity. They refer to whether you can see when wearing lens or glasses with the best prescription at 6 metres away (but not more) what someone with normal vision could see at 12 metres,

24 metres and so on. Some sight loss cannot be improved by lenses or glasses.

Commonly used definitions

The Future sight loss UK reports use the US legal definition of blindness for the purposes of international comparison. This is best corrected visual acuity of less than 6/60. That is being unable to see at 6 metres what someone with normal vision can see 60 metres away.

Partial sight was defined in the same report as being best corrected visual acuity of less than 6/12 to 6/60.

In the UK blindness is defined as 3/60 and partial sight as 6/60, but having a reduced visual field is also taken into account for registration, as this can have a significant effect on vision.

Sources

Unless otherwise stated these statistics are drawn from:

Future sight loss UK (1): The economic impact of partial sight and blindness in the UK adult population; and

Future sight loss UK (2): An epidemiological and economic model for sight loss in the decade 2010-2020

(1) Future sight loss UK Report No 1.

(2) Future sight loss UK Report No 2.

(3) The Health and Social Care Information Centre (2009) Registered blind and partially sighted people: Year ending 31 March 2008. England

(4) The Scottish Government (2009) Registered blind and partially sighted persons, Scotland 2009.

(5) Health Statistics and Analysis Unit, Welsh Assembly Government (2009) Local Authority Registers of People with Disabilities.

(6) Morris M and Smith P (2008) Educational provision for blind and partially sighted children and young people in Britain: 2007. National Foundation for Educational Research (NFER) for RNIB.

(7) based on 2003 registration levels. The drop in registration is unexplained as prevalence of sight loss appears to be increasing. RNIB is working on figures for the numbers of people diagnosed each day in the UK with the four leading causes of blindness. We believe this will be a more representative picture than registration figures.

(8) Douglas G, Pavey S and Corcoran C (2008) (a).

(9) Pey T, Nzegwu F and Dooley G (2007).

(10) Douglas G, Corcoran C and Pavey S (2006).

(11) Lockyer S, Creaser C and Davies JE, Availability of Accessible Publications, November 2004, Library and Information Statistics Unit, Loughborough University.

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(13) Evans JR, Fletcher AE and Wormald RP (2007), Depression and anxiety in visually impaired older people, Ophthalmology, Volume 114, Issue 2,

International Centre for Eye Health, London, pp. 283-288.

(14) Bodeau-Livinec F, Surman G, Kaminski M, Wilkinson AR, Ancel P-Y and Kurinczuk JJ (2007) 'Recent trends in visual impairment and blindness in the UK' Archives of Disease in Childhood 2007, 92, pp1099 - 1104.

(15) Rahi J S and Cable N (2003) 'Severe visual impairment and blindness in children in the UK' The Lancet, Vol 362, October 25, 2003, pp 1359 - 1365.

(16) Based on findings from Splunder J van, Stilma J S, Bernsen R M D and Evenhuis H M (2004) 'Prevalence of ocular diagnoses found on screening 1539 adults with intellectual disabilities' Ophthalmology (2004) 111, pp 1457 - 1462 and Splunder J van, Stilma J S, Bernsen R M D and Evenhuis H M (2006) 'Prevalence of visual impairment in adults with intellectual disabilities in the Netherlands: cross-sectional study' Eye (2006) 20, pp1004 – 1010.

Annex 3 of CEG paper: facts and figures about deafblindness: information provided by SENSE

The following is an extract from "A sense of urgency" (Summary of the longer report by the Centre for Disability Research "Estimating the Number of People with Co-Occurring Vision and Hearing Impairments in the UK " by Janet Robertson & Eric Emerson, CeDR Research Report 2010:1 , April 2010)

The deafblind population has been significantly underestimated and is set to rise dramatically (Sense summary of new independent research and the actions arising from the findings).

Introduction (Richard Brook, Chief Executive Officer, Sense)

Deafblindness is a growing issue in the UK. Almost all of us will have some experience of hearing or visual impairment at some point in our lives, either personally or with a friend or relative.

However, as a society we are often guilty of being dismissive of deafblindness, putting it down to 'getting old' rather than treating it as a genuine disability and offering appropriate support.

New independent research reveals for the first time that the number of deafblind people in the UK has been seriously underestimated to date and uncovers an 'explosion' in the number of deafblind people over the next twenty years.

Here, we will set out clearly the scale of the problem and what needs to be done to support the deafblind community now and the benefits that early intervention will bring in the longer-term.

Sense recommends that a number of key actions need to be taken, including: improved identification of deafblind people; planning and budgeting based on significantly increased future demands; improved health and social care assessments; and provision of appropriate and accessible social care services.

These critical actions, which are outlined in more detail in this report, must be tackled now with a greater sense of urgency.

The deafblind population requiring support

Sense commissioned independent, expert research on the numbers of deafblind people now and over the next twenty years. In 'Estimating the Number of People with Co-Occurring Vision and Hearing Impairments in the UK', the Centre for Disability Research found that the deafblind population has been significantly underestimated and is set to rise dramatically.

CeDR's research method utilised a number of robust and representative surveys, and the report sought to collate information on the presence and sometimes nature and severity of vision and hearing impairment.   This government accepted methodology was also recently used in estimating the learning disabilities population.

The national situation now

There are 356,000 deafblind people in the UK (572 per 100,000 people)

222,000 of these people are aged over 70 (62%)

113,000 are adults aged between *20-69* and 21,000 are children

There are 2,900 deafblind people in an average area (250,000 population).

Future explosion in numbers by 2030

There will be 569,000 deafblind people (806 per 100,000 people), a 60% increase

418,000 of those people will be aged over 70

129,000 will be adults and 23,000 will be children

There will be 4,000 people in an average area

This is an 86% increase in severe deafblindness to 245,000 people.

Number of deafblind people in the UK by age band between 2010 to 2030

There are currently 21,000 young deafblind people (aged between 0 and19) in the UK. This figure is predicted to rise to

22,000 by 2015, and reach 23,000 by 2020. It is predicted levels will then remain stable to 2030.

There are currently 56,000 deafblind people aged between 20 and 59 in the UK. This figure is predicted to rise to 59,000 by 2015, and reach 60,000 by 2020. By 2025, this figure is predicted to drop to 59,000, and fall further in 2030 to 58,000.

There are currently 57,000 deafblind people aged between 60 and 69 in the UK. This figure is predicted to rise to 59,000 by 2015 and remain stable until 2025. At this point, numbers are predicted to rise to 66,000 and increase further to 71,000 by 2030.

