Errata 3 to TS 102 796 V1.4.1

2018-02-16

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1 Introduction

This document contains the currently identified and resolved errata to ETSI TS 102 796 v1.4.1. It is a living document which will be updated based on experience of implementing receivers, services and tests. Versions of this document will periodically be made publicly available via the www.hbbtv.org web site.

The contents of this document will be included in subsequent errata documents making this document obselete.

Feedback is welcome. HbbTV members should provide this through the HbbTV internal issue tracking system. Non-members may provide it by email to info@hbbtv.org.

For avoidance of doubt, the contents of this document have not been reviewed or approved by ETSI.

2 Conventions

In this document, text quoted from other documents or to be added to other documents is indented except where it appears in a table. Fine-grained changes in text from other documents are shown using the underline and strikethrough convention.

3 Summary

The following table summarises the changes included in this document.

Issue #	Short Description	Category	Clauses Impacted	Clause in this document
3535	XML parsing	Other	2.1, 7.2.3.2, 7.2.4, 8.2.1.1, 10.2.4, A.1, A.2.6.2, E.2.1	4.2.4, 4.5.5, 4.6.4, 4.8.2, 4.13.5
4913	Clarify resource usage by HTML5 media elements	Ambiguity	9.6.2, A.2.1	4.7.2, 4.13.3
5097	Frame rate support with UHD content via DASH	Ambiguity	New clause E.4.6	4.15.2
5307	Clarifying media synchroniser error codes	Ambiguity	8.2.3.2	4.6.2
5314	Update inter-device sync spec from DVB blue book back to ETSI	Other	2.1, 8.2.3, 10.2.8, 13, G.1	4.2.1, 4.6.5, 4.8.4, 4.11.3, 4.16.1
5324	Clarify URL scheme and MPD anchor rules	Ambiguity	9.2, E.4.5	4.7.1, 4.15.1

Issue #	Short Description	Category	Clauses Impacted	Clause in this document
5385	Removing support for CSS3 navigation	Other	10.2.2.1, new annex L	4.8.1, 4.17.1
5499	Timing requirements for end of mid roll adverts	Ambiguity	New clause 9.6.12	4.7.4
5500	Confusion over deviceId class	Ambiguity	12.1.5	4.10.1
5575	Running apps from previous spec versions	Editorial	1	4.1.1
5582	Two setChannel methods of video/broadcast defined with same signature	Error	A.2.4.7.4	4.13.10
5583	Ignoring unsupported AIT descriptors	Ambiguity	2.2, 7.2.3.1	4.5.4, 4.2.3
5639	Issue with companion launcher API	Error	8.2.6.1	4.6.3
5738	errorCode(s) for onCSLaunch	Ambiguity	8.2.6.1	4.6.7
5824	Key “Label” should be “label”	Ambiguity	A.2.5.3	4.13.7
5862	Running a regular HbbTV app on a channel not in the terminal channel list	Editorial	6.2.2	4.4.4
5864	text in wrong location in annex A - referring to MetadataSearch	Editorial	A.1	4.13.1
5872	Clarification to 6.2.2.9 re key events	Ambiguity	6.2.2.9	4.4.2
5899	Reference to NI clause 10.1.1 of the DAE specification	Inconsistency	A.1	4.13.16
5910	UPnP version to be used with DIAL	Implementation	2.1, 14.7	4.2.2, 4.12.1
5919	VK_RECORD key is not in any set of keys	Error	A.1	4.13.4
5972	PVR API issues	Error	A.1, A.2.4.7.3, A.2.4.8.1, A.2.4.8.2	4.13.11
5984	Scope of AVAudio and AVVideoComponents	Ambiguity	A.2.4.6	4.13.12
6047	Update key event text in clause 5.2	Editorial	5.2	4.3.1
6049	Avoid MediaSynchroniser API leaking "secret" stream URLs	Other	8.2.3.2.1, 13.6.2, 13.8.2.2	4.6.1, 4.11.1

Issue #	Short Description	Category	Clauses Impacted	Clause in this document
6211	video/broadcast object issues when playing A/V from broadband	Ambiguity	6.2.2.7, A.2.4.1, A.2.4.5, new clause A.2.26	4.4.3, 4.13.8
6215	Content supporting both Clear Key and conventional DRM	Ambiguity	9.6.7, A.2.27, B.3, new clause B.4	4.7.6, 4.13.13, 4.14.1
6422	Clarification of TEMI timeline requirements	Ambiguity	13.4.2	4.11.2
6482	Incoherent AVSubtitleComponent language with TTML tracks	Inconsistency	A.1	4.13.17
6495	Additional cases when 250ms ad insertion transition may not be possible to meet	Other	9.6.3	4.7.3
6498	Subtitle track selection - ability for an app to suppress subtitles reliably	Ambiguity	10.2.7.1, 10.2.7.3	4.8.3
6544	Missing XML declaration in example XML AIT	Error	7.2.3.2	4.5.3
6550	Clarification on XML AIT example	Error	7.2.3.2	4.5.2, 4.12.2
6560	Channel change key behaviour with broadcast independent applications	Ambiguity	6.2.2.2	4.4.1
6564	bindToCurrentChannel() while an A/V Control object is presenting	Ambiguity	A.2.1	4.13.6
6591	"channels" should be "audioChannels"	Editorial	A.2.4.6	4.13.2
6610	Update reference to TS 102 809	Other	2.1, 7.2, 11.1	4.2.1, 4.5.1, 4.9.1
6741	Unclear language in A 2.20.1 - Extensions to Represent Subtitle Presentation	Ambiguity	A.2.20.1	4.13.14
6914	URL used in in DIAL example should be changed	Other	14.7.3.1, 14.7.3.2	4.12.3
6915	Lack of linkage between spec version in AIT signalling and version in DOCTYPE in individual pages of app	Other	7.2.3.1, A.2.6.2	4.5.6, 4.13.9
6971	Ambiguous use of “this”	Ambiguity	7.3.2.6	4.5.8

Issue #	Short Description	Category	Clauses Impacted	Clause in this document
7045	Including or not including data services in the service list based on HbbTV version	Ambiguity	7.2.6	4.5.7
7046	Require the same DASH player for HTML5 video element and A/V control object?	Other	New clause 9.1.1.3	4.7.5
7088	Allow applications to prioritise DRM to use	Other	A.1, new clause A.2.27	4.13.13
7128	Clarification on FSA: Is group priority value 0x00 valid?	Ambiguity	7.2.7.2	4.5.9
7146	Pending requests for FSA files when carousel is unmounted	Ambiguity	New clause 7.2.7.5	4.5.11
7162	SHA-1 sunset date has passed	Other	11.2.4	4.9.2
7196, 7697	Carousel access following channel change	Ambiguity	7.2.5.3	4.5.10
7323	Web Storage following channel change	Other	6.3.2	4.4.5
7338	Cookie writing to persistent storage time requirement	Ambiguity	10.2.1	4.8.5
7364	Clarification on value for property "lastError" if no error occured	Ambiguity	8.2.3.2.1	4.6.6
7439	Clarification to parental rating	Ambiguity	A.1, new clause A.2.28	4.13.15
7598	deviceID	Other	12.1.5, A.2.20.5	4.10.1, 4.13.20
7607	Encrypted Media Extensions Recommendation	Other	2.1	4.2.7
7636	Clarify what timelineSelector to convey in CII message	Ambiguity	13.6.2	4.11.4
7775	Web Storage minimum storage requirement	Ambiguity	10.2.1	4.8.6
7801	Errors in mapping from DASH roles to HTML5 audio/video track kind values	Error	A.2.12.3	4.13.19
7970	Approval and pre-approval to launch an HbbTV app on request by a CS app	Ambiguity	14.6.2	4.12.4

Issue #	Short Description	Category	Clauses Impacted	Clause in this document
8015	Clarifications relating to origins for application boundary	Ambiguity	6.3.2, 6.3.3	4.4.7
8029	Possible ambiguity in table A.1 re subtitlesEnabled	Ambiguity	A.1	4.13.18
8038	WebStorage behaviour if user has disabled persistent storage	Other	12.1.4	4.10.2
8049	URL prefixes for DVB URLs in App Boundary Descriptor	Error	7.2.3.1, 7.2.3.2	4.5.12
8070	RFC for web origin allows it to be null in "privacy-sensitive" contexts	Other	2.1, 6.3.2	4.2.6, 4.4.6
8074	No requirements on the DASH player to adapt	Ambiguity	New clause E.4.7	4.15.3

Key to categories

Ambiguity	Feature where different implementations may behave in different ways. This includes under-specified features as well as inconsistencies within the specification.
Editorial	Purely editorial change
Error	Clear technical error in the specification. Cannot be implemented as written.
Implementation	Feature removed, simplified or modified in order to simplify implementation and testing.

4 Changes to TS 102 796 v1.4.1

4.1 Clause 1 – Scope

4.1.1 Running apps from previous spec versions

In the following paragraph, “the two” is removed as shown with strike-through notation;

> The present document requires terminals to run applications signalled as conforming to ~~the two~~ previous revisions. This allows for smooth transitions where the previous revisions have been deployed.

4.2 Clause 2 – References

4.2.1 Update reference to TS 102 809

Normative reference 3, TS 102 809, is updated from version 1.2.1 to version 1.3.1.

4.2.2 UPnP version to be used with DIAL

The following normative references are added.

[67] ISO/IEC 29341-1:2011: "Information technology -- UPnP Device Architecture -- Part 1: UPnP Device Architecture Version 1.0".

NOTE: This specification was first published by UPnP™ in 2008, and an equivalent version is available from http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf

[68] ISO/IEC 29341-1-1:2011: Information technology -- UPnP Device Architecture -- Part 1-1: UPnP Device Architecture Version 1.1”.

NOTE: This specification was first published by UPnP™ in 2008, and an equivalent version is available from http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.1.pdf

4.2.3 Ignoring unsupported AIT descriptors

The following additional informative reference is added:

[i.21] DVB Services, “MHP & GEM | MHP AIT Descriptor”

NOTE: Located at http://www.dvbservices.com/identifiers/mhp_ait_descriptor

4.2.4 XML Parsing

The following normative reference is added;

[69] W3C Recommendation (4 February 2004): "Extensible Markup Language (XML) 1.0 (Third Edition)"

NOTE: Available at http://www.w3.org/TR/2004/REC-xml-20040204/

4.2.5 Update inter-device sync spec from DVB blue book back to ETSI

In clause 2.1, reference 47 is changed from:

DVB Bluebook A167-2 [06/2016]: "Digital Video Broadcasting (DVB); Companion Screens and Streams; Part 2: Content Identification and Media Synchronisation".

NOTE: Available at http://www.dvb.org/resources/public/standards/a167-2_dvb-css_part_2_content-ID-and-media-sync_June2016.pdf

To

ETSI TS 103 286-2 (V1.2.1): "Digital Video Broadcasting (DVB); Companion Screens and Streams; Part 2: Content Identification and Media Synchronisation".

