भारतीय मानक
Indian Standard

IS 18112 : 2022

उपग्रह प्रसारण प्रेषण के लिए डिजिटल टेलीविजन रिसीवर — विशिष्टि

Digital Television Receiver for Satellite Broadcast Transmission — Specification

ICS 33.160.25

भारतीय मानक ब्यूरो
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Audio, Video and Multimedia Systems and Equipment Sectional Committee, LITD 07

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by Audio, Video and Multimedia Systems and Equipment Sectional Committee had been approved by the Electronics and Information Technology Divisional Council.

There is no ISO/IEC Standard on this subject. This standard has been formulated based on the proposal received from Prasar Bharti (Doordarshan). Presently the televisions in India come with built in analog tuner to receive the analog terrestrial transmission.

Prasar Bharti (Doordarshan) is in the process of closing analogue terrestrial transmission barring those in strategic areas. Specifications for TV with in-built satellite tuner (DVB-S & DVB-S2) given in this document are for replacement of the analog TV tuner with DVB-S & DVB-S2 compliant Satellite tuner in all TV sets (LED/LCD etc). TV with in-built satellite tuner (DVB-S & DVB-S2) would enable reception of non-encrypted (Free-To-Air) multichannel by connecting an appropriate dish antenna with LNB mounted on a suitable place, that is, at roof top or side wall of the building.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

CONTENTS

Indian Standard

DIGITAL TELEVISION RECEIVER FOR SATELLITE BROADCAST TRANSMISSION — SPECIFICATION

1 SCOPE

This document describes a baseline profile, based on open standards for a Digital Television (DTV) receiver for the reception of digital satellite Free-To-Air (FTA) TV and Radio signals. This profile is based predominantly on Digital Video Broadcasting (DVB) standards.

2 REFERENCES

The Standards listed in Annex A and Annex B contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A and Annex B.

3 REQUIREMENTS

3.1 The DTV receiver shall support DVB-S & S2 reception for Free-To-Air (FTA) services. The DTV receiver shall fully comply with detailed specifications as given in Table 1.

3.2 The manufacturer shall ensure compatibility and interfacing with Consumer Electronic equipment such as Audio and Video systems in the country.

3.3 Specifications

The specifications for the various features and capabilities for the DTV receiver shall be as given in Table 1.

3.4 Performance Requirements

The requirements for various performance parameters for the DTV receiver shall be as given in Table 2.

3.5 Safety Requirements

The safety requirements of DTV receiver shall conform to IS 616.

3.6 Electromagnetic Compatibility (EMC) Requirements

The EMC requirements of the DTV receiver shall conform to IS/CISPR 32.

4 MARKING

4.1 Each DTV receiver shall be legibly and indelibly marked with at least the following information:

a) Manufacturer's name or trade mark (if any);
b) Model designation and Serial Number;
c) Country of manufacture;
d) Input supply voltage and frequency (If an external power adapter is provided, DC input voltage, polarity and wattage shall be marked on the TV and AC input voltage, frequency and wattage shall be marked on the power adapter);
e) Power consumption;
f) Input Terminals as applicable; and
g) All Connectors.

4.2 The User Interface (UI) of the DTV receiver shall display all the hardware input ports available, serial number and model number of the DTV receiver unit at appropriate place.

4.3 BIS Certification Marking

4.3.1 The DTV receiver may also be marked with the Standard Mark. The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulation made there under. Details of conditions under which a license for the use of Standard Mark may be granted to manufacturers and producers may be obtained from the Bureau of Indian Standards.

5 OPERATING LIFE TEST

The DTV receiver shall be subjected to operating life test while viewing Live Free-To-Air TV Channel via the in-built satellite tuner. The test shall consist of 48 h of operation at 1.1 times of upper voltage of Input voltage range (declared by the TV manufacturer) and at ambient temperature (45 ºC). For supply voltage and temperature to be maintained during the test, tolerance of ± 5 percent is allowed.

The DTV receiver shall be considered to have failed the test:

a) if there is loss of video and/or Audio longer than 5 seconds;
b) if the DTV receiver reboots or is non-responsive to the Remote Control at the end of the test.

