International Telecommunication Union

ITU-R
Radiocommunication Sector of ITU

Recommendation ITU-R BT.1889
(03/2011)

Common application environment for interactive digital broadcasting services

BT Series

Broadcasting service
(television)

Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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Series	**Title**
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RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

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

RECOMMENDATION ITU-R BT.1889[1]

Common application environment for interactive digital broadcasting services

(Question ITU-R 131/6)

(2011)

Scope

This Recommendation specifies a common application environment to be used for interactive digital broadcasting services.

The ITU Radiocommunication Assembly,

considering

a)   the need to avoid protocols proliferating 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 have been developed that comprise video, audio, still picture, text, graphics, etc. associated with interactive features;

d)   that multimedia applications planned or deployed in some regions are using the executable application environment as described in Recommendation ITU-R BT.1722;

e)   that multimedia applications planned or deployed in some regions are using the declarative application environment as described in Recommendation ITU-R BT.1699;

f)   that Recommendation ITU-T J.200 defines the worldwide common core of application environment for digital interactive television services;

g)   that the ITU-R and ITU-T Sectors are continuously working and reviewing Application Programming Interfaces (APIs);

h)   that common application environment for interactive TV applications is desirable for production and international exchange of multimedia content,

recommends

1   that Recommendation ITU-T J.200 should be used as the application environment for interactive digital broadcasting services.

NOTE 1 – Appendix of this Recommendation summarizes Recommendation ITU-T J.200 for information.

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[1]   This Recommendation should be brought to the attention of ITU-T Study Group 9.

Appendix
(Informative)

Summary of Recommendation ITU-T J.200

1   Overview

Recommendation ITU-T J.200 – Worldwide common core – Application environment for digital interactive television services, consists of basic architecture of the environment, structure of execution engine, and structure of presentation engine.

2   Abbreviations

API	Application programming interface
BML	Broadcast markup language
CA	Conditional access
CSS	Cascading style sheet
DOM	Document object model
GUI	Graphical user interface
HTML	Hyper text markup language
JMF	Java media framework
LWUIT	Light-weight user interface toolkit
MHEG	Multimedia and hypermedia expert group
MIME	Multipurpose internet mail extensions
NCL	Nested context language
UI	User interface or user interaction
XHTML	Extensible hyper text markup language
XML	Extensible markup language

3   Basic architecture

The high-level architecture of APIs and middleware for digital interactive TV can be regarded as essentially comprising two components: the execution engine and the presentation engine. However, these two components are not necessarily independent; appropriate bridges may be defined. In addition to the basic components, there will be other native applications, or service-specific software and content, such as MHEG, as well as various proprietary formats.

Figure 1 shows the structure of the application environment. It identifies the relationship between the presentation engine and the execution engine.

FIGURE 1

**Application environment basic system architecture**
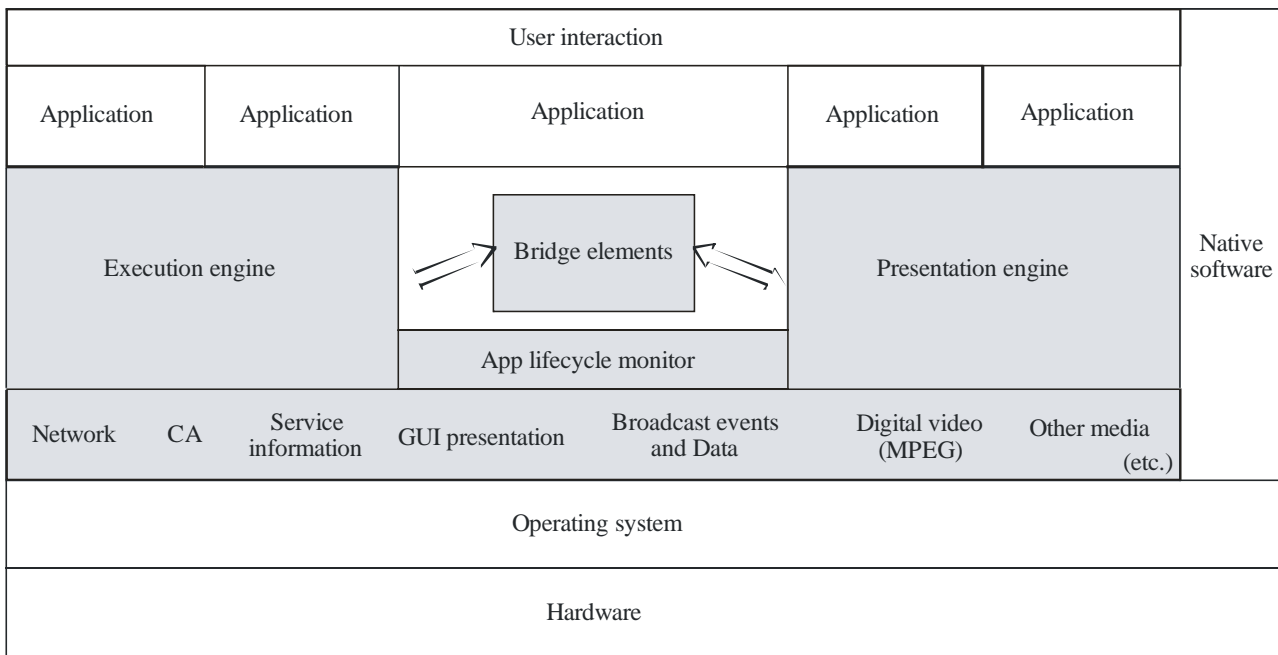
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1. Presentation engine/execution engine – These are major components to handle interactive TV applications and are both required. The presentation engine handles declarative TV applications such as HTML and BML content. The execution engine is a processor that executes interactive TV applications. It is recognized that, in some cases, one or the other has been implemented individually. However, to achieve full harmonization and worldwide interoperability of applications, both execution engine and presentation engine are required.

