



SLOVENSKI STANDARD SIST ETS 300 749 E1:2003

01-december-2003

Digitalna videoradiodifuzija (DVB) – Struktura okvirov, kodiranje kanalov in modulacija za sisteme MMDS pod 10 GHz

Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for MMDS systems below 10 GHz

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: **ETS 300 749 Edition 1**
<https://standards.iteh.ai/catalog/standards/sist/29e354e7-c968-406e-9ab5-62855faefac2/sist-ets-300-749-e1-2003>

ICS:

33.170

Televizijska in radijska
difuzija

Television and radio
broadcasting

SIST ETS 300 749 E1:2003

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST ETS 300 749 E1:2003

<https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003>



EUROPEAN
TELECOMMUNICATION
STANDARD

ETS 300 749

April 1997

Source: EBU/CENELEC/ETSI JTC

Reference: DE/JTC-00DVB-21

ICS: 33.020

Key words: DVB, digital, video, broadcasting, MPEG, TV, multipoint

European Broadcasting Union



Union Européenne de Radio-Télévision

iTeh STANDARD PREVIEW
(standards.iteh.ai)



Digital Video
Broadcasting

<https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-618371012342/sist/ets-300-749-e1-1997>

**Digital Video Broadcasting (DVB);
Framing structure, channel coding and modulation
for MMDS systems below 10 GHz**

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE

Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

Copyright Notification: No part may be reproduced except as authorized by written permission. The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 1997.

© European Broadcasting Union 1997.

All rights reserved.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST ETS 300 749 E1:2003](https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003)

<https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003>

Contents

Foreword	5
1 Scope	7
2 Normative references	7
3 Symbols and abbreviations	7
3.1 Symbols	7
3.2 Abbreviations	8
4 MMDS System concept.....	8
4.1 Baseband interfacing and sync.....	10
4.2 Sync 1 inversion and randomization	10
4.3 Reed-Solomon encoder.....	10
4.4 Convolutional interleaver	10
4.5 Byte to m-tuple conversion	10
4.6 Differential encoding	10
4.7 Baseband shaping	10
4.8 QAM modulation and physical interface	10
4.9 MMDS receiver	10
5 MPEG-2 transport layer.....	10
6 Framing structure	10
7 Channel coding	11
7.1 Randomization for spectrum shaping	11
7.2 Reed-Solomon encoding	12
7.3 Convolutional interleaving.....	13
8 Byte - to - symbol mapping.....	14
9 Modulation.....	15
Annex A (normative): Baseband filter characteristics	18
Annex B (informative): Transparency of MMDS networks	19
Annex C (informative): Bibliography.....	20
History.....	21

Blank page

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST ETS 300 749 E1:2003](https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003)

<https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003>

Foreword

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

NOTE: The EBU/ETSI JTC was established in 1990 to co-ordinate the drafting of ETSs in the specific field of broadcasting and related fields. Since 1995 the JTC 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
Case Postale 67
CH-1218 GRAND SACONNEX (Geneva)
Switzerland

Tel: +41 22 717 21 11
Fax: +41 22 717 24 81

Digital Video Broadcasting (DVB) Project

Founded in September 1993, the DVB Project is a market-led consortium of public and private sector organizations in the television industry. Its aim is to establish the framework for the introduction of MPEG-2 based digital television services. Now comprising over 200 organizations from more than 25 countries around the world, DVB fosters market-led systems, which meet the real needs, and economic circumstances, of the consumer electronics and the broadcast industry.

