



Discussion Paper

***The Implementation of Hybrid Television
Services in Europe***

Version 1.0 November 2011

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Introduction

Hybrid broadcast and broadband television leverages the benefits of broadcast and Internet technologies to bring new services to viewers. Broadcast delivery technologies, such as DVB-T on the digital terrestrial television platform, are used alongside broadband technologies so that viewers can access such services as live and on-demand content from a single receiver. Content can be accessed using either the broadcast technology (i.e. DVB-T) or broadband technology (i.e. IP)

Various terminologies are used to describe the integration of broadcast and broadband services. For the purpose of this handbook, the term **hybrid television** will be used irrespective of the technology referenced.

Examples of hybrid television services include information services such as weather and news, electronic program guides, catch-up television, interactive advertisement and on-demand video. While live television services are delivered to viewers using a broadcast technology, many of the supplemental services make use of the broadband connection for on-demand and low-bandwidth content.

Current hybrid television standards deployed

Three standards have been developed that can currently provide hybrid television services. In addition, many top brand consumer manufacturers have made available proprietary hybrid solutions.

MHEG-IC

MHEG-IC (Interaction Channel) is an extension of the MHEG interactive middleware developed by the Digital Television Group (DTG) in the United Kingdom. It makes use of the same standard protocols used to deliver web content to computers such as TCP-IP, HTTP and HTTPS. www.impala.org

This standard is used in the United Kingdom for its Freeview HD and Freesat (DVB-T2 and DVB-S2) platforms. In addition, 6 countries (Australia, Germany, Hong Kong, Ireland, New Zealand, United Kingdom) have adopted MHEG-5 for interactive services on at least one television platform.

GEM/MHP

GEM/MHP is an open standard for interactive services developed by the DVB Project. It is a Java-based environment designed for use on DVB platforms but can also be used on other digital television platforms. www.dvb.org

Italy is the most extensive MHP market in Europe with over 10 million MHP-enabled receivers in homes. Other countries with some MHP services available on at least one television platform include Belgium, Germany, Korea, Poland, Saudi Arabia, Spain, Switzerland and Taiwan.

HbbTV

HbbTV is an interactive middleware that makes use of existing broadcast and web technologies such as OIPF (Open IPTV Forum), CE-HTML, HTML and the DVB Application Signaling. It was developed by a group of 10 broadcasters and consumer electronics manufacturers alongside a group of their supporters. <http://www.hbbtv.org>

Deployment of the HbbTV standard is in early stages since its standardization by ETSI in June 2010. As of July 2010, commercial services are available in Germany while the Czech Republic, France and Spain have announced plans to adopt the standard. Currently, pre commercial services are available in France and Spain and trials underway in Austria, Denmark, the Netherlands and Switzerland.

Purpose of the DigiTAG Discussion Paper

The DigiTAG Discussion paper on the Implementation of Hybrid Television Services in Europe brings together the requirements related to hybrid television that have been developed by broadcast organisations and industry groups across a number of European markets. It includes the technical specifications, including those in draft format, currently available from France (HD Forum), Italy (HD Forum), the Nordic countries (NorDig) and Spain (AEDETI) as well as the Principles for Internet Connected and Hybrid Television issued by the European Broadcasting Union (EBU).

These requirements address hybrid television receivers (processing digital audiovisual signals in combination with a hybrid application) and hybrid television services provided by broadcasters. Various obligations are placed on the receivers, service provider, broadcaster and/or platform operator. Requirements placed on receivers only address those receivers that are sold through the open retail market and when responding to broadcasters' signals. Requirements do not address any signals or information from an external device connected to a television set. In addition, they do not place any obligations on the manufacturer's portal unless specifically stated.

The Discussion Paper aims to identify requirements at a European level which can be broadly agreed by the industry. However, in an effort to provide complete information, it also includes proposed requirements which some stakeholders in the industry may not support.

The Discussion Paper groups the requirements into three categories:

- *Agreed requirements*: these requirements are applicable across several markets and can be implemented for deployment in 2012. These requirements cover the key principles for hybrid television services, features for hybrid television services provided by broadcasters, features for hybrid television receivers, and specification related features.
- *Future requirements*: these requirements are forward-looking and may best be considered as aspirations rather than requirements.
- *Controversial requirements*: these requirements have not achieved consensus by all DigiTAG members for implementation in an open retail market. They may be specific to one country or market.

