

THE UNITED REPUBLIC OF TANZANIA  
**TANZANIA COMMUNICATIONS REGULATORY AUTHORITY**  
**ISO 9001:2008 CERTIFIED**



**PUBLIC NOTICE**

**Minimum Technical Requirements and Specifications for Satellite (DVB-S2), Cable (DVB-C, DVB-C2), Terrestrial (DVB-T, DVB-T2), Internet Protocol Television (IPTV) Set Top Boxes (STBs) and Integrated Digital Television Receivers**

The Tanzania Communications Regulatory Authority (TCRA), established under the Tanzania Communications Regulatory Authority Act No.12 of 2003, is mandated among other duties, to license communications and broadcasting operators and type approve communication equipment for use in the United Republic of Tanzania pursuant to Section 82 of the Electronic and Postal Communications Act, No.3 of 2010 hereby stipulating as follows:-

1. The Authority shall be responsible for the establishment and publication of technical standards relating to all regulated services in the United Republic of Tanzania.
2. In establishing such standards, the Authority shall-
  - (a) Where appropriate, seek submissions from other interested parties, in particular those persons likely to be most affected by the publication of such standards; and
  - (b) Participate in standardization activities and take due account of any relevant standards prescribed by international organizations to which the United Republic belongs, such as the International Telecommunications Union and other sub-regional groupings."

Furthermore, pursuant to Section 4(1) (a) of the Electronic and Postal Communications (Digital and Other Broadcasting networks) Regulation 2011 which empowers the Authority to determine standards for broadcasting networks in the country and Section 10 (2) of the Electronic and Postal Communications (Digital and Other Broadcasting Networks)

Regulation 2011 which empowers the Authority, from time to time review standards as provided under the Regulations.

The Authority therefore wishes to notify all importers of Digital Terrestrial (DTT), Satellite (DTH), Cable Television receivers, Multiplex Operators, Content Services Providers and the general public that, the minimum technical requirements and specifications for Terrestrial (DVB-T, DVB-T2), Satellite (DVB-S2), Cable (DVB-C, DVB-C2) digital set top boxes (STBs), Internet Protocol Set Top Boxes (IPTV) and integrated digital television receivers have been revised on grounds of technology advancement and obsolescence of old standards for use with DTT, DTH and Cable networks.

Standards are guidelines for equipment manufacturers and/or suppliers aimed at adhering to quality product in the Tanzania.

**The composed minimum technical requirements and specifications for DVB-S2, DVB-C (To be valid until when DVB-C2 is matured in the market), DVB-C2, DVB-T (To be valid until when DVB-T2 is matured in the market), DVB-T2, IPTV Set-Top-Boxes and Integrated Digital Television Receivers shall be as presented in the Tables herein below:**

## 1.0 DVB-S2 MINIMUM TECHNICAL REQUIREMENTS AND SPECIFICATIONS

<b>A: SET TOP BOX (STB) MINIMUM TECHNICAL SPECIFICATIONS</b>		
<b>S/N</b>	<b>A. STB BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication(green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania

<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual	User manual for Understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	Marking: Each STB shall be legibly and indelibly marked with at least the following information:  a) Manufacturer's name or trade-mark (if any); b) Mode designation and serial No.' c) Country of manufacture; d) Input supply voltage and frequency; e) Power consumption; f) Satellite input and output terminals; and g) Sockets for audio and video output.	Basic marks to enable the subscriber to have first-hand information

**B: DVB-S2 SHALL HAVE THE FOLLOWING MINIMUM TECHNICAL SPECIFICATIONS**

<b>1.0</b>	<b>RF tuner &amp; DVB-S2 Channel</b>	Input impedance	75Ω
		Modulation	Single Carrier QPSK with multiple streams
		Modulation schemes	QPSK, 8PSK, 16APSK, 32APSK
		Frequency	950-2150 MHz
		Input signal level	-25 dBm to -65 dBm
		FEC coding	LDPC + BCH 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
		C/N range	-2.0 dB (QPSK) to +16 dB (32APSK)
		Signal Bandwidth	Depends on the transponder
		Interleaving	Bit-Interleaving
		Symbol rate	2~45Msps
		Rotated constellations	2 bit/s/Hz to 5 bit/s/Hz, optimized for operation over non-linear transponders.
		Transport stream	MPEG-2 and MPEG-4 ISO/IEC13818-1

<b>2.0</b>	<b>MPEG Transport stream video and Audio Decoding</b>	Video decoding	MPEG-2/MPEG4 AVC(H.264)
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) - standard definition, 1920X1080 (High definition)
		Audio decoding	MPEG-2 , MPEG-4
		Audio mode	stereo
<b>3.0</b>	<b>Scanning function</b>	The STB should include a frequency scanning function to detect the availability of DVB-S2 signals	
		Be capable of programme memory in case of cut off	
		It should be able to display the number of channel currently being scanned	
		It should be able to display number of services located	
		The decoder shall display details of its name, network ID, signal strength and quality	
<b>4.0</b>	<b>Software</b>	<b>EPG:</b> current and next programme information, 24x7 days schedule	
		Auto/manual tuning	
		24-hourclock	
		<b>OTA:</b> STB software's, EPG, CA features must be upgradable over the air	
		Support receive mail	
		Provides the instant and personalized message prompt including the following:-	
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> <li>• Support multi-language info</li> <li>• Able to display current software and hardware version stored in the decoders</li> <li>• Able to indicate whether an updates are available or not</li> <li>• Able to indicate the unique serial number and state of the STB decoder (error code)</li> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>	
<b>5.0</b>	<b>Interfaces</b>	RF input connector: female connector, input impedance 75 ohms	
		One RCA (CINCH) female connector for video output and two RCA (CINCH) female connectors for stereo sound output	
		RF output: female connector	
		LNB control: STB shall have provisions to provide proper power supply and switching signal for oscillator selection and polarization selection for LNB	
<b>6.0</b>	<b>Interfaces for</b>	STB must include at least one embedded smartcard reader or	

	<b>Conditional Access</b>	a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>7.0</b>	<b>Physical attributes</b>	Power supply AC 220±10%, 50±1Hz
<b>8.0</b>	<b>Environmental attributes</b>	Operating Temperature 0~45°C Operating humidity Up to 90%
<b>9.0</b>	<b>Reliability</b>	MTBF >80,000Hrs

## 2.0 DVB-C MINIMUM TECHNICAL SPECIFICATIONS

<b>A: SET TOP BOX (STB) MINIMUM TECHNICAL SPECIFICATIONS</b>		
<b>S/N</b>	<b>A. STB BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication(green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual.	User manual for understanding the operation of the equipment as well as troubleshooting simple

		problems (English and Swahili languages)
<b>12.0</b>	<p>Marking: Each STB shall be legibly and indelibly marked with at least the following information:</p> <p>a) Manufacturer's name or trade-mark (if any);  b) Mode designation and serial No.'  c) Country of manufacture;  d) Input supply voltage and frequency;  e) Power consumption;  f) Cable input and output terminals; and  g) Sockets for audio and video output.</p>	Basic marks to enable the subscriber to have first-hand information

**B: DVB-C SHALL HAVE THE FOLLOWING MINIMUM TECHNICAL SPECIFICATIONS**

<b>1.0</b>	<b>RF tuner &amp; DVB-C Channel</b>	Input impedance	75Ω
		Modulation	Single Carrier QAM
		Modes	Constant Coding & Modulation
		Modulation schemes	16- to 256-QAM
		Frequency	6 and 8 MHz
		Input signal level	-40 to -60 dBm
		FEC coding	Reed Solomon (RS)
		C/N range	31 dB Min. for 64 QAM
		Signal Bandwidth	47 MHz – 862 MHz
		Interleaving	Bit Interleaving
		Channel raster	6 or 8 MHz
		Constellations	16 QAM, 64 QAM and 256 QAM
		Max Bit Rates (8MHz)	83.1 Mbit/s
<b>2.0</b>	<b>MPEG Transport stream and video and Audio Decoding</b>	Transport stream	MPEG-2/ISO/IEC13818-1
		Video decoding	MPEG-2
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) - standard definition
		Audio decoding	MPEG-2
		Audio mode	stereo
		The STB should include a frequency scanning function to detect the availability of DVB-C signals	
		Be capable of programme memory in case of cut off	

