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Foro Técnico de la televisión digital

**Especificación de receptores de televisión digital terrestre para
aplicaciones interactivas.**

Versión 1.0.0

Elaborado por

**Subgrupo 4 del Grupo de Trabajo 7 del Foro Técnico de la televisión
digital**

Coordinado por

AEDETI

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NOTA IMPORTANTE

Este documento ha sido elaborado y aprobado por consenso por el Grupo de Trabajo 7 del Foro Técnico de la Televisión Digital y no constituye un documento oficial del Ministerio de Industria, Turismo y Comercio.

Table of contents

1. Preface		4
2. Previous Considerations about Interactive Systems		5
2.1. Relation with other organizations	6	
2.2. Other issues addressed by the working group	6	
2.2.1. HbbTV patent rights and royalties	6	
2.2.2. Royalties related to CE-HTML	6	
3. Document terminology		7
4. Glossary		8
5. Definition of the technical parameters of the interactive receiver		9
5.1. Summary of technical parameters for interactive receivers	9	
5.2. Receiver hardware requirements	9	
5.2.1 Remote control unit	10	
5.2.2 Connectivity with external devices	10	
5.3 Receiver interactive requirements	10	
5.3.1 HbbTV version	10	
5.3.2 HbbTV receiver default values	10	
5.3.3 Subtitling	11	
5.3.3.1 DVB subtitles	11	
5.3.4 Video streaming	11	
5.3.4.1 Playback control in CoD	11	
5.3.4.2 Video management	11	
5.3.4.3 Multiple screen displays	12	
5.3.5 Cookies	12	
5.3.6 Third party content	12	
5.3.7 EPG	12	
5.3.8 Broadband event synchronization	12	
5.3.9 Broadcast content and application coexistence	12	
5.4 HbbTV security	12	
5.4.1 DRM in downloaded content	13	
5.4.2 Receivers with support for CI or Embedded CA	13	
5.5 Device error management and monitoring	13	
A. Technical aspects for HbbTV applications signalling		14
A.1. Summary of usage table	14	
A.2. Program Map Table (PMT)	14	
A.3. Service Description Tables (SDT)	14	
A.4. Application Information Table (AIT)	15	
B. Detailed recommendation status		16
C. Contribution from a group of Spanish broadcasters to Hybrid Television and connected TVs		18
C.1. Principios básicos	19	
C.2. Requisitos debidos a la evolución tecnológica	19	
C.3. Requisitos de interoperabilidad particulares para España	20	
D. References		21

1. Preface

En el marco del Grupo de Trabajo 7 del Foro Técnico de la Televisión Digital se ha detectado la necesidad de elaborar una serie de documentos que recojan las especificaciones mínimas que deben cumplir los receptores de televisión digital terrestre que se comercialicen en el mercado español. Para ello se ha dividido la tarea en varios subgrupos:

- Subgrupo 1: Especificación básica de receptores de televisión digital terrestre.
- Subgrupo 2: Especificación de receptores de televisión digital para alta definición.
- Subgrupo 3: Especificación de receptores de televisión digital para acceso condicional.
- Subgrupo 4: Especificación de receptores de televisión digital para aplicaciones interactivas.

Los cuatro documentos se complementan entre sí, conteniendo el primero de ellos la especificación básica que debe cumplir cualquier receptor de televisión digital terrestre que se ponga en el mercado español para garantizar plena compatibilidad con las emisiones de televisión digital terrestre y que puede complementarse con uno o varios de los documentos elaborados por los subgrupos 2, 3 y 4, dependiendo de las funcionalidades que disponga el mismo.

Este documento, elaborado por el Subgrupo 4, “Especificación de receptores de televisión digital terrestre para aplicaciones interactivas”, define los requisitos mínimos que deben cumplir los receptores para permitir la interactividad con las emisiones de televisión digital terrestre.

2. Previous Considerations about Interactive Systems

The development of services of information society, to all of the Spanish population with digital TV and particularly the DTT, is closely tied to the ability of the receiving equipment in the execution of interactive applications associated with digital services. It is therefore key to the successful development of Digital Terrestrial Television, defining characteristics which allow a horizontal market for the development of information society in Spain by DTT.

The Spanish industry is perfectly prepared for the deployment of interactive services, being able to meet the market demand for DTT receivers. The general consensus believes that the best solution to benefit end users and the industry in general, is a market for DTT with a horizontal model.

