The necessity of establishing an HbbTV Test Center

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Abstract

The HbbTV specification has been adopted and embraced by many countries and broadcasters. Many receivers are supporting HbbTV standard, but which of them are supporting local HbbTV profile? When developing HbbTV services, setting up an HbbTV test center and a certification logo regime will be needed to ensure right functionality of receivers.

Keywords: HbbTV, HbbTV Test Suite, Harness, logo regime, Test center
1- Introduction
The HbbTV (Hybrid Broadcast Broadband TV) specification has been adopted and embraced by many countries and broadcasters. According to the HbbTV Association [1], currently 35 countries have deployed HbbTV.

![HbbTV deployment in worldwide](image)

In some countries, broadcasters have joined forces in launching a common HbbTV platform. Lovestv in Spain is a good example. It is a common HbbTV platform launched by Spanish public broadcaster RTVE and commercial broadcasters Mediaset España and Atresmedia. [2] Also, some other countries that interactive services on Digital TV were offered by MHEG or MHP, are migrating their services to the HbbTV; Freeview in UK and tivu in Italy are such examples. [3]

As shown in the Figure 1, HbbTV has been adopted in some Asian countries, also. For example TRT ARTI by TRT in Turkey, Media plus and tonton by media prima and myklk in Malaysia and Toggle in Singapore. Vietnam and Indonesia are trialing HbbTV services also. [4]

Different companies that are involved in receiver manufacturing are supporting HbbTV. For example Mstar and Broadcom as a chipset producer and Seraphic and Vewd as a middleware and browser providers. Also, 44 million devices are HbbTV capable and in most European countries almost all connected TV sets have HbbTV as a standard feature. Figure 2 shows global HbbTV sales in 2017. [5]
2- The necessity of setting up a test center

As mentioned one of the most important advantages of HbbTV is the diversity of receivers, but it is also of the most damaging disadvantage of it. There are so many receivers that support HbbTV, but which of them have the desired profile and correct behavior? The broadcasters need a way to be sure about it but why is this guarantee required?

Chairman of the HbbTV Certification Group explains the reasons as follows [6]:

“There are fundamental differences in the product lifecycle between TVs and other high tech consumer equipment such as PCs. TV receivers are not so easily updated, or frequently replaced then it be ensured that receivers will support a broader range of the specification that may be used, not just those for the current deployed application.

There are also major differences in consumer expectation regarding the product performance between these sectors. There is no expectation by the consumer that every application will work perfectly on every PC in every configuration, but they expect broadcast applications (delivered as HbbTV applications) to be displayed correctly and to function as anticipated on their TVs.

Broadcasters need this insurance because they wish to ensure that the application which they are broadcasting will be handled in exactly the same way on every TV, regardless of the manufacturer, the software architecture or the underlying hardware ”.

Based on mentioned points, a conformance regime should be setup in local market to ensure receivers in the market are compatible with local specification. Case studies show three conformance methods in different countries as follows [7]:

- **Without confirmation regime**
  In this model there is not any confirmation regime. Market is uncontrolled and there is not any way for viewers to be sure about the correct functionality and quality of receivers. Broadcasters are not able to add new services because they don’t know which features are supported by receivers. Lots of bad receivers in the market will damage the platform brand.
● **Confirmation by manufacturers without the supervision of another center**

In this model, receivers will be confirmed by their manufacturers. This model relies on manufacturer’s honesty and broadcasters can’t be sure about the receiver functionality.

● **Confirmation by a test center under supervision of a broadcaster**

In this model, test centers will be announced by broadcasters and there is a logo regime confirmation. Manufacturers submit receivers for testing in a test center. Quality of receivers is ensured and interactive applications are verified to work correctly. Because receiver functionality and quality in the market is maintained, broadcasters can plan new services. By giving the logo to certified receivers, manufacturers can show to their customers that the TV is compliant with HbbTV specification and works well. Consumers will be sure about the functionality of receivers. Some examples of HbbTV logos are Freeview play in UK, Freeview plus in Australia, Freenet TV in Germany, Toggle in Singapore and Antenna Ready SMART HD in Finland.

As explained above the most reliable way to launch the service correctly is to control the market with a logo certification regime. The logo is a label that broadcaster or operator designs. This logo informs everyone, that the receiver is certified and it can launch applications and services correctly. Receivers for getting this logo should go through a specified process with specific steps. Fortunately HbbTV Association provides an official Test Suite and also materials to facilitate this procedure.

