AG050

UK Digital TV Usability and Accessibility Guidelines, including Text to Speech and Connected TV

Version 3.0

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Contents

Preface

This document is in three parts:

Part A Usability Guidelines

Part B Accessibility Guidelines

Part C Connected TV Implementation Guidelines

This guidelines document assumes that the receiving device is conformant with the requirements set out in the DTG's publication "UK Digital TV Receiver Recommendations" available from the publications section of the DTG website, www.dtg.org.uk, and Chapter 22, *Receiver Requirements*, of the DTG's D Book.

Part A contains guidance on the non-technical factors affecting the user experience, while Part B contains guidance on making broadcast services accessible and Part C covers factors particular to connected TV receivers.

Part C is not yet available but it should be noted that most of the recommendations in Part A and Part B apply also to connected TV receivers.

Part A – Usability Guidelines

Part A – Usability Guidelines

Purpose

Part A of this document seeks to provide information on the best industry practices that should deliver an acceptable user experience. Consumers view and judge the services provided by the Freeview brand largely through the product experience.

The best practices contained within Part A of the document promote some strategies for ensuring the customer experience is a good one. However, these are guidelines and do not prevent organisations and companies from delivering a better user experience using different approaches.

1 Remote Control Implementation Guidelines

See D Book Chapter 25 for information on the function-support requirements for remote control handsets.

The following chapter has been written mainly with reference to traditional remote control handsets but, in view of the developments in remote control technologies and interfaces, references to control "buttons" or "keys" may be to control functions or to physical buttons

1.1 Handset feel and comfort

1.1.1 Size and shape

Is the handset large enough to hold comfortably? Is it easy to manipulate using the right or left hand? (E.g. are all buttons accessible with one-handed use?)

When the handset is placed on a flat surface, can it be operated with one finger?

Larger handsets enable larger buttons, labels, and spaces between buttons making them easier to use for people with visual impairments and/or manual dexterity problems. In addition, they can be more comfortable to hold when designed to fit average human hand size.

For more information on anthropometric data see [4].

1.1.2 Centre of gravity and weight

Is the remote control well-balanced and heavy enough to hold comfortably?

The centre of gravity should be such that the remote control sits comfortably in the hand. This must be evaluated with the batteries in position. The remote control should also be designed to be easily operated with either the left or right hand. Whilst there is a tendency to develop lightweight products, consumers tend to prefer slightly heavier TV remote controls.

1.1.3 Texture

Is the remote control material non-slippery and easy to grip?

The remote control should be made of an easy grip material (without being abrasive) rather than smooth plastic that slips easily out of the hand. Avoid

materials such as shiny metallic (chrome) or smooth plastic that produce glare which can make it difficult to see the buttons and labels.

Have the materials specified for the remote control taken in to account any necessary toxicity or allergy issues?

Each manufacturer should be able to provide details of raw material content to ensure that harmful or potentially allergic materials are not present (e.g. latex).

1.2 IR Transmission

1.2.1 Can the handset operate the target receiver from a range of angles?

The area (both horizontal and vertical) in which the digital receiver is able to detect the signal from the remote control should be as broad as possible as direct aim towards the digital receiver can be difficult for some users. Consideration must also be given to the physical mounting position of the receiver module as this can adversely affect both the angle and range of the IR transmission. Is the angle and range fully specified?

1.2.2 Has a suitable IR transmission protocol been selected?

The IR transmission protocol specified should ensure that there is no potential interference with other devices. Careful consideration should also be given to potential post installation support to ensure that alternative manufacturers could supply replacement product using the same IR transmission protocol.

1.3 Button layout and design

1.3.1 Functional groups

Are buttons of the same functional category grouped together?

It is easier to identify, operate, and differentiate functions when buttons are grouped together by similar category (for example, numeric buttons, colour buttons, navigation buttons, volume up/down, and additional services).

1.3.2 Spacing

Is there variation in spacing between buttons (e.g. bigger spaces between functional groupings)?

Spaces between buttons should be greater between functional button groupings than within groupings, as this makes buttons and groupings of buttons easier to identify and locate.

Are the buttons within a functional group well separated (e.g. by 25% to 50% of button width)?

1.3.3 Position

Are more frequently used buttons placed in the most easy to find locations?

Prioritise buttons for inclusion on the handset based on frequency of use. More frequently used functions include stand-by, channel and volume adjustment, and the EPG service and related buttons ("OK" and "back").

Are standardised or commonly used button layouts used where appropriate?

Consider the comfortable position of the thumb assuming that the user holds and manipulates the control with just one hand, left or right.

If the shape of the casing encourages a particular way of holding the remote (for example, with indents for fingers), ensure buttons are easy to reach when the remote is held in this way.

Section 1.5 makes recommendations in this respect.

Do button positions conform to response stereotypes - "programme up" button above "programme down" button; "volume up" to right or above "volume down"?

The position of buttons relative to others can sometimes be indicative, or at least consistent, with their function. This can help locate buttons manually with reduced reliance on visual inspection. For example, at the simplest level, the relative positions of the arrow buttons should be consistent with their direction ("arrow up" above "arrow down", and "arrow right" adjacent right to "arrow left"), decrease/increase (for example, volume, programme number) can be suggested by relative buttons positions that are left/right, below/above respectively.

1.3.4 Location marker

Is there a raised dot ("nib") on the number "5" button?

A raised dot ("nib") on the number "5" button should be provided to help users find the centre of the numeric keypad. This is especially helpful for people with visual impairments who may rely on the "5" button to orient themselves on the remote control. This is consistent with the European Telecommunications Standards Institute (ETSI) standard for tactile identifiers ETSI ES 201 381.

1.3.5 Distinctiveness

Are buttons intuitively differentiable by size, shape, position and texture?

Intuitively distinctive buttons make the remote control easier to use by touch alone. Buttons can be differentiated by:

Size Larger button sizes that are well separated are preferred by users both with and without visual impairments. These facilitate discrete button selection and reduce the need to re-focus when switching visual attention between the television and the remote control.

The most important buttons should be the largest. Optimal button size may be informed by average thumb size data.

For more information on anthropometric data see [4].

Shape Button shape can be consistent with function (for example, the four directional buttons for moving around the menus could be shaped as arrows pointing in their respective direction). Hollows in buttons (small circular centre) give clear ridges making them easy to find, comfortable to press, and easy to clean.

Texture Textures can be used to differentiate particularly important or frequently used buttons.

Force / Sensitivity The button should be designed to ensure that it is not over sensitive and will not be accidentally pressed while the user is locating the button by touch.

1.3.6 Colour

Are the four standard colour buttons (red, green, yellow, blue) coloured correctly and in the standard order (see Section 1.4.11) and the only buttons with these as their background colours?

Users are most familiar with the standard four colour buttons – red, green, yellow and blue. Ensure that the colours used are clear and unambiguous shades of those colours and could not be mistaken for another colour. Where possible, consistency with analogue is desirable. Having more than one button with their background as one of the reserved colours (red, green yellow, blue) may confuse the user when the on-screen display gives options that require the user to respond using the colour buttons. For example, a user may press a red stand-by button instead of the red colour button. See also Section 1.4.1.

Is there sufficient contrast between the buttons, labels and background?

As a general rule, higher contrast increases visibility. Solid background colours (rather than patterned) are desirable.

1.3.7 Toggle

Do toggle buttons have only two states?

Toggle buttons are useful in that they reduce the need for extra buttons; however, when they are associated with more than two states (options) it may be difficult for the user to remember the order of the options.

The state of a toggle button when it has been pressed should ideally be briefly represented by a suitable icon on the screen and as appropriate by some form of optional visual or acoustic feedback (see Section 1.3.8, below) .

1.3.8 Feedback

Are there one or more simple mechanisms to confirm button press (e.g. a click)?

Users like to know that they have successfully pressed a button. This is especially important for people with visual impairments. Feedback should be provided to notify users of each button press. Note that such feedback should ideally be a response of the receiver to signal that the remote control command initiated by the user has been received and understood by the receiver.

If possible, provide multi-sensory feedback (for example, auditory/visual/tactile). Buttons that elicit a more pronounced tone (as with mobile phones) could be optional and user specified. At the very least a receiver should provide some visual feedback visually that a button has been pressed, either by a light on the remote control, on the display or even set top box.

For more information see [3].

1.3.9 Labelling

Is button labelling clear and legible (font, size and colour contrast), durable, and consistent with on-screen display text?

Include clear, legible, and durable button labelling that is consistent with any on-screen text. Sans serif fonts (i.e. those without details at the extremities of characters) are easier to read. Abbreviations (e.g. such as OK, TV) should be in upper case. Strong colour contrasts between labels and background increase usability. The labelling should not easily become indistinct or wear off with use and time.

The remote control labels should directly match the on-screen options (for example, users may be confused when the on-screen "select" option is meant to relate to the remote control "OK" button). Labelling terms should be unambiguous and easily understood. Where practical, abbreviations should be avoided.

1.4 Recommendations for remote control button labeling (traditional handsets)

D Book Chapter 25 contains recommendations for the labelling of functions controlled by a traditional remote control handset. Reference should be made to D Book Table 25-1 for DTT receiver functions and to Table 25-2 for DTV recorder functions.

The recommendations are made exactly as printed in quote marks in the D Book tables. Capitalization of button labels should be consistent, e.g. always lower case or always 'Sentence case'. If there is no recommendation in quote marks see the appropriate note for that function in Sections 2.3.1 to 2.3.16, and 2.4.1 to 2.4.9 below.

Broadcasters and interactive content developers should use the recommended labelling when referencing the receiver functions in on-screen instructions.

Unless specifically stated it is recommended to print the label either on or immediately adjacent to the button.

Note the colours red, green, yellow, and blue should only be used as background colours for the buttons described in Section 1.4.11 "Red, green, yellow and blue colour buttons". Other backgrounds colours may be used for all other buttons.

The following sections give more detailed recommendations for button labelling and positioning.

1.4.1 On/stand-by

The on/stand-by button should be positioned away from the other buttons on the remote control. The ⏻ symbol should be used. The symbol should be moulded and/or printed on the button, or printed adjacent to the button. The button or symbol should **not** be coloured red (see Section 1.3.6).

1.4.2 Numeric buttons 0-9

It is preferred that where practicable the numeric buttons 1-9 should be positioned in 3 rows of numbers, with "1" at the top left and "9" on the bottom right. The 0 (zero) key should be on an additional row beneath these three rows as is shown in Figure A1-1:

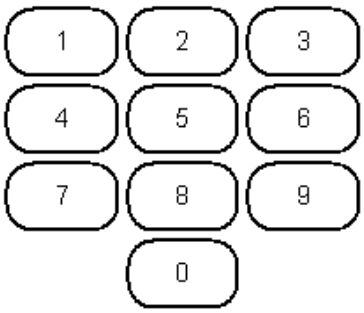

Figure A1-1. Preferred layout for numeric keys

The *5* (five) button should have a nib on or adjacent to the button (ETSI standard for tactile marking ETSI ES 201 381).

1.4.3 Alphabetic entry

Alpha entry on a standard handset (one without an inbuilt alpha-only keypad) should follow the format used by mobile telephones for SMS functionality (see ETSI ETS 300 640). This includes the numeric button "1" reserved for punctuation/symbols and the numeric button "0" for inserting a space. The letters should be printed either on or adjacent to the relevant button – the number in bold, the letters in normal type.

Lower case is preferred, but not essential.

1.4.4 Up, down, left, right (navigation/cursor buttons)

Navigation/cursor buttons should have symbols printed and/or moulded, in order to indicate direction – i.e. arrows or triangles. The buttons should be positioned in a discrete cluster around the "OK" button. The "up", "down", "left" and "right" cursor buttons should be positioned above, below, left and right of the "OK" buttons respectively, as shown in Fig. A1-2.

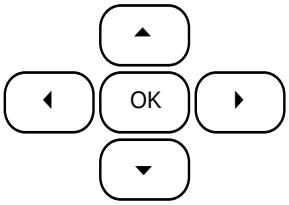

Figure A1-2. Preferred layout for navigation keys

1.4.5 OK/Select

The button is used to select user interaction items within an interactive application or other receiver function. This button should be clearly described in the user guide, particularly if the recommendation is not adopted. The EPG or User Interface must be consistent with the label that is chosen for the remote control.

The button should be positioned in the centre of the navigation cluster, and ideally be a discrete button rather than a rocker. The button should also be easily differentiated from others by touch.

1.4.6 Back

This button returns the user to the previous "level" in an interactive application or other receiver function (e.g. EPG). Note that using this button for a historical back function is also allowed. If the button is pressed and the user is at the "top level" of an interactive application or receiver function this function will normally invoke an exit from that application or receiver function.

In DTT, this button should be mapped to the MHEG "cancel" function (see D Book Section 13.6 "User input"). This "cancel" function should **not** be mapped to a button called "exit" or "cancel" as implied in previous editions of this document.

1.4.7 Return to sound and/or vision

This button invokes a receiver function that returns the user directly to the last *selected* service or known channel, and acts as though the user has just tuned to that service using the EPG or P+/P- keys (i.e. any running EPG or interactive application(s) is immediately terminated and the user views the video/audio for that service if present).

If there is an auto-boot application present in this selected service the boot process is started.

1.4.8 Info

This button is used to display either a now/next banner, or information on the currently viewed event, or both.

1.4.9 Text

This button is used to toggle visibility of interactive services – see D Book Section 19.3 "Use of the "Text"and "Cancel" function".

1.4.10 Guide

This button is normally used to display a full screen EPG if present.

1.4.11 Red, green, yellow and blue colour buttons

The buttons should be self-coloured. It is strongly preferred that they are in a horizontal or near horizontal line on the handset, and they should be in order (from left to right) of red, green, yellow and blue, as shown in Fig. A1-3. The four colours should contrast strongly against the remote control case colour.

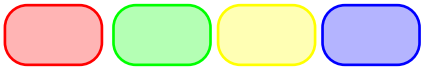

Figure A1-3. Preferred layout for colour buttons (red, green, yellow, blue)

1.4.12 Volume up, volume down

These buttons use the recognised symbol for volume (◅) with a plus and minus symbol as appropriate. The text "Vol" may also be used.

Note that volume up/down function may exist as two distinct and separate buttons, or may exist as a single "rocker" button. The "+" button should be mounted above or to the right of the "-" button.

1.4.13 Mute

Mute function should be overridden by pressing "Volume up" or "Volume down".

1.4.14 Program up, program down

This button should select the next available service in the receiver's channel list.

The program up button (P+, CH+, P▲, CH▲) should be mounted above or to the right of the program down key (P-, CH-, P▼, CH▼)

1.4.15 Subtitles

This button is used to toggle between displaying subtitles (if available with the selected service) and not displaying them.

The function should be available directly from the remote control.

Note that the digital receiver should maintain the selected state ("display"/"don't display" subtitles) across channel changes unless otherwise determined by a user-setting in a suitable set-up menu.

1.4.16 **Audio Description**

This button is used to control the decoding of Audio Description if available with the selected service and event and if the receiver supports AD.

The button toggles between presenting Audio Description (AD) mixed with programme sound or just presenting programme sound. The receiver may be capable of directing the mix to independent audio outputs (e.g. phono and/or headphone) in which case this function controls the relevant output.

