SERIES J: CABLE NETWORKS AND TRANSMISSION OF TELEVISION, SOUND PROGRAMME AND OTHER MULTIMEDIA SIGNALS

Application for Interactive Digital Television – Part 1

Harmonization of declarative content format for interactive television applications

Recommendation ITU-T J.201

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Harmonization of declarative content format for interactive television applications

Summary

Recommendation ITU-T J.201 is intended to harmonize the application environment for declarative content for interactive television. It specifies common elements, media types and APIs at the syntactic level of the declarative application environment.

This edition includes enhancements of broadcast markup language (BML) to provide functionalities for some scenarios of integrated broadcast-broadband (IBB) digital television (DTV) services.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T J.201	2004-07-14	9	11.1002/1000/1375
1.1	ITU-T J.201 (2004) Amd. 1	2005-03-01	9	11.1002/1000/7821
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3.0	ITU-T J.201	2009-12-14	9	11.1002/1000/10547
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* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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Recommendation ITU-T J.201

Harmonization of declarative content format for interactive television applications

1 Scope

This Recommendation is intended to harmonize the application environment for declarative content for interactive TV. It specifies common elements, media types and APIs at the syntactic level of the declarative application environment to satisfy regional application requirements for the four standards: ACAP-X [ATSC A/101], BML [ARIB STD-B24], Ginga-NCL [ABNT 15606-2] [ABNT 15606-5] and DVB-HTML[ETSI TS 102 322] [ETSI TS 102 812]. This Recommendation is divided into six annexes. Annex A describes the common core for XHTML-related technologies of the four standards. Annex B describes additional functionality outside the common core for BML. Annex C describes additional functionality outside the common core for ACAP-X. Annex D describes additional functionality outside the common core for DVB-HTML. The format described in Annex E is intended as the intermediate format for translation between formats including the common core and the standards covered in this Recommendation. The format described in Annex F is a framework to bind content authored in multiple formats into single content.

It is noted that there are other formats such as ETSI MHEG-5 [b-ETSI ES 202 184], which contain declarative functions that are not covered in this Recommendation. However, the migration from environments in current use to the harmonized environment is assisted by the identification of a common core and translation using the intermediate format.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T J.200]   Recommendation ITU-T J.200 (2010), *Worldwide common core – Application environment for digital interactive television services*.

[ETSI TS 102 322]   ETSI TS 102 322 V1.1.1 (2004), *Specification for a Lightweight Microbrowser for interactive TV applications, based on and compatible with WML*.

[ETSI TS 102 812]   ETSI TS 102 812 V1.2.1 (2003), *Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.1.1*.

[ABNT 15606-2]   ABNT NBR 15606-2 V2 (2007), *Digital terrestrial television – Data coding and transmission specification – Part 2: Ginga-NCL for fixed and mobile receivers: XML application language for application coding*.

[ABNT 15606-5]   ABNT NBR 15606-5 V2 (2008), *Digital terrestrial television – Data coding and transmission specification – Part 5: Ginga-NCL for portable receivers: XML application language for application coding*.

[ARIB STD-B24]   ARIB STD-B24 Ver.5.3 (2013), *Data Coding and Transmission Specification for Digital Broadcasting*.

[ATSC A/101]   ATSC A/101 (2005), *Advanced Common Application Platform (ACAP)*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 application programming interface [ITU-T J.200]

3.1.2 casading style sheet [ITU-T J.200]

3.1.3 document object model [ITU-T J.200]

3.1.4 integrated broadcast and broadband (IBB) DTV service [b-ITU-T J.205]

3.1.5 nested context language [ITU-T J.200]

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ACAP-X	ACAP declarative (XHTML)
API	Application Programming Interface
BML	Broadcast Markup Language
CSS	Cascading Style Sheet
DOM	Document Object Model
DTV	Digital Television
HTML	Hyper Text Markup Language
IBB	Integrated Broadcast-Broadband
MHEG	Multimedia Hypermedia Experts Group
NCL	Nested Context Language
VOD	Video On Demand
wTVML	worldwide Television Markup Language
XHTML	extensible Hyper Text Markup Language
XML	extensible Markup Language

5 Conventions

None.

6 Recommendation

The harmonized declarative content formats specified in Annexes A-F should be used for interactive TV applications in the declarative application environment.

When additional interoperability to the core functionality of the declarative content formats defined in this Recommendation is required, the approach described in Annexes E and F is recommended.

Annex A

Common core

(This annex forms an integral part of this Recommendation.)

Methodology for common core, common core of media types, extensible markup language (XML) markup, stylesheet markup, monomedia and behavioural application programming interfaces (APIs), which are based on the commonality between ACAP declarative (XHTML) (ACAP-X), broadcast markup language (BML), Ginga-nested context language (NCL) and DVB-HTML, are described below. Note that BML has four content profiles. Except where otherwise noted, all four profiles of BML are assumed. Note also that NCL embeds HTML objects requiring the common core conformance.

