

Freeview Play — Technical Specification

2017 Profile

Version: 2.1.2

Date: 08/09/2016

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2. Revision History

2.1 Revision History

Revision History		
Version Number	Date	Comment
1.1.1	2014-11-21	Release sign-off.
1.1.2	2014-11-26	Publication release.
1.2.0	2015-09-10	Launch Profile maintenance release. Corrections & clarifications.
1.2.1	2016-01-12	Maintenance release with corrections
1.9.4	2016-02-04	Draft of 2017 profile (based on HbbTV 2.0.1 Redmine tickets)
2.0.0	2016-05-20	Draft of 2017 profile
2.1.0	2016-07-15	Pre-publication release
2.1.1	2016-07-26	Publication release
2.1.2	2016-09-08	References update to published specifications.

2.2 Copyright Notice

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The rights of the creators of all specifications and trademarks referenced within this document are fully acknowledged and must be respected in the application of this specification. See sections 3.1 and 3.2 of this document for full details of references.

3. Summary

Informative: The purpose of this document is to detail the technologies required to implement a Freeview Play hybrid (Broadcast & IPTV) device aimed at the horizontal market. It identifies existing specifications that are required to be supported and also adds a small amount of normative text which is required to provide cohesion between the technologies required. The document is colour coded in order to clarify these sections (see Section 3.2.1).

The platform environment has the following key features:

- Common HTML5 application environment
- Broadcast profile based on D-Book 8 (including MHEG)
- DASH, Smooth Streaming and HLS based media streaming (with a roadmap to providing only DASH streams)
- Aggregated source of metadata providing:
 - Forward and Backwards EPG with deep links to player content
 - Search and Recommendations API across on-demand and Freeview content
 - FVP Application listings and launch locations
- Multiple video object ad-insertion into DASH-based streams
- Digital Rights Management capability
- General security requirements
- Support for accessibility and Companion Screen experiences where implemented by manufacturers.

The specification will use D-Book 8 as the base profile for broadcast services and signalling. IP-delivered services and applications will use the HbbTV standard; this will include features recently edited and amended in HbbTV 2.0.1 [ETSI_102_796]. The present document is drafted such that it reflects the changes and errata which it is anticipated will be published by ETSI based on the HbbTV 2.0.1 specification.

The specifications for Freeview Play will follow a managed evolution. These will be presented as current profile and future dated profile. This document details requirements for 2017 products, specifically for devices tested from 1st Dec 2016.

Other companion documents will cover metadata access APIs, presentation rules and branding and other product requirements.

The key words "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

3.1 Reference Specifications

This document is built around published specifications which are illustrated in Figure 1 and detailed in Section 3.1.1.

This document has also taken into consideration existing profiles of HbbTV available in Europe: [TNT], [TDT], and [HBBTV_NL].

3.1.1 Freeview Play 2017 Profile

The 2017 product cycle of Freeview Play will require all mandatory clauses of the present document and those of the following specifications:

- HbbTV 2.0.1 except where indicated as optional (see Section 3.2.1) in the present document
- D-Book 8
- Microsoft PlayReady DRM version 2.0 (or later)
- ES 202 184 - MHEG5 Broadcast Profile
- Microsoft Smooth Streaming [SMOOTH] and HLS [HLS], required as a transition technology
- DIAL

For the avoidance of doubt the following mandatory features of HbbTV are considered optional:

- HbbTV support for Companion Screen (see Section 14 of [HBBTV2.0])
- HbbTV support for Media Synchronisation (See Section 13 of [HBBTV2.0])
- HbbTV File System Acceleration (See Section 7.2.7 of [HBBTV2.0])

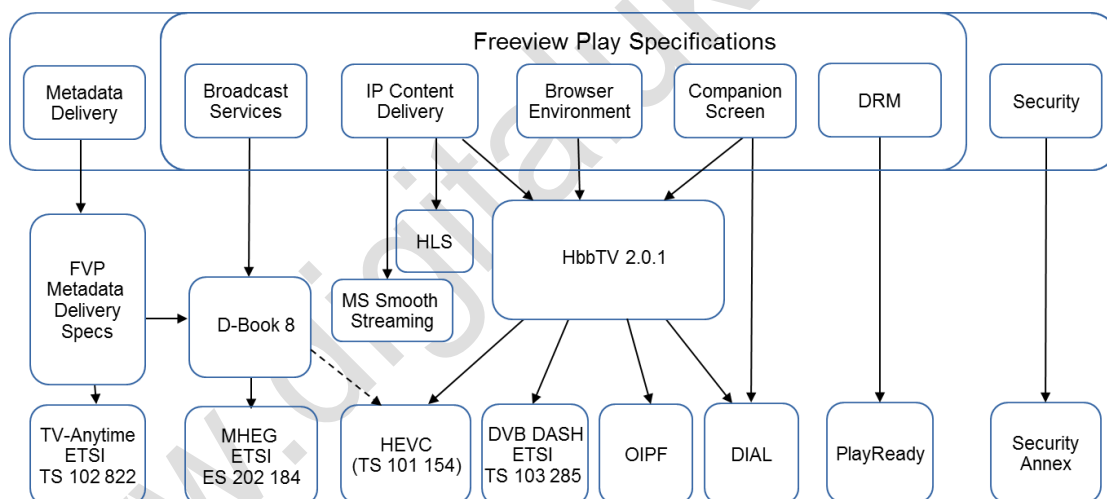


Figure 1: Freeview Play 2017 specification set

3.1.2 Companion Documents

This document should be read in conjunction with the current version of the following Freeview Play documentation:

