

**CONSULTATION ON DRAFT  
MINIMUM TECHNICAL REQUIREMENT AND SPECIFICATION  
For Digital Set-Top Box (DVB-C)**

To define the minimum technical standards/specifications of Digital Setup boxes under the provision of Section 39 (C) of the PEMRA Ordinance 2002 as amended by the PEMRA (Amendment) Act, 2007, which empowers the Authority to prescribe standards and measure for the establishment of broadcast media stations, installation of broadcasting distribution service or teleporting equipment, transmitters, receivers, boosters, converters, distributors and common antenna.

The standards safeguard the legitimate objective such as quality of service, uninterrupted operation of the equipment, safety and competitiveness. The set-top box shall be compatible and ensure compliance with the following minimum technical standards as prescribed by the Authority from time to time.

**All the stakeholders and general public are requested for their valuable comments if any for further improvement in the document.**

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**DRAFT**

Minimum Technical Requirement and Specifications

For

Digital Set-Top Box (DVB-C)

PAKISTAN ELECTRONIC MEDIA REGULATORY  
AUTHORITY

# Minimum Technical Requirement and Specifications

## Digital Set-Top Box (DVB-C)

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## 1. Abbreviations

ACM	Adaptive Coding and Modulation
C/N	Carrier to Noise ratio
CBR	Constant bitrate
CATV	Community Antenna Television
CVBS	Composite Video (analog video, e.g. PAL)
CA	Conditional Access
DVB	Digital Video Broadcasting project
DVB-C	DVB System for cable transmission
EBU	European Broadcasting Union
ETSI	European Telecommunication Standards Institute
ETR	European Technical Report
EN	European Stands
ETS	Education Testing Service
EMM	Entitlement Management Messages
GSE	Generic Stream Encapsulation
HD	High Definition
HDMI	High Definition Multimedia Interface
IEC	International Electro-technical Commission
IEEE	Institute of Electrical and Electronic Engineers
MMI	Man-Machine Interface
MHP	Multimedia Home Platform
MBaud	1,000,000 Baud = 1,000,000 Symbols per second
MPEG	Moving Pictures Experts Group
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
RCA	Radio Corporation of America (connector cable for audio & video)
SNR	Signal to Noise Ratio
STB	Set Top Box
SD	Standard Definition
TR	Telecommunication Report
TS	Transport Stream
VBR	Variable bitrate
YPbPr	Video output terminal

# Minimum Technical Requirement and Specifications

## Digital Set-Top Box (DVB-C)

### 2. Scope

To define the minimum technical standards/specifications of Digital Setup boxes under the provision of Section 39 (C) of the PEMRA Ordinance 2002 as amended by the PEMRA (Amendment) Act, 2007, which empowers the Authority to prescribe standards and measure for the establishment of broadcast media stations, installation of broadcasting distribution service or teleporting equipment, transmitters, receivers, boosters, converters, distributors and common antenna.

The standards safeguard the legitimate objective such as quality of service, uninterrupted operation of the equipment, safety and competitiveness. The set-top box shall be compatible and ensure compliance with the following minimum technical standards as prescribed by the Authority from time to time.

### 3. Compliance with the International standards:

ETSI EN 300 429: “Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for cable systems”.

ETSI TS 102 606: “Digital Video Broadcasting (DVB); Generic Stream Encapsulation (GSE) Protocol”.

ETSI TS 102 771: “Digital Video Broadcasting (DVB); Generic Stream Encapsulation (GSE) implementation guidelines”.

ETR 211 ‘Digital broadcasting systems for television: Guidelines on implementation and usage of service information (SI) in DVB Systems’

ETR 289 ‘Digital video broadcasting (DVB): Support for use of scrambling and conditional access (CA) within digital broadcasting systems.

IEC 60728-1 (May 2008): “Cable networks for television signals, sound signals and interactive services – Part 1: System performance of forward paths”.

