COMMITTEE CT-002

DR 03656

(Project ID: 3091)

Draft for Public Comment Australian Standard

LIABLE TO ALTERATION—DO NOT USE AS A STANDARD

BEGINNING DATE FOR COMMENT: 30 December 2003

CLOSING DATE FOR COMMENT: 2 March 2004

Digital television—Terrestrial broadcasting
Part 1: Characteristics of digital terrestrial television transmissions
(Revision of AS 4599—1999 and AS 4599—1999/Amd 1—2001)

PRICE CODE: C

Standards Australia

COPYRIGHT

Draft for Public Comment
Australian Standard

The committee responsible for the issue of this draft comprised representatives of organizations interested in the subject matter of the proposed Standard. These organizations are listed on the inside back cover.

Comments are invited on the technical content, wording and general arrangement of the draft.

The preferred method for submission of comment is to download the MS Word comment form found at *http://www.standards.com.au/Catalogue/misc/Public%20Comment%20Form.doc*. This form also includes instructions and examples of comment submission.

When completing the comment form ensure that the number of this draft, your name and organization (if applicable) is recorded. Please place relevant clause numbers beside each comment.

Editorial matters (i.e. spelling, punctuation, grammar etc.) will be corrected before final publication.

The coordination of the requirements of this draft with those of any related Standards is of particular importance and you are invited to point out any areas where this may be necessary.

Please provide supporting reasons and suggested wording for each comment. Where you consider that specific content is too simplistic, too complex or too detailed please provide an alternative.

If the draft is acceptable without change, an acknowledgment to this effect would be appreciated.

When completed, this form should be returned to the Projects Manager, **Bala Balakrishnan** via email to **bala.balakrishnan@standards.com.au**.

Normally no acknowledgment of comment is sent. All comments received electronically by the due date will be put before the relevant drafting committee. Because Standards committees operate electronically we cannot guarantee that comments submitted in hard copy will be considered along with those submitted electronically. Where appropriate, changes will be incorporated before the Standard is formally approved.

If you know of other persons or organizations that may wish to comment on this draft Standard, could you please advise them of its availability. Further copies of the draft are available from the Customer Service Centre listed below and from our website at *http://www.standards.com.au/*.

STANDARDS AUSTRALIA Customer Service Centre

Telephone: 1300 65 46 46

Facsimile: 1300 65 49 49

e-mail: mailto:sales@standards.com.au

Internet: http://www.standards.com.au/

Draft for Public Comment

STANDARDS AUSTRALIA

Committee CT-002—Broadcasting and Related Services

Subcommittee CT-002-04 (CT/2/C) — Television Transmitting Equipment

DRAFT

Australian Standard

Digital television—Terrestrial broadcasting

Part 1: Characteristics of digital terrestrial television transmissions

(Revision of AS 4599—1999 and AS 4599—1999/Amd 1—2001)

(To be AS 4599.1—200X)

This draft proposes to provide television receiver manufacturers and broadcasters with the technical specification for the Australian digital terrestrial television transmission system.

Comment on the draft is invited from people and organizations concerned with this subject. It would be appreciated if those submitting comment would follow the guidelines given on the inside front cover.

This document is a draft Australian Standard only and is liable to alteration in the light of comment received. It is not to be regarded as an Australian Standard until finally issued as such by Standards Australia.

DRAFT

PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee CT-002, Broadcasting and Related Services. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than an Australian/New Zealand Standard.

This Standard was prepared in conjunction with the Australian Broadcasting Authority and the television broadcasting industry to ensure consistency of terrestrial broadcasting transmissions and to enable the design of receivers for that service. The Australian Broadcasting Authority has published a set of digital terrestrial television planning parameters in the document 'The Digital Terrestrial Television Broadcasting Planning Handbook' which references this standard.

The objective of this Standard is to provide television receiver manufacturers and broadcasters with the technical specification for the Australian digital terrestrial television transmission system in order to achieve interoperability in digital terrestrial television broadcasting (DTTB) transmission and reception. Standards Australia publishes AS 4933. '*Digital television—Requirements for receivers*, art 1: 7 *VHF/UHF DVB-T television broadcasts*' which is derived from this Standard.

The Australian DTTB system uses the technical content of relevant ETSI Standards. This Standard is set out in Sections, which deal with specific topics in ETSI Standards. These are summarized below:

References			
Section	**Title**	**Number**	**ETSI Standard**
2	Coding	[16]	ETSI TR 101 154 V 1.4.1 (2000-07) Digital Video Broadcasting (DVB); Implementation Guidelines for the use of MPEG-2 Systems, Video and Audio in Satellite, Cable and Terrestrial Broadcasting Applications
3	Teletext/ subtitles	[17]	ETSI EN 300 472 V1.3.1 (2003-01) Digital Video Broadcasting (DVB); Specification for Conveying ITU-R System B Teletext in DVB Bit-streams
		[18]	ETSI EN 301 775 V 1.1.1 (2000-11) Digital Video Broadcasting (DVB); Standard for the Carriage of Vertical Blanking Information (VBI) Data in DVB Bit-streams
		[19]	ETSI EN 300 743 V 1.2.1 (2002-10) Digital Video Broadcasting (DVB); Subtitling Systems
4	Service information	[20]	ETSI EN 300 468 V 1.5.1 (2003-05) Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB Systems
		[21]	ETSI TR 101 211 V1.4.1 (2000-07) Digital Video Broadcasting (DVB); Guidelines on Implementation and Usage of Service Information (SI)

References			
Section	**Title**	**Number**	**ETSI Standard**
		[22]	ETSI Draft TR 101 162 V1.2.1 (2001-01-30) Digital Video Broadcasting (DVB); Allocation of Service Information (SI) and Data Broadcasting Codes for Digital Video Broadcasting (DVB) Systems
5	Data	[23]	ETSI EN 301 192 V1.3.1 (2003-01) Digital Video Broadcasting (DVB); DVB Specification for Data Broadcasting
		[24]	ETSI TR 101 202 V 1.2.1 (2003-01) Digital Video Broadcasting (DVB); Implementation Guidelines for Data Broadcasting
		[25]	ETSI TS 102 006 V1.2.1 (2002-10) Digital Video Broadcasting (DVB); Specification for System Software Update in DVB Systems
6	Modulation	[26]	ETSI EN 300 744 V1.4.1 (2001-01) Digital Video Broadcasting (DVB); Framing Structure, Channel Coding and Modulation for Digital Terrestrial Television
		[27]	ETSI TS 101 191 V1.3.1 (2001-01) Digital Video Broadcasting (DVB); DVB Mega-frame for Single Frequency Network (SFN) Synchronization
7	Conditional access	[28]	ETSI ETR 289 V1 (1996-10) Digital Video Broadcasting (DVB); Support for Use of Scrambling and Conditional Access (CA) within Digital Broadcasting Systems
		[29]	ETSI TS 101 197 V 1.2.1 (2002-02) Digital Video Broadcasting (DVB); DVB SimulCrypt; Head-end architecture and synchronization
		[30]	ETSI TS 103 197 V1.3.1 (2003-01) Digital Video Broadcasting (DVB); Head-end Implementation of DVB Simulcrypt
		[31]	ETSI TR 102 035 V1.1.1 (2002-04) Digital Video Broadcasting (DVB); Implementation Guidelines of the DVB Simulcrypt Standard
8	Interactivity	[32]	ETSI TS 101 812 V1.1.2 (2003-06) Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.0.3
9	Measurement (Informative)	[33]	ETSI TR 101 290 V1.2.1 (2001-05) Digital Video Broadcasting (DVB); Measurement Guidelines for DVB Systems

This Standard is to be read in conjunction with the referenced documents (refer to Page 10 of this Standard).

Copies of these Standards may be purchased from the relevant Standards authorities.

The development of standards within the EBU DVB project is a dynamic process. Reviews of existing and development of new ETSI standards are underway at DVB. End users of this Standard are encouraged to keep up to date with DVB reviews by contacting the DVB Project Office directly at:

DVB Project Office
C/- European Broadcasting Union
17A Ancienne Route
CH-1218 Grand-Saconnex/Geneva
Switzerland
Phone: +41 22 717 27 19
Facsimile: +41 22 717 27 27
e-mail: dvb@dvb.org

or by visiting the DVB website:
http://www.dvb.org

To maintain consistency with the referenced documents, a comma is frequently used in this Standard when referring to a decimal marker, particularly in tables.

Within this Standard, organizations referred to by acronyms include—

(a) Commercial Television Australia—Industry Operational Practices.....CTVA

(b) Digital Video Broadcasting Project..... ……DVB

(c) Digital Television Group ..... ……DTG

(d) European Telecommunications Standards Institute..... ……..ETSI

(e) International Electrotechnical Commission ..... ……IEC

(f) International Organization for Standardization.....……..ISO

(g) International Telecommunication Union ..... ……ITU

(h) Society of Motion Picture and Television Engineers ..... ……SMPTE

Any international Standard references should be replaced by an equivalent Australian Standard when one is available. The availability of equivalent Australian Standards can be determined either from the Standards Australia catalogue or from the Standards Australia website (www.standards.com.au), **select** on-line shopping/search for equivalent Standards.

The following Australian/New Zealand Standards referenced in this Standard have been adopted from ISO/IEC Standards.

AS/NZS	ISO/IEC
13818.1:2002	13818-1:2000
13818.2:2002	13818-2:2000
13818.3:1999	13818-3:1998
13818.4:2002	13818-4:1998
13818.5:1999	13818-5:1997
13818.6:1999	13818-6:1998
13818.9:1999	13818-9:1996
13818.10:2002	13818-10:1999

CONTENTS

Page

SECTION 1 SCOPE AND APPLICATION
1.1 SCOPE 7
1.2 APPLICATION 7
1.3 REFERENCED DOCUMENTS 8

SECTION 2 CODING
2.1 INTRODUCTION 11
2.2 AUDIO (CLAUSE 6 IN ETSI TR 101 154 [16]) 11
2.3 AUDIO CODING FOR DIGITAL TERRESTRIAL TELEVISION BROADCASTING (ITU-R BS.1196 [42]) 12
2.4 EXAMPLES OF FULL SCREEN LUMINANCE RESOLUTIONS FOR SDTV AND HDTV (ANNEX A IN ETSI TR 101 154 [16]) 12
2.5 EXAMPLES OF FULL SCREEN LUMINANCE RESOLUTION FOR HDTV AND SDTV FOR AUSTRALIA 13
2.6 GENERIC CODING OF MOVING PICTURES AND ASSOCIATED AUDIO INFORMATION—VIDEO (AS/NZS 13818.2 [4]) 13

SECTION 3 TELETEXT/SUBTITLES
3.1 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR CONVEYING ITU-R SYSTEM B TELETEXT IN DVB BIT-STREAMS (ETSI EN 300 472 [17]) 14
3.2 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR THE CARRIAGE OF VERTICAL BLANKING INFORMATION (VBI) DATA IN DVB BIT-STREAMS (ETSI EN 301 775 [18]) 14
3.3 DIGITAL VIDEO BROADCASTING (DVB); SUBTITLING SYSTEMS (ETSI EN 300 743 [19]) 14

SECTION 4 SERVICE INFORMATION
4.1 GENERAL 15
4.2 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR SERVICE INFORMATION (SI) IN DVB SYSTEMS (CLAUSES 6.1, 6.2.9, 6.2.15, 6.2.17, 6.2.18, 6.2.26 AND 6.2.35 IN ETSI EN 300 468 [20]) 15
4.3 DIGITAL VIDEO BROADCASTING (DVB); GUIDELINES ON IMPLEMENTATION AND USAGE OF SERVICE INFORMATION (SI) (CLAUSES 4.2 3.10, 4.2.4.7, 4.2.5.1 AND 4.2.1.1.1 OF ETSI TR 101 211 [21]) 26
4.4 DIGITAL VIDEO BROADCASTING SYSTEMS FOR TELEVISION, SOUND AND DATA SERVICES; ALLOCATION OF SERVICE INFORMATION (SI) CODES FOR DIGITAL VIDEO BROADCASTING (DVB) SYSTEMS (CLAUSES 4.1, 4.1A AND 4.5 IN DRAFT ETSI TR 101 162 [22]) 27

SECTION 5 DATA
5.1 DIGITAL VIDEO BROADCASTING (DVB); DVB SPECIFICATION FOR DATA BROADCASTING (ETSI EN 301 192 [23]) 30
5.2 DIGITAL VIDEO BROADCASTING (DVB); IMPLEMENTATION GUIDELINES FOR DATA BROADCASTING (ETSI TR 101 202 [24]) 30
5.3 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR THE CARRIAGE OF VERTICAL BLANKING INFORMATION (VBI) DATA IN DVB BIT-STREAMS (ETSI EN 301 775 [18]) 30

Page

5.4 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR SYSTEM SOFTWARE UPDATE IN DVB SYSTEMS (ETSI TS 102 006 [25]) 30

SECTION 6 MODULATION
6.1 GENERAL 31
6.2 DIGITAL VIDEO BROADCASTING (DVB); FRAMING STRUCTURE, CHANNEL CODING AND MODULATION FOR DIGITAL TERRESTRIAL TELEVISION (CLAUSES 4.4, 4.5.1, 4.5.3, 4.7, 4.6.2.10, 4.8.1, 4.5.5, 4.8.2, 4.8.3, ANNEXES A AND E OF ETSI EN 300 744 [26]) 31
6.3 DIGITAL VIDEO BROADCASTING (DVB); DVB MEGA-FRAME FOR SINGLE FREQUENCY NETWORK (SFN) SYNCHRONIZATION (ETSI TS 101 191 [27]) 48

SECTION 7 CONDITIONAL ACCESS
7.1 DIGITAL VIDEO (DVB) BROADCASTING; SUPPORT FOR USE OF SCRAMBLING AND CONDITIONAL ACCESS (CA) WITHIN DIGITAL BROADCASTING SYSTEMS (ETSI ETR 289 [28]) 49
7.2 DIGITAL VIDEO BROADCASTING (DVB); DUB SIMULCRYPT; HEAD-END ARCHITECTURE AND SYNCRONIZATION (ETSI TS 101 197 [29]) 49
7.3 DIGITAL VIDEO BROADCASTING (DVB); HEAD-END IMPLEMENTATION OF DVB SIMULCRYPT (ETSI TS 103 197 [30]) 49
7.4 DIGITAL VIDEO BROADCASTING (DVB); IMPLEMENTATION GUIDELINES OF THE DVB SIMULCRYPT STANDARD (ETSI TR 102 035 [31]) 49

SECTION 8 INTERACTIVITY
8.1 DIGITAL VIDEO BROADCASTING (DVB); MULTIMEDIA HOME PLATFORM (ETSI TS 101 812 [32]) 50

SECTION 9 MEASUREMENT (INFORMATIVE)
9.1 DIGITAL VIDEO BROADCASTING (DVB); MEASUREMENT GUIDELINES FOR DVB SYSTEMS (ETSI TR 101 290 [33]) 51

DRAFT

STANDARDS AUSTRALIA

Australian Standard
Digital television—Terrestrial broadcasting

Part 1: Characteristics of digital terrestrial television transmissions

SECTION 1 SCOPE AND APPLICATION

1.1 SCOPE

This Standard specifies requirements for digital terrestrial television transmissions in Australia, including the video, audio and data coding, the characteristics of the transport stream, the channel coding and the modulation system.