There are currently 222,000 deafblind people aged 70+ in the UK. This is predicted to rise to 254,000 by 2015, and reach 298,000 by 2020. Numbers are predicted to increase further to 348,000 in 2025 and 418,000 in 2030.

There are currently 356,000 deafblind people in the UK in total. This number is set to increase to 394,000 in 2015, and reach 440,000 in 2020. Numbers are predicted to increase further to 496,000 in 2025 and 596,000 in 2030.

Key national conclusions

The real numbers of deafblind people needing support in the UK will actually be even higher. There is a reliance on self-reporting in surveys and older people often consider their deafblindness as part of getting old, rather than as a disability.

Given the strong association between prevalence and age, the number of people with deafblindness was shown to vary considerably in line with the age-profile of the population.

There will be a significant growth in cases of deafblindness over the next twenty years, largely driven by general demographic change. In particular, there will be a marked increase in the number of older people aged 70+ in the general population.

The regional and local situation

Compared to England CeDR's results showed some variation in countries' prevalence rates.

In Wales, rates were higher among people in the 30-39, 50 59 and 60-69 groups, but lower in the 80-89 group.

In Scotland, rates were significantly higher among people in the 50-59 age group.

In Northern Ireland, rates were significantly lower among people in the 70-79 age group.

The CeDR research has allowed Sense to estimate prevalence data for each demographic in all the UK's individual local authority and health areas. This information is available via: www.sense.org.uk/urgency

Annex 4 of CEG paper: Facts and figures on deafness and tinnitus: information provided by RNID

Facts and figures on deafness and tinnitus

The facts

We have lots of information on deafness, hearing loss and tinnitus.

Go to

www.rnid.org.uk

Contact our Information Line

Telephone 0808 808 0123

Textphone 0808 808 9000

Or write to us

informationline@rnid.org.uk

19-23 Featherstone Street
London EC1Y 8SL

Fax 020 7296 8199

RNID •)))

Changing the world for deaf
and hard of hearing people

Facts and figures on deafness and tinnitus

About this factsheet

This factsheet is part of RNID's **deaf awareness** range. It is written for people who would like to know more about the numbers of deaf, hard of hearing and deafened people in the UK today. We also include figures for people with tinnitus.

At the end of this factsheet we give you details of organisations you can contact for further information.

This factsheet looks at:

How hearing loss and deafness is measured.
Definitions of deafness.
Where we get information on deafness and tinnitus from.
Deaf, deafened and hard of hearing adults and children.
Deafblind people.
Black and minority ethnic deaf and hard of hearing people.
Deaf people with additional disabilities.
How age and gender affects the figures.
People who use British Sign Language (BSL).
People who lipread.
Deaf people and work.
People with tinnitus.
How to work out how many deaf and hard of hearing people there are in your area.

Measuring hearing loss and deafness

Hearing loss and deafness is usually measured by finding the quietest sounds someone can hear using tones with different frequencies – which are heard as different *pitches*. The person being tested is asked to respond – usually by pressing a button – when they can hear a tone and the level of the tone is adjusted until they can just hear it. This level is called the *threshold*.

Thresholds are measured in units called dBHL – dB stands for 'decibels' and HL stands for 'hearing level'. Anyone with thresholds between 0 and 20 dBHL across all the frequencies is considered to have 'normal' hearing. The greater the threshold level is – in dBHL – the worse the hearing loss.

Definitions of deafness

Mild deafness

People with mild deafness have some difficulty following speech, mainly in noisy situations. The quietest sounds they can hear in their better ear average between 25 and 39 decibels.

Moderate deafness

People with moderate deafness have difficulty in following speech without a hearing aid. The quietest sounds they can hear in their better ear average between 40 and 69 decibels.

Severe deafness

People with severe deafness rely a lot on lipreading, even with a hearing aid. BSL may be their first or preferred language. The quietest sounds they can hear in their better ear average between 70 and 94 decibels.

Profound deafness

People who are profoundly deaf communicate by lipreading. BSL may be their first or preferred language. The quietest sounds they can hear in their better ear average 95 decibels or more.

Where do we get information about deafness and tinnitus?

Most of the facts and figures given in this factsheet are researched by the Medical Research Council (MRC) Institute of Hearing Research.

You can also contact organisations specialising in specific aspects of deafness and hearing loss for information. Contact details are at the end of this factsheet.

All figures given in this factsheet apply to the UK unless otherwise specified.

Deaf and hard of hearing people in the UK

There are estimated to be about 9 million deaf and hard of hearing people in the UK. The number is rising as the number of people over 60 increases. About 698,000 of these are severely or profoundly deaf. 450,000 severely or profoundly deaf people cannot hear well enough to use a voice telephone, even with equipment to make it louder. People who cannot use voice telephones might use textphones or videophones.

Deaf and hard of hearing children in the UK

The following statistics have been supplied by NDCS.

In the UK, there are about 20,000 children aged 0-15 years who are moderately to profoundly deaf. About 12,000 of these were born deaf. Children who are born deaf are sometimes called 'prelingually' deaf because they were deaf before they developed language. They have particular educational needs.

There are more than 34,000 deaf children and young people in the UK.

England - 29,000
Scotland - 3,000
Wales - 1,700
Northern Ireland - 1,100

About one in every 1,000 children is deaf at three years old. This rises to two in every 1,000 children aged nine to 16.

0 – 4 year old babies - 3,800.
5 –16 year old children - 17,700.
17 – 25 year old young people - 13,300.

An estimated 840 children are born in the UK every year with significant deafness – moderate to profound deafness. Vaccination means fewer babies are born deaf as a result of their mothers having German measles (rubella) during pregnancy. This drop has been offset by more babies being born deaf from other causes such as premature birth or lack of oxygen during birth. More babies survive with multiple disabilities than used to be the case.

Deafened people

The term 'deafened' describes people who were not prelingually deaf, but have become profoundly deaf in adult life. This often happens suddenly as a result of trauma, infection or ototoxic drugs – drugs that can cause hearing loss.

There are an estimated 123,000 deafened people in the UK aged 16 and over. They often rely heavily on lipreading and written communication. They may require communication support, such as speech-to-text reporters, lipspeakers or notetakers, in meetings and other situations where lipreading is difficult.

Deafblind people

There are about 23,000 deafblind people in the UK. Some are totally deaf and totally blind – other deafblind people have some hearing and vision.

A further 250,000 people experience some degree of dual sensory impairment, many in older age.

For information on deafblindness contact Sense.

