

BOCRA



TECHNICAL SPECIFICATION

FOR

**DIGITAL TERRESTRIAL TELEVISION BROADCAST
PORTABLE AND MOBILE RECEIVERS**

ISSUED BY

**BOTSWANA COMMUNICATIONS REGULATORY
AUTHORITY**

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Technical Specification for Digital Terrestrial Television Portable and Mobile Receivers

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Scope

This specification shall apply to all of the Digital Terrestrial Television Portable and Mobile Receivers that shall be manufactured, imported or used in Botswana for the purpose of receiving the DTT broadcast programmes by the viewers/consumers or any other purpose that shall be deemed to access the DTT Network. It will not apply to integrated Digital Television set or Set Top Box.

The specification gives the minimum requirements in which the Portable and Mobile receivers shall comply.

Botswana Communications Regulatory Authority shall type-approve all of Portable and Mobile Receivers based on the minimum specifications as outlined in this document.

Annexure 1 gives the details of each feature specified under the Operational and Technical Specifications.

Entry into force

This specification shall enter into force on DD/MM/YY.

Document History

Description	Status	Date
Edition 1	Approved	XXXX

Operational Specifications Summary

	Feature	Description/functionality
1	On/Off button	Switches the Portable and Mobile Receiver 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/Manual Search	The unit will perform an automatic search for channels or can be selected manually
5	Signal Quality level indicator	To indicate broadcast signal is good or poor quality (reception)
6	Video Output	This is optional
7	Languages	English is the official language, Portable and Mobile Receiver Operational Manual should be in English. All control buttons on the device and its remote should be in English. Setswana is optional
8	Remote Control IR	Commands and execute the full Portable Receiver functions. Small in size and using AA or AAA batteries. Remote control is optional.
9	Channels 1-100; minimum of 100 TV channels storing	The Portable and Mobile Receiver software must perform the storing of up to 100 programmes be selectable at random as and when the viewer wishes
10	Warranty	The Portable and Mobile Receiver should carry a minimum of 1 year (12 months) warranty
11	Operations Manual	Clear and easy to understand with basic trouble shooting and pictorial illustrations.
12	Conditional Access (optional)	Optional and shall not prohibit viewers on free-to -air DTT channels
13	Connectors	Rear Panel connectors optional

Technical Specification Summary

	Feature	Specification
1	Input Impedance	75Ω Optional
2	AC Mains Power supply	220V ±20V 50Hz ±2Hz Optional
3	DC power supply	12V Optional
4	Power plugs	BS 1363, 4573, 546-3pin Optional
5	Network functionality	MFN and SFN

6	Connectors	RCA 3 connectors (2 audio and 1 video) Optional
7	Modulation	In compliance with the GE06 Channelling Plan of Rec. ITU-R BT.1306 (ITU Region 1 Equivalent-Optional)
8	FEC on OFDM	Comply with ITU-R.BT.1306 (ITU Region 1 Equivalent-Optional)
9	Input signal	0 dBm to -78.4dBm
10	Frequency	UHF (470-694MHz), VHF (174-230MHz) Optional
11	Signal Bandwidth	8MHz Channelization Plan of GE06
12	Guard intervals	1/4, 1/8, 1/16, 1/32, , 1/64, 1/128, 1/256
13	Channel/Noise Ratio	5dB(QPSK1/2) to 23dB (64QAM 7/8) ITU-R.BT.1306 (ITU Region 1 Equivalent-optional)
14	Interleaving	Frequency+Time+Byte+Bit
15	Video decoding	MPEG-4 (H.264)
16	PAL I	625 Lines, 50 Hz, Video bandwidth: 5MHz
17	Aspect Ratio	4:3 and 16:9
18	Frame frequency	25Hz
19	Conditional Access	Smart card /software applicable (optional)
20	RAM	128Mbytes (DDRAM) 8Mbytes (Flash)
21	Processor	≥300MHz
22	Bit stream conversion	MPEG-2 ISO/IEC 13818
23	Audio decoding	Sampling rate: 32kHz, 44.1kHz and 48kHz (Dolby and other related approved audio decoding optional)
24	Connection Interface	USB or Micro B USB
25	Audio mode	Single track/dual track/stereo
26	GE06 channelization Plan	Compliant
27	Portable and Mobile Receiver electronic Components	Comply with approved testing procedures and ITU equivalent
28	Intrinsic radiation immunity	EN 55024 or CISPR 24
29	Harmonic Current Emission	EN 61000-3-2/IEC 61000-3-2
30	Voltage Fluctuations	EN 61000-3-3/IEC 61000-3-3
31	Emission for residential and commercial premises	EN 61000-6-X/IEC 61000-6-X

Additional Notes

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

Annexure 1

I. Manual

The Operation's Manual for the Portable and Mobile Receiver shall be written in the English language and easy to read, understand and follow. It shall have the basic installation guide. Setswana will be an optional extra. Use of graphic/drawing for illustration is encouraged. The whole document shall not exceed 10 pages and the font size not be less than 10.