4.2.6 RFC for web origin allows it to be null in "privacy-sensitive" contexts

In clause 2.1, reference 25 is changed to:

IETF RFC 6454: "The Web Origin Concept"

4.2.7 Encrypted Media Extensions Recommendation

In clause 2.1, reference 66 is changed from

> W3C Working Draft (04 February 2016) : "Encrypted Media Extensions".

to

> W3C Recommendation (18 September 2017) : "Encrypted Media Extensions".

4.3 Clause 5 – User experience

4.3.1 Update key event text in clause 5.2

In clause 5.2, two rows are added to Table 2: “Relevant remote control buttons or key events for the end user when using interactive applications” as shown underlined.

BACK button	Variable usage as defined by the application (typically going back one step in the application flow).
Number keys	Variable usage as defined by the application (typically used for numeric input or channel selection).
Transport keys (play, pause, stop, FF, FR)	Variable usage as defined by the application (typically used to control media playback).
2 program selection buttons (e.g. P+ and P-)	If available: selects the next or previous broadcast service in the internal channel list which may lead to the termination of the running application as described in clause Error: Reference source not found. These functions remain active at all times while broadcast-related applications are running – see clause 6.2.2.2.

The following text is added immediately after the table.

> Some input devices may provide the user with a combined play/pause function instead of separate play and pause functions. Applications should be written to cater for both cases.

4.4 Clause 6 – Service and application model

4.4.1 Channel change key behaviour with broadcast independent applications

In clause 6.2.2.2, the following paragraph is extended with the sentence shown underlined.

> The channel change mechanisms offered by the terminal (e.g. P+/P- keys, number keys) shall remain functional at all times while broadcast related applications are running, regardless of whether media is being presented and whether that originates from broadcast or broadband. The behaviour of these channel change mechanisms is implementation-dependent when a broadcast-independent application is running (and hence no broadcast channel is selected).

4.4.2 Clarification to 6.2.2.9 re key events

The following paragraph is added at the end of clause 6.2.2.9.

> In all cases, an application launched from a non-HbbTV application environment shall be "activated" for the purposes of receiving key events (see clause 10.2.2.1).

4.4.3 video/broadcast object issues when playing A/V from broadband

The following text is added at the end of clause 6.2.2.7:

> Broadcast related applications that wish to access information from the video/broadcast object, e.g. channelchange succeeded events or stream events, while playing broadband content, should put the video/broadcast object into the stopped state. When an application survives a channel change, e.g. caused by P+/P-, the video/broadcast object transitions from the stopped state into the connecting state and into the presenting state if available resources permit (e.g. if additional video and audio decoders are available beyond those used for presenting the broadband content). The application is responsible to put it back into the stopped state.

4.4.4 Running a regular HbbTV app on a channel not in the terminal channel list

The following text is added to clause 6.2.2 immediately before the paragraph starting “Figure 13 shall not apply when selecting an MPEG program which is not a broadcast DVB service.”

> Applications may select services using a mechanism called “locally defined channels” (see clauses 7.13.1.3 and 7.13.11 of the OIPF DAE specification [1]). These may refer to regular broadcast DVB services (whether found by a channel scan or not), in which case figure 13 and the rest of the application lifecycle shall apply. These may also refer to MPEG programs that are not broadcast DVB services.

4.4.5 Web Storage following channel change

In clause 6.3.2, the second bullet point is modified as shown by underline / strikethrough markup.

> For resources loaded via DSM-CC object carousel, the origin shall be ~~the DVB~~a URI in the form ~~(as defined in ETSI TS 102 851 [10] clause 6.3.1)~~:
>
> ~~- "dvb" ":" "//" original_network_id "." transport_stream_id "." service_id "." component_tag.~~
>
> - "hbbtv-carousel" ":" "//" organisation_id ":" carousel_id
>
> where organisation_id is the organisation id associated with the currently-running broadcast related application, and carousel_id is the ID of the carousel from which the resource was loaded, both encoded in decimal with no leading zeros.
>
> NOTE 1: Only broadcast related applications have access to broadcast carousels, and only an application that has a defined organisation_id can be broadcast related.
>
> NOTE 2: URLs using the hbbtv-carousel: scheme cannot be used to access files from the carousel. This scheme is used solely as the origin associated with resources accessed using a dvb: URI.
>
> ~~NOTE: In this case, the "host" is the DVB triplet plus the component_tag.~~
>
> ~~Hexadecimal digits in the DVB triplet and the component_tag shall be encoded using lower case characters.~~

4.4.6 RFC for web origin allows it to be null in "privacy-sensitive" contexts

The following text is added to clause 6.3.2 after the text "For resources loaded via HTTP and HTTPS, the origin shall be as defined in clause 5.3 of the HTML5 Recommendation [54]".

> An HbbTV application shall not be considered a "privacy-sensitive" context for the purposes of clause 7.3 of RFC 6454 [25] and an Origin header shall be included in HTTP requests made on behalf of an HbbTV® application, and during the process of launching an HbbTV® application.

4.4.7 Clarifications relating to origins for application boundary

In clause 6.3.2, the text shown underlined is added to note 2.

> NOTE 2: URLs using the hbbtv-carousel: scheme cannot be used to access files from the carousel or for signalling in a simple_application_boundary_descriptor or an <applicationBoundary> element of an XML AIT. This scheme is used solely as the origin associated with resources accessed or referenced using a dvb: URI.

In clause 6.3.3, a new note 4 is added as shown underlined and the existing note 4 renumbered accordingly.

> one or more dvb: URL prefixes. The application boundary shall be extended to include also object carousels referenced by such prefixes.
>
> > NOTE 4: As defined above, the application boundary is held by the terminal as a set of origins. Clause 6.3.2 defines how to obtain the origin of a dvb: URL. The resulting origins will use the hbbtv-carousel: scheme as defined in clause 6.3.2.

4.5 Clause 7 – Formats and protocols

4.5.1 Update reference to TS 102 809

In clause 7.2.2, the first paragraph is extended with the text shown underlined.

> DSM-CC object carousel as defined in clause 7 of TS 102 809 [3] shall be supported. The present document does not require the use of the protection mechanism described in clause 9 of TS 102 809 [3] by either broadcasters or terminals. Requirements for the use of this mechanism may be defined by the appropriate specifications for each market where the terminals are to be deployed.

In clause 7.2.3.1, the first paragraph is extended with the text shown underlined.

> Table 5 identifies the descriptors and other signalling entities whose MPEG-2 encoding shall be supported. Clause numbers and page numbers refer to TS 102 809 [3]. The present document does not require the use of the protection mechanism described in clause 9 of TS 102 809 [3] by either broadcasters or terminals. Requirements for the use of this mechanism may be defined by the appropriate specifications for each market where the terminals are to be deployed.

4.5.2 Clarification on XML AIT example

In table 7, "Contents of XML AIT for Broadcast-independent applications", in the row for the applicationTransport element, the cell in the column “Requirement on XML AIT file” is extended with the following;

> The URLBase element shall be a URL ending with a slash (“/”) character. No URLExtension elements shall be present. Only one applicationTransport element with type HTTPTransportType shall be present in the scope of the application.

4.5.3 Missing XML declaration in example XML AIT

In clause 7.2.3.2, “xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" is added to the example XML AIT as shown underlined.

```
<?xml version="1.0" encoding="UTF-8"?>
<mhp:ServiceDiscovery
    xmlns:mhp="urn:dvb:mhp:2009"
    xmlns:hbb="urn:hbbtv:application_descriptor:2014">
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    <mhp:ApplicationDiscovery DomainName="example.com">
        <mhp:ApplicationList>
            <mhp:Application>
                <mhp:appName Language="eng">Whizzo Play Along Quiz</mhp:appName>
                    <mhp:applicationIdentifier>
                    <mhp:orgId>123</mhp:orgId>
                    <mhp:appId>456</mhp:appId>
                </mhp:applicationIdentifier>
```

4.5.4 Ignoring unsupported AIT descriptors

Text is added to clause 7.2.3.1 as shown underlined.

Elementary streams that are used to carry an application information table may additionally carry information using other table_ids. When acquiring and monitoring for AIT elementary streams, terminals shall silently ignore table_ids not supported for carriage of AIT information.

> NOTE: The present document only requires support for table_id 0x74 as defined in ETSI TS 102 809 [3].

AIT subtables for HbbTV applications may include descriptors that are not required to be supported by the present document (see DVB services - i.21). Terminals should not support these AIT descriptors unless required by another specification. Terminals shall ignore AIT descriptors that they do not support.

Table 5: Supported application signalling features

4.5.5 XML Parsing

The following is added to clause 7.2.3.2 between the first and second paragraphs (before "The semantics of the fields ..."):

> The XML AIT must not contain an XML Document Type Definition (“<!DOCTYPE ...>”).

The following is added to clause 7.2.4 at the end of the clause;

> The XML event description file defined in clause 8.2 of TS 102 809[3] must not contain an XML Document Type Definition (“<!DOCTYPE ...>”).

4.5.6 Lack of linkage between spec version in AIT signalling and version in DOCTYPE in individual pages of app

The following is added to clause 7.2.3.1 in Table 5 "Supported application signalling features", in the row for "5.2.5 Platform profiles", at the end of the cell in the "Notes" column:

> For example, an application signalled as requiring [1,1,1] is able to detect that it's running on a [1.4.1] terminal and take advantage of the additional features defined in the present document.

4.5.7 Including or not including data services in the service list based on HbbTV version

In clause 7.2.6, changes are made as indicated using underline / strike-through markup.

> Terminals shall process the data_broadcast_descriptor in the SDT. ~~and~~ Terminals shall include, in the terminal's service list all those~~,~~ data services that:
>
> ~~signal applications that are supported. If the selector_bytes are not present, the service shall not be included in the terminals service list.~~
>
> - carry a data_broadcast_descriptor that indicates the HbbTV data_broadcast_id and have selector_byte present and
> - signal an HbbTV application that is supported by the terminal
>
> The present document is intentionally silent about data services that signal application(s) that are not supported. There are a number of reasons and/or circumstances why it may be appropriate to still include these in the terminal channel list.

4.5.8 Ambiguous use of "this"

In clause 7.3.2.6, "this" in the following note is replaced by "The preceding paragraph".

> NOTE: This does not apply to HTTP requests made by the MPEG DASH player or the DRM agent.

4.5.9 Clarification on FSA: Is group priority value 0x00 valid?

In clause 7.2.7.2, the bulleted list introduced by "The semantics are as defined in ETSI ES 202 184 [36] with the following exceptions:" is extended with the following item:

> - group_priority: priority 0 is the highest priority and increasing group_priority value means decreasing actual priority. In the present document there is no allocation of priority values. The system group has no specific meaning.

4.5.10 Carousel access following channel change

The following text is added at the end of clause 7.2.5.3.

> Applications that have HTML documents loaded from a carousel and wish to access equivalent files in a different carousel after a channel change need to take care to ensure that valid file references are used. Without action by the application, relative URLs would still resolve to the original carousel. Applications can use absolute dvb: URLs to explicitly reference the new carousel. Alternatively, if it is desireable to use relative file references,

the HTML5 `<base>` element may be used to update the base path used for the resolution of future relative URLs.