At the end of the operating life duration, the requirements specified in Table 2 shall also be met with.

Table 1 Specifications
(*Clause* 3.1 *and* 3.3)

Sl No.	Specification	Mandatory	Optional
(1)	(2)	(3)	(4)
i)	**BASIC DTV RECEIVER PROFILE:**		
a)	Hardware specification	The processing power and memory configuration of the DTV receiver shall be suitable for the routine operation of the digital reception of the DVB-S and DVB S2 signals, and DTV receiver shall have provision of the routine upgradation or replacement of software.	—
b)	Decompression and decoding of SDTV video	Capability to decompress and decode SDTV signals compressed using MPEG-2 MP@ML (*see* Sl No. 2 and Sl No. 3 of Annex B) and MPEG-4 Part 10 AVC MP @ L3 (*see* Sl No. 3 of Annex A and Sl No. 4 of Annex B).	—
c)	Decompression and decoding of HDTV video	a) Capability to decompress and decode HDTV signals compressed using MPEG-4 Part 10 AVC HP@L4 (*see* Sl No. 3 of Annex A and Sl No. 4 of Annex B). b) The DTV receiver shall be capable of decoding both 1080i and 720p formats and up scaling/down scaling it to the best format supported by it.	—
d)	Decompression and decoding of audio	a) Capability to decompress and decode Audio using MPEG-1 Layer 2 (*see* Sl No. 5 of Annex B). b) Capability to pass through the multi-channel audio formats over compatible outputs such as HDMI ARC,S/PDIF etc. NOTES **1** Capability to decompress and decode using other audio codecs should be provided by TV manufacturers based on the market dynamics. **2** The requirement of Multi-Channel with surround sound audio decoder shall be reviewed from time to time based on the status of available Free-to-Air satellite channels supporting Multi-Channel with surround sound audio.	a) Capability to decompress and decode the multi-channel audio formats.
e)	Active Format descriptors	Ability to handle 16 : 9 widescreen and 4 : 3 picture format changes as detailed in the ‘transmission rules’ including support for correct aspect ratio and Active Format Descriptors. (see Sl No. 6 of Annex B).	—

Table 1 (*Continued*)

Sl No.	Specification	Mandatory	Optional
(1)	(2)	(3)	(4)
f)	Captioning and Sub-titling	Capability to receive and process DVB Subtitle Streams. (*see* Sl No. 11 and Sl No. 12 of Annex B). DVB subtitles shall be invoked from a remote control.	
g)	Teletext	—	The DTV receiver shall include a Teletext decoder (as laid down in Sl No. 13 of Annex B) including up to Teletext Ver 1.5. A suitable remote control button should be provided to launch the Teletext OSD display.
h)	Multi-language support	The DTV receiver is to at least support the setting of a primary and secondary audio language based on the language descriptors associated with the audio-streams transport stream (*see* Sl No. 2 and Sl No. 3 of Annex B). If the primary language is not present then the DTV receiver shall automatically select the secondary audio language.	When the secondary audio language is also not available then the 'country default language' shall be selected. When the default language is also not available then the DTV receiver shall select the first audio PID appearing in the PMT elementary stream loop.
j)	DTV receiver mixed Audio Description	—	DTV receivers that are capable of presenting audio description should provide at least the minimum user controls (as per Sl No. 6 of Annex B).
k)	Broadcast mixed audio description	In addition to multi-language support specifications mentioned at Sl No. i) h) of Table 1 specified above, DTV receivers shall provide a user preference to enable or prioritize broadcast mixed audio description.	—
m)	Service demultiplexing	Capability to receive and process SI (Service Information) (*see* Sl No. 10 and Sl No. 11 of Annex B).	—
n)	Data services	If DVB SSU is supported then Capability to receive and process data streams (*see* Sl No. 7 and Sl No. 8 of Annex B).	—
p)	OSD	Video layer (a full colour layer displaying the output of the MPEG video decoder) to support: a) Y=8 bit, CB=8 bit, CR=8 bit; b) Chroma to be sub-sampled to either 4 : 2 : 0 or 4 : 2 : 2;	—

Table 1 (*Continued*)

