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Digital Video Broadcasting (DVB); Content Protection and Copy Management (DVB-CPCM); Part 14: CPCM Extensions

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Contents

Intellectual Property Rights 4
Foreword 4
Introduction 4
1 Scope 5
2 References 5
2.1 Normative references 5
2.2 Informative references 5
3 Definitions and abbreviations 5
3.1 Definitions 5
3.2 Abbreviations 5
4 Introduction 6
5 Interoperability 6
6 Play Count Extension 6
6.1 Play Count Extension definition 6
6.2 Play Count Data element 7
6.3 Play Count protocols 7
6.4 Content Management 8
6.4.1 USI setting 8
6.4.2 Device and Content Discovery 8
6.4.3 CPCM Functional Entity Behaviour 8
6.4.4 USI Enforcement 8
6.4.4.1 Controls prior to content transfer 8
6.4.4.2 Controls to be enforced when receiving content 9
6.5 Move Protocol 9
6.6 Content Licence Management 10
6.6.1 Content Licence Generation 10
6.6.2 Content Licence Verification 10
6.6.3 Content Licence Protection 10
History 12

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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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The Digital Video Broadcasting Project (DVB) is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulatory bodies, content owners and others committed to designing global standards for the delivery of digital television and data services. DVB fosters market driven solutions that meet the needs and economic circumstances of broadcast industry stakeholders and consumers. DVB standards cover all aspects of digital television from transmission through interfacing, conditional access and interactivity for digital video, audio and data. The consortium came together in 1993 to provide global standardisation, interoperability and future proof specifications.

The present document is part 14 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Introduction

CPCM is a system for Content Protection & Copy Management of commercial digital content delivered to consumer products. CPCM manages content usage from acquisition into the CPCM system until final Consumption, or Export from the CPCM system, in accordance with the particular usage rules of that content. Possible sources for commercial digital content include broadcast (e.g., cable, satellite, and terrestrial), Internet-based services, packaged media, and mobile services, among others. CPCM is intended for use in protecting all types of content - audio, video and associated applications and data. CPCM specifications facilitate interoperability of such content after acquisition into CPCM by networked consumer devices for both home networking and remote access.

This first phase of the specification addresses CPCM for digital Content encoded and transported by linear transport systems in accordance with TS 101 154 [i.1]. A later second phase will address CPCM for Content encoded and transported by systems that are based upon Internet Protocols in accordance with TS 102 005 [i.2].

1 Scope

The present document is the specification of the Digital Video Broadcasting (DVB) Content Protection and Copy Management (CPCM) Extensions. It contains the normative specifications of each standardized Extension to CPCM.

2 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.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

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

[1] ETSI TS 102 825-1: "Digital Video Broadcasting (DVB); Content Protection and Copy Management (DVB-CPCM); Part 1: CPCM Abbreviations, Definitions and Terms".

[2] ETSI TS 102 825-4: "Digital Video Broadcasting (DVB); Content Protection and Copy Management (DVB-CPCM); Part 4: CPCM System Specification".

2.2 Informative references

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 101 154: "Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream".

[i.2] ETSI TS 102 005: "Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in DVB services delivered directly over IP protocols".

[i.3] ETSI TR 102 825-12: " Digital Video Broadcasting (DVB); Content Protection and Copy Management (DVB-CPCM); Part 12: CPCM Implementation Guidelines

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 102 825-1 [1] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TS 102 825-1 [1] apply.

4 Introduction

The CPCM System provides an interoperability platform and common trusted destination for commercial content in the consumer environment. CPCM is a flexible system that can be extended both in a standard way and in a proprietary way.

The present document describes CPCM Extensions standardised by DVB together with corresponding extension elements or protocols.

Currently, the following standardised CPCM Extensions are defined:

- Play Count extension

Other CPCM Extensions may be defined in a next release of the present document.

EXAMPLE: This may happen when an extension is developed after the completion of the Rule Set of a specific C&R Regime.

5 Interoperability

A CPCM Extension implementation is optional.

A CPCM Instance receiving a CPCM message as described in TS 102 825-4 [2] shall ignore any element relative to an extension it does not contain and shall thus behave as if the extension element was not present. It shall ignore any message dedicated to an extension, such as `CPCM_extension_message` or `CPCM_private_data_message`, but may reply with the appropriate error message as defined in TS 102 825-4 [2]. However, it shall not remove any element relative to an Extension from the Auxiliary Data.

Table 1 gives the CPCM Extension Identifiers for CPCM Extensions defined in this specification. Other identifiers are reserved.

Table 1: CPCM Extension Identifiers

CPCM Extension Name	CPCM Extension Identifier
Play Count	0x0001

6 Play Count Extension

6.1 Play Count Extension definition

The purpose of this extension is to limit the number of consecutive plays of a given content item.

If USI SVCA is not asserted, any number of simultaneous plays is allowed. If SVCA is asserted, the number of granted permissions in SVCA determines the maximum number of simultaneous viewings that constitutes one play. This also applies to stored CPCM content.

