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TeleWeb application –

Part 2:
Delivery methods

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TELEWEB APPLICATION –

Part 2: Delivery methods

FOREWORD

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International Standard IEC 62298-2 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

This standard cancels and replaces IEC/PAS 62298 published in 2002.

This first edition constitutes a technical revision.

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

FDIS	Report on voting
100/923/FDIS	100/961/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 62298 consists of the following parts, under the general title *TeleWeb application*:

Part 1: General description

Part 2: Delivery methods

Part 3: Superteletext profile

Part 4: Hyperteletext profile

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- withdrawn;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

The aim of TeleWeb is to deliver World Wide Web-style content to the living-room TV to give the viewer an enhanced television experience. A TeleWeb service broadcasts data files containing text and high-definition graphics to suitable decoders. The data transmitted can be closely linked to events within the accompanying TV programmes or can be more general in nature to emulate a traditional, but higher definition, superteletext service. Different profiles are defined.

It is intended that TV-based decoders be implemented in a cost-effective manner without recourse to the technology normally associated with personal computers. In part, this is achieved by limiting the number of different types of multimedia data that can be used within a service. By careful design of the user interface, decoder manufacturers will be able to offer easy-to-use equipment for accessing TeleWeb services without requiring the consumer to be computer-literate. In addition, they will be able to customize their products to differentiate them from those of their competitors.

This standard focuses on the transmission layer.

TELEWEB APPLICATION –

Part 2: Delivery methods

1 Scope

This part of IEC 62298 specifies the transmission layer of TeleWeb.

TeleWeb services can be broadcast in a number of different ways, for example, VBI, DVB, DAB, etc., and to a variety of decoder types, for example, TVs, portable decoders, PCs, etc. This standard specifies the transmission layer for VBI and DVB broadcasts.

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 62298-1: *TeleWeb application – Part 1: General description*

IEC 62298-3: *TeleWeb application – Part 3: Superteletext profile*

IEC 62298-4: *TeleWeb application – Part 4: Hyperteletext profile*[1]

ISO/IEC 13818-1, *Information technology – Generic coding of moving pictures and associated audio information: Systems*

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

ISO 639-2, *Codes for the representation of names of languages – Part 2: Alpha-3 code*

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

ETSI TR 101 154: V1.4.1, *Digital Video Broadcasting (DVB); Implementation guidelines for the use of MPEG-2 Systems, Video and Audio in satellite, cable and terrestrial broadcasting applications*

ETSI TR 101 202, *Implementation guidelines for data broadcasting, V1.1.1*

ETSI EN 300 421, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for 11/12 GHz satellite services*

ETSI EN 300 429, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for cable systems*

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[1] To be published.

ETSI EN 300 706, *Enhanced Teletext Specification*

ETSI EN 300 708, *Television Systems; Data Transmission within Teletext*

ETSI EN 300 744, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television*

ETSI EN 301 192*, Digital Video Broadcasting (DVB); DVB specification for data broadcasting, V1.2.1*

ETSI ETS 300 472, *Digital Video Broadcasting (DVB); Specification for conveying ITU-R System B Teletext in DVB bit streams*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
bit ordering
in all schematics, numeric values ordered with the most significant bit at the left-hand side and the least significant bit at the right-hand side

3.1.2
conditional access (CA)
mechanism by which user access to service components can be restricted

3.1.3
Independent Data Line (IDL)
stand-alone Teletext packet containing both control and application data. It does not form part of a Teletext page. The packet address is either 30 or 31

3.1.4
module
when broadcast within a DSM-CC data carousel, the contents of a file and its attributes (for example, file type, creation date, etc.) are transmitted separately. The file itself is carried by a number of DDB messages and its attributes appear as descriptors within its module loop within a DII control message

3.1.5
signed integer
positive or negative integer value, in decimal notation. The first digit is preceded by a mandatory plus (+) or minus (–) symbol with no white space between the symbol and the first digit

3.1.6
text string
sequence of displayable Latin-1 characters

3.1.7
unsigned integer
integer value, in decimal notation, not preceded by a plus (+) or minus (–) symbol

3.2 Abbreviations

BSLBF Bit String, Left Bit First
CA Conditional Access
CRC Cyclic Redundancy Check
DAB Digital Audio Broadcasting
DDB Download Data Block message
DII Download Info Indication message
DSI Download Server Initiate message
DSM-CC Digital Storage Media Command and Control
DVB Digital Video Broadcasting
ETS European Telecommunication Standard
HTML Hyper Text Mark-up Language
IDL Independent Data Line
IEC International Electrotechnical Commission
ISO International Organisation for Standardization
LSB Least Significant Bit
MJD Modified Julian Date
MPEG Moving Picture Experts Group
MSB Most Significant Bit
OSI Open Systems Interconnection
PES Packetized Elementary Stream
PID Packet Identifier
PMT Program Map Table
RFC Internet Requests for Comments
RPCHOF Remainder Polynomial Coefficient, Higher Order First
SDT Service Description Table
TS Transport Stream
UIMSBF Unsigned Integer Most Significant Bit First
URL Uniform Resource Locator
UTC Universal Time Coordinated
VBI Vertical Blanking Interval

4 Delivery profiles

There are several ways in which a TeleWeb application can be delivered (see Figure 1 in IEC 62298-1). For the purposes of this document, a delivery profile specifies layers 1 to 4 of the OSI seven-layer model.

4.1 TeleWeb delivered via Teletext packets in VBI lines

Figure 1 shows layers 1 to 4 of the OSI seven-layer model for delivering a TeleWeb service via Teletext packets. The application files are formed into a DSM-CC data carousel at the transport layer, as defined in 5.1. The components of the carousel are then encapsulated in independent Teletext data packets (see 6.3). These are transmitted in the VBI lines of an analog TV signal as described in ETSI EN 300 708.

Layer	Generic content	TeleWeb specific content
Layer 4: Transport	Arranging the data in a suitable way for transport	DSM-CC data carousel: Blocks and modules Descriptors Groups and supergroups Delimiting between messages Forward error correction
Layer 3: Network	Logical functions related to the multiplexing and demultiplexing of data packets belonging to different communications flows: Data channel addressing Data packet sequencing	Format B independent data line as defined in ETSI EN 300 708 (“Packet 31”)
Layer 2: Link	Logical functions related to data transmission: Byte synchronization Error control (framing, misdirection and false detection) Data formatting	Normal Teletext packet format as defined in ETSI EN 300 706
Layer 1: Physical	Electrical transmission of the data signal	Normal Teletext parameters as defined in ETSI EN 300 706

IEC 679/05

Figure 1 – Delivery method for TeleWeb using Teletext packets in VBI lines

4.2 TeleWeb delivered via PES packets in an MPEG-2 TS

Figure 2 shows layers 1 to 4 of the OSI seven-layer model for delivering a TeleWeb service via Teletext packets. The application files are formed into a DSM-CC data carousel at the transport layer, as defined in 5.1. The components of the carousel are then encapsulated in independent Teletext data packets (see 6.3). These are transmitted in an MPEG-2 transport stream using PES packets as described in ETSI ETS 300 472.

NOTE The data is prepared as it would be for transmitting in 4.1, added to a transport stream and treated as an analog Teletext service.