The function should be available directly from the remote control if the receiver supports AD.

Note that the digital receiver should maintain the selected state ("present AD"/"don't present AD") across channel changes.

1.5 **Recorder labelling recommendations**

D Book Chapter 25, section 25.2, details the additional functions that are considered essential or strongly recommended for control by the user of a recorder. D Book Table 25-2 also details the recommendation for function identification or the preferred symbol to be used.

When designing a recorder remote control the principles of sections 1.1, 1.2 and 1.3 should be applied in conjunction with the additional recommendations of sections 1.5.1 – 1.5.9 and 1.6 below.

1.5.1 **Play**

This button has the dual function of starting to play either a live broadcast or selected recording and also to resume a live broadcast or selected recording that has been paused by the user. The play button should be positioned directly to the side or directly above / below the pause button (see 1.5.2).

The play and pause buttons may be combined on a single rocker button.

When a rocker button is used then both symbols for play and pause must be clearly printed on the rocker button as 2 separate symbols. This should guide the user clearly where to press the rocker button to activate either the play or pause function.

Alternatively the play and pause buttons may be combined to be used as a single button toggle (see 1.5.3).

1.5.2 Pause

This button pauses the current recording or playback of live broadcast. This will freeze the current frame on screen. The pause button may also have the function to resume the current recording or playback of live broadcast when pressed again.

The play and pause buttons may be combined on a single rocker button.

When a rocker button is used then both symbols for play and pause must be clearly printed on the rocker button as 2 separate symbols. This should guide the user clearly where to press the rocker button to activate either the play or pause function.

Alternatively the play and pause buttons may be combined to be used as a single button toggle (see 1.5.3).

1.5.3 Play/Pause

This button may be used to combine the Play and Pause functions as described in 1.5.1 and 1.5.2. This single button will have the recommended symbol as shown in the table. The button will toggle between the Play and Pause functions.

1.5.4 Stop

This button is used to stop playback or pause live TV. This will return the device back to a previously reserved state or logical condition

1.5.5 Record

This button is used to record the current event if available, and optionally the selected event from an EPG. This button should be identified by a red circle printed on the centre of the button. The button itself should not be red in colour to avoid confusion with the red button referred to in Section 1.4.11. It is recommended that if the record button is a dark colour then a white circular border should be printed around the outside of the red circle to improve the visual contrast.

A white letter "R" printed on the red circle can be used for additional visual clarity.

1.5.6 Fast forward

This button is used to fast forward the replay of a event or the contents of the live buffer. This function may also have the feature that by pressing the button again the speed of fast forward would be increased.

This button should be located to the right of the Fast reverse button (see 1.5.7 and 1.6).

1.5.7 Fast reverse

This button is used to fast reverse the content of a event or the contents of the live buffer. This function may also have the feature that by pressing the button again the speed of fast reverse would be increased.

This button should be located to the left of the Fast forward button (see 1.5.6, below, and 1.6).

1.5.8 Library

This button is used to display the current list of recorded events on the storage media. This button should be located close to the navigation keys (see 1.4.1) to allow easy navigation once in the library.

1.5.9 Timer list

This button is used to display the planned recordings or give access to add further recordings manually.

1.6 Recorder Functional Groups

Good remote control design will ensure that the following Recorder specific keys are grouped together in a distinctive group (see principles outlined in 1.4)

The following principles should apply to the grouping of particular Recorder specifc buttons:

Play, pause or play/pause, stop (if present), fast forward and fast reverse should be grouped as a clearly distinguishable set of buttons on the remote control.

The record button may be part of this Recorder specific group of buttons or it may be more prominently located on its own for clarity.If the record button is located on its own it should be adjacent to the Recorder specific group of buttons.

Play and pause, if separate buttons, should be adjacent and either alongside or above and below one another.

The fast forward and fast reverse keys should be in the same horizontal row of buttons with fast forward positioned to the right of fast reverse.

2 Packaging, Documentation and Connectivity

2.1 Packaging

2.1.1 Information on the Packaging

The packaging should convey clear information to the consumer of what the receiver is capable of doing. Where appropriate, official recognised logos should be used. (Typically this should include the type of receiver, the broadcast platform(s) and services supported and any high definition or other special capabilities).

The packaging should inform the consumer of any additional facilities or hardware that may be needed. (Typically this will include connecting cables and type of receiving antenna system(s)). Where appropriate, official recognised logos should be used. Outer packaging should include information about retailer post code coverage checks and contact details for after sales support.

Products designed to receive HD services should be specifically indicated. Where applicable this can be done by using an appropriate broadcast logo.

The packaging should clearly indicate any additional or enhanced broadcast services the receiver supports (for example pay TV and Internet services).

The packaging should make use of any current official broadcast-related information schemes or icons that are designed to inform the consumer. (For example prior to digital switch-over in the UK this would include the "digital tick" and "scoreboard")

2.1.2 Information relating specifically to set top boxes and DTRs

For set top boxes and DTRs that are intended for standard definition reception via an analogue signal connection and with which no SCART lead is supplied, then the recommended best practice is for the packaging to indicate that the user may need to purchase a SCART lead.

If the product is intended to receive HD services and no HDMI cable is supplied, the packaging should clearly indicate that an HDMI cable will be needed to view these services in HD.

2.1.3 Information relating specifically to DTRs

For DTRs the packaging should clearly indicate if they are single tuner devices or twin or multi tuner devices and if they support the special EPG features designed to provide accurate recording times, for example the" Freeview +" service in the UK.

Additionally, for twin- or multi-tuner devices, point of sale information should be available to the consumer giving brief descriptions of the capabilities of these tuners, e.g. "capable of recording one channel while viewing another". Typically this information could be on the packaging, in the form of retail display information, specification leaflet or a product description text for on-line retailers.

2.1.4 Contents of packaging

In addition to mandatory documentation, the receiving equipment, the packaging should also contain:

- A printed Quick Start Guide (see 2.4.2).
- The purpose of this is to ensure that the user is able to install the receiver to achieve at least basic reception of services. This should be in printed form and clearly identified as essential reading
- Full user guide (see 2.5.1)

  Best practice is for these to be in printed form but alternative on-screen formats can be considered if they meet certain criteria

- Receivers without integrated displays should include a suitable cable for the primary audio and video connection.

  Note: The purpose of this is to ensure that for self install systems the user is able to satisfactorily connect the equipment to an existing system without having to acquire additional hardware. Special arrangements with retailers, to ensure the supply of suitable connectors, are an alternative solution.

- Remote control with batteries

2.1.5 Opening the Packaging

The packaging should be easy to open, given the dexterity problems and sight problems users might have. It should be easy to remove the packaging for these users.

Best practice for all products is for the packaging to be user friendly and so avoid the use of staples or glue for securing the package. It is also recommended that a solid type internal cushioning material be used, when required, and the use of loose materials such as polystyrene balls is avoided.

Best practice for large receivers with integrated displays is that the packaging should be designed such that it can be lifted away from the product rather than the product has to be lifted from the packaging.

For receivers with integrated displays advice should be given to the consumer where two or more persons are required to remove the product from the packaging. Small components such as batteries and other accessories should be individually and securely wrapped but easy to open by hand. Such component parts should be easily seen when the main item is removed so they are not accidentally discarded with the packaging

2.2 User Documentation

2.2.1 General

User guides should be easy to read, concise and jargon-free (using plain English), should avoid technical abbreviations and have a design and content that will be accessible to the majority of users.

For general guidance on best practice in documentation, see the guide "How to write in plain English" [2]. The process of applying for the Plain English Campaign's Crystal Mark will also help in producing a document that can be read, understood and acted upon by the intended audience.

For specific guidance on the needs of vulnerable consumers in relation to digital TV documentation, see the report produced by the Consumer Expert Group [6]. For more detailed guidance on legibility of printed materials, see the RNIB publication "See it Right" [7].

The user guide should comprise of at least a Quick Start Guide and a main user guide. Best practice is for these to be separate documents.

2.2.2 Design & presentation

The type and size of typeface, its colour contrast from the colour of the paper and the quality of the paper all affect legibility. Contrast is greatest when very dark colours are used on very pale paper. Glossy paper should be avoided as reflected light obscures the print. Page layout should be simple and uncluttered.

2.2.3 Clear and legible typeface

Use simple sans serif or serif typefaces e.g. Arial, Foundry Form, Gill Sans, Helvetica, Bookman, Garamond, Palatino, Times. Stylised and ornate typefaces are to be avoided e.g. Apple Chancery, Braggadocio, Brush Script, Curlz MT, Desdemonia, Edwardian Script, Sand, Textile. Italics and capital letters should be avoided for continuous text, since they make word shapes difficult to recognise for people with impaired sight.

2.2.4 Main text minimum font size

There is some variation in font size between typefaces but 12 point is legible for most readers. Large print minimum for partially sighted people is 16 point.

2.2.5 Single language

Where the instruction manual has to cover different languages, these should be presented in separate sections, complete with diagrams.

2.2.6 Single model documentation

An instruction manual should cover a single product only, unless differences between the models covered are small and mainly cosmetic.

2.2.7 Content

The user guides should have a comprehensive, relevant index. In the case of shorter guides, a detailed contents page (detailing the main sections and sub-sections) may be considered adequate.

2.2.8 Accessibility

The user guides should provide information about the accessibility features of the product and about access services such as subtitling and audio description.

2.2.9 Pictorial representations

The user guides should have pictorial representations and diagrams of the main features to complement the text to help understanding. These should have sufficient resolution and contrast to be useful.

Best practice is for these illustrations to be adjacent to the text to which they refer and presented in a context that will enable the user to recognize. For example, do not just show an isolated button; also show its location on the remote control.

No text should be printed on an image where it will be difficult to read. This is particularly important where screen representations are included.

2.3 Troubleshooting

The user guide should include a "troubleshooting" section relevant to the product and to DVB reception issues in general. Best practice is for the troubleshooting problems to be based on real user experiences. For example DVB reception problems could be based on data from organisations such as DigitalUK.

As a minimum it is recommended that the following situations are addressed:

- No TV picture on first installation (e.g. reasons could be: aerial not connected, incorrect aerial or incorrect aerial alignment, TV not selected for appropriate input).
- Some groups of services missing (e.g. reasons could be: incorrect aerial for full reception, not all channels available from selected transmitter)
- Picture breaks up (e.g. aerial or down-lead needs upgrading or servicing, local interference from domestic appliances).
- Tuning in when using an indoor aerial (This can be difficult as the optimum aerial location may need to be determined. One solution is to tune receive in first with local roof aerial to establish correct tuning and then locate indoor aerial. Best location is often high up and/or near to window.)
- Receiver locks up, Freezes (e.g. explain how to reboot the system)
- Loss of particular individual service(s) (e.g. local service changes so need to retune or add new services. The user should be referred to the appropriate section of the instruction manual)
- What action needs to be taken if a 'digital Switchover event' is taking place in your area. (e.g. if multiplex frequencies are changed the consumer will have to perform a full retune of the receiver, so this process, the reason for it and the consequences of not carrying it out need to be explained. The user should be referred to the appropriate section of the instruction manual)
- Loss of all or group of services (this may occur if the user moves location or a network change has occurred (e.g. digital switchover in the UK). Here the need to do a full retune should be explained and the user should be referred to the appropriate section of the instruction manual.)
- User is receiving multiple services or wrong services are listed in primary LCNs. This will occur when user is located in an aerial with transmitter overlap, particularly if the transmitters are for different regions. The user

should be referred to the appropriate section of the instruction manual that deals with manual tuning and target region descriptor reception. Reference should be made to the Digital UK online guide [9] from which a page can be printed with all of the relevant UHF channel numbers for a given location during the switchover period. The contact telephone number for the Digital UK advice line (08456 505050) can be included for users without Internet access to obtain the relevant UHF channel numbers.

- Pictures sometimes appear squashed. (This is caused by incorrect aspect ratio selection on set top box receiver or incorrect auto widescreen setting on television receiver. The user should be referred to the appropriate section of the instruction manual)

The following should also be included:

- Where to find details about services and service changes in your area (appropriate website link) e.g. in the UK the best source is the web site http://www.dtg.org.uk/consumer and for the digital switchover period there is a telephone advice line 08456 505050.
- Users should be advised to leave their receiver on standby overnight periodically to receive latest software downloads and channel line-up changes. (Information on forthcoming transmissions of software updates is available from the DTG Engineering Channel website (www.dtg.org.uk/industry/download_schedule.php) as well as from the manufacturer's helpdesk.)

2.3.1 Product Support

The supplied documents should incorporate a clear indication of where dedicated information and support services are available.

2.4 Scope of User Guide(s)

The user guide(s) should cover the operation of the receiver in detail, and not assume prior knowledge of this type of product. It should provide clear explanations and demonstrations of the features: in particular, advice on how to make best use of the tools provided to enable the user to select a service and plan future viewing.

2.4.1 On-screen information

Where possible sufficient on-screen information should be provided to avoid reliance on a user guide.

2.4.2 Quick Start Guide (QSG)

2.4.2.1 QSG General

The QSG should be concise with only essential information and should be designed to be easy to follow.

The QSG should use a logical step-by-step approach to guide the user through the installation, connecting up and tuning sequence. The steps should cover connecting up, the tuning process and configuring the TV for optimum performance. This can be done using text instructions with diagrams and screen shots of principal menu. Good practice design can keep these instructions to a minimum if the system provides a comprehensive, on screen, installation and tuning guidance.

The QSG should encourage the user to read the full user guide.

2.4.2.2 QSG Content

The QSG should contain and be limited to general information on how to configure and use the equipment.

Typically the QSG contains:

- How to tune the receiver in for the first time with a clear diagram and explanation on the use of the remote control navigation buttons that may be required (e.g. to initiate of complete this process).
- How to retune the receiver including information regarding the likely need for retuning in the future.
- An explanation of the need for the correct receiving antenna for reception of all multiplexes for current and future transmissions as appropriate (e.g. for pre and post analogue switch off scenarios).
- Information relating to the switch-over process and where to get advice on these and other future events.
- Text and a diagram used to identify the key features on the remote control with references to the sections in the main user guide where more detail can be obtained.
- Troubleshooting tips concerning installation and tuning. This should include problems related to a poor or incorrect aerial.
- A conclusion with some basics of operating the device e.g. switching on and off and changing channel. It should also make specific reference to the sections in the main instruction book where full information on key

features can be obtained (adjusting picture and sound, accessing text, accessing the EPG).

2.4.2.3 QSG connectivity

The QSG should provide text instructions and diagrams for the following basic connection options – as appropriate:

- Connection to aerial, or dish, etc
- Connection to a typical external recording device
- Connection to the power supply.

For more advanced connection diagrams the user should be referred to the main user guide and also to links to suitable on-line help such as official broadcaster support or the manufacturer's connectivity support.