### 3- HbbTV Association test efforts

The HbbTV Association provides a Test suite to verify that devices or components of a device are compliant to the specification. Currently the latest Test suite includes tests for ETSI Specification v.1.4.1. Tests for HbbTV Specification v.2.0.2 are expected to be added during second half of 2018.[8]

HbbTV Test suite is accessible through an HbbTV Registered Test Center that are listed by the HbbTV Association. The list includes DTG Testing Limited, DTV Accredited Compliance Lab (part of Samsung Electronics), Eurofins Digital Testing, Labwise Oy, Sofia Digital Ltd., Sony Europe Ltd. and Vestel Electronic A.S. HbbTV Registered Test Centers are able to offer HbbTV testing services to assist with the deployment of new services and certification of devices or components of a device.[9]

Test suite consists of Test plans, Test cases (data, procedures, scenarios, and expected results), Test streams and Pass and fail criteria. Test Assertion is 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. Test material is all the documents (e.g. HTML, JavaScript, and CSS) and additional files (DVB-TS, VoD files, static images, XMLs) needed to execute the test case. [9]

Test suite runs with a Test Harness. The Test Harness is a system which orchestrates the selection and execution of Test Cases on the receiver, and the gathering of the Test Case Results for the Test Report.[9]

Figure 3 shows a test system. Test cases (that were created based on test assertions and include test materials) will be transmitted by HbbTV Test Harness to the receivers according to test procedure. Harness does this test automatically and final report of test result will be produced.
4- Other test materials

Together with the HbbTV official test suite, HbbTV provides some additional test materials to solve specific challenges in the market. One of these materials is the HbbTV Dash DRM Reference Application.

Interoperability concerning different DRM implementations, DASH profiles and video formats has been a long-standing issue in real-world HbbTV implementations and terminals. Thus HbbTV defined a project to develop an open source application and tools that could be used by all interested parties. One of the main targets of this project was that to reduce of time-to-market for new DASH/DRM apps and to avoid solving the same problems over and over again by providing a common platform for anyone to adapt. Sofia Digital developed the Dash DRM Reference Application and it is available for test. [11]
5- **Set up a local certification regime**

For setting up a local certification regime following steps should be defined:

- **Authoring the receiver specification:**

  HbbTV standard includes many features and any country should define local HbbTV profile. Broadcaster should write receiver specification based on country profile, but before it, they should be realistic in determining their country profile. HbbTV standard contains many features, but not all of them have been implemented.

  Receiver specification must not be a wish; it should be a feasible one and the features must be listed clearly. It should be reviewed by other stakeholders to make sure that it is accepted by the manufacturers.

- **Defining a logo**

  The logo should be unique and only receivers that support the receiver specification should be allowed to use it. Consumers, retailers and manufacturers should be informed about the Logo. The logo will then tell to the consumers that receivers with this logo work correctly.

- **Creation the Legal procedures for logo confirmation**

  Legal procedures for logo confirmation should be established and a concessions policy should be developed to encourage manufacturers for adopting the logo. Also market should be controlled to prevent from selling nonstandard receivers. All receivers should be tested in the test center before availability in the market.

- **determining a/some test center/s and producing the Test suite**

  A test center should be specified for testing the receiver functionality and minimum requirements of the receiver. This test center should work together with a registered HbbTV test center to test with the official Test suite. Also the test center should create local test suite according to the local receiver specification. The team behind the test suite should be well-established experts so they can provide help and support for a long time. Receiver specification should be updated regularly, so the Test Suite should be updated, as well. It is also a good idea to follow the original HbbTV Test Suite format to ensure easier take-up of the local test suite by different manufacturers. For example in Spain and Nordic countries the country-specific test suite is compatible with the main HbbTV Test Suite.

  White list of confirmed receivers can be created and receivers that are certified and received the logo should be announced in a website.

