Text-to-speech for television — General requirements

National foreword

This British Standard is the UK implementation of EN 62731:2013. It is identical to IEC 62731:2013.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Synthèse vocale pour télévision -
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(CEI 62731:2013)

Text-zu-Sprache für Fernsehen -
Allgemeine Anforderungen
(IEC 62731:2013)

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CENELEC

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Foreword

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Endorsement notice

The text of the International Standard IEC 62731:2013 was approved by CENELEC as a European Standard without any modification.

CONTENTS

TEXT-TO-SPEECH FOR TELEVISION – GENERAL REQUIREMENTS

1 Scope

This International Standard specifies the text-to-speech functionality for a (broadcast) receiver with a text-to-speech system. Such a system may be one device, i.e. a receiver with an integrated text-to-speech generator, or may be two devices, i.e. a receiver interfacing with an external text-to-speech device. This International Standard applies only to completely functional stationary (or semi-stationary) digital TV receivers such as set top boxes, integrated digital TVs, recorders and other products whose primary function is to receive TV content. Where this standard refers to TV, this will be shorthand for all such receivers.

This International Standard does not apply to products that are capable of receiving TV as a secondary function (e.g. PCs or game consoles with digital television receivers). It also does not apply to sub-assemblies (e.g. PC tuner cards).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
context
one specific function of a TV

EXAMPLE   Watching TV, EPG, etc.

3.1.2
DTV broadcast event
set of related broadcast streams with a defined start and end time, commonly referred to as a TV programme

Note 1 to entry: DTV events have typically the following properties associated with them: start time, end time or duration, content synopsis, additional content information, parental rating and availability of subtitles or audio description.

3.1.3
DTV service information
metadata describing broadcasting content and its scheduling and timing details

Note 1 to entry: The purpose of DTV service information is to aid the end user to select and schedule viewing and recording, and also to select the equipment configuration.

3.1.4
DTV broadcast event classification
general category of programme/event content, or its classification

EXAMPLES   Movie (drama), news/current affairs, talk show, sports (football), etc.

3.1.5
EPG filter
filter that organises or reduces the list of displayed EPG items according to certain criteria

EXAMPLES   Of criteria are to show only:

- programmes with a certain content type;

- favourites;

- programmes that are audio described;

- programmes for a given time period (for instance "today", "tomorrow", "next 7 days").

3.1.6
event
trigger to start an action

3.1.7
list
collection of items

3.1.8
menu
subsequent order of items

3.1.9
receiver
device capable of receiving or handling digital television signals

3.1.10
service
sequence of programs under the control of a broadcaster which can be broadcast as part of a schedule

3.1.11
subtitle
textual representation of the dialogue (and frequently additional auditory information), typically shown at the bottom of the screen

Note 1 to entry: Subtitles can be a textual rendering in the same language as the spoken dialogue, or can provide a written translation in a different language.

Note 2 to entry: In some parts of the world subtitles are called "(closed) captions", and subtitling is referred to as "(closed) captioning".

Note 3 to entry: This standard uses the term subtitles throughout.

3.1.12
TTS audio
audio output by the TTS engine in correspondence with TTS data

Note 1 to entry: If the TV uses an external TTS converter, TTS audio is interpreted as TTS data.

3.1.13
TTS data
(text) data converted into TTS audio information by the text-to-speech engine

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

DTV   digital television

EPG   electronic programme guide

STB   set top box

TTS   text-to-speech

TV   television

UI   user interface

4   Guiding principles and conventions

This standard describes the required basic behaviour for a TV text-to-speech combination in a basic profile, but also provides for enhanced profiles. It also gives a short introduction into the basic problems of visually impaired people: i.e. what are the problems visually impaired people experience when using and watching TV?

Providing text-to-speech functionality for a broadcast receiver, e.g. TV or STB can be of great help to (visually) disabled people. Such speech functionality may be integrated in the receiver or may be external to the receiver in a separate device.

In general as the guiding principle, when building a TTS interface in the context of this standard, implementers should aspire to achieve functional equivalence of the user experience. This means that a person operating the device using the speech interface should have access to similar information and be able to accomplish similar tasks as with a graphical UI.