2.4.2.4 QSG Connectivity for receivers without integrated displays and DTRs

The QSG should provide the following guidance:

- Connection to a TV via SCARTor HDMI (where appropriate). All common connection configurations should be shown with clear advice on which one is most appropriate for different scenarios. The connection configurations should be shown diagrammatically using pictorial images.
- Where a SCART connections is to be made to a wide-screen display it should advise the user on selecting the appropriate setting on the display that provides automatic format switching between 4:3 and 16:9 broadcasts. Best practice is to advise the user to refer to the user guide.
- Where only one RGB SCART output is provided on a receiver that is required to be connected to a DTR (or VCR) and a display, the QSG guide should explain diagrammatically how this can be achieved by using the SCART loop through capability of the DTR (or VCR).
- Where the receiver is to be connected to a 4:3 display and is supplied with its default video output setting for a 16:9 display (as recommended by DTG) then the QSG should explain the need for the user to change the output setting. This explanation can either be provided in the QSG or can refer the user to the main user guide for this information.

2.5 Main User Guide

2.5.1 Presentation of Main User guide – printed format

The main user guide should cover all operations of the device. It should be presented in a friendly format such that users are encouraged to read it.

A best practice approach would be to structure the user guide into two sections to make the guide less cluttered and complex for the new user. These sections would separately cover:

- Basic features

  Basic features include those features required by the user for viewing the digital television services following initial purchase and installation. These could include the connections, installation and tuning, using the receiver for its primary functions.

- Advanced features

  Additional features include information, features and services not essential for the user immediately following purchase. These can be addressed later once the user has become confident at using the product and its interface.

2.6 Electronic User Guides

For complex and multi function products alternatives to the printed user guide may be appropriate, if the printed guide becomes unacceptably large (e.g. over 100 pages).

Here a best practice approach could be to provide a printed introductory user guide, additional to the QSG, describing the basic features and operation such that the consumer is able to use the equipment for receiving and viewing the main services and main functions. This short guide should also contain clear instructions on how to access and use the on-screen guide. The more detailed instructions could then be provided on-line or on a supplied electronic storage device.

If a user guide is provided in electronic form then the following criteria should apply:

- It should have a *comprehensive* interactive index that allows the user to navigate to the required section or topic.
- It should have an interactive content or text search facility, and a context-sensitive help tool when the receiver is in use, to take the user to the appropriate section of the guide.
- Where the user guide is provided on the associated display it should be in an interactive format such that any instructions being given can be carried out without the user having to exit the guide.
- The presentation of the electronic guide should be consistent with the display technology, e.g. using established website design principles. Font size and line spacing of text should be appropriate for TV screen

viewing. The use of annotated or animated diagrams may help explain technical issues.

It should also be possible for the user guide to be printed out or otherwise available in printed form on request.

2.6.1 Special Formats

It is recommended that the User Guide is additionally available, on request, in alternative formats e.g. including but not limited to large print or audio.

2.7 Connections

As a minimum requirement the product should comply with section 1.4 of the DTG's *Receiver Recommendations* publication.

2.7.1 Identification

Where a choice of inputs and/or outputs is provided, the connector designation e.g. "AV1", "SCART 1", "HDMI 1" and where appropriate the signal types (e.g. RGB for SCART, PC or video for HDMI) should be identified on the product using text or standard symbols. The choice of size and contrast should be such to make it clearly visible. Explanations and recommended functions of these connectors should be explained in the user guide.

Best practice on receivers with integrated displays is for the analogue input sockets to conform to the common practice of the lower numbered inputs (AV1, AV2) to be the higher specified ones, so that, for example, "AV1" can be assumed to support RGB[1].

2.7.2 Access for Receivers with an Integrated Display

For receivers with an integrated display that can be wall mounted, best practice is for there to be convenient access to some connections when it is wall mounted.

[1] Connection for receivers without integrated displays are of concern to this document if the additional connection of DVB-T2 and DVBS/S2 receivers is considered.

3 Installation and Tuning

3.1 Initial settings

Receivers (STBs) and digital TV recorders with analogue video outputs that support both widescreen and 4:3 displays should be supplied set to widescreen mode as the default. The option of changing this setting for a 4:3 display should be explained in the quick start guide and user guide. The option can also be offered as an on-screen choice during the installation process.

3.2 On-screen Presentation

At all stages of the tuning and retuning the status of the process should be indicated on the display. This should use text to describe that action being carried out with an indication of the progress and time remaining. Where instructions to the user are given the meaning should be clear and should avoid technical jargon and should avoid the necessity to use the user guide.

3.3 First Time Tuning

3.3.1 Process

Best practice is for receivers to carry out the full tuning sequence automatically following initial powering on. This can be carried out using the following process, assuming the receiver is connected to a display and a power source and batteries have been inserted into the remote control:

On-Screen display reminds the user to connect a suitable antenna and offers a "start tuning" prompt
A full scan of the broadcast band
A message to inform the user that the tuning process is complete

At all times during the tuning there should be an on-screen indication to give the user confidence that the system is actively carrying out a process. This indication should also give notification of what is taking place at each stage and the progress.

As each multiplex is received, information detailing the services should be displayed. Following the tuning operation the total number of receivable services should be displayed. Best practice is for the TV and radio stations to be listed separately.

The user should be prompted to let the tuning process complete fully before exiting the process. A manual tuning process should also be provided as a means to help tune the receiver under difficult reception conditions. This process should be explained in the user guide.

If after tuning no signals are detected, there should be an on-screen prompt to the user to check their aerial or dish connection with a direct access retune prompt (e.g. "try again").

3.3.2 **Advanced Settings**

Following initial tuning, an on screen message should prompt users of the options to set up any preferences. This may be achieved by referring them to the Quick Start Guide or by an on screen step-by-step process. Typical preferences are:

Subtitling or AD default on
Set-up of favourites or 'hide' channels (as appropriate)
Power saving modes or timers

This screen should also have a clear 'exit' or 'skip' prompt.

4 The User Interface

As a priority, the design of the user interface for regular basic use, should take account of the needs of all possible users, particularly those who are unfamiliar with digital TV. This includes, but is not limited to:

- switching on and off
- changing channel
- adjusting volume (where applicable) and accessing the EPG.

4.1 On-screen messages and prompts

Messages and prompts should be easy to read, with text presented against a plain background.

Best practice is to use a sans serif font size of at least 12 TV lines high (capital "V") on a SD display designed for readability and use on television for normal viewing distances.

[NOTE: For information, in its Usability Requirements (Section B) the UK Targeted Help Scheme CRR specification [12] currently requires the following (reproduced from Scheme document, emphasized words are from original):

"

B 1 The User Interface (UI) ***shall*** be designed using principles derived from good web design practice (see, for example, W3C guidelines at **www.w3.org**) especially when working down menus (e.g. use of clear and unambiguous menu terminology, highlighting current position in the menu etc.). Any selected menu option ***shall*** be highlighted clearly.

B 2 There ***shall*** be a direct and consistent correspondence between relevant on-screen prompts and button labels on the remote control.

B 3 Items in pop-up menus ***shall*** be numbered and directly selectable using numeric keys.

B 4 The UI ***shall*** use a san-serif font designed for readability and use on television & at sizes suitable for normal viewing distances [Tiresias is recommended with 24 line minimum for body text, 18 min. for upper-case]. Mixed case letters ***should*** be used; if not possible then lower-case ***should*** be favoured over upper-case. Italic, underlined, oblique or condensed fonts ***shall*** be avoided.

B 5 Text and relevant symbols/icons ***shall*** be displayed with good contrast. Colours ***should*** be limited to an absolute maximum of 85% saturation. Pure red & white and combinations of red and green ***shall*** be avoided.

B 6 Arabic numerals only ***shall*** be used (1, 2, 3, 4, 5…)

B 7 Symbols ***shall*** accord with appropriate recognised standards.

B 8 Arrows ***should*** accord with the ISO7001 specification.

B 9 Generous inter-linear spacing ***should*** be provided. Words ***should*** have a clear space around them esp. adjacent to symbols. Flashing and scrolling text ***shall*** be avoided.

B 10 Left-aligned text ***should*** be used rather than centred or right-aligned. Justified paragraphs ***should*** be avoided.

"

]

4.1.1 On-screen menus

- Ideally, each menu page should be complete on the screen but if there are further menu options this should be indicated to the user.
- Menu headings should avoid technical terminology unless accompanied by clear explanations of the meaning.
- Most commonly used menu items should be nearer the top of each menu page.
- Main menu categories should be grouped logically from a user's perspective. Best practice is to avoid vague or ambiguous terms such a "tools" or accessories".
- Where possible menu navigation and presentation should be consistent for the different functions of the receiver. (This is to avoid the practice by some TV manufacturers of 'adding' a separately developed DVB-T tuner to an existing television design where it results in two (or even three) differently styled menus and even two different menu buttons on the remote)
- There should be no observable latency between using the navigation buttons and the movement of the screen display cursor.
- On-screen menu, EPG and navigation prompts should be consistent with the remote control labelling and navigation layout.
- When a menu item is highlighted the contents of that option should be further described or the options displayed.

4.2 Interaction between the Remote Control and the Display

4.2.1 Analogue TVs with external digital TV receiver

Where a receiver or DTR is intended to provide an upgrade to an analogue TV, the ability of the STB's remote control to provide basic operation of the TV can be an advantage for the everyday usability. To ensure simplicity of operation with such an arrangement it is recommended that the remote control only provides on/standby and volume control. If programming the remote control for the TV is done by entering a code number then the instructions for programming should be very clear and presented in a step-by-step format. The supplied code list should be limited to brands of TV that were commonly marketed in the UK/Europe.

More advanced operation such as TV channel change or external input selection is not recommended as it can result in unexpected loss of services if incorrect buttons are accidentally pressed.

4.2.2 HD receiving adaptors and recorders

STBs and DTRs intended for receiving HD services should use HDMI CEC signalling to provide single remote control operation (for implementation guidelines see D Book Chapter 26). The provided remote control should at least provide on/standby control and volume control of the TV. Full control of the TV is not recommended as in most installations it is expected that the TV's remote control will act as the master control.

4.2.3 Direct access buttons

Consideration should be given to the use of direct access buttons to access frequently used services, additional to those already specified in the D Book. This should be done in a way that does not clutter the remote control button layout.

4.3 Front Panel Controls

Basic operating controls should be provided on the product itself to provide at least a minimum level of operation without use of a remote control. These should be labelled clearly and meaningfully.

Where an item can be activated via the front panel it should be possible also to de-activate it via the front panel.

4.4 Messages delivered in the broadcast

Any information or instructions generated by the platform operator relating to a network change event should be displayed such that the importance and relevance of the message is clear to the user.

The message should be unambiguous and should not use technical terminology without adequate explanation. The message should not require the user to scroll down the screen; it should be complete on a single screen, or sequence of screens as necessary.

Where appropriate, the message should include references to help lines. The display of the message should give instructions on how to clear the message and how to save it for a later reminder.

If the message requires user initiated or automatic re-configuration of the DVB tuner system there should also be a warning not to unplug the tuner while this action is taking place.

When an assisted or automatic retune of the receiver occurs, a clear on-screen indication should be given to the user that this is taking place e.g. a progress bar or a "please wait" message.

4.5 Service Selection (Finding a Programme)

DTT offers the user a choice of ways for selecting an event, each with its own benefits. To achieve the best from the system each of these methods needs to be provided such that these benefits are realised.

This section covers:

Service lists (Channel list),
Now and Next (N&N $EIT_{p/f}$),
the electronic programme guide (EPG),

4.5.1 Service List

This feature should give quick access to a selected service, it should be quick and responsive to navigate and select using the navigation buttons.

The user may wish to use an alternative third-party EPG offered by the receiver. In this case the instruction manual should advise the user of the pros and cons of the options.

Where a service 'favourites' configuration is offered by the receiver, the service list should display only the selected favourite service if this mode is active.

4.5.2 Now and Next (N&N)

It is required that the receiver provides convenient means for the user to access information relating to the programmes being currently broadcast and to those to be subsequently broadcast. This is typically achieved using the Now and Next (N&N) information that is carried in the EIT data but alternative methods such as a mini-guide is a valid alternative. It is recommended that when in N&N or mini-guide mode on a particular service that the user can scroll through other services to view the N&N on other services.

The N&N or mini-guide should be achieved without interrupting the viewing of the currently-tuned service. This can be achieved by ensuring that the programme detail is displayed as a banner or box, typically at the bottom of the screen and occupying less than one third of the screen height, so as not to obscure heads and allowing the user to continue viewing the current event. If selectable toggled access to programme 'info' is additionally offered for a N&N or mini-guide displayed programme, then the display banner can exceed this size while this detail is displayed. If extended 'info' is available then the size can exceed the lower third of the screen.

Best practice access and exit to the 'now and next', mini guide or 'info' should be achieved by minimal use of remote control buttons, e.g. by a single button toggling the action.

Consideration should be given to allow the user to scroll through the Now & Next for 'other' services while continuing to watch the current programme. If this feature is provided on receivers that offer a 'favourites' configuration then the N&N should only offer only the selected favourite channels when in a favourites configuration.

4.6 Electronic Programme Guide (EPG)

4.6.1 EPG Format

The EPG should be displayed in a format that allows the user to conveniently review programmes in a manner that allows them to directly compare programme schedules between channels. Best practice it to show a minimum of 5 services per screen covering a 2 to 2.5 hour period, using a common time line. More channels or time can be considered if it can be achieved without loss of clarity.

4.6.2 Navigation via EPG

When navigating the EPG, for best practice it should be possible to:

scroll through the service list one service at a time or more rapidly one screen at a time
scroll along the time-line in small steps (e.g. 0.5 hours at a time) or more rapidly (e.g. 1 day at a time)
change service (channel) by selecting from the current event on the EPG book a recording, set a reminder or timer.

Best practice is to provide this navigation using the navigation buttons and the colour coded 'hot buttons'

4.6.3 EPG load time

In receivers where the EPG event data is cleared when in standby, the EPG should re-populate quickly after the system is returned to on-mode (typically to within 90% full in 10 minutes).

4.6.4 Optional EPG display styles

If the system offers alternative EPG display styles such as a single service guide these should be provided as options, not as the default. If they are 'toggled' options then the system should automatically revert back to the users' default option.

4.6.5 Favourites

For receivers where a 'favourite channel' system is offered then, when a favourites group is selected, the EPG should display only the favourite channels.

4.6.6 The synopsis (Info) display

When possible, the full synopsis should be seen on the screen.

4.7 Channel Management

4.7.1 Favourite Channels

When a favourite group is selected, then only these channels should be displayed in the N&N, EPG, channel list and Channel +/-.

4.7.2 Deleting or Hiding Channels

It should be possible to delete or hide selected channels so they cannot be accessed or seen in the EPG or service list. In the case of the delete function a suitable on-screen message should be displayed warning that this channel will become inaccessible unless a full retune is carried out and retuning should be PIN protected.

Hidden channels should only be re-accessible using a PIN.

A reliable emergency recovery system should be provided for the case of the user forgetting the PIN

4.7.3 Changing Channels

Ideally, whenever the user changes channel, details of the current programme being received on that channel should be displayed.

4.8 Retuning

4.8.1 User-initiated retuning

The user-initiated retuning process should follow the same procedure as the first-time tuning described in Section 3.3. Best practice is for the main user guide to give specific retuning information in an easy to locate section.

Access to the retune option should be in a menu group with a logical, intuitive title: "setup" or "tuning". Menu titles such as "configuration", "tools" or "accessories" do not convey an intuitive message. To avoid potential confusions that may occur by offering the user different retuning options, best practice is for a "full auto-scan" option to be offered as the recommended option. This should effectively provide a 'first time install' process but without the need to reset the screen format setting, selected video output format and modulator frequency (where applicable). Alternative options such as "manual tuning", "search for new service retune" or "factory reset", if available, should only be offered as secondary options.