- Freeview Play Technical Specification Security Annex
- Freeview Play Business-to-Consumer Interface Specification
- Freeview Play Taxonomy Vocabulary
- Freeview Play Accessibility Statement

3.2 References

References	
Ref	Document
CENC	ISO/IEC 23001-7, Second Edition: “Common Encryption in ISO base media file format files”
DBOOK	D-Book 8 2015, Digital TV Group.
DIAL	DIsccovery And Launch protocol specification (DIAL) Version 1.7, http://www.dial-multiscreen.org/
ITU-R_BT2020	ITU-R BT.2020 : Parameter values for ultra-high definition television systems for production and international programme exchange. https://www.itu.int/rec/R-REC-BT.2020/en
ITU-R_BT2100	Recommendation ITU-R BT.2100-0 (07/2016) Image parameter values for high dynamic range television for use in production and international programme exchange http://www.itu.int/rec/R-REC-BT.2100-0-201607-I/en
ITU-T_HEVC	ITU-T Rec-H.265 High Efficiency Video Coding (04/2015) https://www.itu.int/rec/T-REC-H.265-201504-I/en UHDTV devices require the latest draft version available from: http://phenix.int-evry.fr/jct/doc_end_user/documents/23_San%20Diego/wg11/JCTVC-W1005-v2.zip
ETSI_103_285	ETSI TS 103 285 (V1.1.1), (2015-05) Digital Video Broadcasting (DVB); MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks -
DVB_SERVICES	DVB services MHP_AIT_Descriptor allocation table, http://www.dvbservices.com/identifiers/mhp_ait_descriptor
ETSI_101_211	ETSI TR 101 211 V1.12.1, (2013-12), Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)
ETSI_101_154	ETSI TS 101 154 V2.2.1 (2015-06) DVB Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream
ETSI_202_184	ETSI ES 202 184 V2.3.1 (2013-03), MHEG-5 Broadcast Profile
ETSI_300_468	ETSI EN 300 468 V1.14.1, (2014-05), Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems

FREEVIEW_TML	Freeview Manufacturers' Trade Mark Licence, http://www.freeview.co.uk/wp-content/uploads/2013/08/Freeview-Manufacturers-Licence-July-2013.pdf
FVP_POD	Freeview Play Product Overview Document, available from Digital UK.
FVP_B2C	Freeview Play Business-to-Consumer (B2C) Interface Specification, V1.3 available from Digital UK.
FVP_SECURITY_ANNEX	Freeview Play — Technical Specification Device Security Annex, V1.0.4, available from Digital UK
HBBTV_NL	HbbTV Forum Nederland, Specification for use of HbbTV in the Netherlands, Version 1.0 May 2013. http://hbbtv.nu/wp-content/uploads/2013/06/130501_Approved_HbbNL_Spec_1.0.pdf
ETSI_102_796	ETSI TS 102 796 V1.4.1 Hybrid Broadcast Broadband TV (HbbTV). http://www.etsi.org/deliver/etsi_ts/102700_102799/102796/01.04.01_60/ts_102796v010401p.pdf
HLS	HTTP Live Streaming v6 September 30, 2011 http://tools.ietf.org/html/draft-pantos-http-live-streaming-06
OIPF_DAE	OIPF-T1-R2 Specification Declarative Application Environment, V2.3, 2014-01-24.
OTS	Sanitizer for Open Type fonts https://code.google.com/p/ots/wiki/DesignDoc
PLAYREADY	Microsoft, Microsoft PlayReady, http://www.microsoft.com/playready/default.aspx
PLAYREADY_DASH	Microsoft, DASH Content Protection using Microsoft PlayReady, version 1.1, 28 February 2013, http://www.microsoft.com/playready/documents/
PLAYREADY_FORMAT	Microsoft, PlayReady Format Specification, included in MSPR1, version 2.0 (Made available by Microsoft to PlayReady licensees)
PLAYREADY_INT	Microsoft, PlayReady Integration to HbbTV Specification, version 1.0 (Made available by Microsoft to PlayReady licensees)
PLAYREADY_SMOOTH	http://msdn.microsoft.com/en-us/library/dn189154.aspx
PLAYREADY_WP	PlayReady DRM overview http://download.microsoft.com/download/b/8/3/b8316f44-e7a9-48ff-b03a-44fb92a73904/Microsoft%20PlayReady%20Content%20Access%20Technology-Whitepaper.docx
RFC2119	IETF RFC 2119 (1997-03), IETF, "Key words for use in RFCs to Indicate Requirement Levels"

RFC6265	IETF RFC6265 HTTP State Management Mechanism http://www.ietf.org/rfc/rfc6265.txt
SMOOTH	Microsoft Smooth Streaming http://www.iis.net/downloads/microsoft/smooth-streaming
TDT	Specification of digital terrestrial television receivers for the Spanish market, Version 1.1.0, Technical Forum Digital TV, Ministry of Industry, Energy and Tourism, Spain, August 2012. http://www.televisiondigital.es/TDT/ForoTecnico/GrupoReceptores/ReceptoresTDT_interactivos.pdf
TNT	HD Forum, TNT 2.0 Terminal Specification, version 1.1, July 9, 2012, http://www.hdforum.fr/sites/default/files/tnt-2-0-terminal-specification-v1-1.pdf

3.2.1 Relationship to HbbTV 2.0.1

This document has been colour coded to indicate the relationship with HbbTV 2.0.1 [ETSI_102_796]:

Green: The section contains references to a standard feature of HbbTV 2.0.1. The text of these sections is provided in order to aid implementation, provide guidance and indicate areas likely to be exploited first. The text of the HbbTV standard remains the normative reference for implementers.

