

BOCRA



TECHNICAL SPECIFICATION

FOR

INTEGRATED DIGITAL TELEVISION (IDTV) SET

ISSUED BY

**BOTSWANA COMMUNICATIONS REGULATORY
AUTHORITY**

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Technical Specification for Integrated Digital Television Set

Contents

Scope	3
Entry into force	3
Document History	3
Operational Specifications Summary.....	4
Technical Specifications Summary	4
Additional Notes.....	5
Annexure	6

Issued by:

Botswana Communications Regulatory Authority
Plot 5067 Independence Avenue
Private Bag 00495
Gaborone
Botswana

Telephone: +267 395 7755
Telephone +267 368 5500
Fax: +267 395 7976
E-mail: info@bocra.org.bw
Website: <http://www.bocra.org.bw/>

Scope

This specification shall apply to all the Digital Terrestrial Television broadcast Integrated Digital Television Set (hereinafter "IDTV") that shall be manufactured, imported or used in Botswana for the purpose of receiving the DTT broadcast services by the viewers/consumers or any other purpose that shall be deemed to access the DTT Network. It will not apply to Set Top Boxes, Portable and Mobile Receivers.

The specification gives the minimum requirements in which the IDTVs shall comply. The other value added features, including, but not limited to Conditional Access, Return Path will be guided by the market.

Botswana Communications Regulatory Authority (hereinafter "BOCRA") shall type-approve all IDTVs based on the minimum specifications as outlined in this document.

Annexure gives the details of each feature specified under the Operational and Technical Specifications.

Entry into force

This specification shall enter into force on 01/05/16.

Table 1: Document History

Description	Status	Date
Edition 1	Approved	21/04/2016

Table 2: Operational Specifications Summary

	Feature	Description/functionality
1	On/Off button	Switches the IDTV power on or off.
2	On Screen Display	Presents the channel programme Number or Programme guide on the screen.
3	Electronic Programme Guide (EPG)	Lists the schedules, displays them on screen once operated.
4	Auto Search	The unit will perform an automatic search for channels. (Manual search optional)
5	Signal strength and Quality level	Indicates signal strength and quality level (reception).
6	Languages	English is the official language, IDTV Operational Manual should be in English. Setswana is optional.
7	Remote Control Unit	Commands and execute the full IDTV functions. Small in size and using AA or AAA batteries.
8	Channels	The IDTV software must store up to 100 programmes selectable at random per user's requirements.
9	Warranty	The IDTV shall carry a minimum of 12 months (1 Year) warranty
10	Operations Manual	Clear and easy to understand with basic trouble shooting and pictorial illustrations.
11	Conditional Access (optional)	Optional and shall not prohibit viewers on free-to -air DTT channels

Table 3: Technical Specifications Summary

	Feature	Specification
1	Input Impedance	75 Ω
2	AC Mains Power supply	220 V \pm 20 V 50 Hz (\pm 2 Hz)
3	Power plugs	BS 1363, 4573, 546 - 3pin
5	Modulation	In compliance with the GE06 Channelling Plan of Recommendation ITU-R BT.1306 System C ¹ or ITU-R BT.1877
6	FEC on OFDM	Comply with Recommendation ITU-R BT.1306 System C ¹ or ITU-R BT.1877
7	Input signal	0 dBm to -78.4 dBm Or -35 dBm to -85 dBm
8	Frequency	UHF (470 - 694 MHz), and VHF (174 - 230 MHz) Optional

¹ Botswana has chosen ISDB-T Standard for all the parameters using 8MHz Bandwidth

