UCC STANDARD FOR DIGITAL VIDEO BROADCAST (DVB) RECEIVERS

Digital Video Broadcasting - Terrestrial (DVB-T2, DVB-T2 Lite, DVB-H, DVB-NGH)

Digital Video Broadcasting - Satellite (DVB-S2, DVB-S2X, DVB-SH)

Digital Video Broadcasting - Cable (DVB-C, DVB-C2)

Digital Video Broadcasting – Internet Protocol TV (DVB-IPTV)

Digital Video Broadcasting – Common Interface Plus (DVB-CI+)

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SYMBOLS AND ACRONYMS

AAC	Advanced Audio Coding
AFD	Active Format Description
CI	Common Interface
CI+	Common Interface Plus
CISPR	Special International Committee on Radio Interference
CVBS	Composite Video Broadcast Signal
dB	decibel
dBm	decibel-milliwatt
DTT	Digital Terrestrial Television

DVB-T2	Digital Video Broadcasting - Second Generation Terrestrial
DVB-S2	Digital Video Broadcasting - Second Generation Satellite
DVB-S2X	Digital Video Broadcasting - Second Generation Satellite Extension
DVB-C	Digital Video Broadcasting - Cable
DVB-C2	Digital Video Broadcasting - Second Generation Cable
DVB-IPTV	Digital Video Broadcasting - Internet Protocol Television
EPG	Electronic Programme Guide
ETSI	European Telecommunication Standards Institute
FTA	Free-To-Air
HbbTV	Hybrid Broadcast Broadband TV
HDCP	High-bandwidth Digital Content Protection
HDMI	High Definition Multimedia Interface
HDTV	High Definition Television
HE AAC	High Efficiency AAC
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardisation
ITU	International Telecommunication Union
LCN	Logical Channel Number
MHz	Megahertz
MPEG	Motion Picture Experts Group
NIT	Network Information Table
OSD	On Screen Display
PID	Packet Identifier
PSI	Programme Specific Information
RIT	Real Time Clock
RCU	Remote Control Unit
RF	Radio Frequency
SDTV	Standard Definition Television
SFN	Single Frequency Network
SI	Service Information
S/PDIF	Sony/Philips Digital Interface
UCC	Uganda Communications Commission
UHF	Ultra High Frequency
USB	Universal Serial Bus
VHF	Very High Frequency
WLAN	Wireless Local Area Network

1. INTRODUCTION

The Uganda Communications Commission (UCC) standard for DVB – Receivers is established to enable equipment manufacturers and/or suppliers of DVB Receivers for the Ugandan market, to provide receivers that are compatible to the available broadcast standards and provide the desired fixed and mobile reception of DVB transmissions.

In this document the phrases below may be used to define particular requirements, where a particular requirement is not provided for in this document, the manufacturer may provide the same at their discretion.

PHRASE	INTERPRETATION
"SHALL"	MANDATORY REQUIREMENT
"CAN"	HIGHLY RECOMMENDED REQUIREMENT
"MAY"	OPTIONAL REQUIREMENT

1.1. Document History

Release - Version	Revision / Version	Date	Comments
UCC Standard for Digital Video Broadcast (DVB) Receivers	Ver. 01	Pending Approval	
Minimum Requirements for DVB-T2 STBs for the Ugandan market	Rev. 03	June 2015	UCC made the following TEMPORARY REVISIONS to the Minimum Requirements for DVB-T2 STBs; • Relaxing the requirement for Volume Buttons from MANDATORY to HIGHLY RECOMMENDED
Minimum requirements for DVB-T2 STBs for the Ugandan market	Rev. 02	June. 2014	UCC made the following REVISIONS to the Minimum Requirements for PAY TV DVB-T2 STBs; • CI+ requirement relaxed from MANDATORY to HIGHLY RECOMMENDED.
Minimum requirements for IDTVs for the Ugandan market	Rev. 01	August 2014	UCC made the following REVISIONS to the Minimum Requirements for IDTVs; • Amended "Certification Mark" to "Type Approval Mark" • RF and HDMI cables excluded from the IDTV support package. • Provision of an electronic manual relaxed from MANDATORY to RECOMMENDED. • PSI/SI and PID update time increased from 1000ms to 10s. • Mandatory factory default for Multiple Subtitling Language amended from MULTIPLE to ENGLISH • Languages and Fonts requirement left to the discretion of the manufacturer, as long as Alpha Numeric Characters are used. • Over specification details for PARENTAL RATING were EXCLUDED. • ACTIVE POWER specification at First-time Power Up was EXCLUDED. • RF Connector reference standard changed from IEC 60169-2 to IEC 61169-2 • HDMI slot from HDMI Output to HDMI Input. • HDCP requirement EXCLUDED. • USB data interface required as a MANDATORY requirement.
Minimum requirements for DVB-T2 STBs for the Ugandan market	Rev. 01	February 2014	The Uganda Communications Commission REVISED the minimum specification requirements for DVB-T2 STBs for the Ugandan Market, as follows: • Power supply requirement amended to allow DC-powered STBs.