The main features of this International Standard are:

- basic functional description for a TV-TTS device combination or TV with integrated TTS;

- profiles for different levels of TV-TTS functionality;

- targeted towards the digital TV application.

In this standard mandatory requirements are specified; optional and informative features are also included.

A claim of conformity with this standard requires conformity with all mandatory requirements. A TV-TTS device combination or a TV with a TTS that is integrated may provide options for a user to enable or disable product features.

5   User requirements of visually impaired people

5.1   Users' needs

This subclause 5.1 explains the needs of visually impaired people as the primary target users for a TV with TTS. Unless these needs are met, the system is not accessible to this user group. Visually impaired people experience access barriers in the course of the following activities when watching TV:

a) following TV programming, e.g. the TV series;

b) using a remote control;

c) not being able to see subtitles;

d) navigating channels;

e) navigating TV inputs;

f) using additional data (text) services provided by the broadcaster, e.g. an EPG;

g) daily operation of the TV and initial setup of the TV for use.

Items a), b) and c) are outside the scope of this standard. Item c) further relates to the fact that in some countries foreign language programmes are being translated via subtitles. For users who cannot see the subtitles, supplementary audio services are sometimes used to deliver an audio version of the subtitles. This standard elaborates on the remaining four items, i.e. d), e), f) and g), in 5.2 to 5.6.

NOTE 1 For DVB systems, item a) is already solved by audio description. Also, the use case of providing supplementary audio services to deliver an audio version of the subtitles is covered in the DVB-SI specification ETSI EN 300 468.

NOTE 2 For ATSC systems, the audio system includes a visually impaired (VI) associate service which allows a complete programme mix containing music, effects, dialogue, and additionally a narrative description of the picture content, see ATSC A/53 part 5 and part 6.

5.2   Navigating channels

The problem is a user does not know which channel the TV displays, i.e. the user gets "lost during navigation". The TV is displaying navigation data on the screen but the user is unable to see it. Such data are for example:

• channel number,

• service name,

• (DTV broadcast) event name.

5.3   Navigating TV inputs

The problem is that a user is unable to select the required input to the TV, e.g. the user wishes to select DTV or a specific external input linked to a recording or other device. The choice is shown on the screen but the user is unable to see it.

5.4   Additional data services

With digital TV a broadcaster may transmit additional data (text) services to augment TV programming, provide additional information on programming, or provide news. Such additional data are:

• information about whether audio description, subtitling is available,

• (next) (DTV broadcast) event name,

• (DVB-) event information (enhanced description of the (DTV broadcast) event),

• EPG data.

The items above are listed in order of importance with the most important item appearing first. It is noted that this data provides additional convenience in using the TV, but that is non-essential for the primary function of watching TV, and selecting channels.

5.5   Operating the TV

User settings are another needed function besides navigation. This can be done through buttons on the remote control (out of scope for this specification), but also via on-screen menus. For visually impaired people on-screen menus are typically of little use.

A distinction exists between initial setup and daily operation of the TV. Initial setup is typically a onetime operation during the lifetime of a TV. Daily operation is more frequent and more important. Consequently a distinction among menu items for daily operation exists, those addressing specific accessibility functions, and TV setup menu items. However, the most frequently used keys are "volume", "channel up/down", and number keys.

5.6   TV use

Use characterization of a TV helps in determining implementation profiles. Navigating channels, for example, is done most often when watching TV, as well as commands like volume up and down. This may be supported by additional data services, but does not affect the primary functions of the TV. Changing the TV's system settings is not done very often, except perhaps for changing sound or video settings or switching audio description on and off. Such settings may have an easy access mode through a special menu. TV installation is typically performed only once during the lifetime of the TV. Often, visually impaired people can benefit from specialized support for installing the TV, i.e. it is part of the service when buying a new TV. Understanding this life- and usage cycle of a TV helps with defining the most effective and efficient solutions and is reflected in the profiles. In the following paragraphs, we refer to "basic", "main" and "enhanced" profiles as further defined and detailed in Clause 8.

