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ISDB-T HARMONIZATION DOCUMENT

PART 1: HARDWARE

(November/2015)

The documentation herein described is currently presented for revision of the contact points of the Working Group on Harmonization of the ISDB-T International Forum.

FOREWORD

This document is the outcome of the joint efforts of the countries that have adopted the ISDB-T standard under the standardization and technical cooperation activities of the ISDB-T International Forum. Participants agree on the relevance of enhancing the interoperability and conformity of ISDB-T systems and commit to maximizing the commonality of the technical specifications.

This document has no standardization value. Its purpose is to serve as a quick reference for characterizing the specificities of digital terrestrial television in the participant countries. It does not describe the industrial property rights mandatory to these standards, and no reference is made to the domestic policies of the countries.

This document has been drafted in accordance with the rules established in the ISO/IEC Directives, Part 2.

List of participants

As of 2015, the countries participating in ISDB-T International Forum are listed below:

ARGENTINA
BOLIVIA
BOTSWANA
BRAZIL
COSTA RICA
CHILE
ECUADOR
GUATEMALA
HONDURAS
JAPAN
MALDIVES
NICARAGUA
PARAGUAY
PHILIPPINES
PERU
SRI LANKA
URUGUAY
VENEZUELA



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ISDB-T Harmonization document for digital terrestrial television

Part 1: Hardware

1 Scope

This document summarizes the specifications of digital terrestrial television receivers among the participant ISDB-T countries. It defines the essential functionalities required for the devices to receive signals of digital television of the thirteen segments (Full-seg) as well as of one segment (One-seg) designed to receive signals in the modality fixed (indoor), mobile and portable reception.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ABNT NBR 15604:2015, *Digital terrestrial television - Receivers*

ARIB STD-B21:v4.6 2007, *Receiver for digital broadcasting*

ARIB TR-B14:v3.8 2006, *Operational guidelines for digital terrestrial television broadcasting*

Harmonization Document between ABNT NBR 15604 and ARIB STD- B21:2009, *Digital terrestrial television broadcasting – Receivers*

RESOLUCIÓN MINISTERIAL N°645-2009-MTC-03, Aprueban especificaciones técnicas mínimas de los receptores de Televisión Digital Terrestre del estándar ISDB-T (Integrated Services Digital Broadcasting – Terrestrial) a ser utilizados en el Peru

3 Terms and definitions

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

3.1

accessibility

condition for utilization, with security and autonomy, of the services, devices, systems, and communication and information means, by persons with hearing, visual, or intellectual impairment

3.2

audio description

locution in each country's language, overlapped on the program's original sound, designed to describe images, sounds, text, and other information that cannot be perceived or understood by people with visual impairments

NOTE: The information is sent by the content provider in an individual audio PES that may be selected at user discretion.

3.3

built-in

any functionality embedded in the receiver that can be developed by software and/or hardware

3.4

closed-caption

transcription in each country's language of dialogs, sound effects, ambient sounds, and other information that cannot be perceived or understood by people with hearing impairments

3.5 coding

process of transforming an external signal into bits that represent the original signal

NOTE: The coding is done, as an example, by sampling, and the information acquired can still be compressed.

3.6 decoding

process to restore the original signal, involving processing the bits received from the encoder

NOTE: The decoding process can also eventually achieve decompression of the received information.

3.7 dongle

device typically connected to a data input port of a computer

3.8 downmix

matrix applied to reduce the number of n channels

3.9 dubbing

translation of a program originally spoken in a foreign language, for example, to replace the original locution with dialog spoken in native language and synchronized with time, intonation, characters' lip movements, etc.

NOTE: The sound in the original language, as well as of other languages, is simultaneously transmitted in an independent audio PES or, optionally, in a dual mono audio stream.

3.10 elementary stream ES

basic bit stream containing information on video or audio or private data

3.11 front-end

a set of components from the antenna input up to the output interface. This module is responsible for retrieving the transport stream.

3.12 Full-seg receiver

devices able to decode audio, video, data, etc., carried on the transport stream layer of the thirteen segments designed for fixed (indoor) and mobile services

NOTE: The Full-seg classification is applied to the digital converter also referred to as a set-top box and to the 13 segment receiver integrated with the display, but not exclusively to these devices. This kind of receiver is able to receive and to decode signals from terrestrial digital television in high definition and, according to the manufacturer's criteria, also to receive and to decode information carried on layer "A" of the transport stream and applied for services recommended for portable receivers, here defined as One-seg.

3.13 integrated receiver

device for receiving digital television signals that is integrated into the display without requiring audio and video signal output interfaces

3.14 LATM/LOAS

transport mechanism defined by the MPEG-4 standard and constructed in two layers, one for multiplexing and the other for synchronizing signals

NOTE: The multiplexing layer LATM (low audio overhead MPEG-4 transport multiplex) manages the multiplexing of several payloads of (audio data) and its configuration data in the elements of AudioSpecificConfig. The synchronization layer LOAS (low overhead audio stream) specifies the syntax for auto-synchronization of the MPEG-4 audio transport stream.

3.15

Sign language window

space delimited in the video where the information is interpreted in sign language

3.16

One-seg receiver

device that exclusively decodes audio, video, data, etc., information transported on layer A that is located in the central segment of the thirteen segments

NOTE: The One-seg classification designates a portable receiver, also called a “handheld”, and is especially recommended for small displays, normally up to 7 inches. Among the products classified as One-seg are receivers integrated with cell phones, PDAs, dongles, and portable television sets that are generally powered by an internal battery and, therefore do not require the use of an external power source, as well as those designated for automotive vehicles. This kind of receiver is able to receive and decode only signals from terrestrial digital television transported on layer “A” and consequently, only baseline profile signals designed for portable devices.