			• CI+ requirement relaxed to OPTIONAL for FTA STBs. • Audio and Video Interfaces; ✓ SCART interfaces relaxed from MANDATORY to OPTIONAL. ✓ RCA Audio Output changed to a MANDATORY requirement.
Minimum requirements for IDTVs for the Ugandan market	Ver. 01	Nov. 2013	The Uganda Communications Commission RELEASED detailed minimum specification requirements for Integrated Digital Television Sets (IDTVs) for the Ugandan Market.
Minimum requirements for DVB-T2 STBs for the Ugandan market	Ver. 01	May 2013	The Uganda Communications Commission RELEASED detailed minimum specification requirements for DVB-T2 STBs for the Ugandan Market.
Basic specification requirements for STBs	Rev. 01	Sept. 2012	UCC REVIEWED the basic specification requirements for STBs, introducing the Common Interface (CI+) as a MANDATORY requirement.
Basic specification requirements for STBs	Ver. 01	June. 2012	UCC RELEASED basic specification requirements for STBs to be used on the Ugandan market.

1.2. Definitions

For the purpose of this document, the following definitions apply:

a) **Digital Video Broadcasting (DVB):** is a suite of internationally accepted open standards for digital television;
b) **Free-to-Air:** A Service which is broadcast and capable of being received without payment of subscription fees;
c) **Multiplex:** A group of Digital Video/Audio Channels that are combined together into one output signal for broadcast;
d) **Set Top Box:** A stand-alone device that converts a Digital Video Broadcast signal to analogue video and audio signals for presentation on a television receiver or other suitable display device;
e) **Integrated Digital Television (IDTV):** This is a television with an in-built tuner for receiving and displaying digital TV transmissions, and;
f) **Dongle:** is a small piece of hardware that connects to another device to enable reception of Digital Video Broadcasts.

1.3. Referenced Standards

All standards referenced in this document are subject to revision. Therefore, reference to a standard is deemed to be to the latest edition of that standard. Parties to agreements based on such standards are encouraged to take steps to ensure the use of the most recent editions of the standards referenced in this document.

2. SCOPE

This document specifies a standard for equipment that receive DVB related services (Free-to-Air and subscription services) from Terrestrial, Cable and Satellite digital broadcast networks.

The types of receivers include Set Top Boxes, Integrated Digital TVs, Mobile Receivers and Dongles.

2.1. Receiver Classification/ Categorisation

2.1.1. Receiver Profiles

For the purpose of this document, the following Receiver Profiles apply:

a) **Basic TV:** corresponds to requirements for reception of basic (*video and service information*) DVB services that do not depend on enhancements by applications or interaction.

b) **Hybrid TV:** corresponds to requirements for reception of Enhanced (*basic services with data and interaction capabilities*) DVB services, that depend on a standardised Application Programme Interface according to Hybrid Broadcast Broadband Television (HbbTV) Specification Version 1.5 (ETSI TS 102 796 [30].

2.1.2. Receiver Categories

For the purpose of this document, the following DVB Receiver categories apply:

- **Terrestrial Receiver.** A receiver meant for the reception of Terrestrial Signals (DVB-T2) according to the ETSI EN 3302 755[1] standard.
- **Satellite Receiver.** A receiver meant for the reception of Satellite Signals (DVB-S2) according to the ETSI EN 302 307-1[2] standard.
- **Cable Receiver.** A receiver meant for the reception of Cable Signals (DVB-C/ DVB-C2) according to the EN 300 429[3] and (or) ETSI EN 302 769[4] standard.
- **IP Receiver.** A receiver meant for the reception of IP based services (DVB-IPTV) to the ETSI TS 102 034[5] standard.
- **Combo Receiver.** A receiver equipped with at least two tuners, for reception of DVB services on different platforms (i.e. either; Terrestrial, Satellite, Cable or IP).