Key operations for a minimum TTS implementation on a receiver for TV use are as set out in the basic profile defined in this standard. This basic profile shall include:

a)   channel number, name and event information – key for a user to identify which service has been selected;

b)   availability of audio description – key for a user to know about the availability of this service feature;

c)   availability of subtitles – key for a user to know about the availability of this service feature;

d)   basic EPG – allow the user to navigate through the EPG, if such data is present in the broadcast, to identify which future events are available to them;

e)   context changes – key for a user to understand if the TV went to another state or when a pop-up message appears;

f)   the main profile shall in addition to all the items from the basic profile include receiver menu functions (allows the user to navigate receiver operations and functions).

Additional operations that shall be included in the enhanced profile, in addition to all those from the basic and main profiles, are:

g)   event Information – provide the event synopsis;

h)   additional EPG data – allows the user to get more info on the service or event;

i)   operations of a recording device – allows the user to record future events, possibly selected via the EPG. Play/pause a recorded event.

6   Functional requirements

6.1   Functionality for TV, TTS device combination
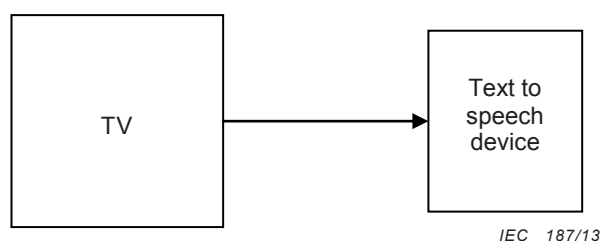

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Figure 1 – TV – TTS device system diagram

The TV-TTS device system diagram is illustrated in Figure 1. As shown in the figure the TTS device is a separate function from the TV, which can be implemented on a device connected with a TV-TTS device interface, or may also be integrated in the TV.

The functionality requirements for a TV with TTS combination are:

- the delay between an event and the resulting TTS audio related to that event shall be such that they are perceived as belonging tied together;

- priority TTS audio shall overrule currently playing TTS audio information;

- the user should be able to stop currently playing TTS audio;

- the user shall be able to repeat the current or previous TTS audio;

- the user shall be able to mute the TTS audio;

- the user shall be able to switch on/off the TTS function;

- the language of the TTS audio shall be the same as set for the TV's UI, except when signalled differently. The TTS device/engine may choose to pronounce the text or to indicate failure in case it does not support the signalled language;

- TTS audio may not need to literally represent the related visual information on the screen as long as the meaning of the visual information stays intact.

6.2 Functionality: TTS device/engine

The TV, in principle, only outputs text strings towards the TTS device.

The TTS device shall follow these outputs:

- an external TTS device should be designed to be fully accessible to visually impaired users without being dependent on the TV;

- the volume level of the TTS device/engine shall be changeable by the user. The TTS device shall announce the new volume level. It should be possible to do this independent from the TV volume;

- the user should be able to adjust speech characteristics like speed, pitch, voice type, when applicable;

- the TTS engine should announce abbreviations as such, letter by letter, rather than as a normal word. Example: "TTS" should be announced "T T S" ("tee tee es") instead of "tts" ("tetes") where relevant. The TTS engine may also pronounce common acronyms in full, e.g. "sub" could be spoken as "subtitles" where appropriate This standard does not identify what is understood to be an abbreviation, rather leaves this at the discretion of implementers;

- the TTS engine should announce numbers in a manner suited to the context, e.g. as natural number, digit-by-digit, etc.;

- the TTS engine is considered to determine the context.

6.3 Functionality: TV

The TV determines the user interface, i.e. what is displayed on the screen, and how the TV interacts with the user. The TV therefore also determines which text is sent to the TTS engine.

The user should be able to control, via the TV TTS, settings like volume, speed, pitch, voice type.

NOTE   In Europe, to fulfil basic accessibility needs, the TV is expected to comply with SELFC.

6.4 Setting up: TV, TTS device combination

TTS audio guidance may be given during the installation of a receiver. TTS audio guidance for receiver installation should adhere to the following requirements when implemented:

- the requirements from 6.1 should apply;

- the user should be able to easily switch on the TTS audio at the beginning of the installation;

- all essential information to complete the installation procedure should be available as TTS audio. Special attention should be given to inform the user the progress of slow processes such as channel searches.

Additional suggestions for TTS audio guidance during receiver installation may be found in DTG-UG024.

