



The Complex World of HbbTV

A White Paper by the HbbTV Experts

The world of HbbTV is **moving fast** and the area of HbbTV testing is **complex**.

This short white paper includes a brief introduction into HbbTV and covers the current adoption status as well as providing details of the HbbTV testing process.

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Digital TV Labs has been active in HbbTV since 2010. They attend all the interoperability plug-fest events, they sit on the HbbTV Association Steering Board and chair the Testing Group. Their engineers have a deep understanding of the HbbTV world and its latest developments.

What is HbbTV?

HbbTV (Hybrid Broadcast Broadband TV) is a dynamic industry standard which provides an open and business-neutral technology platform that seamlessly combines TV services delivered via broadcast, with services delivered via broadband. It also enables access to internet-only services for consumers using connected TVs and set-top boxes.

The founding members of the HbbTV Association together with a large group of supporters, jointly developed the HbbTV specification to create a global standard for hybrid entertainment services. The standard includes components of widely deployed and established technologies such as CE-HTML, DVB, W3C, Open IPTV Forum (OIPF) and MPEG-DASH. The organisation is governed by the HbbTV Steering Group, of which Digital TV Labs is an elected member. HbbTV has four active working groups: Specification, Marketing, Certification and Testing. (<http://www.hbbtv.org/>).

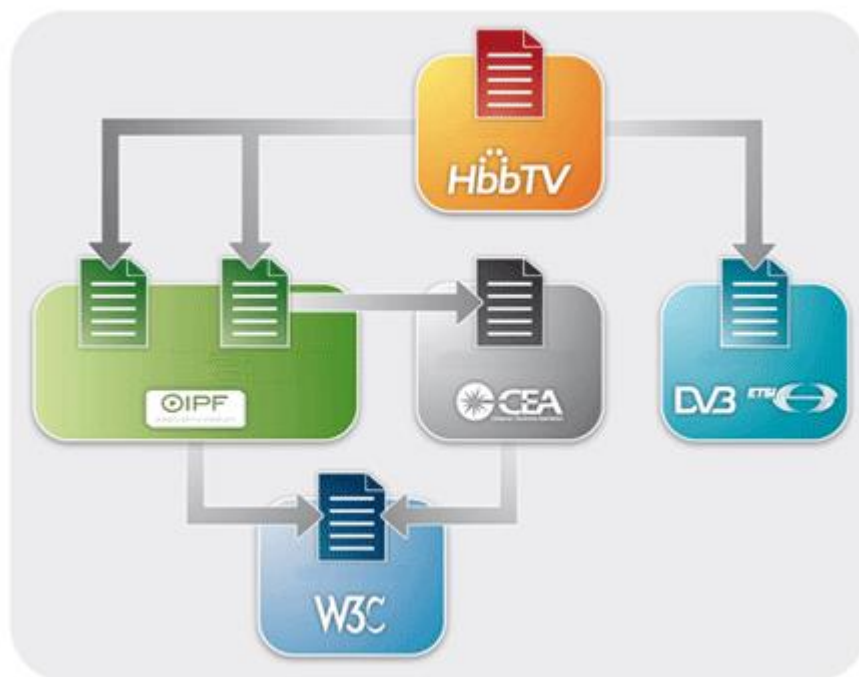


Fig. 1: Constructing the HbbTV standard

Why HbbTV?

Prior to HbbTV, the only two adopted interactive TV standards present apart from proprietary operator deployments were MHEG-5 (UK) and MHP (Italy), neither of which were widely adopted outside these countries in Europe. With the inclusion of internet connections on DVB receivers, the introduction of Smart TV platforms by manufacturers, and the desire for broadcasters to leverage Connected TV, the HbbTV standard was conceived.

The basis of HbbTV is CE-HTML: a subset of XHTML designed for the reduced platform capabilities of consumer electronic platforms. On top of this, HbbTV (via the OIPF specification) defines a set of JavaScript APIs which transforms a static web page into an application environment. This allows, amongst other things, interaction with the broadcast environment (e.g. to see the channel list, initiate recordings etc) and media streaming over IP.

Crucially, HbbTV is specifically designed to link these applications to DVB broadcasts. The broadcast streams contain AITs (Application Information Tables) which associate applications with broadcast services, which may be triggered upon zapping to a service. Applications can be distributed over IP through URL links in these tables, or for receivers with no IP connection, may be carried in the broadcast streams themselves using DSMCC. If an IP connection is present, applications can make use of internet services, for example catch-up services. The current HbbTV 1.5 specification takes the standard beyond simple streaming, enabling robust and monetised delivery with added support for MPEG-DASH adaptive streaming and optionally DRM.

