IEC 62297-1

Edition 1.0 2005-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Triggering messages for broadcast applications – Part 1: Format

Messages déclencheurs pour applications en radiodiffusion – Partie 1: Format

IEC 62297-1:2005

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX S

ICS 33.170

ISBN 978-2-88912-720-7

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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International Standard IEC 62297-1 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

This bilingual version corresponds to the monolingual English version, published in 2005-05.

The text of this standard is based on the following documents:

FDIS	Report on voting
100/910/FDIS	100/949/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 62297 consists of the following parts, under the general title *Triggering messages for broadcast applications:*

Part 1: Format

Part 2: Transport methods

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date.indicated on the IEC web site under http://webstore.iec.ch in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
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INTRODUCTION

Emerging data broadcasting specifications allow a service provider to **trigger** an **application** in a TV receiver. This International Standard specifies the format of a triggering message for TV broadcasting as based on the requirements defined in Annex A. Examples of possible use include displaying information to warn for severe weather conditions or to give rating advice for extreme content in TV programmes. In an interactive system, a message or icon might be displayed inviting on-line access to vote, to register an interest in an advertised product, or to browse programme-related content.

This standard describes a trigger mechanism for teletext transmission methods. The trigger mechanism can also be used for services broadcast via MPEG-2 DSM-CC sections. For the purposes of this standard, a **trigger** is defined as information sent from a service provider as part of a data broadcasting transmission and intended to control an **application** in a TV receiver. Additional information can be supplied along with the basic **trigger** to allow filtering or prioritization techniques to be applied at the receiver. The transmission aspects of trigger messages are specified in IEC 62297-2.

This trigger mechanism is very similar to the one defined in IEC/PAS 62292. The difference lies primarily in different state models, semantics and attribute names.

TRIGGERING MESSAGES FOR BROADCAST APPLICATIONS –

Part 1: Format

1 Scope

This part of IEC 62297 specifies an application-triggering scheme for TV broadcasting information sent from a service provider as part of a data broadcasting transmission and intended to control an **application** in a receiver.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8859-1, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

ETSI TS 101 231, *Television systems; Register of Country and Network Identification (CNI), Video Programming System (VPS) codes and Application codes for Teletext based systems*

ETSI EN 300 706, *Enhanced Teletext Specification*

3 Terms, definitions and abbreviations

3.1 Definitions

For the purposes of this document, the following terms and definitions, in singular or plural form, apply.

3.1.1
ActiveTimeValue
member of the **ApplicationObject**. The value decrements at video frame rate. It is updated on every reception of an **event message**.

3.1.2
Application
software running on a receiver that is addressed by the URL of a **trigger message** and providing the following modes of operation:

a) the display of information, the playback of sound, the download of data;

b) the initiation of any action.

Application examples include the display of a simple text message sent as part of the trigger message, the display of a Teletext, Superteletext (TeleWeb [Tw]) or Internet page, information from an Electronic Programme Guide (EPG), electronic voting, an emergency alert

3.1.3
ApplicationObject
object storing the information about an **application** started or modified by triggers referencing the same URL

3.1.4
Attribute
member of an **ApplicationObject** or **TriggerObject** storing the information transported via an **attribute element**

3.1.5
attribute element
attribute name/value pair

3.1.6
attribute string
any sequence of characters with codes in the range 0×20 to 0×7E inclusive, excluding square brackets (0×5B and 0×5D)

3.1.7
charset
abbreviation for character set

3.1.8
CountdownValue
member of a **TriggerObject**. The value decrements at video frame rate. It is updated on every reception of a **trigger mes**

3.1.9
DateTime

date and time instance of UTC expressed in the form: *yyyymmdd*T*hhmmss*, where *yyyy* represents a year, *mm* represents a month (range 1–12), *dd* represents the day of the month (range 1–31), the capital letter 'T' separates the date component from the time component, *hh* represents an hour (range 0–23), *mm* represents the minutes (range 0–59) and *ss* represents the seconds (range 0–59)

3.1.10
Dummy URL
URL that does not reference any application or data and used in the mandatory URL field of a **trigger message** when the intention is to display only the trigger icon (together with its text) and not to control an application

3.1.11
event message
information extracted from a **trigger message** that is used to create an **ApplicationObject**