7   TV events and TTS data

7.1   TV context and events

The TV can output data in response to events and events can take place in different contexts. The following TV contexts can exist (this list is not necessarily exhaustive):

- watching TV: the user watches TV;
- list: the user browses a (channel) list;
- (acc-)menu: the user browses through the (accessibility) menu structure of the TV. If the menu contains accessibility services, it is called an accessibility menu, or acc-menu. An example of an accessibility service is audio description;
- EPG: the user is browses the EPG;
- standby: the TV is on stand-by;
- timeshift: the user may start a time shift recording or play a time shift recording.

The following contexts are currently outside the scope of this specification and are to be considered for future versions of this specification:

- interactive TV;
- pay-TV.

Within said contexts the following events may occur:

– channel change: the TV changes channels after the user initiated a change channel event, e.g. by pressing a button on the remote control;

– additional information: the TV presents additional information on the item shown. This item may be the event shown on the display, but may also be a highlighted menu item, etc. Additional information may be presented, e.g. after the user has pressed the "info" button on the remote control;

– navigation and selection: the TV highlights another item in e.g. a list or menu. The user selects an item;

– context switch: the TV switches to another context, e.g. from watching TV to menu;

– pop-up message: the TV puts a message on the screen for some purpose, e.g. PIN required, or gives status information.

The TV is expected to output data after an event to the TTS device using the TV-TTS interface. These data contain an indication of the event and the TTS data to be announced.

The different TV contexts and the events which may occur in a certain context are graphically shown in Figure 2. Figure 2 lists the events in a certain context and shows the possible transitions between the different contexts. It also shows that in the menu context it is possible to switch to sub (menus).
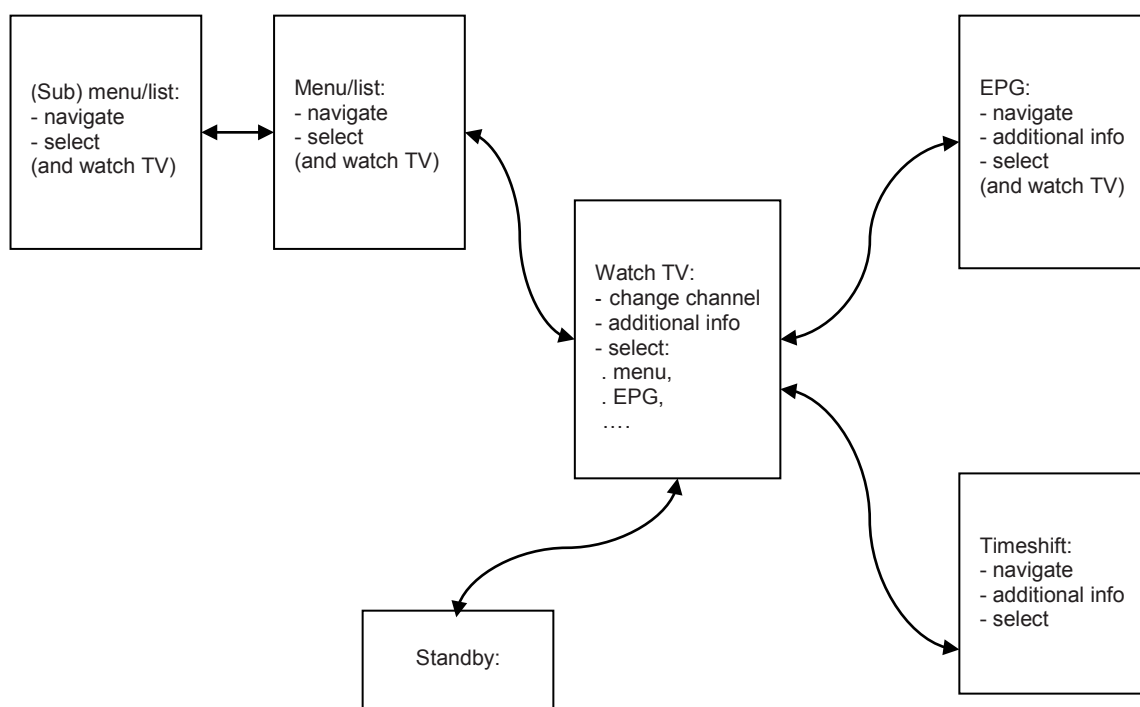
IEC 188/13

Figure 2 – Context event state diagram

7.2   TTS data per event

7.2.1   Details

Subclauses 7.2.2 to 7.2.6 specify which TTS data the TV shall output to the TTS device/engine given a specified event.