Where the same carousel (as defined in B.2.10 of TS 102 809) is signalled in a new service that is on the same multiplex, the terminal shall be able to successfully resolve relative URLs after a channel change since the carousel remains accessible in this case (see clause 9.2).

An example of how the `<base>` element may be used to change the document's base URL is shown below:

```
if (document.getElementById('myBase')) {
    document.getElementById('myBase').href = newBaseUrl;
} else {
    var newBase = document.createElement('base');
    newBase.setAttribute('id', 'myBase');
    newBase.setAttribute('href', newBaseUrl);
    document.getElementByTagName('head')[0].appendChild(newBase);

        }
```

4.5.11 Pending requests for FSA files when carousel is unmounted

A new clause 7.2.7.5 is added as follows:

7.2.7.5 File groups referenced by multiple carousels

A file group might be referenced by several carousels. If a carousel is unmounted and a new carousel mounted which references the same file group then the following apply:

- The file group cache may continue to be filled
- Pending requests for files in the group to be cached may continue or be restarted in an implementation specific manner

4.5.12 URL prefixes for DVB URLs in App Boundary Descriptor

The following text (that occurs in both clauses 7.2.3.1 and 7.2.3.2) is modified in both places as shown using underline / strike-through markup.

When prefixes start with "http://" or "https://", ~~Only~~ only prefixes forming at least a second-level domain shall be supported.

4.6 Clause 8 – Browser application environment

4.6.1 Avoid MediaSynchroniser API leaking "secret" stream URLs

The following property is added to those defined for the MediaSynchroniser embedded object in clause 8.2.3.2.1.

```
String contentIdOverride
```

Description	This value overrides the content ID that would normally be reported to Companion Screen Applications and slave terminals during inter-device synchronisation. When the terminal is a master terminal and inter-device synchronisation functionality is enabled and the value of this property is a string then the content ID that the terminal uses for the CSS-CII service endpoint and the CSS-TS service endpoint is overridden and the value of this property is used instead. If the value of this property is `null` or `undefined` then there is no override. This behaviour is defined in clauses 13.6.2 and 13.8.2. The value of this property shall initially be `null`.

4.6.2 Clarifying media synchroniser error codes

In clause 8.2.3.2.2, the description of the initMediaSynchroniser method is modified with the addition of clarifications as shown underlined.

> If the MediaSynchroniser has already been initialized (including if it is in a permanent error state) then this call shall fail and an error event shall be triggered with error code 13 or 17 (according to the definition of the error codes).
>
> If the media stream for the media object is determined to be not available or if the selected timeline is determined to be not available then this shall result in a permanent error of the MediaSynchroniser and an error event shall be triggered with error code 15 or 16 (according to the definition of the error codes).
>
> If this method completes without error then the MediaSynchroniser shall be considered initialized.
>
> When this MediaSynchroniser is initialized, if there is an existing MediaSynchroniser that has already been initialized then this shall result in a permanent error of the existing MediaSynchroniser and it shall trigger an error event with error code 18.

In clause 8.2.3.2.2, the description of the initSlaveMediaSynchroniser method is modified with the additions of clarifications as shown underlined.

> If the service endpoint at the specified URL is not available then this shall result in a permanent error of the MediaSynchroniser and an error event shall be triggered (see clause 13.3.8) with error code 6.
>
> If the MediaSynchroniser has already been initialized (including if it is in a permanent error state) then this call shall fail and an error event shall be triggered with error code 13 or 17 (according to the definition of the error codes).
>
> If the terminal does not support the capability to act as a slave terminal, then this method shall be undefined.
>
> If this method completes without error then the MediaSynchroniser shall be considered initialized.
>
> When this MediaSynchroniser is initialized, if there is an existing MediaSynchroniser that has already been initialized then this shall result in a permanent error of the existing MediaSynchroniser and it shall trigger an error event with error code 18.

In clause 8.2.3.2.2, the description of the addMediaObject method is modified with the additions of clarifications as shown underlined.

> If the MediaSynchroniser is not initialized, or is in a permanent error state, then this call shall be ignored and an error event dispatched with error code 7 or 13 (according to the definition of the error codes).
>
> If the media object has already been added to the MediaSynchroniser (either by passing it to addMediaObject() or initMediaSynchroniser() methods), then this call shall be ignored and an error event dispatched with error code 4.
>
> If adding the media object would result in multi-stream synchronisation using a combination of streams that is unsupported by the terminal, then this call shall be ignored and a transient error of the MediaSynchroniser shall be generated with error code 20.
>
> The actual presentation of the content might be delayed while the terminal aligns the master media object and the other media object(s) to achieve synchronized presentation in accordance with the correlation timestamps.
>
> The terminal may be required to buffer one or more of the media objects. If the terminal has insufficient buffer space or cannot present the media sufficiently early then the media object shall be added to the MediaSynchroniser but a transient error of the MediaSynchroniser shall be generated with error code 1 or 11.
>
> The terminal shall select the components from the media object to be presented in accordance with the value of the multiDecoderMode parameter and the definitions in clause 10.2.7.
>
> If the terminal fails to access a media item or its timeline, e.g. the resource is not available, then adding the media object shall fail and the MediaSynchroniser shall dispatch an error event with error code 2 or 3 (according to the definition of the error codes).
>
> If the correlation timestamp correlationTimestamp is undefined a correlation timestamp where the value of both properties is 0 shall be assumed. If the correlation timestamp is null or has an invalid format, adding the media object shall fail and the terminal dispatch an error event with error code 5.

In clause 8.2.3.2.2, the description of the removeMediaObject method is modified with the additions of clarifications as shown underlined.

> If the media object has not already been added to the MediaSynchroniser or is the master media object then this call shall be ignored and an error event dispatched with error code 8.
>
> If the MediaSynchroniser is not initialized, or is in a permanent error state, then this call shall be ignored and an error event dispatched with error code 7 or 13 (according to the definition of the error codes).

In clause 8.2.3.2.2, the description of the updateCorrelationTimestamp method is modified with the additions of clarifications as shown underlined.

> If the media object either is not already added to the MediaSynchroniser or is the master media object, then this call shall be ignored and an error event dispatched with error code 8.
>
> If the MediaSynchroniser is not initialized, or is in a permanent error state, then this call shall be ignored and an error event dispatched with error code 7 or 13 (according to the definition of the error codes).

In clause 8.2.3.2.2, the description of the enableInterDeviceSync method is modified with the additions of the clarification as shown underlined.

> If the MediaSynchroniser is not initialized, or is in a permanent error state, then this call shall be ignored and an error event dispatched with error code 7 or 13 (according to the definition of the error codes).

In clause 8.2.3.2.2, the description of the disableInterDeviceSync method is modified with the additions of the clarification as shown underlined.

> If the MediaSynchroniser is not initialized, or is in a permanent error state, then this call shall be ignored and an error event dispatched (see clause 13.3.8) with error code 7 or 13 (according to the definition of the error codes).

In clause 8.2.3.2.4, some of the error values are clarified as shown using underline / strike-through markup.

Value	Description	Permanent or Transient
1	Synchronization is unachievable because the terminal could not delay presentation of content (represented by a media object added using the `addMediaObject()` method) sufficiently to synchronize it with the master media. For example: the buffer size for media synchronization is not sufficient.	Transient
2	The presentation of media object(that was added using the `addMediaObject()` method) failed. The specific reason is given by the error handler of that media object.	Transient
3	The media or the selected timeline for the media could not be found or the media timeline is no longer present (for media represented by a media object that was added using the `addMediaObject()` method).	Transient
4	Media object is already associated with the `MediaSynchroniser`.	Transient
5	The correlation timestamp set for a media object is `null` or has an invalid format.	Transient
6	While acting as a slave terminal, i~~I~~nter-device synchronization with a master terminal failed because of unavailability, e.g. an endpoint is not available or disappeared. Applications should rediscover available terminals as defined in clause 14.7.2 before continuing with inter-device synchronization.	Permanent
7	The call failed because the `MediaSynchroniser` is not yet initialized.	Transient
8	The media object ~~referenced as an argument in the call~~has not been ~~needed to have already been~~ added to the `MediaSynchroniser` using the `addMediaObject()` method~~ but it has not been~~.	Transient
9	The media object (that was passed using the `addMediaObject()` method) is not in a suitable state to participate in synchronization. See clause 9.7.1.	Transient
10	While acting as a slave terminal, i~~I~~nter-device synchronization with a master terminal failed because of a fault in protocol interaction, e.g. the master terminal did not provide required messages or data. Applications can consider trying again.	Permanent
11	Synchronization is unachievable because the terminal could not present the content (represented by a media object added using the `addMediaObject()` method) sufficiently early to synchronize it with the master media.	Transient
13	The method call failed because the `MediaSynchroniser` is in a permanent error state or because it has been replaced by a newer initialized `MediaSynchroniser`.	Transient (see note ~~1~~)
14	The presentation of the master media (that was specified as an argument when the `initMediaSynchroniser()` method was called) failed. The specific reason is given by the error handler of that media object.	Permanent
15	Either t~~T~~he master media object or the selected timeline for ~~a~~the master media object (that were specified as arguments when the `initMediaSynchroniser()` method was called) could not be found or the media timeline is no longer present.	Permanent
16	The master media object is not in a suitable state to participate in synchronization. See clause 9.7.1.	Permanent
17	The method call failed because the `MediaSynchroniser` is already initialized.	Transient
18	This~~e~~ `MediaSynchroniser` has been replaced by a new `MediaSynchroniser` being initialized.	Permanent
19	The master terminal has reported that the `presentationStatus` of the master media has changed to "transitioning" (see clause 13.6.3).	Transient
20	The combination of streams requested for multi-stream synchronisation (by a call to the `addMediaObject()` method) is unsupported.	Transient
NOTE:	The `MediaSynchroniser` will already be in a permanent error state. If this error occurs, the `MediaSynchroniser` remains in the permanent error state.	

4.6.3 Issue with companion launcher API

The description of the `discoverCSLaunchers()` method is modified as shown by underline / strike-through markup.

> When true is returned, the terminal shall determine a set of CS Launcher Applications that are Connected (as defined in clause 14.3.2) and report these by scheduling the onCSDiscovery() callback ~~shall be scheduled to fire~~ within 1 second. There shall be no callback scheduled if false is returned.

> In determining the set of Connected CS Launcher Applications, the terminal performs any discovery and/or association steps that are needed. The details of what is done during this function call or after this function call depend~~e~~s depends on the protocol between the HbbTV® terminal and the CS launcher application and is implementation specific.

In the description of the `onCSDiscovery()` method, the description of the,`csLaunchers` property is modified as shown using underline / strike-through markup:

> A JavaScript Array object containing zero or more `DiscoveredCSLauncher` objects (see clause 8.2.6.3) where each object in the array represents a CS Launcher application that is Connected (as defined in clause 14.3.2). ~~was either:~~
>
> - ~~currently connected at the time of the call to `discoverCSLaunchers()` that triggered this callback;~~
> - ~~or subsequently connected after the time of the call to discoverCSLaunchers() that triggered this callback.~~
>
> The protocol for determining the CS Launchers to be included in this array is out of scope, and not defined by the present document.