3.1.12
event start
event message with its 'script' **attribute element** set to 'start'

3.1.13
event stop
event message with its 'script' **attribute element** set to 'stop'

3.1.14
pending trigger
state where a trigger message has created a **TriggerObject** but the conditions to create an **ApplicationObject** have not yet occurred

3.1.15
priority filtering
rejecting a **trigger message** on account of the value assigned to its 'priority' **attribute element**

3.1.16
RelativeTime
time period measured in seconds and video frames

3.1.17
string
any sequence of characters with codes in the range 0×20 to 0×7E inclusive. Throughout this document **strings** are not case-sensitive unless otherwise indicated

3.1.18
trigger
signal sent from a service provider as part of a data broadcasting transmission with the intention to start or modify an application at a certain time

3.1.19
trigger character
character with a code in the range 0×20 to 0×7E inclusive

3.1.20
trigger del
trigger message with a 'delete' attribute element

3.1.21
trigger event
instant in time when a **trigger** fires and an **event message** is created

3.1.22
trigger mes
trigger message without a 'delete' attribute element

3.1.23
trigger message
information embedded in a **trigger** and intended to control an **application** in a receiver

3.1.24
TriggerObject
object storing the information from all the triggers referencing the same URL

3.1.25
trigger_text
descriptive part of a **trigger message**

3.1.26
URL string
any sequence of characters with codes in the range 0×20 to 0×7E inclusive, excluding angular brackets (0×3C and 0×3E)

3.2 Abbreviations

CNI Country and Network Identification

URL Uniform Resource Locator

UTC Coordinated Universal Time

VPS Video Programming System

4 Trigger message

4.1 General

4.1.1 Viewer interaction

The mechanism through which the viewer enables or disables trigger handling or sets priority threshold levels is at the receiver manufacturer's discretion.

The appearance of an icon and the viewer interaction when responding to it is also at the receiver manufacturer's discretion.

4.1.2 Priority ratings

Triggers labelled with the ‘emergency’ priority rating should always be processed, even if the viewer has disabled trigger handling. The ‘emergency’ priority shall only be used by service providers for genuine emergency situations. The set maker is allowed to provide the user with the ability to switch off this emergency priority.

4.1.3 Character coding

All characters used to code triggers are taken from the ISO 8859-1 character set and are in the range 0×20 to 0×7E inclusive. A character outside this range shall be encoded using the per cent character ('%') followed by the two-digit hexadecimal value of the character. The ‘%’ character itself is represented by the string ‘%25’. The character '[' is represented by %5B, the character ']' by %5D. The default character coding for all string attribute values is ISO 8859-1. The character coding for the name attribute can be changed with the charset attribute.

4.1.4 Future compatibility

To ensure future compatibility, a receiver should ignore data it does not understand, such as **attribute elements** not defined by this edition.

4.2 Life cycles

4.2.1 Trigger message and event message life cycle

Figure 1 describes the life-cycle **trigger message** and an **event message** referencing the same resource (URL). An incoming **trigger message** is acquired through the transport layer. The **priority filtering** process provides the opportunity to reject a **trigger message** on account of its 'priority' **attribute element**. However, it is not recommended to reject a **trigger message** with its 'priority' **attribute element** set to '0' (zero) as this value is reserved for emergency **trigger messages**.

The **Event message preparation** processes the filtered **trigger messages** and provides robustness to the **trigger** protocol when carried over a unidirectional transport layer where the reception of the information is not always guaranteed. Each **trigger message** carries a countdown value indicating the time delay before the **trigger** should fire. To aid robustness, the **trigger message** can be transmitted at intervals before the **trigger event**, each time with an updated countdown value. When the **trigger** fires, an **event message** is generated to the **application** referenced by the URL.

