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**HSTP-CONF-H702
Conformance testing specification for ITU-T
H.702**

Summary

This Technical Paper provides the conformance testing specifications for IPTV systems that follow [ITU-T H.702], which comprise testing of both the capabilities and behaviour of an implementation, and checking what is observed against the conformance requirements in the Recommendation and the implementer's statement of what are the implementation capabilities.

Keywords

Accessibility, audio description, caption, IPTV, sign language, conformance, conformance testing.

Change Log

This document contains Version 1 of the ITU-T Technical Paper on "*Conformance testing specification for ITU-T H.702*" approved at the ITU-T Study Group 16 meeting held in Geneva, 16-27 January 2017.

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Conformance testing specification for ITU-T H.702

1   Scope

This document specifies a set of attributes and procedures designed to indicate whether IPTV systems meet the requirements in [ITU-T H.702] "Accessibility profiles for IPTV systems". This set of conformance tests can provide a basic level of interoperability testing.

2   References

[ITU-T F.791]   Recommendation ITU-T F.791 (2015), *Accessibility terms and definitions*.

[ITU-T H.702]   Recommendation ITU-T H.702 (2015), *Accessibility profiles for IPTV systems*.

[ITU-T H.721]   Recommendation ITU-T H.721 (2015), *IPTV terminal devices: Basic model*.

[ITU-T HSTP-CONF-H721] Technical Paper ITU-T HSTP-CONF-H721 (2015), *Conformance testing specification for H.721*.

[ITU-T X.290]   Recommendation ITU-T X.290 (1995) | ISO/IEC 9646-1 (1994), OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications - General concepts.

[ITU-T Y.101]   Recommendation ITU-T Y.101 (2000), *Global Information Infrastructure terminology: Terms and definitions*.

[ITU-T Y.1901]   Recommendation ITU-T Y.1901 (2008), *Requirements for the support of IPTV services*.

[ITU-T Y.1910]   Recommendation ITU-T Y.1910 (2008), *IPTV functional architecture*.

3   Definitions

3.1   Terms defined elsewhere

3.1.1   Access control [b-ITU-T X.800]: The prevention of unauthorized use of a resource, including the prevention of use of a resource in an unauthorized manner.

3.1.2   accessibility medium [ITU-T H.702]: The media stream containing accessibility information, such as audio stream with audio description, text stream with closed captions, and video stream with sign language interpretation.

3.1.3   accessibility service [ITU-T H.702]: Same as access service (see clause 3.1.1).

3.1.4   audio description [ITU-T F.791]: Also known as 'video description' and 'described video'. The service provides additional audible narrative, interleaved with the dialogue, which describes the significant aspects of the visual content of audio visual media that cannot be understood from the main soundtrack alone.

3.1.5   captions/captioning [ITU-T F.791]: Captions provide a real-time on-screen transcript of the dialogue as well as any sound effects. This service can be provided by means of either textual or graphical supplementary content. The captions and the dialogue are usually in the same language. The service is primarily to assist users having difficulty hearing the sound.

NOTE – Subtitles are the transcription of spoken words, while captions include spoken words plus any meaningful sound whose perception is important to understand the content of the audiovisual program.

3.1.6   caption box [ITU-T H.702]: Opaque or translucent rectangle area in which caption is placed.

3.1.7   Conformance log [ITU-T X.290]: A human-readable record of information produced as a result of a test campaign, which is sufficient to record the observed test outcomes and verify the assignment of test results (including test verdicts).

3.1.8   Conformance testing [ITU-T X.290]: Testing the extent to which an IUT is a conforming implementation.

3.1.9   Content [ITU-T T.174]: Encoded generic value, media or non-media data

3.1.10   Dynamic conformance requirement [ITU-T X.290]: One of the requirements which specify what observable behaviour is permitted by the relevant specification(s) in instances of communication.

3.1.11   Implementation conformance statement (ICS) [ITU-T X.290]: A statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented

3.1.12   Implementation conformance statement (ICS) proforma [ITU-T X.290]: A document, in the form of a questionnaire, which when completed for an implementation or system becomes an ICS.

