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Recommendation ITU-R BT.1722-2
(03/2011)

**Harmonization of the instruction set for the
execution engine for interactive
TV applications**

BT Series
Broadcasting service
(television)



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Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R BT.1722-2

**Harmonization of the instruction set for the execution engine
for interactive TV applications**

(Question ITU-R 131/6)

(2005-2007-2011)

Scope

This Recommendation is intended to harmonize the application environment for interactive TV applications. The potential for commonality in the executable application environment is based on the analysis of the common core identified in the work leading to this Recommendation. Such commonality would benefit content providers through knowledge of commonly adopted executable functionality and economies of scale.

The ITU Radiocommunication Assembly,

considering

- a) the need to avoid proliferation of protocols for interactive multimedia services;
- b) that digital broadcasting services (satellite, terrestrial and cable) are becoming widely available and offer multimedia applications;
- c) that multimedia applications comprising video, audio, still-picture, text, graphics, etc. associated with interactive features have been developed;
- d) that multimedia applications planned or deployed in some Regions are using the executable application environment;
- e) that common instruction sets are desirable for production and international exchange of multimedia content;
- f) that continuous work and review of Application Programming Interfaces (APIs) is being carried out in the ITU-R and ITU-T Sectors;
- g) that Recommendation ITU-T J.200 defines the high-level architecture for a harmonized set of interactive instruction sets and APIs and identifies the structure of application environment comprising the executable application environment and the declarative application environment for digital television services;
- h) that Recommendation ITU-T J.202 defines the executable application environment within Recommendation ITU-T J.200 and is the corresponding Recommendation to Recommendation ITU-R BT.1722,

recommends

- 1** that the harmonized instruction set for the execution engines specified in Annex 1 should be used for interactive TV applications in the executable application environment.

Annex 1

Harmonization of the instruction set for the execution engine for interactive TV applications

1 Introduction

This annex specifies the common core APIs consisting of those described in Table 1. Tables 2 and 3 describe additional broadcast extension APIs to Table 1 to conform to either ETSI TS 102 543 V1.1.1 for the purpose of harmonization among specifications derived from ETSI TS 102 543 V1.1.1, or JavaDTV specification which is the core of GINGA-J and functionally equivalent to ETSI TS 102 543.

2 References

2.1 Normative references

The following texts contain provisions which, through reference in this text, constitute provisions of the present Recommendation.

- Recommendation ITU-T J.200 (2010), Worldwide common core – Application environment for digital interactive television services.
- ETSI TS 102 728 V1.1.1 (2010-01), Digital Video Broadcasting (DVB) Globally Executable MHP (GEM) Specification 1.2.2,
http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=31422.
- ABNT NBR 15606-6, Digital terrestrial television – *Data coding and transmission specification for digital broadcasting – Part 6: JavaDTV 1.3*.

2.2 Informative references

- ETSI TS 101 812 V1.3.1, *Digital Video Broadcasting Multimedia Home Platform (MHP) version 1.0.3*.
http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=25178.
- ETSI TS 102 727 V1.1.1, *Digital Video Broadcasting Multimedia Home Platform (MHP) version 1.2.2*.
http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=31420.
- ETSI TS 102 812 v1.2.2, *Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.1.1*.
http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=25177.
- SCTE 90-1 2004, *OCAP 1.0 Profile*.
<http://www.scte.org/documents/pdf/ANSISCTE9012004.pdf>.
- OC-SP-OCAP1.1.2-090930, OCAP 1.1 Profile.
<http://www.cablelabs.com/specifications/OC-SP-OCAP1.1.2-090930.pdf>.
- ARIB STD-B24 V5.4 (2009), *Data Coding and Transmission Specification for Digital Broadcasting (in Japanese)*.
<http://www.arib.or.jp/english/html/overview/archives/br.html>.

- ARIB STD-B23 V1.2 (2009), *Application Execution Engine Platform for Digital Broadcasting (in Japanese)*.
<http://www.arib.or.jp/english/html/overview/archives/br.html>.
- ATSC A/101 (2 August 2005), *Advanced Common Application Platform (ACAP)*.
http://www.atsc.org/standards/a_101.pdf.
- ISO/IEC 13522-5:1997, *Information technology – Coding of multimedia and hypermedia information – Part 5: Support for base-level interactive applications*.
<http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=26876&ICS1=35&ICS2=40&ICS3=>.
- ETSI ES 202 184, *MHEG-5 Broadcast Profile*.
http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=16127.
- ETSI TS 102 812 V1.2.1 Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.1.1.
http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=18801.
- ABNT NBR 15606-4, *Digital terrestrial television – Data coding and transmission specification for digital broadcasting – Part 4: Ginga-J Environment for execution of procedural applications*.