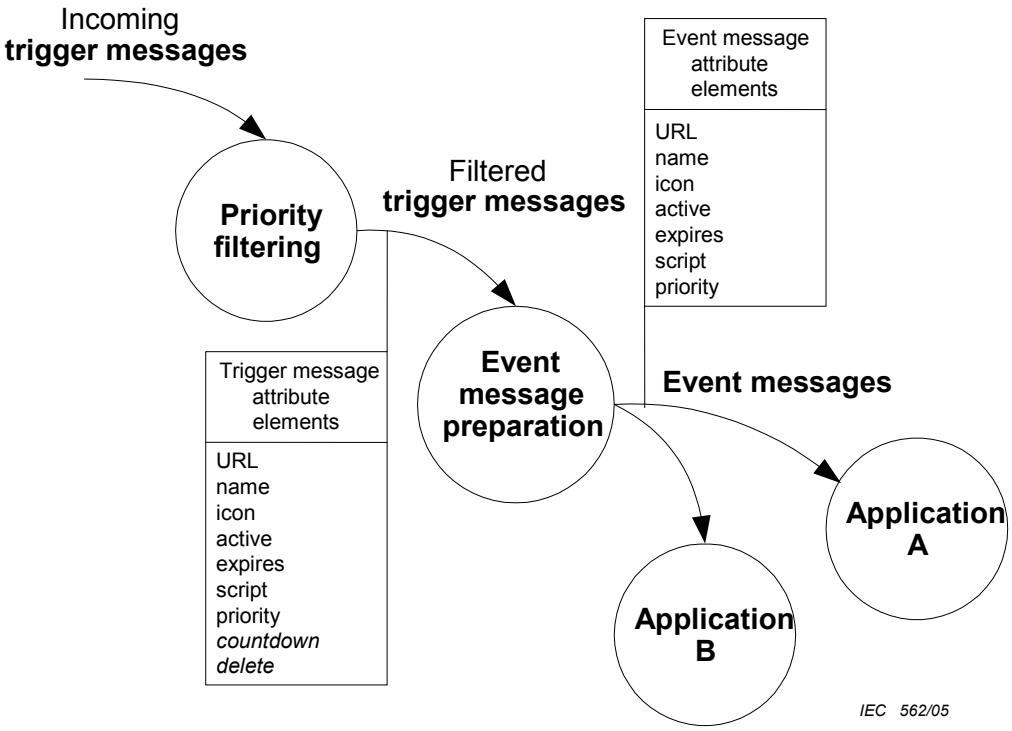
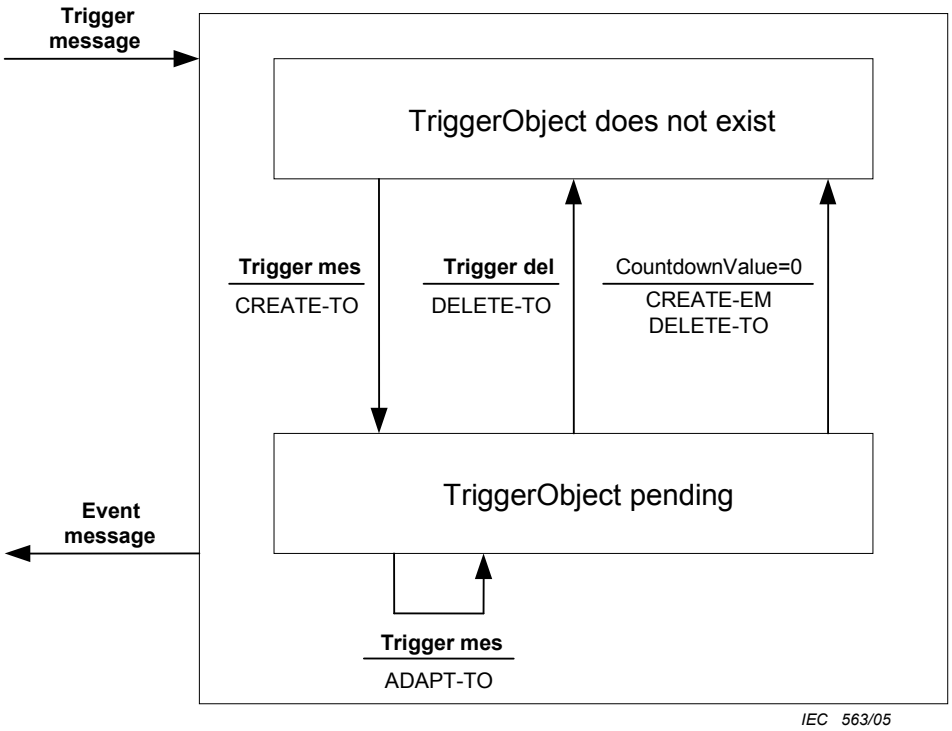


