

AS 4933:2024



STANDARDS
Australia



Digital television — Requirements for receivers for VHF/UHF DVB-T television broadcasts including ancillary services



AS 4933:2024

This Australian Standard ® was prepared by CT-002, Broadcasting and Related Services. It was approved on behalf of Standards Australia's Standards Development and Accreditation Committee on 01 November 2024.

This Standard was published on 15 November 2024.

The following are represented on Committee CT-002:

- Australian Broadcasting Corporation
- Australian Digital and Telecommunications Industry Association
- Australian Industry Group
- Australian Information Industry Association
- Australian Subscription Television and Radio Association
- Community Broadcasting Association of Australia
- Consumer Electronics Suppliers Association
- Engineers Australia
- Free TV Australia
- Special Broadcasting Service

This Standard was issued in draft form for comment as DR AS 4933:2023.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

ISBN 978 1 76139 900 8

Digital television — Requirements for receivers for VHF/UHF DVB-T television broadcasts including ancillary services

Originated as AS 4933.1—2000.
Revised and redesignated as AS 4933:2015.
Second edition 2024.

© Standards Australia Limited 2024

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth).

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee CT-002, Broadcasting and Related Services, to supersede AS 4933:2015, *Digital television—Requirements for receivers, Part 1: VHF/UHF DVB-T television broadcasts*.

AS 4933:2015 will remain current for 24 months from the date of publication of this document. After this time, it will be superseded by AS 4933:2024. Regulatory authorities that reference this Standard in regulation may apply these requirements at a different time. Users of this Standard should consult with these authorities to confirm their requirements.

The objective of this document is to provide technical specifications and requirements for digital television receivers in Australia for the reception of free-to-air (FTA) terrestrial VHF/UHF DVB-T broadcast television. It includes the minimum requirements for Integrated Receiver Decoder (IRD) functionality in accordance with DVB specifications.

This document is to be read in conjunction with AS 5362 to meet advanced modulation and coding requirements for DVB broadcast in Australia.

The specifications in this document conform to DVB-T transmissions in Australia.

DVB-T receivers have been deployed in Australia for two decades. This document recognizes backward compatibility for such receivers to preceding versions of this Standard.

This document references specifications produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalization ELEctrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

Within the European Broadcasting Union, the Digital Video Broadcasting Project (DVB) is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulatory bodies, content owners and others committed to designing global standards for the delivery of digital television and data services.

Standards Australia is a member of the DVB Project with the status of Observer, which allows Standards Australia to support the development of Australian digital television standards, which are focused on the adoption of ETSI/DVB standards.

This document also references NorDig specifications which have been used since 2011 by many consumer electronics manufacturers in the design of DVB system digital television receivers deployed in Australia.

The major changes in this edition are as follows:

- (a) Additions:
 - (i) References to NorDig Unified Requirements specifications in some clauses.
 - (ii) References to NorDig Unified Test Plan in some clauses.
 - (iii) Reference to AS 5362 for DVB-T2 receiver specifications.
 - (iv) Broadcaster Mix Audio Description.
 - (v) Immunity to 700 MHz LTE signals.
 - (vi) Informative explanation about implementation of Single Frequency Networks.
- (b) Deletions:
 - (i) Reception of Analogue PAL-B transmissions.
 - (ii) Requirements for 4:3 displays.

- (iii) Informative references to device operating system software.
- (iv) Requirement for MHEG-5.
- (v) Reference to IP services.
- (vi) Requirement for Teletext data services.
- (vii) Closed Captions on Analogue PAL video.
- (viii) Data broadcasting.
- (ix) Conditional Access, Content Protection and Copy Management.
- (x) Analogue video output connectors.

Standards Australia thanks the International Electrotechnical Commission (IEC) for permission to reproduce Information from its International Standards. All such extracts are copyright of IEC, Geneva, Switzerland. All rights reserved. Further information on the IEC is available from www.iec.ch. IEC has no responsibility for the placement and context in which the extracts and contents are reproduced by the author, nor is IEC in any way responsible for the other content or accuracy therein.

Specifications set out using the verb form “shall” are requirements that need to be met to claim conformance to this document. All other statements are recommendations (set out using the verb form “should”) or additional information and are provided for guidance only.

The terms “normative” and “informative” are used in Standards to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