Orange: The section mandates or restricts features optional in HbbTV 2.0.1. The key difference may be highlighted in orange also, e.g. the use of **SHALL** to override a "SHOULD" in HbbTV.

Yellow: The section makes features optional for Freeview Play devices in 2017 which are mandatory in HbbTV 2.0.1. The key difference may be highlighted in yellow also, e.g. the use of **SHOULD** to override a "SHALL" in HbbTV.

Blue: The section contains features outside the scope of HbbTV 2.0.1.

4. HbbTV Terminal Capability Options

4.1 General

Devices SHALL support the base level of capabilities defined in Section 4.3 of [ETSI_102_796].

Of the four optional features defined in Section 4.3 of [ETSI_102_796] the current document applies the following additional requirements and in any case all devices SHALL accurately and fully report their capability as described in Section 6.4 of this document.

4.2 Download Feature

Support for downloading A/V content from the broadcast or broadband channel into persistent memory, “download feature” is optional, which also implies File Download Protocol (FDP) is optional (see Section 7.2.8 of [ETSI_102_796] is optional).

4.3 PVR Capability

Devices with bulk storage or the capability to add bulk storage (e.g. PVRs and recording TVs) are HIGHLY RECOMMENDED to support the Download and PVR features listed in Table A.1 of [ETSI_102_796], i.e. those features with status M-P and M-D.

4.4 DRM Feature

Support for protected content via broadband SHALL be supported. All devices SHALL support the DRM features in [ETSI_102_796], notably Annex B.1 and B.2 and Annex F. This SHALL be implemented using PlayReady [PLAYREADY] as defined in Section 9.

Support for protected content using the “Clear Key” system detailed in Annex B.3 of [ETSI_102_796] SHALL be supported.

4.5 Launching Applications on a Companion Screen Device

Support for launching applications on a Companion Screen Device is optional.

5. Broadcast Services

The DTT broadcast profile for Freeview Play builds upon the FreeviewHD/Freeview+HD Trade Mark Licence [FREEVIEW_TML].

5.1 Broadcast Features

The device SHALL conform to the broadcast profile and receiver requirements specified in D-Book 8 [DBOOK].

5.2 Broadcast Applications

Devices SHALL support HbbTV 2.0.1 and MHEG broadcast applications. A service may signal both AUTOSTART HbbTV and auto-boot MHEG applications; however, there is no requirement for the device to support the simultaneous execution of HbbTV and MHEG.

Launching of broadcast HbbTV and MHEG applications SHALL be enabled by default.

The co-existence of HbbTV and MHEG SHALL be as described in Section 8.5.2.6.1 of [DBOOK] and Section 6.1.1.1 of this document.

5.3 Metadata Discovery/Bootstrap

The Metadata Delivery System (MDS) SHALL be located by using broadcast signalling. The URI linkage descriptor defined in [ETSI_300_468] and [ETSI_101_211] with a URI linkage type value of 0x80 (user defined) SHALL be used to locate the metadata system authentication service (see Section 4.1 of [FVP_B2C]). The URI linkage descriptor SHALL be preceded by a private data specifier descriptor (PDSD) with UK DTT value 0x0000233A.

The URI_linkage_descriptor SHALL be transmitted in the first descriptor loop of the NIT. The uri_char bytes in the descriptor SHALL carry an http or https URL. The authentication service URI SHOULD be preserved across device boots to remove RF dependency on every boot. The URI linkage descriptor SHALL be re-checked in the event of a failed request to the authentication service as defined in Section 4.3 of [FVP_B2C] and on NIT version changes. If the authentication service address in the URI linkage descriptor has changed this SHALL be used on the next access to the authentication service. The device SHALL NOT re-authenticate until the next authentication service request as defined in Section 4.1 and 4.3 of [FVP_B2C], i.e. a change to the URI_linkage_descriptor SHALL NOT by itself provoke a device to re-authenticate.

If the device cannot acquire the URI_linkage_descriptor, for example, if no DTT signal is receivable on installation or following a channel scan, then the device SHALL fall-back to use a default URL for the metadata system authentication service of:

<https://auth-ctv.digitaluk.co.uk>

It SHOULD be possible to update this URL within (26) weeks of request by Digital UK. The device SHALL revert back to use the URI_linkage_descriptor once it is reacquired, e.g. when a DTT aerial is reconnected or following a rescan.

Where the default URL is being used (i.e. no DTT signal is receivable) then only the application list (see Section 6.7 of [FVP_B2C]) and search and recommendations functions (see Sections 6.4 and 6.5 of [FVP_B2C]) SHALL be displayed to the viewer.

6. Application Environment

6.1.1 MHEG-5 Profile

The device shall conform to the MHEG profile specified in Sections 13 to 19 of D-Book 8 [DBOOK].

6.1.1.1 HbbTV launch from MHEG

It SHALL be possible to launch an HbbTV application from an MHEG application. The device SHALL support the MHEG ApL resident program allowing the launching of HbbTV applications via MHEG as defined by Section 11.18.2.1 of [ETSI_202_184]. The device SHALL also indicate support for this feature as defined in Section 11.18.1 of [ETSI_202_184].