The recommendations contained in this document are justified by the following arguments:

- The digital TV in general, and the terrestrial in particular, can offer advanced services to citizens and new business models for operators as those offered by the interactivity.
- Broadcasters must have complete control to update and evolve these services without the involvement of manufacturers and / or middleware providers.

The changing nature of the receivers available in the market suggests that the percentage of those with back channel connection would grow significantly in the short term. These receivers incorporate by default the elements that would allow access to value-added services through the Internet.

In markets where broadcasters have deployed interactive services that use the return channel, it has demonstrated the economic potential that the use of these features allows. The possibility of the return channel access is restricted to vertical services provided exclusively or linked to the manufacturer. This would prevent the development of that potential and go against a horizontal range of interactive services by broadcasters and public entities.

We strongly recommend that those receivers that are distributed on the Spanish market and have a return channel, allow the use of the broadcasters and partners, through the ability to download and execution of interactive services for the benefit of users and general market, and momentum to the development of the Information Society. This document contains the technical specifications for the implementation of a minimum common interactive interface for all digital television receivers on the Spanish market which have a return channel.

The main objective of this document is to define the technical aspects related to the interactivity, which should be considered to ensure interoperability of DTT receivers for the content of interactive services. It thus aims to consolidate a DTT receiver market with a time span of living adequate for the foreseeable development of digital TV technology in a scope of 2-3 years away.

The proposals, recommendations and specifications in this document have been extracted from the initial proposals arising from the majority of the consensus among the members of the Working Group.

The criteria used to reach that majority consensus have been based on the following criteria:

- a) *Horizontal*: The specification shall permit to establish a horizontal market in which to accommodate the participation of every industry without exception, and that promotes a positive and successful evaluation of the citizens to the DTT.
- b) *Standard*: The specification of this document shall be based on the use of a standard of European level and not on individuals or non-standard solutions.
- c) *Availability*: This specification shall recommend a proven technology solution that is available on the market today to allow an actual deployment.
- d) *Interactive channel*: The proposed solution shall have the capability of an interactive channel that allows implementation of new service models and businesses.

2.1. Relation with other organizations

AEDETI has established official relations with other associations related to digital television in order to develop partnerships for the definition of these recommendations. Listed below are the associations which have established partnerships:

- HbbTV Consortium
- Digital Terrestrial Action Group (DigiTAG)
- AFDESI, Association for the Development of Enhanced TV Services and Interactivity
- DGTVi per il digitale terrestre
- HD Forum France
- AMETIC, Asociación Multisectorial de Empresas de la Electrónica, las Tecnologías de la Información y la Comunicación, de las Telecomunicaciones y de los Contenidos Digitales.

2.2. Other issues addressed by the working group

At this point in the document, those aspects of interactivity are evaluated but outside the scope of a purely technical specification. These aspects have been evaluated at the request of members of the working group.

2.2.1. HbbTV patent rights and royalties

HbbTV currently is not under claims for royalties or patents that may have been included in its technical specification.

2.2.2. Royalties related to CE-HTML

Hitachi and Philips have indicated patents included in this specification.

3. Document terminology

The technical parameters described in this document are suggested as essential and for mandatory compliance, except those indicated as "optional". Also new features, essential and optional, are suggested to be considered for new versions of HbbTV specification. At Annex B a detailed recommendation status is properly listed.

4. Glossary

CATV	Cable Television
CET	Central European Time
CEST	Central European Summer Time
CI	DVB Common Interface
DTT	Digital Terrestrial Television
DTV	Digital Television
DVB	Digital Video Broadcasting
EACEM	European Association of Consumer Electronics Manufacturers
EICTA	European Information and Communication Technology Association
ETSI	European Telecommunications Standards Institute
GPRS	General Packet Radio System
GUI	Graphic User Interface
HbbTV	Hybrid Broadband Broadcast Television
HD	High Definition
HDMI	High Definition Multimedia Interface
IDTV	Integrated Digital TV Set
ISO	International Organization for Standardization
iTV	Interactive Television
MPEG	Moving Picture Experts Group
OTA	Over The Air
PAP	PPP Authentication Protocol
PDC	Program Delivery Control
POP	Point Of Presence
PPP	Point-to-Point Protocol
PPPoE	PPP over Ethernet
PSI	Program Specific Information
PSTN	Public Switched Telephone Network
RTSP	Real time Streaming Protocol
SI	Service Information
SSU	System Software Update
STB	Set Top Box
TDT	Televisión Digital Terrestre

5. Definition of the technical parameters of the interactive receiver

This section of the document defines the technical aspects that must meet a host of interactive DTT.