Contents

Preface..... ii

Introduction..... vii

Section 1 Scope and general..... 1

1.1 Scope 1

1.2 Application 1

1.2.1 General..... 1

1.2.2 Application to baseline television receivers..... 1

1.2.3 Application of appendices..... 2

1.3 Normative references 2

1.4 Terms and definitions..... 3

Section 2 Minimum requirements for receivers..... 5

2.1 Introduction 5

2.2 Minimum receiver requirements..... 5

Section 3 Receiver features..... 8

3.1 General..... 8

3.2 Terrestrial reception..... 8

3.2.1 DVB-T receivers..... 8

3.2.2 Decoding service format types 8

3.2.3 Capability of receiving analogue PAL-B transmissions..... 9

3.2.4 Advisory: Australian regulatory and safety requirements 9

3.3 Power on operations..... 10

3.3.1 First-time operation initialization 10

3.3.2 Subsequent switch on..... 10

3.4 User operation 10

3.4.1 Operating system..... 10

3.4.2 Receiver diagnostics and reset..... 10

3.4.3 Tuner functionality 11

3.4.4 Assigning numbers to services and navigation 11

3.4.5 Electronic Program Guide (EPG)..... 13

3.4.6 I-plate (information banner), OSD and navigation using EITp/f actual..... 13

3.4.7 Signal strength and quality indicator 15

3.4.8 Selection of radio services..... 15

3.4.9 Service unavailable — On-screen service 15

3.4.10 User navigation..... 15

3.5 RF performance, COFDM demodulation and channel decoding..... 15

3.5.1 General..... 15

3.5.2 RF performance 16

3.5.3 DVB-T COFDM transmission parameters..... 17

3.6 Multiplex and transport stream..... 18

3.7 Processing Program-Specific Information (PSI) and Service Information (SI)..... 18

3.7.1 Interpretations of SI variations for Australia 18

3.7.2 Interpretation of MPEG, DVB mandatory and DVB optional tables..... 18

3.7.3 Interpretation of other descriptors 19

3.7.4 Interpretation of Time and Date Time-Offset Tables (Australian variation) 19

3.7.5 Content descriptors (Australian variation from ETSI EN 300 468) 20

3.7.6 Radio services..... 21

3.7.7 Australian use of original_network_ids and network_ids..... 21

3.8 Video decode and display..... 22

3.8.1 General..... 22

3.8.2 MPEG-2 and –4 Part 10 video decoding..... 22

3.8.3 HEVC decoding..... 23

3.8.4 Picture colorimetry and gamma..... 23

3.8.5 Reaction to reception of video formats not supported by the receiver..... 24

3.8.6	Video digital output formats.....	24
3.8.7	Picture format scaling for display	25
3.8.8	Other MPEG video presentation features.....	26
3.9	Audio — Decoding.....	26
3.9.1	Audio outputs	26
3.9.2	MPEG audio	26
3.9.3	AC-3: Decoding and output.....	27
3.9.4	HE AAC audio: Decoding and output.....	27
3.9.5	Audio identification and control.....	28
3.10	Operating software and enhanced functionality	30
3.10.1	API.....	30
3.10.2	Hybrid Broadcast Broadband TV (HbbTV).....	30
3.10.3	MHEG-5.....	30
3.10.4	Program services delivered by IP.....	30
3.11	Subtitles including Closed Captions (CCs) carried in a Teletext format.....	30
3.11.1	General requirements for decoding and display of teletext Closed Captions	30
3.11.2	Support of teletext data services	30
3.11.3	Decoding of teletext Closed Captions from an MPEG Transport Stream.....	30
3.11.4	Viewer access to Closed Captions	31
3.11.5	Notes on decoding Closed Caption data	31
3.11.6	Positioning of Closed Captions over displayed picture	31
3.11.7	Choice of Closed Caption character font.....	31
3.11.8	Time accuracy of Closed Captions	32
3.11.9	Closed Caption teletext reinsertion on VBI of analogue PAL SD output (applies to STBs).....	32
3.11.10	Bit-mapped subtitles.....	32
3.11.11	Access to data service.....	32
3.12	Data broadcasting (broadcast television related).....	32
3.13	Parental guidance	32
3.13.1	Decoding of parental guidance ratings codes.....	32
3.13.2	Display of parental guidance rating	32
3.13.3	Parental guidance program lock-out.....	33
3.14	Conditional access, content protection and copy management (CPCM).....	33
3.14.1	Conditional access options.....	33
3.14.2	Content protection systems	33
3.14.3	Description and use.....	33
3.15	Interfaces and connectors	34
3.15.1	RF input/output.....	34
3.15.2	Analogue video connectors (where fitted).....	34
3.15.3	Audio connectors — Analogue audio.....	34
3.15.4	Digital program interfaces.....	34
3.15.5	Data connectors (where fitted).....	35
3.16	System software update	35
3.16.1	Software updates.....	35
3.16.2	Other methods of implementing system software update	35
Appendix A (normative) Specifications for RF performance of DVB-T receivers.....		36
Appendix B (informative) Implementation of Single Frequency Networks (SFN) in Australia.....		48
Appendix C (informative) Reception quality OSD meter		59
Appendix D (normative) Australian digital television broadcast band frequencies.....		61
Appendix E (informative) Australian non-broadcast band channel frequencies		63
Appendix F (normative) Australian parental guidance codes		64
Appendix G (normative) Subtitles including Teletext based Closed Captions (CCs) in SD and HD programs.....		67

**Appendix H (normative) Specifications for a DVB compliant bit stream for DVB Broadcast
Mix Audio Description..... 71**

**Appendix I (normative) Design issues of special note for digital terrestrial television
broadcasting (DVB-T) receivers for use in Australia..... 76**

Appendix J (informative) HbbTV 81

Bibliography 83

Introduction

Digital Terrestrial Television Broadcasting (DVB-T) officially began in Australia on 1 January 2001. The transmissions are based on the DVB-T system; however, it should be noted that the international DVB Standards and related ETSI, IEC, ISO and ITU-R documents provide for a range of operational systems.

Consumers in Australia expect to have access to a wide choice of receiving equipment, ranging from fully integrated receivers with inbuilt displays to modular set-top box receivers designed to be connected to a separate display and sound reproduction system. In addition, the various broadcasters in Australia use different brands of encoding and transmission equipment. Manufacturers who are supplying the Australian market are obliged, therefore, to ensure that their equipment will operate satisfactorily under the relevant Australian conditions.

This document aims to assist manufacturers by providing the information necessary to ensure that any digital terrestrial television receiving equipment made for the Australian system will operate satisfactorily to receive Australian digital terrestrial television broadcast transmissions.

AS 4933.1 was first published in 2000 and subsequently reviewed and re-published in 2005, 2010 and, redesignated as AS 4933, in 2015. Each edition has recognized the need for accuracy and utility in backward compatibility to previous editions and achieving interoperability in the adoption of ETSI specifications between consumer electronics manufacturers designs of DVB-T receivers.

While the 2000 edition was rudimentary in its specifications for the DVB-T Integrated Receiver Decoder (IRD), in the period leading up to publication of this current edition the DVB specifications have been updated to address of the following challenges:

- (a) Expansion of the DVB specifications for DVB-T, e.g. higher efficiency audio and video coding schemes, related metadata and service information.
- (b) Trends in design of consumer electronics technologies, e.g. additional applications program interfaces to IRD design, system hardware, software and firmware.
- (c) Reduction in availability of radio frequency spectrum, e.g. UHF Bands IV and V down to 694 MHz, and the design in DVB-T receivers to meet requirements for immunity to interference from other radio services in adjacent bands to DVB-T services.

These challenges have influenced revisions to this document in order to maintain its accuracy and utility in relation to changes for frequency use in UHF Bands IV and V, replanning and evaluation of DVB-T signal coverage and reception. Refer to ITU-R and Australian Communications and Media Authority (ACMA) referenced documents.

[Section 2](#) of this document sets out the minimum requirements for DVB-T receivers intended for use in the Australian environment.

Because DVB-T is a rapidly evolving technological environment, manufacturers and other users of this document will need to be aware of any future revisions of this document.

NOTES

Australian Standard®

Digital television — Requirements for receivers for VHF/UHF DVB-T television broadcasts including ancillary services

Section 1 Scope and general

1.1 Scope

This document specifies the requirements for equipment used in Australia for the reception of free-to-air (FTA) terrestrial VHF/UHF DVB-T broadcast television and to allow access to all program services offered. In addition, this document sets out permitted options for specifications that manufacturers may provide.

The requirements for digital television receivers set out in this document are consistent with the relevant Australian broadcast regulatory requirements. The international ETSI DVB specifications within the ETSI Standards, related ISO/IEC, ITU-R and NorDig Unified Requirements documents provide for the implementation of various systems. This document specifies the choices available in Australia and references Australian adaptations of these international Standards where appropriate.

This document does not cover —

- (a) reception of advanced DVB transmissions;

NOTE Refer to AS 5362 for requirements relating to advanced DVB transmissions, including additional decoding functionality to be used in the Australian environment.
- (b) the final presentation characteristics of picture (display) and sound or associated services or requirements for Stereoscopic 3D or 4K UHD TV;
- (c) requirements for subscription television receivers; or
- (d) interoperability issues for DVB-S, DVB-C and datacasting.

1.2 Application

1.2.1 General

The primary purpose of this document is to specify the minimum requirements for equipment intended to receive, demodulate and decode television broadcasts that conform to the Australian implementation of DVB-T and referenced ISO/IEC and ETSI Standards. However, because there are a range of optional features that receiver manufacturers may provide, additional information and recommendations are provided to clarify the preferred or required (as applicable) operation or facility in such cases.

Under the minimum requirements set out in [Section 2](#), equipment shall be capable of simultaneously decoding from the Transport Stream (TS) a video stream, an associated audio stream and associated teletext closed captions (CCs). The decoded information shall be presented in a time-synchronized manner suitable for a display device and sound reproduction system subject to the mandatory implementation of the parental lock function.