The device SHALL return "true" for ApE(N) where N is:

- -1
- application/vnd.hbbtv.xhtml+xml
- text/html
- application/vnd.dvb.ait+xml

Section 11.18.2.1 of [ETSI_202_184] contains an incorrect example of how name/value pairs are used to construct a data set. The correct behaviour is as follows:

Given "name1%" = "value1" and "name2" = "contains spaces", this will produce a data set of the form name1%25=value1&name2=contains+spaces, where each of the names and values has been percent-encoded, except that space characters are replaced with "+"¹.

There is no requirement to return to an MHEG application from an HbbTV application once launched, i.e. launching an HbbTV application kills/replaces the running MHEG application.

The behaviour of an HbbTV application launched in this way SHALL be as specified in Section 6.2.2.9 of [ETSI_102_796].

6.1.1.2 Launch MHEG from HbbTV

There is no requirement to launch MHEG from HbbTV.

6.2 Void

6.3 HbbTV

The application environment described in [ETSI_102_796] SHALL be supported. For the avoidance of doubt, this includes mandatory items in Annex A of [ETSI_102_796], i.e. those features with status M and M-M, which, by reference, requires profiles of OIPF DAE and OIPF Web Standards documents.

¹ This correction is in the next published version of ETSI ES 202 184: V2.4.1.

6.4 Terminal Capabilities Signalling

The device capabilities SHALL be returned by the *application/oipfCapabilities* object defined in Section 10.2.4 of [ETSI_102_796], including the DRMSystemID of the DRM(s) supported by the device and any optional capabilities that are supported such as HEVC UHD.

The *xmlCapabilities* property of the *application/oipfCapabilities* object SHALL provide the TV Option string to indicate whether optional file download “+DL” and/or optional PVR feature “+PVR” is supported by the receiver. As described in Section 4.4 the mandatory DRM feature SHALL be indicated using the +DRM TV Option string as defined in Section 10.2.4 of [ETSI_102_796].

For Freeview Play certified (FVC) devices conforming to this specification the *ui_profile* element's *name* attribute SHALL include the string “DVB_T_FVC_P2” to indicate the device is a DVB Terrestrial Freeview Play receiver conforming to the 2017 specification. Applications SHALL use this to determine that the device has the following capabilities:

- DASH
- PlayReady Version 2.0 or higher
- EBU-TT-D
- HEVC
- Smooth Streaming
- HLS

6.5 Broadcast-independent Applications

HbbTV applications launched from the native user interface SHALL be launched as broadcast-independent. When an application is launched from the following launch points (described in [FVP_POD]) the application SHALL have broadcast-independent status:

- launch from Internet TV/application portal (see Sections 5.3.5 and 6.2.2.6 of [ETSI_102_796])
- launch from EPG (forwards and backwards) and mini-guide using deep links (see [FVP_B2C])
- launch from Search results or Recommendations using deep links (see [FVP_B2C])

The metadata service will provide a link to a suitable XML AIT document for each application (see Section 7 of [FVP_B2C]).

An application launched via the native EPG (based on the supplied metadata) SHALL be able to transition to a broadcast-related application using the *setChannel* method, if the broadcast channel selected has a matching application identity (i.e. *organisation_id* and *application_id*); see Sections 6.2.2.6 and 7.2.3.2 of [ETSI_102_796].

Applications launched in this way SHALL follow the default application boundary rules for HTTP/HTTPS applications described in Section 6.3 of [ETSI_102_796].

When applications are launched as broadcast-independent any presentation of broadcast services shall be terminated by the device.

6.6 Graphics

6.6.1 Resolution

The HbbTV application graphics plane SHALL have a resolution of at least 1280x720. The device shall be capable of supporting this resolution (see Table 11: *Minimum terminal capabilities* of [ETSI_102_796]).

Additionally the device SHALL NOT downscale this resolution.

For graphics resolution higher than 1280x720 see Table 11: *Minimum terminal capabilities* and Clause A.3.9 of [ETSI_102_796].

6.6.2 Colour depth

Over and above that specified in Table 11: *Minimum terminal capabilities* of [ETSI_102_796] RGBA32 SHALL be supported without colour channel truncation.

6.6.3 Downloadable Fonts

Downloadable fonts SHALL be supported, as referenced via Section 4.5 of [ETSI_102_796] (i.e. OIPF Web Standards).

Annex A.3.8 of [ETSI_102_796] SHALL be supported.

6.6.4 Embedded Images

The embedding of inline images in HTML and CSS as described in Section 9.2 of [ETSI_102_796] SHALL be supported.

6.6.5 SVG

The device SHOULD provide support for SVG shape types, including Path, and support for gradients and animations.

6.7 Minimum Performance Requirements and Guidelines

6.7.1 Memory Requirements

See Applications Management APIs in Annex A (Table A.1) of [ETSI_102_796].

6.7.2 Reliability

The reliability and resilience requirements described in Section 9.8 of [ETSI_102_796] SHALL be supported.

6.8 Media Playback APIs — Broadcast

Access to the device's tuner SHALL be supported via the video/broadcast object as defined in Section A.2.4 of [ETSI_102_796].

6.9 Media Playback APIs — On-Demand

6.9.1 AV Control

See sections 9.4.1 and 9.4.3 and A.2.5.1 and A.2.5.2 of [ETSI_102_796].

6.9.2 HTML5 video

See sections 9.4.1 and 9.4.2, see Table A.1, Annex A.2.6 and Section 9.6 of [ETSI_102_796].