Sl No.	Specification	Mandatory	Optional
(1)	(2)	(3)	(4)
		c) Alpha blending need not be supported, but the layer may be shown or hidden. OSD/Graphics Layer (an 8-bit palletized layer which can display region-based graphics): 1) each CLUT palette entry to support: Y= 6 bit, CB = 4 bit, CR= 4 bit; 2) Chroma to be sub-sampled to either 4 : 2 : 0 or 4 : 2 : 2; 3) alpha blending to be either 6 bit across the entire layer, or 2 bit per pixel.	
q)	DTV Receiver character set	The main character set of the DTV receiver shall be the character code table 00 – Latin Alphabet (as per Sl No. 15 of Annex B)	—
r)	Electronic Service Guide (ESG) 'Now/Next'	'Now/Next' information for use in an on-screen banner shall be derived using information from DVB SI EIT p/f tables (*see* Sl No. 10 of Annex B). The actual appearance of the Now/Next banner is left to the manufacturer but it is recommended that the following information be displayed in the bottom third of the screen: a) Current time; b) Start time of now and next program; c) End time of now and next program; d) Channel Number; e) Channel Name; and f) Date.	a) The ESG "Now and next" shall be displayed when the user changes channels for approximately 2 seconds and shall also be launched using the *i* (info) button on the remote control. b) ESG 'Schedule': An Electronic Program Guide (EPG) application may be provided using EIT schedule information from the SI.
s)	Time	The DTV receiver shall have a time clock or calendar running continuously (*see* Sl No. 10 of Annex B). The clock shall be updated by the incoming TDT and TOT table in the SI. The time displayed by the DTV receiver shall be the current time based on time zone.	—
t)	Digital TV output	—	The DTV receiver may offer output(s) for connection to a recording device.

Table 1 (*Continued*)

Sl No.	Specification	Mandatory	Optional
(1)	(2)	(3)	(4)
ii)	**DIGITAL SATELLITE RECEPTION:**		
a)	Demodulation and FEC decoding	Capability to demodulate and decode satellite signals, channel coded and modulated (*see* Sl No. 1 of Annex B).	—
b)	DTV Receiver Installation	During DTV receiver installation, the user shall be able to perform tuning by: a) tuning to a list of user selectable transponders or performing a linear scan of all frequencies and polarisations, and b) manually entering the tuning parameters of the transponder.	—
c)	Network evolution	The DTV receiver shall support dynamic SI/PSI on tuned transponder in order to automatically detect and suitably handle service changes without the need for user intervention. The DTV receiver shall also have the capability to update the service list, including suitably handle transponder changes based on the installation method selected by the user, and appropriate menu options, where applicable. The DTV receiver should not delete transponder parameters and channels due to low signal.	—
d)	Services available	After DTV receiver installation, all services that may be received shall be available to the viewer. The actual services being broadcast may subsequently change [*see* ii) c) of Table 1].	—
e)	Selection via Service List	The service list displayed immediately following a full automatic scan shall present services in ascending Channel Number or Service ID.	—
f)	Selection via Numeric Entry	Selection of a service using numeric entry shall always select a service with that Channel Number regardless of any viewer favourites.	—
g)	Favourite Channel list	The user shall be able to move, sort, swap and delete channels and lock in those changes to update the main channel list based on their preferences. The user shall also be able to add channels and remove channels for one or more Favourite lists, which shall be separate to the main channel list.	

Table 1 (*Continued*)