Layer	Generic content	TeleWeb specific content
Layer 4: Transport	Arranging the data in a suitable way for transport	Embedding in DSM-CC data carousel as specified in this standard
Layer 3: Network	Logical functions related to the multiplexing and demultiplexing of data packets belonging to different communications flows: Data channel addressing Data packet sequencing	Embedding in Format B independent data line as defined in ETSI EN 300 708 (“Packet 31”)
Layer 2: Link	Logical functions related to the data transmission: Byte synchronization Error control (framing, misdirection and false detection) Data formatting	Embedding in an MPEG-2 transport stream using PES packets ETSI ETS 300 472
Layer 1: Physical	Electrical transmission of the data signal	Multiplexing and transmission according to DVB-T ETSI EN 300 744, DVB-C ETSI EN 300 429 or DVB-S ETSI EN 300 421

IEC 680/05

Figure 2 – Delivery method for TeleWeb using PES packets in an MPEG-2 TS

4.3 TeleWeb delivered via DSM-CC sections in an MPEG-2 TS

Figure 3 shows layers 1 to 4 of the OSI seven-layer model for delivering a TeleWeb service via DSM-CC sections. The application files are formed into a DSM-CC data carousel at the transport layer, as defined in 5.1. The components of the carousel are then encapsulated in DSM-CC sections in an MPEG-2 transport stream as described in ISO/IEC 13818-6.

Layer	Generic content	TeleWeb specific content
Layer 4: Transport	Arranging the data in a suitable way for transport	Embedding in DSM-CC data carousel as specified in this standard
Layer 3: Network	Logical functions related to the multiplexing and demultiplexing of data packets belonging to different communications flows: Data channel addressing Data packet sequencing	Embedding in DSM-CC sections as specified in this standard
Layer 2: Link	Logical functions related to the data transmission: Byte synchronization Error control (framing, misdirection and false detection) Data formatting	Embedding in TS packets as specified in ISO/IEC 13818-6
Layer 1: Physical	Electrical transmission of the data signal	Multiplexing and transmission according to DVB-T ETSI EN 300 744, DVB-C ETSI EN 300 429 or DVB-S ETSI EN 300 421

IEC 681/05

Figure 3 – Delivery method for TeleWeb using DSM-CC sections in an MPEG-2 TS

4.4 TeleWeb delivered via other methods

This standard will be amended when necessary with other transport methods.

5 Transport layer protocols

This clause defines protocols for implementing the transport layer.

5.1 DSM-CC data carousel

5.1.1 Overview

The files of a TeleWeb service are organized in DSM-CC data carousels according to the general principles defined in ISO/IEC 13818-6 and adapted for DVB applications as described in ETSI EN 301 192 and ETSI TR 101 202. The DSM-CC data carousel specification embodies the cyclic transmission of data to receivers. The data transmitted within a carousel is first organized into “modules”, which are then subdivided into “blocks”. All the blocks of all modules within the data carousel are of the same size, except for the last block of each module, which may be of a smaller size. Each individual file in a TeleWeb service is treated as a module. Modules can be clustered together to form a “group”. Likewise, groups can be clustered to form “supergroups”.

The data carousel specification defined here uses three messages from the full data carousel specification defined in ISO/IEC 13818-6. The data blocks are carried in DownloadDataBlock (DDB) messages, while control over the modules is provided by DownloadInfoIndication (DII) and DownloadServerInitiate (DSI) messages. Other DSM-CC messages listed in ISO/IEC 13818-6 are not used in the TeleWeb application and should be ignored by receivers designed to this edition. All messages begin with the generic DSM-CC Message Header.[2]

2 ISO/IEC 13818-6, Clause 2.

This header contains information about the type and size of the message. The maximum size of any DII, DSI or DDB message shall be 4 084 bytes (including the message header).

A receiver shall ignore message fields marked “reserved” (ISO-designated) or “reserved for future use” (ETSI-designated), noting that such fields may be variable in size.

A data carousel can have one or two layers of control information as shown in Figure 4. The service provider is free to choose the most appropriate type. A receiver shall be able to work with both types.

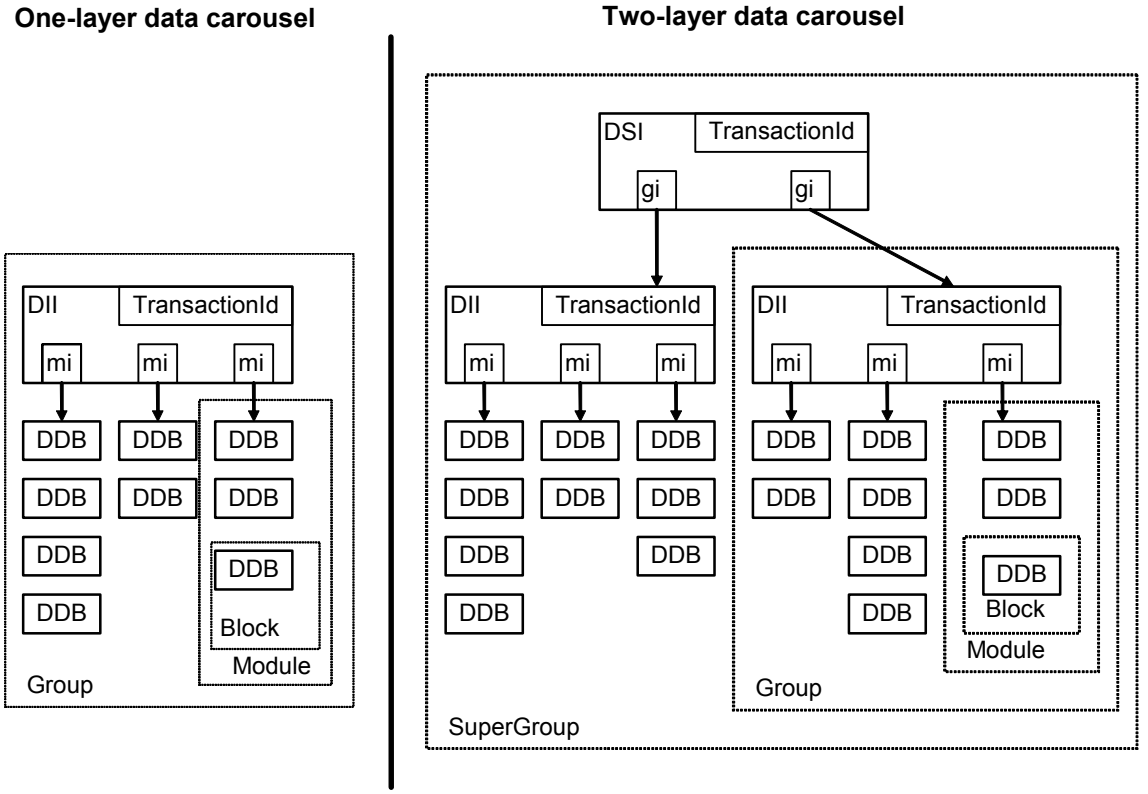

Figure 4 – Structure of one-layer and two-layer data carousels

A one-layer carousel defines a single group. The top-level control message is a DII message. This describes all the modules in the carousel. The module description includes a descriptor loop that carries the attributes (for example, type, theme) of each module.

A two-layer carousel comprises a number of one-layer carousels. The top-level control message is a DownloadServerInitiate message (DSI), 5.1.2.2. This describes the different groups in the supergroup. Each group is described by a DII message as for a one-layer carousel.

A TeleWeb service may be implemented across a number of carousels. The need for multiple carousels arises because of the significant overhead associated with updating the contents of control messages when transmitting real-time information. This can be minimized by limiting the amount of data in a carousel that contains information that changes very frequently. The maximum number of carousels may be limited by the transmission method.

5.1.2 DSM-CC messages

5.1.2.1 DownloadInfoIndication message

A DownloadInfoIndication message contains the description of the modules within a group as well as some general parameters of the data carousel such as block size. Each module within the group can be described by a number of descriptors. These carry the TeleWeb-specific attributes.