[1] **ETSI EN 3302 755:** Digital Video Broadcasting (DVB): Frame Structure channel coding and modulation for a second generation digital terrestrial broadcasting system (DVB-T2)

[2] **ETSI EN 302 307-1**: Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications; Part 1: DVB-S2

[3] **EN 300 429**: Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for cable systems

[4] **ETSI EN 302 769**: Digital Video Broadcasting (DVB); Frame structure channel coding and modulation for a second generation digital transmission system for cable systems (DVB-C2)

[5] **ETSI TS 102 034:** Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks

§X.X	REQUIREMENT DESCRIPTION	SET TOP BOXES		INTEGRATED DIGITAL TVs		MOBILE RECEIVERS	DONGLES
		Basic	Hybrid	Basic TV	Smart TV		

3. GENERAL REQUIREMENTS

3.1. Equipment Identification	**3.1.1. Brand Name and Model** The receiver shall be marked with the supplier or manufacturer's Brand name and Model Markings shall preferably be on the Receiver front panel and shall be Legible, Indelible and Readily Visible	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
	3.1.2. UCC Type Approval Mark All DVB receivers shall upon Type Approval, be marked with: ➢ The UCC Serialised Type Approval Mark[6]. The mark shall be legible, Indelible and Readily visible.	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
3.2. EMC, and Equipment Immunity	The Receivers shall comply with the relevant Electromagnetic Compatibility (EMC) and Equipment Immunity Standards.	➢ CISPR(CISPR 13[7], CISPR-20[8], CISPR-22[9]), ➢ IEC (IEC 6100-3-2[10]), ➢ EN (EN 55013[11], EN 55020[12], EN 55022[13], EN 55024[14]) or ➢ Equivalent international Electromagnetic Compatibility (EMC), and Equipment Immunity standards					
3.3. Safety Requirements	The Receivers shall comply with the relevant International Safety Standards	➢ IEC 60065:2014 Any other internationally acceptable standards					
3.4. Power Supply	All DVB recivers shall either be AC powered or DC powered	➢ AC {Mains: 230V±10% /50 Hz ±2%} **OR** ➢ DC {Source: 12V} Incorporated protection against over/under-voltage and reversed polarity. **NOTE**: Dongles may or may not be powered by the host device/ equipment.					

6 **The UCC Type Approval Mark** shall be provided by the commission to the applicant upon completions of the type approval process and issuing of the UCC Type Approval Certificate.

7 **CISPR-13**: Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement

8 **CISPR-20**: Sound and television broadcast receivers and associated equipment - Immunity characteristics Limits and methods of measurement

9 **CISPR-22**: Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

10 **Electromagnetic compatibility (EMC) - Part 3-2** - Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)