Figure 1 – Trigger messages and event messages life cycle

4.2.2 Event message preparation life cycle

Figure 2 describes the state transitions within the **event message preparation** process. The initial state of a **TriggerObject** is ‘TriggerObject does not exist’. On first reception of a **trigger message** without a 'delete' **attribute element**, a **TriggerObject** referencing the defined URL is created and the state becomes ‘TriggerObject pending’. The **attributes** of the **Trigger Object** are adapted on subsequent arrivals of **trigger messages** referencing the same URL.

If the **CountdownValue** equals zero, either explicitly or as a result of decrementing at frame rate a value received previously, an **event message** is signalled to the **application** referenced by the URL. The **event message** inherits the **attribute elements** of the original **trigger message**, excluding the 'delete' and 'countdown' **attribute elements**. After signalling the **event message** to the application, the **TriggerObject** is deleted.



Key

CREATE-TO	The creation of a **TriggerObject** referenced by the URL.
ADAPT-TO	The adaptation of a **TriggerObject** referenced by the URL.
DELETE-TO	The deletion of a **TriggerObject** referenced by the URL.
CREATE-EM	An **event message** is created and signalled to the **application**.
CountdownValue=0	The **CountdownValue** equals 0.

Figure 2 – TriggerObject life cycle

4.2.3 Application life cycle

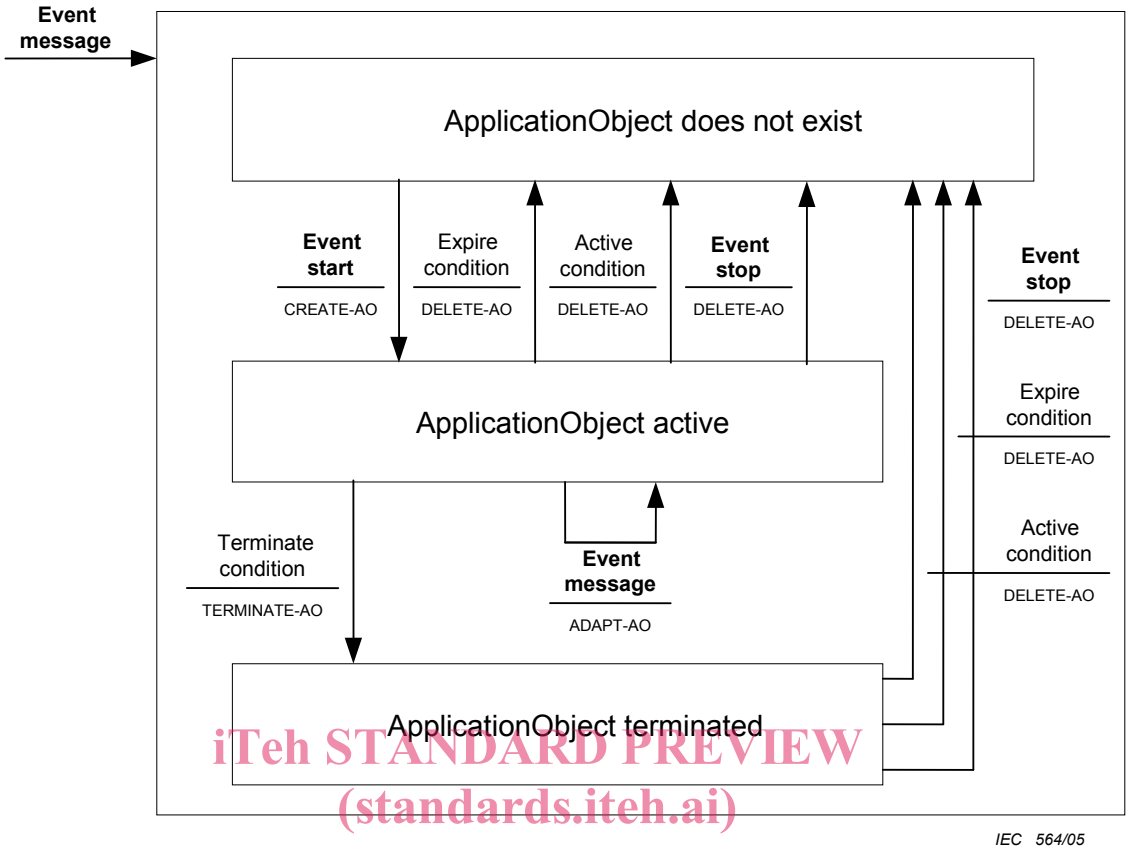
Figure 3 describes the state transitions within the **application** process. The initial state of an **ApplicationObject** is ‘ApplicationObject does not exist’. An **ApplicationObject** is created as a result of an **event start**. An icon is displayed before the application is started if the 'name' attribute element is defined.