A.1 Methodology

A.1.1 Layer model

The graphics layer should lie on top of other layers such as video or text plane.

A.1.2 Application lifecycle

There should be a mechanism to destroy an application from outside the application itself.

A.2 Media type

Common media types are listed in Table A.1.

Table A.1 – Common media types

Image/jpeg
Image/png
Text/cascading style sheet (css)
Application/xhtml+xml

A.3 XML markup

Common XML markups are listed in Table A.2.

Table A.2 – Common XML markup modules

Structure
Text
Hypertext
List
Presentation
Bidirectional text
Forms
Image
Client-side image map
Object
Frames

Table A.2 – Common XML markup modules

Target
Meta information
Scripting
Stylesheet
Style attribute
Link
Base

Common XML markups for the BML for basic services ("fixed terminal profile"), Ginga-NCL XHTML objects, ACAP-X and DVB-HTML are listed in Table A.3.

**Table A.3 – Common XML markup for BML for basic services,
Ginga-NCL XHTML objects, ACAP-X and DVB-HTML**

Common attributes		
Core attributes		`id` `class`
Style attributes		
		`style`
Core modules		
Structure module		
	`body`	`%Core.attrib`
	`head`	
	`title`	
Text module		
	`br`	`%Core.attrib`
	`div`[1]	`%Common.attrib`
	`p`[1], [2]	`%Common.attrib`
	`span`	`%Common.attrib`
Hypertext module		

	`a`	`%Common.attrib`
		`accesskey`
		`href`

Forms modules		
Forms module		

	`input`[1]	`%Common.attrib`
		`accesskey`
		`disabled`
		`readonly`
		`maxlength`
		`type`
		`value`

**Table A.3 – Common XML markup for BML for basic services,
Ginga-NCL XHTML objects, ACAP-X and DVB-HTML**

Object module		
	object[1]	%Common.attrib data type
Metainformation module		
	meta	name content
Scripting module		
	script	
Stylesheet module		
	style	

[1] Only these elements can be a child element of <div>.

[2] Only these elements and CDATA can be a child element of <p>.

A.4 Stylesheet

A.4.1 Common stylesheet properties

Common stylesheet properties are listed in Table A.4.

Table A.4 – Common stylesheet properties

Background	Clear	Outline-color
Background-attachment	Clip	Outline-style
Background-color	Color	Outline-width
Background-image	Content	Overflow
Background-position	Counter-increment	Padding
Background-repeat	Counter-reset	Padding-bottom
Border	Cisplay	Padding-left
Border-bottom	Float	Padding-right
Border-bottom-color	Font	Padding-top
Border-bottom-style	Font-family	Position
Border-bottom-width	Font-size	Right
Border-color	Font-style	Text-align
Border-left	Font-variant	Text-decoration
Border-left-color	Font-weight	Text-indent
Border-left-style	Height	Text-transform
Border-left-width	Left	Top
Border-right	Letter-spacing	Vertical-align
Border-right-color	Line-height	Visibility
Border-right-style	List-style	White-space
Border-right-width	List-style-image	Width
Border-style	List-style-position	Word-spacing
Border-top	List-style-type	Z-index
Border-top-color	Margin	Nav-index
Border-top-style	Margin-bottom	Nav-left

Table A.4 – Common stylesheet properties

Border-top-width	Margin-left	Nav-right
Border-width	Margin-right	Nav-up
Bottom	Margin-top	Nav-down
Caption-side	Outline	

Common stylesheet properties for BML for basic services, Ginga-NCL XHTML objects, ACAP-X and DVB-HTML are listed in Table A.5.

**Table A.5 – Common stylesheet properties for BML for
basic services, Ginga-NCL XHTML objects, ACAP-X and DVB-HTML**

@media	Left[1]	Background-image
Margin	Top[1]	Background-repeat
Padding-top	Width[1]	Font-family
Padding-right	Height[1]	Font-size
Padding-bottom	Z-index	Font-weight
Padding-left	Line-height	Text-align
Border-width	Display	Letter-spacing
Border-style	Visibility	White-space
Position	Overflow	Background-image
[1] The elements <input>, <object>, <div> and <p> must have these property values. The elements , <a>, <span> must not have these property values.		

Furthermore, the following restrictions should be applied:

– Display property:

Only block element can be applied for <p>, <div>, <body>, <input> and <object>.

Only inline values can be applied for <br>, <a> and <span>.

– Position property:

Only absolute values can be applied for <p>, <div>, <input> and <object>.

Only static values can be applied for <br>, <span> and <a>.

A.4.2 Common CSS selectors

Common CSS selectors are listed in Table A.6.

Table A.6 – Common CSS selectors

Universal
Type
Descendant
Class
Id
:first-child pseudo-class
:link pseudo-class
:hover pseudo-class
:active pseudo-class
:focus pseudo-class
:lang pseudo-class

Table A.6 – Common CSS selectors

```
:pseudo-elements
(:first-child, :first-letter, :before, :after)
```

Common CSS selectors for BML for basic services, ACAP-X and DVB-HTML are listed in Table A.7.