In some cases, the video may need to be spatially format-converted (“scaled”) if the received format is different from the display format. Correspondingly, the received audio channels might need to be processed or downmixed to suit the available sound reproduction equipment.

1.2.2 Application to baseline television receivers

Baseline television receivers shall have capability for reception of existing DVB-T standard definition (SD) and high definition (HD) services in accordance with [Section 2](#). [Section 2](#) sets out the minimum requirements for television receivers if they are to operate in accordance with DVB specifications

for Integrated Receiver Decoder (IRD) functionality and receive Australian FTA terrestrial VHF/UHF DVB-T broadcasts.

[Section 3](#) provides a comprehensive list of receiver specifications and features, indicating whether they are mandatory (baseline), recommended or optional. The optional features additional to the baseline requirements referred to in this document include interactive middleware and audio decoding choices, such as surround and multilingual sound, as well as interfaces for ancillary equipment, including —

- (a) Hybrid Broadcast Broadband TV (HbbTV); and
- (b) other additional features as determined by market and changing technology.

NOTE 1 HbbTV is an industry specification adopted by Australian broadcasters to provide integration between broadcast and on-demand services.

NOTE 2 Australian broadcasters and Freeview Australia provide HbbTV interactive services for television receivers that have implemented network capability and HbbTV functionality.

1.2.3 Application of appendices

It is intended that manufacturers and other users of this document take note of the following appendices as applicable:

- (a) [Appendix A](#) (normative) specifies requirements and parameters for the RF performance of the DVB-T receiver's tuner.
- (b) [Appendix B](#) (informative) outlines the historical implementation of DVB-T Single Frequency Networks in Australia
- (c) [Appendix G](#) (normative) provides further specifications and guidance on subtitling, including decoding and display of Closed Captions (CCs) in SD and HD programs.
- (d) [Appendix H](#) (normative) specifies requirements for DVB compliant bit streams for DVB Broadcast Mix Audio Description.
- (e) [Appendix I](#) (normative) provides requirements and further guidance on design issues of special note for digital terrestrial television broadcasting (DVB-T) receivers for use in Australia.
- (c) [Appendix J](#) (informative) provides requirements and further guidance on HbbTV.

1.3 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

IEC 61169-2:2007, *Radio-frequency connectors – Part 2: Sectional specification – Radio frequency coaxial connectors of type 9,52*

IEC 61169-24:2009, *Sectional specification – Radio frequency coaxial connectors with screw coupling, typically for use in 75 Ω cable networks (type F)*

IEC 62002-1:2008, *Mobile and portable DVB-T/H radio access – Part 1: Interface specification*

IEC 62216:2009, *Digital terrestrial television receivers for the DVB-T system*

ISO/IEC 11172-3:1993, *Information technology — Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s — Part 3: Audio*

ISO/IEC 13818-2, *Information technology — Generic coding of moving pictures and associated audio information — Part 2: Video*

ISO/IEC 14496-3, *Information technology — Coding of audio-visual objects — Part 3: Audio*

ISO/IEC 14496-10, *Information technology — Coding of audio-visual objects — Part 10: Advanced video coding*

ETSI TR 101 290 V1.4.1 (2020-06), *Digital Video Broadcasting (DVB); Measurement guidelines for DVB systems*

ETSI TS 101 154 V2.8.1 (2023-07), *Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream*

ETSI TS 101 162 V1.9.1 (2020-07), *Digital Video Broadcasting (DVB); Allocation of identifiers and codes for Digital Video Broadcasting (DVB) systems*

ETSI TS 101 191 V1.4.1 (2004-6), *Digital Video Broadcasting (DVB); DVB mega-frame for Single Frequency Network (SFN) synchronization*

ETSI TS 101 211 V1.13.1 (2021-05), *Digital Video Broadcasting (DVB); Implementation and usage of Service Information (SI)*

ETSI TS 102 323 V1.5.1 (2012-01), *Digital Video Broadcasting (DVB); Carriage and signalling of TV-Anytime information in DVB transport streams*

ETSI TS 102 366 V1.4.1 (2017-09), *Digital Audio Compression (AC-3, Enhanced AC-3) Standard*

ETSI TS 102 809 V1.1.1 (2010-1), *Digital Video Broadcasting (DVB); Signalling and carriage of interactive applications and services in hybrid broadcast/broadband environments*

ETSI EN 300-468, V1.17.1 (2022-10), *Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems*

ETSI EN 300-472, V1.4.1:2017-01, *Digital Video Broadcasting (DVB); Specification for conveying ITU-R System B Teletext in DVB bitstreams*

ETSI EN 300-743, V1.6.1, (2018-10), *Digital Video Broadcasting (DVB); Subtitling systems*

ETSI EN 300-744, V1.6.2, (2015-10), *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television*

NorDig. *NorDig Unified Requirements for Integrated Receiver Decoders for use in cable, satellite, terrestrial and managed IPTV based networks version 3.1.2* (April 2021)

NorDig. *NorDig Unified Test Plan for Integrated Receiver Decoders for use in cable, satellite, terrestrial and managed IPTV based networks version 3.1.2* (April 2021)

ITU-T H.262(02/2012), *Information technology – Generic coding of moving pictures and associated audio information: Video*

ITU-T H.264(08/21), *Advanced video coding for generic audio visual services*

FREE TV OP-61, *Implementation of Hybrid Broadcast Broadband TV by Australian Free-to-air Television Broadcasters*

PlayReady 3.0. <https://docs.microsoft.com/en-us/playready/overview/product-versions>

1.4 Terms and definitions

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

1.4.1

may

indicates the existence of an option

1.4.2

shall

indicates that a statement is mandatory

1.4.3

should

indicates a recommendation

Section 2 Minimum requirements for receivers

2.1 Introduction

This section sets out the minimum functions and operating parameters that a digital TV receiver shall have in order to operate satisfactorily in the Australian FTA digital television environment.

2.2 Minimum receiver requirements

[Table 2.2](#) sets out the minimum requirements for digital TV receivers intended to be used in Australia to receive Australian FTA terrestrial television broadcasts. These requirements are essential for satisfactory operation and are derived from the comprehensive details given in [Section 3](#).

