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Foreword

This Technical Specification (TS) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECTrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

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Modal verbs terminology

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1 Scope

The present document specifies a platform, based on the existing HbbTV[®] specification ETSI TS 102 796 [1], that supports the signalling, transport and presentation of an operator application. The operator application is able to replace some of the terminal's user interface. The extent to which the terminal user interface is replaced by an operator application depends on the type of the operator application and the business models of the operator and manufacturer. The present document assumes the presence of an agreement between an operator and the device manufacturer. Operator applications will not run in the absence of such an agreement. Topics that could or need to be covered by such a bilateral agreement are listed in annex D.

The present document makes use of functionalities described in ETSI TS 102 796 [1] which is describing a platform for signalling, transport, and presentation of enhanced and interactive applications intended for running on hybrid terminals that include both a DVB compliant broadcast connection and a broadband connection to the Internet. The usage of a hybrid terminal for IPTV delivered audio-visual content is described in "IP-delivered Broadcast Channels and Related Signalling of HbbTV Applications" [i.4].

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 102 796: "Hybrid Broadcast Broadband TV".

NOTE: The present document is not suitable to be used with versions before 1.4.1.

[2] Open IPTV Forum Release 2 specification, volume 5 (V2.3): "Declarative Application Environment".

NOTE: Available at <http://www.oipf.tv/specifications>.

[3] ETSI TS 102 809: "Digital Video Broadcasting (DVB); Signalling and carriage of interactive applications and services in Hybrid broadcast/broadband environments".

[4] ETSI TS 102 851: "Digital Video Broadcasting (DVB); Uniform Resource Identifiers (URI) for DVB Systems".

[5] CI Plus[™] specification (V1.3.2) (2015-03): "Content Security Extensions to the Common Interface".

NOTE: Available from: http://www.ci-plus.com/data/ci-plus_specification_v1.3.2.pdf.

[6] IETF RFC 2782: "A DNS RR for specifying the location of services (DNS SRV)".

[7] ETSI TS 103 205: "Digital Video Broadcasting (DVB); Extensions to the CI Plus[™] Specification".

[8] W3C Recommendation "Web Notifications", 22 October 2015.

NOTE: Available at <https://www.w3.org/TR/notifications/>.

[9] ISO/IEC 21320-1 (2015-10-15): "Information Technology - Document Container File".

NOTE: Available at: http://standards.iso.org/ittf/PubliclyAvailableStandards/c060101_ISO_IEC_21320-1_2015.zip.

[10] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".

[11] IETF RFC 5280: "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile".

[12] IETF RFC 5652: "Cryptographic Message Syntax (CMS)".

[13] IETF RFC 4055: "Additional Algorithms and Identifiers for RSA Cryptography for use in the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile".

[14] ETSI EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".

[15] Open IPTV Forum Release 2 specification, volume 7 (V2.3): "Authentication, Content Protection and Service Protection".

NOTE: Available at <http://www.oipf.tv/specifications>.

[16] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

[17] IETF RFC 4501: "Domain Name System Uniform Resource Identifiers".

[18] IETF RFC 3447: "Public-Key Cryptography Standards (PKCS) #1: RSA Cryptography Specifications Version 2.1".

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI TS 103 464: "Hybrid Broadcast Broadband TV Application Discovery over Broadband".

[i.2] Open IPTV Forum Release 2.3 specification volume 5a (V2.3): "Web Standards TV Profile".

[i.3] W3C Candidate Recommendation: "Secure Contexts".

[i.4] HbbTV®: "IP-delivered Broadcast Channels and Related Signalling of HbbTV Applications".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

bilateral agreement: agreement between a terminal manufacturer and an operator defining commercial, operational, technical and user interface arrangements for the use of an operator application

broadband: bi-directional IP connection with sufficient bandwidth for streaming or downloading A/V content

broadcast: uni-directional MPEG-2 transport stream based broadcast using DVB technologies

companion screen device: device (not another HbbTV[®] terminal) that can run applications that in turn link to or work with an HbbTV[®] terminal or HbbTV[®] application

NOTE: Such a device can be for example a mobile phone or a tablet.

hybrid terminal: terminal supporting delivery of A/V content both via broadband and broadcast

operator: entity that aggregates a set of channels and offers them to the user

operator application: application from an operator that takes over some of the user interface of the terminal

operator-specific operator application: operator application that is installed on a terminal and that, when it is active, provides most of the terminal's user interfaces

NOTE: This type of operator applications is intended for set-top-boxes where the manufacturer provides little or no user interface except perhaps for the basic device setup and installation.

privileged operator application: operator application that is installed on a terminal, can be activated by the user and, when it is active, replaces some of the terminal's user interface

NOTE: This type of operator applications is intended for TV sets.

regular HbbTV[®] application: HbbTV[®] application that uses the features defined in ETSI TS 102 796 [1] and nothing from the present document except for features specifically identified as being available to regular HbbTV[®] applications

NOTE: An example of a feature in the present document that is specifically identified as being available to regular HbbTV[®] applications is `Configuration.runningOperatorApplication`.

standard operator application: application providing operator functionality using only the features defined in ETSI TS 102 796 [1]

NOTE: A standard operator application is also a regular HbbTV[®] application.

terminal: HbbTV[®] terminal (as defined in ETSI TS 102 796 [1]) which also supports the detection, installation and execution of operator applications as defined in the present document