Where applicable, before and after retuning, notification should be given to the user that personalised settings such as favourite groups, hidden or deleted channels and events tagged for reminder or recording may have to be reset.

It should be clear to the user when the retuning process has been completed: returning the user to the retuning menu should be avoided.

4.8.2 Assisted Retuning

If the receiver incorporates auto retune (i.e. updates the service list without user intervention) this function should be made clear at the point of sale and in accompanying literature.

4.9 Booking and viewing recordings on DTRs

4.9.1 General

Displayed information related to DTR actions should be in the same visual format as other displays for the device but it should be clearly indicated that they refer to the DTR facility.

4.9.2 Recording

When booking a recording a clear indication should be given to the user of the selected event both in the EPG and in the scheduled recording display. When initiating a recording of a current programme a clear indication that a recording has been started should be given. This can be either a momentary on screen indication or a permanent front panel display, or both.

When a 'live' recording is in progress this should be clearly indicated on the Now & Next and EPG displays for that programme.

When more than one recording is in progress (for twin-tuner DTRs) or one recording is in progress (for single tuner DTRs) the resulting inaccessible channels should be indicated as such, typically they can be greyed out from the channel list and EPG to indicate to the user that they unavailable. If a user tries to access an inaccessible channel a message explaining why it cannot be viewed should be displayed.

When the recording storage medium is near to full capacity a warning message should be displayed on the screen whenever a recording starts or a new recording is programmed.

Prior to deleting a recorded programme a warning message should be given for the user to confirm the deletion.

4.9.3 Playing back and Pause live TV

When operating DTR functions such as pause live TV, fast forward and rewind there should be a clear indication to the user of which operation is being carried out and a position indicator where applicable.

The live TV buffer should be on by default so that an instant rewind function is always available.

The stop button should stop playback and return the user to live TV – but not delete the 'live buffer'.

When playing back in any special mode such as fast or slow motion then a graphic indication of progress, speed, etc., should be displayed on the screen. This display should not unduly obscure the picture.

4.9.4 Library

DTRs should provide the user with a 'library' feature showing recorded and booked programmes with programme title, dates, times, channel, whether viewed, series record information and any security status information (e.g. reserved, locked, etc). Best practice is to provide a shortcut remote control button to access the library.

When a recording has failed, or only partially recorded, the system should report this to the user via the library.

4.9.5 Additional recorder applications

Clear indications and information should appear regarding services that provide broadcaster 'pushed' events or events pulled by the DTR based on user profiles.

4.9.6 Help Menus

Best practice is for on-screen help information to be context sensitive where possible and display characteristics should follow the recommendations in section 2.6, Electronic User Guides

4.10 Additional Services

4.10.1 Access Control (e.g. Parental Controls)

A provision for the user to delete or hide selected channels is strongly recommended**.** Deleted or hidden channels should not appear in the EPG, channel list. A deleted channel can only be accessed by a full retune of the tuner and access to the retuning feature should be PIN protected. A hidden channel can only be seen and accessed via a PIN.

A provision to lock selected channels is also recommended. If provided this should be PIN protected and easy to unlock. The locked channels can appear in the EPG and channel list.

4.10.2 Subtitles and Audio Description (AD)

When subtitle or AD mode is active it should remain active when channels are changed.

Programmes that carry subtitles and/or AD should be clearly indicated in the EPG and N&N or mini guide displays in a manner that the user can identify them without having to hunt for them: e.g. they can be highlighted directly on the EPG

display or by automatic display of the 'info' data as the user scrolls through the EPG or N&N. The appropriate official icons should be used[2].

Programmes that support AD should be identified additionally by differing audible signals (e.g. beep) when AD mode has been globally selected and deselected and when a current AD event is selected. The different signals used should be easily identifiable by all users.

[2] Artwork for the Audio Description logo is available from the Royal National Institute for the Blind, Media and Culture Department, 105 Judd Street, London, WC1H 9NE, UK.
broadcasting@rnib.org.uk

Part B – Accessibility Guidelines

Part B – Accessibility Guidelines

Introduction

This Part offers guidelines to receiver manufacturers wishing to incorporate accessibility features into their products. The DTG *Receiver Recommendations* publication gives details of the mandatory requirements for accessibility features in receivers.

1 Audio Description Services

1.1 Introduction

The technical requirements for receivers incorporating Audio Description functionality are contained in D Book Chapter 22 and *Receiver Requirements*. This chapter provides guidelines on the recommended behaviour of devices that support AD; for example, how a receiver should behave when certain actions are performed.

It is important for blind and partially sighted people to be able to live independent lives and have access to media and culture to avoid the wider serious issues of social and economic exclusion. It is therefore of great importance that blind and partially sighted people can continue to be able to access AD now and in the future.

This chapter covers the following points:

- Description of AD, how it is used and by whom.
- Technical description of AD and the use of audible alerts.
- Detailed commentary on the functionality required by the user to fully exploit AD including issues that are likely to affect AD in the near future.
- Labelling and packaging.

1.2 Background

1.2.1 What is AD?

Audio Description (AD) is an access service mainly used by blind and partially sighted people. Whilst this group is the largest user group for Audio Description, some people with learning difficulties and cognitive disabilities also find AD useful in order to be able to follow the event better.

AD is an elective service, whereby the user chooses to activate the service or not.

AD provides an additional narrative or commentary that describes in spoken form important visual actions or elements that a blind or partially sighted person would not see, but which are important in order to follow the story. Typically, AD describes characters, scene changes, on screen text and other visual clues not otherwise picked up in the normal event sound. It brings a scene to life to a blind or partially sighted viewer who otherwise would not be able to know what is happening on screen.

As AD is used largely by blind and partially sighted users; implementers must ensure that functions, equipment and service behaviours in support of AD are

designed to be fully accessible and usable by this user group. Specifically, they must ensure that the use of the AD functionality does not rely on the ability to see. Consequently, the interface aspects of AD related functions should use audible as well as visual feedback mechanisms (the visual feedback mechanisms being important for partially sighted people and sighted people who use AD or live in mixed households).

In essence, Audio Description is an additional audio stream. For equipment to support Audio Description, it needs to be able to discover, decode and render this stream.

Historically, Audio Description has been provided using two different delivery methods. The first method is known as receiver-mix, the other as broadcast-mix. With receiver-mix, the AD audio stream contains only the additional commentary. The receiver must then combine this stream with the normal audio stream for play-out. This includes a requirement to adjust the balance between both streams in such a manner that the resulting output is usable. For this purpose, content providers transmit fading instructions so that the relative level of main event sound and AD can be set appropriately and can be varied throughout the event.

The alternative delivery method for AD is broadcast mix. In this case the audio commentary is mixed with the original audio by the broadcaster and delivered as an alternative audio stream. Therefore (in contrast to the receiver-mix scenario) for broadcast-mix the receiver simply needs to play-out the alternative audio stream.

In all scenarios, equipment must maintain tight synchronisation between main event content (video and audio) and AD output. This is achieved by embedded timestamps.

The existence of competing delivery mechanisms has in the past caused some confusion, fragmented the market and at times created interoperability problems. At present, the trend for newer services has been to focus on broadcast-mix. However, existing DVB-T and DVB-T2 receivers in the UK support receiver mix and therefore it is likely that this will remain in use for some time to come.

1.2.2 **Provision of AD**

AD is currently provided for a small but growing percentage of broadcast TV events on both DTT and pay-TV services.

AD can also be provided for on-demand services and interactive applications.

AD is provided for HD as well as SD events. Furthermore, in addition to provision of AD for linear broadcast services, there is increasing support for AD in the context of on-demand, catch-up and IP based television. Whilst the technical implementation of AD may differ between platforms, the user requirement remains the same and hence all access principles described in this chapter apply equally to both SD and HD, as well as to linear and non-linear services.

1.2.3 Implementation issues

Implementers cannot assume that AD users are able to see on-screen notifications, including text messages, pop-up dialogues, etc., and therefore audible feedback (sounds, text to speech or pre-recorded sound files) is essential for users of AD. However, it is recommended that, in addition to the primary (audible) feedback for AD functions, the system complements this by equivalent (and consistent) visual indicators. This helps some partially sighted users, people with cognitive impairments as well as sighted people in the same household.

Implementers should carefully consider the methods available to the user for discovering AD content, controlling the AD function, as well as the provision of appropriate feedback on the current system status and changes in the state of AD.

Access to these functions is commonly via menus. In addition, it is highly recommended that AD can be switched on and off from the remote control and, in the case of button-based remote controls, ideally by using a dedicated (sole purpose) button. The accessibility of the remote control in itself is an important and inherent part of the accessibility of the AD functionality.

With regard to the use of menus or other forms of command and control, implementers should take care to organise AD settings in a logical and consistent manner. This also means that the same method of AD operation should be available to the user irrespective of the source and nature of the content being consumed. For example, when viewing content via embedded Internet players, the AD operation and feedback should be as much as possible the same as for real-time linear broadcast or recorded content.

Implementers should aim to ensure that the level of accessibility to AD is maintained regardless of the location of the content. Interactive services delivered through connected receivers should aim, as a minimum, to achieve the same level of accessibility to AD as non-interactive content does. This might require content providers to provide suitable metadata and tagging where relevant in addition to broadcast indicators, to thus enabling receiving

devices to identify the availability of AD content and present this information appropriately.

As traditional button type remote controls provide a degree of tactile feel important to blind and partially sighted users, the use of gesture-based or touch screen remote controls needs to be carefully considered with regard to AD control.

1.3 Technical Description

1.3.1 Current implementation of AD for linear content

D Book sections 4.5 and 4.6 contain details of the coding and signalling used for audio description services.

Control of the function is described in D Book section 25.2.

1.3.2 AD for non-linear content

In the past, service providers and equipment manufacturers have often overlooked support for AD for non-linear broadcast content. This comprises catch-up content (including via embedded, IP-based licensed catch-up players), video-on-demand content and downloadable content for play-back at a later time.

AD should be supported for all such additional content, and the methods used for navigation and control of AD should be consistent across all interfaces. That is, the method used to switch AD on and off and select any AD settings or preferences should be the same whether the user is viewing linear broadcast or watching on-demand video via an embedded player.

1.3.3 Audible alerts

Audible alerts should be concise, easily distinguishable tones or series of tones that can be readily learnt by the user to identify different items of information or feedback. The alerts can be generated by a hardware wave generator or can be via sound files. If sound files are used then consideration should be given to whether pre-recorded spoken messages are more appropriate than an audible alert.

For example, "AD on" or "AD off" could be notified sufficiently by use of a suitable audible tone which may be less intrusive, easier to remember and more concise than playing back a lengthy sound recording.

Since there are different AD requirements that need to be signalled (and potentially other audio alerts provided by the receiver), the tones used to identify different AD states must be easily differentiated by their audible

features only. For simple tone based alerts, variations in frequency, temporal pattern, and sequence can all be used to create clearly distinct notifications. ISO 24500 gives information on the temporal changes that are useful to help people differentiate between tones. It is important for some people who have difficulty hearing frequency changes that temporal patterns are used to help differentiate sound sequences and not to rely on frequency alone. Where a number of different sounds are used the use of frequency as well as temporal patterns can be helpful.

Receiver equipment should support individual AD alerts for each state and these audible alerts should be complemented (but not substituted) by visual indicators.

An option to enable or disable AD alerts should be provided via a suitable user interface. There should be user options to select different types of audio alerts.

All AD alerts should be easily distinguishable from other audio alerts (for example, an alert to show that the receiver has accepted a remote control command). This can be achieved by a use of differing frequency and rhythm.

1.4 Using AD - detail

For users of AD, key requirements are:

- Be able to easily turn AD on or off.
- Know unambiguously the state of AD (i.e. on or off) when it is changed.
- Know which events have AD available, either with regard to currently playing content or while navigating other available content, including changing channel and moving through the EPG or mini guide.
- Be able to watch content other than linear broadcast using AD.
- Know if there is an error within the AD transmission.

It is important that visually impaired users are supported with regard to the above requirements; this necessitates the use of audio alerts in addition to, or instead of, talking features (text to speech) where the latter are provided.. The information contained in these audio alerts should also be presented visually, in support of people who are partially sighted, sighted family members and also sighted people who use AD themselves. It is also important that this is considered for future developments and new facilities that are provided by future generations of receivers.

1.4.1 AD alerts

Optional Audible alerts are required for the following situations:

- When the user switches AD on
- When the user switches AD off

- When the user moves to an event that has AD
- When there is an error with the AD transmission

In addition, the receiver may allow the use of other audio alerts; for example, to show when the receiver has received a command from the remote control. Such other alerts should be different from AD alerts.

If audible alerts are provided for remote control feedback and AD availability are provided, the alerts can occur in close succession therefore should be discernibly different and distinguishable from each other.

ISO 24500 recommends a short pip for on and a longer peep for off. However, it is suggested that single sounds of differing length are used to signify the reception of a remote control command and the presence of AD and hence a more complex signal should be used to signal AD on or off. In the UK Targeted Help [13] scheme a series of rising tones C, E, G has been suggested to indicate "AD on" and the reverse series of tones (i.e. G, E, C) for "AD off". It is suggested that this convention is followed using different length beeps within these alerts as well to distinguish between the two sounds for those with difficulty hearing pitch.

The ISO standard refers to a series of repeated tones to indicate a weak caution signal. It is suggested that this type of signal, is used to indicate an error in the AD transmission. As it may not be obvious to the user what the repeated tones mean, it would be more useful to accompany this alert with an on screen message and/or playback of a pre-recorded sound clip.

It is suggested that:

- A short "pip" sound is used to signify the reception of a remote control command.
- A slightly longer "peep" sound is used to signify the presence of AD in an event. It is suggested that no alert is played if there is no AD within the event to reduce possible confusion with the number of alerts played.
- A series of short rising tones (C, E, G as "pip", "pip", "pip") is used to signify AD on. As this has 3 tones it is distinguishable from the other short alerts even if the user has difficulty in hearing frequency changes.
- A series of long falling tones (G, E, C as "peep", "peep", "peep") is used to signify AD off - these tones to be longer than the AD on sounds to incorporate temporal as well as frequency indications for the alert.
- A series of repeated tones is used to indicate an error in transmission. A series of, for example, 6 short "pips" could be used.

Alternatively, AD on and AD off sounds can be replaced by pre-recorded spoken messages or output via Text-to-Speech (TTS) functionality where this is supported by the receiver. For example, "Audio description on", "Audio

Description off", etc. Some receivers might provide different levels of verbosity and/or play-out speed of the notifications in support of both novice and advanced users (for example, expert users might prefer "AD on" as this is faster than "Audio description on".

The use of spoken messages also allows more complicated statements to be made for example, "Audio Description on, there is no AD for this event" whereas the use of isolated sounds is limited to the basic on/off statement.

Text to speech can be used to voice the AD setting regardless of whether the TTS itself is on or off. For example, if TTS is off, and the user presses AD on the remote control the TTS can be activated to give the AD status and then deactivated until the AD button is pressed again.