11 European limits and methods of measurement of radio disturbance characteristics of broadcast receivers

12 European, immunity from radio interference of broadcast receivers

13 European limits and methods of measurement of radio disturbance characteristics of information technology equipment

14 European immunity requirements for information technology equipment

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3.5. Power Supply Cord and Mains Plug	The power supply cord shall conform to the relevant International standards. The power supply cord may or may not be applicable for Dongles.	➢ BS 6500 , ➢ IEC 60227-6, IEC 60245-7, IEC 60446 The AC main plug shall be fitted with a 3 pin, 13A fused plug or equivalent as per BS 1363/MS 589- Part 1 standard.					
	Power Supply (AC/DC) Cord/ Adapter.	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory if Applicable.	
3.6. Support Package	CVBS-RCA[15] Cable of 1 metre minimum length.	Mandatory	Recommended	Optional	Optional	Recommended	Recommended
	An HDMI Cable of 1 meter minimum length.	Recommended	Recommended	Optional	Optional	Optional	Optional
	All Receivers shall be equipped with a Remote control unit (RCU) and 'AA' or 'AAA' sized batteries.	The Remote Control Unit shall bear all basic functionality such as Power, Volume, Programme/Channel Controls and Numeric numbers 0-9 placed on prominent locations on the RCU. Color-coded multifunctional buttons shall be included to enhance user experience and easy navigation of the Graphic User Interface. The RCU shall have inbuilt hysteresis, allowing enough time to capture a single, double or triple digit entry.					
	An illustrative User Manual in English language.	Mandatory ➢ Printed	Mandatory ➢ Printed	Mandatory ➢ Printed.	Mandatory ➢ Printed	Mandatory ➢ Printed	Mandatory ➢ Printed.
		Optional ➢ Electronic	Recommended ➢ Electronic	Recommended ➢ Electronic	Mandatory ➢ Electronic	Optional ➢ Electronic	Optional ➢ Electronic
	Ethernet Cable.	Optional	Recommended	Optional	Recommended	Optional	Optional
3.7. Processor and Memory	The DVB receiver must be equipped with a powerful Processor and sufficient Memory suitable for the recption of DVB services and where applicable, operation of the Interactive Application. The embedded Processor and Memory shall be suitable for the provision of the routine software and (or) firmware upgrades. The installed Processor and Memory capacity should be clearly visible in the System Information Menu, And all Processor and Memory configurations shall cater for DDRAM , Flash Memory, Storage Memory and the Processor for applicable reciever functions.						
3.8. Maintenance & Upgrade	**3.8.1. Over The Air Software Upgrade.** OAD software and (or) Firmware Upgrade.	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
	3.8.2. USB Software Upgrade. Software and (or) Firmware upgrade through USB.	Recommended	Mandatory	Mandatory	Mandatory	Recommended	Optional
	3.8.3. Ethernet (IP) Software Upgrade. Software and (or) Firmware upgrade through Ethernet using Internet Protocol.	Optional	Mandatory	Optional	Mandatory	Optional	Optional

[15] A Composite (CVBS) and Stereo Audio RCA cable.

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3.9. Navigation Features	**3.9.1. Power** Power Control Button to turn the Receiver ON and OFF	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Recommended
	3.9.2. Programme/Channel Programme Control Buttons to change programme channels and navigate the Menu.	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Recommended
	3.9.3. Volume Volume Control Buttons to change the output sound volume and navigate the Menu	Recommended	Recommended	Mandatory	Mandatory	Mandatory	Recommended
	3.9.4. Menu The Menu button for swtching to Menu display and toggling different Menu Selections.	Recommended	Recommended	Mandatory	Mandatory	Mandatory	Recommended
4. FRONT END CHARACTERISTICS / REQUIREMENTS							
4.1. Radio Frequencies and Bandwidths	*The DVB receiver shall contain at least one Tuner/Demodulator for reception of Cable, Satellite or Terrestrial signals, or an interface for reception of signals from IP networks. Where applicable, The DVB receiver shall be able to automatically scan through the whole frequency range applicable for each of the available Tuners/Demodulators and tune in to the correct DVB framing structure, channel coding and modulation to deliver the incoming transport stream to the next unit.*						
	4.1.1. Terrestrial Tuner and Demodulator All receivers meant for Terrestrial Reception shall include a DVB-T2 tuner/demodulator unit for reception of signals from terrestrial broadcasting transmissions in accordance with EN 300 755, DVB-T2 standard. The receiver shall be able to receive on all frequency bands allocated to digital terrestrial broadcasting in ITU Region 1. **Note:** Support for Either DVB-T2 Lite or DVB-H or DVB-NGH shall be optional for fixed DVB receivers but Mandatory for Mobile DVB receivers. **Note:** The DVB-T2 STB should be able to operate in SFN with echo signals within the guard interval. When the DVB-T2 STB tunes to a mix of two signals from a SFN where the received signals are close in amplitude, it is required that the DVB-T2 STB be able to select the better signal.						