Table A.7 – Common CSS selectors for BML for basic services, ACAP-X and DVB-HTML

Universal
Type
Dynamic (:focus and :active)
Class
Id

A.5 Scripting language

The common scripting language is ECMAScript second edition [b-ECMAScript], with the following restriction:

– Number type supports integer operation only.

Common native objects for BML for basic services, ACAP-X and DVB-HTML are listed in Table A.8. In Ginga-NCL XHTML objects, ECMAScript is optional. However, when used, it requires the common native objects listed below.

Table A.8 – Common native objects for BML for basic services, ACAP-X and DVB-HTML

Object	Methods, properties
(global)	NaN parseInt(string, radix) isNaN(number)
Object	All
Object.prototype	All
Function	prototype length
Function.prototype	All
Array	All
Array.prototype	All
String	All
String.prototype	All
Boolean	All
Boolean.prototype	All
Number	Prototype MAX_VALUE MIN_VALUE NaN Number([value]) New number([value])
Number.prototype	All
Date	prototype Date([year [, month [, date [, hours [, minutes [, seconds [, ms]]]]]]])

**Table A.8 – Common native objects for BML for basic services,
ACAP-X and DVB-HTML**

Object	Methods, properties
	new Date([year [, month [, date [, hours [, minutes [, seconds [, ms]]]]]]])
Date.prototype	toString() getFullYear() getUTCFullYear() getMonth() getUTCMonth() getDate() getUTCDate() getDay() getUTCDay() getHours() getUTCHours() getMinutes() getUTCMinutes() getSeconds() getUTCSeconds() getMilliseconds() getUTCMilliseconds() getImtezoneOffset() setMilliseconds(ms) setUTCMilliseconds(ms) setSeconds(sec [, ms]) setUTCSeconds(sec [, ms]) setMinutes(min, [, sec [, ms]]) setUTCMinutes(min, [, sec [, ms]]) setHours(hours, [,(min, [, sec [, ms]])] setUTCHours(hours, [,(min, [, sec [, ms]])] setDate(date) setMonth(mon [, date]) setUTCMonth(mon [, date]) setFullYear(year [, mon [, date]]) setUTCFullYear{year [, mon [, date]]} toLocaleString() toUTCString()

For BML for basic services, the length to represent a signed integer is 32 bits including the sign.

A.6 DOM API

Common document object model (DOM) APIs in DOM level 1 are listed in Table A.9.

Table A.9 – Common DOM level 1 APIs

Core fundamental	DOMException
	DOMIplementation
	DocumentFragment
	Document
	Node
	NodeList
	NamedNodeMap
	CharacterData
	Attr
	Element
	Text
	Comment

Common DOM level 1 APIs for the BML for basic services, ACAP-X and DVB-HTML are listed in Table A.10. Interfaces listed in Table A.10 that have no specified attributes or methods cover all attributes and methods of the interfaces. In Ginga-NCL XHTML objects, DOM level 1 APIs are optional. However, when used, it requires the common DOM level 1 APIs for the BML listed below.

**Table A.10 – Common DOM level 1 APIs for BML for basic services,
ACAP-X and DVB-HTML**

	Interface	Attributes, methods
Core fundamental	DOMImplementation	
	Document	`implementation` `documentElement`

	Node	`parentNode`
		`firstChild`
		`lastChild`
		`previousSibling`
		`nextSibling`

	CharacterData	`data` `length`
	Element	`tagName`
	Text	

Annex B

Additional elements, media types and APIs for BML

(This annex forms an integral part of this Recommendation.)

Elements, media types and APIs for BML in addition to those listed in Annex A (common core) are described below. Note, items marked "BD)" are common to BML and DVB-HTML. Items marked "BA)" are common to BML and ACAP-X.

B.1   Additional BML media types

Additional BML media types are listed in Table B.1.

Table B.1 – Additional BML media types

Multipart/mixed
Text/xml^{BD)}
Text/xsl
Text/html
Text/plain^{BD)}
Text/css
Text/X-arib-bml;charset="euc-jp"
Text/X-arib-bml;charset="UTF-16"
Text/X-arib-bml;charset="Shift_JIS"
Text/X-arib-bml;charset="UTF-8"
Text/X-arib-jis8text
Text/X-arib-ecmascript;charset="euc-jp"
Text/X-arib-ecmascript;charset="UTF-16"
Text/X-arib-ecmascript;charset="Shift_JIS"
Text/X-arib-ecmascript;charset="UTF-8"
Image/gif
Image/X-arib-png
Image/X-arib-mng
Image/X-arib-mpeg2-I
Image/X-arib-mpeg4-I-simple
Image/X-arib-mpeg4-I-core
Image/X-arib-H264-I-baseline
Image/X-arib-H264-I-main
Audio/X-arib-mpeg2-aac
Audio/X-arib-mpeg2-bc
Audio/X-arib-mpeg4
Audio/X-arib-aiff
Audio/X-arib-additional
Audio/X-arib-romsound
Application/X-arib-stream-text;charset="euc-jp"

