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Technical Specification

Digital Radio Mondiale (DRM); DRM-TMC (Traffic Message Channel)

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Foreword

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

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Introduction

The need for traffic and traveller information is rising in our society. The Traffic Message Channel (TMC) is a specific application which delivers road driver information in an efficient way. TMC messages are intended for dedicated decoders, which perform a selection of the relevant messages and transform them to human-intelligible output, e.g. by display or a speech synthesiser. TMC messages can be filtered so that only those relevant to the current journey are displayed, while a TMC-enabled navigation system can offer dynamic route guidance - alerting the driver of a problem on the planned route and calculating an alternative route to avoid the incident.

TMC is already available in Digital Audio Broadcasting (DAB) [2] and in FM-RDS [4]. To increase the availability of TMC, the DRM system [1] provides a suitable broadcast system. The huge coverage areas of DRM enable the distribution of nationwide and trans-national traffic messages. Therefore the present document allows the use of several TMC services originating from different sources to cover huge traffic areas combined within one DRM data application service.

1 Scope

The present document gives information how to transport the Traffic Message Channel (TMC) in the Digital Radio Mondiale (DRM) system and provides the references to the associated specifications.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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2.1 Normative references

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

- [1] ETSI TS 101 980: "Digital Radio Mondiale (DRM); System specification".
- [2] ETSI EN 300 401: "Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers".
- [3] ETSI TS 101 968: "Digital Radio Mondiale (DRM); Data applications directory".
- [4] IEC 62106: "Specification of the radio data system (RDS) for VHF/FM sound broadcasting in the frequency range from 87,5 to 108,0 MHz".
- [5] ISO 14819-1: "Traffic and Traveller Information (TTI) - TTI messages via traffic message coding - Part 1: Coding protocol for Radio Data System - Traffic Message Channel (RDS-TMC) - RDS - TMC using ALERT-C".
- [6] ISO 14819-6: "Traffic and Traveller Information (TTI) - TTI Messages via traffic message coding - Part 6: Encryption and conditional access for the Radio Data System - Traffic Message Channel ALERT C coding".
- [7] ISO 14819-3: "Traffic and Travel Information (TTI) - TTI Messages via traffic message coding - Part 3: Location referencing for ALERT-C".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

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

DRM-TMC system message: 16 bit field comprising a part of TMC system information

DRM-TMC user message: 37 bit field comprising either a TMC user message, TMC tuning information, an Encryption Administration Group (EAG) or future TMC applications conveyed in ODA groups requiring 37 bits mapping

Fast Access Channel (FAC): channel of the multiplex data stream which contains the information that is necessary to find services and begin to decode the multiplex

Main Service Channel (MSC): channel of the multiplex data stream which occupies the major part of the transmission frame and which carries all the digital audio services, together with possible supporting and additional data services

reserved for future addition (rfa): bits with this designation are set to zero

NOTE: Receivers need not decode these bits.

reserved for future use (rfu): bits with this designation are set to zero

NOTE: Receivers need to check that these bits in order to determine the valid status of the other fields in the same scope.

Service Description Channel (SDC): channel of the multiplex data stream which gives information to decode the services included in the multiplex

NOTE 3: The SDC also provides additional information to enable a receiver to find alternative sources of the same data.

TMC multi-group messages: sequences of between two and five TMC single group messages that constitute a detailed TMC message

TMC system information: information that enables a TMC product to decode and evaluate essential data, which describes the transmission, being received e.g. AID, LTN, SID, MGS

TMC system message: message comprising either TMC system information or TMC tuning information

TMC tuning information: information that a TMC product needs to change from one transmitter to another if the signal becomes weak

TMC user message: message comprising parameters of the actual traffic message such as the Location code and the Event code