Sl No.	Specification	Mandatory	Optional
(1)	(2)	(3)	(4)
h)	Hidden Services		Services marked as 'hidden' in the Logical Channel Number (LCN) descriptor shall not appear in the service list presented to the viewer. Services may also be identified as not selectable by numeric entry in a similar way. The DTV receiver shall locate conflict services and store the same.
j)	Logical Channel Number for Satellite services		The DTV receiver service list shall be managed by Logical Channel Number Descriptors (LCN) carried by the SDT (Service description table) or NIT (Network Information table). The DTV receiver shall locate, store and handle services with Logical
k)	RF input signal	-65 dBm to -25 dBm	—
m)	LNB supply current	Minimum 300mA	—
n)	LNB supply voltage	Vertical polarisation: 13 V D.C Horizontal polarisation: 18 V D.C	—
p)	LNB Control	The following control of the LNB shall be provided: a) Low band/High band switching: 1) Low Band: 10.70 GHz to 11.70 GHz 2) High Band: 11.70 GHz to 12.75 GHz b) Polarization: horizontal/vertical selection.	—
q)	Modulation/Demodulation parameters for DVB-S & DVB-S2 standard	As per Sl No. 1 of Annex B	—
iii)	**CONNECTORS:**		
a)	Interfaces, Connectors	a) Satellite Input: 75 Ω, Female Type (*see* Sl No. 14 of Annex B). b) Input: One HDMI version 1.3a port, or higher port. c) Output: Coaxial or Optical compatible connector such as HDMI ARC, S/PDIF etc.	a) Analog Video: RCA Type: Yellow. b) Analog Audio: RCA Stereo: L (White) and R (Red). c) Additional HDMI inputs and/or outputs. d) HDMI inputs having Audio Return Channel (ARC).

Table 1 (*Continued*)

Sl No.	Specification	Mandatory	Optional
(1)	(2)	(3)	(4)
			e) Component (Y, Pb, Pr) Video. f) USB 2.0 Ports. g) RJ11 (for PSTN Modem). h) RJ45 for Fast Ethernet connection. j) 3.5mm Headphone Jack for stereo audio output or Audio Description and Broadcast Mix Audio Description as mentioned in Sl No. i) j) and k) of Table 1 above. k) 15-pin D-sub female connector for PC connectivity. m) DVI-I Connector for PC connectivity. n) ARC capable HDMI inputs should pass through native, input audio bit streams.
iv)	**MAINTENANCE AND UPGRADE:**		
	Automatic software upgrade mechanism	The software upgrade mechanism shall be DVB SSU, to at least the simple profile (as per Sl No. 9 of Annex B) is required or through a USB port for uploading the control software or via Network.	RS 232C or USB port or RJ 45 Ethernet for uploading control software and/or additional services.
v)	**USER INFORMATION:**		
	a) Remote Control	The manufacture is free to design the remote control. The following remote control functionalities are required: a) Numeric 0-9; b) Power — to turn the DTV receiver on and off; c) Program up/down — to switch between programs; d) Volume up/down — to adjust the volume output level; e) Subtitle — to display as per Sl No. i) f) of Table 1 above; f) Info — to display additional information like reception quality, signal strength indicator and Channel ID etc.; g) EPG/Guide — to display an Electronic Program Guide; h) Back — this function exits from the current menu or OSD and returns to the previous state; and j) Free satellite — user shall be able to access FTA satellite channels from any menu by this shortcut key or	—

Table 1 (*Concluded*)

Sl No.	Specification	Mandatory	Optional
(1)	(2)	(3)	(4)
		functionality. This shortcut key or functionality shall also guide user for scanning of satellite channels.	
	b) Easy to use and simple documentation	DTV receivers shall be simple to set up and operate and be provided with clear easy to understand user documentation in line with that requirement.	—
	c) Support package	The following peripheral items shall be included within a baseline DTV receiver package: a) Remote control and batteries; and b) An easy to understand user manual.	A basic status check should be invoked by a menu driven option or a user selected key.

Table 2 Performance Requirements
(*Clause* 3.3)