Deaf people with additional disabilities

A high proportion of severely or profoundly deaf people have other disabilities as well. Among those under 60, 45% have additional disabilities – these are more likely to be physical disabilities. Among severely or profoundly deaf people over 60 years, 77% have some additional disability. For 45%, this means significant dexterity or sight difficulties, or both.

Black and minority ethnic deaf and hard of hearing people in the UK

There is evidence to suggest that some minority ethnic groups may experience higher levels of deafness. This is especially true of recent immigrants who have come from regions with greater levels of poverty, poor health care and low levels of immunisation against diseases such as rubella.

There are no accurate figures available for the number of black and minority ethnic deaf and hard of hearing people in the UK. An estimated 3,663,000 people are from a minority ethnic group in the UK.

If the pattern of deafness in the general population is repeated in the minority ethnic community, we could estimate that in the UK approximately 500,000 black and minority ethnic people are deaf or hard of hearing. But these figures should be treated with caution. They do not take into account the age profile of different black and minority ethnic communities or account for recent immigrants who may have come from regions with greater levels of poverty, poor health care and low levels of immunisation against diseases such as rubella.

How age affects hearing

Most of the 9 million deaf and hard of hearing people in the UK have developed a hearing loss as they get older. Only about 2% of young adults are deaf or hard of hearing. Around

the age of 50 the proportion of deaf people begins to increase sharply and 55% of people over 60 are deaf or hard of hearing.

Are men and women equally likely to be affected?

From the age of 40 onwards, a higher proportion of men than women become hard of hearing. This is probably because more men have been exposed to high levels of industrial noise. Among people over the age of 80, more women than men are deaf or hard of hearing. This is simply because women tend to live longer than men, not because women are more likely to become deaf.

How many people use hearing aids?

About 2 million people in the UK have hearing aids, but only 1.4 million use them regularly. There are at least another 4 million people who do not have hearing aids but experience significant hearing difficulties in everyday life. They would be likely to benefit from hearing aids.

How many people use British Sign Language (BSL)?

Many people who are born deaf or are deafened early in life use sign language to communicate. It is difficult to say how many people in the UK use BSL as their first or preferred language – current estimates suggest 50,000. There are between 3,000 and 4,000 BSL users in Northern Ireland, as well as around 1,000 users of Irish Sign Language (ISL).

How many people lipread?

It is difficult to say how many people lipread. Everyone lipreads to some extent, especially in noisy situations. When you speak to someone their facial movements will give you information to help you understand the meaning of what they are saying. If you have a hearing loss the balance between what you hear and what you see changes. As your hearing gets worse, you will get more information through lipreading. The biggest group of lipreaders is hard of hearing people.

Deaf people and work

About 3.5 million people of working age (16 – 65 years) are deaf or hard of hearing. 160,000 of these are severely or profoundly deaf.

Deaf and hard of hearing people are less likely to be in employment.

Evidence from the *Labour Force Survey* (Autumn 2001) shows that 68.1% of people of working age who had 'difficulty in hearing' were in employment compared to 81.2% of people who are not disabled. See *Labour Market Trends* August 2002. You can download it free from www.statistics.gov.uk/products/p550.asp or get a copy from your local library.

In 2002 RNID carried out a survey into the employment situation and experiences of deaf and hard of hearing people. The survey found that respondents had an unemployment rate of 19%, which is four times the national average for people who are not deaf or hard of hearing, and not disabled. Nearly a third of those deaf people who were in full-time work earned under £10,000 per year compared to 11.8% of the UK general population.

The register of deaf and hard of hearing people in England

In England deaf and hard of hearing people can register with their local social services department. This is voluntary and many people do not register. People are entitled to help from their social services department whether they are registered or not. This means the figures should be treated with a great deal of caution.

In 2004, only 213,900 people were registered as deaf or hard of hearing in England. As there are more than 7 million deaf and hard of hearing people in England, and 577,000 are severely or profoundly deaf, it is clear that the registers are a very poor guide. The figures are published by the Department of Heath. The report is called *People Registered as Deaf or Hard of Hearing Year ending 31 March2004 England*. You can look at the figures on the Department of Health's website, www.dh.gov.uk.

Social services statistics Wales

You can look at the statistics about the number of people registered as deaf or hard of hearing in Wales on the local government data unit website, www.lgdu-wales.gov.uk.

People with tinnitus

Tinnitus is the word for noises that some people hear 'in the ears' or 'in the head' – buzzing, ringing, hissing, and other sounds. Many people experience tinnitus at some time in their life, but for many it only lasts for a short time. For other people it is permanent. Permanent tinnitus can be either mild or severe.

About 10% of adults – 4.7 million people – have experienced tinnitus for longer than five minutes. This figure does not include people who have had tinnitus for a short time after being exposed to a loud noise.

About 5% of adults – 2.3 million people – have tinnitus, which they find severely or moderately annoying.

About 5% of adults – 2.3 million people – have tinnitus, which makes it difficult for them to sleep.

About 1% of adults – 470,000 people – have tinnitus that has a severe effect on their quality of life.

About 0.5% of adults – 230,000 people – have tinnitus which has a severe effect on their ability to lead a normal life.

7% of adults – 3.3 million people – have been to see their doctor about tinnitus.

Working out how many deaf and hard of hearing people there are in your area

The tables that follow show estimated numbers of deaf and hard of hearing people for the UK as a whole and for England, Northern Ireland, Scotland and Wales. If you know the size of the population in your area, and how it breaks down by age group, you can use the percentages in the first table to calculate estimates for your area.

Estimated percentages of the UK population who are deaf or hard of hearing UK	16-60 years	61-80 years	81+ years
%	%	%	
Mild deafness	4.6	28.1	18.4
Moderate deafness	1.6	16.5	57.9
Severe deafness	0.2	1.9	13.2
Profound deafness	0.1	0.4	3.6
All degrees of deafness	6.6	46.9	93.2

Annex 5 of CEG paper: figures about dexterity and about older people provided by Age UK

There are over 12 million people of state pension age (currently 60 for women and 65 for men in the UK), this means almost 1 in 5 of the UK population. (mid 2009 Population Estimate, UK office for National statistics 2010)

Regarding dexterity we can use arthritis as an indicator. There are an estimated 10 million people in the UK suffering from arthritis (www.arthritiscare.org.uk). The reason it is a reasonable indicator in the context of digital radio is that the 2 most common forms usually affect the hands.

More information about older people in the UK - taken from the Office for National Statistics, briefing paper on "older people's day 2010".