The syntax of a DII message is shown in Table 1. The final column indicates if a field has a fixed or variable value in the TeleWeb application.

Table 1 – Syntax of the DownloadInfoIndication message

Syntax	No. of bytes	TeleWeb use
DownloadInfoIndication() {		
protocolDiscriminator	1	Fixed at 0×11
dsmccType	1	Fixed at 0×03
messageId	2	Fixed at 0×1002
transactionId	4	Variable
reserved	1	Fixed at 0×FF
adaptationLength	1	Variable
messageLength	2	Variable
dsmccAdaptationHeader()	adaptationLength	Reserved for future use
downloadId	4	Variable
blockSize	2	Variable
windowSize	1	Fixed at 0×00
ackPeriod	1	Fixed at 0×00
tCDownloadWindow	4	Fixed at 0×00 throughout
tCDownloadScenario	4	Variable
compatibilityDescriptorLength	2	Fixed at 0×0000 (no compatibilityDescriptor)
numberOfModules	2	Variable
for(i=0; i< numberOfModules; i++) {		
moduleId	2	Variable
moduleSize	4	Variable
moduleVersion	1	Variable
moduleInfoLength	1	Variable
for(j=0; j< moduleInfoLength; j++) {		
moduleInfoByte	1	Variable
}		
}		
privateDataLength	2	Variable
for(i=0; i< privateDataLength; i++) {		
privateDataByte	1	Reserved for future use
}		
}		

The protocolDiscriminator field is used to indicate that the message is a DSM-CC message within a particular environment. This field has the fixed value of 0×11.

The dsmccType field is used to indicate the type of DSM-CC message.[3] The "user-to-network" download messages of which data carousels are a part have been allocated the value 0×03.

The messageId field is fixed at 0×1002 to identify the message as a DownloadInfoIndication message.[4]

The transactionId field provides both the unique identification of a control message and version information. The version component is changed whenever any field of the message is modified. Reference ISO/IEC 13818-6 defines the transactionId as consisting of a 2-bit transactionId_originator field (2 MSBs) and a 30-bit transaction_number field.[5] The TeleWeb application adopts the DVB interpretation as described in ETSI TR 101 202 and divides the field into the four subfields shown in

Figure 5.

In the case of a two-layer carousel, each DII message is referenced from within the group loop of the DSI message. The transactionId field in a DII message and the corresponding groupId field in the DSI message are coded identically.

Bit:	**31**	**30**	**29**	**16**	**15**	**1**	**0**
Sub-field:	Originator		Version		Identification		Update flag
State:	1	0	Variable		Variable		Toggles

IEC 683/05

Figure 5 – Format of transactionId field

The Update Flag (bit 0) shall be toggled every time the message is updated.

The Identification subfield (bits 1 to 15) shall be set to 0×0000 for the top-level control message in the data carousel. All other control messages shall have one or more non-zero bits as described in ETSI EN 301 192. This coding scheme enables a receiver to determine whether a carousel is one- or two-layered having acquired any DII message.

– For the one-layer carousel, the identification field in the DII message will be 0×0000.
– For the two-layer carousel, the identification field in a DII message will be in the range 0×0001 to 0×7FFF.
– The identification field in the DSI message will be 0×0000.

NOTE If multiple carousels are used, a receiver is likely to detect DII messages with identification values from 0×0000 to 0×7FFF.

The Version subfield (bits 16 to 29) conveys a version number for the message. This value shall be incremented modulo 0×4000 every time the control message is updated.

NOTE A receiver should not expect to see linearly incrementing version numbers. There may be missing values. For example, the encoder might have prepared a new DII message (and incremented the version number) following a change, but before it can be transmitted another change is detected, causing the version number to be incremented yet again before transmission. The updating actions required on a change of data are described in 5.1.3.

---

3 ISO/IEC 13818-6, Clause 2, Table 2-2.

4 ISO/IEC 13818-6, 7.3, Table 7-4.

5 ISO/IEC 13818-6, Clause 2, Figure 2-1.

In order to be strictly DSM-CC compliant, the value used in originator subfield (bits 31 to 32) shall be fixed at 0×02 to indicate that the transactionId has been assigned by the network.[6]

The reserved field shall be set to 0×FF as required by ISO/IEC 13818-6.[7]

The adaptationLength field indicates the total length in bytes of the DSM-CC adaptation header (dsmccAdaptationHeader).[8]

NOTE The adaptation header is not used to carry TeleWeb-specific information. Receiver designers should note that data carousels may use the adaptation header for other purposes. Receivers should be able to accept an adaptationLength of any value and should ignore any data in the dsmccAdaptationHeader field.

The messageLength field is used to indicate the total length in bytes of the remainder of the message following this field. This value includes any adaptation headers and compatibility descriptors that may be present.

The downloadId field is used as an identifier for the messages of a particular TeleWeb carousel. All DII and DDB messages within the same carousel shall use the same value in their downloadId fields.

The blockSize field defines the number of blockDataBytes carried in the DDB messages described by this DII.

NOTE The last block of each module may contain fewer blockDataBytes than the value indicated by blockSize.

The windowSize, ackPeriod, and tCDownloadWindow fields are not used by data carousels and all bytes shall be fixed at 0×00.

The tCDownloadScenario field indicates a time period in microseconds for the entire download scenario. If the value is unknown, or is considered to be unimportant, a value of 0×FFFFFFFF shall be inserted in this field.

The compatibilityDescriptorLength field indicates the total length in bytes of the following DSM-CC Compatibility Descriptor.[9]

NOTE 1 According to ISO/IEC 13818-6, the compatibilityDescriptorLength is the first field in the DSM-CC compatibilityDescriptor. It is shown here as a separate field to aid understanding.

NOTE 2 The compatibilityDescriptor is not used by TeleWeb and the compatibilityDescriptorLength field should be set to 0×0000.

The numberOfModules field indicates the number of modules described in the loop following the field. In a one-layer carousel, this loop will describe all the modules associated with the carousel.

The moduleId field is an identifier for the module that is described by the following moduleSize, moduleVersion, and moduleInfoByte fields. The value must be unique within the scope of the message sharing the same downloadId value, i.e. within the same data carousel. Values in the range 0×0000 to 0×FFEF shall be used.

NOTE ModuleId values in the range 0×FFF0 to 0×FFFF are reserved for DAVIC compliant applications[10] and shall not be used in TeleWeb applications.

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6 ISO/IEC 13818-6, Clause 2, Table 2-3.

7 ISO/IEC 13818-6, Clause 2.

8 ISO/IEC 13818-6, 2.1.

9 ISO/IEC 13818-6, 6.1.

10 ETSI EN 301 192, 8.1.3.

The moduleSize field defines the number of blockDataBytes that make up the described module. This equates to the size of the TeleWeb file carried by this module.

The moduleVersion field provides a version number for the described module. The value inserted here shall match the current value of the moduleVersion field carried in the DDB messages of the described module. The moduleVersion field is used for the version attribute defined in IEC 62298-3.

The moduleInfoLength field defines the number of moduleInfoBytes that follow.

The moduleInfoBytes describe the module. These bytes shall contain the descriptors defined in 5.1.4.

The privateDataLength field defines the length in bytes of the following privateDataByte field. The function of the data in the privateDataByte field is specific to the TeleWeb application and is reserved for future use.

5.1.2.2 DownloadServerInitiate message

The DownloadServerInitiate message is used to build a supergroup within a two-layer data carousel.

The syntax of a DSI message is shown in Table 2. The final column indicates if a field has a fixed or variable value in the TeleWeb application. The private data fields of the generic DSI message according to ISO/IEC 13818-6 are used here to carry information relating to each group according to the interpretation in ETSI EN 301 192 and ETSI TR 101 202. To allow future enhancements, provision is made to carry additional private data.

