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Requirements for receivers for VHF/UHF DVB-T2 television broadcasts including ancillary services

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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

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Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee CT-002, Broadcasting and Related Services.

The objective of this document is to specify the requirements for receivers for VHF/UHF DVB-T2 television broadcasts including ancillary services. This includes an extensive range of new specifications beyond those found in DVB-T specifications within AS 4933:2024. These are specified with sufficient detail to allow receiver manufacturers to design and manufacture DVB-T2 receivers to meet Australian technical and regulatory requirements, including the following:

(a) DVB-T2 Multiple Physical Layer Pipes, which allow separate adjustment of the robustness of each delivered service within a channel to meet the required reception conditions (e.g. in-door or roof-top antenna).

(b) DVB-T2 Single Frequency Network implementation, which allows an efficient management of frequency utilization and permits an extension of the *coverage* area.

(c) Increased bit rate efficiency with High Efficiency Video Coding (HEVC), Leading edge High Dynamic Range/High Frame Rate picture formats and multi-channel immersive AC-4 audio coding.

(d) Australian regulatory requirements such as program classification codes, e.g. for parental guidance and time zone different to those applicable in Europe.

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 within the minimum DVB specifications for Integrated Receiver Decoder (IRD) functionality.

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.

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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.

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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 current and proposed Australian digital terrestrial television broadcast transmissions.

The international ETSI DVB Standards, through recognition in other standards, e.g. ISO/IEC 14496-26, specify implementation guidelines and *conformance points* for the use of technologies utilizing MPEG-2 systems in satellite, cable and terrestrial broadcasting systems and in IP-based networks, including coding for adaptive bitrate delivery over IP-based networks. These *conformance points* place some implementation constraints on technologies, while achieving interoperability between design of manufacturers' Integrated Receiver Decoders (IRDs).

In the decade leading up to development of this document, a number of studies became available which have informed standards development organisations (SDOs) on improvements to DVB-T2 receiver design. These include the following:

NOTE The documents listed below are provided for the purposes of historical background.

(a) IEC 61937 (series), *Digital audio – Interface for nonlinear PCM Encoded audio bitstreams applying IEC 60958*.

(b) ISO/IEC 23008-2:2020, *Information technology – High efficiency coding and media delivery in heterogeneous environments – Part 2: High efficiency video coding*.

(c) ETSI EN 303 340 V1.2.1 (2020-09), *Digital Terrestrial TV Broadcast Receivers; Harmonized Standard for access to radio spectrum*

(d) ETSI EN 303 560 V1.1.1 (2018-05), *Digital Video Broadcasting (DVB); TTML subtitling systems*.

(e) ITU-R BT.2036-4 (06/2021), *Characteristics of a reference receiving system for frequency planning of digital terrestrial television systems*.

(f) ITU-R BT.2033-2 (01/2022), *Planning criteria, including protection ratios, for second generation of digital terrestrial television broadcasting systems in the VHF/UHF bands*.

(g) ITU-R BT.2254-5 (11/2021), *Frequency and network planning aspects of DVB-T2*.

(h) ITU-R BT.2269-2 (11/2021), *Typical frequency sharing characteristics for digital terrestrial broadcasting systems in the frequency band 174-230 MHz*

(i) ITU-R BT.2341-1 (11/2014), *TV receiver subjective picture failure thresholds and the associated minimum quasi error free levels for good quality reception*.

(j) ITU-R BT.2383-4 (03/2022), *Typical frequency sharing characteristics for digital terrestrial television broadcasting systems in the frequency band 470-862 MHz*.

(k) ITU-R BT.2386-3 (10/2020), *Digital terrestrial broadcasting: Design and implementation of single frequency networks (SFN)*.

(l) ITU-R BS.2466-0 (07/2019), *Guidelines for the use of the ITU-R ADM Renderer*.

(m) ITU-R BT.2467-1 (03/2021), *Methods for the evaluation of the quality of service of second generation DTTB systems*.

(n) ITU-R BT.2468-1 (03/2021), *Guidance for selection of system parameters and implementation of second generation DTTB systems*.

(o) ITU-R BT.2469-2, *Typical frequency sharing characteristics for digital terrestrial broadcasting systems in the frequency band 174-230 MHz*.

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Section 1 Scope and general

1.1 Scope

This document specifies the baseline television receiver requirements for reception of free-to-air (FTA) terrestrial VHF/UHF DVB-T and DVB-T2 broadcast television.

This document applies to baseline television receivers capable of receiving existing DVB-T services (refer to AS 4933 for relevant requirements) and DVB-T2 services and encoding technologies.

Within a DVB-T2 environment, where receiver requirements are separately referenced for DVB-T in AS 4933:2024, Australian television broadcasters have implemented MPEG-2/MPEG-4 AVC video coding along with AC-3, MPEG-1 Layer II, MPEG-4 AAC and MPEG-4 HE AAC audio codecs. National television broadcasters, ABC and SBS, also have radio services within their transmissions.

This document specifies requirements for DVB-T2 with H.264/AVC, H.265/HEVC video coding, a HDR picture format and AC-4, MPEG-4 AAC, MPEG-4 HE AAC V1 and V2, AC-4 and E-AC-3 audio coding.

The international ETSI DVB Standards and related ETSI, ISO/IEC, ITU-R and NorDig Unified Requirements documents provide for various implementation systems. This document specifies the choices available in Australia and references Australian adaptations of these international Standards where appropriate.

This document covers the requirements for subscription television receivers that can also access the free to air broadcasts.

This document does not specify the final presentation characteristics of picture (display) and sound or associated services, which may be provided as features individually in consumer electronics products.

1.2 Application

1.2.1 General

The primary purpose of this document is to identify the minimum essential requirements for equipment intended to receive, demodulate and decode television broadcasts that conform to DVB specifications for Integrated Receiver Decoder (IRD) functionality and the Australian implementation of DVB-T2 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 closed captions. 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. Another purpose of this document is to provide specifications for high quality picture formats.

If necessary, the video may be required to be converted (“scaled”), as the received format may be different from the display format. Correspondingly, the received audio channels may need to be processed or downmixed to suit the available sound reproduction equipment.