Table B.1 – Additional BML media types

Application/X-arib-stream-text;charset="UTF-16"
Application/X-arib-stream-text;charset="Shift_JIS"
Application/X-arib-stream-text;charset="UTF-8"
Application/X-arib-stream-jis8text
Application/X-arib-stream-png
Application/X-arib-stream-jpeg
Application/X-arib-stream-mpeg2-I
Application/X-arib-stream-mpeg4-I-simple
Application/X-arib-stream-mpeg4-I-core
Application/X-arib-stream-H264-I-baseline
Application/X-arib-stream-H264-I-main
Application/X-arib-mpeg2-ts
Application/X-arib-mpeg2-tts
Application/X-arib-bmlclut
Application/X-arib-btable
Application/X-arib-drcs
Application/X-arib-PDI
Application/X-arib-resourceList
Application/X-arib-storedresourceList
Application/X-arib-rootcertificate
Application/X-arib-contentPlayControl
Application/X-arib-meta+xml;charset="UTF-8"
Application/X-arib-meta+xml;charset="UTF-16"
Video/X-arib-mpeg1
Video/X-arib-mpeg2
Video/X-arib-mpeg4-simple
Video/X-arib-mpeg4-core
Video/X-arib-H264-baseline
Video/X-arib-H264-main
BD) These are common to BML and DVB-HTML.

B.2 Additional BML XML markup

Additional BML XML markups are listed in Table B.2.

Table B.2 – Additional XML markups

Module	Tag
Table[BA]	All
Intrinsic events[BA]	All
Name identification[BA]	All
Applet	All

Table B.2 – Additional XML markups

Basic forms	All
Basic table^{BD)}	All
Server side image map	All
Iframe^{BD)}	All
Legacy	All
BML extension	Bml, bevent, beitem, body&, div&, p&, span&, a&, bdo&, object&
^{BA)} These are common to BML and ACAP-X. ^{BD)} These are common to BML and DVB-HTML.	

B.3   Additional BML CSS properties

Additional BML CSS properties are listed in Table B.3.

Table B.3 – Additional CSS properties

Clut¹⁾
Color-index¹⁾
Background-color-index¹⁾
Border-color-index
Border-top-color-index¹⁾
Border-right-color-index¹⁾
Border-bottom-color-index¹⁾
Border-left-color-index¹⁾
Outline-color-index
Resolution¹⁾
Display-aspect-ratio¹⁾
Grayscale-color-index¹⁾
Used-key-list¹⁾
nav-index¹⁾
nav-up¹⁾
nav-down¹⁾
nav-left¹⁾
nav-right¹⁾
-wap-marquee
-wap-marquee-style
-wap-marquee-loop
-wap-marquee-dir
-wap-marquee-speed
-wap-accesskey
-wap-input-format
-wap-input-required
¹⁾   These attributes are employed for BML for basic services.

B.4 Additional BML DOM APIs

B.4.1 Additional BML DOM level 1 APIs

Table B.4 – Additional BML DOM level 1 APIs

Core extension[BA)]	CDATASection
	DocumentType
	Notation
	Entity
	EntityReference
	ProcessingInstruction
HTML	HTMLCollection[BA)]
	HTMLDocument[BA)]
	HTMLElement[BA)]
	HTMLAnchorElement[BA)]
	HTMLFormElement[BA)]
	HTMLInputElement[BA)]
	HTMLOptionElement[BA)]
	HTMLSelectElement[BA)]
	HTMLTextAreaElement[BA)]
	HTMLImageElement[BA)]
	HTMLObjectElement[BA)]
	HTMLBodyElement[BA)]
	HTMLBlockquoteElement
	HTMLPreElement
	HTMLHeadingElement
	HTMLHRElement
	HTMLDivElement[1)]
	HTMLParagraphElement[1)]
	HTMLQuoteElement
	HTMLBRElement[1)]
	HTMLModElement
	HTMLBaseElement
	HTMLLinkElement
	HTMLDListElement
	HTMLOlistElement
	HTMLUListElement
	HTMLLIElement
	HTMLButtonElement
	HTMLFieldSetElement
	HTMLLabelElement
	HTMLLegendElement

Table B.4 – Additional BML DOM level 1 APIs

HTML	HTMLOptGroupElement
	HTMLTableCaptionElement
	HTMLTableColElement
	HTMLTableElement
	HTMLTableSectionElement
	HTMLTableCellElement
	HTMLTableRowElement
	HTMLAreaElement
	HTMLMapElement
	HTMLParamElement
	HTMLFrameSetElement
	HTMLFrameElement
	HTMLIFrameElement
	HTMLMetaElement[1]
	HTMLTitleElement[1]
	HTMLScriptElement[1]
	HTMLStyleElement[1]
	HTMLHeadElement[1]
	HTMLHtmlElement[1]

[BA] These are common to BML and ACAP-X.
[1] These elements are employed for BML for basic services.