IEEE 802.14: “Broadband Cable Access Method and Physical Layer Specification”.

ETSI EN 300 468: “Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB Systems”.

ISO/IEC 13818-1: “Information technology – Generic Coding of moving pictures and associated audio information: Systems”.

IEC 60169-2 (1965) ‘ Radio Frequency Connectors: Part 2 “Coaxial unmatched connector [including Amendment No.1 (1982)]”

“A new cable frequency plan and power deployment rules”, Redesign Deliverable D14, 2009

“The HFC channel model”, Redesign Deliverable D8, 2008.

“Methodology for specifying HFC networks and components”, Redesign Deliverable D10, 2009.

TR 101202 Specification for data broadcasting; Guidelines for the use of EN 301 192

#### **4. General Requirements:**

##### **4.1 Performance Requirements**

- i.** The manufacturer shall ensure compatibility/interfaces of STBs with consumer electronic equipment, such as televisions, audio systems, VCRs, etc., in the country. Audio and video interfaces that provide such compatibility are listed in Table I. below.
- ii.** The STB shall support reception and processing of EN 300 429 (DVB-C) compliant digitally modulated signals. It shall be able to receive and process Service Information (SI) as laid down in EN 300468 and ETR 211. For data services (if implemented), it shall be able to receive data bit streams compliant to EN 301192 and ETSI TR 101202.
- iii.** The STB Software has to provide the information of the signal level and signal quality.
- iv.** The STB has to be provided with a cold start time of no more than 40 seconds and a start time from standby mode to no more than 10 seconds.
- v.** The STB hardware design has to be provided with an Annualized Failure Rate (AFR) of not more than 2% over 3 years.
- vi.** The STB is required to support the “Hardware root of trust” concept by locking each STB uniquely to the CAS embedded in a secured chipset.
- vii.** The STB should support a smart card/ cardless CAS solution

##### **4.2 Video and Audio Decoding Requirements:-**

- i.** The STB’s video decoder shall fully comply with the DVB Implementation Guidelines for the use of MPEG-2 (SDTV) and MPEG-4 H.264/AVC (HDTV) video in cable ETSI TS 101 154.
- ii.** Up-sampling of sub-sampled resolutions shall be made in accordance with ETSI TS 101 154 [28], i.e. sub-sampled luminance resolutions shall be up-converted by the Decoder Format Converter into the full video raster of the Decoder Composition Output.
- iii.** The STB’s video decoder shall fully comply with standard ISO IEC 14496-10 [8] for decoding MPEG-4 and ISO/IEC 13818-2 [9] for decoding of MPEG-2 coded signals. The decoder must also comply with ETSI TS 101 154 [10] and must support VBR and CBR.
- iv.** The STB’s video decoder shall ensure synchronization between audio and video as follows: audio must never lead the video program by

- more than 20 milliseconds, and must never lag the video by more than 45 Ms.
- v. The STB's video decoder shall be able to switch between 4:3 and 16:9 picture aspect ratios. In case of receiving an anamorphic picture and pre-set 4:3 on TV, the STB shall perform conversion to «16:9 letterbox»
  - vi. In case of RCA, or if any other analogue video output (YPbPr or RCA) is available, the decoded HD video must be down-converted by SD format converter to SD resolution for output via these interfaces. This will ensure compatibility of the STB with the TV sets that do not have digital interfaces. Picture down-conversion must be implemented from any of the incoming encoded HD full screen luminance resolutions of 1920x1080 and 1280x720 (as an OPTION also from 1440x1080, 1280x1080, 960x1080, 960x720 and 640x720) to 720x576 SD resolution. The down-converted video must be displayed as 16:9 letter box on 4:3 displays. The SD format converter should apply appropriate re-interlacing.
  - vii. The STB's audio decoder shall support reception of multi-channel (up to 5.1) audio, in addition to the mandatory SDTV audio decoder requirements. The STB shall provide analogue audio outputs for stereo/mono, S/PDIF output and an HDMI output for multi-channel audio.
  - viii. The STB's audio decoder shall provide at least one stereo audio decoder that is able to meet minimum decoding requirements, based on MPEG 1 Layer II ("Musicam" ISO/IEC 11172-3).
  - ix. The STB's audio decoder shall also support AAC decoding according to ISO/IEC14496-3 subpart 4.
  - x. The STB's audio decoder shall fully comply with DVB Implementation Guidelines for the use of MPEG-2 Systems, Video and Audio in satellite, cable and terrestrial Broadcasting Applications ETSI TS 101 154.
  - xi. The STB's audio decoder shall support decoding of audio in the following modes: dual mono, stereo and joint stereo.
  - xii. The Set-Top Box (STB) shall comply with ETSI EN 50221; Common Interface Specification for Conditional Access and other Digital Video Broadcasting Decoder Applications

