

DRAFT

Minimum Technical Requirement and Specifications

For

Internet Protocol Television (IPTV) Set-Top Box

PAKISTAN ELECTRONIC MEDIA REGULATORY AUTHORITY
(PEMRA)

Minimum Technical Requirement and Specifications

IPTV Set-Top Box

Index Page

Sr. No.	Detail	Page No.
1	Abbreviations	iii
2	Scope	1
3	Compliance with International Standards	1
4	General Requirements	
	4.1 Performance Requirement	4
	4.2 Video and Audio Decoding Requirements	5
	4.3 Specification Requirement	6

1. Abbreviations

ACM	Adaptive Coding and Modulation
C/N	Carrier to Noise ratio
CBR	Constant bitrate
CVBS	Composite Video (analog video, e.g. PAL)
CA	Conditional Access
CABAC	Context-adaptive binary arithmetic coding
CVLC	Context-adaptive variable-length coding
DVB	Digital Video Broadcasting project
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
MPEG	Moving Pictures Experts Group
RF	Radio Frequency
RCA	Radio Corporation of America (connector cable for audio & video)
VBR	Variable bit rate
SNR	Signal to Noise Ratio
SPTS	Single Program Transport Stream
STB	Set Top Box
SD	Standard Definition
TR	Telecommunication Report
TS	Transport Stream

Minimum Technical Requirement and Specifications for

IPTV Set-Top Box (IPTV)

2. Scope

To define the minimum technical standards/specifications of IPTV Set top boxes under the provision of Section 39(2) (C) of the PEMRA Ordinance 2002 as amended by the PEMRA (Amendment) Act, 2007, which empowers the Authority to prescribe standards for the regulation of broadcast or distribution services and related equipment.

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. These technical standards shall apply to all Set top boxes connected to an IPTV system.

3. Compliance with the International standards:

ETSI TS 102 034 V1.5.1 (2014-05): Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks

ETSI TS 102 005 V1.4.1 (2010-03); Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in DVB services delivered directly over IP protocols

ETSI TS 102 542 V1.2.1: Guidelines for the implementation of DVB IP Phase 1 Specifications

ETSI TS 102472:” Digital Video Broadcasting (DVB); IP Data cast over DVBH: Content Delivery Protocols”

ETSI ETR 211: Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)

ETSI TS 102 539 V1.3.1 (2010-04): Carriage of broadband guide content information over IP

ETSI TS 102 824 V1.2.1 : "Digital Video Broadcasting (DVB); Remote Management and Firmware Update System For DVB IP Services"

ETSI TS 102 366 V1.2.1: “Digital Audio Compression (AC-3, Enhanced AC-3) Standard

ETSI TS 101 812 (V1.3.1): “Multimedia Home Platform (MHP) Specification 1.0.3”.

IEEE 802-1990: “IEEE Standards for Local and Metropolitan Area Networks”

IEEE 802.3-2000: “IEEE Standard for Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications”.

IETF RFC 768: “User Datagram Protocol”.

IETF RFC 791: ‘Internet Protocol’

IETF RFC 1042: ‘A Standard for the Transmission of IP Datagrams over IEEE 802 Networks.

IETF RFC 1213: “Management Information Base for Network Management of TCP/IP-based internets: MIB-II”.

IETF RFC 1305: “Network Time Protocol (Version 3) Specification, Implementation and Analysis”.

ETSI TS 101 154 (V1.7.1): “Digital Video Broadcasting (DVB); Implementation guidelines for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream ”.

SMPTE specification 2022-1: “Forward Error Correction for Real-time Video/Audio Transport Over IP Networks”.

SMPTE specification 2022-2: Unidirectional transport of constant bit rate MPEG-2 Transport Streams on IP Networks ”.

ETSI TS 102822-3-2 (V1.3.1): “Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV Anytime"); Part3:Metadata; Sub-part 2: System aspects in a uni directional environment ”

ETSI TS 102 366 (V1.2.1): “Digital Audio Compression (AC-3, Enhanced AC-3) Standard”

ISO/IEC 8859: Information Processing-8 bit Single Octet coded character set, Part 1 through 10.

ETSI EN 300 472; Digital Video Broadcasting (DVB); Specification for conveying ITU-R System B Teletext in DVB bit streams

ETSI EN 300 743: “Digital Video Broadcasting (DVB); subtitle systems “the user must be able to select /deselect subtitles & his choice to maintain across the channel change.