1.2 APPLICATION

This Standard shall be read in conjunction with the referenced international standards.

Digital terrestrial television broadcasting in Australia is based on the DVB specifications published in the ETSI Standards referenced in this Standard.

DVB specifications allow a range of possible operations. The variations specific to Australia include but are not limited to the following at the time of publication:

(a) 7 MHz channels are used both at VHF and UHF. (i.e. Covering Australian channels 6-12 and 28-69)

(b) Transmissions may be either 2 K or 8 K COFDM carrier modes.

(c) Transport streams include MPEG encoded video at 25 frames, 50 fields and 50 frames per second. The video formats broadcast, are up to 1920 pixels by 1080 lines.[1]

(d) Television services transmitted in SDTV will include at a minimum an MPEG-1 Layer II audio stream. This may be in mono, stereo or stereo with surround components. In addition any SDTV service may also contain a Dolby Digital™ (AC-3) audio stream with up to 5.1 discrete channels. The preferred audio stream for a television service transmitted in HDTV is a Dolby Digital™ (AC-3) audio stream with up to 5.1 discrete channels. Alternatively an HDTV service may contain an MPEG-1 Layer II audio stream.[2]

(e) Transport streams will include closed caption subtitles based on ETSI EN 300 472 [17] or ETSI EN 300 743 [19], or both.

(f) Transmissions may include data broadcasting as specified in ETSI EN 301 192 [23].

(g) Transmission filter masks for Australia's 7 MHz channel spacing take into account the relative proximity of lower adjacent channel dual analogue sound carriers.

---

[1] For reception of all free-to-air digital TV broadcast formats in Australia, receivers must have the capability of decoding Main profile @ High level video.

[2] For reception of all free-to-air digital TV broadcast formats in Australia, receivers must have the capability of decoding both MPEG and AC-3 audio streams.

(h) Australian Broadcasters shall implement Single Frequency Networks in accordance with ETSI TS 101 191 [27].[3]

(i) Australian Broadcasters may transmit DVB-T modes suitable for reception by mobile and portable receivers.

(j) Transmissions may include DVB-T hierarchical modes. The mode should be determined or confirmed from TPS signalling and identification of the High Priority and Low Priority streams.

(k) Some Australian broadcasters' transmissions have a +125 kHz or –125 kHz frequency offset.

(l) Australian broadcasters have implemented a scheme for network identification coding through registration with the DVB project office and the Australian Broadcasting Authority. Further information can be obtained from Australian Broadcasters.[4]

(m) Australian broadcasters' transmissions include Australian regulatory requirements for parental guidance, program content, local time offset and logical channel numbers.[5]

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS	
2632:1999	Codes for the representation of names of countries and their subdivisions
2632-1:1999 [1]	Part 1: Country codes
2632-2:1999 [2]	Part 2: Country subdivision codes
13818	Information technology – Generic coding of moving pictures and associated audio information
13818.1:2002 [3]	Part 1: Systems
13818.2:2002 [4]	Part 2: Video
13818.3:1999 [5]	Part 3: Audio
13818.4:2002 [6]	Part 4: Conformance testing
13818.5:1999 [7]	Part 5: Software simulation
13818.6:1999 [8]	Part 6: Extensions for DSM-CC
13818.9:1999 [9]	Part 9: Extension for real time interface for systems decoders
13818.10:2002 [10]	Part 10: Conformance extensions for Digital Storage Media Command and Control (DSM-CC)
ISO	
639	Codes for the representation of names of languages
639-2:1998 [11]	Part 2: Alpha-3 code
ISO/IEC	
8859	Information technology—8 bit single-byte coded graphic character sets
8859-1:1998 [12]	Part 1: Latin alphabet No. 1
11172	Information Technology—Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbits/s
11172-3:1996 [13]	Part 3: Audio

[3] Refer to Australian Broadcasting Authority digital planning for further information. (www.aba.gov.au)

[4] Refer to CTVA OP40 [35] (www.ctva.com.au).

[5] Refer to CTVA OP41 [36] (www.ctva.com.au)

ISO/IEC	
13818	Information technology – Generic coding of moving pictures and associated audio information
13818.7:1999 [14]	Part 7: Advanced Audio Coding (AAC)
DTG	
DTG V3 (1998-11) [15]	Digital Television Group; Requirements for Interoperability (formerly the D-Book)
ETSI	
TR 101 154 V1.4.1 (2000-7) [16]	Digital Video Broadcasting (DVB); Implementation Guidelines for the use of MPEG-2 Systems, Video and Audio in Satellite, Cable and Terrestrial Broadcasting Applications
EN 300 472 V1.3.1 (2003-01) [17]	Digital Video Broadcasting (DVB); Specification for Conveying ITU-R System B Teletext in DVB Bit-streams
EN 301 775 V1.1.1 (2000-11) [18]	Digital Video Broadcasting (DVB); Specification for the carriage of Vertical Blanking Information (VBI) data in DVB bit-streams
EN 300 743 V1.2.1 (2002-10) [19]	Digital Video Broadcasting (DVB); Subtitling Systems
EN 300 468 V1.5.1 (2003-01) [20]	Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems
TR 101 211 V1.4.1 (2000-07) [21]	Digital Video Broadcasting (DVB); Guidelines on Implementation and Usage of Service Information (SI)
Draft TR 101 162 V1.2.1 (2001-01-30) [22]	Digital Video Broadcasting (DVB); Allocation of Service Information (SI) and Data Broadcasting Codes for Digital Video Broadcasting (DVB) systems
EN 301 192 V1.3.1 (2003-01) [23]	Digital Video Broadcasting (DVB); Specification for Data Broadcasting
TR 101 202 V1.2.1 (2003-01) [24]	Digital Video Broadcasting (DVB); Implementation Guidelines for Data Broadcasting
TS 102 006 V1.2.1 (2002-10) [25]	Digital Video Broadcasting (DVB); Specification for System Software Update in DVB Systems
EN 300 744 V1.4.1 (2001-01) [26]	Digital Video Broadcasting (DVB); Framing Structure, Channel Coding and Modulation for Digital Terrestrial Television
TS 101 191 V1.3.1 (2001-01) [27]	Digital Video Broadcasting (DVB); DVB mega-frame for Single Frequency Network (SFN) synchronization
ETR 289 V1 (1996-10) [28]	Digital Video Broadcasting (DVB); Support for use of scrambling and Conditional Access (CA) within digital broadcasting systems
TS 101 197 V1.2.1 (2002-02) [29]	Digital Video Broadcasting (DVB); DVB SimulCrypt; Head-end architecture and synchronization
TS 103 197 V1.3.1 [30]	Digital Video Broadcasting (DVB); Head-end Implementation of DVB SimulCrypt
TR 102 035 V1.1.1 (2002-04) [31]	Digital Video Broadcasting (DVB); Implementation Guidelines of the DVB Simulcrypt Standard
TS 101 812 V1.1.2 (2003-06) [32]	Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.0.3

ETSI	
TR 101 290 V1.2.1 (2001-05) [33]	Digital Video Broadcasting (DVB); Measurement Guidelines for DVB Systems
CTVA	
OP39 - (2001-03) [34]	DVB content descriptor
OP40 - (2003-06) [35]	DVB original network ID and network ID assignments for Australia
OP41 - (2001-06) [36]	Logical Channel Descriptor
OP42 - (2002-04) [37]	Distribution, Transmission, and Monitoring of Closed Captions on line 21/334
OP43 - (2002-06) [38]	Service Replacement Service Procedures
OP44 - (2003-03) [39]	Implementation of Electronic Service Guide Information
OP46 - (2003-08) [40]	Implementation of System Software Upgrades in Australian DVB-T systems
SMPTE	
RP 155 - 1997 [41]	Audio Levels for Digital Audio Records on Digital Television Tape Recorders
ITU-R	
BS.1196 – (2001-01) [42]	Audio Coding for Digital Terrestrial Television Broadcasting

The version numbers of the intended referenced Standards are listed above. Throughout the remainder of this Standard, only the publication number (followed by a number in square brackets) will be quoted, indicating that the reference is the precise version number.

DRAFT

S E C T I O N 2 C O D I N G

2.1 INTRODUCTION

This Section includes technical content from the current version of ETSI TR 101 154 [16] which has been modified to meet the Australian requirements for HDTV with the inclusion of Dolby Digital™ (AC-3) audio coding. An example set of luminance resolution formats for Australian requirements has also been included in Table 2.3.

To meet Australian requirements the recommended level for reference tones for transmission of MPEG and AC-3 is 20 dB below clipping level, in accordance with SMPTE RP 155 [41].

The ETSI clauses which have been modified or are under consideration are listed below followed by the corresponding clause numbers in this Standard.

Referenced ETSI clause number	Status	Clause title	Reference to this Standard
6	Modified	Audio	Clause 2.2
Annex A	Modified	Examples of full screen luminance resolutions for SDTV and HDTV	Clause 2.4
Annex D	Not being considered for implementation in Australia at this time	Implementation of Ancillary Data for MPEG Audio	nil
Annex E	Not being considered for implementation in Australia at this time	Coding of Data Fields in the Private Data Bytes of the Adaptation Field	nil

2.2 AUDIO (Clause 6 in ETSI TR 101 154 [16])

2.2.1 Introduction

This Clause contains the Australian modifications to Clause 6 of ETSI TR 101 154 [16] and describes the guidelines for encoding MPEG backward compatible audio in DVB broadcast bit-streams, and for decoding this bit-stream in the IRD. Additional audio coding systems and ancillary data, of relevance to Australia is Dolby Digital™, which is described in Annex C of ETSI TR 101 154 [16].

2.2.1.1 *Guidelines for encoding MPEG backward compatible audio in DVB broadcast bit-streams, and for decoding this bit-stream in the IRD*

The audio encoding shall conform to either ISO/IEC 11172-3 [13] or AS/NZS 13818.3 [5], except in systems where IRDs are required to comply with Annex C. Some of the parameters and fields in ISO/IEC 11172-3 [13] and AS/NZS 13818.3 [5] are not used in DVB systems and these restrictions are described below.

The recommended level for reference tones for transmission of MPEG audio is 20 dB below clipping level, in accordance with SMPTE RP 155 [41].

The IRD design should be made under the assumption that any legal structure as permitted by ISO/IEC 11172-3 [13] or AS/NZS 13818.3 [5] may occur in the broadcast stream even if presently reserved or unused. To allow full compliance to ISO/IEC 11172-3 [13] and AS/NZS 13818.3 [5] and upward compatibility with future enhanced versions, a DVB IRD shall be able to skip over data structures which are currently 'reserved', or which correspond to functions not implemented by the IRD. For example, an IRD, which is not designed to make use of the ancillary data field, shall skip over that portion of the bit-stream.

This Clause is based on ISO/IEC 11172-3 [13] (MPEG-l Layer II audio) and AS/NZS 13818.3 [5] (MPEG-2 backwards compatible audio coding).

2.3 AUDIO CODING FOR DIGITAL TERRESTRIAL TELEVISION BROADCASTING (ITU-R BS.1196 [42])

2.3.1 Introduction

ITU-R BS.1196 [42], Annex 2 meets the Australian DTTB transmission requirements for the inclusion of Dolby Digital™ (AC-3) audio coding.

2.4 EXAMPLES OF FULL SCREEN LUMINANCE RESOLUTIONS FOR SDTV AND HDTV (Annex A in ETSI TR 101 154 [16])

2.4.1 Introduction

This Clause contains Australian recommended definitions of full screen luminance resolutions for SDTV and HDTV.

The following definitions are applied:

(a) For all DVB compliant MPEG encoding schemes, a High Definition television signal shall be defined as having a maximum sample rate greater than 10 368 000 samples per second and less than 62 668 800 samples per second.

(b) For all DVB compliant MPEG encoding schemes, a Standard Definition television signal shall be defined as less than or equal to 10 368 000 samples per second.

These sample rates are in accordance with the examples listed in Annex A of ETSI TR 101 154 [16] and Annex E of AS/NZS 13818.2 [4].

2.4.1.2 *High Definition*

High Definition shall be defined as any DVB compliant MPEG-2 encoding scheme that requires an encoding of Main Profile at High Level (MP@HL).

MP@HL is defined in Table E25 of Annex E in AS/NZS 13818.2 [4]. It is reproduced below as Table 2.1.

TABLE 2.1

MAIN PROFILE @ HIGH LEVEL
(Table E25 in AS/NZS 13818.2 [4])

No. of layers	Layer id	Scalable mode	Maximum sample density (H/V/F)	Maximum sample rate	Maximum total bit rate /1000000	Maximum total VBV buffer	Profile and level indication
1	0	Base	1920/1152/60	62 668 800	80	9 781 248	MP@ML

2.4.1.3 *Standard Definition*

Standard Definition shall be defined as any DVB compliant MPEG-2 encoding scheme which requires an encoding of Main Profile at Main Level. (MP@ML).

MP@ML is defined in Table E23 of Annex E in AS/NZS 13818.2 [4]. It is reproduced below as Table 2.2.

TABLE 2.2

MAIN PROFILE @ MAIN LEVEL
(Table E23 in AS/NZS 13818.2 [4])

No. of layers	Layer id	Scalable mode	Maximum sample density (H/V/F)	Maximum sample rate	Maximum total bit rate /1000000	Maximum total VBV buffer	Profile and level indication
1	0	Base	720/576/30	10 368 000	15	1 835 008	MP@ML

2.4.2 EXAMPLES OF FULL SCREEN LUMINANCE RESOLUTION FOR HDTV AND SDTV FOR AUSTRALIA

Table 2.3 gives Australian examples of full screen luminance resolution for HDTV.

TABLE 2.3

EXAMPLES OF FULL SCREEN LUMINANCE RESOLUTION FOR HDTV
(Australian implementation)

horizontal_size _value	vertical_size _value	aspect_ratio _information	Sample rate	frame_rate _code	progressive_ sequence
1920	1080	16:9	51 840 000	25	0/1
1280	720	16:9	46 080 000	50	1
1440	1080	16:9	38 880 000	25	0/1
720	576	16:9	20 736 000	50	1

Table 2.4 gives the upper bound of full screen luminance resolutions for SDTV in Australia.