(http://www.statistics.gov.uk/pdfdir/age0910.pdf)

Over the last 25 years the percentage of the population aged 65 and over increased from 15 per cent in 1984 to 16 per cent in 2009, an increase of 1.7 million people in this age group. Over the same period, the percentage of the population aged under 16 decreased from 21 per cent to 19 per cent. This ageing of the population is projected to continue. By 2034, 23 per cent of the population is projected to be aged 65 and over compared with 18 per cent aged under 16.

The fastest population increase has been in the number of those aged 85 and over, the 'oldest old'. In 1984, there were around 660,000 people in the UK aged 85 and over. Since then the numbers have more than doubled reaching 1.4 million in 2009. By 2034 the number of people aged 85 and over is projected to be 2.5 times larger than in 2009, reaching 3.5 million and accounting for 5 per cent of the total population.

Annex B: An Analysis of Accessibility Issues

In light of any recommendations by the Consumer Expert Group, consider the specific accessibility and usability needs of people with disabilities and older people, and identify viable solutions

Version 2 October 2011

Contents

1.0 Technology and Equipment Group

As part of the Digital Radio Action Plan, the Technology and Equipment Group (TEG) must identify, consider and make recommendations on the issues relating to the development of digital radio technologies and equipment. The TEG, chaired by Digital Radio UK (DRUK), comprises device manufacturers, Intellect, BBC, RadioCentre, Government, Ofcom, the Society for Motor Manufacturers and Traders (SMMT) and consumer group representatives (the Consumer Expert Group, CEG). Retailers were invited to join TEG but did not propose any representatives.

1.1 The task

Included within five key objectives, the Digital Radio Action Plan seeks to provide digital radio receivers that are easy to use and accessible for all users. As part of this, TEG is required to advise on the design and implementation of digital radio receivers that are accessible to all listeners.

Within this review TEG must, in light of the recommendations by the Consumer Expert Group, consider the specific accessibility and usability needs of people with disabilities and older people, and identify viable solutions, as is stated in the Digital Radio Action Plan.

This paper considers domestic radios only.

1.2 Purpose of the review

This report considers the accessibility and usability needs of specific user groups, and investigates the current market provision for domestic digital radio receivers in order to identify the deficit in the market landscape and recommend potential viable solutions.

This will provide an understanding of the implications of a potential digital radio switchover on specific consumer groups. It will enable TEG and the wider Digital Radio Action Plan to further advise on the design and implementation of digital radio receivers in order to address the deficit between the requirements of consumer groups and the market landscape for digital radio receivers.

This review is closely tied to the Minimum Specifications Report which also addresses similar accessibility and usability issues, and into which this report feeds.

1.3 Summary of viable solutions

As discussed herewith, this review recommends the following viable solutions:

- Investment into new user-friendly technology
- Research into the current market landscape
- Research into details of what makes a useable and accessible digital radio
- Digital Radio Help Scheme
- Further guidelines provided by the CEG detailing manufacturers' best practice

2.0 CEG's recommendations

As part of the Digital Radio Action Plan the CEG's remit includes examining the consumer issues surrounding a switchover to digital radio and ensuring specific measures are put into place to protect vulnerable listeners.

The CEG produced a report (April 2011, redrafted October 2011) (please see Annex A for this report in full) detailing their accessibility and usability priorities, based on specific research and professional opinions of member organisations built through their experience of working with specific user groups. In addition to the aforementioned paper this report also makes reference to previously published research reports that are relevant to this area.

The CEG members who contributed to this report were:

- Leen Petré, Royal National Institute for Blind People (Chair)
- Gretel Jones, Age UK (Vice Chair)
- Robert Clark, Voice of the Listener and Viewer
- Margaret Grainger, British Wireless for the Blind Fund (BWFB)
- Alison Hopkins, Consumer Focus
- Tim Leech, WaveLength
- Susan Marks, Citizens Advice
- Ruth Myers, Telecommunications Action Group (TAG)
- Katie Waller, Which?
- Carole Garfield, Rural Community Council
- Roy Staines, Sense

- Laura Matthews, Royal National Institute for Deaf People
- Gordon Dury, Voice of the Listener and Viewer
- Monica Rivers, Mencap

This CEG report recommends features in the following areas for digital radio receiver: buttons, display, sound, functionality and audible feedback. As stated in the report, these recommendations are the main digital radio equipment features that will improve accessibility for older users, users with cognitive and memory issues, users with dexterity problems, users with restricted mobility, blind and partially sighted users, and deaf and hard of hearing users.

See Annex A for the full report.

3.0 Current market landscape

At present there are several key research groups, retailers and manufacturers operating in the digital radio receiver market who consider the needs of people with disabilities and older people and identify viable solutions. The following organisations currently comprise the accessible and user-friendly market landscape for digital radio.
- *Research:*
  - Ricability
  - RNIB
  - Which?
  - I2 Media research
  - British Wireless for the Blind Fund
- *Retailers:*
  - British Wireless for the Blind Fund (BWFB)
  - WaveLength
- *Manufacturers:*
  - Pure
  - Roberts

3.1 Research: Ricability in partnership with RNIB and Which?

Ricability (the Research Institute for Consumer Affairs) aims to provide independent information to disabled and older consumers. Working in partnership with the RNIB and most recently Which?, Ricability has carried out two rounds of research testing the ease-of-use of digital radio receivers for people with poor sight or dexterity issues, such as arthritis.

In 2009 Ricability (funded by the RNIB) tested 15 digital radio receivers identified as likely to offer a good standard of accessibility. This research recommended five portable radios:

- Roberts RD-8BW Duet (£137 approximately)
  - Ease-of-use: illuminated preset buttons, rotary dial, large display (24mm x 98mm). This receiver was designed in partnership with the BWBF
- Dualit DAB kitchen radio DKR-1 (£150 approximately)
  - Ease-of-use: large display and character sizes, 10 presets, auto selection
- Panasonic RF-D5 (£70 approximately)
  - Ease-of-use: good size controls, 10 presets, raised markings, auto selection
- Teac R-3 (£80 approximately)
  - Ease-of-use: well-spaced buttons, well-spaced buttons
- Roberts RD-59 Gemini 59 (£153 approximately)
  - Ease-of-use: 10 presets, auto selection

In 2011 Ricability carried out a second piece of research - working in partnership with Which? – testing 8 portable digital radio receivers recently reviewed by Which?. This work built on the 2009 study, though did not identify any additional new radios that could be recommended.

Both sets of research (2009, 2010) concluded that tuning stations on a digital receiver can be difficult for some disabled and older people who cannot easily see the screen. The screen size and legibility of the characters are important factors and retuning can be helpful if users cannot see a display. For ongoing ease of use, the availability and usability of preset buttons are also important.