4.6.4 XML parsing

In clause 8.2.1.1, the description of the targetURL argument of the addStreamEventListener method shall be amended with additional text as shown underlined below.

> The URL of the DSM-CC StreamEvent object or an HTTP or HTTPS URL referring to an XML event description file (as defined in clause 8.2 of [3] and profiled in section 7.2.4) describing the event.

4.6.5 Update inter-device sync spec from DVB blue book back to ETSI

In clause 8.2.3, in the description of the updateCorrelationTimestamp method, “DVB Bluebook A167-2” is replaced by “ETSI TS 103 286-2”.

4.6.6 Clarification on value for property "lastError" if no error occurred

The following changes are made in clause 8.2.3.2.1;

The description of the `lastError` property is changed from

> Shall be the code of the last error that occurred for this MediaSynchroniser object as defined in clause 8.2.3.2.4.

to

> If no error has yet occurred for this MediaSynchroniser object then the value of this property shall be null, otherwise the value shall be the code of the last error that occurred for this MediaSynchroniser object as defined in clause 8.2.3.2.4.

In the description of the `lastErrorSource` property, the second sentence is changed from

> If the error was not caused by a media object or the master terminal or interaction with the master terminal, then this shall be null.

to

> If no error has yet occurred for this MediaSynchroniser object, or if the error was not caused by a media object and was not caused by the master terminal or interaction with the master terminal, then this shall be null.

4.6.7 errorCode(s) for onCSLaunch

In clause 8.2.6.1, the table of error code descriptions is modified as follows:

1) The text introducing the table is changed from:

> The following error codes may be carried in the onCSLaunch callback:

to

> The error code in the onCSLaunch callback shall be one of the following as defined by the error description:

2) The following text is added to the row for "op_not_guaranteed" at the end of the "Error Description" column:

> Since the Launcher application on the CS may not have knowledge that the CS app has actually launched, this error code is termed 'op_not_guaranteed'. If the launcher application is aware that the launch or install operation has completed successfully then this code shall be used.

4.7 Clause 9 – System integration

4.7.1 Clarify URL scheme and MPD anchor rules

The following paragraph is added at the start of clause 9.2.

> This clause describes how URL schemas can be used within HbbTV applications (HTML, JavaScript, images and references to A/V content).

4.7.2 Clarify resource usage by HTML5 media elements

In clause 9.6.2, a sentence is added in the following paragraph as shown underlined.

> The terminal may use hardware audio and video decoders to decode and render <video> and <audio> HTML5 media elements. These hardware resources shall not be allocated to an HTML5 media element before it changes from being paused to 'potentially playing' (as defined in the HTML5 specification). When subsequently paused, an HTML5 media element shall retain its hardware resources, but shall be able to release these resources if required to start playing another HTML5 media element. Hardware resources shall also be released if the HTML5 media element is removed from the DOM and no other references to it exist (see Annex J for a code example of how to achieve this). When resources are released, the terminal may discard any decoded frames that have not been displayed.

4.7.3 Additional cases when 250ms ad insertion transition may not be possible to meet

In clause 9.6.3, the following two items are added to the list “The delay between the end of presentation of an HTML5 media element and starting presentation of another HTML5 media element shall be less than 250 ms if all of the following conditions are met:”

- the video in the two video elements either has the same frame rate, or one frame rate is an integer multiple of the other (see frame rate families in clause 10.4 of DVB-DASH)
- the video in the two video elements has the same colour primaries and transfer characteristics, e.g. BT.709 or BT.2020

4.7.4 Timing requirements for end of mid roll adverts

A new clause 9.6.12 is added as follows;

9.6.12 End of stream indication

The end of presentation of an HTML5 media element is notified to the application by means of an 'ended' event. This event shall not arrive before the last frame of video or the last audio sample is guaranteed to be presented (e.g. because it has entered a display processing pipeline). It should arrive within 80 ms of the last frame of video or the last audio sample being presented (whichever is the later) and shall be received within 250 ms of that time.

> NOTE: When considered with the requirements in clause 9.6.3, this means that the transition at the end of an advert, either to another advert or back to the content, should be possible within 330ms but may be up to 500 ms.

4.7.5 Require the same DASH player for HTML5 video element and A/V control object?

A new clause 9.1.1.3 is added as follows:

9.1.1.3 Media player implementations and API behaviour

For DASH, terminals shall use the same DASH player implementation for any given MPD regardless of whether the A/V control object or the HTML5 video element are used.

4.7.6 Content supporting both Clear Key and conventional DRM

Clause 9.6.7 is amended as shown using underline / strikethrough markup.

If an application attempts to present DRM protected MPEG DASH content using the HTML5 <video> element and this is ~~denied~~ not decrypted by any of the DRM systems that are both listed in the DASH MPD using a ContentProtection element and active according to the state of the oipfDrmAgent object (see the `setActiveDRM` method defined in clause A.2.27), then this failure shall be reported to the application by a `MediaError` whose `code` property is set to `MEDIA_ERR_DECODE`. The application is then responsible for checking if the reason for this error was related to DRM and if so, obtaining more details about the error from the DRM system. For DRM systems that an application can access through the `oipfDrmAgent` object, these two steps would be done using the sendDrmMessage method.

Errors relating to the presentation of protected content when the EME API is being used (see clause B.3) shall be reported as specified in the EME specification [66].

4.8 Clause 10 – Capabilities

4.8.1 Removing support for CSS3 navigation

Text is added in clause 10.2.2.1 as shown underlined.

On up, down, left, right keydown events, terminals shall choose one of the following navigation mechanisms in the priority order listed below:

- Allow applications to capture the events and prevent the default action (known as "JavaScript navigation").
- Handle CSS3 directional focus navigation when the nav-up, nav-right, nav-down and nav-left CSS properties are used by the application.
  NOTE: Terminal support for these will be removed in a future version of the present document. Their use by application authors is discouraged. See Annex L.
- A default navigation mechanism provided by the terminal which shall allow focus to be moved between navigable elements and allow all navigable elements to gain focus.

4.8.2 XML Parsing

In clause 10.2.4, the following new paragraphs are added at the end of the clause.

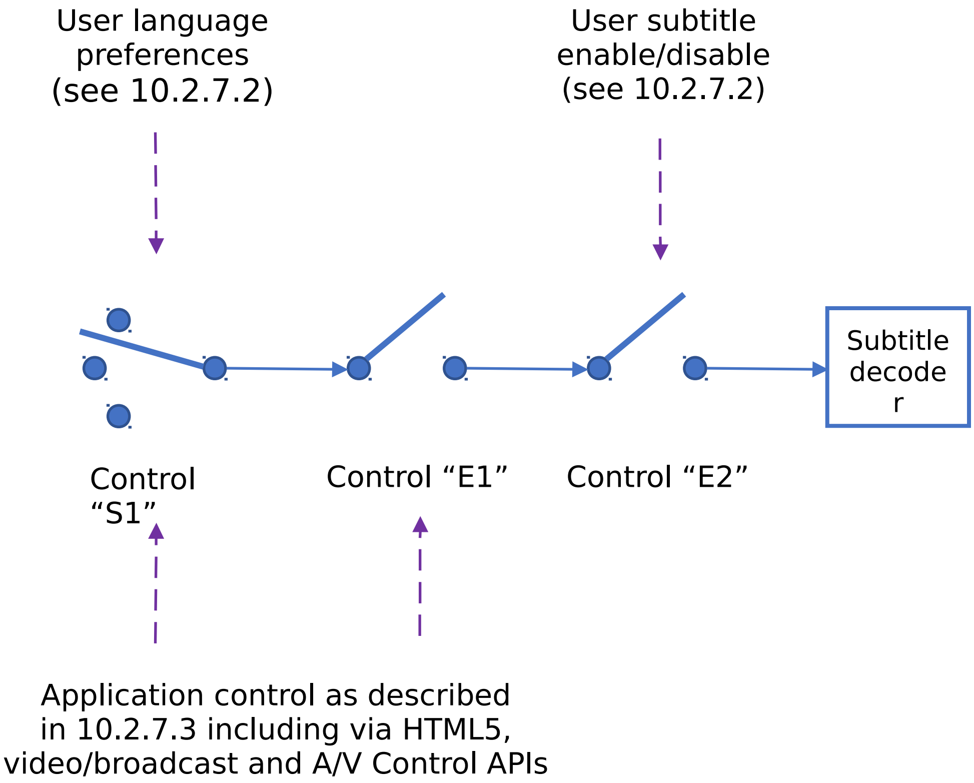
The “doctype” property of the “xmlCapabilities” property of the “application/oipfCapabilities” embedded object shall be null.

NOTE: This indicates that there is no Document Type Definition for the xmlCapabilities.

4.8.3 Subtitle track selection - ability for an app to suppress subtitles reliably

The following is inserted in clause 10.2.7.1 after the paragraph “The terminal shall always perform…” and before the paragraph “The set of components that are available…”:

The following figure shows a logical model for the component selection controls for subtitles, illustrating how user settings and application APIs interact with the state maintained by the terminal:


User language preferences (see 10.2.7.2)
User subtitle enable/disable (see 10.2.7.2)
Subtitle decode r
Control "S1"
Control "E1"
Control "E2"
Application control as described in 10.2.7.3 including via HTML5, video/broadcast and A/V Control APIs

Selection control **S1** determines which of the available subtitle streams is selected for possible presentation. At any one time, this control can be is either under the control of the terminal, according to user language preferences (see clause 10.2.7.2) or it can be under application control and influenced by the relevant component selection APIs (see clause 10.2.7.3). The circumstances under which control passes from one to the other are described in clause 10.2.7.3.

Enabling control **E1** is the application's control over whether subtitles are presented. It is 'closed', enabling subtitles, unless an application is running and all available subtitle components are deselected (via the `unselectComponent` method of a video/broadcast or A/V control object, or by setting the mode attribute of all TextTracks linked to an HTML5 media element to 'disabled' or 'hidden'). The user does not have any ability to control this setting directly. Moreover, this control is influenced solely by the application state and the action of application APIs and can may be 'open', disabling subtitles, even when component selection is under the control of the terminal (as in clause 10.2.7.2).

Enabling control **E2** is the user's control over whether subtitles are presented. It can may be changed when the user changes terminal subtitle preferences. An HbbTV Application does not have any ability to control this setting but its current setting can may be read using the `subtitlesEnabled` property of the Configuration class (see A.2.20.1).

Controls **S1** and **E2** are separate logical controls but may be operated through a combined terminal user interface that offers both language choices and an option to select no subtitles.

Applications may influence both **S1** and **E1** and a single API call may cause either or both of these controls to change. The current state of components as seen by the application shall correctly reflect the state of both **S1** and **E1**. That is, if **E1** is 'open', the relevant APIs and events shall indicate that no component is selected for presentation, regardless of the current state of **S1**.