Table 2.2 — Essential receiver requirements

Item	Description
1	Channel frequencies and bandwidth The receiver shall tune and operate in 7 MHz VHF and UHF digital channel allocations (see Table D.1) within the frequency range of 174 MHz to 230 MHz and 519 MHz to 820 MHz to accommodate over the air broadcast services up to 694 MHz and services provided by cabled distribution systems up to 820 MHz. The centre frequency of some transmissions may be offset by plus or minus 125 kHz (see Clause 3.5.2.5). Higher-powered adjacent channels may be present (see Appendix A).
2	Demodulation The receiver shall be capable of correctly demodulating all modes specified in EN 300 744 v1.6.2 (2015-10) (DVB-T Framing structure, channel coding and modulation of digital terrestrial television).
3	Tuning and scanning Receivers shall be able to scan the required spectrum to detect valid DVB-T transmissions and shall ignore non-compatible transmissions and continue scanning. Receivers shall have a user accessible full auto-tune function that completely erases the tuning and related databases, including “favourites”, prior to the rescan. The factory reset function is not a substitute for this requirement. Tuning shall be in accordance with <i>Nordig Unified Requirements</i> ver. 3.1.2 Clause 3.4.4.
4	Adapt to changes in transmission DVB-T COFDM parameters Receivers shall be able to automatically continue reception of a transmission if the transmission's RF COFDM parameters are changed. A receiver shall demodulate and decode the Transmission Parameter Signalling (TPS) data to determine the transmission's COFDM parameters, such as guard interval and Code Rate. If a previously receivable Transport Stream (TS) and its service(s) are lost, a receiver shall re-access the TPS to determine if there has been a change. If so, it shall reset to the new operating parameters in order to restore reception of the TS in accordance with <i>Nordig Unified Requirements</i> ver. 3.1.2 Clause 3.4.3.
5	Operate in the presence of multipath signals and SFNs Receivers shall be able to operate in SFN and multipath environments and do so with either pre echoes or post echoes within the nominal guard interval range in accordance with Appendix A and <i>Nordig Unified Requirements</i> ver. 3.1.2 Clause 3.4.10.8.
6	PSI and SI changes In the currently selected TS the PMTs shall be monitored at least every second and on selection of a different service. A change shall be implemented within 1 s of reception of the change. For the purposes of discovery of added or changed services, receivers shall detect and respond to changes in the PSI and SI in the TS by checking for service changes at intervals not exceeding 24 hours. This monitoring shall include the PAT, SDT and NIT set of tables and may be while the receiver is in active or standby modes. This shall be in accordance with Clause 3.4.4.7 and Table 3.4.4.7.

Table 2.2 (continued)

Item	Description
7	PID numbering Receivers shall be so configured that no sequenced or ordered numbering of the PID values of various components of a service is assumed. PID numbering shall be in accordance with ETSI EN 300 468 V1.17.1 (2022-10) Clause 5.1.3.
8	Use of Logical Channel Numbers for services Receivers shall use the broadcast Logical Channel Number (LCN) of services for channel selection. The LCNs are found in the NIT second loop with tag of 0x83 (see Clause 3.4.4.1).
9	Access SD and HD program streams Receivers shall decode services from within a Transport Stream in accordance with ETSI TS 101 154 V2.8.1 (2023-07). Receivers shall be able to decode program service streams with video in defined 25/50 Hz based formats in MPEG-2 and MPEG-4, Part 10 AVC (ITU-T H.264) over a range of bit rates as specified in Clause 3.8.2 and Appendix G together with accompanying audio and Closed Caption streams.
10	Audio formats MPEG-1 Layer II, AC-3 and HE AAC v2 Receivers shall be capable of decoding audio streams in MPEG-1 Layer II, AC-3 and HE AAC v2 formats at the respective bit rates given in Clause 3.9 in accordance with ETSI TS 101 154 V2.8.1 (2023-07) Clause 6 and ETSI EN 300 468 V1.17.1 (2022-10) Annex D. If a program service has more than one associated audio stream, the receiver shall provide a method for the user to be able to select which audio stream is presented.
11	Audiovisual synchronization Receivers should maintain the alignment of the sound and vision to within ± 20 ms with reference to the transmitted sound and vision alignment (as signalled in the PTS). See Clause 3.9.5.10 for further information.
12	Access audio only (radio) program streams Receivers shall decode MPEG-1 Layer II and MPEG-4 AAC audio only (radio) services in any of the standard audio formats specified. Audio stream coding service types shall be in accordance with Clause 3.7.6 .
12bis	Audio Description DVB Broadcast Mix Audio Description shall be in accordance with Appendix H for specifications of DVB compliant bit streams.
13	Subtitles including Closed Captions (CCs) using Teletext Receivers shall be able to decode a program service's CCs carried in a TS in accordance with ETSI EN 300 472 V1.4.1 (2017-01) and ETSI EN 300 743 V1.6.1 (2018-10). Within EN 300 472 refer to the teletext magazine 8 (0), in page 01. When selected by the user, the decoded text shall be correctly displayed over the picture using the received character code and the control characters including colour, size and boxed background. The characters shall be located as indicated by row number and position in the row's 40 character packet. This location is within a teletext defined 40 character by 24 row grid positioned over the on-screen picture in accordance with Clause 3.11 and Appendix G .
14	Decoding unsupported formats If a receiver does not recognize a program service type, it shall not include it in the service list.
15	Time zone region selection The receiver shall provide a menu setup for a user to choose their Australian time zone region by a state and territory list, in accordance with the time zones listed in Clause 3.7.4 . The receiver shall then access the information for that time zone in the transmitted TOT for any time display or related functions in the receiver. Time zone region selection shall be in accordance with Clause 3.7.4 and Appendix I. NOTE: This is essential for correct times (including daylight saving) in EPG displays.
16	Parental guidance codes Receivers shall utilize parental guidance information for a program (where provided) and shall display this information in the format indicated in the Australian-specific Look-Up Tables. Parental guidance codes shall be in accordance with Clause 3.13.2 and Appendix F . Parental guidance information is transmitted in the EIT.

Table 2.2 *(continued)*

Item	Description
17	Parental lock Refer to the ACMA's Broadcasting Services (Parental Lock) Technical Standard 2020 for regulatory requirements relating to parental lock capabilities of receivers. This regulation can be found at the Federal Register of Legislation (legislation.gov.au). NOTE: Parental lockout information can be obtained from EITp/f (actual) (see Clauses 3.4.5 and 3.13).
18	Mains operated receivers Mains operated receivers shall be designed to operate at a nominal mains input of 230 V a.c., 50 Hz (see Clause 3.2.4.2 for range of voltages).
NOTE Australian regulatory requirements including (but not limited to) safety, EMC, MEPS and energy rating labelling Standards apply to receivers.	

Section 3 Receiver features

3.1 General

The provisions in this section relating to the operation of Digital Terrestrial Television Broadcasting (DVB-T) reception equipment are based on the Australian adaptation of the DVB-T Standards for DVB compliant Integrated Receiver Decoder (IRD) functionality for basic parameters and digital television terrestrial transmissions. These provisions are for manufacturers and suppliers of Australian DVB-T consumer equipment.

Unlike the previous edition of AS 4933, the provisions in this section and elsewhere in this document follow NorDig specifications. Consultation with consumer electronics manufacturers indicates the design of currently deployed DVB-T receivers in Australia follows specifications, as a primary design reference, in the NorDig Unified Requirements for Integrated Receiver Decoders. This edition makes reference to the NorDig specifications, and these are identified along with referenced clauses in *Nordig Unified Requirements* ver. 3.1.2 (13 April 2021). This is specifically pertinent to RF performance specifications.

NOTE Semantic elements of the PSI and SI syntax code, such as descriptors, are printed in a sans serif font (e.g. "linkage_descriptor = 0x05").

3.2 Terrestrial reception

3.2.1 DVB-T receivers

This document provides requirements in accordance with DVB specifications for Integrated Receiver Decoder (IRD) functionality so that receivers are capable of receiving Australian DVB-T transmissions. This includes any requirements that apply to optional (non-essential) features of such receivers. These clauses reference ETSI/DVB-T Standards and specify requirements to allow for reception of DVB-T FTA (free-to-air) transmissions in Australian conditions.