3.17

parental rating

classification of an informative and pedagogical nature to promote the interests of children and adolescents in a democratic way, enabling that all addressees of the recommendation can participate in the process, and in an objective way, ensuring that the contradiction of interests and arguments promote the correction and the social control of the practiced acts

3.18

profile

specification of capability classes offering different levels of functionality

3.19

return channel or interactive channel

communication mechanism that enables connection between a receiver and a remote provider

3.20

set-top box

device for receiving and decoding digital television signals that is connected to a television set through cables or any other type of connection and that requires analog or digital audio and video output interfaces

3.21

threshold

defined as the boundaries of the digital converter for switching to another option for reception according to the quality of digital and analog signals

3.22

transport stream

syntax of MPEG-2 transport stream for packetizing and multiplexing video, audio, and data signals in the digital broadcasting system

4 Abbreviations

For the purposes of this document, the following abbreviations apply.

A	Amperes
AAC	Advanced Audio Coding
AES/EBU	Audio Engineering Society (AES) e European Broadcasting Union (EBU)
API	Application Program Interface
AV	Audio and Video
AVC	Advanced Video Coding
BER	Bit Error Ratio
BML	Broadcast Markup Language
C/N	Carrier-to-Noise Ratio
CRC	Cyclic Redundancy Check
CVBS	Composite Video Blanking and Sync
D/A	Digital-to-Analog
dB	Decibel
D/C	Down conversion
DQPSK	Differential Quadrature Phase Shift Keying
DTCP	Digital Transmission Content Protection
EIT	Event Information Table
EPG	Electronic Program Guide
ES	Elementary Stream
FEC	Forward Error Correction
FFT	Fast Fourier Transform
fps	frames per second
HE	High Efficiency
HD	High Definition
HD D/C	High Definition Down Conversion
HDMI	High Definition Multimedia Interface
HDTV	High Definition Television
HE-AAC	High Efficiency Advanced Audio Coding
IEC	International Electrotechnical Commission
IF	Intermediate Frequency
I/O	Input/Output
IP	Internet Protocol
IRD	Integrated Receiver Decoder
ISO	International Organization for Standardization
ITU	International Telecommunication Union

LATM	Low Overhead Audio Transport Multiplex
LC	Low Complexity
LFE	Low Frequency Effects
LOAS	Low Overhead Audio Stream
MPEG	Motion Picture Experts Group
MHz	Megahertz
NA	Not applicable
OFDM	Orthogonal Frequency Division Multiplexing
PAL-M	Phase Alternation Line – standard M
PDA	Personal Digital Assistant
PES	Packetized Elementary Stream
PID	Packet Identifier
PMT	Program Map Table
PS	Parametric Stereo
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase-Shift Keying
RF	Radio Frequency
RS	Reed-Solomon
SAP	Second Audio Program
SBR	Spectral Band Replication
SD	Standard Definition
SDI	Serial Digital Interface
SP	Scattered Pilot
STB	Set-Top Box
TCP/IP	Transmission Control Protocol/Internet Protocol
TMCC	Transmission and Multiplexing Configuration Control
TS	Transport Stream
UDP/IP	User Datagram Protocol/Internet Protocol
UHF	Ultra High Frequency
USB	Universal Serial Bus
V	Volts
VHF	Very High Frequency
Y/C	Luminance and chrominance

5 Basic receiver configuration

The basic configuration of the receiver shall be according to Figure 1 and shall be composed of the following units:

- a) antenna for terrestrial reception;
- b) IRD;
- c) connection cable between the antenna and the receiver.

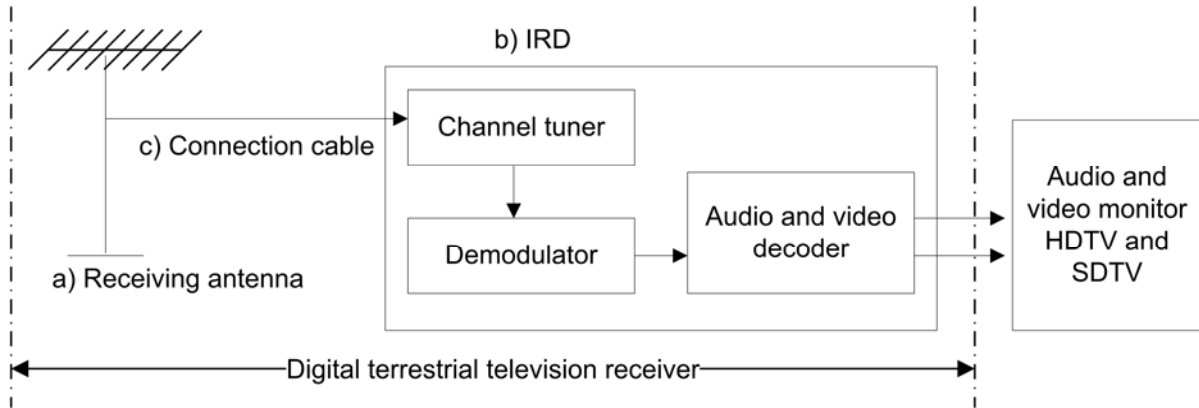


Figure 1 – Basic configuration of receiver

Various types of receivers for receiving digital terrestrial television broadcasts may be designed, that is, receivers intended for fixed stations, for mobile stations, and for portable reception.

6 Hardware reference model

The hardware components of a basic receiver unit are shown in Figure 2.

