

ETSI TS 102 773 V1.4.1 (2016-03)



**Digital Video Broadcasting (DVB);
Modulator Interface (T2-MI) for a second generation digital
terrestrial television broadcasting system (DVB-T2)**

EBU

OPERATING EUROVISION

DVB

Digital Video
Broadcasting

Reference

RTS/JTC-DVB-364

Keywords

digital, DVB, satellite, TV

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.
Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.
© European Broadcasting Union 2016.
All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and
of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	6
Foreword.....	6
Modal verbs terminology.....	6
1 Scope	7
2 References	7
2.1 Normative references	7
2.2 Informative references.....	7
3 Definitions, symbols and abbreviations	8
3.1 Definitions.....	8
3.2 Symbols.....	10
3.3 Abbreviations	10
4 General description.....	12
4.1 System overview	12
4.2 System architecture	12
4.3 Protocol stack	13
5 T2-MI packets	13
5.0 Introduction	13
5.1 T2-MI packet definition	14
5.2 T2-MI payload definitions.....	15
5.2.1 Baseband Frame.....	15
5.2.2 Auxiliary stream I/Q data	15
5.2.3 Arbitrary cell insertion.....	16
5.2.4 L1-current T2-MI packets.....	17
5.2.5 L1-future	18
5.2.6 P2 bias balancing cells.....	19
5.2.7 DVB-T2 timestamp.....	20
5.2.7.0 Introduction	20
5.2.7.1 Null timestamp	21
5.2.8 Individual addressing.....	21
5.2.8.0 Introduction	21
5.2.8.1 Existing addressing functions.....	22
5.2.8.2 Addressing functions specific to DVB-T2	22
5.2.8.2.0 Introduction	22
5.2.8.2.1 ACE-PAPR function	22
5.2.8.2.2 MISO group function	23
5.2.8.2.3 TR-PAPR function	24
5.2.8.2.4 L1-ACE-PAPR function.....	24
5.2.8.2.5 TX-SIG FEF Sequence Numbers function	25
5.2.8.2.6 TX-SIG aux stream transmitter ID function	26
5.2.8.2.7 Frequency function.....	26
5.2.9 FEF part: Null	26
5.2.10 FEF part: I/Q data	27
5.2.11 FEF part: composite.....	28
5.2.12 FEF sub-part	29
5.2.12.0 Introduction	29
5.2.12.1 FEF sub-part: Null	29
5.2.12.2 FEF sub-part: IQ	30
5.2.12.3 FEF sub-part: PRBS	30
5.2.12.4 FEF sub-part: TX-SIG FEF.....	31
5.3 Generation of L1 signalling from the T2-MI packets.....	31
5.4 Transmission order of T2-MI packets	32
5.5 Timing of T2-MI packet transmission.....	33
6 Transport of T2-MI packets	35
6.0 Introduction	35

6.1	Encapsulation of T2-MI packets in MPEG-2 TS	35
6.1.0	Introduction.....	35
6.1.1	Description.....	35
6.2	Encapsulation of MPEG-2 TS in IP packets.....	36
6.2.0	Introduction.....	36
6.2.1	Setup Information	36
6.2.2	Transport Protocols.....	37
6.2.3	Session Initiation and Control.....	37
6.2.4	Network Requirements	37
Annex A (normative):	Calculation of the CRC word	38
Annex B (normative):	T2 Modulator Information Packet (T2-MIP).....	39
B.1	Use of the T2-MIP for over the air synchronization	39
B.2	T2-MIP Definition.....	40
B.2.1	Field description.....	40
B.2.2	Transmission of the T2-MIP over DVB-T2	42
Annex C (informative):	Local Content Insertion.....	43
Annex D (informative):	MISO Management	44
Annex E (informative):	T2-MI overhead	45
E.0	Introduction	45
E.1	Encapsulation of T2 data within T2-MI packets	45
E.2	Transport of T2-MI packets	45
E.2.1	T2-MI packets over MPEG-2 TS	45
E.2.1.0	Introduction.....	45
E.2.1.1	FEC overhead for an ASI link	45
E.2.2	T2-MI packets over MPEG-2 TS to IP.....	46
E.2.2.0	Introduction.....	46
E.2.2.1	FEC overhead	46
E.3	Summary of the overheads associated with T2-MI	46
Annex F (informative):	DVB-T2 Timestamps	47
F.1	Relationships	47
F.2	Rationale.....	47
Annex G (informative):	Use of T2-MI in Test and Measurement Setups.....	48
G.1	Introduction	48
G.2	Use of Program Clock Reference (PCR) timestamps.....	48
G.2.0	Introduction	48
G.2.1	Relation between ISCR and PCR	48
G.2.2	Insertion of PCRs	49
G.2.3	Playout of a Constant Bit-rate (CBR) T2-MI file	49
G.2.4	Playout of a Variable Bit-rate (VBR) T2-MI file	49
G.2.5	Synchronization between T2-Gateway and Modulator	50
Annex H (normative):	T2-MI for Composite Signals.....	51
H.1	Introduction	51
H.2	Multiple T2-MI Streams.....	51
H.3	Alignment of the profiles in the emitted composite signal.....	51
Annex I (informative):	T2-MI for Composite Signals: Network Topology and Synchronization	53

I.1	Introduction	53
I.2	Network Topology	53
I.3	Synchronization of Multiple T2-Gateways	54
I.3.0	Introduction	54
I.3.1	Configuration Changes and Multiple T2-Gateways	55
Annex J (informative):	Change History	56
History		57

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECtrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

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

European Broadcasting Union
CH-1218 GRAND SACONNEX (Geneva)
Switzerland
Tel: +41 22 717 21 11
Fax: +41 22 717 24 81

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

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document defines the interface to a modulator for a second generation terrestrial television system (DVB-T2). The present document also describes a mechanism to allow the operation of over the air regenerative repeaters in SFN or non-SFN networks.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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

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

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

- [1] ETSI EN 302 755: "Digital Video Broadcasting (DVB); Frame structure channel coding and modulation for a second generation digital terrestrial television broadcasting system (DVB-T2)".
- [2] ETSI TS 102 606: "Digital Video Broadcasting (DVB); Generic Stream Encapsulation (GSE) Protocol".
- [3] ETSI TS 101 191: "Digital Video Broadcasting (DVB); DVB mega-frame for Single Frequency Network (SFN) synchronization".
- [4] ETSI EN 301 192: "Digital Video Broadcasting (DVB); DVB specification for data broadcasting".
- [5] ETSI TS 102 034: "Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks".
- [6] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".
- [7] ISO/IEC 13818-1: "Information technology - Generic coding of moving pictures and associated audio information: Systems".
- [8] ETSI EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".
- [9] ETSI TS 102 992: "Digital Video Broadcasting (DVB); Structure and modulation of optional transmitter signatures (T2-TX-SIG) for use with the DVB-T2 second generation digital terrestrial television broadcasting system".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TS 102 831: "Digital Video Broadcasting (DVB); Implementation guidelines for a second generation digital terrestrial television broadcasting system (DVB-T2)".