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	4.1.2. Satellite Tuner and Demodulator All receivers meant for satellite reception shall include a DVB-S2 tuner/demodulator unit for reception of signals from satellite broadcasting transmissions in accordance with EN 302 307-1 standard. Support for DVB-S2X (EN 302 307-2) standard is optional. The receiver shall be able to receive on all frequency bands allocated to digital satellite broadcasting in ITU Region 1.
	4.1.3. Cable Tuner and Demodulator All Receivers meant for Cable Reception shall include a DVB-C tuner/demodulator unit for reception of signals from terrestrial broadcasting transmissions in accordance with EN 300 429 standard. Support for DVB-C2 (EN 302 769) standard is optional.
	4.1.4. DVB- IPTV Based Front-End All Receivers meant for Reception using Internet Protocol (IP) shall include capability to receive DVB-IPTV signals in accordance with the TS 102 034 standard.
5. SERVICE INFORMATION **NOTE**: *The DVB Receiver shall be able to process the necessary SI transmitted within individual transport data streams so that its proper function is secured and the end user is able to make full use of the services provided. The processing of the SI shall be according to the EN 300 468[16] specification for Service Information (SI) in DVB Systems.*	
5.1. Use of DVB SI	The DVB Receiver shall comply with the technical implementation guidelines outlined in the ETSI TR 101 211[17], for the use of DVB SI as specified in the EN 300 468 specification for Service Information (SI) in DVB Systems. The SI table mechanism, syntax and semantics, and minimally; the Service Description Table (SDT), the Event Information Table (EIT) and the Time and Date Table (TDT) should be supported.
5.2. System Timing	The DVB Receiver should support Real Time Clock (RTC) setting or allow network synchronised time.
5.3. Optional and Unrecognised SI	For DVB receivers with recording features, it is recommended that the Selection Information Table (SIT) be supported for partial transport stream selection and recording. Support of Bouquet Association Table (BAT), Stuffing Table (ST) and Data Information Table (DIT) is optional. The DVB Receiver should ignore any incomprehensive SI or tables. The DVB Receivers should discard any PSI/SI signals if it is unrecognised or not supported.
5.4. PSI/SI and PID Update	The DVB receiver should be able to monitor and update all PSI with shorter than 1s interval and all SI with less than 10s interval. The DVB Receivers should update PSI/SI information in memory whenever any update or modification happens on a real-time basis. The DVB Receiver should be able to take prompt action with changes or modifications on the parameters of transmissions, networks and services.
5.5. Dynamic Response to PAT, PMT, NIT	The DVB Receiver shall be capable of identifying changes or new services in the current channel/multiplex and respond to these changes in real time. Changes may occur, in particular: • when a new programme is added to the transport stream • when the transmission of a certain programme is terminated • during regular exchange of programmes within the daily or weekly cycle

[16] EN 300 468 - Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems
[17] ETSI TR 101 211 - Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)

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and SDT Updates	• when switching between the regional programme versions • when language versions are added or removed • when subtitles are added • when the transmission frequency is changed as planned (NIT table) • when other data services are added, such as SSU
5.6. Service Identification and Logical Channel Number (LCN)	The DVB receiver should be able to automatically scan through the whole frequency range available for each of the available Tuners/Demodulators and tune in to the correct DVB framing structure, channel coding and modulation to deliver the incoming transport stream to the next units. The tuning data shall be stored to allow a quick tune in to the selected transport stream. **Note:** Frequency Scanning is not relevant for DVB receivers with IP-based front-end. The DVB Receiver should support LCN by using descriptor with tag value of 0x83 (Version 1) and (or) 0x87 (Version 2). All services should be sorted, listed and managed accordingly with assigned LCN. **Note:** When both the Logical Channel Descriptor *Version 1* and *Version 2* are broadcast within one Original network ID (ONID), the DVB Receiver supporting both descriptors shall only sort according to the *version 2* (higher priority)
5.7. Responses to Network Changes	**5.7.1. Addition of multiplex on a network** When a multiplex is added to the network, it shall make reference in the second loop of the NIT actual table. The NIT (*actual*) and SDT (*actual and other*) version_number shall be changed. The DVB Reciver shall recognise the change of version-_number of the NIT table and that a new transport_stream_id is present in the NIT (*actual*).
	5.7.2. Addition or removal of service on a multiplex When a service has been added to a multiplex, there shall be an update in the SDT (*actual*) for that multiplex which references the new service. The DVB Reciever shall consider a service to be removed from a multiplex if the service is not referenced in the SDT (*actual*) of that particular service. A rescan of any or all the multiplexes shall not be required for the DVB Reciever to acknowledge the presence of a new service. The DVB reciever shall process the SDT (*actual*) and EIT-present/following (*actual*) when tuning to a different multiplex or every 2 seconds as recommended by ETSI TR 101 211. When a new service is added or removed from a multiplex, the DVB receiver may inform the user that a new service has been added or removed using an appropriate DVB Receiver specific method e.g. a short screen pop-up lasting not more than three (3) seconds.
	5.7.3. DVB Operational Mode Changes. In the event that there is any operational mode changes, the DVB receiver shall automatically perform an update to capture these changes with minimal or no disruption to the viewer
	5.7.4. Network Configuration. All **Terrestrial** DVB Receivers shall be able to operate in both Multiple Frequency Networks (MFN) and Single Frequency Network (SFN) environments.
5.8. Summary of SI transmitted and received in	The DVB Receiver should interpret the following service information tables and comply with the ETSI EN 300 468 DVB-SI standard. • Programme Association Table (PAT) , Programme Map Table (PMT), Conditional Access Table (CAT), Network Information Table (NIT), Service Description Table (SDT), Event Information Table (EIT) Present/Following, Event Information Table (EIT) Schedule, Time and Date Table (TDT) Time Offset Table (TOT), Running Status Table (RST)