5.1. Summary of technical parameters for interactive receivers

Item	Technical parameter	Paragraph
HbbTV version	1.1.1	5.3.1
Default parameters	Language : Spanish (Español) Time: CET/CEST Search of updates: Enabled Automatic update: Parameters defined by SG1. Autostart application: Enabled Subtitles: Disabled Security: Active, if the receiver supports some DRM solution.	5.3.2
Video profiles	SD mode: Parameters defined by SG1 HD mode: Parameters defined by SG2	-
SI and PSI information	Compliance with MPEG, DVB (defined by SG 1) y HbbTV.	Refer to document SG1 and section A
Upgrade or replace of middleware over air	Parameters defined by SG1	Refer to document SG1

NOTE: SG1 and SG2 refer to deliverables produced by Sub-Groups of the Working Group 7 of the Technical Forum of Digital Television (SG1 deliverable is a final draft version).

5.2. Receiver hardware requirements

At this point the minimum performance requirements for the user, who should have the digital television receiving equipment to ensure interactivity, are detailed.

[REC-1] It recommends the market to establish the ability to connect to the Internet (e.g. wireless, Ethernet...) as a mandatory requirement in receivers incorporating HbbTV in the Spanish market to avoid the creation of a fleet of receivers without connectivity capabilities. HbbTV receivers supporting WiFi connection should also support the common encryption protocols (WEP, WAP, etc.).

[REC-2] It is recommended that these receivers incorporate adaptive streaming that will allow reception of live content via the broadband communication channel. For technical protocol and formats, see recommendation **[REC-16]**.

5.2.1 Remote control unit

[REC-3] The remote control should be based on the standard HbbTV solution, as to now it has been defined in section 5.2 in HbbTV specification TS 102 796

[REC-4] In addition to the keys, mandated by HbbTV, in the remote control should be available the next key:

- EXIT key event (labelled as Exit or TV or return, or any other comparable text):
Keyboard Event not available for applications.
 - This key stops the execution of any ongoing service HbbTV as Text/TXT button.

5.2.2 Connectivity with external devices

[REC-5] In devices with the technical capability of connecting external devices (e.g. microphones or cameras using USB connection, or through DLNA 1.5 protocol), the HbbTV applications should be able to access the external devices or send/receive content files as an optional feature.

[REC-6] In devices supporting Bluetooth communication interface, the HbbTV applications should be able to send or receive messages through this interface from external devices as an optional feature.

[REC-7] It's desirable that HbbTV receivers could deliver streaming content to external devices through an IP network (i.e. using a Wifi or Ethernet connection) as an optional feature.

5.3 Receiver interactive requirements

At this point, the requirements of the digital television receiving equipment to ensure interoperability in interactive services are detailed.

5.3.1 HbbTV version

We define those interactive receivers in compliance with HbbTV standard as follows:

[REC-8] Compliant with HBBTV 1.1.1 (TS 102 796).

NOTE: Next specification versions should be studied for possible updates on future versions of this document.

[REC-9] This working group recommends that while there is not available a test or set of tests to ensure the interoperability of receivers, manufacturers must provide a statement indicating that all the features in HbbTV 1.1.1. have been implemented, including compliance with the requirements of this document regarding clarification of certain functions and minimum requirements provided, that they do not conflict with these requirements and / or future requirements.

NOTE: this document does not contemplate any definition of the management of possible conformance tests for the Spanish market although their existence will be desirable, to guarantee the evolution and effectiveness of the standard for broadcaster's applications and devices.

[REC-10] The version of HbbTV standard should be regularly checked in order to reflect the latest errata in version 1.1.1 published by the HbbTV consortium and approved by ETSI.

5.3.2 HbbTV receiver default values

[REC-11] It has been considered appropriate to define a series of receiver defaults values to aid the use in normal conditions. These values may be modified by the users once the receiver is installed.

- The user interface language is recommended to be set by default in Spanish.