TABLE 2.4

UPPER BOUND OF FULL SCREEN
LUMINANCE RESOLUTIONS FOR SDTV
(Australian implementation)

horizontal_size _value	vertical_size _value	aspect_ratio _information	Sample rate	frame_rate _code	progressive _sequence
720	576	16:9	10 368 000	25	0/1

2.5 GENERIC CODING OF MOVING PICTURES AND ASSOCIATED AUDIO INFORMATION—VIDEO (AS/NZS 13818.2 [4])

2.5.1 Introduction

Refer to AS/NZS 13818.2 [4] for the Australian DTTB transmission requirements for HDTV.

SECTION 3 TELETEXT/SUBTITLES

3.1 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR CONVEYING ITU-R SYSTEM B TELETEXT IN DVB BIT-STREAMS (ETSI EN 300 472 [17])

ETSI EN 300 472 [17] meets the Australian DTTB transmission requirements.

The Australian television broadcasting industry is migrating from a Teletext standard developed by the Department of Communications, which was last amended in 1997. This standard differed from the European and in particular, the UK implementation of Teletext captioning. Australian broadcasters have recently developed a modification to the Australian Teletext Standard[6], which introduced amendments for the handling of dummy headers. Standardization activities in Australia for Teletext captioning are now focussed on developing a guideline for migration from the Australian Teletext standard to current ETSI/ITU Teletext standards as specified in EBU SPB 492 (1992): 'Teletext specification (625-line television systems)'.

3.2 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR THE CARRIAGE OF VERTICAL BLANKING INFORMATION (VBI) DATA IN DVB BIT-STREAMS (ETSI EN 301 775 [18])

ETSI EN 301 775 [18] meets the Australian DTTB transmission requirements.

3.3 DIGITAL VIDEO BROADCASTING (DVB); SUBTITLING SYSTEMS (ETSI EN 300 743 [19])

ETSI EN 300 743 [19] meets the Australian DTTB transmission requirements.

DRAFT

6 Refer to CTVA OP42 [37] (www.ctva.com.au)

SECTION 4 SERVICE INFORMATION

4.1 GENERAL

This Section includes technical content from ETSI EN 300 468 [20], ETSI TR 101 211 [21] and Draft ETSI TR 101 162 [22] which have been modified to meet the Australian requirements for service information.

4.2 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR SERVICE INFORMATION (SI) IN DVB SYSTEMS (Clauses 6.1, 6.2.9, 6.2.15, 6.2.17, 6.2.18, 6.2.26 and 6.2.35 in ETSI EN 300 468 [20])

4.2.1 Introduction

This Clause contains the Australian modifications to ETSI EN 300 468 [20]. The Australian implementation of the logical channel descriptor is used with approval; copyright is vested in the UK Digital Television Group. Further information on Australian implementation is available in a CTVA operational practice (OP).

The modified ETSI clauses are listed below along with the corresponding clause numbers in this Standard.

Referenced ETSI clause number	Status	Clause title	Reference in this Standard
6.1	Modified	Descriptor identification and location	Clause 4.2.2
6.2.9	Modified	Content descriptor	Clause 4.2.3
6.2.15	Accepted	Extended event descriptor	Clause 4.2.4
6.2.17	Modified	Linkage descriptor	Clause 4.2.5
6.2.18	Modified	Local time offset descriptor	Clause 4.2.6
None	Additional	Logical channel descriptor	Clause 4.2.7
6.2.26	Modified	Parental rating descriptor	Clause 4.2.8
6.2.35	Accepted	Electronic Service Information Guide	Clause 4.2.9

DRAFT

4.2.2 Descriptor identification and location (Clause 6.1 in ETSI EN 300 468 [20])

This clause contains the Australian modifications to Clause 6.1 of ETSI EN 300 468 [20] which is presented in Table 4.1.

Table 4.1 lists the descriptors defined within the present document, giving the descriptors-tag values and the intended placement within the SI tables. The intended usage is marked by +. This does not imply that their use in other tables is restricted. Modified descriptors listed below are in bold type.

TABLE 4.1

POSSIBLE LOCATIONS OF DESCRIPTORS
(Table 12 in Clause 6.1 of ETSI EN 300 468 [20])

Descriptor	Tag value	NIT	BAT	SDT	EIT	TOT	PMT	SIT (note1)
network_name_descriptor	0 × 40	+						
service_list_descriptor	0 × 41	+	+					
stuffing_descriptor	0 × 42	+	+	+	+			+
satellite_delivery_system_descriptor	0 × 43	+						
cable_delivery_system_descriptor	0 × 44	+						
VBI_data_descriptor	0 × 45						+	
VBI_teletext_descriptor	0 × 46						+	
bouquet_name_descriptor	0 × 47		+	+				+
service_descriptor	0 × 48			+				+
country_availability_descriptor	0 × 49		+	+				+
linkage_descriptor	0 × 4A	+	+	+	+			+
NVOD_reference_descriptor	0 × 4B			+				+
time_shifted_service_descriptor	0 × 4C			+				+
short_event_descriptor	0 × 4D				+			+
extended_event_descriptor	0 × 4E				+			+
time_shifted_event_descriptor	0 × 4F				+			+
component_descriptor	0 × 50				+			+
mosaic_descriptor	0 × 51			+			+	+
stream_identifier_descriptor	0 × 52						+	
CA_identifier_descriptor	0 × 53		+	+	+			+
content_descriptor	0 × 54				+			+
parental_descriptor	0 × 55				+			+
teletext_descriptor	0 × 56						+	
telephone_descriptor	0 × 57			+	+			+
local_time_offset_descriptor	0 × 58					+		
subtitling_descriptor	0 × 59						+	
terrestrial_delivery_system_descriptor	0 × 5A	+						
multilingual_network_name_descriptor	0 × 5B	+						
multilingual_bouquet_name_descriptor	0 × 5C		+					
multilingual_service_name_descriptor	0 × 5D			+				+
multilingual_component_descriptor	0 × 5E				+			+
private_data_specifier_descriptor	0 × 5F	+	+	+	+		+	+
service_move_descriptor	0 × 60						+	
short_smoothing_buffer_descriptor	0 × 61				+			+

(*continued*)

TABLE 4.1 (*continued*)

Descriptor	Tag value	NIT	BAT	SDT	EIT	TOT	PMT	SIT (note1)
frequency_list_descriptor	0 × 62	+						
partial_transport_stream_descriptor (note 1)	0 × 63							+
data_broadcast_descriptor	0 × 64			+	+			+
CA_system_descriptor	0 × 65						+	
data_broadcast_id_descriptor	0 × 66						+	
transport_stream_descriptor (note 2)	0 × 67							
DSNG_descriptor (note 2)	0 × 68							
Reserved for future use	0 × 69							
AC-3_descriptor	0 × 6A						+	+
ancillary_data_descriptor	0 × 6B						+	
cell_list_descriptor	0 × 6C	+						
cell_frequency_link_descriptor	0 × 6D	+						
announcement_support_descriptor	0 × 6E			+				
application_signalling_descriptor	0 × 6F						+	
adaptation_field_data_descriptor	0 × 70						+	
service_identifier_descriptor	0 × 71			+				
service_availability_descriptor	0 × 72			+				
Reserved for future use	0 × 73 to 0 × 7F							
User defined	0 × 80 to 0 × 82							
logical_channel_descriptor[7]	0 × 83	+						
User defined	0 × 84 to 0 × FE							
Forbidden	0 × FF							

NOTE 1: Only found in Partial Transport Streams.

NOTE 2: Only in the TSDT (Transport Streams Description Table).

The DVB defined public descriptor for AC-3 audio has the tag value 0 × 6A. The AC-3 descriptor is intended to appear in the PMT table to provide configuration information for IRDs equipped to decode AC-3 audio.

The DVB AC-3 descriptor (see ETSI EN 300 468 [20]) shall be used in the PSI PMT to identify streams which carry AC-3 audio. The descriptor is to be located in a program map section following the relevant ES_info_length field. In the AS/NZS 13818.1 [3] Program Map Table (PMT) the value of stream_type for any PID carrying DVB AC-3 audio stream shall be '0 × 06' (indicates a PES carrying private data).

[7] Used with approval. Copyright of the logical_channel_descriptor is vested in the Digital TV Group.

4.2.3 Content descriptor (Clause 6.2.9 in ETSI EN 300 468 [20])

This Clause contains the Australian modifications to Clause 6.2.9 of ETSI EN 300 468 [20] which is presented below in Table 4.2.[8]

The intention of the content descriptor is to provide classification information for an event.

TABLE 4.2

CONTENT DESCRIPTOR
(Table 27 in Clause 6.2.9 of ETSI EN 300 468 [20])

Syntax	No. of Bits	Identifier
content_descriptor(){		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
for (i=0; i<N; i++) {		
content_nibble_level_1	4	uimsbf
content_nibble_level_2	4	uimsbf
user_nibble	4	uimsbf
user_nibble	4	uimsbf
}		
}		

Semantics of the content descriptor

content_nibble_level_1: This 4 bit field represents the first level of a content identifier. This field shall be coded according to Table 4.3.

content_nibble_level_2: This 4 bit field represents the second level of a content identifier. This field shall be coded according to Table 4.3.

user_nibble: This 4 bit field is defined by the broadcaster.

4.2.4 Extended event descriptor (Clause 6.2.15 in ETSI EN 300 468 [20])

The transmission of the extended_event_descriptor is optional. When used the extended event descriptor may provide long strings of synoptic information describing the program event content.

It is intended that receivers will decode the values of the extended_event_descriptor in accordance with ETSI EN 300 468 Clause 6.2.15 [20].

Australian broadcasters have provided guidance in the use of the extended_event_descriptor for transmission and display of synopsis information about a program event, in the receivers Electronic Service Information Guide.[9]

[8] Refer to CTVA OP39 [34] (www.ctva.com.au)

[9] Refer to CTVA OP44 [39] (www.ctva.com.au).

TABLE 4.3

Content_nibble LEVEL 1 AND 2 ASSIGNMENTS
(Table 28 in Clause 6.2.9 of ETSI EN 300 468 [20])

Content_nibble_level_1 default values	Content Nibble 1 and 2 values		Description
	Content_nibble _level_1 values	Content_nibble _level_2 values	
0 × 0	0 × 0	0 × 0–0 × F	undefined content
0 × 1			**Movie**
	0 × 1	**0 × 0**	movie (general)
	0 × 1	0 × 1–0 × E	reserved for future use
	0 × 1	0 × F	user defined
0 × 2			**News**
	0 × 2	**0 × 0**	news (general)
	0 × 2	0 × 1–0 × E	reserved for future use
	0 × 2	0 × F	user defined
0 × 3			**Entertainment**
	0 × 3	**0 × 0**	entertainment (general)
	0 × 3	0 × 1–0 × E	reserved for future use
	0 × 3	0 × F	user defined
0 × 4			**Sport**
	0 × 4	**0 × 0**	sport (general)
	0 × 4	0 × 1–0 × E	reserved for future use
	0 × 4	0 × F	user defined
0 × 5			**Childrens**
	0 × 5	**0 × 0**	childrens (general)
	0 × 5	0 × 1–0 × E	reserved for future use
	0 × 5	0 × F	user defined
0 × 6			**Music**
	0 × 6	**0x0**	music (general)
	0 × 6	0 × 1–0 × E	reserved for future use
	0 × 6	0 × F	user defined
0 × 7			**Arts/Culture**
	0 × 7	**0 × 0**	arts/culture (general)
	0 × 7	0 × 1–0 × E	reserved for future use
	0 × 7	0 × F	user defined

(*continued*)

TABLE 4.3 (*continued*)

Content_nibble_level_1 default values	Content Nibble 1 and 2 values		Description
	Content_nibble _level_1 values	Content_nibble _level_2 values	
0 × 8			**Current Affairs**
	0 × 8	**0 × 0**	current affairs (general)
	0 × 8	0 × 1–0 × E	reserved for future use
	0 × 8	0 × F	user defined
0 × 9			**Education/Information**
	0 × 9	**0 × 0**	education/information (general)
	0 × 9	0 × 1–0 × E	reserved for future use
	0 × 9	0 × F	user defined
0 × A			**Infotainment**
	0 × A	**0 × 0**	infotainment (general)
	0 × A	0 × 1–0 × E	reserved for future use
	0 × A	0 × F	user defined
0 × B			**Special**
	0 × B	**0 × 0**	special (general)
	0 × B	0 × 1–0 × E	reserved for future use
	0 × B	0 × F	user defined
0 × C			**Comedy**
	0 × C	**0 × 0**	comedy (general)
	0 × C	0 × 1–0 × E	reserved for future use
	0 × C	0 × F	user defined
0 × D			**Drama**
	0 × D	**0 × 0**	drama (general)
	0 × D	0 × 1–0 × E	reserved for future use
	0 × D	0 × F	user defined
0 × E			**Documentary**
	0 × E	**0 × 0**	Documentary (general)
	0 × E	0 × 1–0 × E	reserved for future use
	0 × E	0 × F	user defined
0 × F	0 × F	0 × 1–0 × F	user defined

4.2.5 Linkage descriptor (Clause 6.2.17 in ETSI EN 300 468 [20])

In Australia, the implementation of the linkage descriptor applies to specific applications.

Linkage type 0×05 where the linkage descriptor is located in the SDT for service replacement service applications.[10]

Linkage types 0×09 and $0 \times 0A$ where the linkage descriptor is located in the NIT and UNT for System Software Update applications (refer to ETSI TS 102 006 [25]). [11]

4.2.6 Local time offset descriptor (Clause 6.2.18 in ETSI EN 300 468 [20])

This clause contains the Australian modifications to Clause 6.2.18 of ETSI EN 300 468 [20] which are presented in Tables 4.4 and 4.5.

The local time offset descriptor may be used in the TOT to describe country specific dynamic changes of the local time offset relative to UTC.

TABLE 4.4

LOCAL TIME OFFSET DESCRIPTOR
(Table 54 in Clause 6.2.18 of ETSI EN 300 468 [20])

Syntax	No. of bits	Identifier
local_time_offset_descriptor(){		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
for (i=0; i<N; i++){		
country_code	24	bslbf
country_region_id	6	bslbf
reserved	1	bslbf
local_time_offset_polarity	1	bslbf
local_time_offset	16	bslbf
time_of_change	40	bslbf
next_time_offset	16	bslbf
}		
}		

Semantics for the local time offset descriptor

country_code: This 24 bit field identifies a country using the 3 character code as specified in AS/NZS 2632.1 [1] and AS/NZS 2632.2 [2]. Each character is coded into 8 bits according to ISO/IEC 8859-1 [12] and inserted in order into the 24 bit field. In the case that the 3 characters represent a number in the range of 900 to 999, then country code specifies an ETSI defined group of countries.