HbbTV Deployments and Adoptions

The following countries have or are considering the deployment of HbbTV.

Country	HbbTV Deployments and Adoptions
Germany	HbbTV has been deployed for some time in Germany, both on satellite (e.g. Astra HD+) and Free-To-Air (FTA) terrestrial. It is carried by cable operators such as Telecolumbus and Primacom, as well as supported in the Kabelkiosk package.
Austria	HbbTV is available on most of the main satellite, cable and terrestrial networks, and from many of the broadcasters, with ORF, the public broadcaster having the widest range of services.
France	The French public broadcaster, France Television, has deployed an HbbTV-based video-on-demand (VOD) service. Eutelsat has adopted HbbTV for its FranSat satellite platform. Additionally, the new TNT2.0 platform complete with DRM in 2013 with the introduction of MyTF1. TNT2.0 is based on HbbTV 1.5 incorporating MPEG-DASH adaptive streaming and supporting the Marlin or PlayReady DRM systems. TF1 has recently launched HbbTV based shopping services.
UK	In the UK, the DTG-driven CTV project specified in D-Book 7 Part B heavily references HbbTV 1.5, but is yet to be adopted by any platform operator. Freeview and Digital UK today announced plans to develop a new Freeview-branded connected TV service which is believed to be wholly based on HbbTV2.0. Freesat G2 uses HbbTV.
Switzerland	Radio Télévision Suisse (RTS), which serves the French-speaking part of the country, was the first SRG affiliate to test an HbbTV service, with the other affiliates following in 2014. Available on cable and satellite networks, such as UPC Cablecom. Foreign, French and German, channels have extensive HbbTV coverage.
Netherlands	Dutch broadcasters SPS, NPO, RTL and others have adopted HbbTV for connected TV services. Platforms that support the service include Digitenne (terrestrial) and Canal Digitaal (satellite), though some cable operators have been reluctant to pass through HbbTV signalling.
Scandinavia	The NorDig standards organisation has dropped MHP and selected HbbTV 1.5 in the NorDig Specification version 2.4. Public service broadcaster, DR, has been running a pilot of its catch-up service on HbbTV with great success.
Denmark	Public broadcaster DR has services on terrestrial and cable platforms. German channels available in the country also have HbbTV service offerings.

Finland	Currently 14 channels provide HbbTV services on Digita's platform.
Poland	TVP, TVN and commercial channels Pulse TV and Eska are providing services on various platforms, with reach expected to be in excess of 0.5m by end of 2014.
Czech Republic	Czech public broadcaster CT has been providing services since 2012, including making available over 70,000 hours on content on demand. Recently commercial channels such as Ocko TV have launched services over satellite.
Spain	Abertis is launching TDT Hibrida a connected DTT platform for pay-TV services using HbbTV 1.5 platforms. Digital TV Labs is supplying a TDT Hibrida test suite.
Luxembourg	Test services have been ongoing and formal launch is expected in 2014.
Belgium	Broadcaster RTBF is currently trialling HbbTV.
Slovakia	RTVS has announced HbbTV services will commence by end of 2014.
Hungary	All Antenna Hungary channels on the terrestrial platform are HbbTV enabled.
Turkey	The latest DVB-T2 receiver specification for the imminent launch of DTT services specifies HbbTV.
USA	ATSC is in active liaison with HbbTV to use the technology as part of ATSC3.0.
Russia	The Russian Television and Broadcasting Network trials begun in 2013 with a formal launch expected soon.
Namibia	The Namibian Broadcasting Corporation is rolling out a DVB-T2 pay-TV service using HbbTV. The current specification includes HbbTV 1.1 as optional.
Senegal	Announced adoption of HbbTV as part of the national Digital Terrestrial Television rollout. Launch is expected in late 2014.
ME	A number of Middle Eastern countries are considering adoption.
Australia	Australia next generation Freeview platform, FreeviewPlus officially launched in Sept 2014. Digital TV Labs provides certification services for the FreeviewPlus logo.
Italy	Have expressed a move to HbbTV and away from MHP.
ASEAN Region	A number of countries are considering adoption as part of digital switch over.
Vietnam	Has have adopted HbbTV as part of their new DVB-T2 standard
Malaysia	Has have adopted HbbTV as part of their new DVB-T2 standard
South Africa	Plans to launch HbbTV services after finalizing ASO.