Data fields not described in this clause have the same function and coding as their equivalents in the DII message (5.1.2.1).

Table 2 – Syntax of the DownloadServerInitiate message

Syntax	No. of bytes	TeleWeb use
DownloadServerInitiate() {		
protocolDiscriminator	1	Fixed at 0×11
dsmccType	1	Fixed at 0×03
messageId	2	Fixed at 0×1006
transactionId	4	Variable
reserved	1	Fixed at 0×FF
adaptationLength	1	Variable
messageLength	2	Variable
dsmccAdaptationHeader()	adaptationLength	Reserved for future use
serverId	20	Fixed at 0×FF throughout
compatibilityDescriptorLength	2	Fixed at 0×0000 (no compatibilityDescriptor)
privateDataLength	2	Variable
GroupInfoIndication() {		
numberOfGroups	2	Variable
for(i=0; i< numberOfGroups; i++) {		
groupId	4	Variable

Syntax	No. of bytes	TeleWeb use
groupSize	4	Variable
groupCompatibilityDescriptorLength	2	Fixed at 0×0000 (no GroupCompatibility)
groupInfoLength	2	Fixed at 0×0000 (no groupInfoBytes)
}		
}		
futureUseLength	2	Variable
serviceInfoLength	2	Variable
for(k=0; k<serviceInfoLength; k++) {		
serviceInfoByte	1	Variable
}		
for(k=0; k<futureUseLength-serviceInfoLength-2; k++) {		
futureUseByte	1	Variable
}		
}		

The messageId field is fixed at 0×1006 to identify the message as a DSI message.[11]

The transactionId field has the same four subfields as its equivalent in the DII message. By definition, the identification subfield shall always be set to 0×0000.

The serverId field is unused and shall be set to 0×FF throughout.[12]

The privateDataLength field defines the length in bytes of the remaining part of the message. This consists of group-related data (GroupInfoIndication structure) and bytes reserved for future use (futureUseLength and futureUseByte).

The GroupInfoIndication structure follows the DVB assignment of the private data bytes of the generic DSM-CC DSI message, see ETSI EN 301 192 and ETSI TR 101 202. The bytes are used to convey information about the structure of each group.

The numberOfGroups field indicates the number of groups described in the following loop.

The groupId field enables a particular group to be identified. The field shall contain the same value as is used in the transactionId field of the DII control message that describes the group. This value will change when an update is made to the DII control message, as described in 5.1.3. All groupIds should be unique within the service.

The groupSize field indicates the total number of blockDataBytes that make up the modules in the group.

The groupCompatibilityDescriptorLength field indicates the total length in bytes of the following Group Compatibility structure.[13]

---

[11] ISO/IEC 13818-6, 7.3, Table 7-4.

[12] ETSI EN 301 192, 8.1.2.

[13] ISO/IEC 13818-6, 6.1.

NOTE 1 According to ISO/IEC 13818-6, the compatibilityDescriptorLength is the first field in the DSM-CC compatibilityDescriptor. The groupCompatibilityDescriptorLength is shown here as a separate field outside of the GroupCompatibility structure to aid understanding.

NOTE 2 The GroupCompatibility structure is not used by TeleWeb. Transmissions shall set the group CompatibilityDescriptorLength field to 0×0000.

The groupInfoLength field defines the number of groupInfoBytes that follow. TeleWeb data carousels do not support descriptors on the group level. Therefore, the value of the groupInfoLength must be set to 0×0000 and there are no groupInfoBytes allowed.

The futureUseLength field defines the length in bytes of the following service info and the bytes reserved for future use.

The futureUseBytes are reserved for future enhancements.

The serviceInfoLength field defines the number of serviceInfoBytes that follow.

The serviceInfoByte conveys a list of descriptors defining attributes and characteristics of the service. The coding is given in 5.1.4.

5.1.2.3 DownloadDataBlock message

In a data carousel, the DownloadDataBlock messages contain the blocks of the fragmented modules (i.e. the files of the TeleWeb service). A DDB message contains a single data block of a module. The syntax of the message is shown in Table 3. The final column indicates if a field has a fixed or variable value in the TeleWeb application.

Data fields not described in this section have the same function and coding as their equivalents in the DII message (5.1.2.1). The first part of the message, the header, is similar to that of DII and DSI messages. The main difference concerns the transactionId field which here becomes the downloadId field.

Table 3 – Syntax of the DownloadDataBlock message

Syntax	No. of bytes	TeleWeb use
DownloadDataMessage() {		
protocolDiscriminator	1	Fixed at 0×11
dsmccType	1	Fixed at 0×03
messageId	2	Fixed at 0×1003
downloadId	4	Variable
reserved_1	1	Fixed at 0×FF
adaptationLength	1	Variable
messageLength	2	Variable
dsmccAdaptationHeader()	adaptationLength	Reserved for future use
moduleId	2	Variable
moduleVersion	1	Variable
reserved_2	1	Fixed at 0×FF
blockNumber	2	Variable
for(i=0; i< blockSize; i++) {		
blockDataByte	1	Variable
}		
}		

The messageId field is fixed at 0×1003 to identify the message as a DownloadDataBlock message.[14]

The downloadId field identifies the particular carousel to which the block belongs. It maps to the downloadId field in the parent DII message.

The reserved_1 and reserved_2 fields shall be set to 0×FF as required by ISO/IEC 13818-6.[15]

The moduleId field identifies the unique module to which this block belongs.

The moduleVersion field identifies the version of the module to which this block belongs. When a module is updated, the current value shall be incremented modulo 0×100.

The blockNumber field identifies the position of the block within the module. Block number zero (0) shall be the first block of a module.

The blockDataBytes convey the data of the block. The blockSize variable is conveyed in the parent DII message. However, the last block of a module may be smaller in size. A receiver can calculate the blockNumber value and the size of the last block of a module from the moduleSize and blockSize information carried in the parent DII message.

5.1.3 Handling updates

The transactionId field located in both DII and DSI messages provides unique identification and versioning information. The coding of the subfields is described in 5.1.2.1.

As the transactionId functions as a versioning mechanism, ANY change to ANY file, attribute, module, moduleId or descriptor in the data carousel shall cause the version subfield of the transactionId in the top-level control message to be incremented and the Update Flag sub-field to be toggled. The change propagates up through the structure of the carousel as follows.

1) Any change to the contents of a file, but not the attributes of that file[16], shall cause the moduleVersion field to be incremented in each DDB message required to transmit the module containing the file. This change must be reflected in the moduleVersion field in the module loop of the DII message that includes this module.
2) A field in a DII message can change either as a result of an update to the contents of a module (in which case its moduleVersion field will have altered according to 1) or because of a change in the descriptors of a module (leading to modifications to its moduleInfoBytes). When a field in a DII message changes the version subfield of its transactionId must be incremented to indicate a new version of the message, and the Update Flag must be toggled.
3) In the case of a two-layer carousel, a change to a DII message must be reflected in the corresponding groupId field in the group loop of the DSI message.
4) In the case of a two-layer carousel, since a field in the DSI message has changed the version subfield of its transactionId must also be incremented, and the Update Flag must be toggled.

---

14 ISO/IEC 13818-6, 7.3, Table 7-4.

15 ISO/IEC 13818-6, Clause 2.

16 It is allowed to change the descriptors without changing the module's moduleVersion value. The transactionId value is, of course, changed as a result. When a revised DII arrives, the receiver can detect whether the changes affect modules or descriptors by comparing the current moduleVersion values with those received last time. If a particular moduleVersion value has not altered, all the descriptors for that module have to be processed in order to establish the changes. If the value has altered, both the contents of the module and its descriptors have to be processed.