<b>3.0</b>	<b>Scanning function</b>	It should be able to display the number of channel currently being scanned
		It should be able to display number of services located
		The decoder shall display details of its name, network ID, signal strength and quality
<b>4.0</b>	<b>Software</b>	<b>EPG:</b> current and next programme information, 24x7days schedule
		Auto/manual tuning
		24-hourclock
		<b>OTA:</b> STB software's, EPG, CA features must be upgradable over the air
		Support Receive mail
		Provides the instant and personalized message prompt including the following:-
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> <li>• Support multi-language info</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to display current software and hardware version stored in the decoders</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate whether an updates are available or not</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate the unique serial number and state of the STB decoder (error code)</li> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>
<b>5.0</b>	<b>Interfaces</b>	Input interfaces: Multiple Transport Stream and Generic Stream Encapsulation (GSE)
		RF input/output 75 ohms impedance, female connector
		Output video 1 x RCA(cinch) type; Output audio (L and R) 2 x RCA (cinch) type
<b>6.0</b>	<b>Interfaces for Conditional Access</b>	STB must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>7.0</b>	<b>Physical attributes</b>	Power supply AC 220±10%, 50±1Hz
<b>8.0</b>	<b>Environmental attributes</b>	Operating Temperature 0~45°C
		Operating humidity Up to 90%
<b>9.0</b>	<b>Reliability</b>	MTBF >80,000Hrs

***NB: THE ABOVE DVB-C SPECIFICATIONS WILL BE VALID UNTIL WHEN DVB-C2 IS MATURED IN THE MARKET***

### 3.0 DVB-C2 MINIMUM TECHNICAL REQUIREMENTS AND SPECIFICATIONS

<b>A: SET TOP BOX (STB) MINIMUM TECHNICAL SPECIFICATIONS</b>		
<b>S/N</b>	<b>A. STB BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication (green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual.	User manual for understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	Marking: Each STB shall be legibly and indelibly marked with at least the following information:  a) Manufacturer's name or trade-mark (if any); b) Mode designation and serial No.' c) Country of manufacture; d) Input supply voltage and frequency; e) Power consumption; f) Cable input and output terminals; and g) Sockets for audio and video output.	Basic marks to enable the subscriber to have first-hand information



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**B: DVB-C2 SHALL HAVE THE FOLLOWING MINIMUM TECHNICAL SPECIFICATIONS**

<b>1.0</b>	<b>RF tuner &amp; DVB-C2 Channel</b>	Input impedance	75Ω
		Modulation	OFDM
		Modes	Variable Coding & Modulation and Adaptive Coding & Modulation
		Modulation schemes	16- to 4096-QAM
		Frequency	Flexible, 8 MHz or several hundred MHz
		Service specific robustness	Single and multiple PLP (physical layer pipes)
		Input signal level	-31 to -65 dBm
		FEC coding	LDPC + BCH 1/2, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
		C/N range	-2.0 dB (QPSK) to +16 dB (32APSK)
		Inverse Fast Fourier transform (IFFT) size	4k
		Signal Bandwidth	47 MHz – 862 MHz
		Guard Intervals	1/64 or 1/128
		Interleaving	Bit, Time and Frequency Interleaving
		Channel raster	6 or 8 MHz
		Constellations	5 constellations, ranging in spectrum efficiency from 1 to 10.8 bit/s/Hz, optimized for operation in cable networks
		Pilots Pattern	Scattered and Continual Pilots
Max Bit Rates (8MHz)	83.1 Mbit/s		
<b>2.0</b>	<b>MPEG Transport stream and video and Audio Decoding</b>	Transport stream	MPEG-2 and MPEG-4 ISO/IEC13818-1
		Video decoding	MPEG-2/MPEG4 AVC (H.264)
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) -standard definition, 1920X1080 (High definition)
		Audio decoding	MPEG-2 , MPEG-4
		Audio mode	stereo
<b>3.0</b>	<b>Scanning function</b>	The STB should include a frequency scanning function to detect the availability of DVB-C2 signals	
		Be capable of programme memory in case of cut off	
		It should be able to display the number of channel currently being scanned	

		It should be able to display number of services located The decoder shall display details of its name, network ID, signal strength and quality
<b>4.0</b>	<b>Software</b>	<b>EPG:</b> current and next programme information, 24x7days schedule
		Auto/manual tuning
		24-hourclock
		<b>OTA:</b> STB software's, EPG, CA features must be upgradable over the air
		Support Receive mail
		Provides the instant and personalized message prompt including the following:-
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> <li>• Support multi-language info</li> <li>• Able to display current software and hardware version stored in the decoders</li> <li>• Able to indicate whether an updates are available or not</li> <li>• Able to indicate the unique serial number and state of the STB decoder (error code)</li> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>
<b>5.0</b>	<b>Interfaces</b>	Input interfaces: Multiple Transport Stream and Generic Stream Encapsulation (GSE)
		RF input/output 75 ohms impedance, female connector
		Output video 1 x RCA(cinch) type; Output audio (L and R) 2 x RCA (cinch) type
<b>6.0</b>	<b>Interfaces for Conditional Access</b>	STB must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>7.0</b>	<b>Physical attributes</b>	Power supply AC 220±10%, 50±1Hz
<b>8.0</b>	<b>Environmental attributes</b>	Operating Temperature 0~45°C
		Operating humidity Up to 90%
<b>9.0</b>	<b>Reliability</b>	MTBF >80,000Hrs

## 4.0 DVB-T MINIMUM TECHNICAL SPECIFICATIONS

<b>A: SET TOP BOX (STB) MINIMUM TECHNICAL SPECIFICATIONS</b>		
<b>S/N</b>	<b>A. STB BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication (green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual.	User manual for Understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	Marking: Each STB shall be legibly and indelibly marked with at least the following information:  a) Manufacturer's name or trade-mark (if any); b) Mode designation and serial No.' c) Country of manufacture; d) Input supply voltage and frequency; e) Power consumption; f) RF input and output terminals; and g) Sockets for audio and video output.	Basic marks to enable the subscriber to have first-hand information

**B: DVB-T SHALL HAVE FOLLOWING MINIMUM TECHNICAL SPECIFICATIONS**

<b>1.0</b>	<b>RF tuner &amp; DVB-T Channel</b>	Input impedance	75Ω
		Modulation	COFDM: QPSK, 16QAM, 64QAM
		Frequency	VHF (174-230MHz) - optional, UHF (470–862 MHz)
		Input signal level	-33dBm to -81dBm
		FEC coding	Convolutional Coding + Reed Solomon 1/2, 2/3, 3/4, 5/6, 7/8
		FTT Size	2k, 8k
		C/N range	3dB (QPSK) to 7dB (64QAM)
		Guard intervals	1/4, 1/8, 1/16, 1/32
		Channel raster (width)	7MHz (VHF), 8MHz (UHF)
		Signal Bandwidth	7.61 MHz in the 8 MHz channel; 6.66 MHz in the 7 MHz channel
		Interleaving	Bit+ Frequency
		Max Bit Rates (8MHz)	32 Mbit/s
		Used Bit Rates (8MHz)	5 to 32 Mbit/s
<b>2.0</b>	<b>MPEG Transport stream video and Audio Decoding</b>	Transport stream	MPEG-2 ISO/IEC13818
		Video decoding	MPEG-2/MPEG4AVC
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) - standard definition, 1920X1080 (High definition)
		Audio decoding	MPEG-2 MUSICAM Layer I&II/HEAAC
		Audio mode	Single track/dual track/stereo
		Audio sampling rate	32KHz, 44.1KHz, 48KHz., 96KHz (optional)
<b>3.0</b>	<b>Scanning function</b>	The STB should include a frequency scanning function to detect the availability of DVB-T signals	
		It should also automatically list the content of the terrestrial bouquet by reading the PSI/SI streams and	
		Be capable of programme memory in case of cut off	
		It should be able to display the number of channel currently being scanned	
		It should be able to display number of services located	
		Where the multiplex is seized, the decoder shall display details of its name, network ID, signal strength and quality	