- The default time CET/CEST.
- The automatic updates search should be enabled by default, but the automatic software updates should be disabled by default (see parameter set by SG1).
- Allow HbbTV applications run automatically, HbbTV auto-start applications enabled.
- Subtitles disabled.
- Store cookies enabled (see 5.3.5).

5.3.3 Subtitling

[REC-12] This working group recommends that subtitles formats supported in broadcast channels should be supported in broadband contents.

[REC-13] It should be investigated what mechanisms and subtitled formats should be adopted as mandatory requirements in streaming content on demand mp4 format.

5.3.3.1 DVB subtitles

[REC-14] DVB subtitling should be implemented in accordance with the DVB EN 300-743 standard.

[REC-15] HD subtitling should be implemented in accordance with EICTA Advanced E-Book [15].

5.3.4 Video streaming

[REC-16] The MPEG DASH standard is at draft stage. Once the standard is officially released, the receiver should support MPEG DASH adaptive streaming technology. Among the five profiles defined by MPEG the profile 5 ISO/BFF Simple Live should be deployed.

[REC-17] Other technologies for adaptive streaming could be supported when those are defined in a future version of the HbbTV specification.

5.3.4.1 Playback control in CoD

[REC-18] This working group recommends the establishment, as a mandatory requirement, that the equipment with support to the feature +RTSP and/or adaptive streaming supports different modes of playback, fast-forward and rewind (also called trickplay), in on-demand content.

5.3.4.2 Video management

[REC-19] This working group recommends that the receivers compliant with HbbTV should be able to display broadcast and broadband contents simultaneously (e.g. PiP functionality). This recommendation is an optional feature.

This working group recommends modifying the queue method:

[REC-20] Implementation should pre-buffer data from the queued URL before the current media item has finished playing in order to eliminate the delay between items.

[REC-21] Implementation should allow finishing the video at any time, without being at the end of the asset.

[REC-22] Implementation should allow cuing a video from a mid-point of the content.

5.3.4.3 Multiple screen displays

[REC-23] 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 as an optional feature.

5.3.5 Cookies

[REC-24] Cookies with an expiry date should be stored in persistent memory.

[REC-25] The receiver should respect the expiry date of the cookie. The requirements on size and number of cookies should support the definition in clause 9.1 of the OIPF DAE.

[REC-26] The receiver should have cookies feature activated by default.

[REC-27] This value may be modified by the users once receiver is installed.

[REC-28] The user should be able to delete or refuse all cookies in the receiver.

[REC-29] A method should be available for HbbTV applications to know if the user has refused cookies.

NOTE: 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.

5.3.6 Third party content

[REC-30] The receiver should not allow third party content overlay or any content on screen at the same time as TV Broadcast without being initiated by the user or broadcasting agreement with the third parties. Third party content overlay should not be enabled in the default values of the receiver.

5.3.7 EPG

[REC-31] Access to DVB-SI EIT present/following and EIT Schedule for HbbTV applications should be available. The receiver should allow the applications access to the carried the EIT Schedule actual and other tables in the current service.

5.3.8 Broadband event synchronization

[REC-32] The receivers should implement an event synchronization mechanism coming from the broadband channel similar to the broadcast "stream event" mechanism.

5.3.9 Broadcast content and application coexistence

[REC-33] Starting and stopping an HbbTV service should not cause any glitch in the broadcast content. In full-screen to scaled video transition process is assumed as possible some kind of glitch.

5.4 HbbTV security

Currently, the standard specification defines the mandatory mechanisms to ensure the security and confidence in running applications in section 11 of HbbTV 1.1.1

specification. But for those services and devices that have the ability to download or access on-demand content, the standard did not specify which technology should be implemented to ensure the security. Therefore, each market has the job of establishing what is the technology adopted in terms of DRM.

5.4.1 DRM in downloaded content

[REC-34] This working group recommends that the security requirement is a mandatory requirement for equipment to adopt HbbTV for the Spanish market. As an initial premise, this group recommends that the approach shall not be exclusive to any technology and therefore should be a free competition among potential suppliers of DRM technologies, considering that DTT should be a horizontal market. However, broadcasters, platform operators and/or industry groups should select DRM systems taking into account those DRM solutions already implemented so as to avoid further market fragmentation. The above recommendation does not prevent that future industry implementers could define a minimum list of features and functionalities regarding a DRM for Spanish market.