II. Decoding and Outputs

The Portable and Mobile Receiver shall be a decoder which should be able to decode the DTT signal. The other outputs such as HDMI or Mini HDMI shall be deemed optional. In the event these are included, the type approval for them shall follow the same criteria. A USB or Micro B USB port shall be provided where a device can be connected for upgrades.

It shall be able to search channels both automatically or manually. There shall be stereo (left and right) outputs for audio using RCA connectors (females) and the video output shall be an RCA connector (female) as well for the portable receivers and a 3.5mm headphone socket for the mobile receivers. This could also be an integrated connector. **The acceptance test for electronic components shall be in accordance with the ITU-R.BT.1306 or Region 1 equivalent.**

III. Remote Control

Remote control shall be optional.

IV. Front Display

The Channel number is essential for the storage and selection of channels. The viewer will then know according to the numbers which channels are where the Portable Receiver has been programmed accordingly. Mobile Receiver is optional.

V. Front Panel Menu Buttons & LEDs

There shall be standard LEDs to indicate good or bad signals. These shall be clearly illustrated in the manual. There shall be all the necessary buttons for manual operation on the front panel. These include but not limited to the following: the Menu button, the power "on/off", the channel selection "up/down" and volume control. The Portable Receiver should glow red on power LED when "ON" and black when its OFF. This is optional for Mobile receiver.

VI. On Screen Display

It is mandatory that the Portable and Mobile Receiver has capability for 'On Screen Display'. The OSD will enable the viewer to view any information that she/he wishes to bring forward for reading

VII. Electronic Programme Guide

EPG shall be displayed by the use of the IR remote control (where applicable) or by manual operation through the menu button on the front panel of the Portable and Mobile Receiver. This shall be an exclusive button on the Remote Control. The IR remote control should enable the viewer to input the programme number with much ease for choice of Programme. The EPG also has information on the programme running or the subsequent programme information in which the viewer can choose to view when the programme is of interest. However, the standard EPG which is globally accepted shall be used which shall have 24x7 days schedule.

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

VIII. Warranty

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

IX. Packaging (include batteries)

The Portable and Mobile Receiver shall be packed in a sealed box. In the event the seal is broken the purchaser shall have the right to refuse the item. In addition, the packaging shall contain in it the remote control(optional) with sealed batterie(s), the AV Cable and 3.5mm headphones for mobile receivers, An antenna for the portable receiver. the Operations Manual and the power cable.

X. Connectors

The AV connections together with Power supply connector, the USB port and the HDMI shall be at the rear or side of the Portable Receiver. It shall also have RF in for the antenna. Mobile receivers shall have built in antennas. Should the Portable Receiver have external power input other than the mains supply, it shall also be on the rear or side panel of the Portable Receiver. This is optional in a mobile receiver.

XI. Navigator (USER INTERFACE)

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

I. DC power supply

The Portable and Mobile Receivers may have an additional DC power socket for 12V power supply. The socket shall be mounted on the back or side panel insulated with centre pin at 2.1mm diameter and the plug with the centre hole being positive (+) and the outer part being negative (-). It shall not exceed the 3A rating. Where this is available, the connector cable to battery shall be supplied with colour coded leads (red for positive and black for negative).

II. 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 Portable and Mobile Receivers. The following standards of equivalent shall apply;

EN 55024 or CISPR 24

Information technology equipment - Immunity characteristics - Limits and methods of measurement

EN 61000-3-2 IEC 61000-3-2

Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)

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

EN 61000-6-X or IEC 61000-6-X

Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments

III. Network functionality

When the service provider (broadcaster) designs the networks such that they are either, Multi Frequency or Single Frequency Networks (MFN or SFN), the Portable and Mobile Receiver shall be able to operate in any of the areas of MFN and SFN. The Portable and Mobile Receiver shall not differentiate between MFN and SFN signals.