<b>4.0</b>	<b>Software</b>	<b>EPG:</b> current and next programme information. 24x7days schedule.
		Auto/manual tuning
		24-hourclock
		<b>OTA:</b> STB software's, EPG, CA features must be upgradable over the air. (USB Upgrade-optional)
		Support receive mail
		Provides the instant and personalized message prompt including the following:-
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> </ul>
		<ul style="list-style-type: none"> <li>• Support multi-language info</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to display current software and hardware version stored in the decoders</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate whether an updates are available or not</li> </ul>
<ul style="list-style-type: none"> <li>• Able to indicate the unique serial number and state of the STB decoder (error code)</li> </ul>		
<ul style="list-style-type: none"> <li>• Able to indicate the received multiplex with indications of signal strength and bit errors rates based on the received PLP</li> </ul>		
<ul style="list-style-type: none"> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>		
<b>5.0</b>	<b>Additional Hardware</b>	PVR (optional)
<b>6.0</b>	<b>Teletext &amp;Teletext subtitle</b>	It is able to display Teletext using the OSD and/or by the insertion of the Teletext data in the VBI of the analogue CVBS Video Output
<b>7.0</b>	<b>Interfaces</b>	RF input connector: IEC169-2 female, input impedance 75 ohms
		One RCA (CINCH) female connector for video output and two RCA (CINCH) female connectors for stereo sound output
		RF bypass (loop) IEC169-2 male
		RF output via a PAL-G modulator
		SCART interface (optional)
		HDMI interface (optional)
		Should include at least one RF cable to connect the unit with its associated analogue television receiver
<b>8.0</b>	<b>Interfaces for Conditional Access</b>	STB must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version

<b>9.0</b>	<b>Physical attributes</b>	Power supply: AC 220±10%, 50±1Hz Power: Energy star(option)
<b>10.0</b>	<b>Environmental attributes</b>	Operating Temperature: 0~45°C Operating humidity: Up to 90%
<b>11.0</b>	<b>Reliability</b>	MTBF: >80,000Hrs

***NB: THE ABOVE DVB-T SPECIFICATIONS WILL BE VALID UNTIL WHEN DVB-T2 IS MATURED IN THE MARKET***

## **5.0 DVB-T2 MINIMUM TECHNICAL SPECIFICATIONS**

<b>A: SET TOP BOX (STB) MINIMUM TECHNICAL SPECIFICATIONS</b>		
<b>S/N</b>	<b>A. STB BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication(green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual.	User manual for Understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	Marking: Each STB shall be legibly and indelibly marked with at least the following information:	Basic marks to enable the subscriber to have first-hand information

	a) Manufacturer's name or trade-mark (if any); b) Mode designation and serial No.' c) Country of manufacture; d) Input supply voltage and frequency; e) Power consumption; f) RF input and output terminals; and g) Sockets for audio and video output.	
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**B:DVB-T2 SHALL HAVE FOLLOWING MINIMUM TECHNICAL SPECIFICATIONS**

<b>1.0</b>	<b>RF tuner &amp; DVB-T2 Channel</b>	Input impedance	75Ω
		Modulation	COFDM:QPSK, 16QAM, 64QAM, 256QAM
		Frequency	VHF(174-230MHz)-optional, UHF(470-700MHz)
		Input signal level	-35dBm to -85dBm
		FEC coding	LDPC Code+ BCH Code, Code rates :1/2, 3/5, 2/3, 3/4, 4/5, 5/6
		FTT Size	1K, 2K, 4K, 8K, 16K, 32K
		C/N range (Rice channel)	3dB (QPSK1/2) to 24dB (256QAM5/6)
		Pilot Pattern	PP1 to PP8
		Guard intervals	1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256
		Channel raster	7MHz (VHF),8MHz(UHF), 1.7MHz (VHF)-optional
		Signal Bandwidth	8MHz corresponds to 7.61 MHz in the normal carrier mode, 7.71 MHz for 8k, while 7.777 MHz for 16k and 32k
		Service specific robustness	Physical Layer Pipes (PLP)
		Interleaving	Bit+ Cell + Time + Frequency
		Diversity	SISI, MISO, (SIMO, MIMI if diversity receiver)
		Rotated constellations	Significant robustness gain in channels with severe degradations (multipath, SFN operation, narrow band interference...)
		Mode of Extensions	Future Extension Frame(FEF)
		Max Bit Rates (8MHz)	50.3Mbit/s,(32Ke,256QAM,CR=5/6,GI=1/28,PP7)
Used Bit Rates (8MHz)	Portable SFN:25.0Mbit/s, Fixed SFN:37.0Mbit/s, Fixed MFN:40.2Mbit/s		
GE06	Signal is under the mask of DVB-T2		

		compatible	(power level measured in a 4KHz bandwidth)
<b>2.0</b>	<b>MPEG Transport stream video and Audio Decoding</b>	Transport stream	MPEG-2ISO/IEC13818
		Video decoding	MPEG-2/MPEG4AVC (H.264)
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) - standard definition, 1920X1080 (High definition)
		Audio decoding	MPEG-2 MUSICAM Layer I&II/HEAAC
		Audio mode	Single track/dual track/stereo
		Audio sampling rate	32KHz, 44.1KHz, 48KHz, 96KHz (optional)
<b>3.0</b>	<b>Scanning function</b>	The STB should include a frequency scanning function to detect the availability of DVB-T signals	
		It should also automatically list the content of the terrestrial bouquet by reading the PSI/SI streams and	
		Be capable of programme memory in case of cut off	
		It should be able to display the number of channel currently being scanned	
		It should be able to display number of services located	
		Where the multiplex is seized, the decoder shall display details of its name, network ID, signal strength and quality	
<b>4.0</b>	<b>Software</b>	<b>EPG:</b> current and next programme information, 24x7days schedule	
		Auto/manual tuning	
		24-hourclock	
		<b>OTA:</b> STB software's, EPG, CA features must be upgradable over the air. (USB Upgrade-optional)	
		Support receive mail	
		Provides the instant and personalized message prompt including the following:-	
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> </ul>	
		<ul style="list-style-type: none"> <li>• Support multi-language info</li> </ul>	
		<ul style="list-style-type: none"> <li>• Able to display current software and hardware version stored in the decoders</li> </ul>	
		<ul style="list-style-type: none"> <li>• Able to indicate whether an updates are available or not</li> </ul>	
<ul style="list-style-type: none"> <li>• Able to indicate the unique serial number and state of the STB decoder (error code)</li> </ul>			
<ul style="list-style-type: none"> <li>• Able to indicate the received multiplex with indications of signal strength and bit errors rates</li> </ul>			



		based on the received PLP
		<ul style="list-style-type: none"> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>
<b>5.0</b>	<b>Additional Hardware</b>	PVR (optional)
<b>6.0</b>	<b>Teletext &amp; Teletext subtitle</b>	It is able to display Teletext using the OSD and/or by the insertion of the Teletext data in the VBI of the analogue CVBS Video Output
<b>7.0</b>	<b>Interfaces</b>	RF input connector: IEC169-2 female, input impedance 75 ohms
		One RCA (CINCH) female connector for video output and two RCA (CINCH) female connectors for stereo sound output
		RF bypass (loop) IEC169-2 male
		RF output via a PAL-G modulator
		SCART interface (optional)
		HDMI interface (optional)
		Should include at least one RF cable to connect the unit with its associated analogue television receiver
<b>8.0</b>	<b>Interfaces for Conditional Access</b>	STB must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>9.0</b>	<b>Physical attributes</b>	Power supply: AC 220±10%, 50±1Hz Power: Energy star(option)
<b>10.0</b>	<b>Environmental attributes</b>	Operating Temperature: 0~45°C Operating humidity: Up to 90%
<b>11.0</b>	<b>Reliability</b>	MTBF: >80,000Hrs

## **6.0 MINIMUM TECHNICAL SPECIFICATIONS FOR INTEGRATED DIGITAL TERRESTRIAL, SATELLITE AND CABLE TELEVISION (IDTV)**

### **1. SCOPE**

This specification describes a baseline profile, based on open specifications for Standard (SD) and High Definition (HD) integrated Digital Television (IDTV) receivers for the reception of digital terrestrial, satellite and cable television signals. This profile is based predominantly on Digital Video Broadcasting (DVB) specifications.