9	Signal Bandwidth	8 MHz Channelization Plan of GE06
10	Guard intervals	Comply with Recommendation ITU-R BT.1306 System C ¹ or ITU-R BT.1877
11	Channel/Noise Ratio	Recommendation ITU-R BT.1306 System C ¹ or ITU-R BT.1877
12	Interleaving	Comply with Recommendation ITU-R BT.1306 System C ¹ or ITU-R BT.1877
13	Video decoding	MPEG-4 (H.264)
14	Aspect Ratio	4:3 and 16:9
15	Frame frequency	25 Hz
16	Conditional Access	Smart card /software applicable (Optional)
17	RAM	128 Mbytes (DDRAM) 8 Mbytes (Flash)
18	Processor	≥300 MHz
19	Bit stream conversion	MPEG-2 ISO/IEC 13818
20	Audio decoding	MPEG-4 AAC are required. Sampling rate: 32 kHz, 44.1 kHz and 48 kHz (Dolby and other related approved audio decoding optional)
21	Serial Interface	RS 232 or USB
22	Audio mode	Single track/dual track/stereo
23	GE06 channelization Plan	Compliant
24	Intrinsic immunity	EN 55020 or CISPR 20
25	Intrinsic radiation	EN 55013 or CISPR 13
26	Voltage Fluctuations	EN 61000-3-3/IEC 61000-3-3

Additional Notes

BOCRA recognises equivalent standards from other standardisation bodies and countries in ITU Region 1.

¹ Botswana has chosen ISDB-T Standard for all the parameters using 8MHz Bandwidth

Annexure

I. Manual

The Operation's Manual for the IDTV shall be written in the English language and easy to read, understand and follow. It shall have the basic installation guide. Setswana language will be optional. The use of graphic/drawings for illustration is encouraged.

II. Decoding and Outputs

The IDTVs outputs such as an analogue PAL ,HDMI and RS232 or USB shall be deemed optional. However, a RS232 or USB port shall be provided where a device can be connected for upgrades.

The IDTV should be able to search channels automatically.

III. Remote Control Unit

The IDTV shall have a remote control which is easier to operate or use. The remote control unit shall be powered by either 1 (one) AA battery or 2 (two) AAA batteries. It shall have the capability to switch on/off the IDTV, change, scan, program/edit/re-arrange channels as well as reduce or increase the volume. The remote control unit shall be able to access the root and sub-roots menu of the IDTV. The remote control unit shall be in the category of low power emitting devices.

IV. On Screen Display(OSD)

It is mandatory that the IDTV has capability for 'On Screen Display' (OSD). The OSD will enable the viewer to view any information that the viewer wishes to bring forward for reading.

V. Electronic Programme Guide (EPG)

Electronic Programme Guide (EPG) shall be displayed by the use of the remote control of the IDTV. This shall be an exclusive button on the remote control unit. The remote control shall enable the viewer to input the programme number with much ease for choice of Programme.

Any data casting such as news online, notices etc. that will be available in the transmission shall be displayed as and when prompted by the viewer. The IDTV shall be able to clearly display any transmitted information intended for the viewer.

VI. Warranty

It shall carry a minimum of one (1) year warranty.

VII. Packaging (include batteries)

The packaging shall contain in it the remote control unit with sealed batteries and the operations manual.

VIII. Navigator (USER INTERFACE)

The IDTV shall have a navigator menu, activated by remote control and shall be in English, Setswana is an option.

IX. Power Supply

The AC supply in Botswana is 240 V at 50 Hz. The IDTV shall operate from an AC supply of 220 V \pm 20 V at 50 Hz (\pm 2 Hz). Mains supply in Botswana is as stated above and it is mandatory as this will not change in the near future. Mains connection shall conform to any of the specifications for the power outlets listed in this document.

There are commonly used power plugs and outlets in Botswana. The power plugs and sockets shall be any of the following standards;



BS 1363



BS 4573



BS 546 – 3pin

All IDTV power supplies must be fused. In the event the manufacturer chooses the BS 4573 or BS 546 - 3pin, there shall be a 13 Amps fuse installed before the circuitry of the IDTV.

X. Electromagnetic Compatibility (EMC)

The EMC standards aim to minimise electromagnetic interference from electrical and electronic devices to others and immunity to the interference. Some of the existing standards that are already in use shall form part of the compliance of the IDTVs.