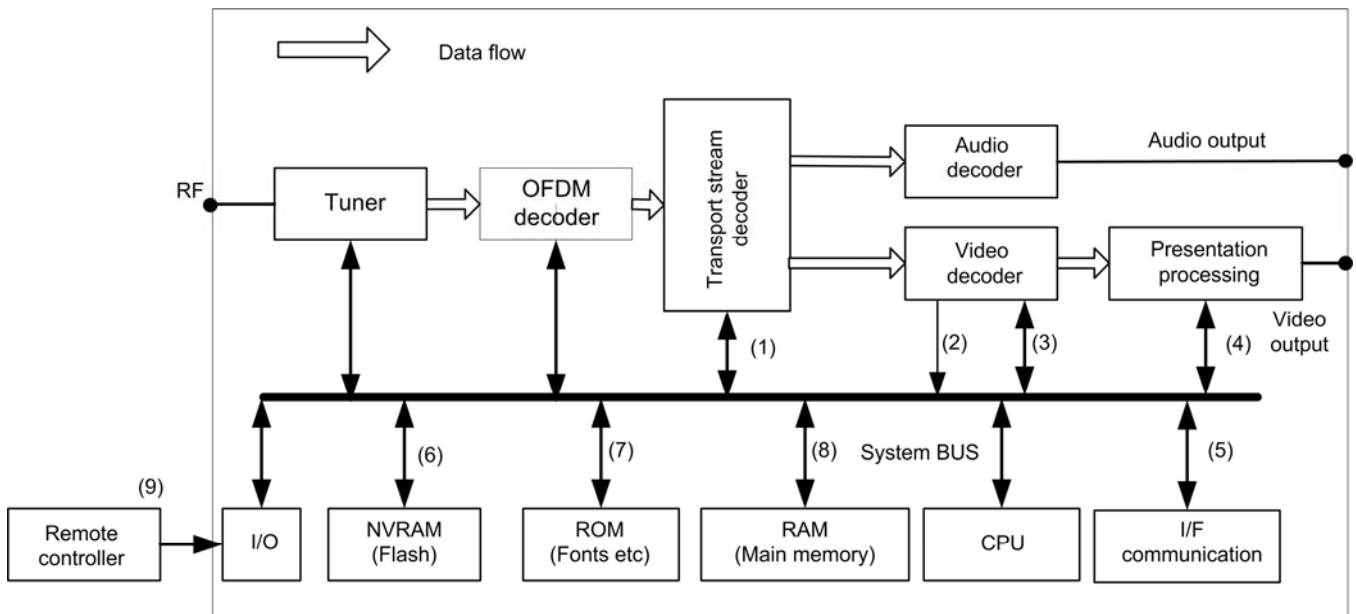


Figure 2- Hardware components of the basic receiver units for Full-seg profile and One-seg profile

The digital broadcasting input signal in a basic receiver unit is converted into a transport stream (TS) by a tuner in conjunction with a demodulation process. The demodulated transport stream is divided into video, audio, and other data through a transport stream decoding process, after which the video stream goes through a video decoding process, and the audio stream goes through an audio decoding process. Through this process, the audio and video are reproduced by the basic receiver units.

When broadcasting data are received, the information shall be transferred to the main memory or nonvolatile memory, since it shall be processed by the CPU. Furthermore, a more interactive performance is expected than compared to the traditional process of watching television using an upload connection, etc. From a hardware performance perspective, the following provisions shall be established:

- (1) transport decoders capable of receiving data;
- (2) reproduction of the stream system and the stored audio data;
- (3) reproduction of the stream system and stored video data;
- (4) presentation of video, still pictures, text, and graphics, etc.;
- (5) function of the interactivity channel using a communication channel;
- (6) size of data that can be saved persistently;
- (7) storage space reserved on the receiver units (for example, fonts);
- (8) sufficient memory capacity to obtain and decode data;
- (9) guidelines regarding remote control operations.

In particular, (1) is defined as a TS decoding function; (2), (3), (4), and (7) are defined as presentation functions; (5) is defined as a communication function; (6), (7), and (8) are defined as memory volume; and (9) is defined as a remote control function.

7 Receiver parameters

Table 1 lists the parameters for integrated receivers based on their national standards and the normative references listed in Section 2. Whenever needed, parameters for Full-seg are categorized separately into integrated receivers and set-top boxes to meet the various needs of manufacturers.

In Table 1, the parameters identified as *mandatory* are requirements that shall be implemented in order to guarantee the correct decoding of signals of terrestrial digital television. They include the requisite minimum functions of demodulation of the bit stream, audio, and video decoding and are applicable to each kind of receiver, with manufacturers permitted to exceed any minimum requirements listed. Functions that are beyond those specified may or may not be installed depending on the product design of individual manufacturers. However, functionalities defined as *prohibited* shall not be implemented in the receivers. The broadcasters who transmit terrestrial digital television services shall necessarily assume that the described functions meet each country's specifications.

To guarantee interoperability between receivers and content providers in the long run, it is highly recommended to take note of the items specified as recommended, optional, not recommended, or not applicable as indicated in Table 1.

For the parameters identified as *recommended*, but not a mandatory requirement, it is strongly suggested to analyze the circumstances of the implementation.

The parameters identified as *optional* mean that the recommendations do not have to be included in the receiver's specifications, but if they are included, they shall follow the specifications.

The parameters identified as *not recommended* mean that it is a practice that is not recommended. It is strongly suggested that before adopting these requirements, to analyze the circumstances where this implementation shall be done and verify and ensure the impact of this specification on the receiver.