B.4.2 BML extensions of DOM APIs

Table B.5 – Additional BML extensions

BML extension	BMLDocument[1]
	BMLCSS2Properties[1]
	BMLEvent[1]
	BMLIntrinsicEvent[1]
	BMLBeventEvent[1]
	BMLDocument[1]
	BMLElement
	BMLBlockquoteElement
	BMLPreElement
	BMLHeadingElement
	BMLHRElement
	BMLDivElement[1]
	BMLSpanElement[1]
	BMLParagraphElement[1]
	BMLQuoteElement

Table B.5 – Additional BML extensions

	BMLBRElement[1]
BML extension	BMLModElement
	BMLAnchorElement[1]
	BMLLinkElement
	BMLDListElement
	BMLOListElement
	BMLUListElement
	BMLLIElement
	BMLButtonElement
	BMLFieldSetElement
	BMLFormElement
	BMLInputElement[1]
	BMLLabelElement
	BMLLegendElement
	BMLOptGroupElement
	BMLOptionElement
	BMLSelectElement
	BMLTextAreaElement
	BMLTableCaptionElement
	BMLTableColElement
	BMLTableElement
	BMLTableSectionElement
	BMLTableCellElement
	BMLTableRowElement
	BMLImageElement
	BMLAreaElement
	BMLMapElement
	BMLObjectElement[1]
	BMLFrameSetElement
	BMLFrameElement
	BMLIFrameElement
	BMLBodyElement[1]
	BMLBmlElement[1]
	BMLBeventElement[1]
	BMLBeitemElement[1]
[1] These elements are employed for BML for basic services.	

B.5 Additional functions for integrated broadcast-broadband services

B.5.1 Markup language switch

A function added to ECMAScript to launch another declarative application environment, such as an HTML browser to access IP service portals, is listed in Table B.6.

Table B.6 – Markup language switch function

```
Number startExtraBrowser(
  input String browserName,
  input Number showAV,
  input String returnURI,
  input String uri
)
```

Arguments:

browserName   Name of the extra browser to be started.

showAV   Flag that specifies whether or not the current playback of a TV program (video and sound) is allowed to continue when the resident application software has been started. The flag values and actions are:

      1: The playback is allowed to continue.

      0: The playback is not allowed to continue.

returnURI   URI of a component that is rendered first when the BML browser is restarted after the resident application software that was started by the function has been stopped. If no component is to be specified, the returnURI must contain an empty string. This argument is designed to help a receiver function. It is not required that a receiver be dependent on this argument to function properly.

uri   URI that is rendered first when the extra browser is started.

Return values:

1   Success

NaN   Failure

Description:

This function starts an extra browser, as specified in browserName. Once this function is executed, no script parts following this function are executed.

B.5.2 Content download

Two functions added to ECMAScript for content download are listed in Tables B.7 and B.8.

Table B.7 – Initiation of content download

```
Number startDlcDownload(
     input String src_path
)
```

Argument:

src_path   URI which represents control information of content to be downloaded

Return values:

1   Success

−1   Invalid parameters

−4   Failure due to incapability of accept of request

NaN   Failure due to other reasons

Description:

This function starts acquisition of control information of content to be downloaded described as 'src_path'. This function returns immediately without waiting for completion of acquisition of the control information. Control information of the content to be downloaded is meta-information, which contains information related to the content including location, license information, etc. Because the control information depends on each IP service that offers the content, the format of the control information is not part of this Recommendation and is not defined in the BML standard. A receiver that allows execution of this function is expected to acquire the content and its related information, as instructed by the control information.

Table B.8 – Acquisition of download status

```
Number getDlcDownloadStatus()
```

Argument:

None

Return values:

1   Request acceptable

−4   Request unacceptable

NaN   Failure

Description:

This function calls startDlcDownload() and returns the status indicating if a request of control information of content to be downloaded is acceptable.

B.5.3   VOD playback

A function added to ECMAScript for video on demand (VOD) content playback is listed in Table B.9.

Table B.9 – VOD content playback

```
Number startVOD(
     input String metafile_uri
     [, input Array option]
)
```

Argument:

metafile_uri   URI of playback control information file for VOD content

Return values:

1   Success

NaN   Failure

Description:

This function starts a resident application to acquire and play VOD content, and gives required information to the application and to the receiver. Actual acquisition and presentation of the VOD content is carried out by the resident application.

Annex C

Additional elements, media types and APIs for ACAP-X

(This annex forms an integral part of this Recommendation.)

Elements, media types and APIs for ACAP-X in addition to those listed in Annex A (common core) are described below. Note, items marked "AD)" are common to ACAP-X and DVB-HTML. Items marked "AB)" are common to ACAP-X and BML.

C.1 Additional ACAP-X media types

Additional ACAP-X media types are listed in Table C.1.