NOTE 1 – At the time of publication, the editions of normative references 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 above.

3 Common platform definitions for interactive TV using executable applications

The recommended platform definitions for interactive TV consist of the common core in Table 1 which is derived from the commonality in ARIB STD-B23, MHP 1.2, ACAP, OCAP 1.0 and GINGA-J.

TABLE 1
Common core APIs

java.awt
java.awt.event
java.awt.image
java.beans
java.io
java.lang
*java.lang.reflect
*java.math
java.net
java.rmi
java.security
java.security.cert
java.security.spec

TABLE 1 (*end*)

java.util
java.util.zip
javax.media
javax.media.protocol
javax.net
javax.net.ssl
javax.security.cert
javax.tv.graphics
javax.tv.locator
javax.tv.media
javax.tv.net
javax.tv.service
javax.tv.service.guide
javax.tv.service.navigation
javax.tv.service.selection
javax.tv.service.transport
javax.tv.util
*java.awt.color
*java.awt.font
*java.awt.im
*java.rmi.registry
*java.security.acl
*java.security.interfaces
*java.text
*java.util.jar
*javax.microedition.io
*javax.microedition.pki
*javax.microedition.xlet
*javax.microedition.xlet.ixc
*javax.microedition.x500

NOTE 1 – Packages with symbol * require careful consideration of compatibility with systems based on older versions of this Recommendation. See normative references.

4 Broadcast extension APIs

Broadcast extension APIs are additional APIs to the common core APIs defined in Table 1, which should be normatively used. APIs which are intended to provide harmonization among standards derived from ETSI TS 102 728 V1.1.1 are described in clause 4.1. APIs for those functionalities derived from ABNT NBR 15606-6 are described in clause 4.2.

4.1 Additional APIs to conform to Globally Executable MHP

In this section, additional APIs to the common core in Table 1 are defined, which are intended to provide harmonization among standards derived from ETSI TS 102 728 V1.1.1. The standards are MHP 1.0.3, MHP 1.1, MHP 1.2.2, OCAP 1.0, OCAP 1.1, ACAP, and ARIB STD-B23 1.2. These additional APIs should be used in conjunction with common core APIs.

NOTE 1 – ETSI TS 102 728 V1.1.1 covers broadcast, packaged media and IPTV targets. In this Recommendation, only broadcast target should be considered.

TABLE 2

Additional APIs to conform to ETSI TS 102 728 V1.1.1

org.davic.media
org.davic.resources
org.davic.mpeg
org.davic.mpeg.sections
org.davic.net
org.davic.net.tuning
org.dvb.application
org.dvb.dsmcc
org.dvb.event
org.dvb.io.ixc
org.dvb.io.persistent
org.dvb.lang
org.dvb.media
org.dvb.net
org.dvb.net.tuning
org.dvb.net.rc
org.dvb.test
org.dvb.ui
org.dvb.user
org.havi.ui
org.havi.ui.event

4.2 Additional APIs to conform to JavaDTV specification

In this section, additional APIs to the common core defined in Table 1 are defined, which are intended to conform to ABNT NBR 15606-6 and are functionally equivalent to ETSI TS 102 728 V1.1.1.

TABLE 3

Additional APIs to conform to JavaDTV specification

com.sun.dtv.application
com.sun.dtv.broadcast
com.sun.dtv.broadcast.event
com.sun.dtv.filtering
com.sun.dtv.io
com.sun.dtv.locator
com.sun.dtv.lwuit
com.sun.dtv.lwuit.animations
com.sun.dtv.lwuit.events
com.sun.dtv.lwuit.geom
com.sun.dtv.lwuit.layouts
com.sun.dtv.lwuit.list
com.sun.dtv.lwuit.painter
com.sun.dtv.lwuit.plaf
com.sun.dtv.lwuit.util
com.sun.dtv.media
com.sun.dtv.media.audio
com.sun.dtv.media.control
com.sun.dtv.media.dripfeed
com.sun.dtv.media.format
com.sun.dtv.media.language
com.sun.dtv.media.text
com.sun.dtv.media.timeline
com.sun.dtv.net
com.sun.dtv.platform
com.sun.dtv.resources
com.sun.dtv.security
com.sun.dtv.service
com.sun.dtv.smartcard
com.sun.dtv.test
com.sun.dtv.transport
com.sun.dtv.tuner
com.sun.dtv.ui
com.sun.dtv.ui.event

5 System specific APIs

In the appendices, the system-specific APIs are given to supplement the common core where appropriate and for possible future use.