The Status of the Standards?

HbbTV 1.1 was published as an ETSI standard in June 2010 as ETSI TS 102 796 v1.1.1. In November 2012, HbbTV 1.5 was published by HbbTV as v1.2.1 of the ETSI standard. The key additions in the HbbTV 1.5 standard include DRM compatibility, DASH adaptive streaming and access to the DVB EIT schedule information from the HbbTV application. HbbTV 2.0 features are being finalised and the spec is expected to be released towards the end of 2014 with extensions to include HTML5, HEVC and support for companion screens.

HbbTV Testing and Test Suites

HbbTV Certification

The HbbTV Association is a standards body and does not enforce a certification regime. Compliance to the specification is governed by the use of the official HbbTV Test Suite. Licensees of the HbbTV Test Suite must not make any claim regarding passing the HbbTV Test Suite unless they have passed all the required tests. Manufacturers of receivers can either purchase the test suite (see below) or be certified by an HbbTV Registered Test Centre such as Digital TV Labs.

Use of the HbbTV Logo

The HbbTV Full Logo License Agreement allows organisations to use the HbbTV logo on HbbTV receiver products and packaging that implement either ETSI TS 102 796 v1.1.1 or ETSI TS 102 796 v1.2.1. It describes the obligations required of a Licensee wishing to use the logo, such as testing the product with the official HbbTV Test Suite and agreeing to modify the receiver if it is found to be non-compliant. An annual logo license fee of €1000 is payable plus a one-off admin fee of €2000.

The HbbTV Test Suite

The preliminary version of the HbbTV Test Suite (v0.95) is available for HbbTV members and non-members from www.hbbtv.org at a cost of €2,000 and contains 250 test cases. Digital TV Labs authored 117 of these test cases. This test suite has limited coverage of the HbbTV 1.1 specification only.

The HbbTV test cases included in the HbbTV Test Suite require an HbbTV compliant test harness such as Digital TV Labs' [Ligada iSuite for HbbTV](#) in order to operate (see Fig. 2). The test harness makes use of a specialised JavaScript API to communicate with test applications running on the receiver and to log results. Using this API and dedicated automation interfaces, the Digital TV Labs' Ligada iSuite automates many of the test cases.

Fig. 2: Ligada iSuite, at a glance

Ligada iSuite for HbbTV

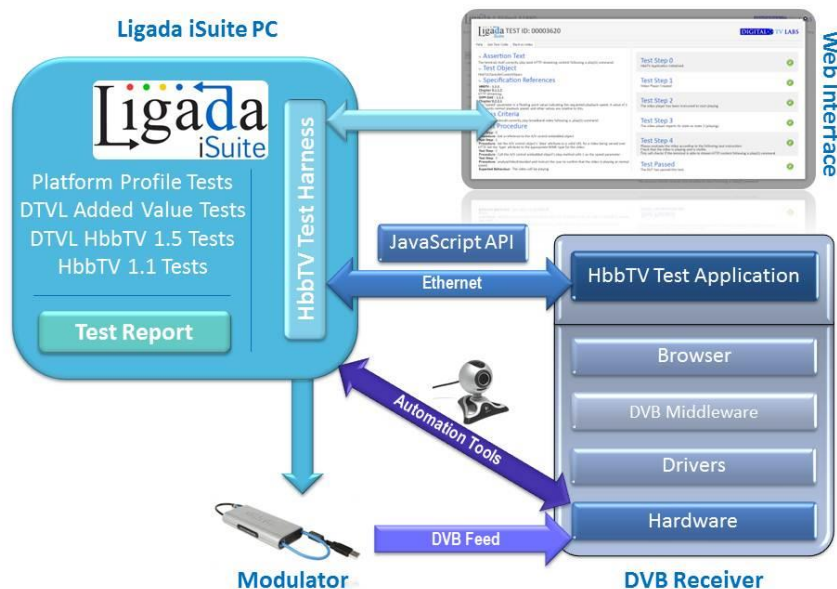


- Validates products against **HbbTV 1.1**
- Provides coverage for the **HbbTV 1.5** specification
- Minimises **interoperability** issues
- Intelligent **automation features** shorten test cycles and allow for **95%** automation of the official test cases
- Interactive test environment to **reduce development times**
- High level **test plan management**, allowing multiple projects with different plans
- Additional Test Suites available to validate for
 - France TNT2.0
 - Spain TDT Hibbrida
 - Australia FreeviewPlus
 - Netherlands HbbTV NL

The typical test set-up for Ligada iSuite is shown in Fig. 3 below.