EBU-TT-D subtitles using the HTML5 media object SHALL be supported see Section A.2.12 of [ETSI_102_796].

6.10 Ad Insertion

When using DASH, section 9.6 of [ETSI_102_796] SHALL be supported to allow acceptable quality of transitions between the playback of HTML5 media elements. This will fulfil the broadcaster requirements for ad insertion. The transition behaviour defined in Section 9.6.3 of [ETSI_102_796] SHALL be supported. Note that the transition time quoted in Section 9.6.3 of [ETSI_102_796] does not include the time for any key acquisition described in Section 9 of the present document.

The devices SHALL support transitions from a protected stream into an unprotected stream, and vice versa.

6.11 User Input & Focus

See Section 10.2.2 of [ETSI_102_796].

Pointer events SHOULD be supported. IF supported they SHALL be as defined in Section 10.2.2.2 of [ETSI_102_796].

6.12 Time Shift Behaviour

IF the device is capable of time-shifting the broadcast service it SHALL adhere to Section 6.2.2.4 of [ETSI_102_796].

6.13 Multi-stream Synchronisation

Multi-stream synchronisation **SHOULD** be supported; see Section 10.2.8 and Section 8.2.3 of [ETSI_102_796]. This feature allows for alternative audio/commentary, access services, etc. to be provided via broadband to complement broadcast.

6.14 Availability of Device ID

It SHALL be possible for an application to obtain a device id using the method specified in Section 12.1.5 of [ETSI_102_796] and Annex A.2.20.5 of [ETSI_102_796].

Access to the device ID SHALL be enabled by default.

7. HTTP Handling

This section applies to browser applications and metadata/image download for UI.

7.1 HTTP Caching in Client

The client SHALL observe the caching rules described in Section 7.3.2.6 of [ETSI_102_796].

7.2 HTTP Redirects

Receivers SHALL follow HTTP redirect rules described in Section 7.3.2.5 of [ETSI_102_796].

7.3 HTTP Cookies

Cookies SHALL be supported as defined in Section 10.2.1 of [ETSI_102_796] and Section 10.11 of [ETSI_103_285].

Cookies are to be stored securely as defined in Section 9.5. Manufacturers SHALL make available a user option to delete cookies.

As defined in Section 10.2.1 of [ETSI_102_796] the same cookie jar MUST be used for applications launched via the manufacturer portal (see Section 5.3.5 of [ETSI_102_796]) and via broadcast. Informative: This is to ensure that the user does not have inconsistent experiences across different sessions dependent on their route to the application.

It is not required that cookie jars are shared across MHEG and HbbTV technologies.

7.4 HTTP User-Agent

The User-Agent requirements defined in Section 7.3.2.4 of [ETSI_102_796] SHALL be included in all requests from the device.

The browser user-agent information SHALL also be provided.

The User-Agent shall also include the Freeview Play certified (FVC) string:

FVC/<version> (<vendorName>; <familyName>; <reserved>)

where:

- Version shall be **2.0** for devices conforming to this specification.
- The familyName is described in Section 7.3.2.4 of [ETSI_102_796].
- The <reserved> field is reserved for future extensions.

A valid example of the syntax above is

```
User-Agent: HbbTV/1.4.1 (+DRM; Sonic; TV14/551TB; 1.32.455; 2.002;  
com.example.2016VX700;) TinterKit/99.9 FVC/2.0 (Sonic; com.example.2016VX700;)
```

The <vendorName> and <familyName>, and <modelName> used in the HbbTV part of the User-Agent, SHALL be supplied to Freeview during the Freeview Play certification process.

7.5 HTTP Connections

The HbbTV application environment SHALL be able to open multiple (i.e. at least 2) simultaneous HTTP connections as defined in Section 7.3.2.7 of [ETSI_102_796].

8. Streaming Services

This section describes delivery of content over broadband; IP media formats, packaging and delivery.

8.1 Services up to HD resolution

All devices SHALL support the streaming of services up to and including HD resolution services.

8.1.1 Codecs

The mandatory codecs defined in Section 7.3 of [ETSI_102_796] SHALL be supported.

The support for HEVC decoding of streams delivered over IP SHALL be supported . HEVC Main 10 Profile at Level 4.1 Main Tier (HEVC_HD_25_10) described in Section 7.3.1.3 of [ETSI_102_796] SHALL be supported.

8.1.2 Resolutions and Frame Rates

See section 7.3 of [ETSI_102_796].

All video resolutions for the progressive representations defined via Section 7.3.1.3 of [ETSI_102_796] up to 10-bit HEVC HD SHALL be supported.

All video resolutions referenced via Section E.4.2.1 of [ETSI_102_796] shall be supported. For the avoidance of doubt this includes the resolutions in Table 17 and Table 18 of [ETSI_103_285] for all devices.

8.2 UHDTV services

In addition to the requirements of Section 8.1 the following applies for devices supporting UHDTV.

For the avoidance of doubt, this section deals with the decoding of UHDTV content and not the requirements of the display panel (if any). Furthermore, it is not mandated that devices have a panel that supports High Dynamic Range (HDR), however, if the display panel is capable of HDR then the requirements of Section 8.2.6 SHALL be followed.

As described in Section 10.4 of [ETSI_103_285] devices are only required to switch seamlessly between video representations where any combination of frame rate, bit-rate, profile/level and resolution differ, therefore, content providers requiring seamless transitions SHALL not provide representations in the same adaptation set that differ in colour space or dynamic range. This implies that in a UHDTV adaptation set HDR and BT.2020 colour space may be used for representations with resolutions lower than those in Table 19 of [ETSI_103_285], i.e. lower than UHDTV.