IEC 62481-1: Digital Living Network Alliance (DLNA) Home Networked Device Interoperability Guidelines - Part 1: Architecture and Protocols

ETS 300 801: Digital Video Broadcasting (DVB); Interaction channel through Public Switched Telecommunications Network (PSTN) / Integrated Services Digital Networks (ISDN)

EN 301 195 Return channel by GSM, DVB-RCG

ES 200 800 Return channel of cable TV distribution systems, DVB-RCC

ETSI TS 103 407: Cross Platform Authentication for limited input hybrid consumer equipment

ETSI TS 102 826 (DVB); DVB-IPTV Profiles for TS 102 034

ETSI TS 102 905 (DVB); Technical Specification for DVB Services in the Home Network Phase 1

ETSI EN 300 468 (DVB); Specification for Service Information (SI) in DVB systems

ETSI TS 102 822-3-1: Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 3: Metadata; Sub-part 1: Phase 1 - Metadata schemas

ETSI TS 102 542-1: (DVB); Guidelines for the implementation of DVB-IPTV Phase 1 specifications; Part 1: Core IPTV Functions

ETSI TS 102 542-2: (DVB); Guidelines for the implementation of DVB-IPTV Phase 1 specifications; Part 2: Broadband Content Guide (BCG) and Content on Demand

ETSI TS 102 542-3-1 (DVB); Guidelines for the implementation of DVB-IPTV Phase 1 specifications; Part 3: Error Recovery; Sub-part 1: Overview of DVB-IPTV Error Recovery

ETSI TS 102 542-3-2 (DVB); Guidelines for the implementation of DVB-IPTV Phase 1 specifications; Part 3: Error Recovery; Sub-part 2: Application Layer - Forward Error Correction (AL-FEC)

ETSI TS 102 542-3-3 (DVB); Guidelines for the implementation of DVB-IPTV Phase 1 specifications; Part 3: Error Recovery; Sub-part 3: Retransmission (RET)

ETSI TS 102 542-4 (DVB); Guidelines for the implementation of DVB-IPTV Phase 1 specifications; Part 4: Remote Management and Firmware Update

ETSI TS 102 542-5(DVB); Guidelines for the implementation of DVB-IPTV Phase 1 specifications; Part 5: Content Download Service (CDS)

IEEE 802.11 n Wi-Fi / WLAN standard

1. General Requirements:

4.1 Performance Requirements

- i. The STB shall support delivery of DVB MPEG-2 TS based services over bi-directional IP networks, both for Live Media Broadcast services (i.e. TV or radio styles) and Content on Demand services, as laid down in ETSI TS 102 034 V1.5.1 (2014-05)
- ii. The manufacturer shall ensure support for Remote Management and Firmware Update Services (RMS-FUS) for managed and unmanaged populations of DVB-IPTV Delivery Network Gateways (DNGs) and Home Network End Devices (HNEDs), as laid down in ETSI TS 102 824 V1.2.1.
- iii. The manufacturer shall ensure compatibility/interfaces of STBs with consumer electronic equipment, such as televisions, audio systems, VCRs, etc., in the country.
- iv. The complete protocol stack used for the delivery of the services mentioned in ETSI TS 102 034 V1.5.1 . The detailed description of the process of encapsulation of the MPEG-2 transport stream packets carrying Audio/video streams and service information (DVB SI), into RTP packets and their transport over the IP network is ETSI TS 542 V1.2.1. IPTV STB should conform to this complete protocol stack.
- v. The carriage of DVB-SI in transport streams is described in Clause 7.1.2 of S/NO. 1 of Annex I .As per this the following are applicable:
 - i. Carriage of PAT & PMT is mandatory on all transport streams.
 - ii. Option 1: Carriage of all DVB SI tables except NIT (TS-Full SI)
 - iii. Option 2: Carriage of tables other than PMT & PAT is optional (TS-Optional SI)
- vi. The STB should have the capability to decode MPEG -2 MP@ML SDTV and optionally MPEG-4 Part 10 AVC HP@L4 HDTV signals.
- vii. The STB should have the capability to decode one or more of the following formats: MPEG-1 Layer2, E-AC3 Stereo, MPEG-4 HE AAC Stereo, MPEG-1 Layer3. If any multi-channel audio is available, it should be transcoded and passed through to an S/PDIF if available.
- viii. DVB has defined a Service Discovery / Selection (SD&S) process in ETSI TS 102 366 V1.2.1. SD&S protocol for multicast services is transported in IP packets in accordance with the DVB STP protocol whereas for Unicast services SD&S info is transported in HTTP. Using this information the IPTV STB should build a list of service providers and the different services available from each service provider.
- ix. ETSI TS 102 539 V1.3.1 (2010-04) specifies the signalling and transport of TV – Anytime Meta data describing both Content on Demand as well as Live services delivered over an

always on bi-directional IP Networks. The capability to use this information to generate Broadband Content Guide should be an optional requirement for the IPTV STB.