3.1.13   Implementation under test (IUT) [ITU-T X.290]: An implementation of one or more OSI protocols in an adjacent user/provider relationship, being that part of a real open system which is to be studied by testing.

3.1.14   IPTV [ITU-T Y.1901]: Multimedia services such as television, video, audio, text, graphics, data delivered over IP-based networks managed to support the required level of QoS/QoE, security, interactivity and reliability.

3.1.15   IPTV terminal device [ITU-T Y.1901]: A terminal device which has ITF functionality, e.g. a STB.

3.1.16   IPTV terminal function (ITF) [ITU-T Y.1901]: The functionality within the home network that is responsible for terminating the IP signal, and converting the content into a renderable format (i.e. enabling it to be seen and/or heard).

3.1.17   Linear TV [ITU-T Y.1901]: A television service in which a continuous stream flows in real time from the service provider to the terminal device and where the user cannot control the temporal order in which contents are viewed.

3.1.18   Pass (verdict) [ITU-T X.290]: A test verdict given when the observed test outcome gives evidence of conformance to the conformance requirement(s) on which the test purpose of the test case is focused, and when no invalid test event has been detected.

3.1.19   profile [ITU-T H.702]: A set of capabilities for accessibility to be implemented in an IPTV system.

3.1.20   Service [ITU-T Y.101]: A structure set of capabilities intended to support applications.

3.1.21   sign language [ITU-T F.791]: A sign language (also called signed language or simply visual signing) is a natural language which, instead of acoustically conveyed sound patterns, uses manual communication with the hands, facial expressions and body language to convey meaning.

3.1.22   Static conformance requirement [ITU-T X.290]: One of the requirements that specify the limitations on the combinations of implemented capabilities permitted in a real open system which is claimed to conform to the relevant specification(s).

3.1.23 Verdict [ITU-T X.290]: A statement of "pass", "fail" or "inconclusive", as specified in an abstract test case, concerning conformance of an IUT with respect to that test case when it is executed.

3.2 Terms defined in this document

None.

4 Abbreviations and acronyms

This document uses the following abbreviations and acronyms:

EPG	Electronic Program Guide
HE	Head End
HTTP	Hypertext Transfer Protocol
IPTV	Internet Protocol Television
ITA	IPTV Terminals with Accessibility enhancements
PWD	Persons With Disabilities
TV	Television
VOD	Video on Demand

5 Introduction

5.1 Scope of testing

A real system is said to exhibit conformance if it complies with the requirements of applicable specifications specified by ITU-T Recommendation in its communication with other real systems. [ITU-T H.702] describes specifications of IPTV systems with accessibility functions. Key features of IPTV systems with accessibility functions are sign languages, captions, and audio descriptions. Scope of this document regarding conformity testing is the same as [ITU-T H.702].

5.2 Conformity requirements

To claim compliance with base specifications, an IPTV system has to accept and make use of:

–   all mandatory elements/attributes specified in base specifications

–   all conditional elements/attributes for which at least one of them is mandatory

–   all the conditional elements/attributes which are mandatory if an optional element/attribute is present

–   all optional elements should be accepted even if not used

Requirements of testing in this document are categorized into followings [ITU-T X.290]:

–   Static conformance requirements: specify the limitations on the combinations of implemented capabilities which are claimed to conform to the relevant specification(s) described in clauses 6 and 7, and Appendix I. These are claimed to be supported by using implementation conformance statement (ICS) which are created before conformity test executions

–   Dynamic conformance requirements: specify observable behaviours which are claimed to conform to the relevant specification(s) by using test procedures described in clauses 6.8 and 7.4

5.3   Test scenarios

Linear TV and VoD are treated as basic IPTV services in [ITU-T H.721] according to [b-ITU-T Y.Sup5]; therefore, test scenario consists of IPTV terminal testing and accessibility function testing. IPTV terminal testing specification is required to be referred to [ITU-T HSTP-CONF-H721]. Other function testing on accessibility requirements is also checked based on the three accessibility mediums (caption, sign language, and audio description) in three profiles (basic profile, enhanced profile, and main profile).