Definitions, References and Acronyms

Definitions

To clarify any possible misunderstanding that may arise regarding the terms used, definitions have been provided below for those terms that could have more than one meaning

- **Application**: a service available from the hybrid television system.
- **Broadcast independent application**: an interactive application not related to any broadcast channel or other broadcast data.
- **Broadcast-related application**: an interactive application associated with a broadcast television, radio or data channel, or content within such a channel.
- **Commercial communication**: content that appears on the screen from a service provider with service usage information.
- **HD resolution**: resolution as defined in ITU-R BT 709. Includes, but is not limited to, 1080i/1920/25, 720p/1280/50, 1080psf/1920/25.
- **Hybrid broadcast / broadband (HBB) systems**: The combination of technical specification and related operational processes (e.g. testing and certification) and contracts (e.g. trademark license) that together define how services can be provided to the end-user based on combinations of traditional broadcast and broadband delivery mechanisms.
- **Hybrid television portal: the entry point** used by the viewer to access the services made available by the HBB system. This term can be used interchangeably with Home Screen and Hybrid TV Menu.

- **Hybrid television receiver:** any receiver, including both television sets and set-top boxes, that can decode services from both a broadcast and a broadband source. The term device is used interchangeably with receiver.
- **Television display:** area of the device used for viewing video content regardless of the origin of the content. This term can be used interchangeably with television screen.
- **Third party content:** content not provided, directly or indirectly, by the broadcaster.

In addition, the terms “shall”, “must” and “should” are used throughout the document. “Shall” and “must” are used for requirements that are considered mandatory while “should” is used for requirements that are considered highly recommended.

Informative References

The below references have been used in compiling these Guidelines in either their draft or final version, as available. In addition, formal liaison has been established with Digital Europe, DTG (UK), Germany DTV Platform and the HbbTV Consortium.

AEDETI, “DTT receiver recommendations for the interactive Spanish market,” version 2.0, 7 June 2011

EBU, “Principles for Internet Connected and Hybrid Television in Europe,” 15 April 2011. Available at http://www.ebu.ch/CMSimages/en/leg_pp_HBB_EBUprinciples_150411_tcm6-71787.pdf

HD Forum France, “TNT 2.0 Terminal Specification,” 7 July 2011.

HD Forum Italia and DGTVi, “Compatible High Definition receivers for the Italian market: baseline requirements,” Final 2.0, volume 1, 2010. Available from the website of the HD Forum Italia at: <http://www.hdforumitalia.org/HD-Book.asp>

NorDig API Subgroup, “NorDig requirements for a Hybrid TV API (Draft),” 25 March 2011.

Standards Referenced

The below standards have been referenced in these Guidelines.

[DASH]	ISO/IEC 23001-6 Information technology – MPEG systems technologies – Part 6 Dynamic adaptive streaming over HTTP (DASH)
[HbbTV]	ETSI TS 102 796 1.1.1 Hybrid Broadcast Broadband TV

Acronyms

The below is a list of acronyms and their definitions used in the text.

AIT	Application Information Table
CI Plus	Common Interface Plus
DASH	Dynamic Adaptive Streaming over HTTP
DRM	Digital Rights Management
DTT	Digital Terrestrial Television
DVB	Digital Video Broadcasting
EU	European Union
HBB	Hybrid broadcast / broadband
HbbTV	Hybrid Broadcast Broadband TV
IP	Internet Protocol
IPR	Intellectual Property Rights
MAC	Media Access Control
MMI	Man Machine Interface
OIPF	Open IPTV Forum
PVR	Personal Video Recorder
RTSP	Real Time Streaming Protocol
URL	Uniform Resource Locator

Agreed requirements

The requirements in this section can be found in nearly all of the national requirements for hybrid television services and receivers and have generated support from broadcasters, network operators and the major consumer electronics manufacturers.

These common requirements are grouped into five sections: key principles for hybrid television services, features for hybrid television service provided by broadcasters, features for hybrid receivers, and features that are related to a single standard.

Key principles for hybrid television services

The key principles for hybrid television services include all requirements that define the intrinsic characteristics of the system. These requirements cover such topics as the use of existing standards and the respect for national broadcast regulations as well as the rights of broadcasters, manufacturers and viewers in regards to the HBB system.