EXAMPLE: If SVCA is 2,5 concurrent viewings will be considered as 3 plays.

The definition of what constitutes one play is out of the scope of the present document and left to CPCM C&R Regimes to determine.

6.2 Play Count Data element

Play count extension makes use of one extension data element `CPCM_play_count_data_element`. This, data element is composed of two fields: `CPCM_play_limit` and `CPCM_play_remaining`.

`CPCM_play_limit` is an 8-bit integer that, when inserted in a CPCM Auxiliary Data relative to a CPCM Content Licence, gives the original play count for the associated Content Item.

`CPCM_play_remaining` is an 8-bit integer that, when inserted in a CPCM Auxiliary Data relative to a CPCM Content Licence, gives the remaining play count for the associated Content Item. Alternatively, when used in the Move protocol, `CPCM_play_remaining` expresses the number of plays that are being moved to the other device, as described in clause 6.4.5.

EXAMPLE: The system is able to inform the user that they still have 3 plays remaining out of the original 5 using the two extensions data elements.

Play count data extension does not use any other extension data element.

The format of `CPCM_play_count_data_element` is shown in Table 2.

Table 2: CPCM Content Licence Identifier

Syntax	Bits	Identifier
`CPCM_play_count_data_element(){`		
`  CPCM_play_limit`	8	uimsbf
`  CPCM_play_remaining`	8	uimsbf
`}`		

Semantics for CPCM_content_licence_identifier:

CPCM_play_limit: This field indicates the original play count for the associated content item.

CPCM_play_remaining: This field indicates the remaining or the requested play count for the associated content item.

6.3 Play Count protocols

There are no protocols specific to the play count Extension.

Play count extension affects the Move protocol. This protocol can be used to move content with a partial amount of the outstanding authorised plays to another Storage Entity.

To that end, play count data element shall be inserted in the optional part, as described in TS 102 825-4 [2] of the following messages:

- *CPCM Content Licence Move Invite*: In this message, `CPCM_play_remaining` field in the `CPCM_play_count_data_element` which is inserted in the message extension indicates the number of plays that are invited to be moved. If this number is greater than the outstanding counts, all the counts will be moved.
- *CPCM Content Licence Move Begin*: In this message `CPCM_play_remaining` field in the `CPCM_play_count_data_element` which is inserted in the message extension indicates the number of plays that are proposed to be moved.
- *CPCM Content Licence Move Request:* In this message `CPCM_play_remaining` field in the `CPCM_play_count_data_element` which is inserted in the message extension indicates the number of plays that are eventually requested.

If all the outstanding play counts are to be moved, there is no need to use the Play Count Extension element in the above messages since the relevant information is already included in the content licence that is to be moved.

Play Count extension shall be added also in the following message:

- *CPCM Instance Enquiry Response message*: If the Instance implements the Play Count extension, it shall insert in the conditional part of the message CPCM Extension element with no data.

- *CPCM Discovery Response message*: If the Instance implements the Play Count extension, it shall insert in the conditional part of the message CPCM Extension element with no data.

Play Count Extension Element shall be ignored when inserted in any other messages.

6.4 Content Management

6.4.1 USI setting

The Play Count extension may be used in conjunction with any USI settings. However, when used with the following USI, the Play Count extension can no more be enforced:

- If Copy Control Information is set to Copy Control Not Asserted, any number of copies may be made by any CPCM Instance, including a CPCM Instance that does not implement the Extension. Consequently, the number of authorised plays can no longer be effectively controlled.
- If Copy Control Information is set to Copy Never, the content cannot be stored. Thus, the play count is equivalent to SVCA control and not useful.
- If Viewable is asserted, any Consumption Point, including an Instance that does not implement the Extension, shall be able to play the content, if authorised by the USI. Thus, the count control cannot be accurate.

The assumption in this specification is that Play Count restricted content is always used with Viewable not asserted and with CCI set to "Copy Once" at the Acquisition Point or "Copy No More" after the first recording.

6.4.2 Device and Content Discovery

The presence of Play Count Extension in Auxiliary Data shall be signalled with other present Auxiliary Data.

In addition to advertising the content as "Not Viewable" with "Copy Once" or with "Copy No More", as described in clause 6.4.1, and play count extension, Storage Entities and Acquisition Points shall also advertise the content as "Viewable" with "Copy No More" to enable interoperability with Instances that do not implement the Extension. .A CPCM Instance implementing the Play Count Extension shall signal it in *CPCM Enquiry Response* and *CPCM Discovery Response* messages.

6.4.3 CPCM Functional Entity Behaviour

A CPCM Instance that does not support this extension shall ignore it and enforce the USI as if the Extension was not present.

Only CPCM Acquisition Points and Storage Entities shall adopt a specific behaviour with regard to Play Count Extension. This specific behaviour concerns the USI enforcement step, as described in clause 6.4.4.

6.4.4 USI Enforcement

6.4.4.1 Controls prior to content transfer

All the controls related to the USI setting shall be performed with exception to the "Viewable" USI that can be sourced to Consumption Points or Export Point under the conditions described below.