5.4   Test methods

5.4.1   Test system

5.4.1.1   Test bed for IPTV basic services with accessibility functions

A test environment consists of (1) a test system which has communication capabilities as a set of servers in order to provide Linear TV and/or VoD services with accessibility functions, and (2) an IPTV terminal device as implementation under test (IUT) [ITU-T X.290].

The test system in this document is required to be equipped with:

–   IPTV basic terminal functionality [ITU-T HSTP-CONF-H721] including content delivery functionalities provided as Linear TV and/or VoD servers according to the test cases

   NOTE – A Linear TV server is named as Linear TV application, and a VoD server is named as On-demand application in Figure 5-1 respectively according to [ITU-T H.721].

–   IPTV Application client with accessibility functions: processes received contents including accessibility medium and displayed on the IPTV terminal devices

–   Network functionalities: supports a unicast network for VoD services and/or multicast network for Linear TV services. IPv4 and/or IPv6 shall be selected based on the specification of the IPTV terminal device

   o   Relevant network protocols for IPTV services (e.g., DNS, DHCP) are also treated by these functionalities.

–   Conformance log generator: watches the details of communication between the test bed system and the IPTV terminal device, and generate logs (e.g., packet capturing software). The specifications of the test environment shall be shown to IUT suppliers or implementers (e.g., software product xyz ver. 1.2.1 as HTTP server) before the conformance testing [ITU-T X.291].

NOTE – [ITU-T H.702] does not refer to IPTV terminal devices per se, but rather to IPTV systems with accessibility functions. The current text in clause 5.4.1 describes only IPTV terminal testing, and HE testing needs further study.
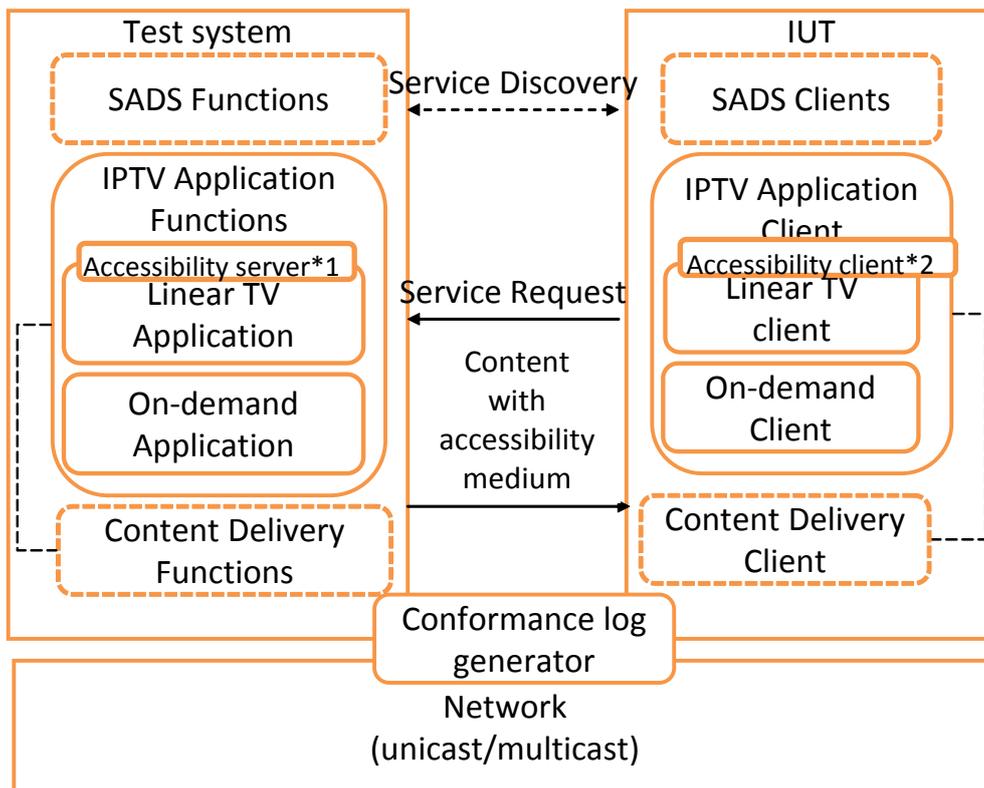
*1: "Accessibility server" is shown as "accessibility medium server functions" in Figure 1 in [ITU-T H.702]
*2: "Accessibility client" is shown as "accessibility medium display processing functions" in Figure 1 in [ITU-T H.702]