1.4.2 Switching AD on and off

AD can be switched on or off either directly from the remote control (preferred method), via a menu setting or both. If both are provided there should be consistency between the methods used to change settings.

Toggling AD on and off is likely to be a frequent action that, on occasions, needs to be done as fast as possible. Therefore, it is suggested that the remote control contain a dedicated function (for example for a button based remotes this would be a dedicated sole use) to toggle AD on or off and that this and other options related to AD are also accessible via menus.

It should be possible to switch AD on or off either from the menus, directly from the remote control or via both options (recommended).

If both options are used there should be consistency between these methods.

The remote control should have a dedicated button to toggle AD on and off.

If a button on the remote control is used it should be easily identifiable by touch. This can be facilitated by the use of tactile markings (although care should be taken over the number of buttons with tactile markings) and/or by locating the button on the edge of an easily identifiable row.

The AD state (on/off) should be identified by an AD on/off alert. This should be complemented by a visual message on screen.

Where TTS is available on the receiver the AD status should be reported using synthetic speech to give an unambiguous statement e.g. "AD on" or "AD off". Where TTS is available but not switched on by the user, the TTS function can still be used to indicate AD status. The TTS would be switched on to give the audible message when AD is turned on or off by the user but then switched off again so none of the other receiver responses are spoken.

It is recommended that one alert be used to indicate AD ON and a different, easily distinguishable, alert to indicate AD OFF, played when the user changes the state of AD from on to off (and vice versa), either through the menu or direct from the remote control. This is a global setting regardless of the presence or not of AD within the current broadcast.

A visual indication of AD status (i.e. on or off) should be given at the same time as the audio alert and under the same conditions.

When AD is switched on or off (via any means) this status should be constant until changed by the user. The setting should remain persistent across channel changes or after switching the receiver off and on again (via full power off or standby cycles).
In addition, this setting should be maintained when accessing interactive content or content that is accessed on-demand (either via a broadcast or from the local recordings menu).

AD settings should be retained following re-tuning of the receiver, software updating or when an IP network setup is changed. If this is not possible, the user should be informed of what the AD status has been reset to via a visual message on screen before the re-tune/update starts. Where pre-recorded spoken messages or TTS is available then a message stating the whether AD is on or off should be given.

If broadcast mix AD is used, there should be a way for the user to identify and select the AD track without relying on vision.

1.4.3 Finding out the status of AD

If TTS is present it is useful to have a button on the remote control which will tell the user their current location. Whilst watching TV this could also indicate the status of AD. However, if there is no TTS then this is likely not possible. In this case the user must go through the process of switching AD on (via the remote control or menu) until the "AD on" alert is played. For a dedicated button on the remote control this is a simple process requiring a maximum of two or three presses of the same button.

1.4.4 Knowing AD is available for an event

It is important that a user is able to find events with AD. Modern television equipment provides users with various means of obtaining information about available content, such as a brief synopsis or more extensive information such as that provided in electronic event guides and even interactive applications.

Whenever the user brings up such information or is navigating it (as for instance while browsing the EPG or changing channel), an AD alert should be provided to indicate the presence of AD for the content for the currently

selected item. The AD notification should come before other queued notifications so that the user can easily consider only relevant events (i.e. those with AD available).

The AD alert should also be played as appropriate when the user is navigating through any content (including catch-up content via an embedded Internet player, previously downloaded or recorded content). This notification should be given regardless of whether AD is on or off, as typically there can be long periods of time when there is no AD output.

The presence of AD for an event should be identified by an "AD presence" alert: this alert should be distinguishable from the AD on/off alerts.

When the alert is enabled, the alert should be played every time an event that has AD is selected (via the event guides, reminders/recordings list and after channel changes).

The AD descriptor should be read to determine the presence of AD.

The AD presence audible alert should be played as soon as possible after the event has been selected. This allows users who are looking for events with AD to find this information out before attempting to obtain any further information.

The presence of AD should be visually indicated by displaying a symbol or the letters "AD" when the full event information is displayed

Clear visual indication of the presence of AD should be provided when an event is accessed through any of these means. This can be part of the event synopsis or part of the event title if this is displayed in the EPG or event information. This indication can simply be the letters "AD" or by displaying the symbol in section 1.6.

1.4.4.1 **Programme guides**

The user must be notified of events that have AD when navigating through the programme guide (as described in section 1.4.3 above). However, some receivers offer additional facilities within a programme guide that are relevant to AD.

Some receivers offer users the option to set a filter on an EPG or mini guide, for example, to show favourites channels. The option to filter on the AD descriptor so that the guide displays only events that carry AD is highly recommended.

It is suggested that suitable options for a filtered guide where TTS is not available are to display the grid view with either or preferably both of the following:

- blank slots for events without AD
- Suitable colour coding to highlight events with AD.

It is important that if colour coding is used then it is easy to distinguish the colour coded events from the non-colour coded events. In addition, the highlight colour selected must be easy to distinguish from other highlights (e.g. for events that might be set to record or remind) and that the font used for the event information contrasts well with the highlight. A facility to filter the event guide to show only events with AD should be provided with suitable user interface options as above.

Where the AD filter is applied, the view should be changed to a list view where possible. If TTS is available, the user should be given a spoken message to indicate which filter has been selected.

1.4.5 Error recovery

If AD output is interrupted due to errors in the audio stream, or otherwise disrupted, the equipment should be able to recover AD output as soon as the error condition has been resolved.

The user must be notified of the problem via an audio alert. It is suggested that, if AD is on, an error tone is played when the AD transmission is interrupted. The status of AD should remain as set by the user. This error tone should also be played after the "AD on" alert when AD is switched on if there is a fault with AD at that time.

If a user misses this error condition and is expecting to hear AD then it is likely the user will toggle the status of AD. The user will then hear the "AD off" sound, turn AD back on and hear the "AD on" alert followed by the "error" sound.

If sound files or TTS are available instead of hardware generated tones then it is recommended that a pre-recorded statement such as "AD temporarily unavailable" is played instead of an error sound.

An "error" alert shall be played when there is a disruption to the AD service.

If AD is switched on whilst there is an error in AD transmission, the "error" alert should be played after the "AD on" alert.

The receiver should attempt to restore the AD playback as soon as possible.

1.4.6 Watching non-linear content

Users need to be able to hear AD for recorded events, downloaded and catch up content in the same way that they select AD for linear broadcast. The receiver must also be able to playback a recorded AD stream in the same way that it can be selected when the recorded event is viewed. The user should be able to select the presence of AD in the same way as for a linear broadcast. For downloaded or catch up content the user must be able to include the AD stream within the download or playback.

For recorded content there are a number of ways to achieve this. Firstly, and ideally, treat the recording as if it were a linear broadcast. However, if it deemed desirable to maximize storage space on the receiver, users could be offered the option to turn off recording AD streams.

Users could select to either:

- Always record AD data (this should be the default);
- Never record AD data;
- Only record AD data when AD has been set to on, on the receiver.
- Be prompted for whether or not to record AD at the time of issuing the recording request.

It is suggested that

- During play-back, the user should have equivalent control over the AD function as for non-recorded content, including the opportunity to switch AD on and off as required.
- For downloaded or streamed content the user should have the option to select the AD stream (either as a default or on an individual event basis).
- For downloaded and streamed content the AD stream should be stored or accessed in such a way that the user has control over the use of AD whilst watching the event.

1.4.7 Other requirements

It is useful, particularly in households where there is more than one viewer, to have the option to selectively route AD (mixed with the broadcast audio) to various receiver outputs routing the main audio to a different audio output. For example, one person could listen to the event audio via the headphones and another listen to the event audio mixed with AD through the TV speakers.

The user should be able to have easy access to the AD mix level setting.

It should be possible to select, via a menu, to route AD plus event audio to a separate device from the event audio. For example, the event audio stream could be sent to headphones and the mixed AD plus event audio stream to the

TV speakers (or vice versa). This allows people in mixed households to elect to have AD or not depending on personal preferences.

1.4.8 AD and 3D content (informative)

RNIB (UK) has undertaken research to find out whether 3D visual effects should be incorporated into AD.
Blind and partially sighted users expressed the overwhelming opinion that it was not necessary to incorporate the 3D visual effect into AD. Reasons given for this included that they felt the existing AD gave them sufficient information to imagine the scene and that 3D is just a visual effect which does not affect the storyline.

Regardless of type of AD content (such as AD for 3D), the user should be able to access the AD settings in the same consistent manner as AD for other content such as (SD or HD)

1.5 Packaging

Products that support AD should have the Audio Description logo on them. The presence of the logo signifies that the product supports AD in full without the need for any additional equipment.

The logo is as shown and high resolution images are available from the RNIB[3].

[3] Royal National Institute for the Blind, Media and Culture Department, 105 Judd Street, London, WC1H 9NE, UK.
broadcasting@rnib.org.uk

2 Subtitles

2.1 Introduction

It is important for deaf and hard of hearing people to have access to media and culture to avoid social and economic exclusion. It is therefore of paramount importance that deaf and hard of hearing people continue to be able to access subtitles across all delivery platforms and devices now and in the future.

This chapter covers the following points:

- Description of subtitles, how it is used and by whom
- Technical description of subtitles
- Detailed commentary on the functionality required by the user to fully exploit subtitles and issues that may affect subtitling in the near future

The technical requirements for receivers incorporating Subtitle functionality are contained in the D Book Section 5 and ETSI EN 300 743. This chapter provides guidelines on the recommended behaviour of devices that support subtitling; for example, how a receiver should behave when certain actions are performed.

2.2 Background

2.2.1 What is subtitling?

Subtitling (also called Closed Captioning in the United States) is an access service used principally by people with hearing loss. People for whom English is not their native language find subtitling useful and it is also helpful for people with learning difficulties..

Subtitling is an elective service, whereby the user chooses to activate the service.

Subtitles for deaf and hard of hearing are a text-based narrative of speech as well as descriptions of sound effects.

As subtitling is used largely by deaf and hard of hearing people; implementers must ensure that functions, equipment and service behaviours in support of subtitling are designed to be easily accessible and usable by this user group. Interface aspects of subtitle related functions should use visual feedback mechanisms (audible feedback mechanisms should also be provided and are important for mixed households and people with sight loss).

Subtitling can be seen as an additional data stream. For equipment to support subtitling, it needs to be able to discover, decode and render this stream.

2.2.2 Provision of Subtitling

The 2003 Communications Act sets legal requirements for broadcasters, including terrestrial, cable and satellite linear SD and HD channels to provide subtitling. Subtitling is also available on certain catch-up and video-on-demand services, and although these services were not included in the 2003 Communication Act, regulatory provisions may well change in the future to include VOD. Section 386C of the Audio-visual Media Services Regulations 2009 states: 'The appropriate regulatory authority must encourage providers of on-demand programme services to ensure that their services are progressively made more accessible to people with disabilities affecting their sight or hearing or both.' The Association for Television on Demand (ATVOD) has been given this role to 'encourage' access service provision and has published access service provision guidelines.

Whilst technical implementation of subtitling may differ between platforms, the user requirement remains the same and therefore all access principles described in this chapter apply to SD and HD, as well as linear and non-linear services.

2.3 Implementation issues

Subtitles should be relevant, timely, accurate, clearly legible, and positioned to not obscure key regions of interest in the video. Subtitles should be authored to meet these requirements and delivered and rendered as authored.

It is recommended that on-screen notifications are provided to inform the user that subtitles are available prior to the commencement of the programme. A pop-up text message with the word ‘Subtitles’ on the top right-hand side of the screen for at least 5 seconds is the method currently adopted by many linear broadcasters. However, implementers should carefully consider the methods available to the user for discovering subtitle provision, controlling the subtitle function (such as switching the subtitles on and off), as well as provision of the appropriate feedback on the current system status and changes to the state of subtitling.

Access to subtitles is commonly through a dedicated ‘subtitles’ button on the remote control, and/or through a user menu structure.

Any on-screen symbols used to identify subtitle provision should match those used on the remote control.

For user menu structures and/or other forms of command and control, implementers should take care to organise subtitle settings in a logical and consistent manner. This also means that the same method of subtitle operation should be available to the user irrespective of the source and nature of the content being consumed.

Implementers should aim to ensure that the level of accessibility to subtitles is maintained regardless of the location of the content. Interactive services delivered through connected receivers should aim, as a minimum, to achieve the same level of accessibility to subtitles as non-interactive content does. This might require content providers to provide suitable metadata and tagging where relevant in addition to broadcast indicators, thus enabling receiving devices to identify the availability of subtitle content and present this information appropriately.

2.4 Technical Description

Receivers shall ensure that subtitles can be presented to the viewer with the correct subtitle, in the right place and at the right time, as signaled in the delivered service.

2.5 User requirements

For users of Subtitles, key requirements are:

- Subtitles easily turned on and off.
- Status of subtitles (i.e. on and off) should be easily identifiable when changed.
- An indication when subtitles are available for currently playing content or while navigating other available content, including changing channel and moving through EPG or mini guide.
- Be able to watch content other than linear broadcasting using subtitles
- Know when there is a technical fault within the subtitle transmission
- A notification on live broadcasts where subtitles are not available, that if the content is scheduled to be repeated with subtitles (perhaps via VOD) that the scheduled date and time will be given.

It is important that deaf and hard of hearing users are supported with regard to the above requirements.

2.5.1 Current implementation of subtitles for linear content

D Book Section 5 and ETSI EN 300 743 contain the technical requirements for subtitles in the UK DTT system.

2.5.1.1 Subtitles for non-linear content

Service providers and equipment manufacturers often overlook subtitle provision for non-linear broadcast content. This comprises catch-up content

(including via embedded video, IP-based licensed catch-up players), video-on-demand content and downloadable content for play-back at a later time.

Subtitle provision and support for all additional content, and the methods used for control and navigation of subtitles should be consistent across all interfaces. The method used to switch subtitles on and off, select any subtitle settings or preferences should be the same whether the user is viewing linear broadcasts or watching on-demand video via an embedded player.

2.5.2 Visual alerts and prompts

Visual alerts should be concise and easily distinguishable. There should be no significant delay or time lag.

For example, when the user presses the subtitles button to turn on the subtitles, a pop-up on-screen text message should notify the event with 'Subtitles on'. Pressing the subtitles button again to turn off the subtitles would prompt 'Subtitles off'.

2.5.3 Subtitle alerts

Visual feedback is required for the following situations:

- When the user switches subtitles on
- When the user switches subtitles off
- When the user moves to content that has subtitles.

If audible alerts are provided for remote control feedback, that consideration is given for the event to be additionally represented in visual form.

2.5.4 Audible alerts

Status notifications using audible alerts can be a particular problem for people with hearing loss. Consideration should be given for the user to select from a range of frequency and/or waveform characteristics (i.e. pure tone, multi-tone, warble etc.) including the option to select 520 Hz square wave which research suggests is the most effective frequency / waveform characteristic for people with high-frequency hearing loss.

2.5.5 Switching Subtitles on and off

The preferred method for switching subtitles on and off is directly using a dedicated 'subtitles' button on the remote control. The second option is through a user menu structure (which itself is accessible through a remote control). If both methods are provided, there should be consistency between the methods used to change settings.

Toggling subtitles on and off may be a frequent action for some users, and this can only be achieved through a dedicated 'subtitles' button.