Use of existing standards and respect for national broadcast regulations

- [001] Broadcasters, platform operators or industry groups shall only select HBB systems that are based on an open (non-proprietary) standard adopted by a competent international standardization body. The technical specification for the HBB system shall be based on existing international standards and specifications, such as those defined by the Open IPTV Forum, DVB, UPnP, DLNA, W3C, IETF, ETSI and other relevant bodies referencing either final specifications or additional chapters that have already been approved for inclusion in the next version of the specification.
- [002] Receivers, when running broadcast-related applications, must not be used to circumvent broadcast regulation. In particular, national regulation and self-regulation on the protection of minors must be respected.
- [003] Receivers shall comply with European and national environmental regulations.
- [004] Broadcasters, manufacturers, service operators and providers are responsible for ensuring that the appropriate Intellectual Property Rights (IPR) and patent issues related to the HBB system are clarified prior to rolling out HBB services.

Principles pertaining to broadcasters

These requirements relate to the rights of broadcasters to protect the integrity of their broadcast signal, to clearly identify their content, and to create personalised and/or targeted content.

- [005] Broadcasters' linear and non-linear programmes and services must be displayed on hybrid devices without any alterations and without disrupting the viewing experience. No alteration to the presentation of the broadcast signal (video and sound) on the hybrid device should occur without an active decision by the viewer. (Exceptions are permitted when the modification allows for an improvement of the viewing experience, e.g. deleting black bars in automatic video format adaption).
- [006] Without prejudice to the possibility for viewers to aggregate content from different sources and on condition that the broadcaster provides the information, there should always be a clear attribution (identification) of the content source to avoid confusion among viewers. When possible, and depending on the broadcast application, The broadcaster's service presentation area, which includes the broadcast video signal, including logos, must remain visible during the viewing of the channel or service concerned, without prejudice to the possibility for viewers to personalise the look-and-feel of the screen. While accepted as a principle, legal backing may be necessary for enforcement.
- [007] The HBB system should allow for personalized and individually addressable services as well as targeted-group and localized services.

Principles pertaining to manufacturers

These requirements pertain to the rights of manufacturers and include such topics as product differentiation, manufacturer portals, receiver options and receiver testing.

- [008] The HBB system shall not prevent manufacturers from differentiating their products.
- [009] The HBB system shall not prevent manufacturers or device specifier (operator or retail) offering their own portals, services and applications via the broadband channel without interfering with channel related portals.
- [010] The HBB system shall neither require nor prevent devices permitting end-users to enter URLs for access to internet services.
- [011] In markets where such provisions are required by national legislation, the organisation responsible for receiver certification shall make available the appropriate testing and certification tools. Where possible, pan-European receiver testing regimes should be put in place to ensure compliance with the related specifications.

Principles pertaining to viewers

These requirements relate to the rights of viewers to access content, including content from local, national and international sources, and to protect their personal data.

- [012] When signalled, viewers should be given direct access to the broadcaster's non-linear offer when watching one of its channels without the need to enter into a third-party (gatekeeper) portal. Multimedia content or applications associated with the broadcaster's linear content should be easy to find and navigate, with clear brand attribution, when users are watching the programme, e.g. by pressing the red button on the remote control.
- [013] The HBB system should be able to accommodate content and services from local, national or international sources.
- [014] Hybrid systems must fully comply with national, EU and international rules on collection, processing and use of personal data including any viewing, usage or search data and user profiling. They should practise and pro-actively encourage and promote growing transparency in relation to the use of viewers' data.
- [015] Personal data containing other than operational information (e.g. for billing purposes) may be collected and used only with the prior informed consent of the users. The creation of user profiles linked to full IP addresses or MAC addresses requires the user's prior informed consent ("opt-in") or a specific legal empowerment.

Features for the hybrid television service provided by broadcasters

The requirements in this section relate to the features of the hybrid television service provided by the broadcasters. They include such issues as media search engines, protection of legacy receivers, and content re-purposing.

- [016] If the hybrid system includes a media search engine, the broadcaster's content - both linear and non-linear - should be referenced in a fair, reasonable and non-discriminatory manner using any metadata provided by the broadcaster.
- [017] The HBB system shall not require a revenue flow to manufacturers for regular and routine updates of software. Broadcasters shall ensure that any changes to applications should be provided in a timely manner and shall not cause trouble to the existing receivers in the market which comply with national specifications and requirements at the time of production.
- [018] HBB receivers shall support a minimum set of formats and protocols in order to reduce the HBB content production costs.

Features for the hybrid television receiver

Hybrid television receivers include both integrated television sets and set-top boxes. The features outlined below include the requirements for hardware and software features as well as broadband connectivity, device display, auto-start applications, the remote control, digital rights management (DRM), and the use of cookies.

Hardware and software features

These requirements relate to the hardware and software features of the device.