The receiver shall be able to receive, decode and present an FTA television service from a correctly constituted Australian DVB-T Transport Stream (TS) irrespective of other services (that might be encrypted) in that TS.

In situations where there is a mixture of FTA services and encrypted services in a TS, the receiver shall be able to decode the FTA services without the need for any decryption mechanism.

3.2.2 Decoding service format types

Receivers shall be capable of decoding services from the TS. The decoded picture, sound and other information shall be presented (scaled appropriately) in a time-synchronized manner. The TS comprises the following:

- (a) Video formats at a 25/50 Hz frame/field rates, including —
 - (i) any SD video stream of up to $720 \times 576 \times 25\text{p}/50\text{i}$ using MP@ML MPEG-2 video or MPEG-4 Part 10 at level 3; and
 - (ii) any HD video stream of up to $1920 \times 1080 \times 25\text{p}/50\text{i}$ MP@HL MPEG 2 video and MPEG-4 Part 10 at level 4.
- (b) Audio formats —
 - (i) MPEG-1 Layer II;
 - (ii) AC 3; and

- (iii) MPEG-4 HE AAC v2 which includes MPEG-4 AAC and MPEG-4 HE AAC.
- (c) Closed Captions (CCs) in teletext format (see [Appendix G](#)).

Decoding service format types shall be in accordance with ETSI TS 101 154 V2.8.1 (2023-07) Clause 5.

Audio formats shall be in accordance with ETSI TS 101 154 V2.8.1 (2023-07) Clause 6.

3.2.3 Capability of receiving analogue PAL-B transmissions

Void.

3.2.4 Advisory: Australian regulatory and safety requirements

3.2.4.1 General

In Australia, electrical safety Standards are adopted by relevant state and territory legislation. Receivers need to meet these safety requirements and other Australian regulatory requirements, including EMC (electromagnetic compatibility), MEPS (Minimum Energy Performance Standards) and energy rating conditions.

3.2.4.2 Electrical safety

3.2.4.2.1 General

Mains powered equipment shall conform to an electrical safety Standard. Depending on the relevant state/territory and federal regulatory regimes that apply, testing in accordance with AS/NZS 62368.1:2018 may also be needed.

3.2.4.2.2 Mains voltage

Australian electrical mains supply is nominally 230 V a.c., 50 Hz. The voltage may vary over a nominal range of 230 V, -6 % to +10 %.

NOTE It has been reported that in some locations, due to system peak loads causing voltage drops or power feeds to the grid from photovoltaic (PV) array installations, this voltage range may extend from 205 V to 264 V.

3.2.4.2.3 Touch current

In the interest of minimizing the effects of cumulative touch currents in the typical domestic situation, where multiple electronic, multimedia and IT devices are connected together, manufacturers need to minimize an individual receiver's touch current as far as is practicable.

Ensuring that touch currents are less than 0.35 mA peak or earthing the equipment frame could minimize such effects.

AS/NZS 62368.1:2018 deals extensively with the issue of touch currents.

3.2.4.3 Electromagnetic Compatibility (EMC) and other ACMA regulations

The Australian Communications and Media Authority (ACMA) has a number of regulatory arrangements that impose labelling and record keeping requirements on importers and manufacturers of digital television receivers.

The EMC regulatory arrangement sets out requirements for digital receiver equipment supplied in Australia.

The EMC regulatory arrangement places limits on the incidental radio emissions from digital receivers to reduce their potential for causing interference to radiocommunications devices. The ACMA

recognizes that there is a number of industry Standards that manufacturers may use to demonstrate compliance with the EMC regulatory arrangements.

Where digital receiver equipment supplied in Australia has a radiocommunications transmitter, it might need to meet mandatory requirements under the ACMA's radiocommunications devices regulatory arrangement and the RF human exposure regulatory arrangement.

Radiocommunications transmitters include devices that connect to wireless local area networks (LANs) or similar technologies.

Where digital receiver equipment supplied in Australia has a telecommunications interface incorporated into the equipment, it might need to meet mandatory requirements under the ACMA's telecommunications customer equipment regulatory arrangement. Mandatory requirements might apply to the device and to any included accessory cable.

Further details on the ACMA's regulatory arrangements are available on the ACMA website (<https://www.acma.gov.au/>).

3.2.4.4 Minimum Energy Performance Standards (MEPS)

Receivers may need to conform to relevant Australian Minimum Energy Performance Standards. Refer to AS/NZS 62087.1:2010, AS/NZS 62087.2.1:2008 and AS/NZS 62087.2.2:2011.

NOTE Refer to the Equipment Energy Efficiency (E3) website (<https://www.energyrating.gov.au/>).

3.3 Power on operations

3.3.1 First-time operation initialization

In summary, if required, the on-screen setup menu should allow the user to —

- (a) set the OSD (on screen display) language (default-English);
- (b) set the preferred picture format and aspect ratio (for output to another device);
- (c) set the Australian region for time offset (e.g. NSW, SA); and
- (d) start a frequency scan for available services or enter tuning details (see [Clause 3.4.3](#)).

3.3.2 Subsequent switch on

When switched on subsequently, a receiver should always return to the previous setup (last selected service).

3.4 User operation

3.4.1 Operating system

The underlying basic operating system is the manufacturer's choice.

3.4.2 Receiver diagnostics and reset

The receiver (via menu selection) should be able to show the current firmware and software versions and initiate a full reset to the manufacturer's default start up settings if required.

3.4.3 Tuner functionality

3.4.3.1 Scanning to find services

All receivers shall have a user-initiated scanning capability to identify all receivable services.

A full rescan function shall be provided that completely erases the existing tuning and related databases, including “favourites”, prior to the rescan.

NOTE 1 This is to ensure that changed services are not given multiple listings which may confuse viewers. Reception of duplicate services on different frequencies needs to be sorted as detailed in [Clause 3.4.4](#).

This scanning capability shall scan all channel frequencies listed in [Table D.1](#).

NOTE 2 The scanning of channels listed in [Appendix E](#) is optional.

A full scan of the DVB-T broadcast bands should start with VHF Band III channels and proceed through the UHF band channels.

The receiver should display the RF channel number as the scan proceeds.

3.4.3.2 Use TPS for transmission discovery

During a scan, it is highly recommended that the tuner accesses the DVB-T Transmission Parameter Signalling (TPS) carriers to determine a transmission’s COFDM parameters. DVB-T tuner specifications shall be in accordance with *Nordig Unified Requirements* ver. 3.1.2 Clause 3.4.

NOTE The TPS are differential bi-phase shift keyed (DBPSK) carriers making its reception more robust.

3.4.3.3 Manual entry of tuning details

There shall also be a single channel frequency entry capability for the user to manually add channels that may have been missed in a full scan.

3.4.3.4 Automatic detection of new or changed services

If a receiver does a background scan for new RF transmissions (e.g. in standby), the viewer should be advised of any new transmissions or services found when they next switch on the receiver with the option to include the changes.

Receivers should be able to discover service changes within an existing (TS) and advise viewers of these changes.

3.4.4 Assigning numbers to services and navigation

3.4.4.1 Logical Channel Numbering (LCN)

Australian broadcasters use non-contiguous LCNs and 3-digit LCNs. Each LCN is linked to a service_id.