5.4.2 Receivers with support for CI or Embedded CA

[REC-35] According to the HbbTV specification, this working group recommends that receivers supporting CI solutions and Embedded CA solutions should support the same functionality defined in 11.4.1 CI+ communication of the HbbTV specification [25].

5.5 Device error management and monitoring

This section covers topics such the ability of the device to recognize and report errors in a standard way.

[REC-36] This working group recommends that the device should include an error tracking log for the events related with the HbbTV services which could be used by the device vendor to help the customer support issues to recognize and report the errors.

A. Technical aspects for HbbTV applications signalling

This section details those requirements and consensus recommendations for the parameters of the Information Service for the standard receivers incorporating HbbTV [25]. The purpose of these guidelines is to facilitate the proper functioning of the receivers in the Spanish networks.

After installation, the receivers should provide to the viewers all services that can be received at their location. Therefore, it is recommended to follow the technical specifications contained in TS 102 809 Hybrid Signalling Application [26] document.

A.1. Summary of usage table

The following table summarizes the recommended use of PSI & SI tables to this specification.

Table	Regulation
Application Information Table (AIT)	Mandatory

A.2. Program Map Table (PMT)

[REC-37] The descriptors that are specified in the regulations of DVB EN 300 468 and TR 101 211 should be supported. The descriptors detailed in the E-Book [15] and those which are added to this document should also be supported.

PMT descriptors

[REC-38] Descriptors specified below should be supported by HbbTV receivers, because this is an indispensable signalling for the interpretation of "Stream Events" by HbbTV applications when these events are broadcasted.

Program loop descriptors

Descriptor	Tag
Deferred_association_tags_descriptor	0x15

Program loop descriptors

Descriptor	Tag
Association_tags_descriptor	0x14

A.3. Service Description Tables (SDT)

[REC-39] It should be supported, the descriptors that are specified in the regulations of DVB EN 300 468 and TR 101 211. It should be supported the descriptors detailed in the E-Book [15] and those added in this document.

A.4. Application Information Table (AIT)

[REC-40] The AIT table is mandatory for use in applications containing HbbTV services. Broadcasters and receivers must follow the specifications of the rules about HbbTV (DVB). An application for service can be marked as "Teletext" to be launched directly by the TXT button (or equivalent) in the remote control. This application is indicated by the Application descriptor usage in the application loop of the AIT. For receivers, it is mandatory to interpret this descriptor if present. The only valid value is usage_type Digital teletext, with the value 0x01 defined in TS 102 809.

B.Detailed recommendation status

Table 1: Detailed recommendation status

Recommendation reference	Section, subsection	Status in Spain
[REC-1]	5.2 Receiver hardware requirements	E
[REC-2]	5.2 Receiver hardware requirements	E
[REC-3]	5.2.1 Remote control unit	E
[REC-4]	5.2.1 Remote control unit	O
[REC-5]	5.2.2 Connectivity with external devices	O-EU
[REC-6]	5.2.2 Connectivity with external devices	O-EU
[REC-7]	5.2.2 Connectivity with external devices	O-EU
[REC-8]	5.3.1 HbbTV version	E
[REC-9]	5.3.1 HbbTV version	E
[REC-10]	5.3.1 HbbTV version	E
[REC-11]	5.3.2 HbbTV receiver default values	E
[REC-12]	5.3.3 Subtitling	E
[REC-13]	5.3.3 Subtitling	EU
[REC-14]	5.3.3.1 DVB subtitles	E
[REC-15]	5.3.3.1 DVB subtitles	E
[REC-16]	5.3.4 Video streaming	E
[REC-17]	5.3.4 Video streaming	EU
[REC-18]	5.3.4.1 Playback control in CoD	E
[REC-19]	5.3.4.2 Video management	O-EU
[REC-20]	5.3.4.2 Video management	EU
[REC-21]	5.3.4.2 Video management	EU
[REC-22]	5.3.4.2 Video management	EU
[REC-23]	5.3.4.3 Multiple screen displays	O-EU
[REC-24]	5.3.5 Cookies	EU
[REC-25]	5.3.5 Cookies	EU
[REC-26]	5.3.5 Cookies	EU
[REC-27]	5.3.5 Cookies	EU
[REC-28]	5.3.5 Cookies	EU
[REC-29]	5.3.5 Cookies	EU
[REC-30]	5.3.6 Third party content	N/A
[REC-31]	5.3.7 EPG	EU
[REC-32]	5.3.8 Broadband event synchronization	EU
[REC-33]	5.3.9 Broadcast content and application coexistence	EU
[REC-34]	5.4.1 DRM in downloaded content	E
[REC-35]	5.4.2 Receivers with support for CI or Embedded CA	E
[REC-36]	5.5 Device error management and monitoring	EU
[REC-37]	A.2 Program map table (PMT)	E
[REC-38]	A.2 Program map table (PMT)	E
[REC-39]	A.3 Service Description Tables (SDT)	E
[REC-40]	A.4 Application Information Table (AIT)	E