### **2. REFERENCES**

The Standards listed in Annex I contains provisions which, through reference in this text, constitute provisions of this specifications. All specifications are subject to revision.

### 3. REQUIREMENTS

The IDTV shall comply to the following:-

- i. Terrestrial, satellite and cable services. IDTV receivers shall fully comply with detailed specifications in Table I.
- ii. The manufacturer shall ensure compatibility/interfaces with Consumer Electronic equipment such as Audio and Video systems in the country.

**TABLE I**

<b>A: INTEGRATED DIGITAL TELEVISION – SATELLITE (DVB-S2) MINIMUM TECHNICAL SPECIFICATIONS</b>		
<b>S/N</b>	<b>I. BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication(green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner’s Manual	User manual for Understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	Marking: Each iDTV shall be legibly and indelibly marked with at least the following information:	Basic marks to enable the subscriber to have first-hand information

	a) Manufacturer's name or trade-mark (if any); b) Mode designation and serial No.' c) Country of manufacture; d) Input supply voltage and frequency; e) Power consumption; f) Satellite input and output terminals; and g) Sockets for audio and video output.	
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**II: MINIMUM TECHNICAL SPECIFICATIONS**

<b>1.0</b>	<b>RF tuner &amp; DVB-S2 Channel</b>	Input impedance	75Ω
		Modulation	Single Carrier QPSK with multiple streams
		Modulation schemes	QPSK, 8PSK, 16APSK,32APSK
		Frequency	950-2150 MHz
		Input signal level	-25 dBm to -65 dBm
		FEC coding	LDPC + BCH 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
		C/N range	-2.0 dB (QPSK) to +16 dB (32APSK)
		Signal Bandwidth	Depends on the transponder
		Interleaving	Bit-Interleaving
		Symbol rate	2~45Msps
		Rotated constellations	2 bit/s/Hz to 5 bit/s/Hz, optimized for operation over non-linear transponders.
<b>2.0</b>	<b>MPEG Transport stream video and Audio Decoding</b>	Transport stream	MPEG-2 and MPEG-4 ISO/IEC13818-1
		Video decoding	MPEG-2/MPEG4 AVC(H.264)
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) - standard definition, 1920X1080 (High definition)
		Audio decoding	MPEG-2 , MPEG-4
		Audio mode	stereo
		The IDTV should include a frequency scanning function to detect the availability of DVB-S2 signals	

<b>3.0</b>	<b>Scanning function</b>	Be capable of programme memory in case of cut off
		It should be able to display the number of channel currently being scanned
		It should be able to display number of services located
		The receiver shall display details of its name, network ID, signal strength and quality
<b>4.0</b>	<b>Software</b>	<b>EPG:</b> current and next programme information, 24x7 days schedule
		Auto/manual tuning
		24-hourclock
		<b>OTA:</b> IDTV software's, EPG, CA features must be upgradable over the air
		Support receives mail. Provides the instant and personalized message prompt including the following:-
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> </ul>
		<ul style="list-style-type: none"> <li>• Support multi-language info</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to display current software and hardware version stored in the receivers</li> </ul>
<ul style="list-style-type: none"> <li>• Able to indicate whether an updates are available or not</li> </ul>		
<ul style="list-style-type: none"> <li>• Able to indicate the unique serial number and state of the IDTV receiver (error code)</li> </ul>		
<ul style="list-style-type: none"> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>		
<b>5.0</b>	<b>Interfaces</b>	RF input connector: female connector, input impedance 75 ohms
		One RCA (CINCH) female connector for video output and two RCA (CINCH) female connectors for stereo sound output
		RF output: female connector
		LNB control: IDTV shall have provisions to provide proper power supply and switching signal for oscillator selection and polarization selection for LNB
<b>6.0</b>	<b>Interfaces for Conditional Access</b>	IDTV must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>7.0</b>	<b>Physical attributes</b>	Power supply AC 220±10%, 50±1Hz
<b>8.0</b>	<b>Environmental attributes</b>	Operating Temperature 0~45°C
		Operating humidity Up to 90%
<b>9.0</b>	<b>Reliability</b>	MTBF >80,000Hrs

**BI: INTEGRATED DIGITAL TELEVISION – CABLE (DVB-C) MINIMUM TECHNICAL**

## SPECIFICATIONS

<b>S/N</b>	<b>I. BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication (green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual.	User manual for understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	Marking: Each IDTV shall be legibly and indelibly marked with at least the following information:  a) Manufacturer's name or trade-mark (if any); b) Mode designation and serial No.; c) Country of manufacture; d) Input supply voltage and frequency; e) Power consumption; f) Cable input and output terminals; and g) Sockets for audio and video output.	Basic marks to enable the subscriber to have first-hand information
<b>II: MINIMUM TECHNICAL SPECIFICATIONS</b>		
	Input impedance	75Ω
	Modulation	Single Carrier QAM

<b>1.0</b>	<b>RF tuner &amp; DVB-C Channel</b>	Modes	Constant Coding & Modulation
		Modulation schemes	16- to 256-QAM
		Frequency	6 and 8 MHz
		Input signal level	-40 to -60 dBm
		FEC coding	Reed Solomon (RS)
		C/N range	31 dB Min. for 64 QAM
		Signal Bandwidth	47 MHz – 862 MHz
		Interleaving	Bit Interleaving
		Channel raster	6 or 8 MHz
		Constellations	16 QAM, 64 QAM and 256 QAM
		Max Bit Rates (8MHz)	83.1 Mbit/s
<b>2.0</b>	<b>MPEG Transport stream and video and Audio Decoding</b>	Transport stream	MPEG-2/ISO/IEC13818-1
		Video decoding	MPEG-2
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) - standard definition
		Audio decoding	MPEG-2
		Audio mode	stereo
<b>3.0</b>	<b>Scanning function</b>	The IDTV should include a frequency scanning function to detect the availability of DVB-C signals	
		Be capable of programme memory in case of cut off	
		It should be able to display the number of channel currently being scanned	
		It should be able to display number of services located	
		The receiver shall display details of its name, network ID, signal strength and quality	
<b>4.0</b>	<b>Software</b>	<b>EPG:</b> current and next programme information, 24x7days schedule	
		Auto/manual tuning	
		24-hourclock	
		<b>OTA:</b> IDTV software's, EPG, CA features must be upgradable over the air	
		Support Receive mail	
		Provides the instant and personalized message prompt including	

		the following:-
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> </ul>
		<ul style="list-style-type: none"> <li>• Support multi-language info</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to display current software and hardware version stored in the receivers</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate whether an updates are available or not</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate the unique serial number and state of the IDTV receiver (error code)</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>
<b>5.0</b>	<b>Interfaces</b>	Input interfaces: Multiple Transport Stream and Generic Stream Encapsulation (GSE) RF input/output 75 ohms impedance, female connector Output video 1 x RCA(cinch) type; Output audio (L and R) 2 x RCA (cinch) type
<b>6.0</b>	<b>Interfaces for Conditional Access</b>	IDTV must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>7.0</b>	<b>Physical attributes</b>	Power supply AC 220±10%, 50±1Hz
<b>8.0</b>	<b>Environmental attributes</b>	Operating Temperature 0~45°C Operating humidity Up to 90%
<b>9.0</b>	<b>Reliability</b>	MTBF >80,000Hrs