[SIST ETS 300 749 E1:2003](https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003)

<https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003>

Transposition dates	
Date of adoption:	4 April 1997
Date of latest announcement of this ETS (doa):	31 July 1997
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 January 1998
Date of withdrawal of any conflicting National Standard (dow):	31 January 1998

Blank page

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST ETS 300 749 E1:2003](https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003)

<https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003>

1 Scope

This European Telecommunication Standard (ETS) describes the framing structure, channel coding and modulation (denoted "the System" for the purposes of this ETS) for a digital multi-program television distribution by Microwave Multipoint Distribution Systems (MMDS) operating below 10 GHz. The aim of this ETS is to present a harmonized transmission standard for cable, satellite and MMDS, based on the MPEG-2 System Layer ISO/IEC 13818-1 [1], with the addition of appropriate Forward Error Correction (FEC) technique. This System follows the modulation/channel coding system for digital multi-program television by cable (see ETS 300 429 in the bibliography) and is based on Quadrature Amplitude Modulation (QAM) with 16, 32, and 64 constellation points.

The System FEC is designed to improve Bit Error Ratio (BER) from 10^{-4} to a range, 10^{-10} to 10^{-11} , ensuring "Quasi Error Free" (QEF) operation with approximately one uncorrected error event per transmission hour.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] ISO/IEC 13818-1: "Coding of moving pictures and associated audio".
- [2] IEEE Trans. Comm. Tech., COM-19, pp. 772-781, (October 1971) Forney, G.D.: "Burst-correcting codes for the classic bursty channel".

3 Symbols and abbreviations

3.1 Symbols

SIST ETS 300 749 E1:2003
<https://standards.iteh.ai/catalog/standards/sist/25c354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003>

α	Roll-off factor
A_k, B_k	Most Significant Bits at the output of the Byte to m-tuple converter
f_0	Channel centre frequency
f_N	Nyquist frequency
$g(x)$	RS code generator polynomial
HEX	Hexadecimal
l	Interleaving depth (bytes)
I, Q	In-phase, Quadrature phase components of the modulated signal
j	Branch index
k	Number of bytes mapped into n symbols
m	Power of 2^m -level QAM: 4,5,6 for 16-QAM, 32-QAM, 64-QAM, respectively
M	Convolutional interleaver branch depth for $j = 1, M = N/l$
n	Number of symbols mapped from k bytes
N	Error protected frame length [bytes]
$p(x)$	RS field generator polynomial
r_m	In-band ripple (dB)
R	Randomized sequence
R_s	Symbol rate corresponding to the bilateral Nyquist bandwidth of the modulated signal
R_u	Useful bit rate after MPEG-2 transport multiplexer
R_u'	Bit rate after RS outer encoder
q	Number of differentially uncoded bits: 2,3,4 for 16-QAM, 32-QAM, 64-QAM, respectively
T	Number of bytes which can be corrected in RS error protected packet
T_s	Symbol period

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

BB	BaseBand
BER	Bit Error Ratio
D/A	Digital-to-Analogue conversion
FEC	Forward Error Correction
FIFO	First In First Out
IF	Intermediate Frequency
IRD	Integrated Receiver Decoder
LSB	Least Significant Bit
MMDS	Microwave Multipoint Distribution Systems
MPEG	Moving Pictures Experts Group
MSB	Most Significant Bit
MUX	Multiplex
PDH	Plesiochronous Digital Hierarchy
PRBS	Pseudo-Random Binary Sequence
QAM	Quadrature Amplitude Modulation
QEF	Quasi Error Free
RF	Radio Frequency
RS	Reed-Solomon
SMATV	Satellite Master Antenna Television
TDM	Time Division Multiplex
TV	TeleVision

4 MMDS System concept

The MMDS System shall be defined as the functional block of equipment performing the adaptation of the baseband TV signals to the MMDS channel characteristics (see figure 1). At the transmitter site, the following TV baseband signal sources can be considered:

- satellite signal(s); [SIST ETS 300 749 E1:2003](https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003)
- cable signal(s); <https://standards.iteh.ai/catalog/standards/sist/23e354e7-e968-40bf-9ab5-62855faefac2/sist-ets-300-749-e1-2003>
- contribution link(s);
- local program source(s).

The processes in the following subclauses shall be applied as shown in figure 1.