2. Bridge elements – This is a mechanism for applications that allows bidirectional mapping between the execution engine and presentation engine.

3. App lifecycle monitor – This controlling software is expressed differently in each specification. It can appear as a full-fledged application or just a simple OS monitor to control the state of the software. The general functionality is to manage applications over its entire life cycle, including initiation, termination, and control.

4. Applications – In some systems these applications can be limited to service-bound applications or unbounded applications. These applications can be written either to the presentation, the execution, or both.

5. User interaction – This is the input layer into remote control, keyboards, and other controllers.

6. Other media – This media includes streaming media such as audio and data feeds or monomedia such as static images and text.

7. Native software – This is software that is either legacy software or software written using additional APIs and functionality outside the specified application environment.

4   Execution engine

Figure 2 shows the structure of the execution engine and indicates the origin of the various elements.

FIGURE 2

Structure of execution engine
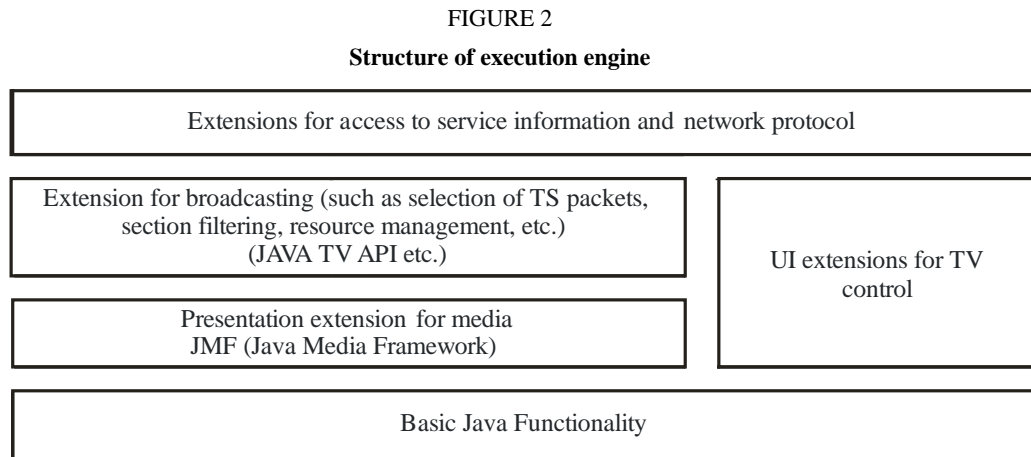
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Key standards that should be supported by the execution engine are:

1.   Basic Java Functionality – This APIs consists of the personal basis profile, foundation profile and connected device configuration.

2.   Extensions for Broadcasting – This API consists of the javax.tv.* packages as specified by Sun Microsystems in the JavaTV specification plus additional broadcasting functionalities such as section filtering, transport stream tuning, resource management, and return channel connectivity management (e.g. DAVIC or Ginga-J).

3.   Presentation extension for media – This API consists of the javax.media.* packages by Sun Microsystems.

4.   UI extensions for TV – This API provides TV specific functionality for presentation and user interaction e.g. HAVi UI API or LWUIT.

5.   Extensions for access to service information and network protocol (e.g. relevant APIs defined in DVB-MHP, OCAP, ACAP, ARIB STD-B23, GINGA-J).

5   Presentation engine

Figure 3 shows the structure of the presentation engine and indicates the origin of the various elements.

FIGURE 3

Structure of presentation engine

Scripting language (ECMAScript, Lua …)	Document style (CSS, …)	Document interface (DOM, language specific …)	Markup language (HTML, BML, NCL …)
TV extensions			
User agent (browser)			
Declarative glue language (optional)			
XML parser			
Receiver functionality	Digital video (MPEG)	Monomedia	Network

BT.1889-03

The key standards that should be supported by the presentation engine are as follows:

1. Markup language such as HTML, BML and NCL Common modules defined in XHTML Modularization and/or HTML as defined by W3C.

2. CSS style sheet to describe presentation style as defined by W3C.

3. DOM APIs to dynamically change the contents of HTML or XHTML documents as defined by W3C.

4. Scripting language.

5. NCL as declarative glue language.

6. TV Specific Extensions and additional APIs and DOM Objects for handling signalling, triggers, protocols, and MIME types specific to TV receivers and receiver-specific functions.

7. Standard media types such as image/jpg, image/png, audio/basic and TV specific media types such as video/mpeg as defined by ISO.

8. XML parser as defined by W3C.