### **C: INTEGRATED DIGITAL TELEVISION – CABLE (DVB-C2) MINIMUM TECHNICAL SPECIFICATIONS**

<b>S/N</b>	<b>I. BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication(green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians

<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual.	User manual for understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	Marking: Each IDTV shall be legibly and indelibly marked with at least the following information:  a) Manufacturer's name or trade-mark (if any); b) Mode designation and serial No.' c) Country of manufacture; d) Input supply voltage and frequency; e) Power consumption; f) Cable input and output terminals; and g) Sockets for audio and video output.	Basic marks to enable the subscriber to have first-hand information

## II: MINIMUM TECHNICAL SPECIFICATIONS

<b>1.0</b>	<b>RF tuner &amp; DVB-C2 Channel</b>	Input impedance	75Ω
		Modulation	OFDM
		Modes	Variable Coding & Modulation and Adaptive Coding & Modulation
		Modulation schemes	16- to 4096-QAM
		Frequency	Flexible, 8 MHz or several hundred MHz
		Service specific robustness	Single and multiple PLP (physical layer pipes)
		Input signal level	-31 to -65 dBm
		FEC coding	LDPC + BCH 1/2, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
		C/N range	-2.0 dB (QPSK) to +16 dB (32APSK)
		Inverse Fast Fourier transform (IFFT) size	4k



		Signal Bandwidth	47 MHz – 862 MHz
		Guard Intervals	1/64 or 1/128
		Interleaving	Bit, Time and Frequency Interleaving
		Channel raster	6 or 8 MHz
		Constellations	5 constellations, ranging in spectrum efficiency from 1 to 10.8 bit/s/Hz, optimized for operation in cable networks
		Pilots Pattern	Scattered and Continual Pilots
		Max Bit Rates (8MHz)	83.1 Mbit/s
<b>2.0</b>	<b>MPEG Transport stream and video and Audio Decoding</b>	Transport stream	MPEG-2 and MPEG-4 ISO/IEC13818-1
		Video decoding	MPEG-2/MPEG4 AVC (H.264)
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) -standard definition, 1920X1080 (High definition)
		Audio decoding	MPEG-2 , MPEG-4
		Audio mode	stereo
<b>3.0</b>	<b>Scanning function</b>	The IDTV should include a frequency scanning function to detect the availability of DVB-C2 signals	
		Be capable of programme memory in case of cut off	
		It should be able to display the number of channel currently being scanned	
		It should be able to display number of services located	
		The receiver shall display details of its name, network ID, signal strength and quality	
<b>4.0</b>	<b>Software</b>	<b>EPG:</b> current and next programme information, 24x7days schedule	
		Auto/manual tuning	
		24-hourclock	
		<b>OTA:</b> IDTV software's, EPG, CA features must be upgradable over the air	
		Support Receive mail	
		Provides the instant and personalized message prompt including the following:-	
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> <li>• Support multi-language info</li> </ul>	

		<ul style="list-style-type: none"> <li>• Able to display current software and hardware version stored in the receivers</li> <li>• Able to indicate whether an updates are available or not</li> <li>• Able to indicate the unique serial number and state of the IDTV receiver (error code)</li> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>
<b>5.0</b>	<b>Interfaces</b>	Input interfaces: Multiple Transport Stream and Generic Stream Encapsulation (GSE) RF input/output 75 ohms impedance, female connector Output video 1 x RCA(cinch) type; Output audio (L and R) 2 x RCA (cinch) type
<b>6.0</b>	<b>Interfaces for Conditional Access</b>	IDTV must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>7.0</b>	<b>Physical attributes</b>	Power supply AC 220±10%, 50±1Hz
<b>8.0</b>	<b>Environmental attributes</b>	Operating Temperature 0~45°C Operating humidity Up to 90%
<b>9.0</b>	<b>Reliability</b>	MTBF >80,000Hrs

#### D: INTEGRATED DIGITAL TELEVISION – TERESTRIAL (DVB-T) MINIMUM TECHNICAL SPECIFICATIONS

<b>S/N</b>	<b>I. BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication(green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>4.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice

<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual.	User manual for Understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	<p>Marking: Each IDTV shall be legibly and indelibly marked with at least the following information:</p> <p>a) Manufacturer's name or trade-mark (if any);  b) Mode designation and serial No.'  c) Country of manufacture;  d) Input supply voltage and frequency;  e) Power consumption;  f) RF input and output terminals; and  g) Sockets for audio and video output.</p>	Basic marks to enable the subscriber to have first-hand information

## II: MINIMUM TECHNICAL SPECIFICATIONS

<b>1.0</b>	<b>RF tuner &amp; DVB-T Channel</b>	Input impedance	75Ω
		Modulation	COFDM: QPSK, 16QAM, 64QAM
		Frequency	VHF (174-230MHz) - optional, UHF (470– 862 MHz)
		Input signal level	-33dBm to -81dBm
		FEC coding	Convolutional Coding + Reed Solomon 1/2, 2/3, 3/4, 5/6, 7/8
		FTT Size	2k, 8k
		C/N range	3dB (QPSK) to 7dB (64QAM)
		Guard intervals	1/4, 1/8, 1/16, 1/32
		Channel raster (width)	7MHz (VHF), 8MHz (UHF)
		Signal Bandwidth	7.61 MHz in the 8 MHz channel; 6.66 MHz in the 7 MHz channel
		Interleaving	Bit+ Frequency
		Max Bit Rates (8MHz)	32 Mbit/s
Used Bit Rates (8MHz)	5 to 32 Mbit/s		

3.0	<b>MPEG Transport stream video and Audio Decoding</b>	Transport stream	MPEG-2 ISO/IEC13818
		Video decoding	MPEG-2/MPEG4AVC
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) - standard definition, 1920X1080 (High definition)
		Audio decoding	MPEG-2 MUSICAM Layer I&II/HEAAC
		Audio mode	Single track/dual track/stereo
		Audio sampling rate	32KHz, 44.1KHz, 48KHz., 96KHz (optional)
3.0	<b>Scanning function</b>	The IDTV should include a frequency scanning function to detect the availability of DVB-T signals	
		It should also automatically list the content of the terrestrial bouquet by reading the PSI/SI streams and	
		Be capable of programme memory in case of cut off	
		It should be able to display the number of channel currently being scanned	
		It should be able to display number of services located	
		Where the multiplex is seized, the receiver shall display details of its name, network ID, signal strength and quality	
4.0	<b>Software</b>	<b>EPG:</b> current and next programme information. 24x7days schedule.	
		Auto/manual tuning	
		24-hourclock	
		<b>OTA:</b> IDTV software's, EPG, CA features must be upgradable over the air. (USB Upgrade-optional)	
		Support receive mail	
		Provides the instant and personalized message prompt including the following:-	
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> </ul>	
		<ul style="list-style-type: none"> <li>• Support multi-language info</li> </ul>	
		<ul style="list-style-type: none"> <li>• Able to display current software and hardware version stored in the receivers</li> </ul>	
		<ul style="list-style-type: none"> <li>• Able to indicate whether an updates are available or not</li> </ul>	
		<ul style="list-style-type: none"> <li>• Able to indicate the unique serial number and state of the IDTV receiver (error code)</li> </ul>	
		<ul style="list-style-type: none"> <li>• Able to indicate the received multiplex with indications of signal strength and bit errors rates based on the received PLP</li> </ul>	
<ul style="list-style-type: none"> <li>• Able to indicate type of middleware and other resident</li> </ul>			