These allocations are found in Draft ETSI TR 101 162 [22]. Country codes for groups of countries shall be limited to those within a single time zone.

EXAMPLE: Australia has 3character code 'AUS', which is coded as:
'0100 0001 0101 0101 0101 0011'.

---

10 Refer to CTVA OP43 [38] (www.ctva.com.au).

11 Refer to CTVA OP46 [40] (www.ctva.com.au)

country_region_id: This 6 bit field identifies a zone in the country which is indicated by country_code.

This is set to '000000' when there are no different local time zones in the country.

TABLE 4.5

CODING OF COUNTRY_REGION_ID
(Australian addition which replaces Table 55 in Clause 6.2.17 of ETSI EN 300 468 [20])

Country_region_id	Description	Australian Postcode Equivalent[12] (Informative)
00 0000	no time zone extension used	
00 0001	Reserved	Used for business postal codes[13]
00 0010	NSW/ACT	2XXX
00 0011	VIC	3XXX
00 0100	QLD	4XXX
00 0101	SA	5XXX
00 0110	WA	6XXX
00 0111	TAS	7XXX
00 1000	NT	08XX
00 1001 – 11 1100	reserved for future use	
11 1101 – 11 1111	Reserved	

local_time_offset_polarity: This 1 bit information indicates the polarity of the following local_offset_time.
If this bit is set to '0' the polarity is positive and the local time is advanced to UTC. (Usually east direction from Greenwich). If this bit is set to '1' the polarity is negative and the local time is behind UTC.

local_time_offset: This 16 bit field contains the current offset time from UTC in the range between –12 hours and +12 hours at the area which is indicated by the combination of country_code and country_region_id in advance. These 16 bits are coded as 4 digits in 4 bit BCD in the order hour tens, hour, minute tens, and minutes.

time_of_change: This is a 40 bit field which specifies the date and time in MJD and UTC (see Annex C of ETSI EN 300 468 [20], when the time change takes place. This 40 bit field is coded as 16 bits giving the 16 LSBs of MJD followed by 24 bits coded as 6 digits in the 4 bit BCD.

next_time_offset: This 16 bit field contains the next offset time after the change from UTC in the range between –12 hours and +13 hours at the area which is indicated by the combination of country_code and country_region_id in advance. These 16 bits are coded as 4 digits in 4 bit BCD in the order hour tens, hour, minute tens, and minutes.

---

[12] Included where decoders accept postcode in the user set up menus. It is recommended that decoders accept postcode entries for use with future multimedia applications.

[13] This value is used for business postcodes that have no regional context.

4.2.7 Logical channel descriptor[14] (Australian addition)

This Clause contains additional tables with Australian requirements, Tables 4.6, 4.7 and 4.8.

The logical channel descriptor provides a default channel label for services. This information is dynamic. The logical channel descriptor may be inserted once in the second descriptor loop of the NIT.

Additional information on the implementation of the logical_channel_descriptor may be obtained from Australian broadcasters[15].

TABLE 4.6

LOGICAL CHANNEL DESCRIPTOR
(Australian addition)

Syntax	No. of bits	Mnemonic
logical_channel_descriptor{		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
for (i=o; i<N; i++){		
service_id	16	uimsbf
reserved	6	bslbf
logical_channel_number	10	uimsbf
}		
}		

descriptor_tag: This shall be assigned to be $[0 \times 83]$[16]

service_id: This is a 16 bit field which serves as a label to identify this service from any other service within the Transport Stream. The service_id is the same as the program_number in the corresponding program_map_section. Services shall be included irrespective of their running status.

reserved: All 'reserved' bits shall be set to '1'.

logical_channel_number: This is a 10 bit field which indicates the broadcaster preference for ordering services. Its use is defined in Table 4.7.

TABLE 4.7

LOGICAL CHANNEL NUMBER
(Australian addition)

logical_channel_number	Description
000	Undefined
001 – 999	logical_channel_number
1000 – 1023	Reserved for future use

14 Used with approval. Copyright of the logical_channel_descriptor is vested in the Digital TV Group.

15 Refer to the CTVA OP41 [36] (www.ctva.com.au).

16 Refer to Table 4.1 for the descriptor tag value for the logical_channel_descriptor.

The rules for use of the logical channel number descriptor are:

(a) Every service shall be allocated a logical channel number.

(b) The values shall be allocated within the range indicated in Table 4.8 and be implemented by broadcasters in accordance with CTVA OP41 [36][15]. A broadcaster may start the set of logical channel numbers at any value, and need not be contiguous.

(c) A logical channel number shall be unique to one service.

(d) A service may be allocated more than one logical channel number.

Table 4.8 shows the allocation of logical_channel_numbers to broadcasters:

TABLE 4.8

LOGICAL CHANNEL NUMBER ALLOCATIONS
(Australian addition)

logical_channel_number	Description
001 to 349	Reserved for broadcaster allocated channel numbers
350 to 399	Shall not be broadcast in Australia
400 to 999	Reserved for broadcaster allocated channel numbers

4.2.8 Parental rating descriptor (Clause 6.2.26 in ETSI EN 300 468 [20])

This clause contains the Australian modifications to Clause 6.2.26 of ETSI EN 300 468 [20], which are presented in Tables 4.9 and 4.10.

This descriptor gives a rating based on age and allows for extensions based on other rating criteria.

TABLE 4.9

PARENTAL RATING DESCRIPTOR
(Table 67 in Clause 6.2.26 of ETSI EN 300 468 [20])

Syntax	No. of bits	Identifier
parental_rating_descriptor(){		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
for (i=0;i<N;i++){		
country_code	24	bslbf
rating	8	uimsbf
}		
}		

Semantics for the parental rating descriptor

country_code: This 24 bit field identifies a country using the 3 character code as specified in AS/NZS 2632.1 [1] and AS/NZS 2632.2 [2]. Each character is coded into 8 bits according to ISO/IEC 8859-1 [12] and inserted in order into the 24 bit field. In the case that the 3 characters represent a number in the range 900 to 999, then country_code specifies an ETSI defined group of countries. These allocations are found in Draft ETSI TR 101 162 [22].

EXAMPLE: Australia has a 3character code ‘AUS’, which is coded as:
‘0100 0001 0101 0101 0101 0011’.

rating: This 8 bit field is coded according to Table 4.10, giving the Australian Parental Guide Code and suggested wording for the onscreen display.

TABLE 4.10

PARENTAL RATING DESCRIPTOR, RATING
(Australian addition, which replaces Table 68 in Clause 6.2.25 of ETSI EN 300 468 [20])

			Receiver menu set-up and suggested OSD wording for setting blocking (Restriction of access)							
			Block all	Block G and above (optional)	Block PG and above	Block M and above	Block MA and above	Block AV and above	Block R and above	No block
Transmitted rating hex code	**Australian parental guide code**	**On-screen display**	**Resultant receiver action to received hex code ✓ is show program X is block until pin entered**							
0 × 00	**Not Classified**		X	✓	✓	✓	✓	✓	✓	✓
0 × 01			X	✓	✓	✓	✓	✓	✓	✓
0 × 02	**P** Pre school	**P**	X	✓	✓	✓	✓	✓	✓	✓
0 × 03		P	X	✓	✓	✓	✓	✓	✓	✓
0 × 04	**C** Children	**C**	X	✓	✓	✓	✓	✓	✓	✓
0 × 05		C	X	✓	✓	✓	✓	✓	✓	✓
0 × 06	**G** General	**G**	X	X	✓	✓	✓	✓	✓	✓
0 × 07		G	X	X	✓	✓	✓	✓	✓	✓
0 × 08	**PG** Parental Guidance recommended	**PG**	X	X	X	✓	✓	✓	✓	✓
0 × 09		PG	X	X	X	✓	✓	✓	✓	✓
0 × 0A	**M** Mature Adult Audience 15+	**M**	X	X	X	X	✓	✓	✓	✓
0 × 0B		M	X	X	X	X	✓	✓	✓	✓
0 × 0C	**MA** Mature Adult Audience 15+	**MA**	X	X	X	X	X	✓	✓	✓
0 × 0D		MA	X	X	X	X	X	✓	✓	✓
0 × 0E	**AV** Adult, Strong Violence 15+	**AV**	X	X	X	X	X	X	✓	✓
0 × 0F	**R** Restricted 18+	**R**	X	X	X	X	X	X	X	✓

NOTE: It is recommended that the defined values of the Australian Parental Guidance Code (indicated in bold) should be used. The undefined values for the Australian Parental Rating Guidance Code are available for future use.

4.2.9 Short event descriptor (Clause 6.2.35 in ETSI EN 300 468 [20])

The transmission of the short_event_descriptor is mandatory in the Event Information Table sections.

Australian broadcasters have provided guidance in the use of the short_event_descriptor for the transmission and display of the name of the scheduled program event and the episode name, in a receiver's Electronic Service Information Guide. [17]

4.3 DIGITAL VIDEO BROADCASTING (DVB); GUIDELINES ON IMPLEMENTATION AND USAGE OF SERVICE INFORMATION (SI) (Clauses 4.2.4.7 and 4.2.5.1 of ETSI TR 101 211 [21])

4.3.1 Introduction

This Clause contains the Australian modifications to ETSI TR 101 211 [21].

The relevant ETSI clauses are listed below along with the corresponding clause numbers in this Standard.

ETSI clause number	Status	Clause title	Reference to this Standard
4.2.4.7	Modified	Parental rating descriptor	Clause 4.3.2
4.2.5.1	Modified	Local time offset descriptor	Clause 4.3.3

4.3.2 Parental rating descriptor (Clause 4.2.4.7 in ETSI TR 101 211 [21])

This descriptor is used to give a rating of the program based on age or other criteria that is used to prevent children from viewing unsuitable programs. If there is a time_shifted_event_descriptor, this descriptor is not allowed, since the parental rating information can be provided in the EIT sub-table for the corresponding NVOD reference service. The parental_rating_descriptor may appear just once in a loop. Transmission of this descriptor is optional.

Country_codes relating to groups of countries may be used within the descriptor. If, as a result, there is more than one entry for a country in the descriptor, then the first entry in the descriptor which includes the country shall take precedence over any subsequent entry. For Australia, the following sequence of data within the descriptor would describe a parental rating of Parental Guidance Recommended (PG):

EXAMPLE: country_code = AUS ('0100 0001 0101 0101 0101 0011')
rating = 0x08

4.3.3 Local time offset descriptor (Clause 4.2.5.1 in ETSI TR 101 211 [21])

This descriptor may be used to indicate the local time offset and the automatic adjustment between summer and winter time by an IRD.

The data given in the descriptor will be constant for most of the time, but will change in the transitions from summer time to winter time and vice versa. In the TOT descriptor loop the local time offset descriptor may occur more than once. It is assumed that the same set of countries/country regions be included in each transmission of the TOT.

The decoder should use the offset described by the 'local_time_offset' if the 'time_of_change' is in the future and the 'next_time_offset' otherwise.

---

17 Refer to CTVA OP44 [39] (www.ctva.com.au).

If the time of the next change is unknown, or there is no next change (in the case of a region that does not use daylight saving) then the time_of_change field shall contain a valid value and the next_time_offset field shall convey the same value as the local_time_offset field.

If a country uses more than one time zone, the country_region_id field identifies the different regions of the country with different time zones. Refer to Table 4.5 in this Standard.

Example data for the descriptor fields:

country_code:	**'0100 0001 0101 0101 0101 0011' (AUS)**
country_region_id	**'00 0010' (NSW/ACT)**
local_time_offset_polarity	**'0' (advanced to UTC, east of Greenwich)**
local_time_offset	**'0001000100000000' (Summer: Australian Eastern Daylight Saving Time +11 hours UTC)**
	'0001000000000000' (Winter: Australian Eastern Standard Time +10 hours UTC)

The descriptor may be applied in the following applications—

(a) display of the current local time on the IRD or TV screen;

(b) display of the program guide in local time; and

(c) timer programming of the video recorder in local time.

4.4 DIGITAL VIDEO BROADCASTING SYSTEMS FOR TELEVISION, SOUND AND DATA SERVICES; ALLOCATION OF SERVICE INFORMATION (SI) CODES FOR DIGITAL VIDEO BROADCASTING (DVB) SYSTEMS (Clauses 4.1, 4.1a, 4.2 and 4.5 in Draft ETSI TR 101 162 [22])

4.4.1 Introduction

This Clause contains the Australian modifications to Draft ETSI TR 101 162 [22].

Australia has registered its original_network_ids and network_ids, with the DVB project Office. These allocations have been formatted to an Australian implementation of original_network_ids, network_ids and also transport_stream_ids and service_ids. These allocations are held by the Australian Broadcasting Authority on behalf of the DVB Project office and further information can be obtained by reference to CTVA OP40 [35].[18]

The relevant ETSI clauses are listed below along with the corresponding clause numbers in this Standard.

ETSI clause number	Status	Clause title	Reference to this Standard
4.1	Modified	Original Network identification coding	Clause 4.4.2
4.1a	Modified	Network identification coding	Clause 4.4.3
4.2	Modified	Bouquet_id	Clause 4.4.4
4.5	Modified	Private data specifier values	Clause 4.4.5

[18] Refer to CTVA OP40 [35] *DVB* (www.ctva.com.au).

4.4.2 Original Network identification coding (Clause 4.1 in Draft ETSI TR 101 162 [22])

The implementation of original_network_id coding for digital television broadcasting in Australia is the result of extensive consultation with the DVB Project Office and the Australian Broadcasting Authority.

Additional information on the assignment of individual values for original_network_id may be obtained from Australian broadcasters[19].

The original_network_id values shown in Table 4.11, are intended for Australian digital television transmissions where the footprint of the transmission may extend beyond the borders of Australia.

For terrestrial original_network_id applications see Clause 4.4.3.

TABLE 4.11

ORIGINAL_NETWORK_ID
(Table 1 in Draft ETSI TR 101 162 [22])

original_network_id	Description	Operator
0 × 1010-0 × 101F	Australian TV Networks	Australian Broadcasting Authority
0 × 2024	Australian DTTB Reference Transport Stream	Australian Broadcasting Authority

4.4.3 Network identification coding (Clause 4.1a in Draft ETSI TR 101 162 [22])

The implementation of network_id coding for digital terrestrial television broadcasting in Australia is the result of extensive consultation with the DVB Project Office and the Australian Broadcasting Authority.