### **4.3 Equipment Conformity**

The set top box shall comply with the international standards according to the DVB- organization and the essential requirements of the CE (European Conformity) and the apparatus shall bear the related conformance mark.

### **4.4 Electronic Program Guide**

The set top box shall provide a complete list of channels and an Electronic Program Guide containing all event information for all program channels on the available multiplexers.

### **4.5 Logical Channel Numbering**

The set top box shall support Logical Channel Numbers associated to the local television-stations and must be unique within the network.

## 4.6 Specification Requirements

	Parameters	Requirements
1	Electrical specifications: a) Input voltage range b) Frequency	170-250V AC 50 Hz $\pm$ 5 per cent
2	Connectors: a) RF input  b) Output video c) Output audio d) RF output  e) Digital a/v output Optional	75 ohms impedance. Female connector (as per IEC 60169-24) 1 X RC A type CVBS 2 X RCA type 75 ohms impedance. Male connector (as per IEC 60169-2) HDMI 1 x USB 2.0 port1 1 x USB 2.0 port 1 x S/P DIF optical
3	RF Characteristics of Signal:  a) Modulation b) Symbol Rate c) Modes d) Modulation e) Frequency f) FEC coding g) C/N range h) Interleaving i) Constellations j) Max Bit Rates (8MHz)	Single Carrier QAM 0.87 – 6.9 Mbuad Constant Coding & Modulation 16 to 256 QAM 8 MHz Reed Solomon (RS) 31 dB Min. for 64 QAM Bit Interleaving 16 QAM, 64 QAM and 256 QAM 83.1 Mbit/s
4	Channel tuner performance: a) Input level per carrier b) Input frequency range c) RF input impedance	37 dB $\mu$ V to 67 dB $\mu$ V for 64 QAM 47 MHz - 862 MHz 75 ohms

5	Decoded video formats  Aspect ratio	MPEG-2: MP@ML, MP@HL (ISO/IEC13818, part 2) H.264 AVC: MP@L4.1(ISO/IEC 14496, part 10) 4:3; 16:9
6	Decoded audio formats	MPEG-1 Layers 1, 2 (ISO/IEC 11172-3) MPEG-2 AAC (ISO/IEC 13818-7) (optional) MPEG-4 AAC (ISO/IEC 14496-3) (optional)
7	Main CPU  Memory	Supporting MPEG2, MPEG4 (H.264), H.265(HEVC), MPEG AAC, MPEG Audio codec At least 8MB Flash and 128MB SDRAM
8	Remote Control	Dual Mode (TV & STB) optional
9	Operating temperature range	0°C to 45°C
10	Operating humidity range	5% to 95% (non-condensing)
11	Languages of operation	English and Urdu (optional)
12	User Manual	English and Urdu (both)
13	Marking	a. Manufacturer's name or trade-mark ; b. Model designation and serial No.; c. Country of manufacture; d. Input supply voltage and frequency; e. Power consumption; f. Cable input and output terminal; g. Sockets for audio and video output.