- [019] HBB receivers shall be able to accommodate HD resolution for linear and non-linear services.
- [020] HBB receivers should enable standalone broadcast services (i.e. no internet connection).

Receiver display

These requirements relate to the display of content on the viewer's receiver.

- [021] A visual display indicating that interactive services are available on one channel should be included if any user interface is:
 - Automatically displayed when switching from one channel to another.
 - Displayed by the user showing program information related to the channel being watched (usually by pressing INFO on the remote control).
- [022] Starting and stopping a broadcast-related application shall not cause any glitch in the video or audio being displayed. Exceptions are permitted when stopping an application which has resized the broadcast video.
- [023] By default, when the video plane of the receiver displays content provided by a DTT service provider, either broadcast or broadband, full screen or resized, the following restrictions shall apply:
 - The usage of the application graphic plane is reserved for the applications under the control of the broadcaster (i.e. signalled in the AIT or launched by an application signalled in the AIT).
 - CI Plus MMI messages and the receiver system user interface are allowed to use the receiver-specific application graphic plane.

Auto-start application

These requirements relate to the applications that are automatically started when the receiver's broadcast-related features are switched on. They shall apply when regular and stable HBB services are available in a particular market.

- [024] By default, broadcast-related auto-start applications should be activated in the device.
- [025] The receiver may include a menu option to allow the user to activate / deactivate the HBB features. By default, the HBB features should be activated.

Remote control

These requirements relate to the functionalities of the remote control.

- [026] The remote control shall support all keys mandated by the selected hybrid television standard. Non classical input devices (touch screens, cell phones, motion detection, etc) shall emulate the functionality rendered by remote control keys.
- [027] The device should include functionality to facilitate the entry of alphanumeric characters.
- [028] Receivers shall support a remote control command to terminate the running HBB application.

Cookies

These requirements relate to the use of cookies.

- [029] Receivers should have Cookies feature activated by default. This value may be modified by the users once the receiver is installed.
- [030] The user should be able to delete or refuse all cookies in the receiver.

Digital Rights Management (DRM)

These requirements relate to the inclusion of DRM technology in a hybrid television receiver.

- [031] Broadcasters, platform operators and/or industry groups should select DRM systems taking into account those DRM systems already implemented so as to avoid further market fragmentation.

Note: DRM solutions currently discussed in Europe include Marlin (for YouView, TiVu, and TNT 2.0), Nagra PRM (for the Mediaset hybrid platform) and Play Ready (also for TNT 2.0). In addition, many CE manufacturers can support the DECE (Digital Entertainment Content Ecosystem) model whereby all content is made available in all the DRMs and the receiver needs only to provide support for one of the approved DRMs. In addition, a solution using CI Plus may be a possible alternative in the future (DRM using a CAM).

Device implementation

This requirement relates to the device implementation.

- [032] It is accepted that the user interface on the receiver may need to temporarily “gain focus” and use some keys requested by the running HBB application. This may occur when the receiver requires the user to interact with the system user interface, (for example a dialogue box may appear stating, “You have lost broadband connection. Press RED to close this message”) or a CI Plus MMI message.

Specification related features (specific to the HbbTV standard)

The requirements listed below only pertain to the HbbTV standard. Topics include record functionalities, support with DVB features, subtitles, trusted applications, and synchronisation functionalities.

Record functionalities

These requirements relate to recording functionalities.

- [033] In cases where the PVR feature is supported by the receiver and when recorded DTT content is played, any HbbTV application associated with the original broadcast event shall not be launched unless signalled as appropriate to do so.

Support with DVB features

These requirements relate to support that shall be provided for specific DVB features.

- [034] The HbbTV applications shall be able to access the DVB-SI EIT present/following and EIT Schedule. The API should allow the applications to access to the carried the EIT Schedule actual and other tables in the current service.

Subtitles

These requirements relate to subtitles.

- [035] Subtitle formats supported in broadcast channels should be supported in MPEG-2 TS streaming content.

Trusted applications

These requirements relate to the authentication of applications.

- [036] The HBB receiver shall support differing levels of trust for differing applications and services. Only trusted applications / services should be able to access features which make persistent changes to the device – e.g. scheduling recordings or downloading content.
- [037] The authentication of an application coming from the broadcast network is implicit. Inserting an application in a broadcast signal by an unauthorized person is not so easy, hence considering a broadcast application as trusted and authenticated by default can be accepted.

Synchronization functionalities

These requirements relate to synchronisation issues.

- [038] A “do it now” event, using stream events support, as mandated by HbbTV, should be executed by the terminal in less than 2s when the HbbTV browser is not doing other things.