A receiver shall provide, as a minimum, a menu listing using LCNs of available services. Each service’s LCN (as included by the broadcaster in the transmitted NIT) shall be used for service menu listings and service selection.

During scanning, the receiver should examine the TS SI NITs and SDTs and identify the LCN data from the Logical Channel Descriptor [tag value 0x83] that is included in the cyclic second loop of the NIT.

NOTE 1 DVB triple: Each service in a TS is uniquely identified to a receiver by the original_network_id, transport_stream_id and service_id, and to the viewer by its LCN, found in the NIT. For NIT and SDT syntax, refer to ETSI EN 300 468 V1.17.1 (2022-10) Clause 6.2.

NOTE 2 Multiple NITs in Transport Stream: Because of distribution requirements, some Australian networks' TSs contain several NITs. When accessing the LCN assignments from the NIT, the receiver software needs to check that the `transport_stream_id` in the NIT corresponds to the actual `transport_stream_id` given in the PAT.

Australian use of `original_network_id`: The Australian LCN system shall use the syntax that is specified in IEC 62216:2009 Clause 9.2.11.2.2. However, LCNs are applied somewhat differently in Australia than in Europe, particularly in relation to the associated use of `original_network_id`. In Australia, each broadcast network has been allocated its own individual `original_network_id` by DVB.

For LCN syntax, see [Clause I.1.1](#), which gives the version adopted by Australia for DVB-T, where the first of the "reserved" bits is used as a "visible_service_flag". LCNs range between 001 and 999. See [Appendix I](#).

Australian broadcasters have agreed to use a convention that assigns LCNs corresponding to each broadcaster's "brand" number.

3.4.4.2 Services without LCNs

Services found without LCNs should be allocated numbers starting at 350 up to 399. This number range should also be used when duplicate service LCNs are found. See [Clause 3.4.4.4](#).

3.4.4.3 Duplicated LCNs

The service with best signal quality should be assigned the broadcaster's LCN number and the other(s) either discarded or changed to a number in the range 350–399.

Alternatively, duplicate LCNs may be listed so that the viewer may edit the list for the best signal.

3.4.4.4 Finding duplicate LCNs

When transmissions overlap, during the scanning a receiver may encounter duplicated services when frequency scanning, e.g. reception from a parent and from a translator. This creates the situation where there might be identical services with the same LCN but on different RF transmissions.

NOTE More information is available in [Appendix I](#) in this document.

3.4.4.5 Follow broadcaster service changes

The receiver should regularly update its listing of and access to available services.

NOTE Broadcasters may change the LCN values in the NIT for existing services or when adding or removing services. These will also be listed in the SDT, PAT.

3.4.4.6 Linkage descriptor

Receivers should read and use the Linkage Descriptor within the SDT to navigate away from "not_running" services. Application of the Linkage Descriptor shall be in accordance with ETSI EN 300 468 V1.17.1 (2022-10) Clause 6.2.19 and ETSI TS 101 211 V1.13.1 (2021-05).

Receivers without this feature require the viewer to manually navigate away from services that have switched to a "not_running" status.

3.4.4.7 Response to service changes — PSI and SI updates

The receiver shall regularly check PSI and SI information repetitively.

Response to PSI and SI updates shall be in accordance with ETSI EN 300 468 V1.17.1 (2022-10) Clause 5.1.4 and ETSI TR 101 290 V1.4.1 (2020-06).

The recommended refresh period values are given in [Table 3.4.4.7](#), which is based on the update times for a DVB transmission given in ETSI TR 101 290 Clause 5.2.1.

Table 3.4.4.7 — Receiver PSI/SI update times

Table in received Transport Stream	ETSI TR 101 290 (for transmission)	Recommended receiver PS and SI refresh period
PAT	0.5 s	≤ 1 s
PMT	0.5 s	≤ 1 s
NIT	10 s	≤ 20 s
SDT	2 s	≤ 4 s
EITp/f actual	2 s	≤ 4 s
TDT	30 s	≤ 60 s
TOT	30 s	≤ 60 s

NOTE See [Appendix J](#) for information on and provisions for AIT and additional tables that may be required to be checked on a more regular basis to successfully receive extended functionality services.

When a user selects another program service, the receiver should use the previously stored tuning information in order to give a fast channel change. After changing the frequency, the TPS should be checked to ensure the transmission parameters have not changed.

If the receiver cannot find the required service (because the broadcaster has changed its operation or the service list), the receiver should check the PAT (and the relevant PMT), the NIT and the SDT.

The receiver should respond to changes to services as identified in the NIT and SDT by altering the channel lists presented to the viewer in a timely fashion.

3.4.5 Electronic Program Guide (EPG)

3.4.5.1 General

Receivers shall be able to use information from EITs, but receivers shall not be adversely affected by the absence of EITs in a transmission.

3.4.5.2 Use of EITschedule-program information

Receivers should be able to capture, store and display EIT schedule program information as required. EIT schedule program information shall be in accordance with ETSI EN 300 468 V1.17.1 (2022-10) Clause 5.2.4.

NOTE Broadcasters provide up to 8 days information of EITschedule(actual) (i.e. current day plus 7 days).

3.4.6 I-plate (information banner), OSD and navigation using EITp/f actual

3.4.6.1 General

The DVB-T receiver shall determine user selected services through decoding and processing of mandatory Service Information data within Tables in the Transport Streams as specified in ETSI EN 300 468 V1.17.1 (2022-10) and *Nordig Unified Requirements* ver. 3.1.2 Clause 12.2.

The receiver shall be able to use the parental guidance information in the transmitted EIT p/f(actual) for the purposes of operating the parental lock feature as specified in ETSI EN 300 468 V1.17.1 (2022-10) Clause 5.2.4.

EITp/f information should be presented for a short period when a service is selected or when an “information” key is pressed.

The display should include the LCN and service name, current time, program event name, program event start time and end time, or duration/progress, and parental guidance rating.

In addition, other information can include the genre, the EIT short event program description, and the EIT extended event program description information.

Information banner OSD detail:

The minimum character positions capable of being displayed in accordance with coding of text characters in ETSI EN 300 468 V1.17.1 (2022-10) should include the following:

- (a) Service number (LCN from NIT) — 3 digits
- (b) Service name (from SDT service descriptor) — 20 characters

From the EIT for each event:

From the EIT for each event, the following should be capable of being displayed:

- (i) EIT short_event_descriptor:
- (ii) Program (event) title — 40 characters
- (iii) Description/synopsis — 200 characters
- (iv) EIT extended_event_descriptor information — Optional display
- (v) Parental guidance rating — 6 characters
- (vi) Now/next event start time/duration — 13 characters

Australian broadcasters use event descriptors as follows (refer to Clause 5.2.4 of ETSI EN 300 468 V1.17.1 (2022-10)):

- (A) The short_event_descriptor provides details of the program name or episode and a short description of the event in text form.
- (B) The extended_event_descriptor, when used, provides an extended synopsis and other details of the program.

For information on the use of EIT schedule, refer to Clause 5.2.4 of ETSI EN 300 468 V1.17.1 (2022-10).

