INTERNATIONAL STANDARD

IEC 62297-2

First edition
2005-05

Triggering messages for broadcast applications –

Part 2: Transport methods

Reference number
IEC 62297-2:2005(E)

Publication numbering

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE M

For price, see current catalogue

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TRIGGERING MESSAGES FOR BROADCAST APPLICATIONS –

Part 2: Transport methods

FOREWORD

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

FDIS	Report on voting
100/911/FDIS	100/950/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.

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- withdrawn;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
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

This part of IEC 62297 focuses on the transport methods of the trigger messages defined in IEC 62297-1.

TRIGGERING MESSAGES FOR BROADCAST APPLICATIONS –

Part 2: Transport methods

1 Scope

This part of IEC 62297 specifies how the trigger messages defined in IEC 62297-1 are transmitted. A trigger is defined as information sent from a service provider as part of a data broadcasting transmission that initiates an application in a receiver. Additional information in the trigger message allows filtering or prioritization techniques to be applied at the receiver. Examples of possible use include the forcing of the display of information to warn of severe weather conditions and advising of extreme content in the TV programme. 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 specifies how trigger messages are broadcast using teletext technology. Both Page Format-Clear and Independent Data Line methods are defined, using protocols defined in ETSI EN 300 708.

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.

IEC 62297-1, *Triggering messages for broadcast applications – Part 1: Format*

ISO/IEC 13818-6, *Information technology – Generic coding of moving pictures and associated audio information – Part 6: Extensions for DSM-CC*

ETSI EN 300 706, *Enhanced Teletext specification*

ETSI EN 300 708, *Data transmission within Teletext*

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*

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
Application Data Block
one instance of the application data to be transmitted via the Page Format-Clear method and following the addition of any error protection/correction data

3.1.2
Bundle
group of 490 application bytes for transmission via IDL format B and to which the FEC algorithm is applied

3.1.3
Bundle Information Structure
data within the stream carried by the Page Format-Clear method that indicates the applications present in the stream

3.1.4
Data Stream
continuous or periodic sequence of data comprising application and transmission related components

3.1.5
Hamming 8/4
method of protecting data against transmission path errors. A protection bit is added for every data bit. Single bit errors per byte can be corrected, two bit errors can be detected

3.1.6
Independent Data Line
teletext packet with address 30 or 31 that does not form part of a teletext page and can be inserted at any point in the transmission cycle

3.1.7
Page Format-Clear
page-based method of broadcasting serial data streams via teletext when the application does not require encryption techniques to be applied to the data

3.1.8
Structure Header
data that precedes an Application Data Block to indicate the application to which it belongs and the size of the block

3.1.9
Trigger message
definition of a trigger event including a URL and optional attributes to specify, for example, a countdown time and an expire time

3.2 Abbreviations

FEC	Forward Error Correction
IDL	Independent Data Line
MIP	Magazine Inventory Page
URL	Uniform Resource Locator

4 Teletext-based methods

4.1 Page-format method

The Page Format-Clear protocol, fully defined in ETSI EN 300 708, is used to transmit one or more trigger messages. A serial data stream is formed and broadcast via successive versions of a Page Format-Clear encoded teletext page.

4.1.1 Maximum length of a trigger message

The encoding method and the maximum payload size of the Page Format-Clear protocol limits the maximum length of a trigger message to 1 022 bytes.

4.1.2 Data stream

A serial data stream according to 4.2 in ETSI EN 300 708 is created from Application Data Blocks, Structure Headers, Bundle Information Structures and Block Separators.

4.1.2.1 Application Data Blocks

In preparation for transmission, each 8-bit byte of a trigger message defined according to IEC 62297-1 is divided into two four-bit nibbles. Each nibble is then Hamming 8/4 encoded according to 8.2 of ETSI EN 300 706. The low-order nibble is encoded, and ultimately transmitted, before the high-order nibble. The resulting bytes are assembled in sequence to form an Application Data Block.

4.1.2.2 Structure Header

Each Application Data Block is preceded by a Structure Header, as defined in 4.2.2 of ETSI EN 300 708. This consists of application identity and block length information, all Hamming 8/4 encoded.

4.1.2.3 Bundle Information Structure

Bundle Information Structures, coded according to 4.2.3 in ETSI EN 300 708, shall be inserted in the data stream at frequent intervals to indicate the type of application(s) present.

4.1.2.4 Application Type value

The Application Type value (0×0010) allocated to trigger applications and carried in the Bundle Information Structure is recorded in ETSI TS 101 231.

4.1.2.5 Transport page

The page consists of a packet X/0 (mandatory), some or all of packets X/1-X/25, and X/28/0 (mandatory). Packets X/1-X/25 are used to carry Application Data Blocks and Bundle Information Structures. Packet X/28/0 provides a “signature” to help a receiver confirm that the page carries trigger information.

4.1.2.6 Page address

The default page number is allocated in ETSI EN 300 706 and has the value 0x1E7. However, if this page number is not available to the service provider, the page in use shall be indicated in a Magazine Inventory Page (MIP), as defined in ETSI EN 300 706. The MIP code for a page carrying trigger information is 0×FC.