Table 1 – Receiver unit parameters

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One- seg		
Antenna input and output				
Antenna input	Mandatory	Optional	Terminal F (IEC61169-24), type 75Ω unbalanced	
Antenna output (<i>pass through</i>)	Optional	Optional	Mandatory requirement for set-top boxes	Japan: Optional for set-top boxes;
Channel reception				
High VHF band	6MHz system Mandatory	Optional	Channels 07 to 13	Paraguay, Venezuela, Peru, Ecuador and Japan: High VHF not required; Chile and Honduras: Mandatory for One-seg;
	8MHz system Optional		Channels 05 to 11	
UHF band	Mandatory	Mandatory	6MHz system Channels 14 to 69	Bolivia, Peru and Ecuador: Ch14 to Ch51; Japan: Ch13 to Ch52; Uruguay and Venezuela: Ch21 to Ch51;
			8MHz system Channels 21 to 48	
Channel bandwidth				
<i>Full-seg</i>				
6MHz system (≈ 5,7 MHz)	Mandatory	Not applicable		
8MHz system (≈ 7,46 MHz)				
<i>One-seg</i>				
6MHz system (≈ 0,43 MHz)	Not applicable	Mandatory		
8MHz system (≈ 0,58 MHz)				
Central carrier frequency				
VHF				
6MHz system: 177 + 1/7 to 213 + 1/7 MHz	Mandatory	Optional		Paraguay, Peru and Japan: High VHF not required; Ecuador: VHF Mandatory for Full-seg including 57+1/7 to 69+1/7 MHz and 79+1/7 to 85+1/7 MHz;
8MHz system: 178 to 226 MHz	Optional			
UHF:				
6MHz system: 473 + 1/7 to 803 + 1/7 MHz	Mandatory	Mandatory		Peru and Bolivia: 473 + 1/7 to 695 + 1/7 MHz; Japan: 473+1/7 to 707+1/7MHz; Venezuela 515 +1/7 to 695 +1/7 MHz;
8MHz system: 474 to 690 MHz				

Sensitivity^a					
Minimum input level:		Recommended	Recommended		
6MHz system: lower than or equal to -77 dBm				For One-seg receivers the minimum input level is - 88 dBm for 6MHz system.	Japan: -75 dBm for Full-seg; Chile and Venezuela: Mandatory; Uruguay: Mandatory for Full-seg;
8MHz system: lower than or equal to -78,4 dBm				For One-seg receivers the minimum input level is - 89,4 dBm for 8MHz system.	
Maximum input level:		Recommended	Recommended		
6MHz system: higher than or equal to -20 dBm					Chile and Venezuela: Mandatory; Uruguay: Mandatory for Full-seg;
8MHz system: higher than or equal to 0 dBm					
Protection ratio (analog television signal)^a					
Co-channel		Mandatory	Mandatory	6MHz system: +18 dB or less 8MHz system: +5 dB or less	
Lower adjacent channel	UHF	Mandatory	Mandatory	6MHz system: -33 dB or less 8MHz system: - 32 dB or less	
	VHF	Mandatory	Mandatory	6MHz system: -26 dB or less 8MHz system: - 32 dB or less	Paraguay, Peru and Japan: NA;
Upper adjacent channel	UHF	Mandatory	Mandatory	6MHz system: -35 dB or less 8MHz system: - 36 dB or less	
	VHF	Mandatory	Mandatory	6MHz system: -26 dB or less 8MHz system: - 36 dB or less	Paraguay, Peru and Japan: NA;
Protection ratio (digital television signal)^a					
Co-channel		Mandatory	Mandatory	6MHz system: +24 dB or less 8MHz system: +20 dB or less	
Lower adjacent channel	UHF	Mandatory	Mandatory	6MHz system: -26 dB or less 8MHz system: -30 dB or less	
	VHF	Mandatory	Mandatory	6MHz system: -24 dB or less 8MHz system: -30dB or less	Paraguay, Peru and Japan: NA;
Upper adjacent channel	UHF	Mandatory	Mandatory	6MHz system: -29 dB or less 8MHz system: -30 dB or less	
	VHF	Mandatory	Mandatory	6MHz system: -24 dB or less 8MHz system: -30 dB or less	Paraguay, Peru and Japan: NA;

^a Refer to the Recommendation ITU-R BT.1368 and the recommendation ITU-R BT.2036.

^b This value corresponds to ISDB-T 64-QAM coding rate 7/8 signal. Other countries adopt the value corresponding to ISDB-T 64QAM coding rate 3/4 signal.

Table 1 (continuation)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
First intermediate frequency (IF)				
Central IF frequency (for Can Tuner):	Mandatory	Mandatory	Optionally, the base band conversion can be adopted	Japan: 57 MHz;
6MHz system: 44MHz				
8MHz system: 36MHz				
Local oscillator at upper side of the receiver frequency (for Can Tuner)	Mandatory	Mandatory		
Synchronization range of the received clock	Mandatory	Mandatory	Deviations equal to or higher than 20 ppm	
Synchronization range of the received frequency (catch-up)	Mandatory	Mandatory	Frequency deviations equal to or higher than 30 kHz	
Front-end signal processing				
Synchronism regeneration	Mandatory	Mandatory	OFDM symbol synchronization	
FFT processing	Mandatory	Mandatory	OFDM symbol duration	
Frame extraction	Mandatory	Mandatory	OFDM synchronization signal	
TMCC decoding	Mandatory	Mandatory	TMCC information	
Carrier demodulation	Mandatory	Mandatory	According to TMCC information	
De-interleaving	Mandatory	Mandatory	Time and frequency de-interleaving	
Demapping				
QPSK	Optional	Mandatory		Japan: Mandatory for Full-seg;
16QAM	Mandatory	Mandatory		
64QAM	Mandatory	Not applicable		
Division into hierarchical levels	Mandatory	Not applicable	Execution indicated on the TMCC	
Bit de-interleaving	Mandatory	Mandatory	Executed in each hierarchical level	
De-puncturing	Mandatory	Mandatory	Executed in each hierarchical level	
Viterbi decoding	Mandatory	Mandatory	Coding rate at ½	
Byte de-interleaving	Mandatory	Mandatory		
Energy inverse dispersal	Mandatory	Mandatory		
TS regeneration	Mandatory	Mandatory		
Reed Solomon decoding	Mandatory	Mandatory	RS decoding (204,188)	
Signal intensity meter	Optional	Optional		Bolivia: Mandatory for Full-seg;
Signal quality meter	Optional	Optional		Bolivia: Mandatory for Full-seg;

