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TECHNICAL REPORT

Human Factors (HF);
Guidance on how to apply the EN 301 549 to digital television products

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Human Factors (HF).

Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Executive summary

The present document complements EN 301 549 [i.1] which covers a wide range of requirements for a variety of ICT solutions. TV manufacturers identified the need to develop a technical report with a focus on televisions (see clause 3.1). TV has a unique set of features which typically operate as a system in combination with content providers offerings. As a result TV manufacturers developed the present document to give clarification for manufacturers towards producing TV that comply with the European Accessibility Act (EAA) [i.3] and the associated Harmonised Standard EN 301 549 [i.1].

Introduction

The present document complements EN 301 549 [i.1] and is targeted at manufacturers and providers of digital television products. A mapping of the provisions of EN 301 549 [i.1] is provided and the present document references the normative work of EN 301 549 [i.1]. The present document is intended to clarify and explain how accessibility requirements of EN 301 549 [i.1] should be applied for TVs and provide consistency of interpretation.

1 Scope

The present document describes the application of accessibility requirements as listed in EN 301 549 [i.1] to TVs. The focus is on the device capability rather than the whole digital TV field. The scope excludes content provision and delivery.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

The following referenced documents may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

[i.1] EN 301 549 (V4.1.0): "Accessibility requirements for ICT products and services" (jointly produced by ETSI/CEN/CENELEC)".

[i.2] IEC 62944: "Audio, video and multimedia systems and equipment - Digital television accessibility - Functional specifications".

[i.3] Directive (EU) 2019/882 of the European Parliament and of the Council of 17 April 2019 on the accessibility requirements for products and services (EAA).

[i.4] ETSI TS 103 205 (V1.2.1): "Digital Video Broadcasting (DVB); Extensions to the CI Plus™ Specification".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

3rd party approved software: application which is supplied by a 3rd party (other than the device manufacturer) as already installed at the point of sale/purchase

3rd party software vendor: independent entity that develops, supports and markets software designed to integrate with another company's product or platform

NOTE: These offerings extend functionality or address specific needs not covered by the main system. They are independent from the product manufacturer.

approved software: software that has been provided by the TV manufacturer

downloaded software: application which the user has downloaded from an application store or other source and installed under the control of the user (not the device manufacturer)

firmware: embedded software including Operating Systems, provided by the TV manufacturer as an essential part of the functionality, without which the product would not work as specified

providers: manufacturer, authorized representative, or importer of digital TV devices

set top box: device which is connected to a TV typically via HDMI which is capable of receiving that media content from either broadcasting via different types of transmission systems or can stream media content via the Internet

smart monitor: multi-function monitor without a broadcast TV tuner

NOTE: In contrast non-smart monitors (e.g. gaming monitors) feature a display screen and external input ports but lack multi-function AV receiving capabilities (such as integrated streaming applications) is considered out of scope.

soft link (stub) (download on demand software): software which is downloaded and installed after a user request

subtitles: written text that is offered in the audiovisual content, which aims to account for:

i) either the spoken words of the content; or

ii) the spoken words of the content in combination with other elements of a soundtrack

NOTE 1: This is also variously described using terms such as "closed captions" or variants such as "subtitles for the deaf and hard-of-hearing".

NOTE 2: See additional notes under the definition of subtitles in EN 301 549 [i.1].

Television (TV) (television products): device whose primary purpose is to display media content and is capable of receiving that media content from either broadcasting via different types of transmission systems and can stream media content via the Internet

NOTE: TVs include smart monitors, set-top-boxes and TV streaming sticks.

TV software: software that is firmware, approved software, 3rd party approved software, software or download on demand software

TV streaming stick: device that plugs directly into a TV's HDMI port and can stream media content via the Internet

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

API	Application Programming Interface
app(s)	application(s)
AV	AudioVisual/Audio-Visual
DRM	Digital Rights Management
EPG	Electronic Programme Guide
FCC	Federal Communications Commission
HbbTV®	Hybrid broadcast broadband TV
HD	High Definition (1920 × 1080 resolution)
HDMI	High Definition Multimedia Interface
ICT	Information and Communication Technology
IP	Internet Protocol
OS	Operating System
OSD	On Screen Display
SD	Standard Definition (640 × 480 or 720 × 480 resolution)
TTS	Text-To-Speech
TV	Television
UHD	Ultra High Definition (3840 ×x 2160 resolution)

WCAG Web Content Accessibility Guidelines

4 General information for TV accessibility

4.1 TV devices within scope

The present document describes the application of EN 301 549 [i.1] in relation to TV to understand how accessibility requirements should be applied. Examples of TVs include smart monitors, set-top-boxes and TV streaming sticks.