Thus by inspection of the transactionId in the top-level control message, a receiver can detect any changes to the carousel.

5.1.4 Descriptors

The file attributes presented in IEC 62298-3 appear in the data carousel as descriptors. Specific descriptors can be inserted for individual modules (i.e. TeleWeb files). These are carried in the moduleInfoBytes of the DII message containing the module. The version attribute defined in IEC 62298-3 is not realized with a descriptor. The moduleVersion in the DII message is taken as the value for the version attribute.

Table 4 lists the descriptors, their tag values and where they may be applied within the carousel. The tag value identifies individual descriptors. Certain descriptors (tag values 0×00 to 0×09) are identical to those defined for DVB data broadcasting in ETSI EN 301 192. The remainder are TeleWeb specific and are allocated tag values from 0×80 as required of private descriptors in ETSI EN 301 192.

Table 4 – Descriptors, tag values and allowed locations

Descriptor	Tag value	Module level	Service level
Type	0×01	✓	
Name	0×02	✓	✓
CRC32	0×05	✓	
Compressed module	0×09	✓	
Encryption/Conditional access	0×82	✓	
Parental rating	0×83	✓	
Language	0×85	✓	✓
Character set	0×86	✓	
Expire time	0×89	✓	
User Group ID	0×8B	✓	
Profile	0×8C	✓	

There shall be a maximum of one descriptor of each applicable type for each module.

To ensure future compatibility, receivers designed to this specification should ignore entire descriptors and additional bytes appearing in current descriptors whose functions are not defined by this edition.

The parental rating, language, expire time and the user ID descriptor may be updated at any time without changing the version of the module. The CRC32, compressed module, encryption/conditional access, and character set descriptor are only allowed to be updated/changed when the version of the module also changes. The type, name and profile descriptor must not be changed at all even when the version of the file is changed.

5.1.4.1 Type descriptor

The type_descriptor contains the type attribute defined in IEC 62298-3 for the data in a module.

Table 5 – Syntax of type_descriptor

Syntax	No. of bytes	Value
type_descriptor() {		
descriptor_tag	1	0×01
descriptor_length	1	Variable
for (i=0; i < descriptor_length; i++) {		
text_char	1	Text string, for example, “text/html”
}		
}		

The descriptor_tag field is common to all descriptors. It identifies the descriptor according to Table 4.

The descriptor_length field is common to all descriptors. It specifies the number of bytes in the descriptor immediately following this field.

The text_char field contains a text string specifying the type of module or group. It follows the media type specifications in [MIME1] and [MIME2]. Supported types are defined in IEC 62298-3.

5.1.4.2 Name descriptor

The name_descriptor contains the Name attribute defined in IEC 62298-3 to be associated with the data in a module or service.

Table 6 – Syntax of name_descriptor

Syntax	No. of bytes	Value
name_descriptor() {		
descriptor_tag	1	0×02
descriptor_length	1	Variable
for (i=0; i< descriptor_length; i++) {		
text_char	1	Name of the module, for example, “index.html”
}		
}		

The text_char field specifies the name of the module as a string of text characters. Text information is coded using the ISO Latin-1 character set.

5.1.4.3 CRC32 descriptor

The CRC32_descriptor carries the CRC attribute defined in IEC 62298-3 for a complete module.

Table 7 – Syntax of CRC32_descriptor

Syntax	No. of bytes	Value
CRC32_descriptor() {		
descriptor_tag	1	0×05
descriptor_length	1	0×04
CRC_32	4	CRC value
}		

The CRC_32 field contains the CRC calculated over this module. This is calculated according to Annex B of ISO/IEC 13818-1.

5.1.4.4 Compressed module descriptor

The presence of the compressed_module_descriptor indicates that the data in the module has the "zlib" structure as defined in [ZLIB]. Table 8 shows the syntax of the compressed_module_descriptor.

Table 8 – Syntax of compressed_module_descriptor

Syntax	No. of bytes	Value
compressed_module_descriptor () {		
descriptor_tag	1	0×09
descriptor_length	1	0×05
compression_method	1	Variable
original_size	4	Variable
}		

The compression_method field identifies the compression method used. This identification follows the definition of zlib structure of RFC 1950 [ZLIB].

The original_size field indicates the size in bytes of the module prior to compression.

5.1.4.5 Encryption/Conditional access descriptor

The encryption_ca_descriptor carries the encryption/conditional access attribute described in IEC 62298-3.

Table 9 – Syntax of encryption_ca_descriptor

Syntax	No. of bytes	Value
encryption_ca_descriptor () {		
descriptor_tag	1	0×82
descriptor_length	1	Variable
for (I=0; i< descriptor_length ; i++) {		
descriptor_byte	1	Variable
}		
}		

NOTE The payload of the encryption descriptor is not defined. However, Superteletext decoders must ignore pages with this attribute/descriptor. Therefore, this container is defined in this specification so that TeleWeb decoders can react on the presence of such a descriptor in future.

5.1.4.6 Parental rating descriptor

The rating_descriptor allows a parental rating to be associated with a module.

Table 10 – Syntax of rating_descriptor

Syntax	No. of bytes	Value
rating_descriptor() {		
descriptor_tag	1	0×83
descriptor_length	1	0×01
rating_value	1	Variable
}		
}		

The rating_value field identifies a parental rating as defined in IEC 62298-3.

5.1.4.7 Language descriptor

The language_descriptor carries the language attribute defined in IEC 62298-3 for a module or service.

Table 11 – Syntax of language_descriptor

Syntax	No. of bytes	Value
language_descriptor() {		
descriptor_tag	1	0×85
descriptor_length	1	0×03
ISO_639_language_code	3	Language code
}		

The ISO_639_language_code – as defined in ISO 639-2.

5.1.4.8 Character set descriptor

Table 12 – Syntax of character_set_descriptor

Syntax	No. of bytes	Value
character_set_descriptor () {		
descriptor_tag	1	0×86
descriptor_length	1	Variable
for (i=0; i<descriptor_length; i++) {		
text_char	1	Text string, for example, 'iso-8859-1'
}		
}		

The **text_char** field specifies the character set (or character encoding) used for the module as a string of text characters. Text information is coded using the ISO Latin-1 character set.

5.1.4.9 Expire time descriptor

The expire_time_descriptor carries the expire time attribute for a module as specified in IEC 62298-3.

Table 13 – Syntax of expire_time_descriptor

Syntax	No. of bytes	Value
expire_time_descriptor () {		
descriptor_tag	1	0×89
descriptor_length	1	0×05
MJD_offset	2	Variable
UTC_hours	1	Variable
UTC_minutes	1	Variable
UTC_seconds	1	Variable
}		

The MJD_offset field specifies the offset (in days) from the reference date of 14 June 1993 (MJD = 0×C000). Thus the actual date according to the modified Julian coding strategy is given by 0×C000 + MJD_offset.

NOTE The absolute MJD value increments daily at 00:00 UTC (coordinated universal time). The latest date supported by this coding scheme is 17 November 2172.

The UTC_hours field specifies the hours component of a "time" referenced to UTC. The valid range is 0 to 23 (decimal) inclusive.

The UTC_minutes field specifies the minutes component of a "time" referenced to UTC. The valid range is 0 to 59 (decimal) inclusive.

The UTC_seconds field specifies the seconds component of a "time" referenced to UTC. The valid range is 0 to 59 (decimal) inclusive.

5.1.4.10 User group ID descriptor

The user_group_id_descriptor contains the user group ID attribute defined in IEC 62298-3 to be associated with the data in a module.