Conversely, Ricability noted that the additional ease-of-use benefits - when tuning stations on a digital receiver, compared to an analogue receiver - meant that digital radios were an improved proposition for partially sighted individuals.

For further information on the Ricability work on accessibility and usability of digital radios, please visit http://www.ricability.org.uk/consumer_reports/at_home/digital_radio/.

3.2 I2 Research: Media research

The I2 media research - "Are you really listening?" - assesses the equipment needs of blind and partially sighted consumers

for accessible and usable digital radios. It was authored by Dr Jonathan Freeman, Dr Jane Lessiter and Ms Eva Ferrari in 2009. (See here for full report: www.gold.ac.uk/media/i2_RNIB_AreYouReallyListening.pdf)

Research summary:

- Blind and partially sighted users tend to be more reliant on radio than sighted users
- There are clear benefits for sighted consumers when the equipment needs of people with sight problems are addressed
- There is limited interest in, and as a result there are concerns about, advanced functions
- Voice output greatly increases the ability of blind and partially sighted consumers to use digital radio equipment as independently as sighted consumers
- Barriers to better addressing the needs of blind and partially sighted consumers cited by industry interviewees centred largely on pragmatic and commercial considerations

The key output for the project has been the prioritised digital radio product design resource, drafted in the form of a design checklist. The checklist items were prioritised by considering factors such as the range of tasks that could be affected by addressing the design consideration, the frequency of tasks, and whether they were involved in basic use such as switching on, changing station, and changing volume.

Highest priority items for product design are:

- The provision of button feedback (including voice output)
- Button design (including size, groupings and spacing)
- Physical properties of the text display (including contrast and size) to make it more readable
- Interface software design to minimise user intervention or to maximise simplicity of user interaction and to provide intuitive processes (e.g. for retune, rescan, scroll, select, play recording)

3.3. Research: British Wireless for the Blind Fund (BWFB)

The BWFB carried out research looking into the "attitudes and opinions from blind and partially sighted people into the digital switchover."

The relevant findings from this paper were as follows:
- The ability to easily store and preset radio stations along with tactile markings and good colour contrast are very important

- Portability (light in weight so that they can be moved from room to room easily), multipurpose /functionality (ability to play CD, Tape, memory stick) and larger buttons and dials are also seen as important design considerations. Receivers also need to be well built to withstand constant usage by blind and partially sighted people
- Very few respondents make any reference to text to speech output and/or talking or audio menus as being an imperative design feature on digital radios for the blind

Please see Annex C for full report.

3.4 Retailers: British Wireless for the Blind Fund (BWFB)

BWFB is a registered charity providing broadcast media to blind and partially sighted persons. BWFB obtain funding from individual legacies, donations and trusts.

Working alongside 302 registered agents, BWFB provides high quality, easy-to-use radio receivers which have been specially designed and adapted for listeners living with sight loss.

BWFB provides 40,000 blind or partially sighted persons in the UK with a BWFB accredited radio under a free permanent loan. Of this, 11,000 products have DAB capabilities. These high-quality and easy-to-use radio receivers have been specially designed and adapted for listeners living with sight loss.

The following criteria are applicable for people to be eligible for a BWFB free permanent loan
- Registered blind or partially-sighted in the UK
- Over 8 years old
- In receipt of means a tested benefit

BWFB aims to provide blind and partially sighted communities with the specialist products they require. When an individual requests a radio (assuming they are eligible), the BWFB distributes a suitable radio and provides a case-by-case personal service; training customers on how to use the radio, set presets, tune etc.

BWFB are the first point of call for customers when there is an issue with the receiver, providing a customer support service when required. BWFB have a 14% product-failure rate, though none of these result in returns. It should also be noted that the product failure rate within the blind community is often higher than the general population, particularly if the equipment is of a

lower quality.

BWFB recommend several digital radio receivers for blind and partially sighted persons, including the following:

Concerto
- Manufactured by Roberts Radio
- DAB and FM
- Remembers last played position (bookmarking)
- 10 presets
- Large easy to read LCD display with zoom function
- High-visibility yellow controls
- 7,500 currently in the market

Duet (and Duet 2)
- Manufactured by Roberts Radio
- DAB and FM
- 10 presets
- Rotary tuning, volume and tone controls
- 1,400 currently in the market

Sonata
- Manufactured by Solutions Radio
- Internet only
- Simple operation – five buttons, one dial
- Remembers last played position (bookmarking)
- 600 currently in the market

For further details on these products and other BWFB recommended products please see http://www.blind.org.uk/radios.html.

3.5 Retailers: WaveLength

WaveLength is a registered charity working to overcome isolation through the provision of televisions and radios. WaveLength obtains funding from individual legacies, donations and trusts.

To date 40,000 radios have been provided and, if required, installed, maintained and replaced, at no cost to the user. An increasing proportion of these receivers are digital.

A range or receivers are provided, in accordance with demand, remaining the property of Wavelength on long-term loan to the recipient for as long as they need. When required WaveLength partners with manufacturers to provide consumers with bespoke receivers, such as the one-button radio (see image below).

3.6 Manufacturers: Pure

Radio manufacturer PURE developed and successfully launched the SONUS-1XT voice-feedback radio set in 2005. This was initially seen as a viable option for blind and partially-sighted listeners, addressing specific usability issues by making the menu structure and station names audible.

The SONUS-1XT was developed with input from the RNIB. Although the product created very strong PR at launch and was available to consumers for approximately 2 years, PURE faced a number of barriers maintaining a successful business case, including the following:

- Initial development costs
- Incremental product costs (memory to hold the audio samples)
- Support costs (including updates to the audio)

As a result, the SONUS-1XT receiver was not commercially viable.

3.7 Manufacturers: Roberts

Roberts work closely with BWFB and have manufactured two accredited products in partnership:

- Concerto
- Duet

Roberts is well-placed to meet the requirements of specific consumer groups and thus intends to remain in this market. However, costs and consumer demand have been cited as potential barriers to development.

4.0 Deficit in the market

As requested in the CEG's report (April 2011, redrafted October 2011), the following table details an assessment of how likely it is that the market is currently (and will going forward) provide for the CEG's functionality and user-interface requests.

Although considerable care has gone into this analysis, TEG recognises the potential for currently unknown factors implicating future product developments.

The following three-tier system is used to give a sense of current market conditions and future trends, and indicates whether the CEG's requests are likely to be delivered by the market or not.