As per Art. 2 (Scope) of the EAA [i.3], a TV only falls within the following scope definition:

"(d) consumer terminal equipment with interactive computing capability, used for accessing audiovisual media services."

NOTE 1: While TVs contain various types of functions that vary between manufacturers and platforms, the present document focuses on the typical functions specified in clause 4.2 which are considered within the scope of EN 301 549 [i.1].

NOTE 2: A TV is not assistive technology in itself as per the definition of assistive technology in clause 3 of EN 301 549 [i.1].

NOTE 3: Video or Audio content (for example, containing audio descriptions, subtitling, rapid flashing images, animations or colours) that are received from sources outside the control of the TV and therefore out of scope (for example HDMI inputs, antenna, apps).

NOTE 4: To ensure safety and correct installation, notwithstanding non-ICT information related to products (i.e. Packaging or printed materials), a TVs accessibility conformance is deemed to start after the TV has been fully assembled (i.e. with stand) and connected.

NOTE 5: At initial start-up (installation) before the TV is configured, full access to all accessibility features may not be possible. This is referred to within clause 14 of EN 301 549 [i.1].

"The inherent nature of certain situations makes it impossible to make reliable and definitive statements that accessibility requirements have been met. In those situations therefore, the requirements in the present document are not applicable:

- when the product is in a failure, repair or maintenance state where the ordinary set of input or output functions are not available;
- during those parts of start-up, shutdown, and other state transitions that can be completed without user interaction."

NOTE 6: If pairing a device via a simultaneous two button press is required during the setup of a TV remote control, it is within scope of EN 301 549 [i.1].

NOTE 7: An internet connection and logging into a system or application account may be required to ensure that all accessibility features are fully enabled and updated.

NOTE 8: It is expected that most TVs are used in a domestic setting, and the accessibility features are intended for personal use and supporting a single user.

4.2 Typical TV functions

When accessibility of a TV is considered - according to the FCC user interface rules - at least the following minimum functions will be present and be expected to be provided in an accessible way by all TVs.

The EAA however goes beyond the FCC user interface rules to the extent that all provided functionality on a TV would need to be accessible. The FCC User Interface Rules mainly deal with visual functions, but some items also relate to audio and other functionality:

a) Power On/Off: Function that allows the user to turn the device on or off.

b) Volume Adjust and Mute: Function that allows the user to adjust the volume and to mute or un-mute the volume.

c) Channel/Program Selection: Function that allows the user to select channels and programs (e.g. via physical numeric or channel up/channel down buttons or via on-screen guides and menus).

d) Display Channel/Program Information: Function that allows the user to display channel or program information.

e) Configuration-Setup: Function that allows the user to access and change configuration or setup options (e.g. configuration of video display and audio settings, selection of preferred language for on-screen guides or menus, etc.).

f) Configuration-Subtitle Control: Function that allows the user to enable or disable the display of closed captions. (Or Subtitle Control).

g) Configuration-Subtitle Options: Function that allows the user to modify the display of closed caption data(e.g. configuration of the font size, font colour, background colour, opacity, etc.). (Or Subtitle Options).

h) Configuration-Audio Description Control or Video Description: Function that allows the user to enable or disable the output of audio description (i.e. allows the user to change from the main audio to the secondary audio stream that contains audio description and from the secondary audio stream back to the main audio).

i) Display Configuration Info: Function that allows the user to display how user preferences are currently configured.

j) Playback Functions: Function that allows the user to control playback functions (e.g. pause, play, rewind, fast forward, stop and record).

k) Input Selection: Function that allows the user to select their preferred input source.

NOTE 1: Source: Annex J - FCC user interface rules of IEC 62944 [i.2].

NOTE 2: EN 301 549 [i.1] refers to subtitles instead of closed captions.

4.3 Open or closed functionality

With reference to clause 3.1, this clause aims to further clarify how the definitions of open and closed functionality apply to a TV.