Table 1 (continuation)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
BER meter	Optional	Optional		
Emergency warning reception	Optional	Optional	See ISDB-T HARMONIZATION DOCUMENT PART 3	Bolivia: Mandatory for Full-seg;
Analog TV reception during transition period	Optional	Optional	For integrated receiver the reception of analog and digital TV signals is recommended.	Ecuador: Mandatory for Full-seg; Bolivia and Chile: Mandatory for integrated receivers; Venezuela: Mandatory for integrated receivers;
One-seg contents exhibition in Full-seg receivers	Optional	Not applicable		
Transport processing				
Section filters	Mandatory	Mandatory		
Section composed by one TS packet	Mandatory	Mandatory		
Multiple sections in a single TS packet	Mandatory	Mandatory	The maximum number of sections in one TS packet is limited to 10.	
Maximum PMT section in a single TS packet	Mandatory	Mandatory	The maximum number of PMT sections in a single TS packet is limited to 4.	
Sections of two or more TS packets	Mandatory	Mandatory		
Memories				
Minimum of 2MB of volatile memory	Optional	Optional	Mandatory for receivers with embedded middleware	
Non-volatile memory for program codes	Mandatory	Mandatory	Storage of program codes on the receiver	
Non-volatile memory for data codes	Mandatory	Mandatory	Storage of data codes common to all receivers	
Video decoding and video output interfaces	Mandatory	Mandatory	See ABNT NBR 15604 section 8.1	
Audio decoding and audio output interfaces	Mandatory	Mandatory	See ABNT NBR 15604 section 8.2	
Primary data decoder	Optional	Optional	See ABNT NBR 15604 section 9.1	Venezuela: Mandatory;
EPG function				
6MHz system	Optional	Optional	See ABNT NBR 15604 section 10	Japan: Recommended for Full-seg; Venezuela: Mandatory;
8MHz system	Recommended	Optional		
Parental rating	Mandatory	Mandatory	See ABNT NBR 15604 section 11. Specific regulations might be applied in each country.	Chile, Japan and Peru: Not defined and not applied;
Accessibility				
Closed-caption	Optional	Optional		Costa Rica and Ecuador: Mandatory; Venezuela: Mandatory;
Audio description	Optional	Optional		Venezuela: Mandatory;

Table 1 (continuation)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
Locution				
6MHz system	Optional	Optional		Japan: NA;
8MHz system	Not applicable	Not applicable		
Dubbing	Optional	Optional		
Sign Language window				
6MHz system	Optional	Optional		Japan: NA; Venezuela: Mandatory;
8MHz system	Not applicable	Not applicable		
Storage and channel access				
Virtual channel	Mandatory	Mandatory	Digital channel numbering shall be the same as for analog channels.	Chile, Venezuela and Japan: Digital channel numbering does not necessarily need to be the same as for the analog channels;
Digital channel access	Mandatory	Mandatory	Shall be accessed through the virtual channel number	
Sequential channel browsing (up & down)	Mandatory	Mandatory	It shall be through all logical services	
High speed digital interface	Optional	Optional	See ABNT NBR 15604 section 14	Venezuela: Mandatory USB 2.0 and Ethernet;
External interfaces				
Antennal input	Mandatory	Optional	Terminal F (IEC61169-24), type 75Ω unbalanced	
Interactive communication function	Optional	Optional		Venezuela: Mandatory;
Video output	Optional	Optional	One output is mandatory for Set-top boxes	Bolivia: Mandatory for Full-seg; Venezuela: Mandatory for Full-seg;
Digital video output	Optional	Not applicable		Bolivia, Chile, Costa Rica and Venezuela: Mandatory for set-top-boxes with HDMI port;
Digital audio output	Optional	Not applicable		
RF output	Optional	Not applicable	Analog modulated in AM/VSB on channels VHF 3 or 4	Brazil: PAL-M modulation; Chile: Mandatory for downconverters with SD video output; Bolivia, Costa Rica and Peru: NTSC-M modulation; Paraguay, Uruguay and Argentina: PAL-N modulation; Venezuela: NTSC-M modulation;

Remote control functions				
Implementation				
6MHz system	Optional	Optional		Costa Rica: Mandatory; Japan: Recommended for Full-seg; Venezuela: Mandatory;
8MHz system	Recommended	Optional		
Power on/off	Recommended	Recommended		Costa Rica: Mandatory;
Numerical functions (0 to 9)	Recommended	Recommended	Direct access to channels	Costa Rica e Venezuela: Mandatory;
Sequential channel selection	Recommended	Recommended	Navigation through the stored channels	Costa Rica e Venezuela: Mandatory;
Volume control	Recommended	Recommended		Venezuela: Mandatory;
EPG				
6MHz system	Optional	Optional	If implemented should be compatible with the EIT table specifications in conformity with Annex 1 of ABNT NBR 15603-2	Japan: Recommended for Full-seg; Venezuela: Mandatory for Full-seg;
8MHz system	Recommended	Optional		