3.4.6.2 Character set

The character set used within both EIT p/f and EIT schedule should conform to ETSI EN 300 468 V1.17.1 (2022-10) Figure A.1 to allow the inclusion of special characters such as the copyright symbol (©).

3.4.6.3 Icons for special features

Manufacturers may also choose to display information or icons to indicate other features of a program that the receiver supports, such as the available audio mode, teletext CCs, other languages (if present), signal quality and program progress.

3.4.6.4 Parental guidance rating in the I-Plate

This coding is carried within the parental_rating_descriptor syntax in the EIT. More information is available in [Clause 3.13](#) and [Appendix F](#) in this document.

Receivers shall refresh the EITp/f (actual) no less than every 4 s.

3.4.7 Signal strength and quality indicator

See [Appendix C](#).

3.4.8 Selection of radio services

Receivers shall be able to select and decode audio only (radio) services presented in any of the audio formats that are requirements of this Standard. Radio services are identified by an LCN.

Radio services are identified in the SDT by service_type 0x02 in the service_descriptor (tag 0x48) syntax.

3.4.9 Service unavailable — On-screen service

3.4.9.1 Poor or no RF signal

When the signal level is below the decoding threshold, this should be indicated to the viewer by a display such as “No signal”.

3.4.9.2 Service selected that has no content or is “not running”

Void.

3.4.9.3 Incompatible service selected

If a service outside the receiver’s decode capability is selected, then a suitable message should be displayed.

3.4.10 User navigation

3.4.10.1 Basic navigation

A method for basic navigation in the digital TV environment shall be provided.

3.4.10.2 Display of Closed Captions (CCs)

Display of CCs should remain active until deactivated by the user.

3.4.10.3 Selection of audio description services

Navigation methods or devices should provide a means of activating an audio description service.

3.4.10.4 Aspect ratio control (Optional)

Void.

3.5 RF performance, COFDM demodulation and channel decoding

3.5.1 General

The following clauses are a summary of the detailed requirements for a receiver’s RF performance and the methods for measurement given in the normative [Appendix A](#) in this document. RF parameters shall meet the requirements found in *Nordig Unified Requirements* ver. 3.1.2 Clause 3.4 for related requirements.

More information and specifications on RF input and output connectors can be found in [Clause 3.15.1](#).

3.5.2 RF performance

3.5.2.1 7 MHz transmission channel bandwidth

The Australian transmission channel bandwidth is 7 MHz. Receivers shall be able to operate on 7 MHz channel spacing at both VHF and UHF.

Receivers with tuners designed to operate with either 7 MHz or 8 MHz channel assignments at UHF should be preset to 7 MHz before sale or have an easy-to-find menu function identified as Australia that contains 7 MHz channel assignments on the broadcast band, as detailed in [Table D.1](#).

3.5.2.2 RF input channel loading allowance

TV VHF and UHF channel loading, RF signals including FM and DAB radio, and VHF and UHF land mobile, should be considered when assessing channel loading.

3.5.2.3 Receiver sensitivity

Receiver sensitivity requirements are set out in [Appendix A](#).

Receiver sensitivity is a function of tuner noise figure and carrier-to-noise threshold as detailed in [Clause A.16](#).

3.5.2.4 Digital terrestrial receiver tuner's frequency range

The digital receiver tuner's frequency range shall cover VHF Band III (174 MHz to 230 MHz), UHF Band IV (519 MHz to 582 MHz) and UHF Band V (582 MHz to 694 MHz), in accordance with the Australian channel tuning [Table D.1](#) for terrestrial transmissions up to CH51. Cable distribution systems operating above 694 MHz may use CH52 to CH69 (up to 820 MHz). See [Table E.1](#) for channel number and frequency limits for non-broadcast bands.

NOTE Refer to <https://www.acma.gov.au/publications/2019-10/rules/embargo-45>.

VHF Bands I and II are not used in Australia for digital terrestrial transmissions.

Manufacturers may optionally provide a tuner that also covers the extended frequency bands for cabled distribution systems. Such equipment would enable access to channel shift in cabled distribution systems, e.g. in commercial premises such as multi-unit dwellings including hotels, resorts and retirement villages. See [Appendix E](#).

3.5.2.5 Channel offsets

Receivers shall be able to tune into and demodulate DVB-T transmissions that are offset from the nominal channel centre frequencies listed in [Table D.1](#) by ± 125 kHz. See [Appendix A](#).

The tuner's AFC (Automatic Frequency Control) pull-in range shall be more than adequate to lock to transmissions with this offset.

3.5.2.6 Operation in Single Frequency Network (SFN) environment

Receivers shall be able to operate in SFN environments with either pre-echo or post-echo signals within the guard interval.

The measurement of SFN performance of receivers shall be in accordance with [Appendices A](#) and [B](#).

3.5.2.7 Interference immunity — Impulse noise rejection

The receiver's RF tuner system should include impulse noise suppression technology as impulse noise is usually more severe in the VHF bands and VHF Band III is widely used in Australia. See [Clause A.18](#).

3.5.2.8 Immunity to DVB-T/-T2 signals in other channels

In accordance with *Nordig Unified Requirements* ver. 3.1.2 Clause 3.4.10.6 and Clause 3.4.10.7.2 Table 3.16, the terrestrial DVB receiver shall permit an interfering DVB-T signal with a minimum interference to signal level ratio (I/C) while maintaining Quasi Error Free (QEF) reception. See [Clause A.23](#).

3.5.2.9 Definition of Quasi Error Free

The ITU definition of Quasi Error Free (QEF) is contained in the Recommendation ITU-R BO.1696 that states “In the DVB context the term ‘quasi error free’ corresponds to less than one uncorrected error event per transport stream hour”.

The ETSI standard, EN 300 744 V1.6.2 (2015-10) quantified for the case of DVB-T the “one uncorrected error event per transport stream hour” in a value of Bit Error Rate, BER: “*Quasi Error Free (QEF) means less than one uncorrected error event per hour, corresponding to BER less than 10^{-11} at the input of the MPEG-2 demultiplexer*” (i.e. BER less than 2×10^{-4} after Viterbi decoder and BER less than 10^{-11} after Reed-Solomon decoder).

Nordig Unified Requirements ver. 3.1.2 Clause 3.10.2 notes that Quasi-Error-Free (QEF) means less than one uncorrected error event per hour. This requirement corresponds to $BER = 10^{-11}$ at the input of the MPEG-2 demultiplexer.

3.5.2.10 Immunity to 700 MHz LTE signals in other channels

In accordance with *Nordig Unified Requirements* ver. 3.1.2 Clause 3.4.10.7.2, the terrestrial DVB receiver shall, for the supported frequency ranges, permit an interfering 4G (LTE) “700 MHz” signal with a minimum interference to signal level ratio (I/C), while maintaining QEF reception. See [Clause A.23](#).

3.5.3 DVB-T COFDM transmission parameters

3.5.3.1 General

In accordance with ETSI EN 300 744 V1.6.2 (2015-10) Clause 4 *Baseline system*, the DVB-T receiver shall —

- (a) use Transmission Parameter Signalling (TPS);
- (b) be able to receive 2K and 8K carrier modes;
- (c) accept QPSK, 16-QAM or 64-QAM;
- (d) accept any valid DVB-T guard intervals; and
- (e) accept any valid DVB-T code rates.