Clause 10.2.7.3 is changed as shown using underline / strikethrough markup.

> The terminal shall maintain such changes made by an application until one of the following occurs:
>
> …
>
> - a component, selected by the application, is being presented and is part of a video/broadcast object or an A/V Control object or an HTML5 media element or a MediaSynchroniser object (as appropriate) which is destroyed:
>
>   in which case component selection for that component type shall revert to the control of the terminal;
> - a component of a particular type is being presented and the user makes a change using the terminal's subtitle/audio description (or other) selection mechanism relating to that component type:
>
>   \- in which case component selection for that component type shall revert to the control of the terminal;
>
>   NOTE: Where an application has explicitly disabled presentation of a particular component type, changes to terminal preferences do not override this. Applications may disable presentation by means of the unselectComponent(Integer componentType) method of the video/broadcast or A/V control object, or by deselecting tracks in an HTML5 media element using the `enabled` attribute of an `AudioTrack` or `VideoTrack` or by setting the `mode` attribute of a `TextTrack` to “disabled” or “hidden”.

4.8.4 Update inter-device sync spec from DVB blue book back to ETSI

In clause 10.2.8.1, the reference to “DVB Bluebook A167-2 [47]” is replaced by “ETSI TS 103 286-2 [47]”.

4.8.5 Cookie writing to persistent storage time requirement

In clause 10.2.1, in table 11, “Minimum terminal capabilities”, the following text is added to the “value” column of the rows for “Cookie support” and “Web Storage”;

> Terminals shall write data to persistent storage within 5 minutes of the the terminal being put into standby. Terminals should write data to persistent storage soon after that data has been set or modified, e.g. within 30 seconds.

4.8.6 Web Storage minimum storage requirement

In clause 10.2.1, in table 11, “Minimum terminal capabilities”, the following text is added to the “value” column of the row for “Web Storage”;

> Terminals shall support at least 8 Mbytes of storage overall, with at least 1 Mbyte being available to any individual domain, subject to sufficient overall space remaining.

4.9 Clause 11 – Security

4.9.1 Update reference to TS 102 809

The following paragraph is added at the end of clause 11.1.

> Security for broadband-delivered applications is provided through TLS as described below. Some security for broadcast-delivered applications and broadcast application signalling is provided by the inherent difficulty in modifying broadcast signals in a way that impacts a significant number of people. More security may be provided using the protection mechanism defined in clause 9 of TS 102 809 [3], see clauses 7.2.2 and 7.2.3.1.

4.9.2 SHA-1 sunset date has passed

The following changes are made in clause 11.2:

- The sentence “Terminals shall cease to trust any signature that uses SHA-1 as the digest algorithm after 31st December 2016.” is removed.
- The two sentences “Mandatory until forbidden by SHA-1 sunset requirement specified above.” are both replaced by “Forbidden”.

4.10 Clause 12 – Privacy

4.10.1 deviceId

Clause 12.1.5 is modified as shown using underline / strike-through markup.

12.1.5 ~~Unique device IDs~~Distinctive identifiers

Terminals shall implement the extensions to the Configuration class for distinctive identifiers as defined in A.2.20.5 and as required in this clause. These extensions support a per-origin, non-associable, user-clearable identifier (these terms are used in W3C EME [66]).

Terminals shall support the `deviceId` property in A.2.20.5 but may restrict the availability of the distinctive identifier. If the availability is restricted, the terminal shall implement one or more of the following:

1) O~~o~~ffer the user the option to enable or disable the availability of a ~~unique~~ distinctive identifier~~device ID (via the deviceId property defined in clause A.2.20.5 of the present document)~~ on a per-application or per organisation basis (e.g. as part of the device settings or installation menu). The availability of~~Access to~~ the distinctive identifier ~~device ID~~ should be enabled by default unless blocked due to local regulatory requirements.

EXAMPLE: The EU General Data Protection Regulation (GDPR) could be considered as a "local regulatory requirement" which may result in some terminal manufacturers setting this option to disabled by default.

2) Display some native UI requesting the user to allow the terminal to make the distinctive identifier available to the application in response to a call to the `requestAccessToDeviceID` method.

NOTE 1: Some terminals may restrict the number of times that an application may call this method.

3) A manufacturer specific method for determining access to the distinctive identifier, for example by maintaining a list of those application providers where the application provider and the terminal manufacturer have entered into a suitable agreement covering such availability.

4) Access to the distinctive identifier is blocked to applications until they have been activated as defined in clause 10.2.2.1.

NOTE 2: Hence access to the distinctive identifier by autostart broadcast-related applications will be denied until the user has, for example, pressed the red button.

Terminals that support the second option above shall support the `requestAccessToDistinctiveIdentifier` method in A.2.20.5.

NOTE 3: The `deviceId` property defined in clause A.2.20.5 is in the Configuration class. This should not be confused with the `deviceID` property in the LocalSystem class defined by the OIPF DAE specification [1], which is marked as "NI" in Table A.1 of the present document.

It shall not be possible to determine the identifier that would be presented to one origin or by a specific device, knowing the identifier that was generated for a different origin or ~~on~~ by a different device. The distinctive identifier ~~device ID~~ shall be generated by deriving an ID of at least 128 bits using a secure hash function from a combination of a device unique value that is not required to be secret (e.g. serial number), plus a common secret value (e.g. common to a manufacturer or model or product family), plus the origin of the HTML document (see clause 6.3.2), plus a value that changes each time the user requests that a new value of the identifier is generated (e.g. the time the user request was made).

It shall be possible for the user to generate a new but distinct value for the distinctive identifier ~~device ID~~.

NOTE 4: This mechanism is modelled on the IOS 7 mechanism [i.14] and on the Android advertising identifier [i.15].

4.10.2 WebStorage behaviour if user has disabled persistent storage

In 12.1.4, the following text is added at the end of the clause.

If the user has disabled persistent storage in this way then either (a) access to the localStorage attribute shall fail with a SecurityError exception or (b) a call to setItem on the localStorage object shall fail with a QuotaExceededError exception as defined in the Web Storage specification as referenced through the OIPF DAE specification [1]. Storage attempts shall not fail silently as a result of user preferences.

4.11 Clause 13 - Media synchronization

4.11.1 Avoid MediaSynchroniser API leaking "secret" stream URLs

Clause 13.6.2, "CSS-CII service endpoint (master terminal)", is changed as shown using underline / strike-through markup below.

CII messages sent by the master terminal via a connection to the CSS-CII service endpoint shall convey the following:

- When the `contentIdOverride` property of the `MediaSynchroniser` object is (or is set to) a non-null value then the `contentId` and `contentIdStatus` properties of the CII message shall be overridden as follows:

  - the value of the `contentId` property shall be the value of `contentIdOverride`, and
  - the `contentIdStatus` shall be "`final`".

- When `contentIdOverride` is (or is set to) undefined or `null` then no override takes place and t~~T~~he `contentId` and `contentIdStatus` properties shall correspond to the Content Identifier of the master media. For DVB broadcast services (and PVR recordings made from them) and MPEG DASH streams this shall be as defined in clause 5.2 of DVB Bluebook A167-2 [47]. For ISOBMFF and MPEG2 TS delivered via broadband:

  - the value of the `contentId` property shall be the absolute version of the URL provided by the HbbTV® application to specify the location of the media stream, before any redirect that may occur, and
  - the `contentIdStatus` shall be "`final`".

NOTE 1: When playing back a PVR recording of a DVB broadcast service, the contentId represents the original broadcast. Although the contentId incorporates elements that come from components that are not necessarily recorded (e.g. NIT, BAT and SDT) these elements are considered pseudo static and therefore can be captured once during the recording process for inclusion in the contentId during playback.

NOTE 2: The effect of an application setting the `contentIdOverride` property of the `MediaSynchroniser` is to prevent exposing the original content ID for the master media. If `contentIdOverride` is set before inter-device synchronisation is activated and remains set, then clients using this protocol will only ever see the value of `contentIdOverride` as the value of the `contentId` property in messages.

The other numbered notes in 13.6.2 are renumbered accordingly.

Clause 13.8.2.2, "Synchronization timeline availability", is changed as shown using underline / strike-through markup below.

13.8.2.2 Synchronization timeline availability

As the first stage of the protocol session, the MSAS function of the master terminal awaits a setup-data message from the slave terminal or CSA. This message requests the Synchronization Timeline to be used for the remainder of the protocol session. The Synchronization Timeline defines the reference frame for contentTime property values in Control Timestamps and Actual, Earliest and Latest Presentation Timestamps exchanged during the protocol session.

The requested Synchronization Timeline shall be available if the requirements for determining the availability defined in clause 9.7.3 of the present document and clause 9.2 of DVB Bluebook A167-2 [47] are met and the requested Timeline is supported by the master terminal (see clause 13.4.2) and the master terminal has sufficient resources to decode the requested Timeline (see clause 13.4.2).

When the contentIdOverride property of the MediaSynchroniser object is (or is set to) a non-null value the value of this property overrides the content ID of the master media and shall be used in its place when determining availability according to the process defined in clause 9.2 of DVB Bluebook A167-2 [47]. When contentIdOverride is (or is set to) undefined or null, then no override takes place.

NOTE 1:The availability of the Synchronization Timeline is dependent on whether the contentIdStem matches the contentId for the master content (which might be overridden as described above) and whether the requested timeline is currently derivable for the master media.

4.11.2 Clarification of TEMI timeline requirements

In clause 13.4.2, the note shown underlined is added and the following notes renumbered accordingly.

DVB Bluebook A167-2 [47] defines support in the terminal for the decoding of MPEG-TS Timed External Media Information (TEMI) timeline descriptors in the adaptation field of Transport Stream packets carrying Packetized Elementary Streams (PES). Terminals shall support at least the following components of a DVB service to carry MPEG TEMI timeline descriptors:

- Any component that is supported by the terminal for use with media synchronization and MPEG TEMI, i.e. audio, video and subtitles.
- Any component with stream_type 6 (private PES) and stream_id 1011 1101 ("private_stream_1") in the PES packet header, including, but not limited to, components where the PES packet payloads are empty.

NOTE 2: The MPEG specification for TEMI (referenced via ETSI TS 103 286-2) defines carriage in adaptation fields of "media components". This is extended by the requirements above to include components with PES packets with empty payloads.

NOTE 3 : Selection of the correct timeline descriptors by component tag and timeline id is done via the timeline selector by using the media sync API as defined in clause 8.2.3. This also means that there can be different timelines present if applications use either multiple components or timeline ids or a combination of both.

4.11.3 Update inter-device sync spec from DVB blue book back to ETSI

In clause 13, all of the references to “DVB Bluebook A167-2 [47]” are replaced by “ETSI TS 103 286-2 [47]”.

4.11.4 Clarify what timelineSelector to convey in CII message

In clause 13.6.2, the paragraph before table 21, “Primary aspect of presentationStatus when master media is a video/broadcast object”, is extended as shown underlined.