- Unavailable = device(s) with the referenced request(s) currently are not (and are unlikely to ever be) provided by the market
- Available with assistance = device(s) with the referenced request(s) are currently provided by the market with assistance (i.e. charity, subsidy, help scheme etc)
- Available = device(s) with the referenced request(s) are currently provided by the market. *Note: there are one (or more) product(s) available, and these have been available for at least an 18 month period

For the purpose of this review, the "market" is defined as "enabling goods and services to be exchanged without direct charitable or Governmental assistance." This helps signify how likely it is that the requests from the CEG require additional support (for example, BWFB, WaveLength, Government or a help scheme) in order to be made available to consumers.

Reference	CEG request	Likelihood of market delivery
1. Buttons		
1.1	The device shall have the option to easily store and preset radio stations via buttons, with a sufficient number of presets (e.g. 5)	Available
	The retention of these presets when batteries are taken out of the radio or the radio is taken off its mains connection	Available
1.2	The physical properties of button design shall make buttons easily identifiable for the user (such as tactile markings, large size, logical groupings, using different shapes and well spaced out button layout)	Available with assistance
1.3	The position of the controls shall not negatively impact the stability of the radio	Available
1.4	The button colour and button labels shall have a strong tonal contrast in strong contrasting colour. (e.g. yellow controls on charcoal equipment)	Available with assistance
1.5	The button labels shall be positioned unambiguously in relation to their button	Available

1.6	Button labels and symbols for identical functions shall be consistent across manufacturers' and equipment ranges.	Red
1.7	The device shall have a tactile or audible indication of button presses via tactile depression or audible clicks	Available
1.8	The device shall come with a remote control	Available
1.9	The device shall have the facility, or can be adapted, to function with only a single (on/off) button	Available with assistance
2. Display		
2.1	The physical properties of the text display (including good colour contrast and size) shall be readable	Available
2.2	Moving text on the display can be displayed in a stationary mode	Available
3. Sound		
3.1	The equipment shall offer the user the ability to adjust the tone to suit personal hearing loss through tone control button (or 'speech enhance' tone or equaliser setting)	Available with assistance
4. Functionality		
4.1	The interface software design shall be such that it minimises the number of steps a user has to take to control the device and it maximises simplicity of user interaction with the device.	Available
4.2	The device shall have a headphone socket	Available
4.3	The instruction manual should be clear and logical and set-up procedures, including connecting the lead, positioning the aerial, tuning and adjusting the volume should be simple.	Available
4.4	Navigating menus, setting presets and using EPGs and record functions should be simple and intuitive	Available
5. Audible feedback		
5.1	The device shall provide voice output (speech feedback to confirm button presses or function alternations as well as voice output reading out information on the text display.)	Red
6. Usability of radios with dedicated functions		

6.1	Portable radios – manipulating the aerial and inserting and removing batteries should be simple, requiring minimum force and dexterity.	Available
	Portable units should have a suitable handle/grip for lifting and carrying. The unit should feel well balanced in transit.	Available
6.2	Bedside radios – the display should be dimmable to a level suiting the individual for dark ambient conditions while remaining readable	Available

5.0 Viable solutions

This review recommends four potential viable solutions to the aforementioned issues raised by the CEG concerning the specific accessibility and usability needs of people with disabilities and older people.

5.1 Investment

Lack of resource and funding prohibits the development of accessible and user-friendly digital radio receiver innovations. Manufacturers assert that to date it has not been commercially viable for receiver manufacturers to invest in the required technical development to produce a lot of the products suitable for people with disabilities and older people.

A potential viable solution is that funding be made available for the development of accessible and user-friendly products.

5.2 Research

Further research is required to understand the digital radio receiver market landscape and to provide details concerning what makes a receiver useable and/or accessible. As mentioned herewith, the research programmes to date have targeted portable radio receivers, leaving out HIFI sets, clocks, docks and in-car products. Currently there is appetite for further research but no available funding.

A potential viable solution is that funding be made available for further research.

5.3 Implementation Guidelines

It has been suggested that dialogue between the CEG and manufacturers must be furthered in order to maintain and improve awareness of the needs of specific consumer groups and the appropriate technical change to digital radio receiver products. For example, it should be noted that a set of implementation guidelines have been drafted for text-to-speech (please see Annex B for this paper in full).

A set of Implementation Guidelines, as provided to manufacturers by the CEG where appropriate, detailing best practice for specific usability and accessibility feature requests, is a viable solution.

5.4 Government Help Scheme

Furthermore, if the market cannot suitably provide for specific consumer groups and contend with all of the aforementioned requests of the CEG, as this review asserts, then a Digital Radio Switchover Help Scheme, akin to that managed by Government during television switchover, is a potential viable solution.

Annex C: Best Practice Guidelines: Text-to-Speech (TTS) for Digital Radio

Contents

1. Introduction
2. Scope
3. Features of the Radio that need to be speech enabled:

> Switching the radio on and off
> Menu
> Lists
> Changing mode
> Tuning
> Changing station
> Electronic Program Guide (EPG) (where supported)
> Broadcast text (as data)
> Setting presets
> Recording and reminders (where supported)

4. Prioritisation
   - Essential
   - Highly recommended (all Essential features plus)
   - Recommended (all Essential and Highly recommended features plus)
5. General spoken UI Guidelines

> 5.1 Usability
> 5.1.1 Switching the TTS on and off
> 5.1.2 Volume of TTS audio
> 5.1.3 Verbosity
> 5.1.4 TTS characteristics
> 5.1.5 Muting the audio
> 5.1.6 TTS content
> 5.1.7 TTS response to user commands
> 5.1.8 Information
> 5.2 Interrupting TTS
> 5.3 Intelligibility
> 5.4 TTS implementation
> 5.4.1 Language support – recommended
> 5.3.2 TTS versus voice tags
> 5.4.3 Embedded versus separate TTS provision

1. Introduction

This document specifies text-to-speech functionality for a (broadcast) receiver with text-to-speech system. It includes what shall or may be supported by the receiver with text-to-speech system to achieve useful functionality for the user and indicates how this should be implemented.

The specification is broken down into essential, highly desirable and desirable functionality. This is to ensure that if TTS is implemented only for the essential items within the radio then it is still accessible to and usable by blind and partially sighted people for daily operation of the radio.

In general as the guiding principle, when building a TTS interface, implementers should aspire to achieve functional equivalence of the user experience. This means that a person operating the device using the speech interface should have access to similar information and be able to accomplish similar tasks as with a standard UI. For example, an icon might be used to indicate that a program in an EPG has a reminder set, the information contained in this icon should be provided through the TTS interface using suitable wording.