Sl No.	Specifications/Parameters	Mandatory Values	Optional
(1)	(2)	(3)	(4)
i)	Electrical specifications a) Input voltage range b) Frequency	a) 110 – 240 VA.C. b) 50 Hz ± 2 percent	—
ii)	RF characteristics to be supported by the DTV receiver	As per DVB-S and DVB-S2 standard for Satellite signal	—
iii)	Satellite DTV: DVB-S tuner performance characteristics		
	a) Input level per carrier	a) Required C/N for QEF (BER = 10^{-10} to 10^{-11}) **Mode / Pilots / C/N (dB)** QPSK 1/2 / No / 3.8 QPSK 2/3 / No / 5.6 QPSK 3/4 / No / 6.7 QPSK 5/6 / No / 7.7 QPSK 7/8 / No / 8.4	
	b) Input frequency range	b) 950 to 2150 MHz	
	c) RF input impedance	c) 75 Ω	
iv)	Satellite DTV: DVB-S2 tuner performance Characteristics	a) Required C/N for QEF (PER = 10^{-10} to 10^{-11}) **Mode / Pilots / C/N (dB)**	
	a) Input level per carrier	QPSK 1/2 / No / 2.0 QPSK 3/5 / No / 3.2 QPSK 2/3 / No / 4.1 QPSK 3/4 / No / 5.0 QPSK 4/5 / No / 5.7 QPSK 5/6 / No / 6.2 QPSK 8/9 / No / 7.2 QPSK 9/10 / No / 7.4 8PSK 3/5 / Yes / 6.5 8PSK 2/3 / Yes / 7.6 8PSK 3/4 / Yes / 8.9 8PSK 5/6 / Yes / 10.4 8PSK 8/9 / Yes / 11.7 8PSK 9/10 / Yes / 12.0	—
	b) Input frequency range	b) 950 to 2150 MHz	
	c) RF input impedance	c) 75 Ω	
v)	Symbol rate	2 to 45 Msps	
vi)	RF input return loss	8dB Minimum	
vii)	DisEqC		DisEqC 1.2
viii)	Operating ambient temperature range	5 °C to 45 °C	—
ix)	Operating humidity range	Up to 90 percent (non-condensing)	—
x)	Power consumption	DTV shall comply with Power consumption requirements as per prevailing Bureau of Energy Efficiency (BEE) regulations or notifications issued for TV.	

ANNEX A
(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

Sl No.	*IS No.*	*Title*
1.	IS 616: 2017	Audio, video and similar electronic apparatus — Safety requirements (*fifth revision*)
2.	IS/CISPR 32:2015	Electromagnetic compatibility of multimedia equipment — Emission requirements
3.	IS/ISO/IEC 14496-15 : 2019	Information technology — Coding of audio — Visual objects: Part 15 Carriage of network abstraction layer (NAL) unit structured video in the ISO base media file format (*first revision*)

ANNEX B
(*Clause* 2)

LIST OF REFERRED INTERNATIONAL STANDARDS

Sl No.	*International Standards/ Publications.*	*Title*
1.	a) ETSI EN 300421 Ver 1.1.2	First generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S)
	b) ETSI EN 302 307 Ver 1.4.1	Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2)
2.	ISO/IEC 13818-1 :2007	Information technology — Generic coding of moving pictures and associated audio information — Part 1: Systems (MPEG 2)
3.	ISO/ IEC 13818-2 :2000	Information technology — Generic coding of moving pictures and associated audio information — Part 2: Video Coding
4.	ISO/IEC 14496-10:2020	Information technology — Coding of Audio-Visual objects — Part 10: Advance Video Coding (MPEG-4 Part 10 AVC).
5.	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: MPEG-1 Audio Layer II
6.	ETSI TS 101 154 Ver 2.7.1	Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream.
7.	ETSI EN 301 192 Ver 1.7.1	Digital Video Broadcasting (DVB); DVB specification for data broadcasting
8.	ETSI TR 101 202 Ver 1.9.1	Digital Video Broadcasting (DVB); Implementation guidelines for Data Broadcasting
9.	ETSI TS 102 006 Ver 1.4.1	Specification for System Software Update in DVB Systems
10.	ETSI EN 300 468 Ver 1.16.1	Specifications for Service Information (SI) in DVB systems
11.	ETSI TS 101 211 Ver 1.12.1	Guidelines on implementation and usage of Service Information (SI) in DVB systems
12.	ETSI EN 300 743 Ver 1.6.1	Subtitling Systems
13.	ETSI EN 300 706 Ver 1.2.1	Enhanced Teletext specification
14.	IEC 61169-24	Radio-frequency connectors — Part 24: Sectional specification Radio frequency coaxial connectors with screw coupling, typically for use in 75 ohm cable networks (type F)
15.	ISO/IEC 6937	Information technology — Coded graphic character set for text communication — Latin alphabet

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