The subtitles button should be easily identifiable and fully explained in the receiving equipment user guides and manuals using plain English.

The subtitle button on the remote control should be labelled with 'subtitle' or 'subtitles'; however where space is limited, the abbreviation 'S' is acceptable.

Subtitle status settings should be retained after channel change, viewing streamed media / VOD, switching the receiver on and off and the power supply, re-tuning of the receiver, software updating or when an IP network setup is changed.

2.5.5.1 **Availability of Subtitles for an event**

It is important that a user be able to find content that has subtitles. Modern television equipment provides users with various means of obtaining information about available content, such as a brief synopsis or more extensive information such as that provided in electronic programme guides and interactive applications.

Content that has subtitles listed on electronic programme guides should be visually identified (it is an Ofcom regulatory requirement to use the letter 'S'). The identification should be fully explained in the receiving equipment user guides and manuals in plain English.

When the user selects a service that includes subtitles, this should be indicated in the initial banner.

2.5.5.2 **Programme guides**

The user must be notified of content that have subtitles when navigating through the electronic programme guide.

Some receiving equipment offer additional content search facilities on EPG or mini guides, for example to show favourite channels. The option to provide a subtitle descriptor filter so that the EPG identifies and displays content that is subtitled would be of particular benefit to subtitle users and is highly recommended.

2.5.5.3 **Error recovery**

If subtitle output is interrupted due to errors in the data stream, or otherwise disrupted, the receiving equipment should be able to recover the subtitle output as soon as the error condition has been resolved without any user intervention.

When an interruption occurs, the user should be notified, if possible, of the problem via an on-screen text prompt stating that subtitle transmission has been interrupted. The subtitles status should remain as set by the user.

2.5.5.4 Watching non-linear content

Users need to be able to see subtitles for recorded events (and live broadcasts), downloaded and catch-up content in the same way that they select subtitles for linear content. Where the receiving equipment has a 'record' facility, it must also be able to playback a recorded subtitle stream and the user should be able to select subtitles in the same way as for linear broadcast.

It is recommended that during playback, the user should have equivalent control over the subtitle function as for non-recorded content, including the opportunity to switch subtitles on and off as required. For downloaded or streamed content the user should have the option to select the subtitle stream (either as a default or on an individual event basis) and the subtitle stream should be stored or accessed in such a way that the user has control over the use of subtitles whilst watching the event.

2.5.5.5 Subtitle rendering

Guidance on subtitle creation is available from BBC and Ofcom.

For SD displays, characters should occupy no less than 20 television lines for the capital 'V', including lines at the top and bottom of each character with pixels that are at least 50% illuminated. For HD displays, the corresponding size is 36 television lines.

2.5.6 General

2.5.6.1 Instructions

All aspects of the subtitles function and EPG notification of subtitle availability should be explained in the user guide or operating instructions that accompany the equipment in plain English. Any technical jargon words should be explained in a clear and concise way.

2.6 Further reading

A number of guidelines documents have been issued: the contents of these documents have not been reproduced here as they may be updated by their owners and are subject to copyright. Links have been given, to allow readers to access the documents electronically.

2.6.1 Guidelines Documents

The following documents contain useful information concerning the creation, presentation and timings of subtitles.

BBC Online - Subtitling Editorial Guidelines V1.1

This document outlines the BBC Subtitling's requirements for bbc.co.uk. Download from:
http://www.bbc.co.uk/guidelines/futuremedia/accessibility/subtitling_guides/online_sub_editorial_guidelines_vs1_1.pdf

Contents include: editing; timing; subtitle breaks; synchronisation; line breaks; matching shots; identifying speakers; colours; presentation; intonation and emotion; accents; difficult speech; inaudible speech and silence; hesitation and interruption; cumulatives; humour; children's subtitling; music and songs; sound-effect labels, and numbers

Ofcom's Guidelines on the provision of television access services

In addition to containing links to other useful documents, this Ofcom document includes guidance including: Pre-recorded and live subtitles; Lay-out; Non-speech information; Synchronisation of speech and subtitling; Speed of subtitling and Accuracy. It can be downloaded from:

http://stakeholders.ofcom.org.uk/broadcasting/guidance/other-guidance/tv_access_serv/guidelines/

The referenced documents contain more-detailed information on subtitle preparation and subtitling children's programmes.

2.6.2 Other

Tiresias Screenfont - a typeface for television subtitling

Tiresias Screenfont was designed to have characters that are easy to distinguish from each other on electronic displays. The design was carried out, with specific reference to persons with visual impairments, on the philosophy that good design for visually impaired persons is good design for everybody. Further information from:
http://www.tiresias.org/fonts/screenfont/about_screen.htm

3D Subtitling

The updated Subtitling Systems Specification (EN 300 743 v1.4.1) provides a mechanism that allows subtitles and other on-screen graphics to be best positioned so they can be viewed correctly in the stereoscopic picture. It uses existing DVB subtitling implementations and is backward compatible with 2D streams. Annex C of EN 300 743 v1.4.1includes illustrations of the application of the disparity_shift_update_sequence mechanism for 3D content.

The specification can be downloaded from:

http://pda.etsi.org/exchangefolder/en_300743v010401p.pdf (may require registration)

The reconstruction of the composite image that includes the subtitles needs to be done in the receiver. Using standards for subtitling already available for DVB broadcast systems, in addition to depth information provided by the broadcasters, the receiver should position correctly the captions into the plano-stereoscopic video images.

3 Text to Speech translation

3.1 General Introduction

This chapter is based on the White Paper produced by the DTG Usability Text To Speech Subgroup, "Implementation Guidelines and Recommendations for Text-to-Speech v.1.4". It outlines the minimum requirements to which each TTS enabled product should adhere, thus generating a common method for delivering text to speech. It describes what functions should be supported by TTS-enabled products. For example, it should be possible to speak the Logical Channel/Service Number. Guidelines on how to present receiver information as TTS audio are described.

Guidelines are provided on the behavioural operation of a device that supports TTS functionality. For example, how should a receiver with a TTS implementation behave when certain actions are performed? What type of text should be spoken and when?

The product referred to within this chapter may be one of two types: embedded, where the TTS function is embedded directly into the DTT platform, and external, where TTS is provided from a device external to the DTT platform.

(A separate specification has been produced for Text to Speech functionality on Sky, Sky + and Sky + HD satellite receiver boxes deployed in the U.K. and in the Republic of Ireland which describes the messages available, the interface and the protocol in which they are provided to an external TTS unit. The functionality available largely corresponds to that specified in the "Main Profile" section (3.5.1) of this chapter. The specification is referenced BSKYB-CTEC-EPGTTS-SPEC-09-001.)

3.2 Main features

The requirements cover four areas of TTS functionality:

- Generic TTS requirements that are, applicable to all aspects of the product and its configuration.
- Guidelines for announcement of components, where data remains consistent, unchanged and not updated with external data.
- Guidelines for announcement of components that are updated by an external source (broadcast service information or external media), and therefore subject to change.
- Three levels of TTS profiles: main (minimum requirements), enhanced and full.

3.2.1 Items outside specification scope

The following items are outside the scope of this specification:

- The interface to be used between a receiver (TV, set-top-box) and an external TTS device.
- The protocol to be used for interfacing between a TV/STB and an external TTS unit.

Other groups (such as Digital Europe) are preparing documents in this area.

3.3 Text To Speech Requirements

If a receiver is to implement TTS functionality, it is recommended, as a minimum requirement, that the Main Profile defined in Section 3.5.1 should be followed.

3.3.1 Generic requirements

This section sets out the general requirements for generating the audio information spoken by the TTS engine or device (herein referred to as 'audio information'). Guidelines for applying these requirements in specific applications are provided in Section 3.4 of this chapter.

All relevant information on the screen, as soon as it is displayed, should be accessible to the user as audio information. Relevant information includes any text and icons that are providing useful information to the user. The following are excluded from this requirement:

- Anything embedded in the broadcast video (e.g. news ticker).
- Subtitles.
- Any output from an interactive service such as MHEG.
- Text or graphics that are included for cosmetic reasons only (e.g. company logo).
- Update to the display of the current time and date.
- Conditional Access information.

Audio information should be ordered to present the most important items first (see guidelines in section 3.4). Important information should be presented as soon as it is displayed; other information (e.g. navigation information) may be presented only upon request.

Audio information (as described above) or feedback (e.g. a key click sound) should be provided after the user has invoked a function (via front panel or

remote control). This should be within a maximum of three seconds. This is not essential when the result of the action is to put the receiver into a non-active state (e.g. going into standby or power off state). However, this is essential when entering an active state (e.g. coming out of standby or power on state).

Audio information should be announced in the same way in response to the user invoking a function via a front panel control or from a remote control device.

The user should be provided with audio information so that they always know where they are within the receiver UI. For example, the title of a menu screen should be announced following a transition to a new screen.

It should be possible to cancel the presentation of the audio information currently playing with a user action, for example through a dedicated 'shut up' function.

If new information is displayed that takes priority over any currently playing audio information, the presentation of the currently playing information should be cancelled to allow the presentation of the new audio information. For example, this could be in response to a user action like moving through the EPG or changing service.

Notwithstanding the above requirements, receivers are allowed to block the cancellation of some audio information, e.g. warnings about the result of invoking a factory reset feature.

It should be possible to repeat the currently playing, or previously played (if none currently playing) audio information. There should be a dedicated 'repeat' button to do this, which may also add additional audio information, e.g. navigation information for the current screen as referred to in requirement 0 above. If the audio information has changed since the last presentation (e.g. time display), the new audio information should be presented rather than a simple repeat of the previous information.

There should be an easily-accessible way to turn Text to Speech on and off, preferably through a dedicated function.

A description of those functions which are essential for the user to interact with the user interface within the current context (but not necessarily displayed on screen) should be included in the audio information. It is acceptable that this information is included in the "additional information" as referred to in item 8 above.

When a progress bar or a changing numeric indicator (e.g. percent complete) or similar is displayed, it is not required to provide audio

information every time the screen is updated. However, its condition should be accessible in line with item 0 above. If the UI design is such that the user is waiting for something to complete and the completeness is indicated by this bar or indicator, audio information on the status should be provided regularly.

For any delay in receiver operation of ten seconds or more for which there is no onscreen notification, some form of audio feedback should be provided, e.g. beeps or TTS audio information (if available).

An audio indication should be provided when an MHEG/interactive application is started or stopped, except if it is stopped due to a service change.

The language of the audio information should by default be the same as that set by the user for the receiver UI, except for any text that has a different language provided with it. If the TTS engine does not support the signalled language, it should not attempt to pronounce the text, and should indicate via audio information that the signalled language is not supported.

Receivers may provide audio information that is not a literal reading of the visual information on the display, as long as the equivalent meaning is conveyed to the user.

When the user mutes the audio, no further audio information should be presented, except for feedback from invoking the mute function. Audio beeps (e.g. from remote) will continue to be audible after this action.

All static words (as opposed to dynamic content) should be pronounced correctly.

3.3.2 Configuration of TTS Engine

The user should be able to change the amount of audio information (e.g. amount of help given within prompts). It should be possible to at least set two levels of verbosity, one for beginners and one for expert users.

The user should be able to adjust the volume of the audio information, and the TTS engine should announce the change at the new volume level.

The user should be able to adjust the speed and, where applicable, other characteristics of the audio information such as pitch and TTS voice type.

3.4 Text to Speech Guidelines (informative)

This section provides guidelines for applying the rules in the previous section to specific scenarios.

There is no requirement to provide audio information for anything that is not visible on the display, except when explicitly required by section 3.4.1, below.

3.4.1 **Generic Guidelines**

Where a screen title will aid the understanding of the user, that title should be spoken, even if not visible on the screen.

All audio information for screen options should be unambiguous and make sense on its own.

For empty screens or lists (e.g., Favourites lists with no favourites, media with no files), suitable audio information will be provided, even if not visually presented.

Where a pop-up notification is presented on-screen, an unambiguous announcement should be made to let the user know that a pop-up has been presented, before announcing the contents of the pop-up.

For complex screens containing large amounts of information (e.g. diagnostics) there should be a way for the user to access the information in manageable sections.

Abbreviated words should be spoken in full by the TTS engine.

All numbers should be spoken in a manner suited to the context, e.g. as natural numbers, ordinals or digit-by-digit.

Location-based content should be fully understandable in the context of other items on the screen. In this event these other items should be output as TTS data. For example, in a grid based EPG the highlighter and its (x,y) position within the grid also represents information. Therefore, the contents of the x-axis and y-axis at the position of the highlighter should also be output, such as date/time & LCN.

3.4.2 **UI-specific Guidelines**

Note: for items 3.4.2.2 and 3.4.2.3, below, the following information should (where available) be provided to the user. The order given below is suggested for guidance; however, recording and reminder notifications could be placed before the event title if desired. Additionally, as an alternative, the event synopsis, parental rating and guidance information may be accessed via an information function on the remote control rather than being part of the EPG string.

3.4.2.1 **Menus**

When entering a menu, the menu name should be spoken

When initially displaying a menu-style screen, the total number of menu entries and the currently highlighted entry should be spoken.

All menu entries should be numbered and this number spoken with the menu entry. This does not imply that the number is visible. The menu entry should be selectable with the numeric buttons, if fitted, on the remote control.

Possible options against a menu entry should follow requirements 1 and 2 above.

3.4.2.2 **Electronic Program Guides**

When **opening** the EPG or changing view (for example, changing between list view and grid view), the receiver should state the following information:

- Screen information e.g. screen title, screen type (list versus grid view).
- The Audio Description alert, if applicable.
- Logical channel/service number.
- Service name.
- Event title.
- Start time, including the date if not the same as the current date. The name of the day (e.g. Wednesday) or context-dependent references (e.g. tomorrow) are acceptable if they are unambiguous.
- End time or duration.
- Audio description, if applicable.
- Subtitles, if applicable.
- Recording and reminder notifications (set to record/recording/recorded) if applicable.
- Event synopsis.
- Parental control lock status if set.
- Parental rating, if available.
- Guidance information.

Note: It is not required to announce whether a service is encrypted or free-to-air.

When **moving to a new service** in the EPG, the receiver will state the following information:

- The Audio Description alert, if applicable
- Logical channel/service number.
- Service name.
- Event title.

- Start time, including the date if not the same as the date of the previous event. The name of the day (e.g. Wednesday) or context dependent references (e.g. tomorrow) are acceptable if they are unambiguous.
- End time or duration.
- Audio description, if applicable.
- Subtitles, if applicable.
- Recording and reminder notifications (set to record/recording/recorded) if applicable.
- Event synopsis.
- Parental control lock status if set.
- Parental rating, if available.
- Guidance information.

When **moving within a service** in the EPG, the receiver should state the following information:

- The Audio Description alert, if applicable
- Event title
- Start time, including the date if not the same as the date of the previous event. The name of the day (e.g. Wednesday) or context dependent references (e.g. tomorrow) are acceptable if they are unambiguous
- End time or duration of the event
- Logical channel/service number
- Service name
- Audio description, if applicable
- Subtitles, if applicable
- Recording, reminder notification (e.g. set to record/recording/recorded) if applicable
- Event Synopsis
- Parental control lock status if set.
- Guidance information.