2. Scope

These best practice guidelines outline the user requirements for TTS within (the DAB and DAB + aspect of) a digital radio user interface. They are specifically aimed at DAB Radio and do not explicitly cover other forms of radio such as Internet or FM. However, the principles outlined here could be applied to other audio devices and on other platforms; for example, docks, DAB+, DMB and Internet radio.

The TTS engines referred to may be one of two types:

1. Embedded (where TTS is embedded directly into the product itself)

2. External (data is sent to an external device which converts it into synthetic speech)

3. Features of the Radio that need to be speech enabled

TTS must operate for set-up, menu, broadcast text and additional features such as EPG where it exists. Note: this document rules out slideshow requiring TTS.

Switching the radio on and off

On initial set up (out of the box) the TTS default setting shall be on with navigational instructions spoken on to how to continue. An option shall be provided to allow a user to switch off the TTS to cater for users that do not want spoken instructions. TTS shall include the status (e.g. "text to speech on" or "text to speech off") as the action is completed.

When the radio is switched on there shall be audible information that the radio is starting up within 3 seconds (where possible) of switch on and the TTS shall state the name of the station that is tuned.

If the user puts the radio into sleep mode the TTS shall state this mode and, if applicable, the sleep time. For example: "Sleep mode, 15 minutes to power off".

When the radio is switched off using standby or power off, the TTS shall state "standby" or "power off " (as appropriate) before continuing with the action.

Menu

The TTS shall provide access to menus.

Users should be provided with TTS such that they know where they are when moving within the receiver User Interface (UI).

- When opening a menu the title of the menu should be spoken.
- It is helpful to indicate the number of options within the menu and the number of the current option. If there is a visual display this does not need to be shown visually.
- Where a menu item allows the user to change a setting the current setting should be voiced with the menu item.

- When a setting is changed the user must be informed of the new setting. It is useful to include the setting name at this point as well for confirmation in a beginner mode.

Lists

When a user accesses a list that is empty (e.g. a list of reminders when no reminders exist) the TTS should inform the user of this by a statement such as "no reminders set" or "list empty". For example, if there is no radio station available the TTS shall state a generic message indicating that there is no station available).

Changing mode

The TTS shall enable the user to switch between different modes (such as clock, mp3 player etc.) stating the mode type as the user selects it. Note: this information can include the wording "no TTS available" if applicable.

Tuning

The user shall be able to tune or re-tune the radio as required. When the radio requires a retune it shall be possible to navigate to the tuning menu and initiate a retune. The TTS shall state the navigational information.

Changing station

When changing to a new station the TTS shall state:
1. Station name
2. Event title

If the station name is not available then the TTS should state a generic message indicating that there is no station available.

Electronic Program Guide (EPG) (where supported)

When entering the EPG the TTS shall indicate to the user that the EPG has been opened.

When navigating within the EPG the TTS should state the following where available:

When moving to a new station:
1. Station name
2. Event title
3. Event start time
4. Event end time
5. Event date (if not on today)
6. Recorder and reminder notifications

    When moving within a station:
1. Event title
2. Event start time
3. Event end time
4. Event date (if not on today)
5. Station name
6. Recorder and reminder notifications

If the station name is not available then the TTS should state a generic message indicating that there is no station available.

If the user cannot move further within the station or no further event information is available the user should be informed of this.

Broadcast text (as data)

Broadcast information is usually in the form of the Dynamic Label Segment (DLS) in DAB radio. The TTS shall provide access to this information for the current program/station. For example, if the UI has the facility for the user to request additional information about the broadcast event or station (such as event name, times and synopsis or station signal strength) the TTS shall announce this information when it has been requested.

The TTS shall provide access on demand (for example, via an info button) to other broadcast information about the station you are listening to e.g. signal strength.

Setting presets

When a user sets a preset the TTS shall inform the user that this has been set and give the station name and preset location (for example, "Preset 4, BBC Radio 4).

Recording and reminders (where supported)

If available, the user should be able to set an event to remind or record. This should be voiced using TTS.

If a user performs an action to record an event via the EPG the TTS shall provide confirmation that the event has been set to record.

If the UI provides access to a list of recorded events the TTS shall enable the user to select an event to play.

If the UI provides access to a list of programs that the user has set reminders for, the TTS shall state the program name, date and program start time and end time when selected.

The TTS shall provide the user confirmation of deletion of a reminder or recording.

4. Prioritisation

Whilst all the features in section 2 are important there are some features that are used on a frequent basis and are therefore of a higher priority for a TTS implementation. This section lists the features from section 2 in order of priority.

Essential:
- o Switching the radio on and off
- o Changing station
- o Tuning
- o Broadcasted text (as data usually in the form of DLS in a DAB radio)
- o EPG (where implemented)

Highly Recommended (all Essential features plus):

o Setting presets
o Changing mode
o Recording and reminders
o Menus
o Lists

Recommended (all Essential and Highly recommended features plus):

o Set up (out of the box)

5. General spoken UI Guidelines

5.1: Usability

5.1.1: Switching the TTS on and off

The user must be able to easily switch the TTS on and off (ideally via a direct access button) and the TTS shall include the status (e.g. "text to speech on" or "text to speech off") as the action is completed.

5.1.2: Volume of TTS audio

TTS shall be at a level so that it can be clearly heard above the broadcast audio. This should be accomplished, for example, by dipping the level of the broadcast volume when TTS is being provided.

It is recommended that it should also be possible to allow the user to adjust the volume of the TTS relative to the broadcast volume.

5.1.3: Verbosity

It is important that the TTS is succinct and conveys the necessary information only

It should be possible to set at least two levels of verbosity, one for beginners and one for expert users. However, beginner users tend to prefer to have more connecting words. For

example, beginners will prefer words such as "From" and "To" when presenting program times, whereas expert users will be happy with simply stating two times.

5.1.4: TTS characteristics

All TTS should be unambiguous and make sense in isolation (i.e. without any visual clues). For example, when a user sets a preset TTS shall inform the user that this has been done and give the station name and preset button (e.g. "Preset 4 - BBC Radio 4").

It is recommended that the user should be able to adjust the speed of the TTS audio and other characteristics such as pitch and TTS voice type.

5.1.5: Muting the audio

If the user mutes the audio no further TTS will be heard except for feedback after pressing the mute key.

5.1.6: TTS content

Where appropriate, TTS should speak the information contained as text on the visual screen.