To date HbbTV have not announced the release of the HbbTV 1.5 Test Suite. Ligada iSuite incorporates additional HbbTV 1.1 test cases and an HbbTV 1.5 test suite which includes MPEG-DASH and EIT-S API support and which will be submitted for adoption as part of the official HbbTV test suite later. Ligada also incorporates OIPF test cases that will be adopted as part of the official HbbTV test suite at a later date.

Fig. 3: HbbTV testing set-up



Operator and National Profile Testing

As mentioned in the “Standards and Adoption” section, there are a number of operator and national platforms that incorporate the HbbTV standard, and more are due to be announced soon.

In 2013, a number of French broadcasters launched HbbTV services based on the TNT2.0 specification. Manufacturers can test conformance against the TNT2.0 specification by purchasing the TNT2.0 Test Suite from Digital TV Labs or completing a TNT2.0 test at one of Digital TV Labs’ Test Centres. The TNT2.0 Test Suite contains some specific tests for the TNT2.0 platform – notably Marlin and PlayReady DRM test cases.

In 2014, Spanish DTT broadcasters began launching HbbTV service called TDT Híbrida, operated by Abertis. The platform implements a live device certificate white-list system which will enable any HbbTV application to interrogate the device certificate and, based on validation against the white-list, launch accordingly. In order to be white-listed, manufacturers must pass the Abertis-operated certification regime using the TDT Híbrida Test Suite build by Digital TV Labs which runs on Ligada iSuite.

Also in early 2014, Freeview Australia announced the adoption of HbbTV for its next generation DTT platform, FreeviewPlus. Certification is required from an HbbTV Test Centre, such as Digital TV Labs against the HbbTV 1.5 specification to obtain the mandated logo. In addition, manufacturers are required to implement Marlin or PlayReady DRM, similar to TNT2.0.

Recently, HbbTV NL announced their specification for the Netherlands HbbTV platform. Digital TV Labs Ligada iSuite for HbbTV can be utilised to validate conformance to the specification.

Application Testing

Ensuring that applications work on the wide and diverse range of HbbTV devices is a major interoperability challenge, as this is the first time in the history of digital TV that a standard application platform will be deployed across multiple horizontal markets. Application developers have the following testing options:



- *Testing on PC-based browsers*
- *Testing on multiple receivers*
- *Static application testing tools*

As HbbTV applications are based on familiar W3C technologies, many developers for HbbTV would expect to test using standard web tools for desktop browsers. However, the CE-HTML/JavaScript/CSS/Media specified by HbbTV is a significantly reduced subset of standard web applications which can present interoperability problems on later deployment. Crucially, this departure from the traditional web page is exaggerated by the inclusion of the detailed JavaScript environment defined by OIPF, of which HbbTV is the first major deployment.

Typically, application developers may include functionality which is not supported on strictly compliant HbbTV receivers. The problem is compounded, as some HbbTV browsers embedded onto digital receivers include desktop-browser features and are therefore not reliable test beds.

Digital TV Labs’ **Validator for HbbTV**, provided as a web service, is a specialist static code analysis tool which can be used by HbbTV application developers to verify their applications. Validator will:

- Check that applications are only using CE-HTML/JavaScript/CSS which is supported by the HbbTV Specification
- Check usage of OIPF JavaScript APIs
- Check that any files, including media objects, referenced by or contained within the application are accessible

Conclusion

In the fast moving world of internet video services, HbbTV has gained wide ranging support from broadcasters, operators and technology providers throughout the world, and is the leading harmonising standard of broadcast, IPTV and broadcast entertainment delivery. The standard has gone from inception to deployment in just 3 years and has sparked a wave of interest in many global regions.

This burgeoning interest brings about challenges of integrating nascent technologies and frameworks such as OIPF and MPEG-DASH and effective customised profile creation at a national or operator level, as well as on-going conformance that has been instrumental in making standards such as DVB a success.

Conformance really is key to end-user adoption, as poorly delivered content and applications can lead to negative user perception. Digital TV Labs, having been an active contributor to HbbTV since 2010, has a number of services and products to address some of these concerns such as Ligada iSuite for HbbTV, Validator and our HbbTV consultancy and training services.

The continuing standard development work, planned or currently in progress, is testament to the world's interest in the industry and HbbTV's rapid rise to widespread deployment.

For more information about HbbTV, or any of Digital TV Labs' testing or consultancy services, please contact info@digitaltv-labs.com