8.2.1 Codecs

For devices supporting UHDTV then HEVC Main 10 profile, level 5.1 for 25Hz and 50Hz Main tier (HEVC_UHD_25) SHALL be supported (see Section 7.3.1.3 of [ETSI_102_796]).

8.2.2 Resolutions and Frame Rates

For devices supporting UHD TV then video resolutions detailed in Table 19 of [ETSI_103_285] SHALL be supported.

8.2.3 Colorimetry

Decoders SHALL be capable of decoding signals using the ITU-R BT.2020 colour primaries with non-constant luminance colour encoding [ITU-R_BT2020], as described in Section 5.14.3.3 of [ETSI_101_154]. This is explicitly signalled as VUI colour_primaries equal to 9 (see Table E.3 of [ITU-T_HEVC]), and matrix_coeffs equal to 9 (see Table E.5 of [ITU-T_HEVC]).

Appropriate processing SHALL be included in the device to map the ITU-R BT.2020 colour volume to the capabilities of the display.

8.2.4 Chroma Sample Location

Decoders shall be capable of decoding signals that have the chroma sample location set to type 2, signalled with chroma_sample_loc_type_top_field equal to 2 (see Figure E.1 of [ITU-T_HEVC]).

8.2.5 Standard Dynamic Range

SDR HEVC DASH streams SHALL use the ITU-R BT.2020 10-bit opto-electronic transfer function (OETF). This is explicitly signalled by setting the VUI transfer_characteristics equal to 14.

8.2.6 High Dynamic Range

HDR HEVC DASH streams SHALL be encoded using the “ITU-R BT.[HDR-TV]” Hybrid Log Gamma (HLG) OETF [ITU-R_BT2100].

To allow HLG HDR streams to also be decoded and displayed by SDR devices, the HDR streams SHALL be signalled using the HEVC “backwards compatible” signalling of HLG. Thus the VUI transfer_characteristics SHALL be set equal to 14 (for compatibility with SDR devices) and the alternative_transfer_characteristics SEI message SHALL be present on each HEVC DVB_RAP [ETSI_101_154]. The value of the preferred_transfer_characteristics within the SEI message SHALL be set equal to “18”, indicating HLG (see Annex D.2.38 of [ITU-T_HEVC]).

Appropriate processing shall be included in the HDR device to map the “ITU-R BT.[HDR-TV]” [ITU-R_BT2100] colour volume to the capabilities of the display.

8.3 Bitrates

The minimum requirements for bit-rates are specified in Section 7.3.1.2 of [ETSI_102_796].

8.4 Access Services

8.4.1 Subtitles

EBU-TT-D subtitles SHALL be supported as defined in Section 7.3.1.5.1 of [ETSI_102_796]. Applications MAY render subtitles directly where EBU-TT-D is not

available. Control of the display of subtitles SHALL be as defined in Section 10.2.7 of [ETSI_102_796].

8.4.2 Audio Description

See Section 7.1.2 of [ETSI_102_796] and Annex E.2.4 of [ETSI_102_796]. This allows for the broadcaster-mix delivery of audio description only. The application will control stream selection.

Control and reporting of the enablement of audio description shall be as defined in Section A.2.20.3 of [ETSI_102_796].

8.5 Streaming Protocols

The device SHALL support unicast streaming of both unprotected and protected content. The content being streamed may represent on-demand content or live delivery.

See Sections 4.3, 7.3.2 and 9.1.1 of [ETSI_102_796].

Where the content provider is using DASH based streaming they SHALL use the DASH profile defined in Annex E of [ETSI_102_796] and the MPD SHALL indicate this according to Annex E.2.1 of [ETSI_102_796] as urn:dvb:dash:profile:dvb-dash:2014.

The Freeview Play platform will ultimately use DASH as the streaming technology; however, a migration strategy is required for existing streaming services.

The use of Smooth Streaming, HLS and non-adaptive HTTP unicast streaming listed in this section will be according to profiles already in use by UK broadcasters.

8.5.1 On-Demand

8.5.1.1 Unprotected

Content not requiring DRM MAY be streamed using HTTP Live Streaming [HLS] according to specification version 6, equivalent to protocol version 3.

Content not requiring DRM MAY be streamed using Smooth Streaming [SMOOTH]. Note that a segment size of 2 seconds will be used.

Content not requiring DRM MAY be streamed using non-adaptive HTTP unicast streaming, in MP4 format, as defined [ETSI_102_796] section 9.1.1.2. This is intended for short form content such as adverts and trailers.

Content not requiring DRM MAY be streamed using the DVB profile of MPEG DASH [ETSI_103_285].

Devices SHALL support all four technologies.

8.5.1.2 Protected

Content requiring DRM MAY be streamed using Smooth Streaming [SMOOTH] with PlayReady [PLAYREADY_SMOOTH]. A segment size of 2 seconds will be used.

Note that the broadcaster MAY switch between protected and unprotected modes within the same stream.

Content requiring DRM MAY be streamed using ISO CENC [CENC] protected DVB DASH. For DRM solutions see Section 9 of this document. See Annex B of [ETSI_102_796].

Devices SHALL support both technologies.

The decryption of ISO CENC [CENC] protected DVB DASH content using the Clear Key system described in Annex B.3 of [ETSI_102_796] SHALL be supported.