Table 4.12 lists the range of re-useable terrestrial values of network_id assigned for use in Australia. In a purely terrestrial context, bounded by geographical constraints, these values may be used for either network_id or original_network_id, or both, in accordance with ETSI EN 300 468 [20] and ETSI TR 101 211 [21], as appropriate.

The values in Table 4.12 shall not be used as original_network_ids, where the services may be received internationally.

Additional information on the assignment of individual network values for network ids and original_network_ids, may be obtained from Australian broadcasters[19].

TABLE 4.12

NETWORK _ID ALLOCATION TEMPLATE
(Table 2 in Draft ETSI TR 101 162 [22])

network_id	Description	Network type	Country Code(s) of validity	Operator
	Reusable terrestrial			
0 × 3201 — 0 × 3300	Australian Digital Terrestrial Television	Terrestrial	Australia	Australian Broadcasting Authority

[19] Values Assigned to Australia are registered with the DVB Project Office; Refer to CTVA OP40 [35] (www.ctva.com.au).

4.4.4 Bouquet_id (Clause 4.2 in Draft ETSI TR 101 162 [22])

The implementation of bouquet_id coding for terrestrial television has been researched and a methodology for implementation in Australia has been identified in consultation with the DVB Project Office and the Australian Broadcasting Authority.

Additional information on the assignment of individual values for bouquet_id may be obtained from Australian broadcasters.[20]

Table 4.13 Bouquet_id contains the values applicable to the coding of bouquet_id to meet Australian requirements.

TABLE 4.13

BOUQUET_ID
(Table 4 in Draft ETSI TR 101 162 [22])

Bouquet_id	Bouquet name	Country Code(s) of validity	Bouquet operator
0 × 3200 — 0 × 320F	Australian Digital Terrestrial Television	Australia	Australian Broadcasting Authority

4.4.5 Private data specifier values (Clause 4.5 in Draft ETSI TR 101 162 [22])

The implementation of the private_data_specifier coding for terrestrial television has been researched and a methodology for implementation in Australia has been identified in consultation with the DVB Project Office and the Australian Broadcasting Authority.

Additional information on the assignment of individual values for private_data_specifier may be obtained from Australian broadcasters.[21]

Table 4.14 Private data specifier contains the values applicable to the coding of private_data_specifier to meet Australian requirements.

Australia has applied to the DVB project office for the assignment of the values 0 × 00003200 to 0 × 0000320F to terrestrial broadcast operators.

TABLE 4.14

(Table 7 in Draft ETSI TR 101 162 [22])
PRIVATE DATA SPECIFIER VALUES

Private data specifier values	Organisation specifying private SI codes
0 × 00000000	Reserved
0 × 00003200 — 0 × 0000320F	Australian Terrestrial Television Networks

[20] Values Assigned to Australia are registered with the DVB Project Office

[21] Refer to the CTVA OP40 [35] (www.ctva.com.au).

SECTION 5 DATA

5.1 DIGITAL VIDEO BROADCASTING (DVB); DVB SPECIFICATION FOR DATA BROADCASTING (ETSI EN 301 192 [23])

This Standard references ETSI EN 301 192 [23].

ETSI EN 301 192 [23] has been identified as suitable for Australian application and is adopted for the Australian DTTB transmission Standard.

5.2 DIGITAL VIDEO BROADCASTING (DVB); IMPLEMENTATION GUIDELINES FOR DATA BROADCASTING (ETSI TR 101 202 [24])

This Standard references ETSI TR 101 202 [24]).

ETSI TR 101 202 [24] has been identified as suitable for Australian application and is adopted for the Australian DTTB transmission Standard.

5.3 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR THE CARRIAGE OF VERTICAL BLANKING INFORMATION (VBI) DATA IN DVB BIT-STREAMS (ETSI EN 301 775 [18])

This Standard references ETSI EN 301 775 [18].

ETSI EN 301 775 [18] has been identified as suitable for Australian application and is adopted for the Australian DTTB transmission Standard.

5.4 DIGITAL VIDEO BROADCASTING (DVB); SPECIFICATION FOR SYSTEM SOFTWARE UPDATE IN DVB SYSTEMS (ETSI TS 102 006 [25])

This Standard references ETSI TS 102 006 [25].

Certain limitations on the scope of ETSI TS 102 006 [25] are necessary in the Australian implementation of digital terrestrial television due to the number and diversity of terrestrial network operators.[22]

DRAFT

[22] Refer to the CTVA OP46 [40] www.ctva.com.au).

SECTION 6 MODULATION

6.1 GENERAL

This Section includes modifications to the current versions of ETSI EN 300 744 [26], and ETSI TS 101 191 [27] to meet the Australian requirements for modulation.

The changes are prompted by the potential use in Australia of a number of available 6 MHz channels, the use of 7 MHz channel bandwidth and the modulation being a variant of PAL-B system not covered by ETSI EN 300 744 [26].

This Australian Standard has been adjusted to give the 6 and 7 MHz figures in the main text.

Modifications included in this Australian Standard have been recommended to DVB for consideration in future revisions of ETSI EN 300 744 [26] and ETSI TS 101 191 [27].

6.2 DIGITAL VIDEO BROADCASTING (DVB); FRAMING STRUCTURE, CHANNEL CODING AND MODULATION FOR DIGITAL TERRESTRIAL TELEVISION (Clauses 4.4, 4.5.1, 4.5.3, 4.5.5, 4.7, 4.6.2.10, 4.8.1, 4.5.5, 4.8.2, 4.8.3, Annexes A and E of ETSI EN 300 744 [26])

6.2.1 Introduction

This Clause contains the Australian modifications to ETSI EN 300 744 [26] with the inclusion of new information for Bandwidth.

The relevant ETSI clauses are listed below along with the corresponding clause numbers in this Standard.

ETSI clause number	Status	Clause title	Reference to this Standard
4.4	Modified	OFDM frame structure	Clause 6.2.2
4.5.1	Modified	Functions and derivation	Clause 6.2.3
4.5.3	Modified	Location of scattered pilot cells	Clause 6.2.4
4.7	Modified	Number of RS-packets per OFDM super-frame	Clause 6.2.5
4.6.2.10	Accepted	Cell identifier	
4.8.1	Modified	Spectrum characteristics	Clause 6.2.6
4.5.5	Modified	Amplitudes of all reference information	Clause 6.2.7
4.8.2	Modified	Out-of–band spectrum mask (for 7 MHz channels)	Clause 6.2.8
4.8.3	Modified	Centre frequency of RF signal (for 7 MHz channels)	Clause 6.2.9
Annex A	Modified	Simulated system performance for 7 MHz channels	Clause 6.2.10
Annex E	Modified	Values for 6 MHz, 7 MHz and 8 MHz channels	Clause 6.2.11

6.2.2 OFDM frame structure (Clause 4.4 in ETSI EN 300 744 [26])

The transmitted signal is organized in frames. Each frame has a duration of T_F, and consists of 68 OFDM symbols. Four frames constitute one super-frame. Each symbol is constituted by a set of K = 6 817 carriers in the 8 K mode and K = 1 705 carriers in the 2 K mode and transmitted with a duration T_S. It is composed by parts: a useful part with duration T_U and a guard interval with a duration Δ. The guard interval consists in a cyclic continuation of the useful part, T_U, and is inserted before it. Four values of guard intervals may be used according to Table 6.2.

The symbols in an OFDM frame are numbered from 0 to 67. All symbols contain data and reference information.

Since the OFDM signal comprises many separately-modulated carriers, each symbol can in turn be considered to be divided into cells, each corresponding to the modulation carried on one carrier during one symbol.

In addition to the transmitted data an OFDM frame contains:

(a) Scattered pilot cells.

(b) Continual pilot carriers;

(c) TPS carriers.

The pilots can be used for frame synchronization, frequency synchronization, time synchronization, channel estimation, transmission mode identification and can also be used to follow the phase noise.

The carriers are indexed by k ∈ [K_{min}; K_{max}]and determined by K_{min} = 0 and K_{max} = 1 704 in 2 K mode and 6 816 in 8 K mode respectively. The spacing between adjacent carriers is $1/T_U$ while the spacing between carriers K_{min} and K_{max} is determined by (K1)/T_U. The numerical values for the OFDM parameters for the 8 K and 2 K modes are given in Tables 6.1 and 6.2 for 7 MHz channels and in Clause 6.2.11, Tables 6.11 and 6.13 for 6 MHz and 8 MHz channels. The values for the various time-related parameters are given in multiples of the elementary period T and in microseconds. The elementary period T is 7/64 µs for 8 MHz channels, 1/8 µs for 7 MHz channels and 7/48 µs for 6 MHz channels.

TABLE 6.1

NUMERICAL VALUES FOR THE OFDM PARAMETERS FOR THE 8 K AND 2 K MODE FOR 7 MHz CHANNELS (Table 4 in ETSI EN 300 744 [26])

Parameter	8 K mode	2 K mode
Number of carriers K	6 817	1 705
Value of carrier number K_{min}	0	0
Value of carrier number K_{max}	6 816	1 704
Duration T_U	1024 µs	256 µs
Carrier spacing $1/T_U$ (note 1) (note 2)	*976,6 Hz*	*3 906 Hz*
Spacing between carriers K_{min} and K_{max} (K1)/T_U (note 2)	6,65625 MHz	6,65625 MHz

NOTES:

1 Values in italics are approximate values.

2 Values above are for 7 MHz channels. Values for 6 and 8 MHz channels are given in Clause 6.2.11.

The emitted signal is described by the following expression:

$$s(t) = \left\{ e^{j\,2\pi\,f_{\mathrm{c}}t} \sum_{m=0}^{\infty} \sum_{l=0}^{67} \sum_{k=K_{\min}}^{K_{\max}} c_{\mathrm{m,l,k}} \times \Psi_{\mathrm{m,l,k}}(t) \right\}$$

where:

$$\Psi_{\mathrm{m,l,k}}(t) = \begin{cases} e^{j2\pi\,\frac{k'}{T_{\mathrm{U}}}(t-\Delta-l\times T_s-68\times m\times T_{\mathrm{s}})} & (l+68\times m)\times T_{\mathrm{s}} \le t \le (l+68\times m+1)\times T_{\mathrm{s}} \\ 0 & else \end{cases}$$

where:

K	denotes the carrier number
l	denotes the OFDM symbol number
m	denotes the transmission frame number
K	is the number of transmitted carriers
T_{S}	is the symbol duration
T_{U}	is the inverse of the carrier spacing
Δ	is the duration of the guard interval
f_{c}	is the central frequency of the RF signal
k'	is the carrier index relative to the centre frequency, $k' = k - (K_{\max} + K_{\min})/2$
$c_{\mathrm{m,0,k}}$	complex symbol for carrier k of the Data symbol no. 1 in frame number m
$c_{\mathrm{m,1,k}}$	complex symbol for carrier k of the Data symbol no. 2 in frame number m
…	
$c_{\mathrm{m,67,k}}$	complex symbol for carrier k of the Data symbol no. 68 in frame number m.

DRAFT

TABLE 6.2

DURATION OF SYMBOL PART FOR THE ALLOWED GUARD INTERVALS FOR 7 MHz CHANNELS (Table 5 in ETSI EN 300 744 [26])

Mode	8 K mode				2 K mode			
Guard interval Δ / T_U	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32
Duration of symbol part T_U	8 192 × T 1024 µs (note)				2 048 × T 256 µs (note)			
Duration of guard Interval Δ	2 048 × T 256 µs	1 024 × T 128 µs	512 × T 64 µs	256 × T 32 µs	512 × T 64µs	256 × T 32 µs	128 × T 16 µs	64 × T 8 µs
Symbol duration $T_S = \Delta + T_U$	10 240 × T 1280 µs	9 216 × T 1152 µs	8 704 × T 1088 µs	8 448 × T 1056 µs	2 560 × T 320 µs	2 304 × T 288 µs	2 176 × T 272µs	2 112 × T 264 µs

NOTE: Values for 7 MHz channels. Values for 6 and 8 MHz channels are given in Clause 6.2.11.

The $c_{m,l,k}$ values are normalized modulation values of the constellation point z (see Figure 9 in [26]) according to the modulation alphabet used for the data. The normalization factors yield $E[c \times c^*] = 1$ and are shown in Table 6.3.

TABLE 6.3

NORMALIZATION FACTORS FOR DATA SYMBOLS (Table 6 in ETSI EN 300 744 [26])

Modulation scheme		Normalization factor
QPSK		$c = z/\sqrt{2}$
16QAM	$\alpha = 1$	$c = z/\sqrt{10}$
	$\alpha = 2$	$c = z/\sqrt{20}$
	$\alpha = 4$	$c = z/\sqrt{52}$
64QAM	$\alpha = 1$	$c = z/\sqrt{42}$
	$\alpha = 2$	$c = z/\sqrt{60}$
	$\alpha = 4$	$c = z/\sqrt{108}$

6.2.3 Functions and derivation (Clause 4.5.1 in ETSI EN 300 744 [26])

Various cells within the OFDM frame are modulated with reference information whose transmitted value is known to the receiver. Cells containing reference information are transmitted at 'boosted' power level (see Clause 6.2.7). The information transmitted in these cells are scattered or continual pilot cells.

Each continual pilot coincides with a scattered pilot every fourth symbol; the number of useful data carriers is constant from symbol to symbol: 1 512 useful carriers in 2 K mode and 6 048 useful carriers in 8 K mode. The number of continual pilots per symbol remains constant whereas the number of scattered pilots varies between symbols in the pattern shown in Figure 1. The number of occasions continual pilots coincide with the scattered pilots varies between symbols and has a pattern of 12, 11, 11, 11, 12 (45, 44, 44, 44, 45) for 2 K (8 K).

The value of the scattered or continual pilot information is derived from a PRBS (Pseudo Random Binary Sequence) which is a series of values, one for each of the transmitted carriers (see Clause 4.5.2 of ETSI EN 300 744 [26]).