Table 14 – Syntax of user_group_id_descriptor

Syntax	No. of bytes	Value
user_group_id_descriptor() {		
descriptor_tag	1	0×8B
descriptor_length	1	Variable
for (i=0; i< descriptor_length; i++) {		
text_char	1	User group ID
}		
}		

The text_char field specifies the name of the module as a string of text characters. Text information is coded using the ISO Latin-1 character set.

5.1.4.11 Profile descriptor

The profile_descriptor carries the profile attribute defined in IEC 62298-3 for a module.

Table 15 – Syntax of profile_descriptor

Syntax	No. of bytes	Value
profile_descriptor () {		
descriptor_tag	1	0×8C
descriptor_length	1	0×01
profile_flags	1	Variable
}		

The profile_flags field defines the TeleWeb profile the module is intended to be displayed on.

The format of the profile_flags byte is shown in

Figure 6.

B7	B6	B5	B4	B3	B2	B1	B0
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Profile_2	Profile_1

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Figure 6 – Format of the profile_flags byte

Profile_1 is an active high flag representing the Superteletext profile for attribute specified in IEC 62298-3.

Profile_2 is an active high flag representing the Hyperteletext profile attribute specified in IEC 62298-4.

5.2 Interaction channel

5.2.1 Service-related attributes

The table of service-related attributes in IEC 62298-3 is extended with a URL substitution entry. The revised table is shown below in Table 16. The mandatory column indicates the attributes that are mandatory in all broadcast TeleWeb services.

Table 16 – List of service-related attributes

Attribute	Function	In Superteletext profile	Mandatory
Name	The name of the service. Used in absolute URLs	Yes	Yes
Information	A textual description of the service. Used for the service selection	Yes	Yes
Language	The principle language used for this service	Yes	Yes
Transmission Schedule	List of maximum cycle times	Yes	No
URL substitution	The string to be substituted in place of tw:// to make an http://URL	No	No
NOTE A decoder designed to this specification should ignore service-related attributes not listed in Table 16.			

5.2.2 URL substitution

The URL substitution attribute contains the textual prefix/replacement string to find the broadcast content through an ISP interaction channel. The maximum length for the string is restricted to 255 characters.

If the defined URL substitution string for the service "exotic" is "http://www.exotic.com/TeleWeb", a TeleWeb URL "tw://exotic/file.htm" should be translated to "http://www.exotic.com/TeleWeb/file.htm" to find the file on the WWW.

5.2.3 Interaction channel protocol

An interaction channel shall use the common internet-compatible TCP/IP transport layer.

5.2.3.1 HTTP protocol

Hypertext transfer protocol (HTTP) version 1.1 as defined in RFC 2616 shall be implemented.

For information, HTTP enables the access of TeleWeb applications over the interaction channel. Version 1.1 has the advantage over version 1.0 that it allows persistent connections, thereby making better use of bandwidth. Version 1.1 also specifies caching rules. The GET method is used to request information referred by a URL. The HEAD method is often used for testing hypertext links for validity, accessibility, and recent modification. The other methods are for debugging and manipulations at the server end other than fetching HTML pages.

5.2.3.2 Domain name translation

The domain name server (DNS) protocol as defined in RFC 1035 shall be implemented.

5.2.3.3 Transport layer protocols

Transmission control protocols (TCP) as defined in RFC 793 shall be implemented.

User datagram protocol (UDP) as defined in RFC 768 shall be implemented.

For information, UDP support is required by the DNS protocol.

5.2.3.4 Network layer protocol

Internet protocol version 4 (IPv4) as defined in RFC 791 shall be implemented.

Internet protocol version 6 (IPv6) as defined in RFC 2460 is not mandatory.

5.2.3.5 Data-link layer protocol

This layer left at the discretion of the device manufacturer.

5.2.3.6 Physical layer protocol

A TeleWeb device should support a minimum transport speed of 9 600 bits/s. However, the recommended speed is 56 kbits/s.

For information, the physical connection to the Internet (PSTN/ISDN modem, ADSL/cable adapter, etc) is left at the discretion of the device manufacturer.

5.2.4 User control of the interaction channel connection

When a user is not broadband connected, in other words when a cost is involved in establishing and maintaining the connection, the rules listed in this subclause apply.

When an application is about to establish a connection over the interaction channel, the user shall be warned by presenting a screen component displaying the following properties of the requested connection:

- service name;
- the complete telephone number to be dialled;
- estimated connection cost.

In addition to the connection properties, the screen component should present the option to go ahead and make the connection or not to make the connection. The user can suppress this control interface through the decoder configuration.

The following information shall be displayed during the connection:

- indication that the interaction channel is in use.

The following information can be requested during the connection:

- ISP name;
- connected telephone number;
- connection time and estimated connection cost.

During a connection, the user shall be able to disconnect at any time. In addition to that, the user shall be given the option of defining a time period after which a connection is automatically broken after a time of inactivity. The period of inactivity should be definable between reasonable minimum and maximum values.

5.2.5 Handling of personal data

Whenever personal data is sent to a server through the interaction channel, the user shall be informed and should have the ability to prevent this action. The user can suppress this control interface through the decoder configuration.

Whenever personal data is stored in persistent storage on the decoder, the user shall be informed and should have the ability to prevent this action. The user can suppress this control interface through the decoder configuration. Additionally, the user shall have the means of erasing this data.

For information, personal data is retrieved either from an HTML form into which the user entered personal data or from persistent storage media.

5.2.6 Interaction channel security

A secure connection shall be established if the form to be submitted demands it.

When building a secure connection, only the server shall be authenticated (this removes the need for a client certificate). Every time a certificate is verified, its serial number shall be compared to those in the certificate revocation list. If the certificate's serial number is in the list, or if verification fails for any other reason, the connection shall be broken and the user should be informed.

All data transmitted over the secure connection shall be encrypted. What cipher algorithm and hash algorithm to use over a secure connection is implementation-dependent and is negotiated during handshaking. Table 17 lists the recommended bulk cipher algorithms and Table 18 lists the MAC algorithms to use for encryption and decryption.

Table 17 – Recommended bulk cipher algorithms for decryption and encryption

3DES (triple DES)
RC2
RC4

Table 18 – Recommended MAC algorithm for decryption and encryption

MD5
SHA

The level of encryption (40/64/128-bits, etc.) should be left to the application.

5.2.6.1 Security protocols

The minimum security protocol shall be secure sockets layer (SSL) version 3.0 as defined in [SSL 3.0].

The preferred security protocol is transport layer security (TLS) protocol version 1.0 as defined in RFC2246.

A device must be able to verify digital certificates according to RFC2459, which is based on X.509.

5.2.6.2 Certificate management

A device shall be able to verify digital certificates.

Several certificate authorities (CA) issue digital certificates. In order to be able to verify digital certificates, a device shall be equipped with the following data in its non-volatile memory:

- the trusted root certificate as specified in Table 19 or a later version of it;
- a certificate revocation list from the certificate authority VeriSign.

Table 19 – Root certificate parameters

Friendly name	VeriSign Class 3 Primary CA
Serial number	7DD9 FE07 CFA8 1EB7 1079 67FB A789 34C6
Valid to	2028 Aug 02 1:59:59 AM

When a digital certificate is revoked, the broadcaster shall broadcast an updated certificate revocation list as defined in RFC 2459 and a new trusted root certificate.

A certificate shall be broadcast as a DER encoded binary X.509 file with the name-extension ".cer". A certificate revocation list shall be broadcast as a file defined in RFC 2459 chapter 5.1 with the name-extension "crl". The device shall save the list and the certificate in non-volatile memory. The old versions of the certificate and the revocation list shall be removed.

To be able to verify a certificate a device must fulfil the requirements listed in Table 20.