On first reception of an **event start,** an **ApplicationObject** referencing the defined URL is created and the state becomes ‘ApplicationObject active’. The **attributes** of the **Application Object** are adapted on subsequent arrivals of **event messages** referencing the same URL.

An **ApplicationObject** is deleted on reception of an **event stop**, on reaching the (absolute) 'expires' time or when the (relative) 'active' time period has been completed.

If the viewer terminates the **application**, the state becomes ‘ApplicationObject terminated’. Once in this state, the **application** cannot be restarted until the **ApplicationObject** has been deleted. This adds robustness to the procedure and prevents the **application** restarting if the same **trigger** is repeated at a later time.

NOTE This is needed if the broadcaster wants to address viewers who join the programme later.



Key

Expire condition	The DateTime value from the 'expires' attribute element is greater than, or equal to, the current DateTime value. The two values should be compared at video frame rate. The 'expires' attribute element may be updated on every instance of an **event message** referencing the same URL.
Active condition	The ActiveTimeValue equals 0.
Terminate condition	The **ApplicationObject** is terminated due to viewer action or other reason.
CREATE-AO	Create the **ApplicationObject** referenced by the URL.
ADAPT-AO	Adapt the **ApplicationObject** referenced by the URL.
DELETE-AO	Delete the **ApplicationObject** referenced by the URL.
TERMINATE-AO	Terminate the **ApplicationObject** referenced by the URL.

Figure 3 – ApplicationObject life cycle

On the reception of an **event start** with a 'name' **attribute element** defined, an **Application Object** referencing the defined URL is created but the application itself is not run immediately. Instead, an icon defined by the 'name' **attribute element** is displayed. After the confirmation of the icon by the viewer, the **ApplicationObject** is fully started. The icon is removed if the **ApplicationObject** is deleted before a positive response from the viewer.

4.3 Syntax of trigger message

4.3.1 General

The syntax of a **trigger message** is shown in Table 1.

Table 1 – Syntax of trigger_message

Syntax	Number of Bytes
trigger_message() {	
trigger_text_length	2
trigger_text()	trigger_text_length
}	

4.3.2 Trigger text length

The **trigger_text_length** field defines the number of characters in the following **trigger_text** field.

NOTE For practical reasons, the maximum length of the **trigger message** may be limited by the application or transport protocol.

4.3.3 Syntax of trigger text

4.3.3.1 General

The syntax of the **trigger_text** field is shown in Table 2.

Table 2 – Syntax of trigger_text

Syntax	Number of bytes
trigger_text() {	
for (i=0; i<trigger_text_length; i++) {	
trigger_character	1
}	
}	

The sequence of **trigger characters** starts with a **URL string** delimited by angular brackets. This is followed by one or more **attribute strings** delimited by square brackets. Optionally, the final element is a checksum delimited by square brackets:

<*url***> [***attr*$_1$**:** *val*$_1$**][***attr*$_2$**:***val*$_2$**]**...**[***attr*$_n$**:***val*$_n$**][***checksum***]**

4.3.3.2 URL element

The first element of the **trigger_text** must be a **URL string** enclosed in angular brackets. The URL element is used twofold: a) it uniquely identifies the **trigger**, and b) it locates the resource of the **application**. This implies that for each resource only one current **trigger** can be defined.

Internet URL – An Internet URL shall be identified by the sequence http:// and shall be defined according to [URI].

Example: <http://xyz.com/fun.html>

Local Identifier URL – A Local Identifier URL is identified by the sequence lid://. The Local Identifier URL scheme is defined in [DDE].