7.2.2   Channel change

7.2.2.1   General

A channel change event outputs data on the newly selected channel. Channel change typically only occurs in the watch TV context.

7.2.2.2   Watch TV context

A channel change event in the watch TV context shall at least output the following TTS data for the newly selected channel if present:

a) <channel number>

b) <service name>

c) <present (DTV broadcast) event name>

d) <audio description y/n>.

A channel change event in the watch TV context may also output the following other recommended TTS data if present:

e) <present (DTV broadcast) event start time>

f) <present (DTV broadcast) event end time or duration>

g) <next (DTV broadcast) event name>

h) <next (DTV Broadcast) event start time>

i) <next (DTV Broadcast) event end time or duration>

j) <audio description yes/no next (DTV broadcast) event>.

7.2.3 Additional information

7.2.3.1 General

An additional information event shall output the additional available information on the selected/highlighted item as shown on the TV screen as TTS data.

NOTE   The TV channel shown on the TV is a "selected item", i.e. it is the selected channel.

Additional information typically occurs in the watch TV, EPG, and timeshift contexts.

7.2.3.2 Watch TV context

An additional information event in watch TV context may also output the following other recommended information as TTS data:

a) <(DTV broadcast) event synopsis>

b) <parental rating>

c) <next (DTV broadcast) event synopsis>

d) <presence of subtitles y/n>

e) <next (DTV broadcast) event parental rating>

f) <encrypted y/n>

g) <DTV broadcast event classification>.

7.2.3.3 EPG context

An additional information event in the EPG context may also output the following other recommended TTS data:

a) <(DTV broadcast) event synopsis>

b) <parental rating>

c) <subtitle availability>

d) <languages available>.

7.2.3.4 Timeshift context

An additional information event in the timeshift context may output the following data on an event or service to be recorded or to be played back:

a) <(DTV broadcast) event synopsis>

b) <parental rating>

c) <subtitle availability>.

7.2.4 Navigation and selection

7.2.4.1 General

A navigation and selection event shall output as TTS data/audio the (new) highlighted item. The TV shall output as TTS data/audio a selected and/or changed item.

The highlighted item may only be fully understandable in context with other items on the screen. In this case these other items should also be output as TTS data. For example: in a matrix type of EPG the x,y position of the highlighted item also represents information. In this case the contents of the x-axis and y-axis at the position of the highlighted item should also be output as TTS data.

7.2.4.2 List context

The generic requirements for navigation and selection in 7.2.4.1 apply.

7.2.4.3 (Acc-)Menu context

The generic requirements for navigation and selection in 7.2.4.1 apply.

7.2.4.4 EPG context

The generic requirements for navigation and selection in 7.2.4.1 apply. The TV shall output as TTS data the individual elements listed below if also displayed on screen:

a) channel number,

b) service name,

c) audio description (if available),

d) subtitles (if available),

e) event name,

f) event start time,

g) event end time or duration.

For usability reasons when moving within a service in the EPG, it is recommended that the TV does not repeat the <channel number> and <service name>.

This list does not mandate a specific order of enunciation of these items.

7.2.4.5 Timeshift context

The generic requirements for navigation and selection in 7.2.4.1 apply. Typically it may be expected that in this context the commands play, pause, rewind, forward, stop, and record are covered.

7.2.5 Context switch

7.2.5.1 General

A context switch event shall output as TTS data the context name and may output guidance on how to operate in the selected context. Guidance data may be on what type of buttons can be used and what actions they trigger.

Guidance data on how to operate in a certain context is up to the manufacturer. Examples of guidance data:

• "You are in the EPG context. Use navigation buttons. Up/down navigation will run you through all channels. Left/right navigation will run you through the time schedule."

• "You are in the TV menu. Use up/down and OK to operate the menu."

7.2.5.2 Watching TV context

The same TTS audio for a channel change event in the watching TV context shall be output as TTS audio when entering the watching TV context from the standby context.