Table 20 – Algorithm requirements for certificate verifications

Signature algorithm	sha1RSA and md5RSA and md2RSA
Thumbprint algorithm	sha1
Public key length	1024 bits or 2048 bits

For information, a server should have its own certificate, which will be the first in the chain of certificates. The client only needs to trust one certificate, and the one to be trusted is usually the root certificate.

A client shall be able to download a new root certificate. It probably does not need to keep a list of revoked certificates.

The verification of the server on the client side goes as follows. The client

– receives a certificate;

– checks that it was issued by the CA which produced the on-board root certificate;

– uses the public key in the root certificate to decode the signature in the received certificate and obtains a signature hash;

– checks that the signature hash matches the hash of the rest of the received certificate.

6 TeleWeb DSM-CC transmission via Teletext

This clause describes how Teletext data packets are used to transmit a TeleWeb service once it has been encoded into a data carousel as described in 4.1.

6.1 Transmission of data carousels

A TeleWeb service shall always consist of eight data carousels: one two-layer carousel and seven one-layer carousels. The limitation of one two-layer carousel arises because there is no downloadId field in a DSI message to allow differentiation. The top level control message of each carousel shall be transmitted continuously. If a one-layer carousel is empty of data, the numberOfModules in its DII messages shall be set to zero (0). If the two-layer carousel is empty of data, the NumberOfGroups field in its DSI message shall be set to zero (0). The minimum repetition rate of empty carousels shall be defined in a code of practice.

The data carousel to which a particular DDB or DII message belongs shall be indicated through the coding of its downloadId field. The 29 MSBs shall all be set to 0×0. The 3 LSBs shall be set to 0×0 for the DDB and DII messages belonging to a two-layer carousel. A unique value in the range 0×1 to 0×7 shall be allocated to each one-layer carousel and the 3 LSBs of the downloadId field shall be set to this value.

6.2 Transmission protocol

The transmission of each individual DSM-CC message described in 5.1.1 is preceded by a delimiting character and followed by a 16-bit CNI code and a 16-bit checksum as shown in

Figure 7. Successive DSM-CC messages are concatenated to form a serial data stream.

Delimiter	DSM-CC message (N)	CNI	Checksum	Delimiter	DSM-CC message (N+1)	CNI	Checksum
1 Byte	N Bytes	2 Bytes	2 Bytes	1 Byte	N Bytes	2 Bytes	2 Bytes

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Figure 7 – Message transmission sequence

6.2.1 CNI Code

The 2-byte CNI code (MSB first) of the TV channel transmitting the TeleWeb service should be transmitted after each DSM-CC message and before the checksum (CRC). In this case, a TV channel change (especially if the data is received from an external satellite receiver) can be properly detected.

NOTE Otherwise, there is always the possibility that the messages of different services are mixed together which results in corrupted data.

The checksum should contain both the DSM-CC message and the CNI code.

6.2.2 Message checksum

Prior to transmission, the CCITT CRC algorithm as defined in Annex A is applied to a complete DSM-CC message and the 16-bit CNI code. The start value loaded into the shift register is 0×FFFF. If the message, the CNI code and the appended CRC value are received correctly, a receiver will calculate a value of 0×0000. The CRC value is appended after the CNI code with most significant byte occurring first. The addition of this CRC does not alter any size or CRC parameter integral to the message.

6.2.3 Delimiting between messages

A framing protocol is inserted prior to the start of each message in order to allow a receiver to identify the start and finish of the component messages of the data carousel. This protocol requires the special use of two code values, 0×C0 and 0×DB.

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 DSM-CC message. If a data byte within a message, the CNI code or the checksum (calculated as described in 6.2.2) has the code value 0×C0, it shall be replaced by the two-byte sequence 0×DB, 0×DC.

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

Any number of 0×C0 bytes may be inserted between messages, allowing the byte to be used as a “time filler” if required. As a minimum, a single instance shall be inserted after the CRC for the previous message and before the first byte of the next message.

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.

6.2.4 Byte order

The fields of the DSM-CC messages are transmitted in the order they occur in the message and descriptor syntax tables shown in 5.1.2.1 to 5.1.2.3. Multi-byte values are encoded most significant byte first, i.e. Big Endian. The same applies to the CNI code and the checksum.

6.3 Teletext packet format

The TeleWeb data stream formed according to 6.2 shall be transmitted using IDL format B packets. These packets are fully specified in 6.8.1 of ETSI EN 300 708.

Restriction in the number of packets transmitted per field can be specified in the code of practice.

6.3.1 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 values permitted are specified in 6.4.2 of ETSI EN 300 708.

6.3.2 Application identifier

The four message bits of the application identifier byte shall be set to 0000 to indicate a TeleWeb service, as shown in Table 21. The message bits are numbered 1 to 4 for compatibility with ETSI EN 300 708.

NOTE The application identifier value 0000 is allocated to TeleWeb in [AppCodes].

Table 21 – Allocation of the message bits in the application identifier byte

B4	B3	B2	B1	Application
0	0	0	0	TeleWeb

6.3.3 Format type

When the application identifier byte is set to the value defined in 6.3.2, the coding of the format type byte is according to Table 22. The message bits are numbered 1 to 4 for compatibility with ETSI EN 300 708.

Table 22 – Allocation of the message bits in the format type byte

B4	B3	B2	B1	Application
0	0	0	1	Reserved for future use
0	1	0	1	TeleWeb application, short TeleWeb service
1	0	0	1	TeleWeb application, full TeleWeb service
1	1	0	1	Reserved for future use

B1 = 1 and B2 = 0 define the packet type to be IDL-format B.

6.3.4 Continuity index

As defined in 6.8.1.3 of ETSI EN 300 708.

6.3.5 User data

The user data bytes carry the data stream as defined in 6.1.

6.3.6 Forward error correction

As defined in 6.8.2 of ETSI EN 300 708.

7 Signalling TeleWeb in DVB

In this clause, it is described how TeleWeb may be signalled in DVB so that a decoder is able to automatically detect and access available TeleWeb services.

This standard presents two possible ways to transmit TeleWeb data in DVB. The first one is based on the transmission of the IDL format B packets via DVB PES packets (see 8.1). The second way is to directly transmit the TeleWeb data carousel using DSM-CC sections (see 8.2). This clause focuses on the way a TeleWeb application is signalled.

7.1 Signalling in the program map table (PMT)

A service for which TeleWeb is available shall include an extra data broadcast component in the PMT. The stream type for data carousels in the PMT is ISO/IEC 13818-6 type B (0×0B).

7.1.1 Program map table (PMT)

The program map table (PMT) defines the different elements of which the different programs are composed. It also provides means for identifying the type and other properties of those elements. For example, a program may be composed of one video stream, two audio streams, and a Teletext application, all data transmitted via PES packets. The PMT will also be the entry point for signalling a TeleWeb application.

Table 23 – Section of a program map table

Syntax	No. of bits
program_map_section() {	
table_id	8 uimsbf
:	
program_number	16 uimsbf
:	
for (i=0; i<N1; i++) {	
stream_type	8 uimsbf
reserved	3 bslbf
elementary_PID	13 uimsbf
reserved	4 bslbf
ES_info_length	12 uimsbf
for (j=0; i<N2; j++) {	
descriptor()	8 uimsbf
}	
}	
CRC_32	32 rpchof
}	

table_id identifies a PMT table.

program_number defines the program number (16-bit) of the program for which the program elements are defined.

stream_type specifies the type of program element carried within the packets with the PID whose value is specified by the elementary_PID. For example 0×0B indicates a DSM-CC data carousel, 0×06 indicates PES packets for private data (when TeleWeb is transmitted using PES packets).

elementary_PID is a 13-bit field specifying the PID of the transport stream packets which carry the associated program element.

descriptor() is a descriptor that specifies additional attributes for a program element. For a stream transporting TeleWeb a data_broadcast_id descriptor will be used (see 7.1.2).