6.2.4 Location of scattered pilot cells (Clause 4.5.3 in ETSI EN 300 744 [26])

Reference information, taken from the reference sequence, is transmitted in scattered pilot cells in every symbol. Scattered pilot cells are always transmitted at the 'boosted' power level (see Clause 6.2.7). Thus the corresponding modulation is given by:

$$Re\{c_{m,l,k}\} = 4/3 \times 2\ (½\ \ w_k)$$

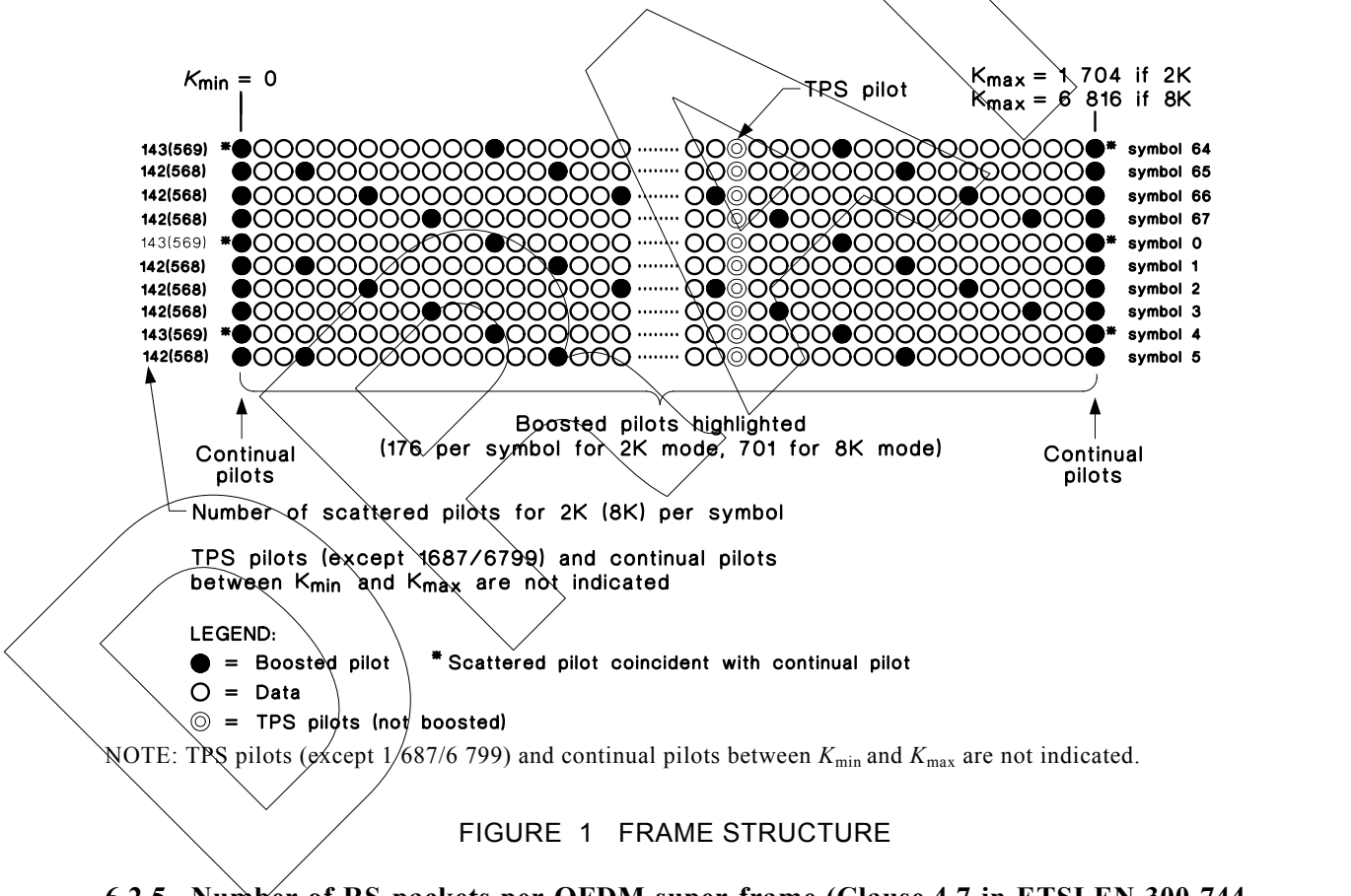
$$Im\{c_{m,l,k}\} = 0$$

Where m is the frame index, k is the frequency index of the carriers and l is the time index of the symbols.

For the symbol of index 1 (ranging from 0 to 67), carriers for which index k belongs to the subset
$\{k = K_{min} + 3 \times (1 \bmod 4) + 12p \mid$ p integer, p ≥ 0, $k \in [K_{min}; K_{max}]\}$ are scattered pilots.

Where p is an integer that takes all possible values greater than or equal to zero, provided that the resulting value for k does not exceed the valid range $[K_{min};K_{max}]$.

The pilot insertion pattern is shown in Figure 1.



NOTE: TPS pilots (except 1 687/6 799) and continual pilots between K_{min} and K_{max} are not indicated.

FIGURE 1 FRAME STRUCTURE

6.2.5 Number of RS-packets per OFDM super-frame (Clause 4.7 in ETSI EN 300 744 [26])

The OFDM frame structure allows for an integer number of Reed-Solomon 204 byte packets to be transmitted in an OFDM super-frame, and therefore avoids the need for any stuffing, whatever the constellation, the guard interval length, the coding rate or the channel bandwidth may be. (See Table 6.4.)

The first data byte transmitted in an OFDM super-frame shall be one of the SYNC/ $\overline{\text{SYNC}}$ bytes.

TABLE 6.4

NUMBER OF REED-SOLOMON PACKETS PER OFDM SUPER-FRAME FOR ALL COMBINATIONS OF GUARD INTERVAL, CODE RATES AND MODULATION FORMS
(Australian addition)

Code rate	QPSK		16QAM		64QAM	
	2 K mode	8 K mode	2 K mode	8 K mode	2 K mode	8 K mode
1/2	252	1008	504	2016	756	3024
2/3	336	1344	672	2688	1008	4032
3/4	378	1512	756	3024	1134	4536
5/6	420	1680	840	3360	1260	5040
7/8	441	1764	882	3528	1323	5292

TABLE 6.5

USEFUL BITRATE (MBIT/S) FOR ALL COMBINATIONS OF GUARD INTERVAL, CONSTELLATION AND CODE RATE FOR NONHIERARCHICAL SYSTEMS FOR 7 MHz CHANNELS
(Australian addition)

Modulation	Code rate	Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4,354412	4,838235	5,122837	5,278075
	2/3	5,805882	6,450980	6,830450	7,037433
	3/4	6,531618	7,257353	7,684256	7,917112
	5/6	7,257353	8,063725	8,538062	8,796791
	7/8	7,620221	8,456912	8,964965	9,236631
16QAM	1/2	8,708824	9,676471	10,245675	10,556150
	2/3	11,611765	12,901961	13,660900	14,074866
	3/4	13,063235	14,514706	15,368512	15,834225
	5/6	14,514706	16,127451	17,076125	17,593583
	7/8	15,240441	16,933824	17,929931	18,473262
64QAM	1/2	13,063235	14,514706	15,368512	15,834225
	2/3	17,417647	19,352941	20,491349	21,112299
	3/4	19,594853	21,772059	23,052768	23,751337
	5/6	21,772059	24,191176	25,614187	26,390374
	7/8	22,860662	25,400735	26,894896	27,709893

NOTES:

1 Values above are for 7 MHz channels. Values for 6 and 8 MHz channels are given in Clause 6.2.11.

2 For correct operation of transmission (with no bit stuffing) and reception equipment bit rate is recommended to be set within ±100bps of the nominal value for the mode

3 For the hierarchical schemes the useful bit rates can be obtained from Table 6.5 as follows:

(a) HP stream: figures from QPSK columns.

(b) LP stream, 16 QAM: figures from QPSK columns.

(c) LP stream, 64 QAM: figures from 16 QAM columns.

6.2.6 Spectrum characteristics (Clause 4.8.1 in ETSI EN 300 744 [26])

The OFDM symbols constitute a juxtaposition of equally-spaced orthogonal carriers. The amplitudes and phases of the data cell carriers are varying symbol by symbol according to the mapping process described in Clause 4.3.5.

The power spectral density $P_k(f)$ of each carrier at frequency—

$$f_k = f_c + \frac{k'}{T_U}$$

$$k' = k - (K_{max} + K_{min})/2; (K_{min} \le k \le K_{max})$$

is defined by the following expression:

$$P_k(f) = \left[\frac{\sin(\pi \times (f - f_k) \times T_S)}{\pi \times (f - f_k) \times T_S}\right]^2$$

The overall power spectral density of the modulated data cell carriers is the sum of the power spectral densities of all these carriers, plus the modification due to the boosted level of the reference carriers. A theoretical DVB transmission signal spectrum is illustrated in Figure 2 (**for 7 MHz channels**). Because the OFDM symbol duration is larger than the inverse of the carrier spacing, the main lobe of the power spectral density of each carrier is narrower than twice the carrier spacing. Therefore the spectral density is not constant within the nominal bandwidth of ***6,657 227 MHz*** for the 8 K mode or ***6,660 156 MHz*** for the 2 K mode (see Note).

NOTE: Values in italics are approximate values.

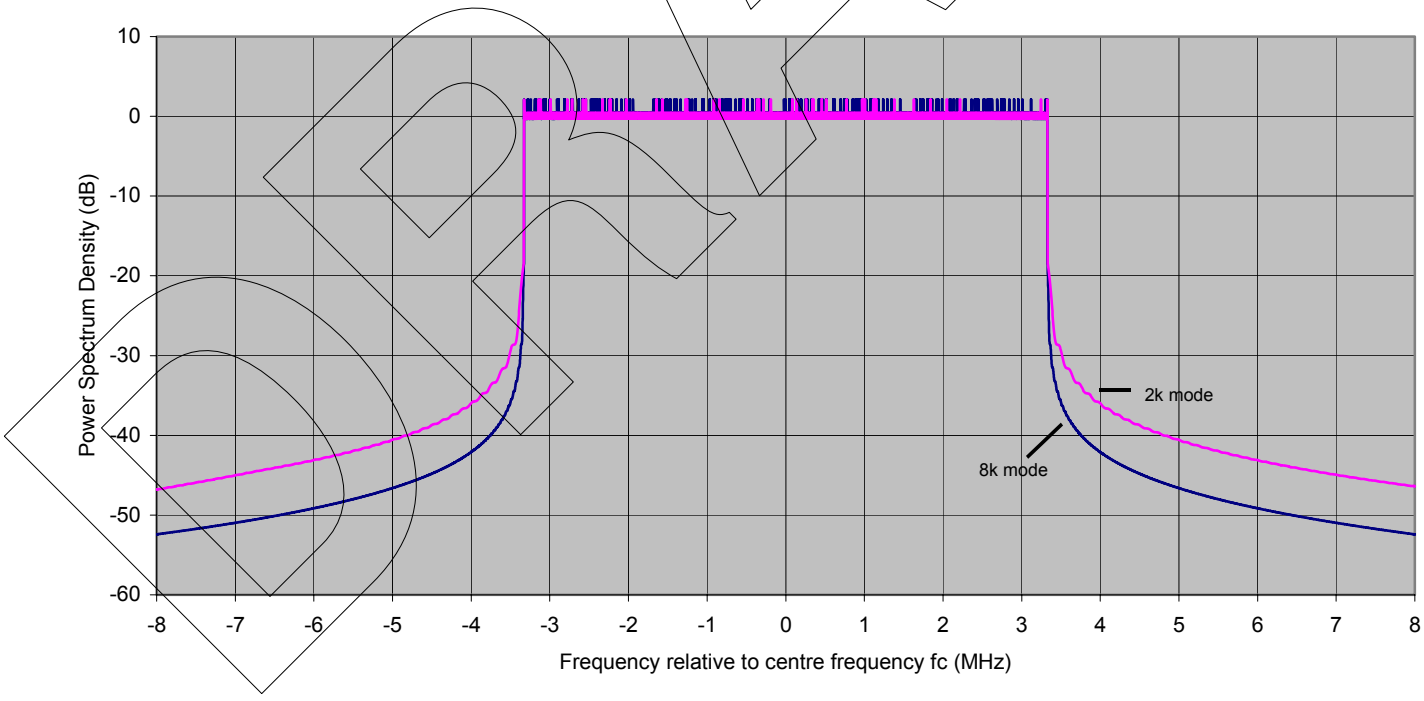


FIGURE 2 THEORETICAL DVB TRANSMISSION SIGNAL SPECTRUM FOR GUARD INTERVAL $\Delta = T_u/32$ (FOR 7 MHz CHANNELS)

6.2.7 Amplitudes of all reference information (Clause 4.5.5 in ETSI EN 300 744[26])

As explained in Clause 6.2.2 the modulation of all data cells is normalized so that E[c'c*] = 1. All cells which are continual or scattered pilots, i.e. they are members of the sets defined in Clause 6.2.4 (or Clause 4.5.4 of ETSI EN 300 744), are transmitted at boosted power so that for these E[c' c*] = 16/9 (2,5 dB higher).

6.2.8 Out-of-band spectrum mask (for 7 MHz channels) (Clause 4.8.2 in ETSI EN 300 744 [26])

To control the interference into analogue or digital services from a digital service, the level of the spectrum at frequencies outside the nominal bandwidth of the interfering digital service, can be reduced by applying the appropriate filtering or by reducing the interfering digital service power.

Spectrum masks for cases where a transmitter for digital terrestrial television is co-located with, and operating on a channel adjacent to—

(a) a transmitter for analogue television is given in Figure 3 and Table 6.6 for analogue television system B/PAL/A2; or

(b) a transmitter for digital television is given in Figure 4 and Table 6.7 for COFDM digital television with a modulation mode of 64QAM with an FEC of 2/3.

The masks shown in Figure 3 and 4 cover the minimum protection needed for analogue and digital television where the analogue and the digital television transmitters are collocated and are applicable for cases where no polarization discrimination between digital and analogue television is used.

The masks are to be used for the comparison of ERPs of the wanted and unwanted services. Such comparison may be provided from calculation from the actual transmitter spectrum output and antenna system gains.

The masks provide the limit to the power and the out of band products of the unwanted digital service. The mask levels are fixed in relationship to the wanted service, hence the actual mask of the interfering service must be derived from the actual operating power of the interfering service and its relationship to the wanted analogue or digital service.