Table 2: Key to status column

Status	Meaning
E	Essential
EU	Suggestions for HbbTV specification in a European Level.
O	Optional feature.
O-EU	Optional feature suggested for HbbTV specification in a European level.
N/A	Not agreed.

C. Contribution from a group of Spanish broadcasters to Hybrid Television and connected TVs

NOTE: *The content in this section has not been translated to English to preserve the original perspective provided by Spanish broadcasters in their contributions.*

El Grupo de Radiodifusores para el estudio de la Televisión conectada en España, integrado por los principales radiodifusores españoles públicos y privados, ha elaborado el presente documento que representa un planteamiento preliminar de su perspectiva en lo que se refiere a los requisitos para la adopción de estos sistemas en España. Su objetivo es facilitar el debate todos los actores involucrados para favorecer su rápida introducción. En esta primera iteración se centran exclusivamente en los requisitos esenciales, es decir en requisitos que resultarían obligatorios para todos los receptores.

Se ha partido de los criterios establecidos por la Unión Europea de Radiodifusores en el informe “EBU Tech 3338” así como los principios recogidos en “EBU Principles for Internet Connected and Hybrid Television in Europe”, ya consensuados en el seno de dicha entidad a nivel paneuropeo. En consecuencia, y en aras de evitar resultar farragoso, no se traducen estos preceptos sino que se analizan y se profundizan en aquellas cuestiones que pueden resultar de especial relevancia por la particular idiosincrasia española (por ejemplo, nuestra variedad cultural y lingüística o la regulación nacional sobre accesibilidad y control paterno) o porque la evolución tecnológica requiere realizar consideraciones sobre sistemas más avanzados que otros desplegados con anterioridad en el mercado.

Así pues, como señala la Unión Europea de Radiodifusores, debe tenerse presente que el enfoque de esta nueva generación de TV interactiva se realiza exclusivamente para mercados horizontales, esto es, sin condicionantes que vinculen la implementación a disponer de acuerdos con fabricantes de receptores, proveedores de “widgets”, plataformas verticales de TV, operadores de telecomunicaciones, proveedores de acceso a Internet, soluciones de distribución web “end-to-end”, etc. Asimismo, se entiende que esta nueva generación de TV interactiva debe estar sometida a criterios similares de accesibilidad, control parental, servicio público, responsabilidad editorial e interoperabilidad, entre otros, ya aplicados al mundo de la TV.

Los requisitos para los receptores se han fijado para lo que se ha denominado “terminal de TV conectada a Internet”, entendido como tal *aquel dispositivo de electrónica de consumo (televisor, descodificador, etc.) que dispone de acceso a contenidos distribuidos vía canal de radiodifusión y vía distribución web a través de banda ancha y que, asimismo, presenta capacidad de interpretación de las aplicaciones relacionadas*. Los términos canal de radiodifusión y distribución web a través de banda ancha aquí empleados se utilizan con el significado acuñado por la ITU. Es decir, se trata de terminales híbridos que incluyen sintonizador de TV retrocompatible con los estándares DVB, conexión de banda ancha para aplicaciones (incluso con contenido multimedia) interpretables por un “browser” y cruce de señalización entre ambos medios.