Streaming features

These requirements relate to adapting streaming feature.

- [039] To guarantee streaming quality on OTT network, the device shall support MPEG DASH adaptive streaming protocol as defined in a future version of the HbbTV standard. Note that this only applies to new receivers after the finalisation of related specifications and not to legacy receivers in the market.
- [040] HBB applications (and the underlying functionality in the receiver) shall allow the end-user to use the following trick modes when viewing on-demand content: pause, fast forward and rewind.

Future implementations requirements

This section provides requirements that could be implemented in hybrid television receivers in the future. They are forward-looking and may best be considered as aspirations rather than agreed requirements. It will not be possible for hybrid television receivers to include such requirements when they are deployed as of 2012.

The requirements detailed below relate to new receiver features, support with external devices, cookie management and the display of content.

New receiver features

These requirements relate to features that can be included when developing receivers in the future.

- [041] Devices should be able to display broadcast and broadband contents simultaneously (e.g. PiP functionality)
- [042] It should be investigated what mechanisms and subtitled formats should be adopted as mandatory requirements in streaming content on demand mp4 format.
- [043] In the case that a receiver can support more than one output screen, the application should be able to manage the content displayed in each screen.
- [044] Platforms and devices should accommodate systems, with a maximum of communality, which allow broadcasters and other content providers to provide a linkage between their linear and non-linear offers (permitting, in particular, enhanced or synchronised audiovisual content by a combination of linear and non-linear elements, e.g. online voting, sports statistics and sign language).
- [045] Receivers should implement an event synchronization mechanism coming from the broadband channel similar to the broadcast "stream event" mechanism.
- [046] The HBB system should accommodate advanced on-screen graphics.

Cookies management

These requirements relate to the use of cookies.

- [047] A method should be available for HBB applications to know if the user has refused cookies.

Recording features

These requirements relate to the recording functionality of a hybrid television platform.

- [048] If record functionalities are enabled on the HBB system, end-users shall be able to find, organize, schedule and record TV shows, including single episodes and series, taking into account broadcast and broadband content. The ability to record live broadband streams will need to be clarified based on the availability of technical standards.

Controversial requirements

The requirements in this section are those for which consensus among DigiTAG members has not been achieved, at the time of writing, for implementation in an open retail market. These requirements may be specific to one country or market or may be pan-European broadcast requirements.

Such requirements could be implemented should alternative business models be adopted such as subsidy allowances to offset the cost of receivers by the service platform operator.

The requirements in this section relate to the principles related to broadcasters, access to broadcaster's content and device implementation.

Principles pertaining to broadcasters

These requirements relate to the rights of broadcasters to avoid overlays of third-party content, to request the removal of widgets and to be given access to data regarding their programmes and services.

- [049] Receivers must not allow the overlay of third-party content or commercial communications on the broadcaster's content without the broadcaster's consent or an active decision by the viewer, whenever it is technically feasible. While accepted as a principle, legal backing may be necessary for enforcement.
- [050] The same conditions as for overlays must apply to commercial communications which appear anywhere on screen at the same time as the television broadcast.
- [051] Broadcasters must be able to request the removal of those widgets or applications that appear to facilitate access to pirated content.
- [052] Broadcasters must be informed about and, upon request, given access to, any data which that may be collected via hybrid systems relating to the use of their programmes and services, with due respect for data protection rules.

Access to broadcaster's content

The below requirements relate to the access of broadcast content on hybrid TV portals, menus, homes screens and broadcaster's television channels.

- [053] Hybrid TV portals, hybrid TV menus and home screens must guarantee non-discriminatory access for all broadcasters and content providers.
- [054] Broadcasters' complete on-demand offering should be prominently displayed and easily accessible in an appropriate category on the hybrid TV menu or home screen.
- [055] Viewers must be able to access any portal site/application provided by the broadcaster from the home screen (where it should be identified by the broadcaster's logo or icon) and also while watching one of the broadcaster's television channels by pressing the red (or similar) button on the remote control

Receiver features

The below requirements relate to the reception of live content using the broadband network.

- [056] The device should incorporate the feature "+ RTSP" that will allow reception of live content via the broadband communication channel.
- [057] The ability to record video on demand content streamed over broadband shall be under the control of the content provider.
- [058] In receivers with the technical capability of connecting external devices (e.g. microphones or cameras using USB connection), the HBB applications should be able to access the external devices.
- [059] In receivers supporting Bluetooth communication interface, HBB applications should be able to send or receive messages through this interface to and from external devices.