Table 1 (continuation)

Functionalities			Receiver type		Specification remarks	Country remarks
			Full-seg	One-seg		
Interactive functions					Recommended in receivers with embedded middleware.	
Confirm			Recommended	Recommended	Mandatory in Full-seg receivers with BML. Optional in One-seg receivers with BML.	
Exit			Recommended	Recommended	Optional in receivers with BML	
Back			Recommended	Recommended	Mandatory in Full-seg receivers with BML. Optional in One-seg receivers with BML	
Directional(▲ ▼ ◀ ▶)			Recommended	Recommended		
Color			Recommended	Recommended		
Video decoding and output signals						
Video profiles and levels						
H.264/AVC HP @ L4.0			Mandatory	Not applicable		Japan: MPEG-2 video;
H.264/AVC BP @ L1.3			Optional	Mandatory	Support to FMO, ASO and RS audio tools is not required	Japan: Level 1.2;
Primary service decoding			Mandatory	Mandatory		
Primary service identification			Mandatory	Mandatory		
Designation of component_tag values			Mandatory	Mandatory	According to ABNT NBR 15604, Table 6	
Priority of the secondary ES			Mandatory	Mandatory	Exhibition according to the increasing order of component_tag values	
Multiple services reproduction			Optional	Optional		Chile: Mandatory for Full-seg receivers;
Video display format, aspect ratio and resolution						
Format	Aspect ratio	Resolution				
SQVGA	4:3	160 x 120	Optional	Mandatory		Japan: Optional;
SQVGA	16:9	160 x 90	Optional	Mandatory		Japan: Optional;
QVGA	4:3	320 x 240	Optional	Mandatory		
QVGA	16:9	320 x 180	Optional	Mandatory		
CIF	4:3	352 x 288	Optional	Mandatory		
525i(480i)	4:3	720 x 480	Mandatory	Not applicable		
525i(480i)	16:9	720 x 480	Mandatory	Not applicable		
525p(480p)	16:9	720 x 480	Mandatory	Not applicable		
625i(576i)	4:3	720 x 576	Optional	Not applicable		Argentina and Uruguay: Mandatory for Full-seg;
625i(576i)	16:9	720 x 576	Optional	Not applicable		Argentina and Uruguay: Mandatory for Full-seg;
625p(576p)	4:3	720x576	Optional	Not applicable		Argentina and Uruguay: Mandatory for Full-seg;
625p(576p)	16:9	720 x 576	Optional	Not applicable		Argentina and Uruguay: Mandatory for Full-seg;

750p(720p)	16:9	1280 x 720	Mandatory	Not applicable		
1125i(1080i)	16:9	1920x1080	Mandatory	Not applicable		Japan: Also 1440x1080 for Full-seg;

Table 1 (continuation)

Functionalities		Receiver type		Specification remarks	Country remarks
		Full-seg	One-seg		
Frame rate					
5fps		Optional	Mandatory		
10fps		Optional	Mandatory		
12fps		Optional	Mandatory		
15fps		Optional	Mandatory		
24fps	6MHz system	Optional	Optional		Brazil, Costa Rica, Argentina, and Japan: Mandatory for One-seg;
	8MHz system	Optional	Mandatory		
25fps	6MHz system	Mandatory	Not applicable		Brazil, Costa Rica, Venezuela and Japan: Optional; Argentina: Mandatory for One-seg;
	8MHz system	Mandatory	Mandatory		
30/1,001 Hz or 30fps	6MHz system	Mandatory	Mandatory	30/1,001 Hz required only for Full-seg receivers	Japan: One-seg 30fps not applicable;
	8MHz system	Optional	Mandatory		
50fps		Mandatory	Not applicable		Brazil, Venezuela and Japan: NA;
60/1,001 Hz	6MHz system	Mandatory	Not applicable		Argentina: Optional for One-seg;
	8MHz system	Optional	Not applicable		
Analog video output					
Composite video output (CVBS)		Optional	Optional	Mandatory requirement for set-top-boxes	
RF audio and video output		Optional	Not applicable		Bolivia: Mandatory for Full-seg;
Y/C output		Optional	Not applicable		
Analog component video output		Optional	Not applicable		
Digital video output		Optional	Optional		Venezuela: Mandatory for Full-seg;
Identification of output format		Optional	Optional		
Video seamless switch		Recommended	Recommended		Venezuela: Mandatory for Full-seg;
Pan & Scan		Recommended	Recommended	Defines the video interest area	
Audio processing and audio output signals					
Audio decoding parameters					
MPEG-4 AAC standard		Mandatory	Mandatory		Japan: MPEG-2;
Dynamic range control		Mandatory	Not applicable		
Dialogue normalization		Mandatory	Mandatory		

SBR non-backward compatible explicit signaling	Mandatory	Mandatory		Japan: Optional;
Downmixing	Mandatory	Not applicable		
Sampling frequency 32 kHz, 44,1 kHz, 48 kHz	Mandatory	Mandatory		Japan: Also 24kHz, 22.05kHz, 16kHz;
Quantization 16 or 20 bits	Mandatory	Mandatory		Japan: 16 bits only;