- x. In a scenario where the Servers at the transmitting end has so many options, there has to be a means for the Server to find out the configurations and the capabilities of the receiving devices at the consumers premises before exercising those options. This is the function of the Remote Management System (RMS) and the Firmware Update Service (FUS) described in ETSI TS 102 824 V1.2.1.
- xi. The STB Software has to provide the information of the signal level and signal quality.
- xii. 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 5 seconds.
- xiii. The STB hardware design has to be provided with an Annualized Failure Rate (AFR) of not more than 2% over 3 years.
- xiv. 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.
- xv. The STB should support a smart card/cardless CAS solution.
- xvi. In the case of a cardless CAS, STBs should include a smartcard slot (minimal cost) as mitigation against risks of “clone” type piracy attacks and the replacement of devices.
- xvii. The Set-Top Box (STB) shall comply with ETSI EN 50221; Common Interface Specification for Conditional Access and other Digital Video Broadcasting Decoder Applications

4.2 Video and Audio Decoding Requirements:-

The STB’s video decoder shall fully comply with the ETSI TS 102 005; (DVB); Specification for the use of Video and Audio Coding in DVB services delivered directly over IP protocols for the use of MPEG-2 (SDTV) (bare minimum requirement) but also any other higher standard i.e. AVC (H.264 or MPEG-4 Part 10) and HEVC (H.265); (HDTV).

4.3 Specification Requirements

	Parameters	Requirements
1	Electrical specifications: a) Input voltage range b) Frequency	170-250V AC 50 Hz \pm 5 per cent
2	Processor: RAM memory Flash memory	800 MHz and above 500 MB and above 256 MB and above
3	Operating System	Android 4.0 (minimum) and above
4	Wireless LAN	Wi-Fi (IEEE 802.11n)
5	Graphics Resolution	Standard Definition (SD): 720X576 High Definition (HD): (Optional) 1920 x 1080p(30fps) or higher (1080p @ 60fps) with capability to down-convert to SD (720x576) 2D/3D graphics processing engine Standard Open GL ES 2.0/1.1/1.0 interface and Open VG 1.1 Picture in Picture and Picture in Graphics (Optional)
6	Aspect ratio	4:3; 16:9
7	TV standard	PAL
8	Video Codec	MPEG-2: MP@ML, MP@HL (ISO/IEC13818, part 2) (bare minimum) (H.264 AVC: MP@L4.1(ISO/IEC 14496, part 10) & H.265/HEVC (Optional) WMV-9 VC1 video, XviD; HD video support (Optional) CABAC and CAVLC support CBR and VBR support
9	Audio Codec	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) Dolby (AC-3) and Dolby Pass-through (optional)

10	Data	Teletext (DVB EN 300 472) Subtitles (DVB EN 300 743) SPTS/IP
11	Security	Integrated CA/Smart Card
12	Network Protocols	TCP/IP, ICMP, UDP, IGMP V2/V3, HTTP and FTP Protocols for terminal access: Static IP, PPPoE and DHCP, Streaming media transport: RTP and RTCP, Streaming media play: HLS, RTP and RTSP
13	Browser Standards	HTML 4.0/HTML 5, Java Script 1.5, Dynamic HTML and XHTML 1.0, DOM level 2.0, SSL 3.0(128 bit encryption for secured transactions), HTTP 1.1, CSS level 2, XML, JVM (CLDC 1.1 & MIDP 2.0), Flash 5.0 and support for Audio/Video plug-in
14	Parental Control/Lock	Basic feature for controlling viewers
15	Electronic Program guide (EPG)	On screen electronic guide
16	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
17	Interfaces Ethernet Port Video Output Port Audio Output Port USB Port Miscellaneous Connectors Power input Keyboard	 1 x 10/100 Mbps Ethernet RJ45 1 x HDMI V1.3a to V2.0 1 x RCA for CVBS 2 x RCA for Audio L/R 5.1 Dolby Digital Optical Output, 1 x S/P DIF optical 2 x USB 2.0 Port Mic Input 3.5 mm Slot Mini-jack 1x DC power input port Infrared Keyboard (optional)
18	Remote Control	IR Remote Control, Dual Mode (TV & STB) optional
19	Operating temperature range	0°C to 45°C
20	Operating humidity range	5% to 95% (non-condensing)
21	Languages of operation	English and Urdu (optional)
22	User Manual	English and Urdu (both)

23	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.
24	Warranty	1 year