- **Announcement of the logo conformance regime**

  The official body controlling the conformance regime should define clear registration instructions, instruct where to go for certification testing, and enough of the details of certification process and documentation.
6- An example of certification regime: The certification regime in Finland

The Nordic IRD technical specifications are established with the aim to ensure that IRDs in the Nordic market satisfy a common set of minimum requirements, independent of operator/service provider and transmission media. This specification is publishing with cooperation of different companies and operators and broadcasters. [13]

![Figure 5- NorDig IRD profiles](image)

Finland as a country of Nordic region follows NorDig IRD technical specification. But in Finland some localization on NorDig specification was created based on the country profile for the Finnish market. Finnish Antenna Ready HD and Finnish Cable Ready HD are defined as logo for IRDs.

To ensure the proper functionality of hybrid services in TV sets, Antenna Ready RY and the Finnish Federation for Communication and Teleinformatics(FiCom) agreed to start testing smart TV receivers. Antenna Ready Smart HD testing ensures that Finnish broadcaster’s Hybrid TV services function properly in TV receivers that operate in terrestrial broadcast network and include hybrid features. [14]

![Figure 6- Finnish IRD logos](image)
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The processes of certification for logo are as follows:

The manufacturer familiarizes itself with the Nordig specifications available from nordig.org. Then, after deciding it wants to enter the Finnish market, the local representative for the brand instructs the factory or parent company to consult the website for Finnish certification available at https://www.testatutlaitteet.fi/manufacturers. In the website the two test laboratories are listed, and the manufacturer is free to choose either one.

After agreeing the contract, the project is started, and the manufacturer typically submits 2-3 pieces of the devices under test. The test laboratory starts the tests, and in co-operation with the manufacturer the tests are then passed. The process takes anything from 4-8 weeks. After successful passing of the tests, the finalized test report is submitted to the umbrella organization for Ficom. In there, the Ficom Receiver certification experts group reviews the report and decides whether the logo can be granted to the manufacturer device platform. After successful decision, the devices are listed in the above-mentioned website. There are separate lists for Cable, Antenna and Hybrid devices. The license is valid for three years.

7- HbbTV trial in Iran

Study on HbbTV standard, its solutions and services was started in IRIB Research and development department since 2014. Thanks to these studies and after evaluation of different solutions, HbbTV end-to-end solution using Sofia Digital Backstage Starter Kit [15] was set up in the laboratory of IRIB R&D in December 2017. The goal of this trial was the evaluation of different features of the standard and their feasibility, knowing the different services types, and knowing the challenges of its implementation before its launch in a larger scale. [16]

![Figure 5: a typical architecture for HbbTV solution [15]](image)

Receivers that were used in the trial were supplied based on the first model of confirmation regime, from an uncontrolled market. So there was no clear way to make sure that the standard version and features of the receivers were fully assured. All assurances were based on receiver manufacturer’s claim.
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Many tests were successful in the trial. The results of the trial showed many benefits of HbbTV for IRIB such as:

- compatibility with DVB head end
- possibility of making synchronizations between DVB content and application
- possibility of transmission of application thru broadcast without the need for broadband
- possibility of introducing wide ranges of interactive applications thru broadband
- possibility of providing additional information related to the broadcast content
- easy app development
- development of services independent of specialist companies like the STB or TV provider

But one of the most important observations in the trial was the lack of support for some features of HbbTV standard by some receivers. Some of the observations are as follows:

- One of the receivers couldn’t launch application thru carousel or stream event
- One of them had problem in broadcast video scaling in some applications
- One of them didn’t show Farsi font correctly.
- One of them had problem with playing Live dash.

Results also showed that in order to achieve the maximum benefit, there’s a strong need of writing the receiver profile, setting up a test center, and having a certification logo regime for the receivers.

After the successful trial of HbbTV and earning valuable experiences in a laboratory environment, a new trial in the city is in process. First tests of a HbbTV service have been transmitted by DVB-T2/HEVC transmitter in Tehran since 31 May 2018, and now it is accessible on Ch. 31 UHF in TV3.

8- Conclusion

HbbTV is still at the beginning in Iran. Minimum requirements specification of HbbTV receivers was published and negotiations about it with manufacturers is in process.

Note that setting up a test center and defining a certification logo regime for assurance of receivers with correct functionality is essential. Without a test center, the market may be out of control and there will be no assurance of proper service reception. This will seriously damage the development and penetration of the service.

9- References

[1] https://www.hbbtv.org/deployments/
[13] NorDig Unified Requirements for IRD for use in cable, satellite, terrestrial and IP-based networks, ver 2.4