7.2.5.3   List context

When entering the list context the TV shall output as TTS data:

- <list title>
- <number of list items>.

7.2.5.4   (Acc-) Menu Context

When entering the (Acc-) Menu Context the TV shall output as TTS data:

- <menu title>
- <number of menu items>.

7.2.5.5   EPG Context

When entering the EPG context the TV shall output as TTS data:

- <highlighted item>.

The TV may also output as TTS data:

- <EPG overview>: shortly describe EPG
- <EPG filter setting applied>.

The TV shall output as TTS data if the <highlighted item> is an (DTV Broadcast) event and is shown on screen:

a) <channel number>

b) <service name>

c) <audio description y/n>

d) <subtitles y/n>

e) <present (DTV broadcast) event name>

f) <present (DTV broadcast) event start time>

g) <present (DTV broadcast) event end time or duration>.

7.2.5.6   Standby context

When entering standby the user should be notified that the receiver is switching to standby.

7.2.5.7   Timeshift context

When entering timeshift the user should be notified that the receiver is switching to a context for time shifting.

7.2.5.8   Currently not supported contexts

Contexts interactive TV and pay-TV are currently outside the scope of this specification. It is recommended to inform the user of entering an unsupported context and to inform the user on how to leave said context again.

7.2.6   Pop-up message

For a visually impaired user pop-up messages often constitute an insurmountable access barrier, unless fully supported by the TTS device. The visually impaired user must be made aware of the occurrence of the pop-up, its contents in full and what action is required from the user in order to proceed. Pop-up messages are often modal, thus preventing the user from exercising normal control and navigation until the pop-up has been dismissed.

The user shall be informed of any warnings and notifications, such as tuning issues or PIN control. When a pop-up message appears on the screen it should output as TTS data:

- \<notification of pop-up\>
- \<description of pop-up\>.

TTS audio on changing status information shall be provided regularly and after completion. It is not required to provide for TTS audio at every update.

8 TTS profiles

8.1 Basic profile

A TV with integrated TTS or a TV-TTS device combination shall at least support the Basic profile. The basic profile shall support TTS audio as specified in the event and context clauses for the following events and contexts:

- channel change event:
  - watch TV context;
- navigation and selection event:
  - list context,
  - acc-menu context,
  - EPG context;
- additional information event:
  - watch TV context;
- context switch event:
  - list context,
  - standby context,
  - acc-menu context,
  - EPG context;
- pop-up message event.

NOTE   A channel change event can be seen as a special case of a navigation event.

8.2 Main profile

The main profile shall support TTS audio as specified in the event and context clauses for the following events and contexts:

- channel change event:
  - watch TV context;
- navigation and selection event:
  - list context,
  - acc-menu context,
  - menu context,
  - EPG context;
- additional information event:
  - watch TV context;
- context switch event:
  - list context,

- standby context,
- acc-menu context,
- menu context,
- EPG context;
- pop-up message event.

8.3 Enhanced profile

The enhanced profile shall support TTS audio as specified in the event and context clauses for the following events and contexts:

- channel change event:
  - watch TV context;
- navigation and selection event:
  - list context,
  - acc-menu context,
  - menu context,
  - EPG context,
  - timeshift context;
- additional information event;
  - watch TV context,
  - EPG context,
  - timeshift context;
- context switch event:
  - list context,
  - standby context,
  - acc-menu context,
  - menu context,
  - EPG context,
  - timeshift context;
- pop-up message event.

8.4 Summary

Table 1 gives an overview of the different profiles.

Table 1 – Overview of profiles

Event	Context	Basic profile	Main profile	Enhanced profile
channel change	watch TV context	X	X	X
navigation and selection event	list context	X	X	X
	acc-Menu context	X	X	X
	menu context		X	X
	EPG context	X	X	X
	timeshift context			X
additional information event	watch TV context	X	X	X
	EPG context			X
	timeshift context			X
context switch event	list context	X	X	X
	standby context	X	X	X
	acc-Menu context	X	X	X
	menu context		X	X
	EPG context	X	X	X
	timeshift context			X
pop-up message event	"all contexts in profile"	X	X	X

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