C.1. Principios básicos

- 1) Adopción de una solución común estandarizada para evitar el impacto socioeconómico negativo derivado de la fragmentación del mercado.
- 2) Asegurar la integridad del contenido ofrecido por los radiodifusores, tanto en imagen corporativa (ej. no sobre impresionar con banners los logotipos) como para la propia señal (ej. no insertar cuñas publicitarias en lugar de las emitidas en origen).
- 3) Facilidad de navegación y acceso, similar a la experiencia del usuario con la actual TV digital pero con visión unificada de ambos medios.
- 4) Evitar la aplicación de una doble legislación, y mucho menos lagunas regulatorias que incidan de forma negativa sobre la protección de la infancia o que apliquen de forma distinta a los diferentes actores (ejemplo contenido en los portales de los radiodifusores versus contenido accesible a través de otros portales de otras entidades).
- 5) Control eficiente de los mecanismos de protección de datos y de los perfiles de usuarios. En particular los radiodifusores no podrán ser excluidos de acceder a información recogida por terceras partes a partir de sus propias emisiones.
- 6) Clarificación legal de las restricciones y posibilidades de la gestión del contenido, autenticación de usuarios y protección frente a copias.

C.2. Requisitos debidos a la evolución tecnológica

- 1) Soporte de "Streaming" de directos en el canal de banda ancha.
- 2) Soporte de encapsulados "Transport Stream" e ISOBFF (MP4) tanto para "OnDemand" como para directos en canal de banda ancha.
- 3) Soporte de "Streaming" Adaptativo basado en estándares abiertos (ej. MPEG-DASH).
- 4) Soporte de todos los modos de "trick-play" para "OnDemand" bajo demanda, incluidos "FAST-FORWARD" y "FAST-REWIND".
- 5) Soporte de múltiples audios tanto para "OnDemand" como en "Streaming" de directos (ej.: Versión Original, Audiodescripción, varios idiomas españoles, etc.).
- 6) Soporte de subtítulos tanto para "OnDemand" como en "Streaming" de directos (incluyendo los embebidos en el propio flujo).
- 7) Mecanismo de sincronización de eventos para "OnDemand" y "Streaming" de directos (Similar a "Stream Events" de canal Broadcast).
- 8) El receptor deberá tener habilitado por defecto que se ejecuten las aplicaciones HbbTV señalizadas en la AIT del canal de radiodifusión.
- 9) Los receptores deben realizar la descarga completa del carrusel en caché y

trabajar en memoria. Asimismo, el receptor debe monitorizar el carrusel y actualizar en caché aquellos elementos que se modifiquen.

- 10) El receptor debe permitir una carga rápida de las aplicaciones en el canal de banda ancha, incluso facilitando que las mismas estén “precacheadas” (o al menos su página de entrada).
- 11) Debe existir algún mecanismo de detección automática e inmediata de las actualizaciones de los elementos “precaheados”, tanto si estos provienen del canal de banda ancha como del canal de radiodifusión.
- 12) Si un mismo carrusel está en varios canales, no deber ser recargado, lo que permitiría no tener que releer los datos para la generación de una EPG en el cambio de canal, en especial si los canales entre los que se conmuta no están en el mismo múltiplex.
- 13) El sistema debe permitir el almacenamiento de cookies en la memoria permanente del receptor.
- 14) El sistema debe estar provisto de mecanismos de protección frente a ataques maliciosos.

C.3. Requisitos de interoperabilidad particulares para España

- 1) Adecuación de los estándares a la normativa e idiosincrasia nacional para control paterno, accesibilidad, variedad cultural, clasificación temática por géneros, descripción del contenido, identificación del canal y de la emisión, etc. En particular se debe verificar lo dispuesto en la norma UNE 133 300 a este respecto así como en la regulación sobre control parental y accesibilidad (y su iconografía) que resulte de aplicación.
- 2) Respeto a las inversiones ya realizadas por los radiodifusores fruto del proceso de digitalización de la TV, buscando sinergias tanto técnicas como económicas que se traduzcan en rapidez en la introducción del servicio así como inmediatez en la publicación de sus contenidos.
- 3) Posibilidad de insertar “plug-ins” para fomentar la retro compatibilidad, evolución y competencia.
- 4) Retro compatibilidad con dispositivos legado no conectados a Internet.
- 5) Capacidad de evolución para su integración en las funcionalidades de hogar digital conforme a lo dispuesto en la normativa nacional que resulte de aplicación (por ejemplo, sobre infraestructuras comunitarias de telecomunicación).
- 6) El sistema debe ser coherente y compatible con los mecanismos de meta datado que se adopten para España.
- 7) El sistema debe ser coherente y compatible con los mecanismos de medición de audiencias que se adopten para España.

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