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the DVB system	
6. SERVICES	
6.1. Subtitling	**6.1.1. Specification for Subtitling** The DVB Receiver shall support DVB subtitling in accordance with ETSI EN 300 743 [18] and display it using the On Screen Display (OSD) capabilities while decoding the full television service (video and audio). The subtitle object code shall be handled as pixels (bitmap).
	6.1.2. Multiple Subtitling Language The DVB Receiver should be able to handle multiple subtitling streams within the same service and the correspondent PSI/SI information like language descriptors. The DVB Receiver should provide convenient user control for enabling, disabling, displaying and to select primary and secondary subtitling languages. In case of subtitling is set to "ON" and the subtitle streams do not match any of the settings of preferred languages, the DVB receiver shall select the first subtitle stream signaled in the elementary stream loop of the PMT. The recommended factory default settings are: • The default setting on the DVB Receiver for subtitling set to "ON" • The primary preferred language set to "English Language" (ENG) • The secondary preferred language set to "Multiple Languages" (MUL)
	6.1.3. Support for Hearing Impaired The DVB Receiver may be capable of displaying subtitles for the hearing impaired. The DVB Receiver should be capable of overlaying the subtitle text on the picture. The subtitles for the hearing impaired may differ from the normal subtitles by the amount of text displayed per second, which is controlled by the broadcasted content. When enabled, subtitles shall automatically be displayed. When disabled, the decoder shall allow manual selection from the available list of broadcasted subtitle services.
6.2. Electronic Programme Guide (EPG)	**6.2.1. Specification for EPG** The DVB Receiver shall decode full EIT information with capability to display "*Present/ following*" (or "*Now/ Next*") and schedule EPG information in accordance with guidelines given in ETSI TR 101 211 and requirements defined in ETSI EN 300 468. The DVB Receiver shall also be able to continue to operate in the absence of EIT transmission. The DVB Receiver shall provide users with a navigation function through the OSD interface to guide them through the environment of the services provided. The data necessary for preparing and updating the guide should be transmitted within the transport data stream. The DVB Receiver must be able to process the EPG data flow at a rate of at least 1 Mbps. It is governed by; the EN 300 468 standard and TR 101 211 recommendation. The graphic format and extent of the electronic programme guide shall be given by the DVB Receiver's system software, which must meet the conditions set out in the preceding sections, including localisation for the national environment. The DVB Receiver shall display the *present/following* information immediately after switching the programme and at any time on request (*after pressing the relevant Info button to 'DO'*). The overview of the planned programmes must be available for at least seven days. The DVB Receiver must display all characters of the **short_event_descriptor** item, which is responsible for displaying the name and short description

[18] ETSI EN 300 743 - Digital Video Broadcasting (DVB) Subtitling systems

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	of the programme.						

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6.2.2. EPG Presentation

EPG presentation shall include but not limited to the following:

- Service name, Programmeme title, Programme duration, Elapsed duration (optional), Short description, Long description (extended text), Present/following (now/next) event, Current date/time, Parental guidance information.

The DVB Receiver shall provide an EPG organizer to access the *Next Seven-Day* programme guide with all information in above list. It should be a practical and easy to use search function.

6.2.3. Languages and Fonts

The DVB Receiver shall support an easily visible character coding for EPG and other labeling decoding and presentation.

6.2.4. Parental Lock Feature

The DVB Receiver shall have parental lock capabilities to block television programmeming with a particular Classification Code from being shown unless the correct PIN code is entered by the user.

The DVB Receiver shall be able to identify the Classification Code that is applied to the television programme and shall allow user to set the rating that he/she wants to block. The DVB Receiver shall support standard Classification codes.

6.2.5. Parental Rating Display

The parental rating information shall be displayed clearly as part of EPG.

The parental rating descriptor shall be transmitted and the full parental rating information shall be appended to the front of the programme title or programme description by the broadcaster.
Manufacturers can add additional displays of programme ratings, but they must display the full rating information.