3.2 Abbreviations

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

AID	Application Identification
ALERT-C	Advice and problem Location for European Road Traffic, Version C
CC	Country Code (TMC)
CRC	Cyclic Redundancy Check
DRM	Digital Radio Mondiale
ECC	Extended Country Code
FAC	Fast Access Channel
hdr	Header
ID	IDentifier
LTN	Location Table Number (TMC)
LTO	Local Time Offset
MGS	Message Geographical Scope (TMC)
MSb	Most significant bit
MSC	Main Service Channel
ODA	Open Data Application (RDS)
RDS	Radio Data System
rfa	reserved for future addition
rfu	reserved for future use
SDC	Service Description Channel
SID	Service IDentifier (TMC)
TMC	Traffic Message Channel
TMCHI:	Traffic Message Channel Header Indicator
UA	User Application
UTC	Co-ordinated Universal Time

4 General

DRM has been designed to provide transport mechanisms for data applications which are complimentary to the audio service(s) carried or which stand alone. [3] gives the data application identifiers needed for DRM.

4.1 TMC description

Traffic messages are coded in Events, Locations and Extents. All over Europe the same protocols are used. A TMC decoder in the receiver should be able to perform a selection of the relevant messages. The output can be by display, speech synthesizer or forwarded to the navigation system for automatic traffic incidents avoidance.

TMC is split into:

- TMC user messages carrying traffic data, being made known to the driver or a navigation system.
- TMC system messages carrying meta data such as table numbers, being of use to the TMC decoder for management purpose.

5 TMC data transport

DRM enables the distribution of nationwide and trans-national traffic messages. The collection of several TMC services originating from different sources can be combined within one DRM data application service. Each TMC service can be transmitted in its own application format and with its own parameters (e.g. local time offset). The different TMC services shall use different unique TMC Short IDs.

DRM provides different mechanisms to transport data. For the transmission of the TMC data a DRM packet mode stream with DRM data units shall be used. This mode is advantageous for this application because it supports variable bit rates and provides error control and synchronisation mechanisms. A further advantage of this mechanism is the flexibility. If other applications using packet mode are in use the capacity of the service can be shared dynamically.

TMC multi-group messages, i.e. several corresponding DRM-TMC user messages shall be within one data unit. Up to 7 padding bits may be included at the end of the data unit to achieve byte alignment. The length of the data units shall be equal to or less than 128 bytes.

The DRM-TMC system messages and DRM-TMC user messages are packed into DRM data units, whereby the content of the data unit is defined as follows:

- TMCHI 1 bit
- rfu 1 bit
- TMC Short ID 4 bits

when **TMCHI** = 1:

- the DRM-TMC header shall be transmitted:
 - rfa 1 bit
 - TMC UA flag 1 bit
- When TMC UA flag is = 1 an additional field is sent:
 - TMC UA data 8 bits
- number of TMC Services 4 bits
- Country ID 4 bits
- ECC (Extended Country Code) 8 bits
- TMC LTO 6 bits
- number of DRM-TMC system messages, m ($m > 0$) 2 bits
- m DRM-TMC system messages $m \times 16$ bits
- and additional TMC user messages could be transmitted:
 - n DRM-TMC user messages $n \times 37$ bits
 - Paddingbits variable length
 - CRC 16 bits

when **TMCHI** = 0:

- n DRM-TMC user messages ($n > 0$) $n \times 37$ bits
- Paddingbits variable length
- CRC 16 bit

The following definitions apply:

TMCHI: this TMC header indicator bit shall indicate the presence of the TMC header which consists of the following first fields.

rfu: this bit is reserved for future use of the remainder of the parameter field and shall be set to zero for the currently specified definition of this field.

TMC Short ID: this field contains the short ID for the TMC service concerned. It is unique for a combination of Country ID, ECC, SID and LTN for the current radio programme.

rfa: this bit is reserved for future additions and shall be set to zero until they are defined.

TMC UA flag (User Application flag): this bit indicates if the User Application data field is present (flag=1), otherwise the TMC AID is CD46hex (ALERT-C).

TMC UA data (User Application data): This 16-bit field, when present, shall contain the TMC Application Identifier as defined in [5].

NOTE: When the TMC UA data is absent the AID = CD46hex is valid.

number of TMC Services: this field coded as a 4 bit unsigned binary number indicates the number of TMC short IDs in the range 0 to 15.

Country Id: this field is defined as Country Code (CC) in [7].