		applications version numbers
<b>5.0</b>	<b>Additional Hardware</b>	PVR (optional)
<b>6.0</b>	<b>Teletext &amp; Teletext subtitle</b>	It is able to display Teletext using the OSD and/or by the insertion of the Teletext data in the VBI of the analogue CVBS Video Output
<b>7.0</b>	<b>Interfaces</b>	RF input connector: IEC169-2 female, input impedance 75 ohms One RCA (CINCH) female connector for video output and two RCA (CINCH) female connectors for stereo sound output RF bypass (loop) IEC169-2 male RF output via a PAL-G modulator SCART interface (optional) HDMI interface (optional) Should include at least one RF cable to connect the unit with its associated analogue television receiver
<b>8.0</b>	<b>Interfaces for Conditional Access</b>	IDTV must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>9.0</b>	<b>Physical attributes</b>	Power supply: AC 220±10%, 50±1Hz Power: Energy star(option)
<b>10.0</b>	<b>Environmental attributes</b>	Operating Temperature: 0~45°C Operating humidity: Up to 90%
<b>11.0</b>	<b>Reliability</b>	MTBF: >80,000Hrs

### E: INTEGRATED DIGITAL TELEVISION – TERESTRIAL (DVB-T2) MINIMUM TECHNICAL SPECIFICATIONS

<b>S/N</b>	<b>I. BASIC FEATURES</b>	<b>OPERATIONAL EFFECT(S)</b>
<b>1.0</b>	Auto and manual search modes	Basic features for broadcasting channel searching
<b>2.0</b>	Signal Quality Level indicator	Basic feature for signal level indication(green or yellow) for acceptable signal quality
<b>3.0</b>	<b>Parental Control/Lock</b>	Basic feature for controlling viewers
<b>4.0</b>	<b>Electronic Program guide (EPG)</b>	On screen electron guide
<b>5.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>6.0</b>	Languages: English and Swahili	Availability language selection feature: Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania

<b>8.0</b>	Minimum 1000 channels receivable and storable	The software programming for channel storage caters for 00-99 or 000 to 999 hence channel storage is the best choice
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual.	User manual for Understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	<p>Marking: Each IDTV shall be legibly and indelibly marked with at least the following information:</p> <p>a) Manufacturer's name or trade-mark (if any);  b) Mode designation and serial No.'  c) Country of manufacture;  d) Input supply voltage and frequency;  e) Power consumption;  f) RF input and output terminals; and  g) Sockets for audio and video output.</p>	Basic marks to enable the subscriber to have first-hand information

## II: MINIMUM TECHNICAL SPECIFICATIONS

<b>1.0</b>	<b>RF tuner &amp; DVB-T2 Channel</b>	Input impedance	75Ω
		Modulation	COFDM:QPSK, 16QAM, 64QAM, 256QAM
		Frequency	VHF(174-230MHz)-optional, UHF(470– 700MHz)
		Input signal level	-35dBm to -85dBm
		FEC coding	LDPC Code+ BCH Code, Code rates :1/2, 3/5, 2/3, 3/4, 4/5, 5/6
		FTT Size	1K, 2K, 4K, 8K, 16K, 32K
		C/N range (Rice channel)	3dB (QPSK1/2) to 24dB (256QAM5/6)
		Pilot Pattern	PP1 to PP8
		Guard intervals	1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256
		Channel raster	7MHz (VHF),8MHz(UHF), 1.7MHz (VHF)-optional
		Signal Bandwidth	8MHz corresponds to 7.61 MHz in the normal carrier mode, 7.71 MHz for 8k, while 7.777 MHz for 16k and 32k
		Service	Physical Layer Pipes (PLP)

		specific robustness	
		Interleaving	Bit+ Cell + Time + Frequency
		Diversity	SISI, MISO, (SIMO, MIMI if diversity receiver)
		Rotated constellations	Significant robustness gain in channels with severe degradations (multipath, SFN operation, narrow band interference...)
		Mode of Extensions	Future Extension Frame(FEF)
		Max Bit Rates (8MHz)	50.3Mbit/s,(32Ke,256QAM,CR=5/6,GI=1/28,PP7)
		Used Bit Rates (8MHz)	Portable SFN:25.0Mbit/s, Fixed SFN:37.0Mbit/s, Fixed MFN:40.2Mbit/s
		GE06 compatible	Signal is under the mask of DVB-T2 (power level measured in a 4KHz bandwidth)
<b>2.0</b>	<b>MPEG Transport stream video and Audio Decoding</b>	Transport stream	MPEG-2ISO/IEC13818
		Video decoding	MPEG-2/MPEG4AVC (H.264)
		Aspect Ratio (image rate)	4:3,16:9
		Frame frequency	25Hz (PAL)
		Video Resolution	720X576 (PAL) - standard definition, 1920X1080 (High definition)
		Audio decoding	MPEG-2 MUSICAM Layer I&II/HEAAC
		Audio mode	Single track/dual track/stereo
		Audio sampling rate	32KHz, 44.1KHz, 48KHz, 96KHz (optional)
<b>3.0</b>	<b>Scanning function</b>	The IDTV should include a frequency scanning function to detect the availability of DVB-T signals	
		It should also automatically list the content of the terrestrial bouquet by reading the PSI/SI streams and	
		Be capable of programme memory in case of cut off	
		It should be able to display the number of channel currently being scanned	
		It should be able to display number of services located	
		Where the multiplex is seized, the receiver shall display details of its name, network ID, signal strength and quality	
		<b>EPG:</b> current and next programme information, 24x7days schedule	
		Auto/manual tuning	
		24-hourclock	
		<b>OTA:</b> IDTV software's, EPG, CA features must be upgradable	

<b>4.0</b>	<b>Software</b>	over the air. (USB Upgrade-optional)
		Support receive mail
		Provides the instant and personalized message prompt including the following:-
		<ul style="list-style-type: none"> <li>• Display and withdrawal of subtitles</li> </ul>
		<ul style="list-style-type: none"> <li>• Support multi-language info</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to display current software and hardware version stored in the receivers</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate whether an updates are available or not</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate the unique serial number and state of the IDTV receiver (error code)</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate the received multiplex with indications of signal strength and bit errors rates based on the received PLP</li> </ul>
		<ul style="list-style-type: none"> <li>• Able to indicate type of middleware and other resident applications version numbers</li> </ul>
<b>5.0</b>	<b>Additional Hardware</b>	PVR (optional)
<b>6.0</b>	<b>Teletext &amp;Teletext subtitle</b>	It is able to display Teletext using the OSD and/or by the insertion of the Teletext data in the VBI of the analogue CVBS Video Output
<b>7.0</b>	<b>Interfaces</b>	RF input connector: IEC169-2 female, input impedance 75 ohms
		One RCA (CINCH) female connector for video output and two RCA (CINCH) female connectors for stereo sound output
		RF bypass (loop) IEC169-2 male
		RF output via a PAL-G modulator
		SCART interface (optional)
		HDMI interface (optional)
		Should include at least one RF cable to connect the unit with its associated analogue television receiver
<b>8.0</b>	<b>Interfaces for Conditional Access</b>	IDTV must include at least one embedded smartcard reader or a DVB-CI (Common Interface) slot to allow any type of conditional access module to be plugged in to the set top box. The CI should be upgradable to newer version
<b>9.0</b>	<b>Physical attributes</b>	Power supply: AC 220±10%, 50±1Hz Power: Energy star(option)
<b>10.0</b>	<b>Environmental attributes</b>	Operating Temperature: 0~45°C
		Operating humidity: Up to 90%
<b>11.0</b>	<b>Reliability</b>	MTBF: >80,000Hrs