8.5.2 Live Delivery

8.5.2.1 Unprotected

Content not requiring DRM MAY be streamed using HTTP Live Streaming [HLS] according to specification version 6, equivalent to protocol version 3.

Content not requiring DRM MAY be streamed using Smooth Streaming [SMOOTH]. Note that a segment size of 2 seconds will be used.

Content not requiring DRM MAY be streamed using the DVB profile of MPEG DASH [ETSI_103_285]. See section 7.3.2 of [ETSI_102_796].

Devices SHALL support all three technologies.

8.5.2.2 Protected

Content requiring DRM MAY be streamed using Smooth Streaming [SMOOTH] with PlayReady [PLAYREADY_SMOOTH]. A segment size of 2 seconds will be used. Note that the broadcaster may switch between protected and unprotected modes within the same stream.

Content requiring DRM MAY be streamed using ISO CENC protected DVB DASH. For DRM solutions see Section 6 of this document. See Annex B of [ETSI_102_796].

Devices SHALL support both technologies.

The decryption of ISO CENC [CENC] protected DVB DASH content using the Clear Key system described in Annex B.3 of [ETSI_102_796] SHALL be supported.

8.6 Seek Requirements

Where the HTML5 media object is used, the seeking behaviour defined in Section 9.4.2 of [ETSI_102_796] SHALL be supported.

8.7 Timelines Accuracy

If the device supports Media Synchronisation (see Section 13 of [HBBTV2.0]) then the accuracy of media to application synchronisation SHALL be as defined in Section 13.10 of [ETSI_102_796].

9. Content Protection

9.1 General

This section describes the mechanisms required to protect content provided to the device.

Devices SHALL be required to meet the robustness requirements of the specified DRM system. Where device private secrets are used these must be protected as described in Section 4.5 of [FVP_SECURITY_ANNEX].

Devices SHALL follow the persistent storage rules in Section 10.2.3.2 of [ETSI_102_796] for broadband delivered content. Informative: this requires that streamed content SHALL NOT be persistently stored.

9.2 DRM System

See informative guidelines in Annex F of [ETSI_102_796] on DRM Integration.

9.2.1 PlayReady

PlayReady is one of the DRM systems required for content protection. Devices SHALL support Microsoft PlayReady as per [PLAYREADY_INT], [PLAYREADY_WP] and [PLAYREADY_DASH] to allow Content Protection operations and Protected Content consumption. For PlayReady signalling to the HbbTV application, the CA System ID to be used is provided in [PLAYREADY_INT].

PlayReady protection of Smooth Streaming SHALL be as described in [PLAYREADY_SMOOTH].

All mandatory features of PlayReady SHALL be supported.

These features include (but may not be limited to):

- Application triggered proactive licence acquisition
- Reactive licence acquisition triggered by the media player / Licence post-delivery
- Licence acquisition URL override
- Licence caching if allowed/defined by the licence policy (e.g. when transitioning from a protected stream into an unprotected stream and back into the original protected stream the previously acquired licence must be used; additional licence acquisition requests are not permitted)

HTTP and HTTPS SHALL be supported for licence acquisition requests.

For PlayReady signalling in MPEG-DASH assets, the format and values to be used (including SystemID) are provided in [PLAYREADY_DASH] and [PLAYREADY_FORMAT].

The specifications are provided by Microsoft to PlayReady licensees.

9.2.1.1 DRM API

Devices SHALL support the *sendDRMMessage* function of the *oipfDrmAgent* object, and SHALL use “PlayReadyInitiator” messages with the message type “application/vnd.ms-playready.initiator+xml”.

Devices SHALL support the *onDRMMessageResult* function of the *oipfDrmAgent* object, and SHALL use “PlayReadyResponse” messages in the message result of the function.

The failure of playback due to the DRM system (e.g. denial) SHALL be handled as described in Section 9.6.7 of [ETSI_102_796]. Details described in [PLAYREADY_INT] MAY offer the application better visibility of the PlayReady related failure.

Note: Versions of HbbTV prior to HbbTV 2.0.1 indicate that the DRM API is only available to ‘trusted’ applications; by default broadcast-independent applications are ‘untrusted’. However, this was a bug in the specification and the DRM API shall be as defined in Annex A.1 of [ETSI_102_796]: the DRM API shall be available to “trusted” and “untrusted” applications.

9.2.1.2 PlayReady Licence Acquisition URL Override

Devices SHALL support setting the licence acquisition URL for licence post-delivery using PlayReadyInitiator messages sent via the *sendDrmMessage* function of the *oipfDrmAgent* object.

Example:

```
<object type="application/oipfDrmAgent" id="drmAgent"
  style="visibility:hidden"></object>
...
var msgType = "application/vnd.ms-playready.initiator+xml";
var message =
  '<?xml version="1.0" encoding="utf-8"?>' +
  '<PlayReadyInitiator
  xmlns="http://schemas.microsoft.com/DRM/2007/03/protocols/">' +
  '<LicenseServerUriOverride>' +
  '<LA_URL>https://drm.example.com/rightsmanager.asmx</LA_URL>' +
  '</LicenseServerUriOverride>' +
  '</PlayReadyInitiator>';
var drmSystemId = "urn:dvb:casystemid:19219";
var drmAgent = document.getElementById('drmAgent');
drmAgent.onDRMMessageResult = myDrmMessageResultHandler;
drmAgent.sendDRMMessage(msgType, message, drmSystemId);
```

9.2.2 Alternative DRM

Alternative DRM solutions will be continually evaluated. If implemented these SHALL be applied to content in addition to PlayReady, therefore a device will only be required to support one DRM system.