Table 1 (continuation)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
LATM/LOAS	Mandatory	Mandatory	Audio transport multiplexation and synchronization	Japan: ADTS;
Up to 5.1 audio channels per LATM/LOAS	Mandatory	Not applicable		
Up to 8 streams LATM/LOAS associated with the same program	Mandatory	Not applicable		
Audio decoding mode				
Mono (1/0)	Mandatory	Mandatory		
Stereo (2/0)	Mandatory	Mandatory		
Stereo multichannel (3/2+LFE)	Mandatory	Not applicable		
Allowed decoding modes				
Stereo multichannel (3/0, 2/1, 3/1, 2/2, 3/2)	Optional	Not applicable		
Dual-mono	Optional	Optional		Japan: Mandatory;
Audio profile and levels				
LC AAC @ L2	Mandatory	Not applicable		
LC AAC @ L4	Mandatory	Not applicable	Level 4 (L4) does not apply to stereo transmissions.	
HE-AAC+SBR v.1 @ L2	Mandatory	Not applicable		
HE-AAC+SBR v.1 @ L4	Mandatory	Not applicable	Level 4 (L4) does not apply to stereo transmissions.	
HE-AAC+SBR+PS v.2 @ L2	Optional	Mandatory		
Primary audio stream decoding	Mandatory	Mandatory	Component_tag 0x10	
Load impedance 10 kΩ	Optional	Optional		
Analog audio output interface				
Audio output terminal	Optional	Optional	Set-top boxes shall have at least one stereo output.	Japan: Mandatory; Bolivia: Mandatory for Full-seg; Peru and Venezuela: Mandatory with RCA connector;
Output level 250mVrms ± 3 dB	Optional	Optional	Recommended specification if the audio output interface is available and the output level is fixed. In case of variable output level, output level 250mVrms ± 3 dB (@Full scale -18 dB) is recommended.	Venezuela: Mandatory;
Output impedance ≤ 2.2 kΩ	Optional	Optional	Mandatory if the audio output interface is available	

Load impedance 10 kΩ	Optional	Optional		
RCA output terminal	Optional	Not applicable		
Stereo downmixing	Optional	Optional	Mandatory for receivers without multi-channel output	

Table 1 (continuation)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
Digital audio output interface	Optional	Not applicable		
Audio interface via bluetooth	Optional	Optional		
Audio mode discrimination	Mandatory	Mandatory		
Audio mode indication	Optional	Optional		
EPG				
H - EIT	Optional	Not applicable		
M – EIT	Optional	Not applicable		
L – EIT	Optional	Optional		
Parental rating				
Blockage by parental rating	Mandatory	Mandatory	User defined	Chile, Japan and Peru: Not defined;
Descriptor semantics				
Country code	Mandatory	Mandatory		
Rating	Mandatory	Mandatory		
Receiver shall not block the event				
Missing descriptor	Mandatory	Mandatory	Missing in the 1 st loop of the PMT or EIT	
Country code	Mandatory	Mandatory	Argentina: 0x415247 Bolivia: 0x42 4f4c Botswana: 0x425741 Brazil: 0x425241 Chile: 0x43484c Costa Rica: 0x435249 Ecuador: 0x454355 Guatemala: 0x47544D Honduras: 0x484E44 Japan: 0x4A504E Maldives: 0x4D4456 Nicaragua: 0x4E4943 Paraguay: 0x505259 Peru: 0x504552 Philippines: 0x50484C Sri Lanka: 0x4C4B41 Uruguay: 0x555259 Venezuela: 0x56454e	
Blocking password	Mandatory	Mandatory		
Temporary unblocking	Optional	Optional		
Receiver configuration				
Blockage exclusively by the age rating	Optional	Optional	The implementation of one of the two blocking modalities shall be present in the receiver.	Chile, Japan and Peru: Not defined;
Blockage by age and content	Optional	Optional		Chile, Japan and Peru: Not defined;
Exhibit audio, video and data of the blocked event	Prohibited	Prohibited		Chile, Japan and Peru: Not defined;

Exhibit information on the blocked event	Optional	Optional	Title, synopsis, etc.	Chile, Japan and Peru: Not defined; Venezuela: Recommended;
Exhibit message of the blocked event	Recommended	Recommended	Information on age rating and content description	Chile, Japan and Peru: Not defined;

Table 1 (continuation)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
Display event rating in the beginning or during the program	Not applicable	Not applicable		
Implementation of the blocking function				
Interface for configuration	Mandatory	Mandatory	Implementation is not specified. It is up to the discretion of the receiver manufacturer.	
Blocking password	Mandatory	Mandatory		
Temporary unblocking	Optional	Optional		
Accessibility resources				
Closed-caption	Optional	Optional		Costa Rica and Ecuador: Mandatory for Full-seg; Venezuela: Mandatory
Audio description	Optional	Optional		Venezuela: Mandatory;
Audio locution				
6MHz system	Optional	Optional		Japan: NA;
8MHz system	Not applicable	Not applicable		
Dubbing (SAP)	Optional	Optional		Bolivia: Recommended for Full-seg;
Sign Language window				
6MHz system	Optional	Optional		Japan: NA; Venezuela: Mandatory;
8MHz system	Not applicable	Not applicable		
Channels search and storage				
Automatic channels search	Mandatory	Mandatory	Auto scan or re-scan	Costa Rica and Japan: Recommended;
Automatic channel search at first installation	Optional	Optional	When the receiver is powered up for the first time	Costa Rica and Japan: Recommended; Venezuela: Mandatory;
Manual channels adding	Optional	Optional		Chile, Costa Rica and Ecuador: Recommended for Full-seg;
Continuous reception	Optional	Recommended	Recommended for receivers in motion	Japan: Optional for One-seg;
Channel re-scan	Recommended	Recommended	Periodicity defined by the receiver's manufacture	Japan and Venezuela: Optional for One-seg;
Virtual channel				
Digital numbering (virtual)	Mandatory	Mandatory	The channel should be accessed through the virtual number.	
Digital numbers similar to the current analog ones				
6MHz system	Mandatory	Mandatory		Japan: Optional; Venezuela: Not applicable;
8MHz system	Optional	Optional		