Figure 5-1 – Testbed for basic IPTV services with accessibility functions

5.4.2 Conformance log

A conformance log is a human-readable record of information produced as a result of a test campaign, sufficient to record the observed test outcomes and verify the assignments of test verdicts. This information combines the observations of the actual test events which occur when the test system is run against an IPTV terminal device, with information which relates those events to the test cases concerned [ITU-T X.293].

In each steps when ITA communicate with the test system, especially described in clauses 6.8 and 7.4, conformance logs should be collected and checked in a verdict process regarding both static and dynamic conformance requirements.

5.5 Implementation conformance statement (ICS) proformas

The specific requirements to be met by suppliers (in respect of each ICS they are to provide) shall be stated in base specifications. The ICS proforma shown in Appendix I are in the form of a questionnaire to be completed by the supplier or implementer [ITU-T X.291].

6 Conformance for IPTV system with accessibility functions

6.1 Caption

Implementation methods for caption for IPTV are shown in clause 7.2 of [ITU-T H.702]. The observed test outcomes and the results of evaluations (including verdicts) shall be filled in on the corresponding check list (e.g., Table I.1 in Appendix I).

6.2 Sign language

Implementation methods for sign language for IPTV are shown in clause 7.2 of [ITU-T H.702]. The observed test outcomes and the results of evaluations (including verdicts) shall be filled in on the corresponding check list (e.g., Table I.2 in Appendix I).

6.3 Audio description

Implementation methods for audio description for IPTV are shown in clause 7.2 of [ITU-T H.702]. The observed test outcomes and the results of evaluations (including verdicts) shall be filled in on the corresponding check list (e.g., Table I.3 in Appendix I).

Test Preparation:

1. Detailed specifications which are difficult to be measured or to be observed (e.g., details of media decoding formats) through the conformity testing should be filled in check-lists in Appendix 1

2. Ingest the video and audio contents to the test IPTV system with accessibility functions, and set a network environment for the testing

3. A test ITA connects to the test system over an IP network (see NOTE 1)

4. The test ITA executes the consumption of IPTV services (see NOTE 2)

Testing:

5. The test ITA acquires a list of contents over the network and selects a content

6. The test ITA acquires the contents over the network and display the content (see NOTE 3)

7. Test check-list should be filled according to the test results

8. Test passes if the ITA succeeds in steps 5 and 6 according to the completed check-lists (see NOTE 4)

NOTE 1 – Details of network attachment specifications are out of scope of this document.

NOTE 2 – Details of service specifications are out of scope of this document, see [ITU-T H.721].

NOTE 3 – The order of steps 5 and 6 can be exchanged based on the content selection mechanisms implemented in the ITAs.

NOTE 4 – Conformance logs shall be recorded through steps 5 and 6 for subsequent checking.

Appendix I

ITU-T H.702 conformance checklist

Table I-1 contains the provisional checklist for conformance testing of accessibility profiles in IPTV terminal devices following [ITU-T H.702]. This list is intended to be gradually incorporated to the main text of this document as specific testing procedures are made.

Columns "Status" in tables described below show requirement levels of elements/attributes for reference. Mandatory elements/attributes are shown "R", optional ones are shown as "OR" and conditional requirements are shown as "C".

Requirement level marked with an "R" is required for implementation and required to be tested during conformance testing. Requirement level marked with an "OR" is optionally required for implementation and optionally required to be tested during conformance testing. Requirement level marked with "C" is conditionally required for implementation and conditionally required to be tested during conformance testing.