While the `MediaSynchroniser` API timeline is available (see clause 9.7.3) the timelines property shall convey a list where the first item in the list is a timeline options JSON object (as defined in clause 5.6 of TS 103 286-2 [47]) that describes the `MediaSynchroniser` API Timeline (as defined in clause 13.4.3). To do this, the `timelineSelector` in the first item in the list shall by an exact string match for the `timelineSelector` passed as an argument to the `initMediaSynchroniser()` method.

4.12 Clause 14 – Companion screens

4.12.1 UPnP version to be used with DIAL

The start of clause 14.7.2 is extended with the text shown underlined.

HbbTV® is a DIAL [50] application registered at the DIAL registry [i.8]. The registered name for HbbTV® applications is '`HbbTV`'. For terminal and service endpoint discovery, the terminal shall support DIAL [50] except that the response to an M-SEARCH request, as specified by section 5.2 of DIAL [50], may be compliant with section 1.2.2 of UPnP Device Architecture 1.0 [67] instead of section 1.3.3 of UPnP Device Architecture 1.1 [68].

NOTE: Section 1.3.2 of UPnP Device Architecture 1.1 [68] requires devices issuing an M-SEARCH request to be fully backwards compatible with previous versions.

The discovery response example in clause 14.7.3.1 is changed as shown using underline / strike-through markup below.

Discovery Response

A UPnP/1.0 compliant terminal responds with HTTP/1.1 OK, LOCATION header and DIAL ST:

```
HTTP/1.1 200 OK
CACHE-CONTROL: max-age = 1800
EXT:
LOCATION: http://192.168.1.11:50201/dial.xml
SERVER: Linux/2.6 UPnP/1.0 Sony-BDP/2.0
ST: urn:dial-multiscreen-org:service:dial:1
USN: uuid:00000004-0000-1010-8000-d8d43c1923dc::urn:dial-multiscreen-
org:service:dial:1
```

~~The~~ A UPnP/1.1 compliant terminal respond~~se~~s with HTTP/1.1 OK, ~~and~~ LOCATION header~~,~~ and DIAL ST:

```
HTTP/1.1 200 OK
CACHE-CONTROL: max-age = 1800
EXT:
LOCATION: http://192.168.1.11:50201/dial.xml
SERVER: Linux/2.6 UPnP/1.1 Sony-BDP/2.0
BOOTID.UPNP.ORG: 1
ST: urn:dial-multiscreen-org:service:dial:1
USN: uuid:00000004-0000-1010-8000-d8d43c1923dc::urn:dial-multiscreen-
org:service:dial:1
```

4.12.2 Clarification on XML AIT example

In the example XML AIT in clause 14.6.2, “whizzo-app.html” is moved from the `URLBase` element to the `applicationLocation` element as shown with underline and strike-through markup.

```
<mhp:applicationTransport xsi:type="mhp:HTTPTransportType">
   <mhp:URLBase>http://www.example.com/~~whizzo-app.html~~</mhp:URLBase>
</mhp:applicationTransport>
<mhp:applicationLocation>whizzo-app.html?launch=from-cs</mhp:applicationLocation>
```

4.12.3 URL used in in DIAL example should be changed

In clauses 14.7.3.1 and 14.7.3.2, the references to

> Origin: http://cs.services.broadcaster.com

are replaced with

> Origin: http://cs.services.example.com/

4.12.4 Approval and pre-approval to launch an HbbTV app on request by a CS app

Clause 14.6.2 is modified in two places as shown below using underline / strike-through markup.

> The terminal might have states where the feature is temporarily unavailable, e.g. during a channel scan. The states when the feature is not available are not defined by the present document. If the terminal rejects the application launch for this reason it shall respond with the response code 503.
>
> Terminals shall support at least one of the following mechanisms for approvals or pre-approvals and shall not, by default, launch applications without ~~at least one of the following~~ such approval~~s~~ or pre-approval~~s~~:

and

> The terminal UI should provide means for the user to either approve or pre-approve application launching. This may include means for the user to accept or block requests from particular companion devices. If the terminal rejects the application launch because approval or pre-approval by the user was requested and denied, then it shall respond with the response code 403, where the body of the response is the 4 character string "USER" and has content type "text/plain".
>
> The terminal shall allow future applications to be launched by supporting either, or both, of:
>
> - explicit user approval,
> - and/or mechanism by which explicit pre-approvals can be updated.
>
> If the terminal rejects the request for reasons other than any of the above, then it shall respond with the response code 403, with an empty response body.

4.13 Annex A – OIPF DAE Specification Profile

4.13.1 Text referring to MetadataSearch in wrong location in annex A

The following text is in the wrong row in table A.1.

> The count parameter of the findProgrammesFromStream method of the MetadataSearch class is not included.

It is moved from the row for the row for the “Basics” of the Programme classs to the row for “The MetadataSearch class”.

4.13.2 "channels" should be "audioChannels"

In the clause A.2.4.6, in the definition of the createAVAudioComponent method, the channels argument is renamed to “audioChannels” and the three references to the “channels” property are replaced with a reference to the “audioChannels” property.

4.13.3 Clarify resource usage by HTML5 media elements

In clause A.2.1, the following paragraph is amended as indicated using underline / strike-through markup.

> If the resources that would be needed by an A/V Control object or a video/broadcast object are allocated to ~~in use by~~ an HTML5 media element (see clause 9.6.2), and the media element requiring the resource and the current media element owning the resource have not been added to the same media synchronizer object, then the request to present media through the object shall fail. For an A/V control object, the object shall go to playState 6 with the error property being 3, "insufficient resources". For a video/broadcast object, this shall be reported by an onChannelChangeError with errorState 11, "insufficient resources are available to present the given channel (e.g. a lack of available codec resources)".

4.13.4 VK_RECORD key is not in any set of keys

In table A.1, in the row for “The Keyset class”, the notes column is amended as indicated using underline / strike-through markup.

The Keyset class	7.2.5	M(*)	For terminals not making the VK_RECORD key event available to HbbTV applications, t~~T~~he otherKeys and maximumOtherKeys properties are not included. For terminals making the VK_RECORD key event available to HbbTV applications, the otherKeys and maximumOtherKeys properties shall be supported and applications shall be able to request the VK_RECORD key event using them.~~and~~ T~~t~~he getKeyLabel method ~~are~~ is not included. The icons returned by the getKeyIcon method shall be 32 x 32 pixels.	None

4.13.5 XML Parsing

1) In clause A.1 "Detailed section by section definition":

In the row "Content Access Download Descriptor Format", add to the "Notes" column:

> The Content Access Download Descriptor must not contain an XML Document Type Definition (“<!DOCTYPE ...>”).

In the row "Content Access Streaming Descriptor Format", add to the "Notes" column after the existing text:

> The Content Access Streaming Descriptor must not contain an XML Document Type Definition (“<!DOCTYPE ...>”).

2) In clause A.2.6.2 "MIME type and DOCTYPE", after the bulletted list, add a new paragraph:

> The "doctype" declaration must not contain an “intSubset” as that is defined in the XML specification [69].

4.13.6 bindToCurrentChannel() while an A/V Control object is presenting

Clause A.2.1 is modified as shown using underline / strike-through markup.

A.2.1 Resource management

In clause 4.4.5 of the OIPF DAE specification [1], the STATIC_ALLOCATION model is not included in the present document. All resource allocation is under the DYNAMIC_ALLOCATION model.

Resource allocation between any number of A/V control objects and/or video/broadcast objects shall be based on a “first-come, first-served” policy. Resources shall not be taken away from one object of either of these types in order to meet a request on a second object of either of these types.

- If the resources needed for the request on the second object (suitable video decoder, suitable audio decoder and, suitable tuner if the second object is a video/broadcast object, suitable tuner) are not available then the request on the second object shall fail as defined by the API for the type of object concerned.
- If the resources needed for the request on the second object are available (e.g. the terminal has multiple audio and video decoders available to the HbbTV implementation) then the resources shall be allocated to the second object and the request shall not fail due to lack of resources (although it may fail for an another unrelated reason).
- If the request on the second object succeeds then the terminal shall present both objects at the same time without synchronisation. If applications wish to have multiple objects present media with synchronisation then the objects need to be added to a MediaSynchroniser object.

NOTE 1: Broadcast-related applications that wish to use a video/broadcast object and media decoders foralso wish to use broadband-delivered content need to put the video/broadcast object into the stopped state to release the media decoders. Calling the unselectComponent method on a video/broadcast object does not release the media decoder for that component type. Changing a video/broadcast object from a presenting a TV service to presenting a radio service should not release the video decoder. . Changing a video/broadcast object from a presenting a TV or radio service to presenting a data service (see clause 7.2.6 of the present document) should not release the video or audio decoder.

NOTE ~~1~~2: The policy for managing hardware resources defined here that applies to the A/V Control object and video/broadcast objects (first-come, first-served) is intentionally the exact opposite of the policy defined for the HTML 5 media element in clause 9.6.2 of the present document.

If a broadcast-related application that either

- does not include a video/broadcast object at all or
- includes a video/broadcast object that is in the unrealized state

attempts to start playing broadband-delivered video/audio then the presentation of the broadcast channel shall be suspended and allocation of the required media resources by the A/V control object shall succeed. After the A/V control object release the allocated resources, e.g. by stopping the media, presentation of the broadcast service shall resume.

NOTE 3: In spite of the above requirement, applications wishing to present only broadband-delivered video/audio should explicitly stop broadcast video/audio presentation in order to avoid implementation-dependent behaviour during the transition.

NOTE 4: The above requirement is unrelated to availability of video and audio decoder resources. Hence such applications will give the same user experience on terminals supporting multiple video and audio decoders as they do on terminals supporting only one decoder of each type. Applications wishing to simultaneously present broadcast-delivered video/audio and broadband-delivered video/audio need to create both a video/broadcast object and an A/V control object or HTML5 media element.

Clause A.2.4.1 is modified as shown. In this text, additions to TS 102 796 are shown in italics. Underlining is used to indicate text that is to be underlined in TS 102 796. Strike-through text in italics is to be included in TS 102 796 also with strike-through. Strike-through text not in italics indicates text to be deleted from TS 102 796.