DRAFT

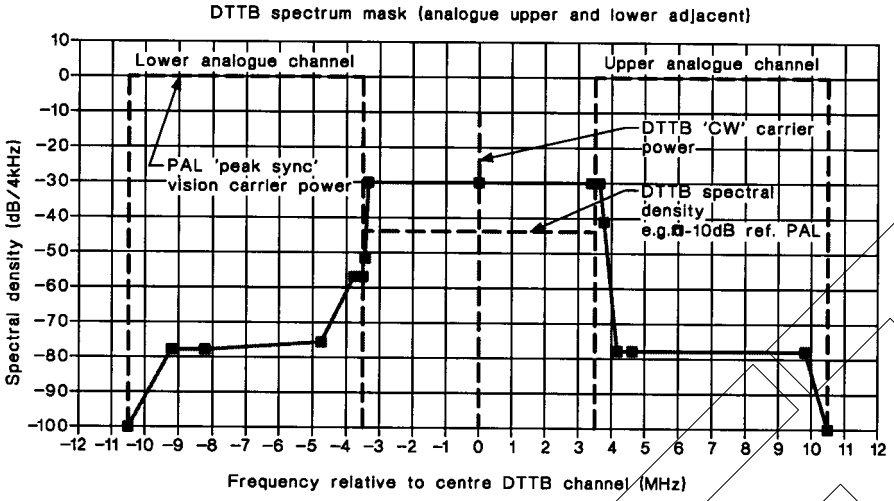


FIGURE 3 SPECTRUM MASK FOR A DIGITAL TERRESTRIAL TELEVISION TRANSMITTER OPERATING WITH A CO-LOCATED LOWER OR UPPER ADJACENT CHANNEL ANALOGUE TELEVISION TRANSMITTER

TABLE 6.6

BREAKPOINTS FOR DTTB SPECTRUM MASK WITH ANALOGUE UPPER AND LOWER ADJACENT

Lower breakpoints

Relative frequency (MHz)	0	-3,3	-3,4	-3,5	-3,51	-3,75	-4,75	-8,25	-9,25	-10,5
Relative level (dB/4 kHz)	-29	-29	-50	-56	-56	-56	-74,5	-77	-77	-100

Upper breakpoints

Relative frequency (MHz)	0	3,5	3,7	3,8	4,2	4,75	10	10,5
Relative level (dB/4 kHz)	-29	-29	-29	-40	-77	-77	-77	-100

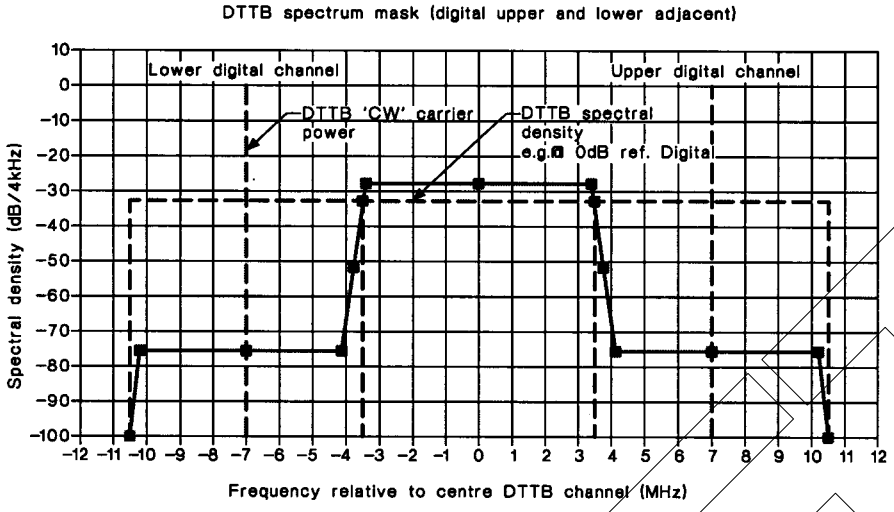


FIGURE 4 SPECTRUM MASK FOR A DIGITAL TERRESTRIAL TELEVISION TRANSMITTER OPERATING WITH A CO-LOCATED LOWER OR UPPER ADJACENT CHANNEL DIGITAL TERRESTRIAL TELEVISION TRANSMITTER

TABLE 6.7

BREAKPOINTS FOR SPECTRUM MASK WITH DIGITAL UPPER AND LOWER ADJACENT

	Breakpoints							
Relative frequency (+/ MHz)	0	3,35	3,5	3,85	4,2	7	10,3	10,5
Relative level (dB/4 kHz)	-27	-27	-33	-52	-75	-75	-75	-100

6.2.9 Centre frequency of RF signal (for 7 MHz channels) (Clause 4.8.3 in ETSI EN 300 744 [26])

In Australia DTTB transmissions will be based upon a 7 MHz channel spectrum plan for both VHF Band III (CH6-12) and UHF Band IV/V (CH27–69). The transmissions will be nominally centred in the channel with the exact location determined by offset requirements. An offset of either +125 kHz or –125 kHz from the channel centre frequency may be applied if it permits easier channel combining arrangements and/or results in a reduction of interference between services. The centre frequency can be calculated from the channel frequency limits in the particular location.

For nominal channel limits and for possible variations to the nominal 7 MHz bandwidth refer to the ABA Digital Planning Handbook for DTTB.

6.2.10 Simulated system performance for 7 MHz channels (Annex A in ETSI EN 300 744 [26])

Tables 6.10, 6.11 and 6.12 give simulated performance anticipating ‘perfect channel estimation and without phase noise’ of channel coding and modulation combinations, and are subject to confirmation by testing.

These results are given for the Gaussian channel, Ricean channel (F_1) and Rayleigh channel (P_1). F_1 and P_1 are described in Annex B of EN 300744.

Associated useful bit rates available are also indicated as a function of the guard interval to active symbol duration for the four different values of guard interval.

TABLE 6.8

REQUIRED C/N FOR NONHIERARCHICAL TRANSMISSION TO ACHIEVE A BER = 2×10^{-4} AFTER THE VITERBI DECODER FOR ALL COMBINATIONS OF CODING RATES AND MODULATION TYPES. THE NET BIT RATES AFTER THE REED-SOLOMON DECODER ARE ALSO LISTED

		Required C/N for BER = 2×10^{-4} after Viterbi QEF after Reed--Solomon			Bit rate (Mbit/s)			
Modu-lation	**Code rate**	**Gaussian channel**	**Ricean channel (F_1)**	**Rayleigh channel (P_1)**	**Δ/T_U = 1/4**	**Δ/T_U = 1/8**	**ΔT_U = 1/16**	**Δ/T_U = 1/32**
QPSK	1/2	*3,1*	*3,6*	*5,4*	*4,354*	*4,838*	*5,123*	*5,278*
QPSK	2/3	*4,9*	*5,7*	*8,4*	*5,806*	*6,451*	*6,830*	*7,037*
QPSK	3/4	*5,9*	*6,8*	*10,7*	*6,532*	*7,257*	*7,684*	*7,917*
QPSK	5/6	*6,9*	*8,0*	*13,1*	*7,257*	*8,064*	*8,538*	*8,797*
QPSK	7/8	*7,7*	*8,7*	*16,3*	*7,620*	*8,467*	*8,965*	*9,237*
16QAM	1/2	*8,8*	*9,6*	*11,2*	*8,709*	*9,676*	*10,246*	*10,556*
16QAM	2/3	*11,1*	*11,6*	*14,2*	*11,612*	*12,902*	*13,661*	*14,075*
16QAM	3/4	*12,5*	*13,0*	*16,7*	*13,063*	*14,515*	*15,369*	*15,834*
16QAM	5/6	*13,5*	*14,4*	*19,3*	*14,515*	*16,127*	*17,076*	*17,594*
16QAM	7/8	*13,9*	*15,0*	*22,8*	*15,240*	*16,934*	*17,930*	*18,473*
64QAM	1/2	*14,4*	*14,7*	*16,0*	*13,063*	*14,515*	*15,369*	*15,834*
64QAM	2/3	*16,5*	*17,1*	*19,3*	*17,418*	*19,353*	*20,491*	*21,112*
64QAM	3/4	*18,0*	*18,6*	*21,7*	*19,595*	*21,772*	*23,053*	*23,751*
64QAM	5/6	*19,3*	*20,0*	*25,3*	*21,772*	*24,191*	*25,614*	*26,390*
64QAM	7/8	*20,1*	*21,0*	*27,9*	*22,861*	*25,401*	*26,895*	*27,710*

NOTES:

1 Figures in italics are approximate values, refer to table 6.5 for bit-accurate values.

2 QEF (Quasi Error Free) means less than one uncorrected error event per hour, corresponding to BER=10^{-11} at the input of the MPEG-2 demultiplexer.

TABLE 6.9

REQUIRED C/N FOR HIERARCHICAL TRANSMISSION TO ACHIEVE A BER = 2×10^{-4} AFTER VITERBI DECODER

			Required C/N for BER = 2×10^{-4} after Viterbi QEF after Reed-Solomon			Bit rate (Mbit/s)			
Modulation	**Code rate**	**α**	**Gaussian channel**	**Ricean channel (F_1)**	**Rayleigh channel (P_1)**	**Δ/T_U = 1/4**	**Δ/T_U = 1/8**	**Δ/T_U = 1/16**	**Δ/T_U = 1/32**
QPSK in non-uniform 16QAM	1/2	2	*4,8*	*5,4*	*6,9*	*4,354*	*4,838*	*5,123*	*5,278*
	2/3		*7,1*	*7,7*	*9,8*	*5,806*	*6,451*	*6,830*	*7,037*
	3/4		*8,4*	*9,0*	*11,8*	*6,532*	*7,257*	*7,684*	*7,917*
							+		
	1/2		*13,0*	*13,3*	*14,9*	*4,354*	*4,838*	*5,123*	*5,278*
	2/3		*15,1*	*15,3*	*17,9*	*5,806*	*6,451*	*6,830*	*7,037*
	3/4		*16,3*	*16,9*	*20,0*	*6,532*	*7,257*	*7,684*	*7,917*
	5/6		*16,9*	*17,8*	*22,4*	*7,257*	*8,064*	*8,538*	*8,797*
	7/8		*17,9*	*18,7*	*24,1*	*7,620*	*8,467*	*8,965*	*9,237*
QPSK in non-uniform 16QAM	1/2	4	*3,8*	*4,4*	*6,0*	*4,354*	*4,838*	*5,123*	*5,278*
	2/3		*5,9*	*6,6*	*8,6*	*5,806*	*6,451*	*6,830*	*7,037*
	3/4		*7,1*	*7,9*	*10,7*	*6,532*	*7,257*	*7,684*	*7,917*
							+		
	1/2		*17,3*	*17,8*	*19,6*	*4,354*	*4,838*	*5,123*	*5,278*
	2/3		*19,1*	*19,6*	*22,3*	*5,806*	*6,451*	*6,830*	*7,037*
	3/4		*20,1*	*20,8*	*24,2*	*6,532*	*7,257*	*7,684*	*7,917*
	5/6		*21,1*	*22,0*	*26,0*	*7,257*	*8,064*	*8,538*	*8,797*
	7/8		*21,9*	*22,8*	*28,5*	*7,620*	*8,467*	*8,965*	*9,237*

NOTES:

1 Figures in italics are approximate values.

2 Results for QPSK in non-uniform 64-QAM with $\alpha = 4$ are not included due to the poor performance of the 64-QAM signal.

TABLE 6.10

REQUIRED C/N FOR HIERARCHICAL TRANSMISSION TO ACHIEVE A BER = 2 X 10^{-4} AFTER VITERBI DECODER

Modulation	Code rate	α	Required C/N for BER = 2 x 10^{-4} after Viterbi QEF after Reed-Solomon: Gaussian channel	Ricean channel (F_1)	Rayleigh channel (P_1)	Bit rate (Mbit/s): Δ/T_U = 1/4	Δ/T_U = 1/8	Δ/T_U = 1/16	Δ/T_U = 1/32
QPSK in uniform 64QAM	**1/2**	1	*8,9*	*9,5*	*11,4*	*4,354*	*4,838*	*5,123*	*5,278*
	2/3		*12,1*	*12,7*	*14,8*	*5,806*	*6,451*	*6,830*	*7,037*
	3/4		*13,7*	*14,3*	*17,5*	*6,532*	*7,257*	*7,684*	*7,917*
							+		
	1/2		*14,6*	*14,9*	*16,4*	*8,709*	*9,676*	*10,246*	*10,556*
	2/3		*16,9*	*17,6*	*19,4*	*11,612*	*12,902*	*13,661*	*14,075*
	3/4		*18,6*	*19,1*	*22,2*	*13,063*	*14,515*	*15,369*	*15,834*
	5/6		*20,1*	*20,8*	*25,8*	*14,515*	*16,127*	*17,076*	*17,594*
	7/8		*21,1*	*22,2*	*27,6*	*15,240*	*16,934*	*17,930*	*18,473*
QPSK in non-uniform 64QAM	**1/2**	2	*6,5*	*7,1*	*8,7*	*4,354*	*4,838*	*5,123*	*5,278*
	2/3		*9,0*	*9,9*	*11,7*	*5,806*	*6,451*	*6,830*	*7,037*
	3/4		*10,8*	*11,5*	*14,5*	*6,532*	*7,257*	*7,684*	*7,917*
							+		
	1/2		*16,3*	*16,7*	*18,2*	*8,709*	*9,676*	*10,246*	*10,556*
	2/3		*18,9*	*19,5*	*21,7*	*11,612*	*12,902*	*13,661*	*14,075*
	3/4		*21,0*	*21,6*	*24,5*	*13,063*	*14,515*	*15,369*	*15,834*
	5/6		*21,9*	*22,7*	*27,3*	*14,515*	*16,127*	*17,076*	*17,594*
	7/8		22,9	23,8	29,6	15,240	16,934	17,930	18,473

NOTES:

1 Figures in italics are approximate values.

2 Results for QPSK in non-uniform 64-QAM with $\alpha = 4$ are not included due to the poor performance of the 64-QAM signal.

6.2.11 Values for 6, 7 and 8 MHz channels (Annex E in ETSI EN 300 744 [26])

The system can be scaled to 6 MHz and 7 MHz channels by changing the elementary period to T = 7/48 µs for 6 MHz channels and T = 1/8 µs for 7 MHz channels. In a practical implementation this corresponds to a change of clock frequency from 64/7 MHz for 8 MHz channels to 48/7 MHz for 6 MHz channels or to 8 MHz for 7 MHz channels.

The frame structure and the rules for coding, mapping and interleaving are kept. The change of sampling frequency results in change of the carrier spacing, the symbol length, the guard interval length and the useful bit rate as given in tables below.

Australia has implemented a 7 MHz bandwidth system. 6 MHz and 8 MHz parameters have been included for comparison. The numerical values for the OFDM parameters are set out in Tables 6.11, 6.12 and 6.13.

The duration of symbol part for the allowed guard intervals for 6, 7 and 8 MHz channels is shown in Tables 6.14, 6.15 and 6.16.

The useful bit rate (MBIT/s) is shown in Tables 6.17, 6.18 and 6.19.