Logical channel presentation	Optional	Optional	Defined by receiver manufacturer	
Storage form	Mandatory	Mandatory	remote_control_key_id	
Two digits for channel identification	Mandatory	Mandatory	Assumes values between 1 and 99	
Service type (3 rd digit)	Optional	Optional		
Service number (4 th digit)	Optional	Optional		

Table 1 (continuation)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
Analog and digital channels tuner	Optional	Not applicable	Threshold between the option for digital or analog is not specified.	
Switching from digital to analog reception	Optional	Optional	In automatic mode, the threshold is defined by the manufacturer.	Chile: Automatic switching prohibited;
Browsing sequentially through channels				
Browsing through the primary logical channels	Mandatory	Mandatory	Default	
Browsing through all the logical channels	Not Recommended	Not Recommended	If implemented, this configuration shall be defined by the user.	Chile, Ecuador and Uruguay: Mandatory;
Primary idiom selection	Mandatory	Mandatory	Audio, subtitles, closed caption. and primary data	
Secondary idiom selection	Optional	Optional		
USB port				
Transport stream output	Prohibited	Not applicable	This shall not preclude individual fair use in accordance with ABNT NBR 15605-1. Permission related to the HD video and associated audio is signaled by the content provider.	Venezuela: Mandatory;
USB port	Optional	Not applicable	Not applicable to receivers with BML	Ecuador and Uruguay: Recommended; Venezuela: Mandatory;
USB interface for built-in modem	Recommended	Not applicable		Venezuela: Mandatory;
USB for receivers with embedded middleware	Mandatory	Not applicable		
Software architecture				
Authentication manager	Mandatory	Not applicable	Specifications applicable to receivers that have access to the interactivity channel via USB port	
Device manager	Mandatory	Not applicable		
Interface IP (Ethernet)				
RJ-45 8-pin connector	Optional	Not applicable		Venezuela: Mandatory for Full-seg;
Physical interface protocol stack	Optional	Not applicable		Venezuela: Mandatory for Full-seg;
Content output	Prohibited	Not applicable		
Channels tuner	Optional	Not applicable		
Content control	Prohibited	Prohibited		
Interface serial 1394				
4- or 6-pin 1394 connector	Optional	Optional		
Transport stream input interface	Optional	Optional		

Transport stream output interface	Prohibited	Prohibited		
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Table 1 (continuation)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
Interactivity channel implementation	Optional	Optional		Venezuela: Mandatory for Full-seg;
Receiver software architecture				
Authentication manager	Optional	Not applicable	Specification for receivers with embedded middleware	Venezuela: Mandatory for Full-seg;
External device manager	Optional	Not applicable		
Architecture of the installation software				
Authentication of the application for external device	Optional	Not applicable	Specification for receivers with embedded middleware	
Device driver	Optional	Not applicable		
Physical layer protocol	Optional	Not applicable		Venezuela: Mandatory for Full-seg;
Configuration file	Optional	Not applicable		
Hardware architecture				
USB Port	Optional	Not applicable	Specification for receivers with embedded middleware	Ecuador: Mandatory for Full-seg with interactivity channel; Venezuela: Mandatory for Full-seg;
Installation mode	Optional	Not applicable		
Connection type switching	Optional	Not applicable		
Receiver software update				
Download function	Recommended	Recommended		Brazil and Japan: Optional;
Software update	Optional	Optional		
Data update	Optional	Optional		
Software certification	Optional	Optional	Management and protection model defined by manufacturer	
Reception method	Optional	Optional	In compliance with ABNT NBR 15608	
Preferable specifications of the receiver				
Update functions	Recommended	Recommended	In accordance with ARIB STD-B21:2007, subsection 12.3.1	Brazil and Japan: Optional;
Necessary hardware performance	Optional	Optional	In accordance with ARIB STD-B21:2007, subsection 12.3.2	
Memory for common data	Optional	Optional		
Non-volatile memory for software downloading	Optional	Optional		
Receiver signal processing				
Service information	Mandatory	Mandatory		
Simultaneously processing of PIDs	Mandatory	Mandatory	Equal or higher than 12	
Program stream selection	Mandatory	Mandatory		

Table 1 (conclusion)

Functionalities	Receiver type		Specification remarks	Country remarks
	Full-seg	One-seg		
Criteria for uniqueness				
Receiver architecture	Mandatory	Mandatory	In accordance with ARIB TR-B14:2007, subsections 9.3 and 9.4	
Automatically CUT or skip advertisements	Prohibited	Prohibited		
Insertion of uncorrelated contents	Prohibited	Prohibited		
Spanish Language	Mandatory	Mandatory		Brazil: Portuguese; Japan: Japanese; Botswana, Maldives and Sri Lanka: English;
Electrical power: 110V/220V, 50Hz,	Mandatory	Optional		Bolivia: AutoVolt, 50Hz; Botswana: 220V, 50Hz; Brazil and Peru: 60Hz; Costa Rica and Ecuador: 110V, 60Hz; Chile: 220V, 50Hz; Japan: 100V, 50/60Hz; Paraguay and Argentina: 220V, 50Hz; Uruguay: 230V, 50Hz; Venezuela: 120V, 60Hz, Type B connector;