- In clause 7.13.1.3 of the OIPF DAE specification [1], the definition of the bindToCurrentChannel() method is modified as shown:

If the video/broadcast object is in the unrealized state and ~~video from~~ exactly one channel is currently being presented by the OITF then this binds the video/broadcast object to that ~~video~~channel (even if the current channel does not contain video and/or audio). If more than one channel is currently being presented by the OITF then this binds the video/broadcast object to the channel whose audio is being presented. *A successful call shall result in control of the resources used to present the channel (tuner, video decoder if the channel includes video and audio decoder if the channel includes audio) being seamlessly transferred to the calling HbbTV application. This is intentionally the opposite of the "first-come, first-served" policy used between a video/broadcast object and other video/broadcast or A/V control objects.*

If the video/broadcast object is in the stopped state then this restarts presentation of ~~video and audio from~~ the current channel under the control of the video/broadcast object. ~~If video from more than one channel is currently being presented by the OITF then this binds the video/broadcast object to the channel whose audio is being presented.~~

If the video/broadcast object is in the unrealized state and there is no channel

> *currently being presented, or binding to the necessary resources to play the channel (suitable tuner, suitable video decoder if the channel includes video and suitable audio decoder if the channel includes audio) through the video/broadcast object fails for whichever reason, the OITF SHALL dispatch an event to the onPlayStateChange listener(s) whereby the state parameter is given value 0 ("unrealized") and the error parameter is given the appropriate error code.*

Clause A.2.4.5 is extended with the following text;

In clause 7.13.3, the definition of the property onProgrammesChanged is modified with the addition of the text shown underlined:

> The function that is called for a video/broadcast object in the presenting or stopped states when the programmes property has been updated with new programme information, e.g. when the current broadcast programme is finished and a new one has started. The specified function is called with no arguments.

4.13.7 Key "Label" should be "label"

In clause A.2.5.3, in the table of keys and values for the "value" attribute, the key "Label" shall be "label".

4.13.8 video/broadcast object issues when playing A/V from broadband

An extra row is added to the table in clause A.2.4.1 as shown:

Connecting	The terminal successfully connected to the broadcast or IP multicast stream but presentation of content is blocked, e.g. by a parental rating mechanism ~~or~~, content protection mechanism or resources can't be claimed that are currently in use for presenting broadband content	Connecting	ChannelChangeSucceeded PlayStateChange	This is conceptually equivalent to a successful channel change where a transient error immediately pre-empts media presentation without the video/broadcast object entering the presenting state.

The following text is added at the end of the bulleted list in clause A.2.4.1.

- The following paragraph is amended as shown using underline/strike-through markup.

  If the current channel ~~currently being presented~~ is requested to be changed due to an action outside the application (for example, the user pressing the CH+ key on the remote) then any video/broadcast object ~~presenting~~ bound to that channel (i.e. in the connecting, presenting or stopped states as the result of a call to bindToCurrentChannel()) SHALL perform the same state transitions and dispatch the same events as if the channel change operation was initiated by the application using the setChannel() method.

The following text is added at the end of clause A.2.4.5.

- In clause 7.13.7.1, the definition of the property `currentChannel` is changed as shown;

  The channel currently ~~being presented by~~bound to this embedded object (i.e. the object is in the connecting, presenting or stopped states as the result of a call to bindToCurrentChannel()) if the user has given permission to share this information, possibly through a mechanism outside the scope of this specification. If no channel is ~~being presented~~ bound to this embedded object, or if this information is not visible to the caller, the value of this property SHALL be null.

A new clause A.2.26 is added a shown.

A 2.26 Correction to the ApplicationPrivateData class

In clause 7.2.4.1, the definition of the property `currentChannel` is changed as shown;

For a broadcast-related application, the value of the property contains the channel whose AIT is currently controlling the lifecycle of this application. If ~~no channel is being presented, or if~~ the application is not broadcast-related, the value of this property shall be null. During a channel change, the value of the property shall reflect the new channel once a `ChannelChangeSucceeded` event has been sent to any registered listeners on the corresponding video/broadcast object.

NOTE: If the terminal does not acquire the AIT signalling for the new channel until after the `ChannelChangeSucceeded` event has been generated then an application that is not allowed to survive the channel change will see the new value for a short time before it is stopped.

4.13.9 Lack of linkage between spec version in AIT signalling and version in DOCTYPE in individual pages of app

In clause A.2.6.2, the following note is added immediately after the paragraph "Terminals are not required to load or run documents which do not include one of the DOCTYPE doctype declarations defined or referenced above."

> NOTE: There is no linkage between the DOCTYPE used in the pages that form part of an HbbTV application and the contents of the version fields in the AIT or XML AIT from which the application was launched. For example, an application signalled as requiring version 1.4.1 can include pages with any of the DOCTYPEs listed above.

Also all instances of "doctype" in lower case (either with or without quotation marks) are replaced by DOCTYPE in upper case.

4.13.10 Two setChannel methods of video/broadcast defined with same signature

In clause A.2.4.7.4, the method "void setChannel(Channel channel, Boolean trickplay, String contentAccessDescriptorURL, Integer offset)" and the preceeding paragraph are removed.

4.13.11 PVR API issues

In table A.1 in clause A.1, the notes column of the "Extensions to video/broadcast for recording and timeshift" row has "- onPlaySpeedsArrayChanged " added to the list under "Terminals that support time-shift of broadcast video shall support the following events and properties even if they do not support the full PVR option:".

The following changes are made in clause A.2.4.7.3:

1. The first instance of the property "ScheduledRecordingCollection getInProgressRecordings()" has the signature replaced by "function onPlayPositionChanged(Integer position)". The definition of the property remains unchanged.
2. The second instance of the property "ScheduledRecordingCollection getInProgressRecordings()" is deleted.
3. The type of the playSpeed property is changed from Integer to Number.
4. The property onplaySpeedsArrayChangedonPlaySpeedsArrayChanged() is renamed onPlaySpeedsArrayChangedonPlaySpeedsArrayChanged() (i.e. "play"→"Play").
5. The following text is added at the end of the clause - "In addition, the properties recordingState and onRecordingEvent defined in A.2.4.8.2 shall be supported."

In clause A.2.4.8.1, the paragraph immediately before the figure is extended with the underlined text.

> The recording functionality is subject to the state transitions represented in the state diagram in Figure A.1. <u>The timeshift functionality is not represented explicitly in these state diagrams but is defined in the following clauses.</u>

The following changes are made in clause A.2.4.8.2.

1. The definition of the "error" argument of the "onRecordingEvent" property is changed from "The current state of the recording. One of:" to "If the state of the recording has changed due to an error, this field contains an error code detailing the type of error. One of:".
2. In the table listing error codes for the error argument of the onRecordingEvent property, the rows for values 5 and 6 ("Value not used" and "Recording has successfully completed") are deleted.

4.13.12 Scope of AVAudio and AVVideoComponents

The following changes are made in clause A.2.4.6.

1) The following text is added at the end of the description of the createAVAudioComponent method.

> The scope of successfully created objects shall be limited to the application that created them. When that application exits, they shall cease to exist and shall no longer be presented. This may result in no audio being presented.

2) The following text is added at the end of the description of the createAVVideoComponent method.

> The scope of successfully created objects shall be limited to the application that created them. When that application exits, they shall cease to exist and shall no longer be presented. This may result in no video being presented.

4.13.13 Allow applications to prioritise DRM to use

A new clause A.2.27 is added as follows:

A.2.27 Extensions to the application/oipfDrmAgent embedded object

This object shall be extended with the following additional method.

Boolean setActiveDRM(String DRMSystemID)		
Description	Sets the DRM system, specified by `DRMSystemID`, that the terminal shall use with any new requests for playing protected broadband content. Any other DRM systems present in the terminal shall not be used with new requests until this method is called again even if this means playback of content fails. If the method is called with the `DRMSystemID` set to null, the algorithm used by the terminal to determine which DRM to use is outside the scope of the present document. The value `true` shall always be returned in this case. This shall be the default state if no calls to this method have been made. A call to this method with `DRMSystemID` set to `"urn:hbbtv:oipfdrm:inactive"` shall disable the use of all DRM systems in response to requests to play protected broadband content with the exception that the operation of the EME API is not affected (see clause B.3). Methods on the `oipfDrmAgent` object may still be called in this state, though depending on the DRM system, some uses of `sendDRMMessage` may fail. Protected broadband content may still play if suitable keys or licences are provided using the EME API. If for any reason the terminal is unable to set the specified DRM system as requested, the method shall return `false`, otherwise it shall return `true`.	
Arguments	*DRMSystemID*	The DRM system as defined in clause 9.3.10 of the OIPF DAE specification [1] and in Table 9 ("DRMControlInformation Type Semantics") of the OIPF Metadata specification [18].

In table A.1 in clause A.1, the notes column of the "Content Service Protection API " row has the following text added at the end.

> If the DRM feature is supported (even if with only one DRM system) or if the terminal supports CI Plus then the extensions defined in clause A.2.27 shall be supported.

4.13.14 Unclear language in A 2.20.1 - Extensions to Represent Subtitle Presentation

In clause A.2.20.1, the description of the subtitles enabled property is changed from:

> Shall be set to false if subtitles are disabled by the terminal and applications cannot enable subtitles using the component selection API of the supported media objects i.e. A/V Control object, video/broadcast object and HTML5 media elements. Otherwise shall be set to true.

to:

> Shall be set to false if subtitles are disabled by the terminal. When set to false, subtitle components that are selected using a video/broadcast object, A/V control object or HTML5 media element will not be presented. See also clause 10.2.7.

4.13.15 Clarification to parental rating

In clause A.1, in the row for the ParentalRating class, in the Notes column;

> For example, "13" means a programme that is rated suitable for persons of 13 years of age or older.

is replaced with

For further information, see clause A.2.28.

A new clause A.2.28 is added as follows:

A.2.28 Clarification of encoding of DVB-SI parental ratings

The DVB parental rating scheme is represented in a ParentalRating object by setting the scheme property to "dvb-si". The contents of the ParentalRating object are determined by the DVB parental_rating_descriptor, as defined in clause 8.4.4 of DAE[1]. The relationship between the rating field in the DVB parental_rating_descriptor and the ParentalRating object name and value properties is shown in Table A.6.

Table A.6: Encoding of parental rating

Value in DVB-SI rating field	ParentalRating name property	ParentalRating value property	Description
0x01	"4"	4	Recommended minimum age is 4 years old
0x02	"5"	5	Recommended minimum age is 5 years old
0x03	"6"	6	Recommended minimum age is 6 years old
0x04	"7"	7	Recommended minimum age is 7 years old
0x05	"8"	8	Recommended minimum age is 8 years old
0x06	"9"	9	Recommended minimum age is 9 years old
0x07	"10"	10	Recommended minimum age is 10 years old
0x08	"11"	11	Recommended minimum age is 11 years old
0x09	"12"	12	Recommended minimum age is 12 years old
0x0A	"13"	13	Recommended minimum age is 13 years old
0x0B	"14"	14	Recommended minimum age is 14 years old
0x0C	"15"	15	Recommended minimum age is 15 years old
0x0D	"16"	16	Recommended minimum age is 16 years old
0x0E	"17"	17	Recommended minimum age is 17 years old
0x0F	"18"	18	Recommended minimum age is 18 years old

1

4.13.16 Reference to NI clause 10.1.1 of the DAE specification

In table A.2, in the row for "trusted" security, in the "Description" column, the text in brackets is removed as shown in strike-through.

Only trusted applications as defined in clause 11.1 shall have access to the referenced API.

If other applications or web pages try to use this API, the terminal shall throw an error with the name property set to SecurityError ~~(see clause 10.1.1 of the OIPF DAE specification [1])~~.