For the purpose of EN 301 549 [i.1] a TV is considered as CLOSED functionality because:

- The primary function of a TV is the presentation of audio, video, broadcast and broadband related content and services.
- Such TV content usually has content or Digital Rights Management (DRM) restrictions that prevent the TV display content from being exported to other devices due to commercial reasons, to prevent piracy and to respect the content holders' rights and distribution agreements. Therefore, data and AV signals from the TV cannot be exported.
- The Closed functionality definition means that the TV itself would need to provide the required Accessibility feature support in principle.
- While a TV classification is primarily CLOSED, there may be some instances on a case-by-case basis whereby an OPEN classification could apply (i.e. Keyboard connection, Switch Access, Remote control codes).
- TVs are traditionally devices that provide built in Accessibility support directly, without the need to connect additional peripheral equipment.
- Although apps can be downloaded, primary accessibility functions cannot be downloaded and are integral to the TV.
- If Open classification is selected, the interface / signals transmitted from the TV to the external assistive technology need to be clearly specified.

5 TV software

5.1 TV software conformance responsibilities

For showing compliance with the essential accessibility requirements of the EAA [i.3], TV software should conform to the accessibility requirements of EN 301 549 [i.1] which are applicable to software.

A TV can periodically receive a software update via a number of methods including:

a) Download from a service centre.

b) Software contents contained on physical storage media.

c) Software downloaded & installed directly by the TV.

Conformance with EAA requirements is within the responsibility of a 3rd party software vendor in the following scenarios:

- Soft link in TV (software downloaded by the User on demand) and 3rd party approved software which is downloaded from an app store;
- Side loaded software e.g. from external memory device.
- Background updates occur to 3rd party approved software.

TV software updates can modify, add or remove APIs used by 3rd party software to conform with EAA requirements. It is good practice that manufacturers document planned changes to accessibility features to allow 3rd party software providers to make adjustments.

It is recommended that manufacturers provide information about the need for EAA conformance to the 3rd party App suppliers.

5.2 Platform software systems and apps

TVs can be manufactured with an Operating System (OS), as a 'Platform' with the possibility to allow OS vendors, App providers, or users to develop, update, download, install, delete, modify and create software applications (apps).

A TV's software should provide common software APIs to other software applications to achieve accessibility. How capabilities and APIs are defined, determined and used, is out of scope of the present document.

NOTE: Where ICT is a TV, the requirements of this clause do not apply to content outside the control of the TV manufacturer.

5.3 TV & non-web software

The Web Content Accessibility Guidelines (WCAG) are intended for web browser-based content and usage of mobile web applications. Those guidelines have been extended to include other products. A TV might contain a mixture of either non-web software and/or web software. Clauses 9, 10 and 11 from EN 301 549 [i.1] therefore apply.

When applying generic accessibility success criteria to TV, alternatives may be needed if criteria are impractical or counterproductive. For example, 200 % text magnification could introduce overlapping or a need for scrolling, which diminishes accessibility of the television. Implementations that meet accessibility goals while considering the technical capabilities and typical usage of TVs are preferable.

6 TV Accessibility Features

6.1 TV connectivity

A TV is not limited to but can support connectivity such as Bluetooth®, Wi-Fi® or inductive loops to enhance the availability of accessibility features.

The primary responsibility for the accessibility of AV services including adequate quality for accurate display and synchronized with sound and video delivered to a TV lies with the service provider.

Features are supported on devices, dependent on national and local service requirements and consequently the ability to carry out appropriate testing based on those requirements.

6.2 Audio description

Audio Description can be contained in an audio track which a TV receives. The content provider has the responsibility to ensure the audio track is appropriate and synchronized. The TV manufacturer has the responsibility of the correct presentation and selection of the feature. The TV manufacturer's responsibility is to align the audio and video to the time code provided by the content, and (if the player is provided by the manufacturer) to provide the user with a way to choose between the different media alternative options.

NOTE: If the television audio is muted, enabling Audio Description may or may not automatically unmute the audio. Whether or not the audio is unmuted is a design decision by the manufacturer.

6.3 Spoken subtitles

Spoken Subtitles can be contained in an audio track which a TV receives. The content provider has the responsibility to ensure responsibility of the audio track is appropriate and synchronized. The TV manufacturer has the responsibility of the correct presentation and selection of the feature. The TV manufacturer's responsibility is to align the audio and video to the time code provided by the content, and (if the player is provided by the manufacturer) to provide the user with a way to choose between the different media alternative options.

6.4 Subtitles

Broadcast subtitles in Europe are typically received by the TV s bitmap images which the TV renders on screen. The TV therefore has no control as to the contents of the subtitles or the prescribed placement of the subtitles on screen.

NOTE 1: Clause 4.2, item g) outlines the expected subtitle configuration options that are expected to be available to users when the content delivery method permits such customization capabilities on the TV.