If the user cannot move further within the service or no further event information is available while browsing the EPG, they should be informed by the TTS engine.

3.4.2.3 **Changing Service and Information Banners**

When changing to a new service or returning to a service from the menu or other screens, the receiver should state the following information:

- Audio description alert, if applicable
- Logical channel/service number, if displayed
- Service name
- Event title, if displayed

- Event start time, if displayed
- Event end time or duration, if displayed
- Event synopsis, if displayed.

3.4.2.4 **Making and Accessing Recordings**

When making recordings from the EPG or TV, the receiver should state the following information:

- Event title of the event to be recorded.
- When accessing scheduled recordings, the receiver should state the following information:
- Audio description alert if applicable
- Event title
- Logical channel/service number
- Service name
- Recording start time
- Recording end time
- Date or Day. This may be in the form of a date such as "DD/MM" or "today, tomorrow, DD/MM" or "Wednesday 3rd November".

The order of the items above can be specified by the manufacturer. It is strongly recommended that the event title is given first after the AD alert.

When accessing recorded events, the receiver should state the following information:

- Audio description alert, if applicable
- Event title
- Recording status / date recorded e.g. "currently recording" or date shown as e.g. "DD/MM/YYYY" or "1st November 2009".
- Duration of recording
- Logical Channel/Service Number
- Service Name
- Recording protected, if applicable
- Recording locked, if recorded on a locked channel

It is recommended that the above order be followed. However, the order can be as specified by the manufacturer, with the strong recommendation that the event title is given first after the AD alert.

3.4.2.5 **Setting-up external TTS device**

When initially switched on, an external TTS device will have audio information enabled as a default and provide the user with the ability to set voice options (e.g. language, speed, volume etc.). If a menu system is used, TTS for this menu should follow the guidelines in section 3.4.2.1 above. If

other means (e.g. remote control) are used, the user must be informed of how to proceed.

For an external TTS product it should be possible for the TTS to be toggled on or off, via the supplied remote control or controls on the device.

3.4.2.6 Setting-up receiver

A receiver with an embedded TTS system will have audio information on as a default when setting up the system. It is recommended that either an option on the front page of the set-up or instructions are provided to the user to switch off the TTS for set up.

Since the receiver setting up is manufacturer specific, the following are general guidelines to providing audio information.

During set-up, the receiver will state the following information:

- The information contained on the screen.
- Any necessary instructions on how to proceed. For example, if the navigation areas tells the user how to move to the next screen or how to change an option, then this information needs to be provided as audio information at the appropriate point.
- If menus are used, the guidelines for speaking menus must be adhered to.
- Where the set-up includes an action that will take some time (e.g. tuning), audio information should provide feedback at regular (e.g. 10 seconds) intervals stating that the action is on-going and, ideally, giving a status update (e.g. 80% complete).

On completion of or during set up of a receiver with an embedded TTS system the user should be informed of how to put the TTS back on if it has been switched off for set up.

3.5 TTS Profiles

It is expected that manufacturers may wish to differentiate their products by providing varying levels of support for TTS. Profiles are the same for either embedded or external TTS devices.

The three profiles are defined below.

3.5.1 Main Profile

3.5.1.1 Viewing and changing services

The user should be:

- informed of what event is on now and should be informed of what event is on next (where available) . This should include LCN, service name, event title, start and end time or duration;

- able to access the synopsis of the current event title and should be able to access the synopsis of the next event title;
- informed of the number button that they have pressed (on changing service);
- informed of the service that they are viewing;
- informed of the service that they have changed to. This should include LCN, service name, event title, start and end time;
- The user should be informed whether an event title has subtitles and/or AD is available (AD only has to be announced if there is not audible notification – e.g. beep).
- able to navigate the service list (where available);
- informed if a service that has been tuned to is not available due to PIN control, tuning issues or pop-up messages;
- able to navigate the EPG, if such data is present in the broadcast, to identify which future events are available to them, start and end times, and audio description and subtitle availability;

The user should be informed whether an event title has subtitles and/or AD is available (AD only has to be announced if there is not audible notification - alert).

3.5.1.2 **Menus**

The user should be informed of any warnings and notifications, such as re-tuning or PIN control.

The user should be able to navigate the menus i.e. the following should be available as audio information: entering a menu, exiting a menu, moving between and selecting items and change a setting in the menu, as appropriate.

The user should be informed of a change of setting.

3.5.1.3 **DTR**

For receivers, that support DTR functionality the following buttons should be announced when pressed: Pause, Playback, Rewind, Fast Forward, Stop and Record.

3.5.1.4 **Additional**

The user should be informed of the current status when the AD, subtitles, TTS and mute functions are invoked via the remote control (subject to availability). In addition, the user should be:

- able to find out the current time where available;
- informed when the receiver has been switched to standby;
- informed of what service is on now when the receiver leaves standby. This should include service name and event title;
- informed of action in progress;
- able to alter the volume of the TTS;

- informed if the TTS audio information is not available when the user enters a function or feature for which TTS audio information is not supported.

The TTS should be off as a factory default but should be temporarily on for set-up and factory reset.

3.5.2 Enhanced Profile

Features to include: those covered in the Main profile.

3.5.2.1 Viewing and changing services

The user should be informed of what event is on now and next (where available). This should include LCN, service name, event title, start and end time or duration. In addition, the user should be::

- able to access the synopsis of the current and next event titles.
- able to find information on specific event titles in the EPG.
- informed of an event start time.
- informed whether an event title has subtitles and/or AD are available (AD only has to be announced if there is not an audible notification).
- able to access the synopsis for all event titles.
- informed of any filters that have been applied to the EPG, e.g. TV/radio.
- informed of a service lock or pay-TV service when in the EPG or service list (if available).

3.5.2.2 Menus

The user should be informed of the number of items available within menus

3.5.2.3 Additional

- The user should be able to access any recorded events.
- The TTS should be off as a factory default but should be on for set-up and factory reset.
- The user should be able to alter the speed of the TTS
- The user should be able to alter the level of verbosity of the TTS
- The user should be able to alter the pitch of the TTS
- The user should be able to alter the TTS voice type

3.5.3 Full Profile

Features to include those covered in the Enhanced profile.

3.5.3.1 Viewing and changing services

The user should be able to access interactive services such as MHEG.

3.5.3.2 Additional

The user should be able to alter the pitch of the TTS

The user should be able to alter the TTS voice type

3.5.4 **Features currently outside of profiles**

Anything beyond scope of profiling, e.g. IP network setup options, on demand and IP TV. This may change in the future.

Part C – Connected TV Implementation Guidelines

1 Connected TV Accessibility Areas

This Part considers the specific user experience requirements for services and content delivered across the broadband network and the user requirements for product behaviour where content is being delivered from both broadcast and IP services.

Many of the recommendations in Parts A and B apply also to connected TV receivers. The D-Book gives details of the mandatory requirements for accessibility features in receivers.

Note: Part C discusses the accessibility and usability aspects of receivers for Connected TV, where the primary function is television. The accessibility of companion devices themselves falls outside the scope of this document. Similarly, the accessibility of apps is currently outside the scope of this document.

1.1 Introduction

The advent of Connected TV (CTV), bringing together traditional television services with Internet based content, has brought many new benefits to viewers. As a proposition, it offers more content, more choice over viewing opportunities and more interactivity. It also connects the television receiver to previously separate devices and services.

As with all new technologies, this new functionality and the added features of Connected TV nevertheless create accessibility and general usability challenges whilst offering opportunities for improved accessibility beyond what can be achieved with traditional services. This Part C highlights the main concerns and provides suggestions for how they can be addressed. It also identifies opportunities to harness Connected TV as a means to bring innovation to accessibility-related features and content.

1.2 Areas of concern specific to Connected TV

1.2.1 Complexity

Connected TV products provide new content and additional functions compared to broadcast services. Consumers often experience products as more complex than traditional receivers. While the concept of Connected TV is generally understood to be that of a "better" TV (i.e. with more content and more flexibility in terms of how and when to watch it), many users complain that Connected TV products are frequently too complex and feel more like a PC than a TV. Many disabled and older people furthermore face specific accessibility barriers, described in more detail below. The problems

of accessibility as faced by disabled people in Connected TV products are compounded by general complexity barriers.

1.2.2 Initial setup

Because of the need to connect Connected TV receivers to the Internet in addition to a broadcast signal, users are often faced with tasks and terminology that they do not understand or with which they are not familiar, or which are not designed for accessibility. In addition, devices often require additional accounts to be set up for specific on-demand services. Chapter 2 provides recommendations for improved accessibility of the initial setup process.

1.2.3 Finding and playing content

In Connected TV products, users often need to navigate to "different" parts of the system in order to find and play content, or have to activate different media player applications to get to content. Interaction should be simpler, more consistent and effortless – especially the journey between live broadcast and on-demand services. The differences between access services provision for broadcast content versus IP delivered content further contribute to the accessibility problem. This does not just pertain to the differences in provision of access services, but also to the often differing methods for activation and control depending on whether or not the content viewed is broadcast or IP-delivered in nature.

The facilities for browsing, finding and selecting content often look and feel very different when comparing linear with on-demand content.

Chapter 3 provides recommendations for improved accessibility with regard to finding and playing content.

1.2.4 User Interface and remote controls

Users often experience what they perceive to be inconsistencies in menus and other controls, usually because of inherent architectural or semantic differences between broadcast and IP-delivered content. For example, they find that pressing subtitle or audio description buttons while watching on-demand content may not have the expected result compared to watching linear content.

Specific accessibility features of the User Interface are sometimes not consistently available and supported for both broadcast and IP-delivered content. Text entry methods (for search terms, URLs…) are often inaccessible, in part or entirely, to disabled users. Chapter 4 discusses issues related to User Interfaces and remote controls.

1.2.5 Media Players and other applications

Embedded media players and other on-device applications often lack the accessibility functions common to other platforms (such as desktops) while Connected TV application developers are frequently unaware of the requirements for accessibility in support of older and disabled users. Applications on companion devices face similar issues and frequently don't even take advantage of native accessibility-related capabilities of the host platform (such as iOS or Android).

Embedded media players frequently do not support some or all of the user interface accessibility features of the broadcast parts of the product and propagation of remote control buttons for subtitling and audio description into these media players is often unsupported.

1.3 Accessibility statement

Where a product has been specifically designed for given user groups (for example a product has many of the features related to visually-impaired people as covered in this document), it may be useful to include a statement declaring this and listing the specific features and behaviours intended to support this user group. This could be of particular value to those purchasing receivers online without the benefit of demonstration or advice from sales staff.

Where present, the accessibility statement should be included at the start of the user guide.

2 Initial setup

The recommendations for non-CTV receivers (See Part A - Chapter 3: Installation and Tuning) apply to Connected TV devices as well. However, a CTV product also needs to be connected to a home IP network for access to Internet-based services and applications. Furthermore, many CTV receivers provide access to on-demand and other services that require configuration of account details (typically username and password or PIN) before they can be used.

Some aspects of product setup typically only occur once or twice during a product's usage. Some manufacturers or retailers may therefore **consider offering assisted setup to customers** as an alternative to self-install. This could be in the form of face to face help or remote assistance over a network connection. In the case of remote assistance, it should however be noted that the remote assistance strategy still requires the customer to install the product to such an extent that it can establish a successful remote assistance connection.

Many aspects of setup are relevant even after first usage: for instance retuning, changing authentication credentials and pairing with companion devices. Consequently, these aspects must still be designed to be as accessible as possible.

2.1 Avoid Jargon

Jargon should be avoided when explaining to end users how to set up the home networking connection and configure their accounts. Many end users will not understand terms and abbreviations like "DHCP", "IP Address" etc.

Describing actions on screen and in any documentation in plain language so that non-technical audiences can understand them is, therefore, important.

2.2 Text Entry

Unlike the operation of non-CTV receivers, users of CTV receivers will need to enter text at several times, during the initial set-up and connection to a home network and in normal use to enter passwords or PINs or when interacting with applications.

Entering passwords or PINs should be simple.

Many CTV receivers require text input via the remote control or via on-screen keyboards, or various combinations of these methods. The usability

of such methods is low and can provide a significant accessibility barrier to the visually impaired and users with physical disabilities (that require adapted keyboards or single switch input methods) as well as users with cognitive disabilities.

Some users with physical disabilities will also be unable to use standard text entry methods.

Provide feedback. The set-up process can be assisted for visually-impaired people and some users with cognitive disabilities if there is clear and unambiguous feedback on the exact stage of the process and an accessible means of entering the required information. Devices that support TTS (see Part B - Chapter 3: Text to speech translation) will offer a greatly improved experience for such users, provided the initial setup process is fully covered by the TTS interface. Where feedback would be provided solely in audible form, this would be inaccessible to deaf people and many hard of hearing users.

Support plug-and-play connection of devices. A major difficulty in configuring account details such as usernames and passwords (or when entering information like WPA keys for home networking configuration where WPS is not available or not in use), is where keyboard input is required. By supporting zero-configuration attachment of HCI-compliant external USB keyboards, receivers can greatly improve the accessibility of the initial setup (see Part C chapter 4).

The recommendations in chapter 4 on Text Entry should be supported in full at the initial setup stage, in particular for entry of passwords and PINs.

2.2.1 Verification of credentials

Allow repeated attempts to set up accounts.

The user should be able to test individual accounts as they are entered into the system where this does not happen automatically once the user has entered details. If the test fails (typically because the details entered are incorrect), the user should be offered the choice of retrying immediately, trying again later (this may require providing guidance on how to return to this step) or proceeding with the rest of the setup process.

2.3 Connection to the home network

2.3.1 Wired connections

Use DHCP as default.

Receivers that are connected to a home network by means of a wired connection should by default use DHCP[4] (as specified in D-Book part B, section 4) for their configuration and attempt to establish a connection as soon as the electrical connection with a network is established.

2.3.2 Wireless connections

Support WPS

For wireless connections, receivers should support WPS (Wi-Fi Protected Setup) as this makes connection to a secure home network much easier for the user, especially when providing the user with a simple step by step instruction.

The advised sequence is to press the WPS button on the router last (receiver first) to avoid the (small) risk of concurrent WPS activation by neighbouring devices.

2.3.3 Verification of WAN connectivity

Test and confirm access to external site.

Once configured for IP access, a receiver should try a connection to a relevant remote server and inform the user of success or failure, since even if connection to a local network is successful, this does not guarantee external connectivity is available. (WAN: Wide Area Network)

2.4 Pairing with companion devices

Support automatic discovery of connected devices.

Many Connected TV products can be used with companion devices (secondary devices such as smartphones and tablets).

In some cases, companion devices provide an additional input method for text entry which might benefit from the accessibility features of the secondary device's Operating System. However, this obviously relies on the

[4] **DHCP** (Dynamic Host Control Protocol) allows a computer to join an IP-based network without having a pre-configured IP address.

ability to successfully connect the companion device to the receiver, which in turn requires that process to be fully accessible.

Assuming that the secondary device is already connected to the home network, receivers may be set up to accept connection requests from devices on the same local network automatically (advanced users should be offered the possibility of switching this ability off where security concerns apply).

As an example of current best practice, some products provide pairing whereby an autodiscovery process identifies the new device (discovered on the local LAN or via Bluetooth for example) and the user only needs to ensure both devices show the same, one-off numerical code (this must be read out to blind users). If the user confirms the codes are correct, the pairing is completed and the devices considered authorised.