Note that for embedded objects, untrusted applications may acquire instances of them without restrictions, either through the object factory or by using HTMLObjectElements. Security restrictions are enforced only when the application attempts to access properties or execute functions on the objects.

4.13.17 Incoherent AVSubtitleComponent language with TTML tracks

In clause A.1, in table A.1, the following changes are made in the “Notes” column:

1) In the row for “Extensions for playback of selected media components”, clause 7.16.5 of the OIPF DAE specification, the following text is added at the end:

> The value of the language property shall be either an ISO 639-1 [60] 2-character language code or an ISO 639-2 [61] 3-character language code as defined by clause 8.4.2 of the OIPF DAE specification [1] as modified in the present document.

2) In the row for “AVComponent”, clause 8.4.2 of the OIPF DAE specification, the following text is added at the end:

> See clause A.2.5.3 of the present document for the mapping for EBU-TT-D subtitles.

4.13.18 Possible ambiguity in table A.1 re subtitlesEnabled

In clause A.1, in table A.1, in the row for “The Configuration class”, the notes column is changed as shown using underline / strike-through notation.

> Support for read-only access to the following properties is mandatory:
>
> - preferredAudioLanguage
>
> - preferredSubtitleLanguage
>
> - preferredUILanguage
>
> - countryId
>
> The extensions to the Configuration class defined in clause A.2.20 shall be supported.
>
> All other properties and methods are ~~optional~~not included.
>
> ~~The extensions to the Configuration class defined in clause A.2.20 shall be supported.~~

4.13.19 Errors in mapping from DASH roles to HTML5 audio/video track kind values

In clause A.2.12.3, the following text is changed as shown by underline and strike-through markup.

For a `VideoTrack`, g~~G~~iven a role scheme of "`urn:mpeg:dash:role:2011`", determine the `kind` attribute from the value of the role descriptors in the `<AdaptationSet>` element as follows.

- ~~o~~— "alternative": if the role is "alternate" but not also "main" or "commentary", or "dub";
- ~~o~~— "captions": if the role is "caption" and also "main";
- ~~o~~— ~~"descriptions": if the role is "description" and also "supplementary";~~
- ~~o~~— "main": if the role is "main" but not also "caption", "subtitle", or "dub";
- ~~o~~— ~~"main-desc": if the role is "main" and also "description";~~
- ~~o~~— "sign": permitted for `VideoTrack`s by HTML5 [54] but not used in the present document;
- ~~o~~— "subtitles": if the role is "subtitle" and also "main";
- ~~o~~— ~~"translation": if the role is "dub" and also "main";~~

- "commentary": if the role is "commentary" but not also "main";
- "": otherwise.

For an `AudioTrack`, given a role scheme of "`urn:mpeg:dash:role:2011`", determine the `kind` attribute from the value of the role descriptors in the `<AdaptationSet>` element as follows.

- "alternative": if the role is "alternate" but not also "main" or "commentary", or "dub";
- "descriptions": if the role is "description" and also "supplementary";
- "main": if the role is "main" but not also "caption", "subtitle", "dub" or "description";
- "main-desc": if the role is "main" and also "description";
- "translation": if the role is "dub" and also "main";
- "commentary": if the role is "commentary" but not also "main";
- "": otherwise.

4.13.20 deviceID

Clause A.2.20.5 is modified as shown using underline / strike-through markup.

A.2.20.5 Extensions for distinctive identifiers~~device IDs~~

The following property is added to the `Configuration` class.

```
readonly String deviceId
```

NOTE 1:This property is named deviceId for historical reasons but it does not return a permanent identifier for the device.

Returns either a string representing ~~an~~ distinctive identifier that is unique for the combination of the ~~receiver~~ terminal and the HTML document origin or a status code. The distinctive identifier shall use a character set that is restricted to alphanumeric characters and the hyphen. The status code shall be a number preceded by the '#' character.

Valid status codes are:

Status code	Description
#1	The terminal is configured to request explicit user approval for this application. The application may call `requestAccessToDistinctiveIdentifier` to obtain such approval even if this method has previously been called and the user did not grant access.
#2	Access to the distinctive identifier is denied explicitly by the user following a previous call by the application to `requestAccessToDistinctiveIdentifier`. Further calls to `requestAccessToDistinctiveIdentifier` willdo not result in the user being asked again for approval. This is for use by terminals that restrict the number of times that an application may call this method.
#3	Access to the distinctive identifier is denied in accordance with the user option setting – see clause 12.1.5 2).
#4	Access to the distinctive identifier is denied by the terminal manufacturer, e.g. because the application provider and the terminal manufacturer have not entered into a suitable agreement covering such access.
#5	Access to the distinctive identifier is denied as the application has not yet been activated.

NOTE 2: Other status codes may be defined in future versions of the present document.

The value of this property may change after a call to `requestAccessToDistinctiveIdentifier`, a change to the user option, a request by the user to generate a new distinctive identifier or some other event. ~~If this identifier is not being made available to the application (see clause 12.1.5 of the present document), then the value of this property shall be the empty string ("").~~

The following method is added to the `Configuration` class.

requestAccessToDistinctiveIdentifier(function callback)	
Description	Calls the callback with `true` as the first argument if the `deviceId` property contains a distinctive identifier, otherwise calls the callback with `false` as the first argument. This callback takes place either immediately or after a user interaction according to the following rules. Calls to this method while a callback is outstanding shall be ignored. If this method is supported, the terminal shall provide some native UI that requests the user to grant access to the distinctive identifier for the calling application. The terminal may persistently store the user response between invocations of the application. If the `deviceId` property contains the value "#1", the terminal shall display this native UI when this method is called. The callback shall be called only after the UI is removed and the argument shall reflect the updated state of the `deviceId` property following the interaction with the user. This method call shall not block while the UI is displayed. If the `deviceId` property contains a different status code, the terminal shall not display the native UI and shall immediately call the callback with `false` as the first argument. If the `deviceId` property already contains a distinctive identifier, the terminal shall not display the native UI and shall immediately call the callback with `true` as the first argument.

4.14 Annex B - Support for protected content delivered via broadband

4.14.1 Content supporting both Clear Key and conventional DRM

The following text is added to the end of clause B.3.

> When using this mechanism for encrypted content that could contain DRM licences or triggers, applications need to call `setActiveDRM("urn:hbbtv:oipfdrm:inactive")` on terminals that support the "DRM feature" before any such encrypted content is buffered. This prevents any automatic licence acquisition or similar action by DRM systems that an application can access using the `oipfDrmAgent` object. See also clause A.2.27.
>
> Terminal behaviour is undefined if an application attempts to use EME to present content containing DRM licences or triggers (other than those relating to the ClearKey mechanism) on a terminal that supports the "DRM feature" unless `setActiveDRM("urn:hbbtv:oipfdrm:inactive")` has been called prior to buffering any encrypted content.

A new clause B.4 is added as follows;

> B.4 Encrypted media extensions with DRM (informative)

The use of a Content Decryption Module to provide access to a DRM system using the Encrypted Media Extensions [66] is outside the scope of the present document. However, content providers should be aware that some terminals may support one or more DRM CDMs.

Any application that wishes to attempt to use a DRM CDM to handle protected content must be aware that a terminal that also supports the "DRM feature" may act on any DRM signalling within media content independently of EME API calls unless `setActiveDRM("urn:hbbtv:oipfdrm:inactive")` is called prior to any encrypted content being buffered. See also clause A.2.27.

4.15Annex E - Profiles of MPEG DASH

4.15.1 Clarify URL scheme and MPD anchor rules

The first paragraph of clause E.4.5 is extended with the text shown underlined.

<u>When the URL of an MPD is referred to by an HbbTV Application, the URL may include MPD Anchors.</u> Terminals shall support MPD Anchors using the 't' key of the URI fragment part as defined in clause C.4 of the MPEG DASH specification ISO/IEC 23009-1 [29] as profiled in clause 10.9.2 of the DVB DASH specification [45]. Support for other MPD Anchor keys is not required

4.15.2 Frame rate support with UHD content via DASH

A new clause E.4.6 is added as shown.

E.4.6 DASH specific aspects for video

Terminals shall support those frame rates in the 25Hz/50Hz family required by DVB-DASH [45]. There is no requirement to support frame rates in the 30Hz/60Hz family.

4.15.3 No requirements on the DASH player to adapt

A new clause E.4.7 is added as shown.

E.4.7 Adaptation

The present document does not define specific algorithms for bitrate adaptation in MPEG DASH content. However, to ensure a minimum level of adaptation capability and to improve testability, the following requirements are defined:

When the terminal is presenting a DASH video AdaptationSet in which there is a lower bitrate video representation than the one currently being presented, the terminal shall adapt to a lower representation if all of the following conditions are met:

- the lower representation has a resolution of 704x396 or greater for a progressive representation or 704x576 or greater for an interlaced representation at a frame rate of 25 Hz or greater
- use of the lower representation is not precluded by user preferences

- given a series of consecutive video segments whose indicated duration totals 10 seconds or more, the time taken for the terminal to actively download those segments is greater than 5/4 times the total duration of the segments
- the terminal has not buffered more than 45 seconds beyond the current playback position

When the terminal is presenting a DASH video AdaptationSet in which there is a higher bitrate video representation than the one currently being presented, the terminal shall adapt to a higher representation if all of the following conditions are met:

- the higher representation has parameters which are supported by the terminal and the display
- use of the higher representation is not precluded by user preferences
- given a series of consecutive video segments whose indicated duration totals 30 seconds or more, the time taken for the terminal to actively download those segments is less than 1/K times the total duration of the segments, where K is given by 2 * higher_bandwidth / lower_bandwidth, where higher_bandwidth and lower_bandwidth are taken from the Representation@bandwidth attribute from the DASH MPD.

  NOTE 1: In the context of this clause, "adapt" means to switch to downloading segments from a new representation. There may be a delay before such a switch is observable by the viewer due to segments previously buffered by the terminal.

  NOTE 2: Nothing in this clause precludes adaptation in circumstances other than these, including adapting before the thresholds stated here are reached.

  NOTE 3: "the time taken for the terminal to actively download" segments does not include any time waiting before or between segment requests, nor any time when downloading of segments is suspended.

Manufacturers are strongly advised against implementing an adaptation algorithm that only satisfies these requirements. Such an algorithm is unlikely to perform well.

4.16 Annex G - Implementer guidelines for media synchronization

4.16.1 Update inter-device sync spec from DVB blue book back to ETSI

In clause G.1, the reference to DVB Bluebook A167-2 is replaced by a reference to ETSI TS 103 286-2.

4.17 New Annex L

4.17.1 Removing support for CSS3 navigation

A new annex L is added as shown.

Annex L (normative):
Deprecated features

D.1 Introduction

Some of the features that have been required by previous versions of the present document have been deprecated. These features are listed in this Annex. Application authors should not use these features and terminals will not be required to support them in a future version of the present document.

D.2 CSS3 directional focus navigation

The requirement for terminals to support CSS3 directional focus navigation (the nav-up, nav-right, nav-down and nav-left CSS properties) in clause 10.2.2.1 has been deprecated.