**ANNEX I: LIST OF REFERRED INTERNATIONAL STANDARDS**

<b>S/No</b>	<b>Reference No.</b>	<b>Title</b>
1.	TR 101 190 Ver 1.3.2	Implementation Guidelines for DVB Terrestrial Services; Transmission aspects
2.	EN 302 755 Ver 1.3.1	Framing structure channel coding and modulation for a second generation digital terrestrial broadcasting system (DVB-T2)
3.	EN 300 429 Ver 1.2.1	Framing structure, channel coding and modulation for cable systems (DVB-C)
4.	EN 300 421 Ver 1.1.2	Framing structure, channel coding and modulation for 11/12 GHz satellite services (DVB-S)
5.	EN 302 307 Ver 1.2.1	Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2)
6.	TS 102 773 Ver 1.3.1	Modulation Interface for a second generation digital terrestrial television broadcasting system
7.	ISO/IEC 13818-1: 2007/Amd. 6 : 2011	Information technology – Generic coding of moving pictures and associated audio information" Part 1:Systems (MPEG 2)
8.	ISO/ IEC 13818-2: 2000/Amd. 3 : 2010	Information technology – Generic coding of moving pictures and associated audio information Part 2 Video Coding
9.	ISO/IEC 14496-3 : 2009	Information technology - Coding of audio-visual objects : Part 3 Audio
10.	ISO/IEC 14496-15 : 2010	Information technology - Coding of audio-visual objects : Part 15 Advanced Video Coding (MPEG-4 Part 10 AVC) (AVC File Format)
11.	ETSI TS 101 154 Ver 1.10.1	Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream.
12.	ETSI EN 301 192 Ver 1.5.1	Digital Video Broadcasting (DVB); DVB specification for data broadcasting
13.	EN 50221 Ver 1	Common Interface Specification for Conditional Access and other Digital Video Broadcasting Receiver Applications and ETR 289 Ver 1 Support for use of scrambling and Conditional Access (CA) within digital broadcasting systems
14.	TS 101 699 Ver 1.1.1	Extensions to the Common Interface Specification
15.	TS 102 006 Ver 1.3.2	Specification for System Software Update in DVB Systems
16.	ETSI EN 300 468 Ver 1.13.1	Specifications for Service Information (SI) in DVB systems
17.		
18.	TS 101 211 Ver 1.10.1	Guidelines on implementation and usage of Service Information (SI) in DVB systems
19.	ETSI EN 300 743 Ver	Subtitling Systems

	1.4.1	
20.	ETSI TS 102 831 Ver 1.1.1	Digital Video Broadcasting (DVB); Implementation guidelines for a second generation digital terrestrial television broadcasting system (DVB-T2)
21.	ETSI TS 102 201 Ver 1.2.1	Digital Video Broadcasting (DVB); Interfaces for DVB Integrated Receiver (DVB-IRD)
22.	ETSI EN 300 706	Enhanced Teletext specification

## **7.0 MINIMUM TECHNICAL SPECIFICATIONS FOR INTERNET PROTOCOL TELEVISION (IPTV) SET TOP BOXES (STBs)**

### **1. SCOPE**

This minimum technical specification specifies the requirements of a digital Set Top Box (STB), for use by the subscribers to receive IPTV services delivered to the viewers' homes using fiber cable as last mile access network. In the home, the IPTV STB is to be connected to the Cable Modem using a 10/100 Base T Ethernet connector.

Alternately the STB could also be used for receiving IPTV services delivered using high speed Digital Subscriber Line (DSL) based access technologies (ADSL2, ADSL2+, VDSL etc.) or for receiving services delivered via a broadband modem connected to a 4G network. In this case STB is to be connected to the DSL Modem or the Broadband Modem using the Ethernet connector.

### **2. REFERENCES**

The Standards listed in Annex I contains provisions which, through reference in this text, constitute provisions of this specifications. All specifications are subject to revision.

### **3. REQUIREMENTS**

The IPTV STB shall be based on open (non-proprietary) architecture and shall ensure technical compatibility and effective interoperability amongst different IPTV services in the country. The interoperability shall be achieved by complying with the following ETSI standards:-

- i. TS 102 034 V1.5.1 (2014-05): Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services
- ii. over IP Based Networks TS 102 542 V1.2.1: Guidelines for the implementation of DVB IP Phase 1 Specifications
- iii. TS 102 539 V1.3.1 (2010-04): Carriage of broadband guide content information over IP
- iv. TS 102 824 V1.2.1 : "Digital Video Broadcasting (DVB); Remote Management and Firmware Update System For DVB IP Services"
- v. TS 102 366 V1.2.1: "Digital Audio Compression (AC-3, Enhanced AC-3) Standard

## 4. SOFTWARE SPECIFICATIONS

**4.1** The STB shall have the capability to receive the following three types of services delivered using Real Time Streaming Protocol (RTSP) as defined in S/NO. 1 of Annex I.

- i. Live Media Broadcast (LMB): Delivery in Unicast or Multicast
- ii. Media Broadcast with Trick Modes (MBwTM): Delivery in Unicast only
- iii. Content on Demand (CoD) Delivery in Unicast. User initiates a presentation

**4.2** The complete protocol stack used for the delivery of the services mentioned in Clause 4.1 above, is described in clause 4 of S/NO. 1 of Annex I. 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 given in Clause 7 of S/NO. 1 of Annex I. The IPTV STB should conform to this complete protocol stack.

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)

**4.3** The STB should have the capability to decode MPEG -2 MP@ML SDTV and optionally MPEG-4 Part 10 AVC HP@L4 HDTV signals.

**4.4** The STB should have the capability to decode MPEG -2 MP@ML SDTV and optionally MPEG-4 Part 10 AVC HP@L4 HDTV signals.

**4.5** 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.

**4.6** On connection to the network, the IPTV STB should send a broadcast query requesting info from the DHCP server. On receiving this request, the DHCP server will assign an IP address to the STB. This process is defined in detail in Clause 8 of S/NO. 1 of Annex I.

**4.7** DVB has defined a Service Discovery / Selection (SD&S) process in Clause 5 of S/NO. 1 of Annex I. 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.

**4.8** Clause 9 of S/NO. 1 of Annex I specifies the File Upload System Stub (FUSS), which is mandatory and allows the system software of an IPTV STB to be updated on a power-cycle or reboot. The sending of the system software will be handled by the mechanisms specified in S/NO. 4 of Annex I. The IPTV STB should conform to this in order to get the software update.

**4.9.** S/NO. 3 of Annex I 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.

**4.10** Clause 10 of S/NO. 1 of Annex I specifies Content Download Services (CDSs). CDSs provide the download of content items to a local storage of the IPTV STB via a broadband IP connection.

Two types of services are supported: push download services where the distribution decision is taken by the service provider (without explicit request from the user) and pull download services where the download is requested by the user. If a STB is equipped with appropriate local storage, it could use this service for content downloading.

**4.11** Annex E of S/NO. 1 of Annex I defines an optional protocol for Application Layer FEC (ALFEC) protection of streaming media for DVB-IPTV services carried over RTP transport. If this option is used at the sending end, the STB should have the capability to decode this FEC.

**4.12** Annex F of S/NO. 1 of Annex I defines an optional re-transmission mechanism (RET) to provide for protection against packet loss of DVB-IPTV services carried over RTP transport. It specifies the mechanism to provide immediate Feedback (FB) towards the network using RTCP and how to retransmit the missing packets.

**4.13** 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 S/NO. 4 of Annex I.

Remote Management is the ability of a server entity outside the home environment to monitor and configure the devices within the home and covers provisioning and assurance tasks. It optionally includes firmware updates to the equipment.

**4.14** Conditional Access: Specific support for Conditional access or Content Protection is out of scope of this ETSI standard as given in S/NO. 1 of Annex I (Clause 1.1.2).