The behaviour described below regards only Acquisition Points or Storage Entities implementing the Extension. All other Acquisition Point and Storage Entities shall enforce USI as described in TS 102 825-4 [2].

Play Count restricted content, sourced by an Acquisition Point or a Storage Entity, which may be through a Processing Entity, shall be sourced as "Viewable" and "Copy No More" content, if the `CPCM_play_remaining` is greater than zero. In such a case, the Acquisition Point or the Storage Entity shall decrement the value of `CPCM_play_remaining` in the CPCM Content Licence by one.

NOTE 1: A CPCM C&R regime may authorise an Instance to revert to the previous Licence if the criteria that one play was actually made are not fulfilled.

EXAMPLE: If only a few seconds of the content were played, the status of the associated Content Item may be known using CPCM content item status protocol described in TS 102 825-4 [2].

An Acquisition Point may source Play Count restricted content to only one Storage Entity as "Copy Once" Content.

A Storage Entity may send Play Count restricted content to another Storage Entity for the purpose of making a copy only through the Move protocol.

An Acquisition Point that sources content to a Consumption Point or an Export Point, which may be through a Processing Entity, shall update correspondingly `CPCM_play_remaining` in the extension before sourcing to a Storage Entity. It may generate several Content Licences sourced to different Storage Entities as long as the total of `CPCM_play_remaining` fields in the different Content Licences matches the actual remaining play count.

If SVCA is also asserted only one Play shall be counted as long as the number of granted permissions is lower or equal to the value of `simultaneous_view_count`. Upon receipt of a permission request when the number of granted permissions is equal to `simultaneous_view_count`, the CPCM Instance verifies the status of each CPCM Instance to which a permission was granted using the same protocol as described in TS 102 825-4 [2]. If the number of positive answers that are received is lower than the granted permissions, it behaves as described in TS 102 825-4 [2]. Else, if the number of outstanding play count is zero, it denies the permission. Else, the permission is granted and the number of outstanding Play Count is decremented by one.

The same controls shall be applied each time the number of granted permissions equals a multiple of `simultaneous_view_count` and play count data element is greater than zero.

If the C&R regime allows a grace period before decrementing the play count data element, the source CPCM Instance shall run the protocol to verify the status of each CPCM Instance to which permission was granted before this grace expires. If the number of positive answers is below the relevant multiple of `simultaneous_view_count`, the play count will not be decremented.

NOTE 2: Security control implementations need to make sure that it is not possible to restore to the device a duplicate Content Licence which was made before a Play occurred. The CPCM Implementation Guidelines, TR 102 825-12 [i.3], give examples on how to prevent this.

6.4.4.2 Controls to be enforced when receiving content

All the controls related to the other USI setting shall be performed. There is no specific control related to Play Count extension.

6.5 Move Protocol

Before starting the Move protocol, the Source CPCM Instance checks whether the number of counts to be moved is lower than the remaining count. If not, or if this number was not given in the Move invitation, either from the peer CPCM Instance of from the user interface, it shall Move the entire count.

If all the remaining plays are to be moved, the Move protocol runs exactly the same way as described in TS 102 825-4 [2].

If only a partial number of `CPCM_play_remaining` is to be moved, the protocol runs the same way, with the following exceptions:

- `CPCM_play_count_data_element` with `CPCM_play_remaining` set to the number of counts to be moved shall be inserted in the messages *CPCM Content Licence Move Begin*, *CPCM Content Licence Move Request* and, if used, *CPCM Content Licence Move Invite*.
- The Security Control of the Source CPCM Instance creates two new Content Licences, one with the remaining play count and one with the "to be moved" count. This is performed just after disabling the previous Content Licence.
- Upon receipt of a *CL Movement request* message, Security Control sends the Content Licence with the "to be moved" count through a *`move_CL_response_message`*.
- Once informed that the Content Handling has received a *`move_CL_confirm_message`*, the Security Control erases the disabled Content Licence.

Content can be Moved, with partial or total play count, to a Storage Entity that does not implement the Play Count extension. The content will not be viewable from this Storage Entity but will be Movable, with the total count only, to a Storage Entity that implements the Extension using standard Move Protocol.

NOTE: If the Move occurs with a Storage Entity that already holds a Content Licence for the same Content, if allowed by the applicable C&R regime, an implementation may generate a new Content Licence with aggregated extension `CPCM_play_remaining`.

6.6 Content Licence Management

6.6.1 Content Licence Generation

Content Licence is generated as described in TS 102 825-4 [2]. A new CL shall be generated, with updated Auxiliary Data digest, each time a new play or a CL move with partial count occurs.

6.6.2 Content Licence Verification

Content Licence shall be verified as described in TS 102 825-4 [2].

6.6.3 Content Licence Protection

The Play Count Extension requires SAC/Device protection mode for the associated Content Licence.

The protection mode for Content Licence shall be chosen as described in TS 102 825-4 [2].

List of Tables

Table 1: CPCM Extension Identifiers 6

Table 2: CPCM Content Licence Identifier..... 7

History

Document history		
V1.1.1	February 2011	Publication