4.1.2.7 Coding of packet X/0

Packet X/0 shall be coded according to 4.3.1 in ETSI EN 300 708. Triggers must be encoded as data stream 1 (S3 = 0).

4.1.2.8 Coding of packet X/28

The page shall include a packet X/28/0 format 1 to define unambiguously the page type and its coding. The general coding of a packet X/28/0, format 1, is defined in 9.4.2 of ETSI EN 300 706. The coding of the packet defined here in Table 1 replaces the generic Page Format-Clear coding specified in ETSI EN 300 708.

Table 1 – Coding of Packet 28/0, format 1

Triplet	Bits	Function
1	1-4	**Page function** These bits define the function of the data in packets 1 up to 25 of the page. They shall be set to the value 1 100 as allocated in ETSI EN 300 706 to indicate a page containing trigger messages defined according to IEC 62297-1
1	5-7	**Page coding** These bits define the coding of packets 1 up to 25 of the page. They shall be set to the value 011 as allocated in ETSI EN 300 706 to indicate that the packets are coded in the Hamming 8/4 format
1	8-18	Set to 11111111100 (bits 8 to 18). This value is chosen to ensure existing data broadcasting decoders, designed to Clause 5 of ETSI EN 300 708, ignore this page
2-13	1-18	**Reserved for future use**

4.1.2.9 Coding of packet X/1 to X/25

Packets X/1 to X/25 carry the data stream formed from Application Data Blocks and Bundle Information Structures. One or more Block Separator bytes (value = 0×A1), as defined in 4.3.2.3 of ETSI EN 300 708, shall be inserted before each Structure Header. The first data byte of the packet contains the Block Pointer value, as defined in 4.3.2.4 of ETSI EN 300 708. This indicates the location in the packet of the first Block Separator byte, if present.

4.1.3 Transmission aspects

A page encoded in the Page Format-Clear protocol can be transmitted in several fragments. The decision whether or not to allow the page to be transmitted without a 20 ms delay between the packet X/0 and the remaining packets is left open and should be defined by the application.

Transmitting a page comprising a packet X/0, a packet X/28/0 format 1 and a single Bundle Information Structure starting in packet X/1 shall signal the presence of an inactive trigger service. Such a page should be broadcast at least once every teletext cycle (±20 s).

4.2 Independent data line method

IDL format B, fully defined in 6.8 of ETSI EN 300 708, allows serial data to be broadcast in an efficient way. A Forward Error Correcting (FEC) algorithm protects the user data.

To broadcast trigger messages, a serial data stream is formed from one or more trigger messages. The protocol stack is shown in Figure 1.

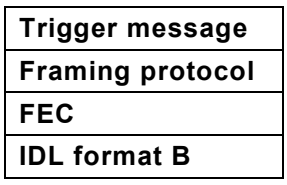

Figure 1 – Protocol stack

4.2.1 Maximum length of a trigger message

The use of IDL format B does not place an upper limit on the size of a trigger message.

4.2.2 Data stream

A data stream is formed from one or more trigger messages. The data stream is transmitted in the User Data bytes of the IDL.

The 8-bit data bytes of a trigger message are not modified or encoded in any way in preparation for transmission.

To allow a receiver to identify the start and finish of individual trigger messages, successive instances are delimited in the following manner, making special use of the code values 0×C0 and 0×DB.

a) The code 0×C0 is used as a delimiter between messages and shall not appear in the data stream anywhere else. It shall be inserted immediately before the start of any trigger message. If a data byte within a trigger message has the code value 0×C0, it shall be replaced by the two-byte sequence 0×DB, 0×DC.

b) If a data byte within a trigger message has the code value 0×DB, it shall be replaced by the two-byte sequence 0×DB, 0×DD.

c) Any number of 0×C0 bytes may be inserted between trigger messages, allowing the byte to be used as a "time filler" if required. As a minimum, a single instance shall be inserted between successive trigger messages.

NOTE Conceptually, the substitution of bytes in the data stream with values 0×C0 and 0×DB during the encoding process is carried out once the data stream has been assembled. Thus, the substitution process does not alter the value of any message size, length or checksum values, etc. Accordingly, a receiver should substitute the sequences 0×DB, 0×DC and 0×DB, 0×DD with the appropriate single byte values before checking message sizes or checksums.

4.2.3 Packet structure

The packet structure of an IDL format B is specified in 6.8.1 of ETSI EN 300 708.

4.2.3.1 Data Channel and Designation Code

The four message bits of the Hamming 8/4 encoded Designation Code field shall be set to 1111 to specify an IDL. The possible values for the Data Channel are specified in 6.4.2 of ETSI EN 300 708. No more than one Data Channel shall transmit trigger services.

4.2.3.2 Format Type

The four message bits of the Hamming 8/4 encoded Format Type byte in an IDL format B carrying trigger information have the function and coding shown in Table 2.