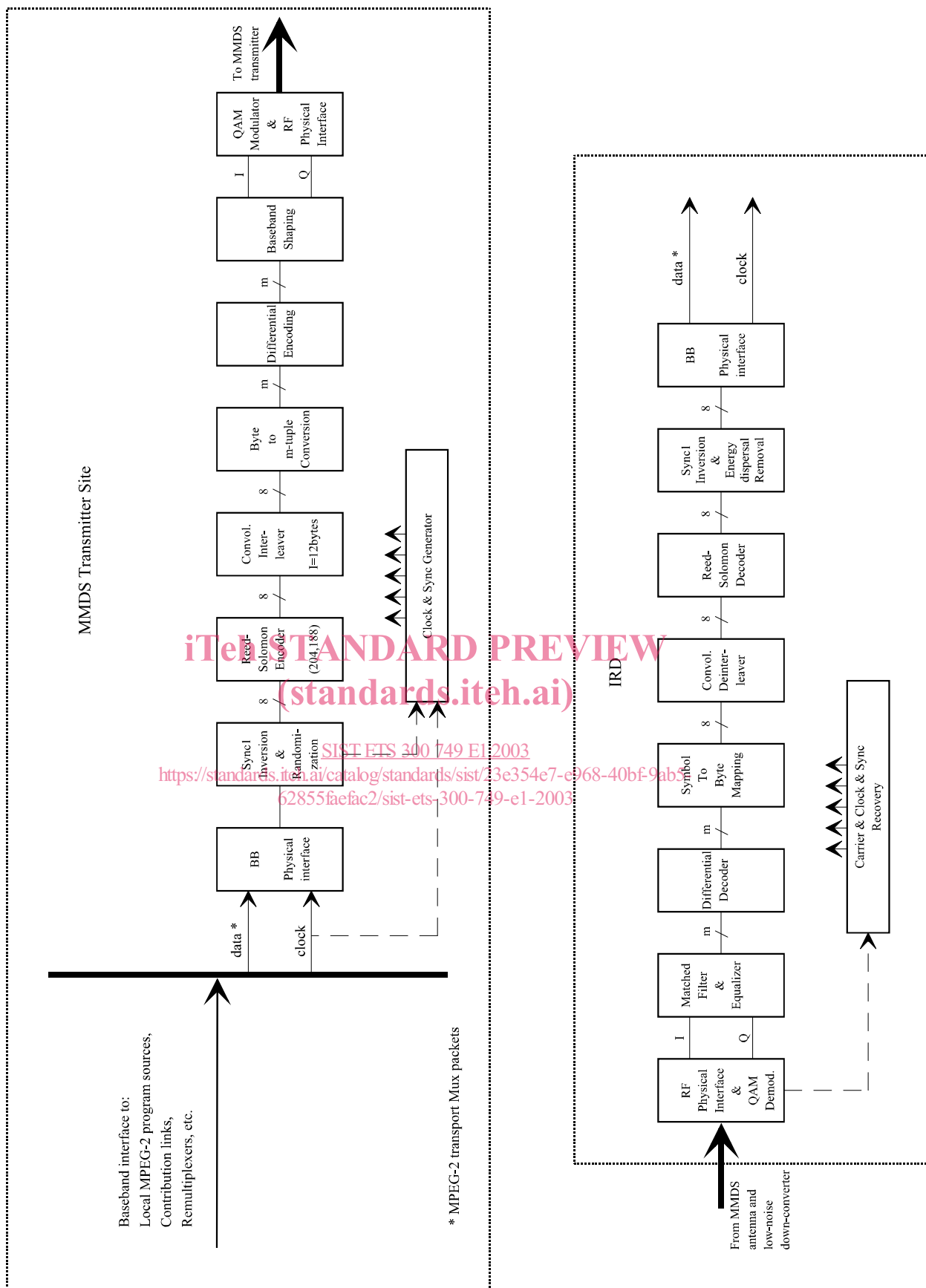


Figure 1: Conceptual block diagram of elements at the transmitting and receiving sites of MMDS systems below 10 GHz