Columns "Support" are used to fill in whether specifications of [ITU-T H.702] are used or not [b-ITU-T X.296].

The common notations for support answers are:

– supported: Y, y, YES or yes

– not supported: N, n, NO, no

– no answer required: N/A, n/a or "-"

Columns "Remarks" is used to fill in additional information for clarifying relevancies to [ITU-T H.702] specifications if necessary.

NOTE – If optional specifications are used under specific conditions, the conditions should be also described for verdicts (e.g., only if Linear TV is served).

I.1 Checklist

Table I.1 – Capabilities of profiles

Accessibility medium	Capabilities	Status			Support
		Basic profile	Enhanced profile	Main profile	
Caption	Turn on/off overlaid caption (R-1)	R	R	R	
	Change the direction of displaying text between horizontal and vertical (R-2)	OR	R	R	
	Change the transition effect of the caption text between cut and scroll (and bidirectional) (R-3)	OR	R	R	
	Select from multiple captions (R-4)	R	R	R	
	Change font size of the caption text (R-5)	R	R	R	
	Change font colour of the caption text (R-6)	R	R	R	
	Change caption position of the caption text (R-7)	R	R	R	
	Change the background colour of caption box (R-8)	R	R	R	
	Change the size of background box (R-9)	R	R	R	

Accessibility medium	Capabilities	Status			Support
		Basic profile	Enhanced profile	Main profile	
	Change font style of the caption text (OR-1) (R-11)	OR	R	R	
	Hold the language setting of captions when multiple captions are supported (Function of holding the language setting. When a user changes channels, the user can get the same language caption as in the previous channel) (OR-2) (R-12)	OR	R	R	
	Synchronize captions with video (OR-3) (R-22)	OR	OR	R	
	Synchronize caption with the main video during the playback mode including slow motion (OR-4) (R-23)	OR	OR	R	
	Automatically generate multiple captions with speech recognition (OR-5)	OR	OR	OR	
	Display caption to different display devices (OR-6)	OR	OR	OR	
	Change display speed (OR-7)	OR	OR	OR	
Sign language	Turn on/off overlaid sign language (OR-8) (R-13)	OR	R	R	
	Select from multiple sign languages (OR-9) (R-14)	OR	R	R	
	Change video size of sign language (OR-10) (R-15)	OR	R	R	
	Change video position of sign language (OR-11) (R-16)	OR	R	R	
	Synchronize sign language video with the main video during the playback mode including slow motion (OR-12) (R-24)	OR	OR	R	
	Hold the language setting of sign language when multiple sign languages are supported (OR-13) (R-25)	OR	OR	R	
	Change the background colour of sign language video (OR-14)	OR	OR	OR	
	Automatically generate synthesized sign language interpretation (OR-15)	OR	OR	OR	
	Avoid covering important information of original main video with sign language video (OR-16)	OR	OR	OR	
Audio description	Turn on/off audio description (OR-17) (R-17)	OR	R	R	
	Adjust volume of audio description (OR-18) (R-18)	OR	R	R	
	Read letters and description of button on the screen (OR-19) (R-19)	OR	R	R	
	Select from multiple audio descriptions (OR-20) (R-20)	OR	R	R	

Accessibility medium	Capabilities	Status			Support
		Basic profile	Enhanced profile	Main profile	
	Synchronize audio description with the main video during the playback mode including slow motion (OR-21) (R-26)	OR	OR	R	
	Play in slow motion, pause-and-play (OR-22) (R-27)	OR	OR	R	
	Hold the language setting of audio description when multiple audio descriptions are supported (OR-23) (R-28)	OR	OR	R	
	Adjust sound quality of audio description (OR-24) (R-29)	OR	OR	R	
	Avoid interfering original main audio with audio description (OR-25)	OR	OR	OR	

Bibliography

[b-ITU-T X.296]   Recommendation ITU-T X.296 (1995) | ISO/IEC 9646-7:1995, *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Implementation conformance statement*

[b-ITU-T Y.Sup5]   ITU-T Y.1900-series-Supplement 5 (2008), *Supplement on IPTV service use cases*

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