Table 2 – Coding of the four message bits in the Format Type byte

B4 (AN1)	B3 (AN0)	B2	B1	Function
0	0	0	1	Reserved for future use
0	1	0	1	Reserved for future use
1	0	0	1	Reserved for future use
1	1	0	1	Triggers in use

NOTE Bit 1 = 1, bit 2 = 0 define the IDL packet type to be Format B.

4.2.3.3 Application Identifier

As defined in ETSI TS 101 231 the Application Identifier 6 (0110) shall be used to indicate that the IDL format B packets carry only trigger information.

4.2.3.4 Continuity Index

As defined in 6.8.1.3 of ETSI EN 300 708.

4.2.3.5 Transmission aspects

4.2.3.5.1 Packet filling byte

If it is required to transmit a trigger message at a specific time and there are insufficient bytes to complete a Teletext packet, the remaining bytes shall be filled with the delimiting byte, 0×C0, and the packet should be transmitted immediately.

4.2.3.5.2 Completing the bundle

For a receiver to make best use of the FEC scheme, a complete bundle comprising 14 packets carrying user and FEC data and 2 packets carrying only FEC data needs to be broadcast. If there is insufficient trigger data to complete a bundle, the remaining bytes in the bundle shall be filled with the delimiting byte, 0×C0.

4.2.3.5.3 Service indication

To signal the presence of a trigger service the broadcaster should send out a dummy packet at least once every Teletext cycle (±20 s). A dummy packet is a packet with only filler bytes 0×C0 in the user data section.

4.2.3.6 User Data

The User Data bytes carry the data stream formed from trigger messages.

4.2.3.7 Forward Error Correction

As defined in 6.8.2 of ETSI EN 300 708.

5 MPEG-2 transmission based method

To broadcast a trigger message in DSM-CC sections, the DSMCC Stream Event Descriptor shall be used. The use of this places an upper limit on the size of a trigger message of 255 bytes. Only one trigger message per Stream Event Descriptor is allowed. The format of the descriptor is defined in ISO/IEC 13818-6, Table 8-6. Table 3 shows the Stream Event Descriptor.

The Stream Event Descriptor is transmitted as part of a DSMCC_Descriptor_list in a DSM-CC section with a table_id of 0×3D. See the definition of DSM-CC Section format in 9.2.2, Table 9-2 and the definition of DSMCC_Descriptor_list in 9.2.7, Table 9-5 of ISO/IEC 13818-6. Only one Stream Event Descriptor per DSMCC_Descriptor_list is allowed.

Table 3 – Stream Event Descriptor

Syntax	Number of bits	Mnemonic
StreamEventDescriptor {		
descriptorTag	8	uimsbf
descriptorLength	8	uimsbf
eventId	16	uimsbf
reserved	31	bsblf
eventNPT	33	uimsbf
for(i=0; i<N; i++) {		
privateDataByte	8	uimsbf
}		
}		

The **descriptorTag** field identifies the type of stream descriptor. The value of the descriptorTag field for the Stream Event Descriptor is 26.

The **descriptorLength** field specifies the number of bytes of the descriptor immediately following descriptorLength field.

The **eventId** field shall be set to zero by the broadcaster. A receiver shall reject a Stream Event Descriptor whose eventId is non-zero.

The **eventNPT** field shall not be used by the receiver. A broadcaster should set it to zero.

The **privateDataByte** shall contain the trigger message (as defined in IEC 62297-1).

Broadcasters are responsible for placing the Stream Event Descriptors of each service on a single PID. It will be different from the PID that carries the application. The PID used shall be defined by the application.

Annex A
(informative)

Code of practice

A.1 Page-format teletext transmissions

A.1.1 General

An application should state in its specification or code of practice whether a receiver is required to interpret trigger messages broadcast as part of a page-format teletext service.

A.1.2 Page number

An application should specify whether only the default page number will be used or if a receiver is expected to interrogate an MIP in order to determine an alternative page number.

A.1.3 Magazine Inventory Page

It is recommended that an MIP is transmitted with the trigger page indicated if the default page number is not to be used.

When an MIP page is transmitted, the corresponding entry for the trigger page should be set to the Trigger Message Page code value (0×FC) as allocated in ETSI EN 300 706 even if the trigger page is transmitted on the default page number (0×1E7).

A.1.4 20ms page delay

The decision on whether or not to allow the page to be transmitted without a 20 ms delay between the packet X/0 and the remaining packets should be taken after considering the capabilities of the receiving equipment likely to be encountered.

An application should state whether a receiver is required to handle pages carrying trigger messages that are transmitted without the 20 ms delay.

A.2 Independent data line teletext transmissions

A.2.1 General

An application should state in its specification or code of practice whether a receiver is required to interpret trigger messages broadcast via IDL format B.

A.2.2 Alternative protocol stacks

An application should specify the protocol stack that will be used.

A.2.3 Fast trigger applications

If broadcasters wish to implement time-critical trigger applications (like the BBC news subtitles), it is possible to send incomplete bundles (including neither filler packets nor the 2 FEC packets (see 4.1.3)). The receiver should process these packets if the horizontal FEC is correct.

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ISBN 2-8318-7953-1

ICS 33.170

Typeset and printed by the IEC Central Office
GENEVA, SWITZERLAND