The following standards of equivalent shall apply;

EN 55020 or CISPR 20

Sound and television broadcast receivers and associated equipment-Immunity characteristics-Limit and methods measurements.

EN 55013 or CISPR 13

Sound and television broadcast receivers and associated equipment-Radio disturbance characteristics-Limit and methods measurements.

EN 61000-3-3 IEC 61000-3-3

Part 3-3: Limits — Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current 16A per phase and not subject to conditional connection

XI. Conditional Access (CA)

The IDTV may provide for Conditional Access (CA). This is to enable the future expansion of broadcasting where Pay TV may be introduced. The facility for conditional access shall be in the IDTVs that will be used for that purpose only. It will not affect the basic IDTVs for normal access. The CA shall be optional and the CA shall be approved by the Authority where it has been included. The necessary documentation of the CA shall be provided for reference in the application for approval. IDTV with Conditional Access shall still carry Free to Air channels and shall not at any given time be affected by the non-payment of subscription of pay per view service providers. All shall be able to carry free to air DTT services.

XII. Upgrade

Software upgrades are important to allow service to provide bug fixes and quality improvements to their products. The IDTV shall have the ability to perform any software upgrade that might be available through a USB or any other available interface. This shall in no way compromise the operation of the STB and the service provider shall take full responsibility for the upgrade and the effects to consumer devices.

XIII. Tuning/Scanning procedures

The receiver shall, in case of same Transport stream ID and Service ID on two or more different frequencies save all frequencies, or select the frequency with better signal. The receiver shall be able to receive and react on tuning parameters in PSI/SI tables. In addition to the automatic search, where Channel ID (or frequency) is entered by the end user. The receiver shall tune to this channel, search all available transmission modes, add new services and replace existing services in the service list (without considering any quality criteria).

XIV. Input impedance

The impedance shall be 75 Ω for use with standard outdoor or indoor aerial via a coax cable. This is the nominal impedance that is used across almost all broadcast or receiver equipment of radio frequency signals. The source impedance and the input impedance for maximum power transfer shall match that of the unit. In general, the antennae shall be based on the 75 Ω specification.

XV. Modulation

The modulation in the DTT has to have a high level of resilience in co-channel narrowband interference hence it is implemented in digital terrestrial TV broadcast.

There has to be a number of parameters that safeguard the transmission signals against interference and also give rise to minimum set of values that protect the customer in order for them to enjoy reception. The ITU has come up with specific Recommendations to guide broadcasters, equipment suppliers and other manufacturers to adhere to these standards.

Any IDTV which is to be imported, sold, distributed and operated/used in Botswana shall be able to decode digital terrestrial television broadcast which complies with the requirements of Recommendation ITU-R BT.1306 System C¹ or ITU-R BT.1877

XVI. Forward Error Correction (FEC)

The FEC figures are standards in decoders and this are meant to safeguard inter carrier frequency interference. FEC consistently corrects any errors using the Reed Solomon sequence and Convolution Code (RS+CC).

Optional: the Bose-Chaudhuri-Hocquengham and Low-density parity-check (BCH+LDPC).

The IDTV shall have an error free recovery mode and the response time in the variation shall be not more than one (1) second.

FEC coding shall be the nominal sequence of the OFDM. The IDTV shall conform to the Recommendation ITU-R BT.1306 System C¹ or ITU-R BT.1877.

XVII. Input signal

The sensitivity of the receive side of the IDTV should be specified. This is to enable bare minimum for the IDTV to be able to handle the minimum required signal in order to provide reproduction of the signal. In the event the signal is lost, the 'no signal' shall be displayed on the screen. This will assist the view to see that the TV set is not the one that is off but transmission has been lost.

The input signal level shall be;

a maximum of 0 dBm which shall be the maximum allowed level.

The maximum level is specified in order that the demodulator will be protected. The input level is set at -78.4 dBm¹ or

a maximum of -35 dBm which shall be the maximum allowed level.