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AIT	Application Information Table
APDU	Application Protocol Data Unit
API	Application Programme Interface
A/V	Audio/Video
ASCII	American Standard Code for Information Interchange
BAT	Bouquet Association Table
CA	Certificate Authority
CSP	Content and Service Protection
CMS	Cryptographic Message Syntax
CI	Common Interface
CICAM	Common Interface Conditional Access Module
CRL	Certificate Revocation List
DAE	Declarative Application Environment
DASH	Dynamic Adaptive Streaming over HTTP
DER	Distinguished Encoding Rules
DNS	Domain Name Service
DOM	Document Object Model
DRM	Digital Rights Management
DSM-CC	Digital Storage Media - Command and Control
DVB	Digital Video Broadcasting
DVB-SI	Digital Video Broadcasting - Service Information
DVB-C	Digital Video Broadcasting - Cable

DVB-S	Digital Video Broadcasting - Satellite
EPG	Electronic Programme Guide
FDP	File Delivery Protocol
FQDN	Fully Qualified Domain Name
HDMI	High Definition Multimedia Interface
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol - Secure
IP	Internet Protocol
IPTV	Internet Protocol TeleVision
MMI	Man Machine Interface
MPEG	Motion Picture Experts Group
NIT	Network Information Table
OIPF	Open IPTV Forum
PVR	Personal Video Recorder
PKI	Public Key Infrastructure
RF	Radio Frequency
RSA	Rivest, Shamir and Adleman
SAS	Specific Application Support
SDT	Service Description Table
SRV	Service Record
TLS	Transport Layer Security
TV	TeleVision
TXT	Teletext
UI	User Interface
URI	Uniform Resource Identifier
VoD	Video on Demand
XML	eXtensible Markup Language

4 Overview

4.1 Operator applications (informative)

4.1.1 Scope and motivation

Operator applications replace parts or all of the user interface that is otherwise provided by the Terminal. Typically, this includes UI elements of TV watching mode (e.g. channel info banner and channel selection) and the electronic program guide (EPG).

Using operator applications allows for:

- Implementation of a homogenous user experience over all services of the operator.
- Integration of the operator's enhanced services with the basic UI elements.
- Branding of all UI elements.
- Update and extension of the operator's UI without the need of an update of the system software.

The actual set of UI elements provided by a specific operator application depends on its type and on the product design of manufacturer and operator.

4.1.2 Types of operator applications

There are three types of operator applications as shown in table 1.

Table 1: Types of Operator Applications

Standard	Standard operator applications are HbbTV® applications as defined in ETSI TS 102 796 [1]. They do not replace UI elements of the terminal but may provide alternatives to some of them. The present document does not define any technical extensions for standard operator applications.
Privileged	Privileged operator applications are installed on a terminal. When active, they replace some of the user interface of the terminal. Privileged operator applications are intended for TV sets.
Operator-specific	Operator-specific operator applications are installed on a terminal. When active, they replace virtually all of the user interface of the terminal. Operator-specific operator applications are intended for set-top-boxes where the manufacturer provides little or no user interface.

A terminal may provide support for only privileged operator applications or only operator-specific operator applications or both.

4.1.3 Standard operator applications

4.1.3.1 Introduction

To a certain degree it is possible to use regular HbbTV® applications to implement typical features provided by an operator. Such applications (referred to as standard operator applications) are usually broadcast-related, and they are signalled on all channels of the operator. The following clauses describe the user experience of standard operator applications compared to actual operator applications as defined in the present document (i.e. privileged and operator-specific operator applications).

4.1.3.2 Features of standard operator applications

Standard operator applications cannot replace UI elements of the terminal but may provide alternatives to some of them such as:

- EPG.
- Channel list.
- List of other applications of the operator.
- Promotion of the operator and its content.

4.1.3.3 Design policy for standard operator applications

The design of a standard operator application is solely under the responsibility of the operator.

4.1.3.4 TV channels

A standard operator application is usually only available on channels of the operator. As soon as the user selects a channel that is not offered by the operator, the standard operator application is terminated.

The user may set up a favourite channel list including all channels of the operator. In that case, zapping through the favourite channel list would not change the user experience.

Furthermore, all partners in a network may agree that a standard operator application is allowed to run on all channels of the network.

4.1.3.5 Activating and launching of standard operator applications

It is neither possible nor required for the user to activate a standard operator application before it is actually launched.

The operator and the broadcaster decide how the operator's standard operator application is launched. It may be one of the following:

- The operator application is launched automatically as soon as a channel of the operator has been selected (i.e. the operator application is the autostart application).
- The operator application can be launched by pressing the TXT button of the remote control (i.e. the operator application is signalled as Digital Teletext application).
- The operator application can be launched from an autostart application by pressing a dedicated button on the remote control (e.g. the "green" button).

4.1.3.6 User input for standard operator applications

Standard operator applications can only use key events of buttons as defined for regular HbbTV® applications.

4.1.4 Privileged operator applications

A privileged operator application replaces some parts of the user interface of the terminal. Typically, that includes content related UI elements in TV watching mode such as:

- Channel info banner.
- Channel selection:
 - Channel list.
 - Channel number input.
 - Zapping.
- Component selection:
 - Audio stream selection.
 - Subtitle stream selection.
- Parental control for broadcast content.
- Timeshift control.
- Recording in TV watching mode.
- Messages in regards to programming (e.g. Reminders or Recordings).

It may also include general UI elements in TV watching mode:

- Volume control banner.
- System messages (e.g. "Signal lost", "Upgrade available", "Channel list updated" etc.).
- CA and DRM messages.
- CICAM MMI.

Furthermore, a privileged operator application may replace the UI of the following other embedded applications:

- EPG.
- PVR archive/Media library.