Table C.1 – Additional ACAP-X media types

Application/acap-j
Application/acap-certificate
Application/acap-digest
Application/acap-permission
Application/acap-signature
Application/acap-x
Application/acap-x-metadata
Application/font-tdpfr
Application/java
Application/zip
Application/xhtml+xml
Audio/ac3
Audio/basic
Audio/mpeg[AD]
Image/mpeg[AD]
Text/ecmascript[AD]
Video/mng
Video/mpeg
Video/mpv
[AD] These are common to ACAP-X and DVB-HTML.

C.2 Additional ACAP-X XML markup

Additional ACAP-X XML markups are listed in Table C.2.

Table C.2 – Additional ACAP-X XML markups

Module	Tag
Table[AB]	All
Intrinsic events[AB]	All
Name identification[AB]	All
[AB] These are common to ACAP-X and BML.	

C.3 Additional ACAP-X CSS properties

Additional ACAP-X CSS properties and selectors are listed in Table C.3.

Table C.3 – Additional ACAP-X CSS properties and selectors

Properties	Atsc-dynamic-refresh
Selectors	Child
	Adjacent sibling
	Attribute and attribute values

C.4 Additional ACAP-X stylesheet attributes

Additional ACAP-X stylesheet attributes are CSS level 2, CSS-BOX, CSS-COLOR, CSS-TV, CSS-UI and their related DOM APIs.

C.5 Additional ACAP-X DOM APIs

Additional ACAP-X DOM level 2 APIs are listed in Table C.4.

Table C.4 – Additional ACAP-X DOM level 2 APIs

Core fundamental[AD]	DOMException
	DOMIplementation
	DocumentFragment
	Document
	Node
	NodeList
	NamedNodeMap
	CharacterData
	Attr
	Element
	Text
	Comment
Core extension[AB]	CDATASection
	DocumentType
	Notation
	Entity
	EntityReference
	ProcessingInstruction
HTML[AB]	HTMLAnchorElement
	HTMLBodyElement
	HTMLCollection
	HTMLDocument
	HTMLElement
	HTMLFormElement
	HTMLInputElement

Table C.4 – Additional ACAP-X DOM level 2 APIs

HTML[AB]	HTMLObjectElement
	HTMLOptionElement
	HTMLSelectElement
	HTMLTextAreaElement
	HTMLImageElement
View	AbstractView
	DocumentView
Stylesheets[AD]	DocumentStyle
	LinkStyle
	MediaList
	Stylesheet
	StylesheetList
CSS	Counter
	CSSCharsetRule
	CSSFontFaceRule
	CSSImportRule
	CSSMediaRule
	CSSPageRule
	CSSPrimitiveValue
	CSSRule
	CSSRulesList
	CSSStyleDeclaration
	CSSStyleRule
	CSSStyleSheet
	CSSUnknownRule
	CSSValue
	CSSValueList
	DocumentCSS
	DOMImplementationCSS
	ElementCSSInlineStyle
	Rect
	RGBColor
	ViewCSS
Event [AD]	DocumentEvent
	Event
	EventException
	EventListner
	EventTarget

Table C.4 – Additional ACAP-X DOM level 2 APIs

EventSet	KeyEvent
	KeyModifiers
	MouseEvent[AD)
	MutationEvent[AD)
	UIEvent[AD)
	VirtualKeys
[AB) These are common to ACAP-X and BML.	
[AD) These are common to ACAP-X and DVB-HTML.	

ACAP-X extensions of DOM APIs are listed in Table C.5.

Table C.5 – Additional ACAP-X extensions

ACAP-X extension	DOMExceptionExt
	HTMLAnchorElementExt
	HTMLDocumentExt
	HTMLImageElementExt
	HTMLFormElementExt
	HTMLObjectElementExt
	HTMLTriggerObjectElementExt
	HTMLOptionsCollection
	DocumentViewExt

Annex D

Additional elements, media types and APIs for DVB-HTML

(This annex forms an integral part of this Recommendation.)

Elements, media types and APIs for DVB-HTML in addition to those listed in Annex A (common core) are described below. Note, items marked "DB)" are common to DVB-HTML and BML. Items marked "DA)" are common to DVB-HTML and ACAP-X.

D.1 Additional DVB-HTML media types

Additional DVB-HTML media types are listed in Table D.1.

Table D.1 – Additional DVB-HTML media types

Application/xml
Application/dvbj
Application/dvb.pfr
Audio/mpeg[DA)]
Image/gif
Image/mpeg[DA)]
Text/ecmascript[DA)]
Text/plain[DB)]
Text/css
Text/xml[DB)]
Text/dvb.utf8
Multipart/dvb.service
Video/dvb.mpeg.drip
[DA)] These are common to DVB-HTML and ACAP-X.   [DB)] These are common to DVB-HTML and BML.

D.2 Additional DVB-HTML XML markups

Additional DVB-HTML XML markups are listed in Table D.2.