Appendix I (Informative)

Specific additional APIs common to MHP 1.0.3, MHP 1.1.1 and MHP 1.2

org.davic.mpeg.dvb
org.davic.net.ca
org.dvb.net.ca
org.dvb.si

Appendix II (Informative)

Specific additional APIs common to OCAP 1.0 and OCAP 1.1

org.ocap
org.ocap.application
org.ocap.event
org.ocap.hardware
org.ocap.hardware.pod
org.ocap.media
org.ocap.mpeg
org.ocap.net
org.ocap.resource
org.ocap.service
org.ocap.si
org.ocap.system
org.ocap.ui.event
org.ocap.storage
org.ocap.system.event
org.ocap.test
org.ocap.ui

Appendix III (Informative)

OCAP 1.1 specific additional APIs

org.ocap.diagnostics
org.ocap.environment

Appendix IV (Informative)

ARIB STD-B23 specific additional APIs

jp.or.arib.tv.media
jp.or.arib.tv.net
jp.or.arib.tv.si
jp.or.arib.tv.ui
org.davic.net.ca
jp.or.arib.tv.peripheral
jp.or.arib.tv.peripheral.devices
jp.or.arib.tv.peripheral.protocol
jp.or.arib.tv.peripheral.stream
jp.or.arib.tv.io
jp.or.arib.tv.service.selection
org.ocap.shared.dvr
org.ocap.shared.dvr.navigation
org.ocap.shared.media

Appendix V (Informative)

MHP 1.2 specific additional APIs

org.dvb.application.inner
org.dvb.application.privileged
org.dvb.application.plugins
org.dvb.application.storage
org.dvb.auth.callback
org.dvb.dom.bootstrap
org.dvb.dom.css
org.dvb.dom.dvbhtml
org.dvb.dom.environment
org.dvb.dom.event
org.dvb.dom.inner
org.dvb.internet
org.dvb.smartcard
org.dvb.spi
org.dvb.tvanytime
org.dvb.xml
org.w3c.dom
org.w3c.dom.events
org.w3c.dom.views

Appendix VI (Informative)

ACAP specific additional APIs

org.atsc.dom
org.atsc.dom.environment
org.atsc.dom.events
org.atsc.dom.events
org.atsc.dom.html
org.atsc.dom.views
org.atsc.si
org.ocap.media
org.ocap.net
org.ocap.si
org.ocap.ui.event
org.ocap.application
org.ocap.event
org.ocap.service
org.ocap.system
org.ocap.hardware.pod
org.w3c.dom
org.w3c.dom.css
org.w3c.dom.events
org.w3c.dom.html2
org.w3c.dom.views

Appendix VII (Informative)

Ginga-J specific additional APIs

br.org.sbtvd.bridge
br.org.sbtvd.net
br.org.sbtvd.net.si
br.org.sbtvd.net.tuning
br.org.sbtvd.ui
com.sun.net.ssl
javax.net
javax.net.ssl
javax.security.cert
javax.crypto
javax.crypto.interface
javax.crypto.spec
javax.microedition.apdu

Appendix VIII (Informative)

Migration from MHEG-5 to MHP

The process of migration may be assisted by modification and/or addition to a harmonized specification. By way of example, additional functionalities to migrate from MHEG-5 to DVB-MHP are given below:

1. Extend the graphics APIs to support drawing lines thicker than 1 pixel for all primitives. This could be implemented by extending the underlying PersonalJava specification or by making DVB-specific extensions.
2. Add 14:9 font support to the DVBTxtLayoutManager. If this is not feasible, then it may be possible to use a defensive solution of 16:9 for all display types. This would distort the font (by compressing it horizontally) but would ensure the expected text flow.
However, the logical widths calculated when using this aspect ratio would be different, resulting in the line breaks being inserted at different points in the body of text. More importantly, anything other than very basic formatted text (relying on tabulation) would have a slim chance of being rendered correctly.
3. Add VK_CANCEL to the set of minimum supported key events.

4. Synchronize the character repertoire to MHEG repertoire specified in ETSI ES 202 184.
 5. Provide CI AppMMI extensions; the ability for an interoperable plug-in to register itself as a handler for specific application domains, and the ability to operate a data pipe to the source module.
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