



Unit Test Descriptions for Hybrid Broadcast Broadband TV

Version 1.0

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Modal verbs terminology

In the present document "shall", "shall not", "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).

"must" and "must not" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The Unit Test Descriptions for Hybrid Broadcast Broadband TV referenced in this document have been defined for verification of HbbTV Devices for conformance with the following HbbTV Specifications:

- ETSI TS 102 796 V1.4.1 (informally known as HbbTV 2.0.1) [1]
- ETSI TS 102 796 V1.5.1 (informally known as HbbTV 2.0.2) [2]

The audience this document targets is any regulator or any organisation referring to the HbbTV specifications listed above with an intention to define a conformance regime.

The Unit Test descriptions for the HbbTV Specifications contains three parts:

- 1) A part including the conditions of publication.
 - 2) A part with recommendations to organization referring to the specification.
 - 3) Information about the XML format of the unit test description with a link to the Test Assertions Repository.
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1 Scope

The present document extends [2] (and its previous version [1]) by providing users of these specifications with a method to access to the test assertions for the purpose of assessing the compliance of equipment and services with [2] (and its previous version [1]).

2 References

2.1 Normative references

The following referenced documents are required for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- | | |
|-----|---|
| [1] | ETSI TS 102 796 “Hybrid Broadcast Broadband TV”; V1.4.1. Including all approved Erratas. |
| [2] | ETSI TS 102 796 “Hybrid Broadcast Broadband TV”; V1.5.1. Including all approved Erratas. |
| [3] | HbbTV Test Specification For HbbTV Test Suite https://www.hbbtv.org/resource-library/ |

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

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

Assertion: Testable statement derived from a Conformance requirement that leads to a single test result

Broadband: An always-on bi-directional IP connection with sufficient bandwidth for streaming or downloading A/V content

Broadcast: classical uni-directional MPEG-2 transport stream-based broadcast such as DVB-T, DVB-S or DVB-C

Conformance requirement: An unambiguous statement in the HbbTV specification, which mandates a specific feature or behaviour of the terminal implementation

HbbTV application: An application conformant to the present document that is intended to be presented on a terminal conformant with the present document

HbbTV test case XML: The HbbTV XML document to store for a single test case information such as Test Assertions, Test Procedure, specification references and history.

HbbTV Test Specification: Refers to [6].

HbbTV Technical Specification: Refers to HbbTV specification [2] and previous version [1]

Referring Organizations: organizations publishing documents that refer to this Technical Specification.

Testing Group: a working group of the HbbTV Association that is authorised to approve HbbTV Test Assertions and Test Material, manage the working practices of test creation, and test challenges and test removal/repair.

Test Assertion: A high level description of the test purpose, consisting of a testable statement derived from a Conformance requirement that leads to a single test result.

NOTE: Not to be confused with the term “assertion” as commonly used in test frameworks e.g. JUnit.

Test Case: The complete set of documents and assets (assertion, procedure, preconditions, pass criteria and test material) required to verify the derived Conformance requirement.

NOTE 1: This definition does not include any test infrastructure (e.g. web server, DVB-Playout...) required to execute the test case.

NOTE 2: For the avoidance of doubt, Test Material is implemented in a way that produces deterministic and comparable test results to be stored in the final test report of this Test Material. Test Material adhere to the HbbTV Test Specification as defined by the HbbTV Testing Group.

Test Material: All the documents (e.g. HTML, JavaScript, CSS) and additional files (DVB-TS, VoD files, static images, XMLs) needed to execute the test case.

Test Procedure: A high level textual description of the necessary steps (including their expected behaviour) to follow in order to verify the Test Assertion.

3.2 Abbreviations

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

API	Application Programming Interface
CSS	Cascading Style Sheets
DAE	Declarative Application Environment
DVB	Digital Video Broadcasting
DUT	Device under Test
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IP	Internet Protocol
MPEG	Motion Picture Experts Group
TV	Television
XML	Extensible Markup Language

4 Recommendations for organisations referring the specification (informative)

As the owner of the Test Assertions to which the present document refers, the HbbTV Association would like to draw the attention of organizations who plan to refer to the present document with a view to operating a conformance regime, (“Referring Organizations”) to the following points.