Table D.2 – Additional XML markups

Basic Table[DB)]
Iframe[DB)]
[DB)] These are common to DVB-HTML and BML.

D.3 Additional DVB-HTML CSS properties

Additional DVB-HTML CSS properties and selectors are listed in Table D.3.

Table D.3 – Additional DVB-HTML CSS properties and selectors

Properties	Direction
	Unicode-bidi
	Min-width
	Max-width
	Min-height
	Max-height
	Font-stretch
	Font-size-adjust
	Table-layout
	Empty-cells
	Speak-header
	Opacity
	Nav-first
	Clip-video
	Compose-rule
Selectors	Child
	Adjacent sibling
	Attribute and attribute values

D.4 Additional DVB-HTML DOM APIs

D.4.1 Additional DVB-HTML DOM level 1 APIs

Additional DVB-HTML DOM level 1 APIs are listed in Table D.4.

Table D.4 – Additional DVB-HTML DOM level 1 APIs

HTML	DVBHTMLCollection
	DVBHTMLDocument
	DVBHTMLElement
	DVBHTMLAnchorElement
	DVBHTMLButtonElement
	DVBHTMLFormElement
	DVBHTMLInputElement
	DVBHTMLOptionElement
	DVBHTMLSelectElement
	DVBHTMLTextAreaElement
	DVBHTMLImageElement
	DVBHTMLAreaElement
	DVBHTMLMapElement

Table D.4 – Additional DVB-HTML DOM level 1 APIs

HTML	DVBHTMLObjectElement
	DVBHTMLFrameSetElement
	DVBHTMLFrameElement
	DVBHTMLIFrameElement

D.4.2 Additional DVB-HTML DOM level 2 APIs

Additional DVB-HTML DOM level 2 APIs are listed in Table D.5.

Table D.5 – Additional DVB-HTML DOM level 2 APIs

Core fundamental[DA]	DOMException
	DOMIplementation
	DocumentFragment
	Document
	Node
	NodeList
	NamedNodeMap
	CharacterData
	Attr
	Element
	Text
	Comment
View	AbstractView
	DocumentView
Style sheets[DA]	DocumentStyle
	LinkStyle
	MediaList
	Stylesheet
	StylesheetList
Event[DA]	DocumentEvent
	Event
	EventException
	EventListner
	EventTarget
EventSet[DA]	MouseEvent
	MutationEvent
	UIEvent
[DA] These are common to DVB-HTML and ACAP-X.	

Annex E

Presentation interoperability through translation

(This annex forms an integral part of this Recommendation.)

Some service providers may find the core functionality is limited for their purposes, though they still wish to target the multiple presentation engines identified in this Recommendation.

As a supplement to the core functionality, the worldwide television markup language (wTVML) specified in [ETSI TS 102 322] defines a format to author such interactive services, which can then be mechanically translated to any desired presentation markup language.

The wTVML format uses an XML data structure with declarative behaviour and little or no scripting and, as such, is easier to translate to other markup languages.

Because wTVML expresses the author's intent, rather than the implementation, richer non-core features of each supported markup become available for use.

In addition, wTVML can also be used as a native presentation language.

When using wTVML as the intermediate format for format translation of the declarative application, the following may require careful consideration, by the organization responsible for the application, for translation of the original application to wTVML.

– Broadcast message signals such as those carried by a DSM-CC stream event.

– Additional scripting language, for example for cache control.

Annex F

Presentation integration of multiple formats for declarative applications

(This annex forms an integral part of this Recommendation.)

Some service providers may wish to employ multiple formats identified in this Recommendation including the common core. Usage of the multiple formats can be in many ways, such as concurrent use, switch of one format to another, and so on. This means that an integration framework for content employing multiple formats is required.

As a framework for integration of multiple declarative application formats, nested context language (NCL) specified in [ABNT 15606-2] defines a format to bind content authored in multiple formats into single content. NCL is a glue language based on XML that holds media objects together in a multimedia presentation. Objects may be of different types: common perceptual media objects (video, audio, images, etc.), imperative media objects (code chunks written in Lua scripts, Java, etc.), or declarative hypermedia objects (XHTML documents, SVG documents, multimedia hypermedia experts group (MHEG) applications, etc.).

Multiple declarative contents can be presented in a multiple-device platform, for example in a home network. Ginga-NCL can be used to distribute the declarative content to be processed in each device in cooperation.

When using NCL as the framework to bind content authored in different declarative application formats, careful consideration to organize binding content is required.

– Although synchronization relationships can be defined in each declarative hypermedia object, synchronization coming from external events shall be managed by Ginga-NCL. That is, system time base can only be in NCL, not in each media object. In particular, time-based events such as an event triggered by normal play time should be handled in NCL.

