



Whitepaper on HbbTV Testing for Broadcasters and Operators

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HbbTV presents broadcasters and operators with a business-model neutral method to combine broadcast and broadband delivery and provide unified, enhanced and compelling interactive services. Catch-up services, VOD, Gaming, DRM protected content and operator portals and branded EPGs are all deployed on HbbTV platforms today. Next generation TV platforms based on HbbTV are live across the world in over twenty countries, including in France, Germany, Spain, Australia and New Zealand. More recently UK and Italy have announced platforms based around the latest version of the specification, HbbTV 2.0.

Generating commercial success from these applications requires a good, consistent user experience on all devices. The only way to be certain this is being achieved, and that new services not yet written or deployed will work on devices in the market, is through testing. The HbbTV Association and its members have a range of testing approaches to assist the deployment of HbbTV platforms and services.

Deploying HbbTV – what is needed?

Some considerations for HbbTV deployments include:

Head-End Integration: One of the key aspects of HbbTV deployment is integration into broadcaster Head-End infrastructure. Application and EPG (DVB) signalling must be tightly coupled with HbbTV elements to ensure correct synchronisation of interactive, value added and revenue creating applications and services.

IT Infrastructure: Streaming and other IT infrastructure must be scalable to meet the demand of HbbTV services. IP-video delivery requires a DASH origin server, content delivery network and (optionally) a DRM solution to be defined, tested and deployed.

Migration: For platforms with legacy technologies already deployed and an existing base of deployed receivers, a migration plan and interim coexistence testing approaches need to be considered.

Interoperability: To maximise reach and continued end-user engagement, HbbTV applications must be interoperable with deployed and forthcoming receivers.

TV Experience: Existing service provider OTT and multiscreen infrastructure can be re-used, but viewers expect a lean-back TV experience, and appropriate technology, service offering and UI considerations should be taken into account. Successful services require compelling applications and operators and broadcasters need to test and ensure those applications will work for all consumers.

Why is Testing important?

The HbbTV specification defines playout, transmission, receiver and application environments and refers to clearly defined and open standards. However lean-back consumers have zero patience meaning any malfunction in the chain will significantly reduce engagement and impact and may even result in viewers switching to another service.

Figure 1 illustrates the need for testing using a test suite and why simply running existing applications on existing receivers is not a guarantee that future applications will work. HbbTV App 1 only exercises part of the HbbTV platform, leaving part of the API untested. HbbTV App 2, when it's deployed on devices in the market may fail if devices have only been tested against App 1.

Devices are not so easily updated, or frequently replaced, and the HbbTV test suite aims to cover a broader range of the specification that may be used, not just those for the current known application deployed today.

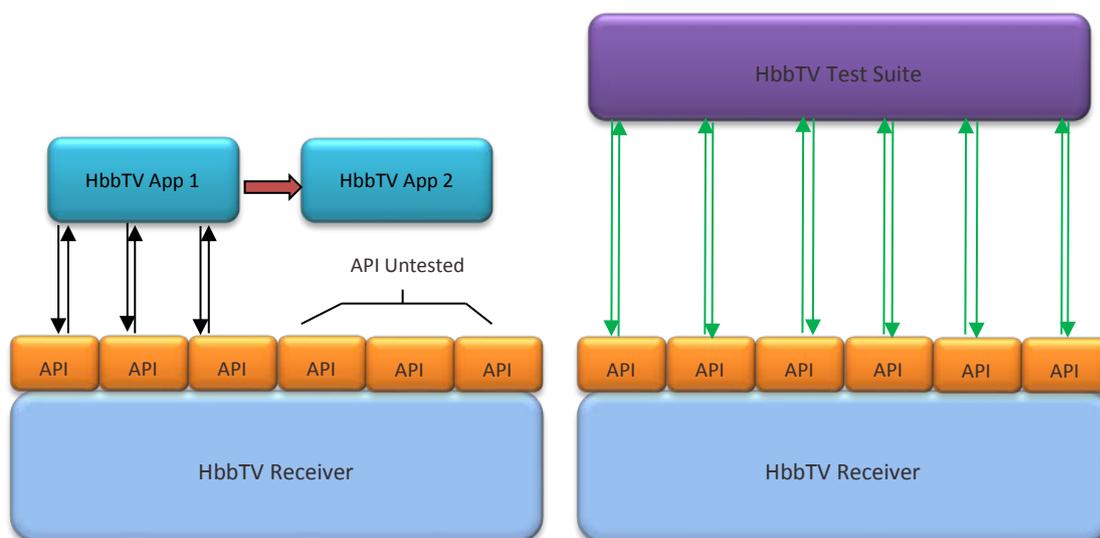


Figure 1 - HbbTV test suite covers more of the HbbTV platform than application testing alone