- (1) HbbTV's goal is to achieve a commonly implemented standard across all its deployed markets and territories and as such strongly recommends organisations referring to this specification implement a common Test Assertions list, adding a level of tolerance to possible errors instead of removing applicable test assertions from the list. Creating different Test Assertion lists across multiple markets has the potential to introduce market fragmentation and is therefore discouraged.
- (2) 100% compliance of devices with the complete set of test assertions might not be achieved in the early years of a given specification version and therefore, it is advisable for Referring Organizations to adopt
 - i. A Test Challenge Process. This is an important element of any compliance process and HbbTV Association operates its own Test Challenge process for the assertions listed in this document
 - ii. Temporary Tolerances, e.g. for performance requirements that a hardware implementation may not be able to meet
 - iii. Waivers and Allowances, especially for non-critical aspects of a device or service implementation
- (3) HbbTV Association strongly advises and encourages that Referring Organizations to contribute to and feedback on issues with test assertions, or the specifications to improve them in the future. HbbTV Association operates its own Test Challenge process for the assertions listed in this document and is encouraging any Referring Organization to contribute to such test challenge process to help improve the reliability of the tests.
- (4) Even full compliance to any defined test suite does not guarantee full interoperability in any market implementation and further action is required to ensure services and implementations are fully interoperable:
 - i. Devices in the market will need to be tested against real available applications from on air services to improve interoperability.
 - ii. HbbTV Association recommends service testing and interoperability plug-fests to augment compliance testing to the applicable test assertions.
 - iii. Mandating any test list, several years ahead of service availability, will not guarantee interoperability at later dates.
- (5) Immediate conformance to any published test case cannot be achieved. Device Manufacturers will need to be given reasonable and sufficient time to implement and/or fix issues.
 - i. The industry accepted normal practice is that manufacturers require eighteen months lead time (aka sunrise period) to provide an implementation once a new test assertion has been published.

5 Conditions of publication

- (1) HbbTV keeps copyright of the Test Assertions referred in this document.
- (2) The HbbTV Association provides this document to support its Specification by outlining the scope of testing defined (by way of a published list of Test Assertions) for the benefit of users of its Specification. It is the objective of the Association in doing so to increase the interoperability of services and implementations and welcomes feedback on ways to improve interoperability.
- (3) The publication by the HbbTV Association of the test assertions is made on a voluntary basis to help and inform market participants. Fulfilment of all published applicable test assertions is good practice to improve interoperability but is not alone sufficient to ensure the compliance of equipment against a certain version of the specification.
- (4) HbbTV Association makes no warranty that the published test assertions are correct and necessary, and accept no liability in conjunction with published test assertions, nor with any subsequent testing or other

certification activity or product based on the published test assertions that a third party may develop, apply to a third party, or be exposed to.

- (5) HbbTV Association's Published Test Assertions include only assertions for which an approved test case exists and it has proved to be a valid test case; other assertions may exist and not be included in the published Test Assertions. A test case may not be in the list of approved test cases because has been found to include defects and has been removed from the list (defined as a Challenge). Possible reasons for removal of tests cases from the list include, but are not limited to: IPR claims, difficulties for the market devices to pass the test cases or errors, or defects in the tests themselves.
- (6) The published test assertions may change from time to time at the initiative of the HbbTV Association at the sole discretion of the HbbTV Association, without any explanation or justification of its decisions, without any ex-ante or ex-post notice. HbbTV Association will accept no liability on the occurrence and possible implications of these changes. HbbTV will not make any judgements or adjudications on issues arising between Referring Organisations, Service Operators or Device Implementers. HbbTV Association has no expectations and does not enforce that legacy devices of any age are updated to keep up with such possible changes.
- (7) Certain categories of tests, e.g. those that apply to independent HbbTV specifications, have been designed in the knowledge that a mutually acceptable commercial relationship is likely to be required between service provider and device manufacturer and as such mandation of those test cases by any referring organisation does not override this principle.

6 Test Assertions specification

6.1 Test Assertion Template

6.1.1 Introduction

Each Test Assertion consists of a list of attributes, as described below

The attributes can be:

- General Attributes: The General Attributes uniquely identify the Test Assertion.
- References: References to the spec that the Test Assertion applies to.
- Preconditions: Lists preconditions on the DUT before this test can be run.

6.1.2 General Attributes

6.1.2.1 Test Assertion ID

The Test Assertion ID is a string that uniquely identifies the Test Assertion . It contains two parts, a "namespace" and a "Local ID", separated by an underscore.

For official HbbTV tests, the Test Assertion IDs will usually be allocated by the HbbTV Testing group. In this case, the namespace shall be "org.hbbtv". E.g. "org.hbbtv_0000123F". The HbbTV Testing group shall ensure those tests IDs are unique.

It is important that every Test Assertion has a different Test Assertion ID. If another organization wants to generate Test Assertion IDs for its own tests, then it shall not use the "org.hbbtv" namespace. Instead, it shall take a domain name it controls, reverse it, and use that for the namespace part of the Test Assertion ID. In this case, the Local ID can be anything permitted by the schema. Organizations should have some internal procedure to allocate Local IDs so that they don't generate duplicate Test Assertion IDs.