ECC (Extended Country Code): this field shall be used in combination with the Country Id field to identify a geographical area over which the TMC is valid. The ECC coding shall be as defined in IEC 62106 [4].

TMC LTO: these 6 bits define the local time offset for the present TMC service according to clause 8.1. The TMC LTO for the service is expressed in multiples of half hours in the range $-15,5$ hours to $+15,5$ hours. The MSb coded as "0" shall give a positive offset (East of zero degree longitude), the MSb coded as "1" shall give a negative offset (West of zero degrees longitude). TMC LTO shall be transmitted for the target area for which the TMC service is valid.

number TMC of system messages: this field, coded as a 2 bit unsigned binary number, specifies the number of system messages in the range 0 to 3.

DRM-TMC system message: 16 bit field comprising a part of TMC system information as defined in ISO 14819-1 [5].

DRM-TMC user message: 37 bit field comprising either a TMC User message, TMC tuning information, an Encryption Administration Group (EAG) or future TMC applications conveyed in RDS-ODA groups requiring 37 bits mapping. The TMC information shall be used according to ISO 14819-1 [5] and ISO 14819-6 [6]. Multi-group messages shall be contained in a single data unit. Restrictions for n can be derived from the data unit length.

Paddingbits: this field of variable length shall contain 0 to 7 bits to make up the length to an integral number of bytes for the packet. The padding bits shall be set to "0".

CRC: this 16-bit CRC shall be calculated on all bits in the data unit before the CRC value, including Paddingbits if present. It shall use the generator polynomial $G(x) = x^{16} + x^{12} + x^5 + 1$. Details are defined in [1].

6 Mapping of TMC messages

Figures 1 and 2 show how the TMC information is mapped to the DRM data unit which is transported using one or several DRM packets.

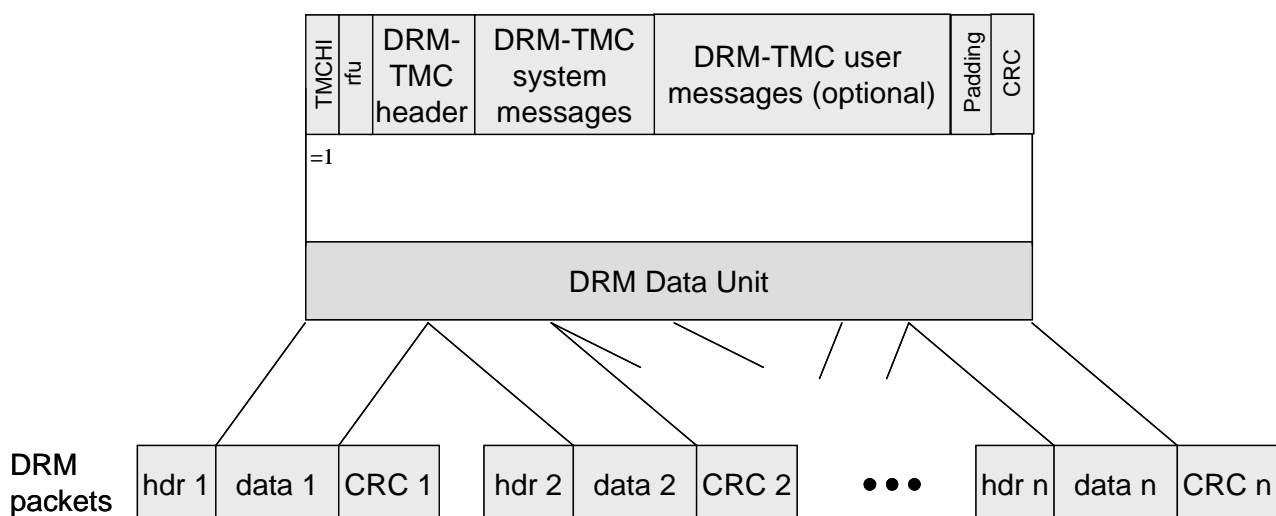


Figure 1: Mapping of TMC information to the DRM data unit when TMCHI = 1