## 5.0 BASIC FEATURES

S/N	I. BASIC FEATURES	OPERATIONAL EFFECT(S)
<b>1.0</b>	<b>Parental</b> Control/Lock	Basic feature for controlling viewers
<b>2.0</b>	Electronic Program guide ( <b>EPG</b> )	On screen electron guide
<b>3.0</b>	Full function standard <b>IR remote control</b> , using AA or AAA size battery.	Small size battery, hence an easier to handle (small in size) remote control
<b>4.0</b>	Languages: English and Swahili	Availability language selection feature:

		Swahili is the national language spoken by majority Tanzanians
<b>7.0</b>	<b>PAL I/B/G</b> auto conversion	PAL I is the VIDEO System for Tanzania
<b>9.0</b>	Favourite channel list editing	Provision for editing channels for user preference (basic feature)
<b>10.0</b>	Warranty: 1 year	To avoid substandard equipment in the market
<b>11.0</b>	Owner's Manual	User manual for Understanding the operation of the equipment as well as troubleshooting simple problems (English and Swahili languages)
<b>12.0</b>	<p>Marking: Each IPTV shall be legibly and indelibly marked with at least the following information:</p> <p>a) Manufacturer's name or trade-mark (if any);  b) Mode designation and serial No.'  c) Country of manufacture;  d) Input supply voltage and frequency;  e) Power consumption;  f) Ethernet input/output  g) Sockets for audio and video output.</p>	Basic marks to enable the subscriber to have first-hand information

## 6.0 HARDWARE SPECIFICATIONS

<b>S/No</b>	<b>Parameter/Spec</b>	<b>Mandatory</b>	<b>Optional</b>
1	Interfaces/ Connectors	<ol style="list-style-type: none"> <li>1. Input :10/100 BaseT Ethernet</li> <li>2. Analog Audio Output</li> <li>3. Stereo RCA</li> <li>4. Composite Video Out RCA (Yellow)</li> </ol>	<ol style="list-style-type: none"> <li>1. 1000 BaseT Ethernet connector RJ45</li> <li>2. Compressed Multichannel Audio output: S/PDIF (IEC 61937)</li> <li>3. Uncompressed digital AV Streams Output: HDMI Port V1.3a to V2.0</li> </ol>

			4. USB 2.0 Ports
2	Graphics Resolution	Standard Definition (SD): 720X576	High Definition (HD): 1920 x 1080i (30fps) or higher (1080p @ 60fps) with capability to down-convert to SD (720x576)
3	Command Device	IR Remote Control	Keyboard / Mouse
4	Local Storage	-	Hard Disk

## 7.0 PERFORMANCE REQUIREMENTS

	<b>Specification/Parameter</b>	<b>Mandatory Requirements</b>	<b>Optional</b>
1	Electrical Specs a) Input Voltage range b) Frequency	AC 220±10%, 50±1Hz	
2	Operating Ambient Temperature.	0~45°C	
3	Operating humidity range	Up to 90%	
4	Front Panel Features a) Connector b) Controls (buttons 7) c) LED Indicators	a) USB Host – A Type 5V 500ma b) Power, Menu, OK. Remote Control Unit c) Power, Link, HD/SD, Receiver	
5	Back Panel a) Ethernet b) Audio Video Connectors	10/100 Mbps Ethernet RJ45 i) Component, Y, Pb, Pr ii) Component Video RCA	1000 Mbps Ethernet RJ45 i) 5.1 Dolby Digital Optical

	c) Miscellaneous Connectors	iii) Stereo L,R Audio RCT (2 sets) iv) Mic Input 3.5 mm Slot Mini-jack	Output ii) HDMI V1.3a to V2.0 i) External IR Receiver ii) USB 2.0 Port
6	Video Codec	i) MPEG-2 SMPTE ii) HEVC	i) MPEG-4 ii) HEVC
7	Audio Codec	i) MPEG-1 Layer 2 (Musician) ii) MPEG-4 AAC iii) MPEG-1 Layer 3 iv) AC-3 Stereo	i) AC-3 ii) E-AC-3
8	Processor	32-bit Host Processor 400MHz 1000DMIPS	
9	Remote Control (IR Support) Keys/Buttons/Indicators	Battery Condition Power On/Off Mute Numeric Keys (10) Search Previous Program Home TV CoD Video Player (Play, Stop, Pause, Fast Forward, Rewind, Previous Frame) Favourite Information Menu Settings Guide Organizer Coloured Buttons (4)	

		(Blue Yellow Red & Green) For Designer Assigned Usage Reset	
10	Supported Video Output	PAL	
11	Aspect Ratio	4:3 and 16:9	

### ANNEX I: LIST OF REFERRED INTERNATIONAL STANDARDS

S/No	Reference No.	Title
1.	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
2.	ETSI ETR 211	Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)
3.	ETSI TS 102 539 V1.3.1 (2010-04)	Digital Video Broadcasting (DVB); Carriage of Broadband Content Guide (BCG) information over Internet Protocol (IP)
4.	ETSI TS 102 824 V1.2.1 (2008-07)	Digital Video Broadcasting (DVB); Remote Management and Firmware Update System for DVB IP Services
5.	ETSI TS 102 366 V1.2.1	Digital Audio Compression (AC-3, Enhanced AC-3) Standard
6.	ETSI TS 101 812 (V1.3.1)	Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.0.3
7.	ETSI TS 542 V1.2.1	Guidelines for the implementation of DVB IP Phase 1 specifications
8.	IEEE 802-1990	IEEE Standards for Local and Metropolitan Area Networks: overview and architecture
9.	IEEE 802.1Q-1998	IEEE Standards for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks
10.	IEEE 802.2-1998	IEEE Standard for Information technology- Telecommunications and information exchange between systems - Local and metropolitan area networks – Specific requirements - Part 2: Logical Link Control
11.	IEEE 802.3-2000	IEEE Standard for Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer



		Specification
12.	IETF RFC 768	User Datagram Protocol
13.	IETF RFC 791	Internet Protocol
14.	IETF RFC 826	An Ethernet Address Resolution Protocol: or converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware
15.	IETF RFC 1042	A Standard for the Transmission of IP Datagrams over IEEE 802 Networks
16.	IETF RFC 1122	Requirements for Internet Hosts - Communication Layers
17.	IETF RFC 1213	Management Information Base for Network Management of TCP/IP-based internets: MIB-II
18.	IETF RFC 1305	Network Time Protocol (Version 3) Specification, Implementation and Analysis
19.	IETF RFC 1630	Universal Resource Identifiers in WWW
20.	IETF RFC 3550	RTP: A Transport Protocol for Real-Time Applications
21.	IETF RFC 1890	RTP Profile for Audio and Video Conferences with Minimal Control
22.	IETF RFC 2011	SNMPv2 Management Information Base for the Internet Protocol using SMIV2
23.	IETF RFC 2030	Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
24.	IETF RFC 2250	RTP Payload Format for MPEG1/MPEG2 Video)
25.	IETF RFC 2326	Real Time Streaming Protocol (RTSP)
26.	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
27.	ETSI TS 102 323	Digital Video Broadcasting (DVB); Carriage and signalling of TV-Anytime information in DVB transport streams
28.	ISO/IEC 23001-1 (MPEG-B)	Information Technology - MPEG Systems Technologies – Binary MPEG format for XML
29.	ETSI TS 102472	Digital Video Broadcasting (DVB);IP Data cast over DVBH: Content Delivery Protocols
30.	SMPTE specification 2022-1	Forward Error Correction for Real-time Video/Audio Transport Over IP Networks
31.	SMPTE specification 2022-2	Unidirectional transport of constant bit rate MPEG-2 Transport

		Streams on IP Networks
32.	ITU-T Recommendation H.610 (07/2003)	Full service VDSL – System architecture and customer premises equipment
33.	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"); Part 3: Metadata; Sub-part 2: System aspects in a uni directional environment
34.	ETSI TS 102 366 (V1.2.1)	Digital Audio Compression (AC-3, Enhanced AC-3) Standard

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