The receiver shall automatically detect which COFDM transmission parameters are being used in the selected 7 MHz channel that are identified in the TPS carriers.

3.5.3.2 Change in COFDM transmission parameters — Acquisition time

The acquisition lock time should be —

- (a) within 2 s when a viewer changes to a service that is on a different RF channel; or
- (b) within 5 s when a broadcaster changes the COFDM transmission parameters of a transmitter as identified by TPS.

3.5.3.3 Reception of DVB-T Hierarchical Modulation transmissions

Australian television broadcasters are not implementing hierarchical modulation.

3.6 Multiplex and transport stream

Receivers should be able to manage 32 PIDs simultaneously as a minimum.

3.7 Processing Program-Specific Information (PSI) and Service Information (SI)

3.7.1 Interpretations of SI variations for Australia

DVB-T transmissions in Australia differ in some respects from those in Europe. Clauses and appendices relating to Australian practice that directly concern receiver manufacturers include the following:

- (a) In the EIT:
 - (i) Parental guidance — [Clause 3.13](#) and [Appendix F](#).
 - (ii) Program classification/genre — [Clause 3.7.5](#).
- (b) In the TDT and TOT:
 - Time offset zones — [Clause 3.7.4](#) and [Appendix I](#).
- (c) In the NIT:
 - Logical Channel Numbers — [Clause 3.4.4.1](#).

Other information on broadcaster codes for DVB-T that is not necessary for receiver design but may be of interest to receiver manufacturers, such as “network_id”, is available at www.dvb.org.

3.7.2 Interpretation of MPEG, DVB mandatory and DVB optional tables

3.7.2.1 General

Australian broadcasters regularly change their program service arrangements for a variety of reasons.

In the currently selected TS the PMTs shall be monitored at least every second and on selection of a different service in accordance with ETSI EN 300 468 V1.17.1 (2022-10) and ETSI TS 101 211 V1.13.1 (2021-05). A change shall be implemented within 1 s of reception of the change.

For the purposes of discovery of added or changed services, receivers shall detect and respond to changes in the PSI and SI in the TS by checking for service changes at intervals not exceeding 24 hours. This monitoring shall include the PAT, SDT and NIT set of tables and may be while the receiver is in active or standby modes. See [Clause 3.4.4.7](#).

NOTE Australia has registration in DVB of original_network_id; network_id; bouquet_id; ca_system_id; private_data_specifier; and country/region codes.

3.7.2.2 Application Information Table (AIT)

This table provides full information on the data broadcast and the required activation state of applications carried by it. The AIT comprises the set of AIT sub tables within the selected service, which have an application_type that the receiver can decode. Navigation between DVB-T broadcast service and HbbTV shall be initiated by information carried in the DVB SI in an Application Information Table (AIT) in accordance with Free TV OP-61.

NOTE Refer to ETSI TS 102 809 v1.1.1 (2010-1).

3.7.2.3 Content Reference Identifier (CRID)

CRIDs and URIs shall be encoded in DVB transport streams in accordance with TV Anytime specifications in ETSI TS 102 323 v1.5.1 (2012-01), which defines two types of CRID as follows:

- (a) A programme CRID (type 0x31) which is allocated from each unique event.
- (b) A series CRID (type 0x32) which can be allocated to each programme in a series.

Each event in the EIT may be associated with multiple CRIDs through one or more content identifier descriptors (CRID). Refer to ETSI TS 102 323 v1.5.1 (2012-01) and ETSI EN 300 468 V1.17.1 (2022-10) for use of CRIDs.

Australian television broadcasters have implemented Content Reference IDs for accurate recording in PVRs.

Refer to Free TV OP-72 (Issue 1 December 2014) *Implementation of Content Reference IDs by Australian Television Broadcasters*.

3.7.2.4 Default Authority Descriptor (DAD)

The default authority descriptor (DAD) defined in ETSI TS 102 323 V1.5.1 (2012-01) Clause 6.3 *Default authority and abbreviated CRIDs* may be used to shorten the CRIDs carried within the EIT. The DAD may be located in the TS loop of the NIT or the service descriptor loop of the SDT.

3.7.3 Interpretation of other descriptors

Receiving equipment shall interpret MPEG and DVB descriptors correctly and shall be able to skip over those that are currently “reserved” or that correspond to functions not implemented by the receiving equipment in accordance with ETSI EN 300 468 V1.17.1 (2022-10) Clause 5 and ETSI TS 101 211 v1.13.1 (2021-05) Clause 4.2 *SI descriptor allocation and usage*.

3.7.4 Interpretation of Time and Date Time-Offset Tables (Australian variation)

3.7.4.1 General

There are several time zones in Australia, some of which change for daylight saving. To accommodate these changes, Australia has allocated 7 country_region_id values which vary from ETSI EN 300 468 V1.17.1 (2022-10).

Receivers shall display the current local time on the front panel or in OSD program guides, or both in accordance with ETSI TS 101 211 v1.13.1 (2021-05) Clause 4.1.5 *Time and Date Table (TDT)* and [Appendix I](#) in this document. This information is available from the TOT. The time displayed shall correspond to the local time of the region the user has identified.

For more information, refer to www.australia.gov.au/time-zones-and-daylight-saving.

Table 3.7.4.1 — country_region_id for Australian States (time zones)

country_region_id =	Transmitted code	Receiver's setup menu display
	00 0000	Not used
	00 0001	Reserved
	00 0010	NSW/ACT
	00 0011	Vic.
	00 0100	QLD
	00 0101	SA
	00 0110	WA
	00 0111	Tas.
	00 1000	NT
	00 1001	Reserved
	11 1111	Reserved

Receivers shall provide a setup menu that allows users to select their region, as shown in [Table 3.7.4.1](#).

3.7.4.2 Informative notes on Time-Offset Tables

Receivers are able to find time information in DVB Time and Date Table (TDT) and, more importantly, TOTs in a transmission. These tables are transmitted with the same unique PID of 0x0014 but are separately identified by the table_ids of 0x70 and 0x73 respectively.

The TOT will contain the time in Universal Coordinated Time (UTC) and the date in Modified Julian Date (MJD), followed by a local_time_offset_descriptor loop (tag value 0x58). A secondary loop contains country_code, country_region_id, local_time_offset_polarity and local_time_offset. This second loop allows offsets for each time zone to be given if needed.

The country_code at the beginning of this second loop will be Australia’s three-character code — “AUS”.

The receiver will need to know the country_region_id code value to correctly interpret the local_time_offset descriptor information found in the TOT. The receiver will need to have a setup menu entry that allows users to select their region and also the capacity to store the users’ selection.

Some broadcasters transmit TOTs with a single loop containing the region code and time offset for the area covered by that transmission. Other broadcasters use TOTs with multiple loops, each loop for a separate Australian time zone with the offset for that zone.

Further information is available in Clause I.4 and www.australia.gov.au/time-zones-and-daylight-saving.

3.7.5 Content descriptors (Australian variation from ETSI EN 300 468)

Receivers may display, as required, a program’s classification/genre as identified by the content_descriptor (tag value = 0x54) that may be found in the EIT in Table 3.7.5.

Only the content_nibble_level_1 is currently defined.