For example, a company that controls the "example.com" domain could use Test Assertion IDs like "com.example_FOO", or "com.example_BAR_BAZ_9876-42"

Note: The domain name used in Test Assertion IDs shall be a real domain name, and shall be registered on the Internet in the usual way, using the normal ICANN roots. There is no need for there to be a website there.

6.1.2.2 Test Assertion Version

The Test Assertion Version specifies a specific version of the Test Assertion and has the following format: <integer> version.

6.1.2.3 Title

A short title to identify this specific Test Assertion (mandatory).

6.1.2.4 Test Suite Version

Contains the version of the release, where the test related based on the Test Assertion was first time included.

6.1.2.5 Assertion Text

Describes what is tested in this Test Assertion . The Test Assertion value format shall be a text field (no limit). Whitespace is not significant.

For HbbTV tests, there shall be at most one assertion.

6.1.2.6 Additional Information

Contains information about challenges, i.e. when the challenge is raised against the test based on a test assertion, there will be information indicating that a challenge against exists but has not been validated.

6.1.3 References

6.1.3.1 Test Applicability

The Test Assertion specifies which specifications it applies to. Official HbbTV tests shall specify this element and shall use a name of "HBBTV" (case sensitive) and a version of "1.4.1", "1.5.1". Tests that are valid for more than one version of HbbTV shall include tags for all applicable versions. The master list of specification names is maintained by HbbTV Testing Group and is described in the HbbTV Test Specification [3]. For each spec element in the <appliesTo> tag, the test case shall:

- be conformant to that specification, and
- test some feature of that specification.

It is not necessary to include a spec element for every potential regime that could reference HbbTV to use this test. For instance, a country-specific testing regime may require support for HbbTV and seek to use a particular Test Assertion - it is not required to include a spec element for that regime.

Every test case shall have an appliesTo element with at least one spec element. It shall include a spec element for at least one HbbTV version. It may also include spec elements for other specifications as defined in the HbbTV Test Specification [3].

6.1.3.2 Specification References

References to the different specification sections or versions. For each version of the HbbTV specification, there is a list of sections covered by this Test Assertion (top-level). Each top level entry includes references to one or more specification sections. Each specification section has the following attributes.

6.1.3.2.1 Document Name

A short identifier for the document that contains the specification section (e.g. "HBBTV" for the HbbTV specification). A list of acceptable identifiers is maintained by HbbTV Testing Group and is described in the HbbTV Test Specification [3].

6.1.3.2.2 Chapter

The chapter number within the specified document (a dot separated list of integers or characters without spaces, e.g. 9.3.1)

6.1.3.2.3 Specification Text

The specific text from the referenced specification section tested by this Test Assertion (optional). The format of the specification text is a text field (no limit). Whitespace is not significant.

6.1.4 Preconditions

6.1.4.1 Required Terminal Options

The terminal options required on the DUT to run this test (if empty, this test is mandatory for all devices). The format of the Required Terminal Options value is a text field without spaces.

Available options and their correct usage are described in the HbbTV Test Specification [3].

6.1.4.2 Optional Features

Terminal features which are required on the DUT, in addition to required terminal options, to run this test. Available features and their correct usage are described in the HbbTV Test Specification [3].

6.2 Test Results

6.2.1 Overview (informative)

This document describes the Test Assertions for verification of HbbTV Devices.

6.2.2 Pass criteria

The result of the test shall be PASS only if all of the following criteria are met:

- 1) All normative test preconditions were satisfied.
- 2) All step results stored by the test harness have the value 'true' for the 'result' parameter.
- 3) All steps that involve analysis of device behaviour have been evaluated to give a result and that result is 'true'.
- 4) All steps that involve interaction with the test environment (e.g. user input through a remote, or changing the input media to the device) succeeded.
- 5) The test ran successfully to the end, and did not terminate abruptly.

If, at a given time, any of the above criteria are not met the result at that time shall be FAIL. However, users of reports of conformance against these assertions should note the possibility of FAIL results caused by test issues (Challenges), non-deterministic behaviours within the whole test environment such as internet connectivity and other factors. Therefore a robust review, challenge and waiver process will need to be implemented to interpret and address such issues.

6.3 Test Assertion repository

The HbbTV Association maintains a repository of current Test Assertions supported by the HbbTV Test Suite. The repository is maintained by the HbbTV Association in a timely manner to reflect changes to the status of the Test Assertions.

The repository of current Test Assertions can be found at the following link:

<https://tar.hbbtv.org>