To avoid these kinds of issues and for a deployment to be successful, a strategy for comprehensive testing of individual components and the system as a whole is required. To achieve this, two components are needed:

Receiver Specification: Application developers and device manufactures require clear guidance in order to bring applications and devices to market. A receiver specification must address a number of factors including content security, application security and custom APIs as examples. The HbbTV Specification is designed to comprehensively address the common technologies needed for a hybrid service and therefore avoid the need for local variations. It also remains agnostic about certain implementation choices, for example the specific DRM that will be used, and there are often regulatory requirements that vary between deployments.

Device and Application Conformance: A method to check receivers meet the specification to reduce interoperability issues should be in place, in conjunction with testing toolsets aligned to the specification. The HbbTV Test Suite is designed to verify device conformance to the HbbTV specification and other associated specifications (such as those from DVB and W3C). In parallel, applications need to be tested to ensure compliance with the specification and a number of tools and methods from third parties exist to address this.

It must be emphasised that while running and passing the HbbTV Test Suite on receivers is absolutely necessary for interoperability, it is not sufficient. Running applications on receivers is also needed as applications will test the use of APIs in combinations that will not be tested by a test suite which is fundamentally a set of unit tests.

How does the HbbTV Association address testing?

HbbTV Testing

The HbbTV Association provides a test suite for members and non-members (via a Registered Test Centre) to verify that devices or components of a device are compliant to the specification. Manufacturers can either licence the test suite (see below) to certify their own devices or have their devices certified by an HbbTV Registered Test Centre. Licensees of the HbbTV Test Suite may not make any claim regarding HbbTV conformance, unless they have passed all the required tests.

The HbbTV Test Suite

The major effort by the HbbTV Association outside the development of the specification has been the creation of the HbbTV Test Suite. HbbTV employs a rigorous process for creating and reviewing the test material to ensure it is of a high quality. At time of writing, the latest version of this suite (v8.0.0) contains over 900 test cases. It is available to members who licence it or to non-members through registered test centres; please visit <http://hbbtv.org/resource-library/#testing-information-and-support> for details,

The v8.0.0 version of the test suite is approved for certification of devices for the following HbbTV specifications:

- ETSI TS 102 796 v1.2.1 + Errata 2 (HbbTV v1.5)
- ETSI TS 102 796 v1.1.1 + Errata 2 (HbbTV v1.0)

Tests for HbbTV 2 are expected to be approved during Q4 2015 and 1H 2016 as they are reviewed and accepted by HbbTV. Prior to this, the draft tests will be included in the test suite as “additional test materials” while they receive final review and acceptance by HbbTV. The current suite also contains additional test materials to cover Open IPTV Forum specifications, and this “additional test material” could in future releases contain tests for other specifications. This “additional test material” also provides a means to include additional tests within the HbbTV Test Suite for regional deployments (Nordig are considering this approach).

HbbTV welcomes feedback and contributions from broadcasters and operators to add to and improve the test suite. If problems common to multiple manufacturers’ products are found and reported to HbbTV, then they can be analysed and the test suite expanded accordingly. For example, HbbTV received reports from Freeview Australia concerning issues around launching broadcast-related applications and media playback. These were analysed and additional test cases purchased as part of the HbbTV 2.0 test suite activity. As later examples will show, other operators have acquired additional test materials directly and then contributed these into the HbbTV Test Suite.

The HbbTV test cases included in the HbbTV Test Suite require an HbbTV compliant test harness; details on how to obtain a test harness which provides minimum required functionality to execute approved test materials in a manual way are provided with the test suite.

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, it is possible to automate many of the test cases, and commercial test tools which implement the test harness specification are also available. Alternatively organisations may implement their own test harness according to the specification.

The test harness specification also defines a standard format for reporting the results of running the test suite. If a broadcaster or operator’s certification regime requires evidence of passing the HbbTV test suite, then it is recommended that manufacturers be required to provide these results.

HbbTV Registered Test Centres

For typical operators and broadcasters, HbbTV testing is not a core competency and keeping up to date on best practices, managing new versions of specifications and test materials, scheduling logistics, retesting and support requires a significant investment in time, labour

and money. HbbTV Registered Test Centres are able to offer HbbTV testing services to assist with the deployment of new services and certification of devices or components of a device. Please see <http://www.hbbtv.org/resource-library/#testing-information-and-support> for a current list of registered test centres.