6.2.6. Multi-Language Support

The DVB Receiver shall provide a mechanism for the selection of primary and secondary language options for both Subtitles and Audio selection. The DVB Receiver shall as a minimum, interpret the following ISO 639-3 language codes:

- English (ENG), Swahili (SWH), French (FRA), Original Audio (QAA*), Multiple Languages (MUL**)

* Original Audio is only applicable for Audio
** Multiple Languages is only applicable for Subtitle

6.2.7. Teletext

The DVB Receiver shall be able to support and display teletext information.

6.2.8. Remote Control Unit (RCU)

An RCU shall be bundled with the DVB Receiver. It should be simple and easy to use, with all basic functionality such as power, volume control and numerical number 0-9 placed on prominent locations on the remote control. Color-coded multifunctional buttons shall be included to enhance user experience and ease navigation on the DVB Receiver User Interface.

The DVB Receiver's remote control interface shall have inbuilt hysteresis, allowing enough time to capture a single, double or triple digit entry. This is to cater for the possibility of large numbers of services thus requiring the TV receivers to expect up to 3 numbers, entered via remote control, to select the LCN of a programme service.

It is recommended that manufacturers and (or) Vendors avail alternative Remote Control Units for those with impaired vision or impaired manual dexterity (e.g. over-sized keys and character fonts, shaped keys).

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	6.2.9. Reliability **a. Robustness** The RCU shall be designed to withstand frequent usage, with a robust case that is resistant to damage from being dropped onto hard surfaces or sat upon. **b. Environmental** The RCU shall be designed to work in the same environmental conditions (i.e. ambient temperature and humidity) as specified for the DVB Receiver. **c. Key life** The design of the key mechanism shall be such as to provide a minimum of five 95) years' operation under normal expected usage.						
6.3. Signal Strength and Quality Bar	The DVB Receiver shall be able to display both signal strength and quality (BER) level. This will aid the user in setting up indoor antenna to ensure best reception position or identifying other reception problems.						
6.4. Service Unavailability	In the event of service unavailable, poor or no RF signal, the DVB Receiver shall display an on-screen message.						
6.5. Listing of All Available Services	The DVB Receiver shall provide a listing of all available services after scanning.						
6.6. First-time Power Up	Upon powering up for the first-time, the DVB Receiver shall initiate the following processes: a. Set OSD language (Default – English); b. Prompt tuning/scanning for all available services; and c. Set other configurations (user data, preferences and others).						
7. INTERFACES AND CONNECTORS							
7.1. RF Input Connector	The RF Input connector must be of the IEC female type with an impedance of 75 Ω according to the IEC 61169-2[19] standard. The following specifications shall apply for Satellite and Terrestrial: d. **Terrestrial Receiver:** May provide 5V DC output for the active antenna power supply. If it is provided, the 5V DC shall be able to be turned on/off. e. **Satellite Receiver:** shall provide an LNB supply voltage (11/15V, 13/18V, 21 V or off) and a supply current (400 mA with short circuit and Surge Protection). RF Input Connector is not required for IP-DVB Receivers, unless it's being used for an RF loop-	Mandatory for Terrestrial, Cable and Satellite Receivers.	Mandatory for Terrestrial, Cable and Satellite Receivers.	Mandatory for Terrestrial, Cable and Satellite Receivers.	Mandatory for Terrestrial, Cable and Satellite Receivers.	Mandatory for Terrestrial Mobile Receivers.	May or May not be applicable for Terrestrial, Cable and Satellite Dongles.

[19] IEC 61169-2 - Specification for Radio frequency coaxial connectors

§X.	REQUIREMENT DESCRIPTION	SET TOP BOXES		INTEGRATED DIGITAL TVs		MOBILE RECEIVERS	DONGLES
		Basic	Hybrid	Basic TV	Smart TV		
	through Connection.						