7.1.2 data_broadcast_id descriptor

The data broadcast id descriptor identifies the type of the data component. It shall be placed in the ES_info loop of the PMT table.

Table 24 – data broadcast ID descriptor

Syntax	No. of bits
data_broadcast_id_descriptor() {	
descriptor_tag	8 uimsbf
descriptor_length	8 uimsbf
data_broadcast_id	16 uimsbf
teleweb_service_type	1 bslbf
reserved	7 bslbf
trigger_PID	16 uimsbf
}	

descriptor_tag: This 8-bit field identifies this descriptor. It shall have the value 0×66.

data_broadcast_id: This 16-bit field identifies the data broadcast specification that is used to broadcast the data in the broadcast network. For TeleWeb, three different data_broadcast_ids are reserved.

Table 25 – TeleWeb data broadcast IDs

data_broadcast_id	Description
0×0114	TeleWeb data carousel
0×0115	TeleWeb object carousel
0×0116	TeleWeb

For TeleWeb data carousels delivery in DSM-CC sections the value 0×0114 shall be used.

teleweb_service_type: 0 = Short TeleWeb service, 1 = Full TeleWeb service

trigger_PID: This 16-bit field identifies the PID used for broadcasting stream events for the service.

7.2 Signalling in the service description table (SDT)

7.2.1 Service description table (SDT)

Each subtable of the SDT describes services that are contained within a particular transport stream. The services may be part of the actual transport stream or part of other transport streams, these being identified by the means of the table_id.

Table 26 – Section of a service description table

Syntax	No. of bits
service_description_section() {	
table_id	8 uimsbf
:	
:	
for (i=0; i<N1; i++) {	
service_id	16 uimsbf
:	
descriptor_loop_length	12 uimsbf
for (j=0; i<N2; j++) {	
descriptor()	8 uimsbf
}	
}	
CRC_32	32 rpchof
}	

table_id identifies an SDT table (0×42 for actual transport stream and 0×46 for other transport streams).

service_id: This 16-bit field serves as a label to this service from any other service in the transport stream. The service_id is the same as the program_number in the corresponding program_map_section (see 7.1.1).

descriptor_loop_length: This 12-bit field gives the total length in bytes of the following descriptors.

7.2.2 data_broadcast_descriptor (optional)

The data broadcast descriptor identifies the data component and may be used to provide a text description of the data component.

Table 27 – Section of a data broadcast descriptor table

Syntax	No. of bits
data_broadcast_descriptor() {	
descriptor_tag	8 uimsbf
descriptor_length	8 uimsbf
data_broadcast_id	16 uimsbf
component_tag	8 uimsbf
selector_length	8 uimsbf
for (i=0;i<selector_length;i++) {	
selector_byte	8 uimsbf
}	
ISO639-2_language_code	24 uimsbf
text_length	8 uimsbf
for (i=0;i<text_length;i++) {	
text_char	8 uimsbf
}	
}	

descriptor_tag: This 8-bit field identifies this descriptor. It shall have the value 0×64.

data_broadcast_id: This 16-bit field identifies the data broadcast specification that is used to broadcast the data in the broadcast network. For TeleWeb data carousels the value 0×0114 shall be used.

component_tag: This optional 8-bit field has the same value as the component_tag field in the stream identifier descriptor that may be present in the program map section for the stream in which the data is broadcast. If this field is not used, it shall be set to the value 0×00.

selector_length**:** This 8-bit field specifies the length in bytes of the following selector field.

selector_byte: This is an 8-bit field. The sequence of selector_byte fields specifies the selector field. For TeleWeb it may contain a copy of the service_name descriptor if this descriptor is defined in the DSI.

text_length: The 8-bit field specifies the length in bytes of the following text describing the data component.

text_char: A character of the text description of the data component. For TeleWeb the service information string of the service information descriptor used in the DSI shall be used.

7.3 Service detection time

The PMT for the programs of the current transport stream must be transmitted at least every 0,1 s (see ETSI TR 101 154, 4.1.7). That means the maximum time to detect a TeleWeb service is about 0,1 s (after the table_id if the PMT is known). All descriptors used in the PMT should be rather small to allow this high repetition rate.

7.4 Multiple TeleWeb services

Where multiple TeleWeb services are transmitted, different PIDs shall be used. For each TeleWeb service the PMT shall contain an entry with a TeleWeb data broadcast id descriptor identifying the PID of the stream where the TeleWeb data can be found.

8 Transport in DVB

8.1 Transport in PES packets

All data-carousel messages are transmitted as described in ETSI ETS 300 472.

8.2 Transport in DSM-CC sections

All data-carousel messages are transmitted using DSM-CC section format. The DSM-CC section format is defined in 9.2 of ISO/IEC 13818-6.

The DSM-CC standard provides an option to use either a CRC32 or a checksum for detecting bit-errors. For TeleWeb, only CRC32 is allowed, i.e. in table 9-2 of ISO/IEC 13818-6, the field section_syntax_indicator = 1.

The maximum section length is 4096 bytes for all types of sections used in data carousels. The section overhead is 12 bytes, leaving a maximum of 4084 bytes of payload per section.

For TeleWeb any single TS packet shall deliver the payload of no more than four sections.

NOTE The upper limit is theoretically around 11-13. However, some demux chips apply the section filter serially and run out of processor cycles if there are too many sections to process. The bigger the number, the more efficient is the broadcast – but it is diminishing returns.

Annex A
(informative)

CCITT CRC-16

The following C program can be used to calculate the CCITT CRC-16. This code is for information only and is not optimized for efficiency. Any algorithm delivering the same result may be used. At the beginning the variable 'crc' is set to 0×FFFF. For each bit, the data starting with the most significant bit of the first byte and ending with the least significant bit of the last byte, the algorithm is executed with 'ser-data' set to the value of the bit. After the algorithm is called for the last bit, the variable 'crc' holds the result of the CRC calculation.

For encoding, the most significant byte of this value is appended to the data followed by the least significant byte.

For decoding, the additional two CRC bytes are also fed to the CRC algorithm. In this case, the result in the 'crc' variable should be 0 for the correct data.

```
// Update the CRC for transmitted and received data using
// the CCITT 16-bit algorithm (X^16 + X^12 + X^5 + 1)
unsigned char ser_data;
static unsigned int crc
crc = (unsigned char)(crc>>8)|(crc<<8);
crc ^= ser_data;
crc ^= (unsigned char)(crc & 0xff)>>4;
crc ^= crc <<12;
crc ^= (crc & 0xff) << 5;
```

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[SSL 3.0] http://wp.netscape.com/eng/ssl3/draft302.txt

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testing engineer ❑
marketing specialist ❑
other.....

Q3 I work for/in/as a: *(tick all that apply)*

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technical documentation ❑
thesis ❑
manufacturing ❑
other.....

Q5 This standard meets my needs: *(tick one)*

not at all ❑
nearly ❑
fairly well ❑
exactly ❑

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

standard is out of date ❑
standard is incomplete ❑
standard is too academic ❑
standard is too superficial ❑
title is misleading ❑
I made the wrong choice ❑
other .....

Q7 Please assess the standard in the following categories, using the numbers:
(1) unacceptable,
(2) below average,
(3) average,
(4) above average,
(5) exceptional,
(6) not applicable

timeliness.....
quality of writing.....
technical contents.....
logic of arrangement of contents .....
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