Exceptions (provide TTS only on demand):

- Regularly updated information (time, current song).
- Progress bar or changing numeric indicator. However, once a retune has been initiated the TTS shall provide feedback as to the tuning progress at regular intervals, stating that the action is ongoing. On completion of the retune the TTS shall state the current state or mode of the radio.
- Do not render graphics that do not contain information through TTS.

For any delay in radio operation of ten seconds or more, for which there is no on-screen information, some form of audio feedback needs to be provided at regular intervals for example "please wait".

5.1.7: TTS response to user commands

When TTS is on, the system should never provide silence in response to a valid user instruction.

TTS should follow all user actions and be provided within a maximum of 3 seconds after the user has activated a command.

5.1.8: Info

There should be a button to allow the TTS user to obtain context sensitive help as to what functions are available to be selected. It should be possible for the user to request a repeat of the currently playing or last output TTS. This could be combined into a single "Where am I?" functionality which provides the user with the current location in the UI (including a repeat of the essential information) and additionally states the navigation buttons that can be used.

5.2: Interrupting TTS

If a user requests new information or a repeat of the current information that takes priority over any currently playing TTS, the current output shall be interrupted and the new TTS spoken. For example, when a user presses the "info" button. Under exceptional circumstances a user action may not be possible until the TTS is completed. For example, a warning about resetting the radio back to factory defaults.

It should be possible to silence the current TTS output.

5.3: Intelligibility

Static text (e.g. menu items) should be pronounced correctly according to the currently selected language. For example, a lexicon can be used in addition to correct pronunciation if implemented.

Where numbers are included in the static text they should be spoken in a manner suited to the context e.g. "page 3/9" should be spoken as "page 3 of 9" not as "page three ninths".

Dynamic text will in general be rendered by the synthesizer used. It is though recommended to alleviate known mispronunciations with dynamic text (for example, "www." should be pronounced as "double you" "double you" "double you" "dot".

5.4: TTS Implementation

5.4.1: Language support - recommended

Where the UI is available in different languages ideally the TTS should support these. However, if there is a receiver UI language that is not supported by the TTS, then the user must be informed of this in some way before changing the UI language.

5.4.2: TTS versus voice tags

In general all text should be voiced dynamically through TTS - not through the use of static voice-tags or pre-recorded sound files. This is due to the dynamic nature of broadcast data. However, frequently occurring phrases can be stored as voice tags and used within the speech string. If this is done, it must not impact on the time to read out information and must be updated immediately when a station name or frequency changes. It is advisable to not use voice tags for broadcast information because, for example, if a voice tag is used for a station name and the station name is updated then the voice tag becomes redundant and the TTS provided to the user is no longer relevant.

5.4.3: Embedded versus separate TTS provision

The TTS can be provided in one of two ways:

1.   Embedded (where TTS is embedded directly into the product itself)

2.   External (data is sent to an external device which converts it into synthetic speech)

The method of provision can be via either method noting that if the TTS is provided via a separate product then the user has to be able to easily source, pay for, install and use this separate product. Ideally, any separate interface used should be able to be used with later models of the product allowing the user to

upgrade the main product without having to upgrade the separate speech interface.

Annex D: Glossary

AAC:
Advanced Audio Coding, HE-AAC v2, a version of AAC, is used for both DAB+ and DMB.

Band 3:
Frequency band between 174 and 230 MHz of the VHF range, used for DAB services (formerly used for analogue television)**.**

DAB: Digital Audio Broadcasting:
Method for the digital transmission of radio signals for mobile reception, developed by EUREKA project 147.

DAB+:
Additional audio codec for 'Digital Audio Broadcasting', based on the new audio coding technology HE-AAC v2 (also known as AAC+ or MPEG-4). DAB+ is backwards compatible to the current DAB standard. DAB, DAB+ and DMB are all part of the Eureka-147 family of standards.

DAB+ upgradeable:
A DAB receiver is called DAB+ upgradeable if it can be upgraded via USB to a DAB+ receiver.

DLS: Dynamic Label Segment
Supplementary data services in text form (up to 128 characters) running alongside the DAB or DAB+ radio programme. Similar to RDS on FM radio.

DMB: Digital Multimedia Broadcasting [Synonym: T-DMB]
This is the method for the digital transmission of multimedia signals (especially video services) for mobile reception. DMB is part of the same family of standards as DAB and DAB+.

DRC: Dynamic Range Control
With help of the Dynamic Range Control (DRC) the receiver may reduce the dynamic range of the audio signal. The purpose of this is to adapt the dynamic range of the audio signal to listening in a noisy environment.

EPG: Electronic Programme Guide

An Electronic Programme Guide is an on-screen guide to scheduled radio or television programmes, allowing a viewer/listener to navigate, select, discover and record content by time, title, channel, genre, etc.

ETSI: European Telecommunications Standards Institute
The European Telecommunications Standards Institute is an independent, non-profit, standardization organization of the telecommunications industry (equipment makers and network operators) in Europe, with worldwide projection.

FIB: Fast Information Block
The FIB contains 256 bits and comprises an FIB data field and a CRC. The FIB data field consists of one or more Fast Information Group (FIG).

FIC: Fast Information Channel
The FIC is a non-time-interleaved data channel with fixed equal error protection. In particular it is used to send the DAB Multiplex Configuration Information (MCI) and optionally Service Information and data services.

FIG: Fast Information Group
The FIG carries the following parts: Multiplex Configuration Information (MCI), Service Information (SI), FIC Data Channel (FIDC) and Conditional Access (CA).

MPEG audio layer 2
An audio codec defined by ISO/IEC 11172-3. It is the dominant encoding standard for audio broadcasting as part of the DAB digital radio signal, and it is the core of the MP3 standard.

Multiplex:
Output of a multiplexer (often used as a synonym for ensemble).

Multiplexer: [Synonym: MUX]
A device that performs multiplexing by selecting one of many analog or digital data sources and outputting that source into a single channel.

Packet Mode:
Mode of data transmission in which data are carried in addressable blocks called packets. The packet structure supports multiplexing of various service components in one sub-channel; a sequence of packets is conveyed in a sub-channel.

RDS:
Radio Data System, Transmission of additional text data via FM broadcast.

Service Linking:

This allows cross-referencing to other modes of reception of the same programme, such as FM, DRM, AM and other DAB ensembles. Receivers allowing this function will automatically switch to other modes of reception if the current one becomes unavailable (e.g. when leaving the coverage area). Synonym: Service Following

TTS: Text to speech
Ability for a digital radio receiver to speak dynamic text.

TPEG: Transport Protocol Experts Group
This is the group of experts that developed a standard (of the same name) for transmitting traffic information via digital systems such as DAB and DVB.