The maximum level is specified in order that the demodulator will be protected. The input level is set at -85 dBm

which shall be the maximum allowed level. The 0 dBm is specified in order that the demodulator will be protected. The input level is set at -78.4 dBm which shall constitute the minimum input level to be detected and demodulated by the RF input unit. The minimum signal is set in order for the IDTV to demodulate because most of the terrestrial signals are at very low levels. In the same aspect, the maximum level of 0 dBm has to be specified in order to protect the IDTV internal demodulator.

XVIII. Subtitles

The IDTV shall be able to display Subtitling in ARIB STD-B24¹ or ETSI EN 300 743 .

¹ Botswana has chosen ISDB-T Standard for all the parameters using 8MHz Bandwidth

XIX. C/N

In any signal propagation, there is bound to be noise in the signal. In broadcasting environment there is a significant ratio between the carrier signal and the inherent noise. The bigger the ratio the better the quality of the video signal in the case of television broadcast.. The conformance shall be within Recommendation ITU-R BT.1306 System C¹ or ITU-R BT.1877.

XX. Guard Intervals

The standard guard intervals allow separation of signals and it is desirable that a clear separation be recommended so that there is conformance in terms of the originating transmissions. It is however desirable that those shorter guard intervals are used. This will increase the channel efficiency. The required guard intervals are as Recommendation ITU-R BT.1306 System C¹ or ITU-R BT.1877.

XXI. Operational Frequency

The IDTV shall operate within the band of frequencies as agreed by the ITU for Region 1 which is 470 MHz to 694 MHz (UHF).

The above mandatory 470 MHz to 694 MHz is the specified digital terrestrial Television broadcast which the IDTV must receive.

XXII. Signal Bandwidth

Botswana is signatory to the ITU's Region 1 GE06 and the frequency planning that has been agreed and planned for a bandwidth of 8 MHz. It is therefore mandatory that the IDTV shall decode channels in accordance with the GE06 Channelization plan.

XXIII. Frequency off set

An off-set frequency of 125 kHz from the nominal centre frequency is specified and the IDTV should be able to still decode the signal.

XXIV. Memory and Processor

The RAM requirement is to be able to store the configurations for the IDTV and as well as any other information, the viewer does not have to store everything from the beginning when power is lost. The higher the RAM and the processor speed the better. The basic processor shall give the minimum required speed that it does not take much time to process the input commands. The unit shall consist of the following minimum specifications: 128 Mbytes for DDRAM SDRAM, 8 Mbytes for Flash Memory and 300 MHz processor.

¹ Botswana has chosen ISDB-T Standard for all the parameters using 8MHz Bandwidth

XXV. Resolution

The resolutions tally well with aspect ratios. The IDTV shall be able to display 4:3 signal to 16:9 . The required video quality shall be 720 x 576 for SD aspect ratio and 1920 x 1080 for 16:9 HD aspect ratio.

XXVI. Frame Rate

The frequency frame shall be 25 Hz.

XXVII. Audio Decoding

The IDTV shall be able to decode MPEG-4 AAC sampled at 32 kHz, 44.1 kHz and 48 kHz whereas any other sampling such as 96 kHz will not be a mandatory requirement. An internationally approved formats such as Dolby etc. can be used and documentation shall be provided for type-approval by the Authority. This will allow high quality audio presented in mono, dual or stereo signal to be received.

XXVIII. Interface

The serial interface is the connection using the USB or RS 232 to communicate with other devices. In other operational requirements, the USB or RS 232 connector could also be an interface for the PC/Laptop to project data for a programme source. (Optional)

The requirement is generally for interoperability with other equipment for similar operations. The interface for RF input shall be in accordance with the IEC 61169-2 female input on 75 Ω impedance. The bundled item of conversion adaptor is also acceptable. The HDMI shall be optional.

XXIX. Software applications

These IDTV specifications allow for creativity and innovation in developing software application for datacasting.

XXX. Additional Hardware

Personal Video Recoder (optional)