Table F.1 describes each NCL 3.0 module elements and attributes that are present in the NCL 3.0 enhanced digital television (DTV) profile. Attributes and contents (child elements) of elements may be defined in the module itself or in the NCL enhanced DTV profile that groups the modules. Element attributes that are required are underlined. In the table, the following symbols are used: (?) optional (zero or one occurrence), (|) or (*) zero or more occurrences, (+) one or more occurrences.

Table F.1 – Extended structure module elements and attributes

Module	Elements	Attributes	Content
Extended structure module	ncl	*id, title, xmlns*	(head?, body?)
	head		(importedDocumentBase? ruleBase?, transitionBase?, regionBase*, descriptorBase?, connectorBase?, meta*, metadata*)
	body	*id*	(port | property | media | context | switch | link | meta | metadata)*
Extended layout module	regionBase	*id, device, region*	(importBase | region)+
	region	*id, title, left, right, top, bottom, height, width, zIndex*	(region)*
Extended media module	media	*id, src, refer, instance, type, descriptor*	(area | property)*
Extended context module	context	*id, refer*	(port | property | media | context | link | switch | meta | metadata)*
Extended MediaContentAnchor module	area	*id, coords, begin, end, text, position, first, last, label, clip*	empty
Extended CompositeNodeInterface module	port	*id, component, interface*	empty
Extended PropertyAnchor module	property	*name, value*	empty
Extended SwitchInterface module	switchPort	*id*	mapping+
	mapping	*component, interface*	empty
Extended descriptor module	descriptor	*id, player, explicitDur, region, freeze, moveLeft, moveRight, moveUp; moveDown, focusIndex, focusBorderColor; focusBorderWidth; focusBorderTransparency, focusSrc,focusSelSrc, selBorderColor, transIn, transOut*	(descriptorParam)*
	descriptorParam	*name, value*	
	descriptorBase	*id*	(importBase | descriptor | descriptorSwitch)+
Extended linking module	bind	*role, component, interface, descriptor*	(bindParam)*
	bindParam	*name, value*	empty
	linkParam	*name, value*	empty
	link	*id, xconnector*	(linkParam*, bind+)

Table F.1 – Extended structure module elements and attributes

Module	Elements	Attributes	Content
Extended CausalConnector functionality	causalConnector	*id*	(connectorParam*, (simpleCondition | compoundCondition) (simpleAction | compoundAction))
	connectorParam	*name, type*	empty
	simpleCondition	*role, delay, eventType, key, transition, min, max, qualifier*	empty
	compoundCondition	*operator, delay*	((simpleCondition | compoundCondition)+, (assessmentStatement | compoundStatement)*)
	simpleAction	*role, delay, eventType, actionType, value, min, max, qualifier, repeat, repeatDelay, duration, by*	empty
	compoundAction	*operator, delay*	(simpleAction | compoundAction)+
	assessmentStatement	*comparator*	(attributeAssessment, (attributeAssessment | valueAssessment))
	attributeAssessment	*role, eventType, key, attributeType, offset*	empty
	valueAssessment	*value*	empty
	compoundStatement	*operator, isNegated*	(assessmentStatement | compoundStatement)+
Extended ConnectorBase module	connectorBase	id	(importBase|causal Connector)*
Extended TestRule module	ruleBase	id	(importBase|rule | compositeRule)+
	rule	*id, var, comparator, value*	empty
	compositeRule	*id, operator*	(rule | compositeRule)+
Extended TestRuleUse module	bindRule	*constituent, rule*	empty
Extended ContentControl module	switch	*id, refer*	(defaultComponent?, (switchPort | bindRule | media | context | switch)*)
	defaultComponent	*component*	empty
Extended DescriptorControl module	descriptorSwitch	*id*	(defaultDescriptor?, (bindRule | descriptor)*)
	defaultDescriptor	*descriptor*	empty
Extended import module	importBase	*alias, documentURI, region*	empty
	importedDocumentBase	id	(importNCL)+
	importNCL	*alias, documentURI,*	empty

Table F.1 – Extended structure module elements and attributes

Module	Elements	Attributes	Content
Extended TransitionBase module	transitionBase	*id*	(importBase, transition)+
Extended Transition module	transition	*id*, *type*, *subtype, dur, startProgress, endProgress, direction, fadeColor, horRepeat, vertRepeat, borderWidth, borderColor*	empty
Extended Metainformation module	meta	*name*, *content*	empty
	metadata	*empty*	RDF tree
(?) optional (zero or one occurrence), (|) or (*) zero or more occurrences, (+) one or more occurrences			

Bibliography

[b-ITU-T J.202]   Recommendation ITU-T J.202 (2003), *Harmonization of procedural content formats for interactive TV applications.*

[b-ITU-T J.205]   Recommendation ITU-T J.205 (2012), *Requirements for an application control framework using integrated broadcast and broadband digital television.*

[b-ETSI ES 202 184]   ETSI ES 202 184 V1.1.1 (2004), *MHEG-5 Broadcast Profile.*

[b-ECMAScript]   Standard ECMA-262 (1998), 2nd Edition, *ECMAScript Language Specification.*

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