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 for receivers that implement an HbbTV Specification. 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 is payable plus a one-off admin fee – please see the <http://www.hbbtv.org/resource-library/#testing-information-and-support> for more details.

HbbTV Interoperability Workshops

HbbTV organises regular interoperability workshops – usually occurring 3 times a year in Germany - where device manufacturers and application providers can work together to test applications and debug interoperability issues. These are open to any company, not just members of HbbTV. Broadcasters and Operators may choose to run additional local interoperability testing events for their own target markets, and HbbTV can help to publicise these and HbbTV members can help support and run them.

HbbTV Application Testing

Ensuring that applications work on the wide and diverse range of HbbTV devices is a major interoperability challenge. Even if a device has been certified with the test suite, there is no guarantee that it will correctly present an application which uses HTML and JavaScript features that are not included in the HbbTV specification. Application developers currently have the following testing options to enhance their in-house testing efforts:

- Static application testing tools such as Eurofins Digital Testing's HbbTV App Validator and IRT's Validate HbbTV service.
- Testing on PC-based browsers using emulators such as FireHbbTV or Opera's HbbTV Emulator.
- Testing on multiple receivers through a receiver collection or 'zoo'.

Care must be taken when using the last two options as any specific implementation will likely include features that are not included in the HbbTV specification but not excluded by it either. An application using one of these features may be presented correctly on one implementation but fail on another in the future (where that device is fully compliant with the HbbTV specification).

HbbTV Testing Solutions

Furthermore, a number of HbbTV member companies offer a suite of additional services to help operators and broadcasters with comprehensive testing solutions covering training, planning and deployment.

HbbTV testing and Certification in deployments around the world

There are a number of operator and national platforms that incorporate the HbbTV standard, and many more are working towards its adoption in markets across Europe, Asia Pacific and globally.

These platforms adopt different approaches to testing and certification across these deployments. In most cases the platform has market specific needs – such as choice of DRM system or UI requirements – that go beyond the HbbTV Specification.

In 2013, a number of French broadcasters launched HbbTV services based on the TNT2.0 specification. This incorporated parts of HbbTV 1.1 and 1.5 and some additional TNT2.0 specific requirements such as performance and Marlin or PlayReady DRM support. Many of the HbbTV 1.5 tests that were created for this platform have now been contributed back to HbbTV part of the official HbbTV Test Suite, but France has no platform logo and no enforcement of passing the tests.

Other operators have ensured interoperability of these extensions by creating their own additional HbbTV test cases and enforcing that these tests, along with the HbbTV official test suite, are used to test receivers wishing to use the platform logo. A few examples follow:



In 2014, Spanish DTT broadcasters launched an HbbTV service called TDT Hibrida. 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, adapt its behaviour accordingly. In order to be white-listed, manufacturers must pass the operator certification regime. This regime includes testing against the TDT Hibrida Test list, which also references the HbbTV Test Suite and some DRM and local specific tests.

In Spain local interoperability testing events have been organised to help manufacturers and application developer debug issues on target devices and help foster the adoption of HbbTV in the local market.



Also in 2014, Freeview Australia announced the adoption of HbbTV for its next generation DTT platform, FreeviewPlus. Certification is required from an HbbTV Registered Test Centre against the HbbTV 1.5 specification to be able to use the FreeviewPlus logo. In addition, manufactures are required to implement Marlin or PlayReady DRM, similar to TNT2.0. Freeview also conduct their own additional internal testing of devices against test applications. A very similar FreeviewPlus platform has been separately rolled out in New Zealand with comparable functionality and a mandatory certification regime.



Meanwhile, in the UK, Digital UK announced the adoption of HbbTV in its new service branded FreeviewPlay that was launched in October 2015. At this time, details of the certification and testing regime are not public but launch partners have been using early HbbTV 2.0 test materials, along with existing DRM and local specific tests to validate devices to the FreeviewPlay launch specification.

Conclusion

In the fast moving world of TV, HbbTV has gained wide ranging support from broadcasters, operators and technology providers throughout the world, and is the leading harmonising standard of broadcast and broadband entertainment delivery. However, as with all complex platforms, integrating technologies and frameworks from DVB, W3C, OIPF and others brings interoperability challenges that must be addressed through application and device conformance testing.

HbbTV and its members have a variety of solutions to address these challenges and continue to invest in the development of test materials, interoperability testing and certification. For operators and broadcasters already deploying HbbTV services or looking to adopt the technology, therefore, there are many ways to ensure that services are successful and consumers get the experience they expect from today's TV platforms.

For more information about HbbTV please visit the website <http://hbbtv.org/> or contact info@hbbtv.org.