§X.	REQUIREMENT DESCRIPTION	SET TOP BOXES		INTEGRATED DIGITAL TVs		MOBILE RECEIVERS	DONGLES
		Basic	Hybrid	Basic TV	Smart TV		
7.2. RF Output Connector	The RF Output connector must be of the IEC male type IEC 61169-2 standard. Where applicable The DVB Receiver shall provide an RF connector interface with a loop-through.	Recommended	Recommended	Recommended	Recommended	Not Applicable	Not Applicable
7.3. RCA, CVBS Output	The DVB Receiver Shall provide the Audio and Video output (RCA, CVBS) interface.	Mandatory	Mandatory	Not Applicable	Not Applicable	Recommended	Optional
7.4. HDMI	The DVB Receiver shall provide HDMI interface for digital video and audio output. HDMI interface must comply with the specifications of HDMI release 2.0 releases.	Mandatory	Mandatory	Mandatory	Mandatory	Recommended	Optional
7.5. Copy Protection on Outputs	The DVB Receiver that has the HDMI interface as specified in § 6.4 above, shall provide High Bandwidth Digital Content Protection (HDCP) on the HDMI output for all output/ Input resolutions.	Mandatory	Mandatory	Mandatory	Mandatory	Recommended	Optional
7.6. Common Interface	Common Interface shall be implemented as outlined in the DVB-CI+ specification V1.4, or DVB-CI+ Specification V2.0 or later.	Recommended	Recommended	Recommended	Recommended	Optional	Optional
7.7. Data Interfaces and Interactivity	*The DVB Receiver may be furnished with any of the interfaces indicated below, intended for data transmission: If any data interface is used for recording the received content to an external storage medium, the protection (if any) against unauthorised access must also be maintained in the data provided at such an interface (i.e., the data at this interface must not be modified by decoding or removing this protection). When any of the interfaces (Ethernet, WLAN) is used as a back channel, it is recommended – as a platform for the provision of interactive services – to use the HbbTV system implemented in accordance with the current versions of the technical specifications of ETSI TS 102 79[20] and ETSI TS 102 809[21]*						
	7.7.1. Ethernet under IEEE 802.3 (*at least 100Base-T*)	Recommended	Recommended	Recommended`	Mandatory	Recommended	Recommended
	7.7.2. WLAN (IEEE 802.11, b, g)	Optional	Recommended	Optional	Mandatory	Optional	Optional
8. VIDEO AND AUDIO DECODING REQUIREMENT							

[20] ETSI TS 102 79 - Specifications for Hybrid Broadcast Broadband TV

[21] ETSI TS 102 809 – DVB specifications for signalling and carriage of interactive applications and services in Hybrid broadcast/broadband environments

§X.	REQUIREMENT DESCRIPTION	SET TOP BOXES		INTEGRATED DIGITAL TVs		MOBILE RECEIVERS	DONGLES
		Basic	Hybrid	Basic TV	Smart TV		

8.1. Video Decoding

The DVB Receiver shall be able to decode video formats as specified below for SDTV and HDTV based on the ITU-T Recommendation H.264[23] or ISO / IEC 14496-10[24].

a) Standard Definition SDTV

- Main Profile @ Level 3
- Frame frequency 25 Hz
- Image format / Aspect Ratio 4:3, 16:9
- Definition 720, 704, 544, 480 (point) x 576 (lines).

b) High Definition HDTV

- High Profile @ Level 4
- Frame frequency 25 and 50Hz (see the table below)
- Image format Aspect Ratio 16:9

Formats supported: at least by details based on ITU-T R H.264 /or ISO / IEC 14496-10 as described in the table below:

Vertical size	Horizontal size	Frame rate	Progressive/ Interlaced
1080	1920	25	I
1080	1440	25	I
720	1280	50	P

8.2. Aspect Ratio

The DVB Receiver shall provide convenient user control for appropriate aspect ratio switching between 4:3 and 16:9 to adapt display in different size and aspect ratio.

8.3. Active Format Description (AFD)

When AFD is used, the DVB Receiver shall present the video aspect ratio properly according to the current AFD value and response in next frame. The DVB Receiver shall support at least the Active Formats shown in the Table below;

Active Format	Aspect ratio of the "area of interest
1000	Active format is the same as the coded frame
1001	"Pillar box" 4:3 (center)
1010	"Letter box"16:9 (center)

8.4. Audio Decoding

The DVB Receiver must support (decode) sounds compressed:

- In MPEG-1 Audio Layer II
- In MPEG-4 HE AAC. Support to multichannel (surround) audio in this format is also recommended;

Support for the E-AC-3 (Dolby Digital Plus) format, including multichannel (surround) audio is **Highly Recommended**. If supported, the equipment must enable transparent E-AC-3 transmission via HDMI output, and provide conversion from E-AC-3 to AC-3 for S/PDIF output. As to multichannel audio, the equipment must enable conversion to stereo audio (L/R) and enable audio description.