Where subtitles based on a timed-text format are delivered, the TV device may offer the user the ability to customize the presentation of the timed text subtitles.

NOTE 2: For advanced display features where content from different sources is combined, such as in picture-in-picture or multi-view (where the display size for content is reduced), it is the manufacturer's decision to enable the option for subtitles and to decide how subtitles should be displayed.

6.5 Text-To-Speech (TTS)

Text-To-Speech (TTS) synthesizers built into a TV are reliant on text strings being parsed by it. A TV will not be able to provide speech output if the text is not available in a machine-recognizable format.

If applications do not use the corresponding TTS APIs provided by TV manufacturers, then the application will not be able to provide voice guidance from the TV device TTS engine.

There is no requirement for subtitle text to be parsed by a built-in TTS synthesizer as Spoken Subtitles are delivered as a separate audio track.

NOTE: When an external device, such as a Conditional Access Module, generates visible text on a TV, the TTS engine may not provide spoken output. This could be due to a lack of access to the source text, or voicing priorities with active applications. For instance, the text may include version numbers or special characters meant for service personnel, or may be overlaid on standard TV functions that should take precedence (ETSI TS 103 205 [i.4], clause 16 "A General recommendation is that High Level MMI should be implemented on the Host in a way so as to avoid disruption to applications that may be running on the Host.")

6.6 Sign language

Support for sign language is typically provided in the broadcast stream so the TV does not have control over it.

Sign language can be provided in two ways:

a) in the broadcast stream; and

b) sign language video of the interpreter can be contained in a video track which a TV receives.

6.7 EPGs/Content discovery mechanism

EPGs are a service provided based on metadata by an EPG provider, which is typically a broadcaster or operator of TV content. The EPG content helps users discover available TV programs and other content.

When EPG content is received from a broadcast or IP source, TV manufacturers have no control over that content or its metadata.

TV manufacturers are responsible for ensuring that the presentation of the EPG conforms to the relevant requirements set out in EN 301 549 [i.1].

6.8 Interactive services

Interactive services such as HbbTV® where available can introduce support for accessibility, however a TV's role could be limited as it will not be able to control all elements of the service.

6.9 Two-way voice or video communication and relay or emergency service access

As most TVs do not provide two-way voice or video communication and relay or emergency service access, they would not be expected to meet the requirements relating to two-way voice or video communication and relay or emergency communication.

6.10 Volume Reset

Requirement 5.1.3.13 of EN 301 549 [i.1] is intended for terminals and kiosks used in public spaces, and is not applicable to personal devices such as TVs in a domestic setting.

6.11 Text Enlargement

Where ICT is a TV, it is excluded as the suitable viewing distance and angle depends on the size of the screen, the display resolution and the viewing environment.

6.12 Reflow

If a TV allows zooming which introduces reflow of text, then requirement 11.1.4.10 from EN 301 549 [i.1] applies.

6.13 Play, Pause, Hide

The requirements "Play, Pause, Hide" in clauses 9.2.2.2, 10.2.2.2, 11.2.2.2 of EN 301 549 [i.1] are intended to ensure non-interference with assistive technology. If it can be assured that "Play, Pause, Hide" does not interfere with assistive technology, the requirements does not need to be met in the default mode and it is sufficient to meet these requirements in one mode of operation.

If it cannot be guaranteed that the "Play, Pause, Hide" requirements does not interfere with assistive technologies, the "Play, Pause, Hide" requirements in EN 301 549 [i.1] are applicable. Examples how to meet the requirements in EN 301 549 [i.1] include, but are not limited to:

- Providing dedicated buttons in the UI or a dedicated key to "Play, Pause, Hide" auto-playing content.
- Providing the user control, such as the up/down/left/right keys, to move away from auto-playing content, to pause or stop the auto-playing content, to ensure non-interference with assistive technologies.

7 Resolution & Frame Rate

A TV should meet the resolution and frame rate requirements set out in clauses 6.5.2 and 6.5.3 of EN 301 549 [i.1], but two-way video communication if supported may be limited to lower resolution based on the user's internet connection, the communication service's server capabilities, etc.

8 Remote Controls

8.1 Keyboards

Remote controls are typically keypads to enter limited numbers of characters, therefore EN 301 549 [i.1], clause 5.1.6 "Operation without keyboard interface" is applicable.

A keypad together with an on-screen keyboard can be considered to be a keyboard.

A voiced on-screen keyboard is required.

The remote control itself is not required to emit any sound.