In addition to text entry, companion devices may provide further alternative methods for operating the product that can be useful to specific user groups. This may include access to the EPG, a spoken interface on the companion device, a simplified user interface, etc.

3 Finding and playing content

3.1 Consistency

Use a single content guide for all available content

While Connected TV solutions offer much more choice and flexibility to viewers, both in terms of what content they want to consume and where and when to consume it, finding, navigating and controlling the different types of content is a fragmented, often inconsistent and frequently confusing experience. Instead of having a single, unified content guide where people can browse, search and select all available content in a consistent manner, consumers have to switch between different "parts" of the receiver depending on what type of content they want to view and when they want to view it.

Furthermore, it is common for (certain) features in support of accessibility not to be consistently available across all content guides, delivery and play-out technologies.

For instance, a user wanting to watch a certain television channel as currently broadcast would use a part of the user interface associated with linear broadcasting functions, typically an EPG, whereas to view a past programme, the user needs to switch to an embedded media player that comes with its own menus, guides and navigation.

3.1.1 Uniform content browsing

Use a single interface style for EPGs for broadcast and IP-delivered content

Use the same terminology and controls for searching, filtering and marking as "favourite" across all different types of content.

As stated above, many current Connected TV implementations do not provide a unified model for finding, navigating and controlling different types of content (broadcast versus catch-up and on-demand) but require users to switch to different menus, guides or media players depending on what they want to watch and whether or not this is past, current or future scheduled content. Whilst this enables content providers to create their own individual "look and feel" for the Connected TV programme guide it can be confusing for the viewer unless the guides include the essential features for accessibility.

Therefore, implementers are encouraged to develop interfaces that bring together broadcast and IP-delivered content in a single, consistent presentation. This could take the form of a single unified browser for content (instead of different programme/content guides and lists), irrespective of whether or not content is delivered via broadcast or over IP.

Receivers should also support all User Interface accessibility features of the solution (such as screen magnifiers, selectable themes, audio beeps and/or text-to-speech…) while browsing and searching content from all available sources.

Show the availability of access services for the current programme, for content in content/programme guides and when changing the content, including when switching between broadcast- and IP-delivered content.

3.1.2 Reverse EPG

Connected TV receivers should as a minimum support the reverse EPG facility as defined in D-Book 7.

3.1.3 Searching and filtering

Receivers should provide a simple search that operates across services.

It should be possible to search for content based on availability of access services for this content. For example, a visually-impaired user might want to search only for content that is audio described.

The ability to present only content for which a given access service is available should also be available when filtering channels or programmes, for instance within the EPG.

4 User Interface and Remote Control

4.1 Text Entry

More than other television products, Connected TV receivers frequently ask for textual input from users. Examples are: entering (a) search or filter term(s) in Programme Guides or elsewhere, entering authorisation codes or PINs when accessing certain content or entering URLs. As already indicated in chapter 2, the initial setup also frequently requires text entry.

4.1.1 Inaccessibility of default text entry methods

Support alternative text entry methods

Many products rely on the use of the numerical keypad on the remote control, virtual keyboards or a combination of both. Many of these text entry methods are cumbersome compared to full-sized, physical keyboards and many users find using them unsatisfactory.

In addition, however, these text entry methods create fundamental problems for several categories of disabled and older people. Generally, accessibility of these text entry methods is low or non-existent for visually-impaired. Some categories of people with physical disabilities or cognitive disabilities will also be unable to use such text entry methods.

Note that for certain users, text entry is also dependent on the feedback mechanism (which is normally visual). For instance, many blind and partially sighted people will not be able to use the normal visual feedback channel for text entered.

4.1.2 Support for HID compliant external keyboards

Support USB-HID devices[5]

Equipment that allows Human Interface Device (HID) compliant external keyboards to be connected via a USB port will significantly improve the problem of text entry accessibility, as this would allow not just a range of standard wired and wireless keyboards to be used with the Connected TV

[5] For details see "USB Device Class Definition for Human Interface Devices, Version 1.11" (www.usb.org)

solution, but would also allow specialised keyboards for certain groups of disabled people to be connected to the system.

Some manufacturers provide text entry via companion devices. This can represent an improvement over remote control or on-screen keyboards in terms of usability and accessibility, but it is not fully equivalent to allowing HID compliant USB keyboards to be connected as described above. Firstly, the accessibility of the companion screen itself then comes into play and secondly accessibility of the discovery and pairing process required to connect the companion device to the CTV receiver then becomes another factor (see also the section on Initial setup above).

Other alternative input assistive technologies such as single switch controls might also be used with HID compliant USB support.

4.1.3 Text input via companion devices

USB keyboards preferred to tablets and mobile phones for text entry

Many non-disabled users also favour external input devices. Some manufacturers offer virtual keyboard replacements on secondary devices such as mobile phones or tablets. These can improve the accessibility for entering on screen information, but are not a fully equivalent alternative to external USB keyboards as they cannot replace special assistive technology keyboards: they do not offer the physical properties (in terms of key travel, repeat, layout, shape and separation and tactile feedback provided by specialised keyboards) or the degree of customisation required by some end users.

Note: The accessibility of companion devices themselves falls outside the scope of this document. Similarly, the accessibility of apps is outside the scope of this document.

4.1.4 Spoken input

Some solutions allow for spoken input (using automatic speech recognition, ASR) as an alternative to text input. This can improve the accessibility of text entry for some categories of disabled people, but this is not a solution that will work for all users and should therefore not be seen as the sole alternative to standard input methods.

As an alternative (or in addition) to spoken input facilities on the receiver, companion devices may also be used as the spoken input provider.

4.1.5 Text-to-speech assisted input

Some users, in particular blind and partially-sighted users, may benefit from text entry using the numeric keys on the remote control assisted by the text-to-speech engine. As characters are entered, the text-to-speech engine provides spoken feedback on the text entered.

See Part B, Chapter 3: "Text to Speech translation" for more information about the text-to-speech function.

4.2 Supporting User Interface convenience features

Increase accessibility through support for convenience features

Increasingly, receivers support specific accessibility features in their User Interface, such as screen magnifiers, high-visibility colour schemes, audio feedback and/or text-to-speech, etc.

Receivers should support these features as consistently as possible across all parts of the product (including when navigating IP-delivered content).

4.3 Access Services

Support for subtitling and audio description for broadcast content is specified in the D-Book, which also covers their delivery as part of IP based services. The availability of access services for IP based content is at present low, but rising steadily and an industry forum organised by ATVOD[6] is expected to further contribute to an increase in support for access services across more and more platforms.

4.3.1 User controls for access services

At present, control over access services (for example switching them on or off) is frequently done in a very different way when using IP-delivered content compared to broadcast content.

Control of access service should be independent of source

Receivers should allow end users to change the on/off setting for each access service while viewing or playing content, irrespective of whether or not this is IP or broadcast content.

Availability of access services should be displayed for all services

[6] ATVOD is the Association of Television on Demand Operators with authority delegated from Ofcom for regulating UK video on demand services

Receivers should inform the user of the availability of access services (and any changes therein) for the programme they are currently viewing, for content in content/programme guides and when changing the content, including when switching between broadcast and IP-delivered content.

Maintain selection of access services

Receivers should also maintain the choice of enabled/disabled access services across channel changes/content changes and across power on/standby cycles and apply this to both broadcast and IP-delivered services.

4.3.1.1 Remote controls

The provisions of Part A - Chapter 1 apply in full to Connected TV receivers.

When watching a broadcast, viewers normally press a subtitle or audio description button on the remote control for turning the access service in question on or off. However, the same button frequently does not do anything at all when viewing IP based content.

Receivers should provide a mechanism for signalling the access service key button presses to any embedded media players. The objective should be that dedicated access services buttons on the remote control work for all types of content supported by the receiver in the same manner.

4.3.2 Role of content providers

Access services in Content should be consistent regardless of delivery method

Where a broadcast programme is available with access services, users can reasonably be assumed to expect the same access services to be present when accessing the programme over IP through some form of on-demand service. Broadcasters and other content providers should ensure this is indeed the case[7].

Secondly, content providers should make sure that any metadata and other information (such as in Electronic Programme Guides) is correct with regard to the availability of access services. In other words, if an access service is available, it should be signalled accordingly (both in relevant metadata as

[7] See www.atvod.co.uk/uploads/files/ATVOD_WGAS_Report_2014.pdf for recommendations from ATVoD on subtitle exchange between content providers.

well as in textual descriptions, EPGs, etc) and vice-versa. At present, the processes of transposing broadcast content for IP delivery often do not consistently address the signalling of access services and so users can face the situation where a programme previously available as broadcast with audio description or subtitling is still signalled as having subtitling and audio description available when browsing the directory for IP content (including via a reverse EPG) even though the access services in question are no longer available.

4.3.3 Recording/downloading

Recordings should include access service components when present

When recording content, be it from broadcast or IP sources, or when downloading IP content, receivers should by default record any related access services so that the user can select at the time of playout which access services to activate for that content.

Receivers may allow the user to switch off recording/downloading of access service resources either as a general setting or on a per recording/download basis. This should apply consistently to both broadcast and IP-delivered content.

5 Media players and interactive applications

Connected TV solutions include media players from broadcasters and third party content providers and might also include other interactive applications that run in a sandboxed operating environment in the receiver. Unfortunately, these applications tend to be generally very inaccessible.

It does not need to be the case that interactive applications are as inaccessible as they are today. There is scope to improve matters by ensuring more consistent interfaces (or at least the mechanisms by which application developers can achieve this), and allowing external assistive technologies to be used with interactive applications.

5.1 Interaction between receiver and applications/media players

As already indicated in Part C chapter 4, media players and interactive applications often do not respond to remote control keys for such things as switching on/off of access services or other accessibility functions like a magnifier.

Make key commands available to applications/media players

Receivers should provide the functionality to propagate key commands, settings and controls into the application/media player sandbox (such as remote control key presses), in particular for access service and accessibility features so that embedded media players and interactive applications can take advantage of these features.

5.2 Support for HID compliant external keyboards

Receiver support for HID compliant external keyboards as set out in Chapter 4 should be available to interactive applications and media players.

5.3 HTML5 features

5.3.1 Support for navigable sub DOM for HTML5 canvas elements

The D-Book Part B specification for Connected TV specifies the HTML5 Canvas element. Receivers should support a navigable sub DOM for the content inside the canvas element (for an example see the Firefox 13 and above implementation[8]).

This will allow navigation of the interactive elements. Where a receiver supports TTS, it is recommended that focus changes and other navigation steps inside the interactive content also result in appropriate spoken output. Application developers can map interactive regions to elements receiving focus in the fallback content.

Implementers should examine the best means of supporting existing assistive technologies.

5.3.2 Alternative content

Use alternative content in HTML5 elements to increase accessibility

The D-Book Part B specification mandates support for the <source>, <audio> and <video> HTML5 elements. Implementations should support alternative content in these elements (for example, an audio element might include a text transcript of the spoken content while track elements can provide subtitling or audio description for the content).

Application developers are encouraged to take advantage of these facilities to make audio and video content fully accessible.

5.3.3 WAI-ARIA for full HTML5/JavaScript systems

Conform to the WAI-ARIA specification

The Web Accessibility Initiative (WAI) develops strategies, guidelines, and resources to help make the Web accessible to people with disabilities. Increasingly, receivers are supporting full browser functionality based on HTML5, CSS3 and Javascript, and it is recommended that such receiver implementations should be designed to be compliant with the WAI Accessible Rich Internet Applications 1.0 (WAI-ARIA) specification[9].

[8] See http://www.w3.org/TR/dom/ and http://blog.paciellogroup.com/2012/06/html5-canvas-accessibility-in-firefox-13/
[9] see http://www.w3.org/WAI/intro/aria

Appendix 1

Abbreviations

ATVOD	Authority for Television On Demand, independent co-regulator for the editorial content of UK video on demand services
CTV	Connected TV
DHCP	Dynamic Host Control Protocol
DTG	Digital Television Group
DTT	Digital Terrestrial Television
DVB	Digital Video Broadcasting
DVB-T	DVB Terrestrial
DVB-T2	Second generation Digital Video Broadcasting Terrestrial
EPG	Electronic Program Guide
EIT	Event Information Table. Defined in EN 300 468.
EITpf	Event Information Table, present/following
HDMI	High Definition Multimedia Interface. (www.HDMI.org)
HID	Human Interface Device
HTML	Hypertext Mark-up Language
IP	Internet Protocol
LAN	Local Area Network
LCN	Logical Channel Number
MHEG	Multimedia and Hypermedia Experts Group. ISO/IEC 13522-5.
TTS	Text-to-Speech
USB	Universal Serial Bus
WAI-ARIA	Web Accessibility Initiative Accessible Rich Internet Applications
WAN	Wide Area Network
WPA	Wi-Fi Protected Access
WPS	Wi-Fi Protected Setup

Definitions

EN 300 294	Television Systems; 625-line television Wide Screen Signalling (WSS). Equivalent to ITU-R BT.1119.
EN 300 468	Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems. v1.11.1.
EN 300 743	Digital broadcasting systems for television, sound and data services; *Subtitling systems*.
ETS 300 640	Human Factors (HF); Assignment of alphabetic letters to digits on standard telephone keypad arrays
EN 300 744	Digital broadcasting systems for television, sound and data services; Framing structure, channel coding and modulation for *digital terrestrial television*.
EN 50049-1	Peritelevision Connector.
ISO/IEC 13818-1	Information technology - Generic coding of moving pictures and associated audio information: Systems. ISO/IEC 13818-1:1996(E).
ISO/IEC 13818-2	Information technology - Generic coding of moving pictures and associated audio information: Video.
ISO/IEC 13818-3	Information technology - Generic coding of moving pictures and associated audio information: Audio.
ISO/IEC 13522-5	MHEG-5. Information technology - Coding of multimedia and hypermedia information: Support for Base-Level Interactive Applications.
ISO/IEC 13522-5:1997/Cor.1:1999(E)	MHEG-5. Information technology - Coding of multimedia and hypermedia information: Support for Base-Level Interactive Applications. Technical Corrigendum 1.
ISO/IEC 62216-1	ISO/IEC 62216-1, Digital terrestrial television receivers for the DVB-T system, part 1: Baseline receiver specification. (Commonly known as the E-Book)
Advanced Television Directive (95/47/EC)	Directive 95/47/EC Directive of the European parliament and of the Council of 24 October 1995 on the use of standards for the transmission of television signals.
MHEG-5 UKPROFILE	UK Profile of MHEG-5, A specification for interactive services comprising chapters 11-19 of the D Book
ETSI ES 202 184	MHEG-5 Broadcast Profile
ETSI ES 201 381	Human Factors (HF); Telecommunications keypads and keyboards; Tactile identifiers
Statutory Instrument 2003 No. 1901	Advanced Television Services Regulations 2003 (SI 2003/1901) supporting Article 24 of and Annex VI to Directive 2002/22/EC (the —Universal Service Directivell) http://www.opsi.gov.uk/si/si2003/uksi_20031901_en.pdf
ISO 24500	Ergonomics -- Accessible design -- Auditory signals for consumer products

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