9.2.3 Content protection without DRM

The Clear Key system of protecting content described in Annex B.3 of [ETSI_102_796] SHALL be supported.

9.3 TLS Client Authentication

Each device SHALL contain a client certificate as specified in Section 4.6 of [FVP_SECURITY_ANNEX] and Section 11.3 of [ETSI_102_796]. This SHALL be supplied to Freeview during the Freeview Play certification process.

9.4 TLS Server Authentication

The device SHALL comply with the policy for TLS and SSL Root Certificates defined in Section 11.2 of [ETSI_102_796].

Devices are not required to support A/V delivery over TLS.

More details of the device certificate for client authentication over TLS are given in [FVP_SECURITY_ANNEX].

9.5 Stored Data Security

The device SHALL provide secure application/cookie data storage and transit (see Table 11: *Minimum terminal capabilities* of [ETSI_102_796]). This includes application cookies and cookies used as part of any DASH playback. For the avoidance of doubt the secure protocol associated with the secure-only-flag SHALL be TLS, see [RFC6265].

Application data stored on the device, including cookies, SHALL be encrypted using an algorithm with strength at least equivalent to AES with a 128-bit key. Keys protecting such data SHALL be suitably protected (see Section 4.5 of [FVP_SECURITY_ANNEX]) in the device and SHALL be unique to each device. Manufacturers SHALL be responsible for all aspects of key management.

9.6 Onward Content Management

Devices supporting UHDTV SHALL support HDCP 2.2. UHD content not delivered under DRM control or as described in Annex B.3 of [HBBTV] SHALL NOT be redistributed through any local or remote network without encryption nor presented through any HDMI output without HDCP being enabled.

10. Software Management

10.1 Trials Management

The device SHALL support procedures whereby player releases, software upgrades, etc., can be trialed across small populations in collaboration between manufacturer and Digital UK. It is expected these trials would feature a small number of receivers, such that software updates could be provided directly to trialists (e.g. via USB/SD card).

10.2 Software Update

In-the-field update capability is required. The device SHALL be updatable in a practical manner. Existing DRM system provider agreements MAY require additional update mechanisms (e.g. in case of a DRM breach) which SHALL be implemented.

Receivers SHALL support a local mechanism for firmware update (e.g. USB).

10.3 Development and Testing Override

In order to facilitate development and some early testing the device SHALL support procedures whereby the default location of the MDS (see [FVP_B2C]) used by the device can be configured. For example, this could be achieved by supplying a file on a USB stick containing a URL of the development MDS. This SHALL be disabled in production devices.

11. Platform Metadata — Description and Delivery

Forward schedule metadata is available to receivers in the broadcast stream as profiled in [DBOOK], i.e. DVB EIT.

Enhanced, backwards and on-demand metadata is provided through a business-to-consumer interface, i.e. by accessing the Freeview Play MDS metadata system. The format of this is specified in [FVP_B2C].

The metadata contains:

- basic and enhanced linear schedule information (forwards 7 days)
- catch-up schedule information (backwards 7 days, though this may be extended in the future)
- application (player) metadata
- metadata search and recommendations interface
- deep links to applications to play content
- channel and content images

11.1 Application Launching based on Metadata

The B2C metadata interface [FVP_B2C] provides the required information for the device's native UI to launch broadcast-independent applications from a player portal, from a linear service specific deep-link and from a content specific link see Section 7 of [FVP_B2C].

11.2 Regionalisation

Regionality will be defined based on received broadcast information, where available. Several of the API calls in the B2C metadata interface require the broadcast network_id, see Section 5.6 of [FVP_B2C]. This allows broadly regionalised metadata to be supplied to the device. The EPG and application metadata/launching SHALL present a consistent view in regard of regionality.

The device MAY still be required to filter catch-up results based on the available broadcast services and viewers' service preferences, see Section 5.6 of [FVP_B2C].

The situation where a device cannot receive a DTT signal, and hence not acquire any network_id, is addressed in Section 5.6 of [FVP_B2C].

Broadcast-related apps MAY acquire the currently received network id (if available) and other information from the Channel class; see Table A.1 of [ETSI_102_796].

12. Companion Screen

The device SHALL support the launching of applications via DIAL [DIAL] directly. Launching of specific players registered in the DIAL registry is defined in player specific guidelines.

Companion screen devices **SHOULD** be supported by the device using the mechanisms defined in Section 14 and Section 8.2.6 of [ETSI_102_796], specifically but not limited to:

- Application-to-Application Communication (see Section 14.5 of [ETSI_102_796])
- Launching an HbbTV application from a Companion Screen (see Section 14.6 of [ETSI_102_796])
- Discovering devices and their service endpoints (see Section 14.7 of [ETSI_102_796])

12.1 Inter-device Synchronisation

The device **SHOULD** implement the inter-device synchronisation feature described in Section 10.2.9 of [ETSI_102_796].

Where inter-device synchronisation is implemented, note that:

- The minimum size of a buffer for media synchronisation (Section 13.4 of [ETSI_102_796]) is zero bytes.

Master functionality is required (see Section 10.2.9.2 of [ETSI_102_796]), but slave functionality (see Section 10.2.9.3 of [ETSI_102_796]) is optional.

13. Out of Scope

This section details relevant technology choices which are specifically out of scope.

13.1 IPv6

Support for IPv6 is currently NOT required.

13.2 IP Multicast

Support for IP multicast is currently NOT required.

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