TABLE 6.11

NUMERICAL VALUES FOR THE OFDM PARAMETERS FOR THE 8 K AND 2 K MODES FOR 6 MHz CHANNELS

Parameter	8 K mode	2 K mode
Number of carriers K	6 817	1 705
Value of carrier number K_{min}	0	0
Value of carrier number K_{max}	6 816	1 704
Duration T_U	*1194,667 µs*	*298,667 µs*
Carrier spacing $1/T_U$	*837,1 Hz*	*3 348 Hz*
Spacing between carriers K_{min} and K_{max}, $(K1)/T_U$	*5,71 MHz*	*5,71 MHz*

NOTE: Values in italics are approximate values.

TABLE 6.12

NUMERICAL VALUES FOR THE OFDM PARAMETERS FOR THE 8 K AND 2 K MODES FOR 7 MHz CHANNELS

Parameter	8 K mode	2 K mode
Number of carriers K	6 817	1 705
Value of carrier number K_{min}	0	0
Value of carrier number K_{max}	6 816	1 704
Duration T_U	1024 µs	256 µs
Carrier spacing $1/T_U$	*976,6 Hz*	*3 906 Hz*
Spacing between carriers K_{min} and K_{max}, $(K1)/T_U$	*6,66 MHz*	*6,66 MHz*

NOTE: Values in italics are approximate values.

TABLE 6.13

NUMERICAL VALUES FOR THE OFDM PARAMETERS FOR THE 8 K AND 2 K MODES FOR 8 MHz CHANNELS

Parameter	8 K mode	2 K mode
Number of carriers K	6 817	1 705
Value of carrier number K_{min}	0	0
Value of carrier number K_{max}	6 816	1 704
Duration T_U	896 µs	224 µs
Carrier spacing $1/T_U$	*1 116 Hz*	*4 464 Hz*
Spacing between carriers K_{min} and K_{max} $(K1)/T_U$	*7,61 MHz*	*7,61 MHz*

NOTE: Values in italics are approximate values.

TABLE 6.14

DURATION OF SYMBOL PART FOR THE ALLOWED GUARD INTERVALS FOR 6 MHz CHANNELS

Mode	8 K mode				2 K mode			
Guard interval Δ / T_U	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32
Duration of symbol part T_U	8192 × T *1194,667 µs*				2048 × T *298,667 µs*			
Duration of guard Interval Δ	2 048 × T *298,667µs*	1 024 × T *149,333 µs*	512 × T *74,667 µs*	256 × T *37,333 µs*	512 × T *74,667 µs*	256 × T *37,333 µs*	128 × T *18,667 µs*	64 × T *9,333 µs*
Symbol duration $T_S = \Delta + T_U$	10 240 × T *1493,3 µs*	9 216 × T *1344 µs*	8 704 × T *1269,3 µs*	8 448 × T *1232 µs*	2 560 × T *373,3 µs*	2 304 × T *336 µs*	2 176 × T *317,3 µs*	2 112 × T *308 µs*

NOTE: Values in italics are approximate values.

TABLE 6.15

DURATION OF SYMBOL PART FOR THE ALLOWED GUARD INTERVALS FOR 7 MHz CHANNELS

Mode	8 K mode				2 K mode			
Guard interval Δ / T_U	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32
Duration of symbol part T_U	8 192 × T 1024 µs				2 048 × T 256 µs			
Duration of guard Interval Δ	2 048 × T 256 µs	1 024 × T 128 µs	512 × T 64 µs	256 × T 32 µs	512 × T 64 µs	256 × T 32 µs	128 × T 16 µs	64 × T 8 µs
Symbol duration $T_S = \Delta + T_U$	10 240 × T 1280 µs	9 216 × T 1152 µs	8 704 × T 1088 µs	8 448 × T 1056 µs	2 560 × T 320 µs	2 304 × T 288 µs	2 176 × T 272 µs	2 112 × T 264 µs

TABLE 6.16

DURATION OF SYMBOL PART FOR THE ALLOWED GUARD INTERVALS FOR 8 MHz CHANNELS

Mode	8 K mode				2 K mode			
Guard interval Δ / T_U	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32
Duration of symbol part T_U	8 192 × T 896 µs				2 048 × T 224 µs			
Duration of guard Interval Δ	2 048 × T 224 µs	1 024 × T 112 µs	512 × T 56 µs	256 × T 28 µs	512 × T 56 µs	256 × T 28 µs	128 × T 14 µs	64 × T 7 µs
Symbol duration $T_S = \Delta + T_U$	10 240 × T 1 120 µs	9 216 × T 1 008 µs	8 704 × T 952 µs	8 448 × T 924 µs	2 560 × T 280 µs	2 304 × T 252 µs	2 176 × T 238 µs	2 112 × T 231 µs

TABLE 6.17

USEFUL BIT RATE (MBIT/S) FOR ALL COMBINATIONS OF GUARD INTERVAL, CONSTELLATION AND CODE RATE FOR NON-HIERARCHICAL SYSTEMS FOR 6 MHz CHANNELS

Modulation	Code Rate	Guard interval			
5,0625 Ms/s		**1/4**	**1/8**	**1/16**	**1/32**
QPSK	1/2	*3,732*	*4,147*	*4,391*	*4,524*
	2/3	*4,976*	*5,529*	*5,855*	*6,032*
	3/4	*5,599*	*6,221*	*6,587*	*6,786*
	5/6	*6,221*	*6,912*	*7,318*	*7,540*
	7/8	*6,532*	*7,257*	*7,684*	*7,917*
16-QAM	1/2	*7,465*	*8,294*	*8,782*	*9,048*
	2/3	*9,953*	*11,059*	*11,709*	*12,064*
	3/4	*11,197*	*12,441*	*13,173*	*13,572*
	5/6	*12,441*	*13,824*	*14,637*	*15,080*
	7/8	*13,063*	*14,515*	*15,369*	*15,834*
64-QAM	1/2	*11,197*	*12,441*	*13,173*	*13,572*
	2/3	*14,929*	*16,588*	*17,564*	*18,096*
	3/4	*16,796*	*18,662*	*19,760*	*20,358*
	5/6	*18,662*	*20,735*	*21,955*	*22,620*
	7/8	*19,595*	*21,772*	*23,053*	*23,751*
Guard Time:	'2 K'	*74,7*	*37,3*	*18,7*	*9,3*
(µsec)	'8 K'	*298,7*	*149,3*	*74,7*	*37,3*

NOTE: Figures in italics are approximate values.

DRAFT

TABLE 6.18

USEFUL BIT RATE (MBIT/S) FOR ALL COMBINATIONS OF GUARD INTERVAL, CONSTELLATION AND CODE RATE FOR NON-HIERARCHICAL SYSTEMS FOR 7 MHz CHANNELS

Modulation	Code Rate	Guard interval			
5,90625 Ms/s		**1/4**	**1/8**	**1/16**	**1/32**
QPSK	1/2	*4,354*	*4,838*	*5,123*	*5,278*
	2/3	*5,806*	*6,451*	*6,830*	*7,037*
	3/4	*6,532*	*7,257*	*7,684*	*7,917*
	5/6	*7,257*	*8,064*	*8,538*	*8,797*
	7/8	*7,620*	*8,467*	*8,965*	*9,237*
16-QAM	1/2	*8,709*	*9,676*	*10,246*	*10,556*
	2/3	*11,612*	*12,902*	*13,661*	*14,075*
	3/4	*13,063*	*14,515*	*15,369*	*15,834*
	5/6	*14,515*	*16,127*	*17,076*	*17,594*
	7/8	*15,240*	*16,934*	*17,930*	*18,473*
64-QAM	1/2	*13,063*	*14,515*	*15,369*	*15,834*
	2/3	*17,418*	*19,353*	*20,491*	*21,112*
	3/4	*19,595*	*21,772*	*23,053*	*23,751*
	5/6	*21,772*	*24,191*	*25,614*	*26,390*
	7/8	*22,861*	*25,401*	*26,895*	*27,710*
Guard Time:	'2K'	*64*	*32*	*16*	*8*
(µsec)	'8K'	*256*	*128*	*64*	*32*

NOTE: Figures in italics are approximate values.

DRAFT

TABLE 6.19

USEFUL BIT RATE (MBIT/S) FOR ALL COMBINATIONS OF GUARD INTERVAL, CONSTELLATION AND CODE RATE FOR NON-HIERARCHICAL SYSTEMS FOR 8 MHz CHANNELS

Modulation	Code Rate	Guard Interval			
6,75 Ms/s		1/4	1/8	1/16	1/32
QPSK	1/2	*4,976*	*5,529*	*5,855*	*6,032*
	2/3	*6,635*	*7,373*	*7,806*	*8,043*
	3/4	*7,465*	*8,294*	*8,782*	*9,048*
	5/6	*8,294*	*9,216*	*9,758*	*10,053*
	7/8	*8,709*	*9,676*	*10,246*	*10,556*
16-QAM	1/2	*9,953*	*11,059*	*11,709*	*12,064*
	2/3	*13,271*	*14,745*	*15,612*	*16,086*
	3/4	*14,929*	*16,588*	*17,564*	*18,096*
	5/6	*16,588*	*18,431*	*19,516*	*20,107*
	7/8	*17,418*	*19,353*	*20,491*	*21,112*
64-QAM	1/2	*14,929*	*16,588*	*17,564*	*18,096*
	2/3	*19,906*	*22,118*	*23,419*	*24,128*
	3/4	*22,394*	*24,882*	*26,346*	*27,144*
	5/6	*24,882*	*27,647*	*29,273*	*30,160*
	7/8	*26,126*	*29,029*	*30,737*	*31,668*
Guard Time:	'2K'	56	28	14	7
(μsec)	'8K'	224	112	56	28

NOTE: Figures in italics are approximate values.

6.3 DIGITAL VIDEO BROADCASTING (DVB); DVB MEGA-FRAME FOR SINGLE FREQUENCY NETWORK (SFN) SYNCHRONIZATION (ETSI TS 101 191 [27])

6.3.1 Introduction

This Standard references ETSI TS 101 191 [27].

SECTION 7 CONDITIONAL ACCESS

7.1 DIGITAL VIDEO (DVB) BROADCASTING; SUPPORT FOR USE OF SCRAMBLING AND CONDITIONAL ACCESS (CA) WITHIN DIGITAL BROADCASTING SYSTEMS (ETSI ETR 289 [28])

This Standard references ETSI ETR 289 [28].

ETSI ETR 289 [28] has been identified as suitable for implementation in Australia and is adopted for the Australian DTTB transmission Standard.

7.2 DIGITAL VIDEO BROADCASTING (DVB); DUB SIMULCRYPT; HEAD-END ARCHITECTURE AND SYNCRONIZATION (ETSI TS 101 197 [29])

This Standard references ETSI TS 101 197 [29].

ETSI TS 101 197 [29] has been identified as suitable for implementation in Australia and is adopted for the Australian DTTB transmission Standard.

7.3 DIGITAL VIDEO BROADCASTING (DVB); HEAD-END IMPLEMENTATION OF DVB SIMULCRYPT (ETSI TS 103 197 [30])

In preparing this Standard, a draft version of ETSI TS 103 197 [30] was referenced. A review of ETSI TS 103 197 [30] has been undertaken and it is proposed that Australia adopts the latest version. ETSI TS 103 197 [30].

7.4 DIGITAL VIDEO BROADCASTING (DVB); IMPLEMENTATION GUIDELINES OF THE DVB SIMULCRYPT STANDARD (ETSI TR 102 035 [31])

This Standard references ETSI TR 102 035 [31].

ETSI TR 102 035 [31] has been identified as suitable for implementation in Australia and is adopted for the Australian DTTB transmission Standard.

DRAFT

SECTION 8 INTERACTIVITY

8.1 DIGITAL VIDEO BROADCASTING (DVB); MULTIMEDIA HOME PLATFORM (ETSI TS 101 812 [32])

This Standard references ETSI TS 101 812 [32], commonly known as MHP version 1.0.3.

It should be noted that at the time of publication of this Standard, ETSI and DVB have withdrawn previously published versions of TS 101 812 [32].

ETSI TS 101 812 [32] has been identified as suitable for Australian application and is adopted for the Australian DTTB transmission standard.

DRAFT

S E C T I O N 9 M E A S U R E M E N T (I n f o r m a t i v e)

9.1 DIGITAL VIDEO BROADCASTING (DVB); MEASUREMENT GUIDELINES FOR DVB SYSTEMS (ETSI TR 101 290 [33])

This Standard references ETSI TR 101 290 [33].

ETSI TR 101 290 [33] has been identified as suitable for Australian application and is adopted for the Australian DTTB transmission standard.

*** END OF DRAFT ***

DRAFT

PREPARATION OF AUSTRALIAN STANDARDS

Australian Standards are prepared by a consensus process involving representatives nominated by organizations drawn from all major interests associated with the subject. Australian Standards may be derived from existing industry Standards, from established international Standards and practices or may be developed within a Standards Australia technical committee.

During the development process, Australian Standards are made available in draft form at all sales offices and through affiliated overseas bodies in order that all interests concerned with the application of a proposed Standard are given the opportunity to submit views on the requirements to be included.

The following interests are represented on the committee responsible for this draft Australian Standard:

Australian Broadcasting Authority

Australian Broadcasting Corporation

Australian Caption Centre

Australian Chamber of Commerce and Industry

Australian Consumers Association

Australian Electrical and Electronic Manufacturers Association

Australian Information Industry Association

Australian Subscription Television and Radio Association

Broadcast Australia

Commercial Radio Australia

Commercial Television Australia

Community Broadcasting Association of Australia

Consumer Electronics Suppliers Association

Electronic Services Industry Association Inc

Ministry of Economic Development, New Zealand

Special Broadcasting Service

Television NZ

Telstra Corporation

DRAFT

Standards Australia

Standards Australia is an independent company, limited by guarantee, which prepares and publishes most of the voluntary technical and commercial standards used in Australia. These standards are developed through an open process of consultation and consensus, in which all interested parties are invited to participate. Through a Memorandum of Understanding with the Commonwealth government, Standards Australia is recognized as Australia's peak national standards body.

Australian Standards

Australian Standards are prepared by committees of experts from industry, governments, consumers and other relevant sectors. The requirements or recommendations contained in published Standards are a consensus of the views of representative interests and also take account of comments received from other sources. They reflect the latest scientific and industry experience. Australian Standards are kept under continuous review after publication and are updated regularly to take account of changing technology.

International Involvement

Standards Australia is responsible for ensuring that the Australian viewpoint is considered in the formulation of international Standards and that the latest international experience is incorporated in national Standards. This role is vital in assisting local industry to compete in international markets. Standards Australia represents Australia at both ISO (The International Organization for Standardization) and the International Electrotechnical Commission (IEC).

Electronic Standards

All Australian Standards are available in electronic editions, either downloaded individually from our Web site, or via on-line and CD ROM subscription services. For more information phone 1300 65 46 46 or visit us at

www.standards.com.au