NOTE: Apps may provide their own keyboard, and the CE maker is not responsible for the app provider's implementation. There is a contractual obligation between the CE maker and the app provider approved 3rd party to ensure compliance with EN 301 549 [i.1].

8.2 Primary media controls

A TV remote control is typically only used to perform functions as described in clause 4.2 therefore has a limited subset of controls to carry out the primary purpose of the TV.

For a TV a primary media control could include program, volume, EPG, menu controls, etc.

8.3 Key repeat and double strike key acceptance

On TV remote controls, key repeat may allow continuous command input when a button is held, such as for volume adjustment, channel changes, or menu navigation, and some remote controls may also provide continuous alphanumeric entry.

EN 301 549 [i.1] defines key repeat as the "generation of multiple entries of the same alphanumeric data into input fields or into documents" when a button of a keyboard (or virtual keyboard) is pressed continuously. The requirement for key repeat functionality are only applicable if the key repeat function cannot be turned off.

TV remote controls may exhibit key repeat for alphanumeric data input, but they are usually not intended for entry of large text sections. Key repeat control settings are usually aimed at input devices designed where sustained typing tasks are typical, such as on computer keyboards.

Therefore:

- If a TV remote control is enabled to provide key repeat on alphanumeric data input and that functionality cannot be turned off by the user, clause 5.7 of EN 301 549 [i.1] applies to such TV remote controls.
- If there is the option to turn the key repeat functionality off by the user, clause 5.7 of EN 301 549 [i.1] may be ignored. In these cases it is best practice to set the default to "key repeat off".

NOTE: If a TV remote control allows for "key repeat" for alphanumeric data input without the user option to turn this feature to "off" it would be good practice to disable "key repeat" for alphanumeric data input as a factory setting.

Double-strike key acceptance prevents multiple activations when a single press is intended and is relevant for users with a tremor or similar conditions. Unlike the key repeat requirement in clause 5.7 of EN 301 549 [i.1] the requirement in clause 5.8 of EN 301 549 [i.1] applies to both data and command input.

The requirement in clause 5.8 of EN 301 549 [i.1] is conditioned on the ability to "adjust the time before the same key can be accepted again".

Therefore:

- If a TV remote control has key repeat functionality and the capability to "adjust the time before the same key can be accepted again", clause 5.8 of EN 301 549 [i.1] applies to such a remote control.
- In all other cases clause 5.8 of EN 301 549 [i.1] may be ignored.

9 On Screen Displays (OSD) timeouts

TV displays utilize different technologies, so when implementing user configurable timeouts for on-screen menu elements, the selectable timeout durations will consider not exceeding the display's burn-in threshold. This will prevent permanent screen burn from prolonged static image elements.

10 Text magnification/text resizing

Text scaling on TV displays can be applied selectively to just the focused text element, such as a highlighted menu item, or globally to all on-screen text. Since TVs typically show content in standard resolutions such as Standard Definition (SD), High Definition (HD), or Ultra High Definition (UHD), text resize options will need to only scale text to a legible size that fits completely within the display area. This ensures that all on-screen characters remain fully visible for the active resolution without needing to scroll to read text. This would also prevent clipping or truncation. TV display resolution, positioning and size are variables that are based on user preferences. TV UIs do not allow users to dynamically change the text properties (line height, character spacing) therefore requirements 11.1.4.12 of EN 301 549 [i.1] do not apply to TVs.

11 Conformance

Where there is no test case defined in Annex C of EN 301 549 [i.1] "Determination of conformance" for a functional requirement of a TV, the requirement is informative only. If there is no test case, there is no requirement.

If an EAA related critical defect is detected, TV manufacturers should abide by best efforts to find the root cause or provide a workaround to rectify the issue as soon as possible.

EN 301 549 [i.1], Tables A.2.3, A.2.8, A.2.9 and A.2.10, and potentially other tables (Annex ZA) are applicable to TVs.

Annex A:
Change history

Date	Version	Information about changes
September 2024	V0.0.9	Edithelp
October 2024	V0.10	Comments incorporated from calls 04/10 and 08/10/2024, comments received until 01/11/2024
November 2024	V0.11	Comments incorporated from call 13/11/2024
December 2024	V0.12	Comments received by 12/12/2024
March 2025	V0.2	Consensus comments accepted for TR 104 060 V.1.2.1
April 2026	V1.2.1	Endorsement by TC HF

History

Version	Date	Status
V1.1.1	February 2025	Publication
V1.2.1	June 2026	Publication