IV. Conditional Access

The Portable and Mobile Receiver 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 Portable and Mobile Receivers that will be used for that purpose only. It will not affect the basic Portable and Mobile Receivers 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. Portable and Mobile Receiver 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.

V. Off Air Upgrade

The Portable and Mobile Receiver shall have the ability to perform any software upgrade that might be available off air automatically. This shall in no way compromise the operation of the Portable and Mobile Receiver.

VI. 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, the receiver shall allow a manual 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).

VII. Input impedance

The impedance shall be 75Ω 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 for maximum power transfer the input impedance shall match that of the unit. The antennae are based on the 75Ω specification. This is optional in a mobile receiver with built in antennas.

VIII. 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 gives rise to minimum set of values that protects 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 Portable and Mobile Receiver 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 ITU-R.BT.1306 or ITU Region 1 equivalent.

IX. Forward Error Correction

The FEC figures are standard in decoders and this are meant to safeguard inter carrier frequency interference. FEC consistently corrects any errors using the Reed Solomon sequence. The Portable and Mobile Receiver shall have an error free recovery mode and the response time in the variation of shall be not more than 1 (one) second.

FEC coding shall be the nominal sequence of the OFDM. **The Portable and Mobile Receiver shall conform to the ITU-R.BT1306 or ITU Region 1 equivalent.**

X. Input signal

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

XI. Subtitles

The receiver shall be able to decode any subtitles from any of the recognised Standard. This shall be through the relevant key in the IR Remote control Subtitling is a must in most broadcast environment. It is in this manner that the programme will have in most cases English subtitles. In future production there might be the need introduce Setswana Subtitles as well. The Subtitles shall not lag the video and audio and shall appear at the bottom of the screen. It is also required that a good and effective synchronisation of both video/audio and Subtitles is maintained.

Ability to change the font size of the subtitle will be an added advantage. The Portable and Mobile Receiver shall be able to display Subtitling in reference to ARIB STD-B24.

XII. C/N Range (Rice Range)

In any signal propagation, there is bound to noise in the signal. In broadcasting environment there is for 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. It is therefore necessary to set the minimum noise ratio. QPSK 1/2 shall be 5dB to 23dB for the 64QAM 7/8. **The conformance shall be within Rec. ITU-R BT. 1306 or ITU Region 1 equivalent.**

XIII. Guard Intervals

The standard guard intervals allow separation of signals and it is desirable that a clear separation is recommended so that there is conformance in terms of the originating transmissions. It is however desirable those shorter guard intervals are used. This will increase the channel efficiency. The required guard intervals are as **ITU-R.BT.1306 or ITU Region 1 equivalent.**

XIV. Operational Frequency

The unit 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 470MHz to 694MHz is the specified digital terrestrial Television broadcast which the Portable and Mobile Receiver must receive.

XV. 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 8MHz. **It is therefore mandatory that the Portable and Mobile Receiver shall decode channels in accordance with the GE06 Channelization plan.**

XVI. Memory and processor

The RAM requirement is to be able to store the configurations for the Portable and Mobile Receiver and as well as that 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 here that it does not take much time to process the input commands. The unit shall consist of the following minimum specifications: 128Mbytes for DDRAM SDRAM, 8Mbytes for Flash Memory and 300MHz processor.

XVII. Resolution

The resolutions tally well with aspect ratios. The Portable Receiver shall be able to display 16:9 signal. The required video quality shall be 720x576 for the 4:3 for aspect ratio and 1280:720 for 16:9. This is optional in a mobile receiver.

XVIII. Audio Decoding

The audio shall be sampled at 32kHz, 44.1kHz and 48kHz whereas any other sampling such as 96kHz will not be a mandatory requirement. An internationally approved formats such 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.

XIX. Interface

In mobile and portable receivers, a USB or Micro B USB is required for communicating with the device during upgrades and also as an output port for external display. The HDMI/Mini HDMI shall be optional.

XX. Software Application

With the technical evolution there is the need the heart of today's ICT serves quite a purpose to effect that tying to specific brands and patent items defeats the objective of future development and versatility in the growth of sectors.

The software application shall support the following:-

- Data casting
- Over the air trouble shooting
- Over the air upgrading
- Robust application
- Operational efficiency
- Re-boot without delay and display and withdrawal of subtitles

The Portable and Mobile Receiver shall deploy software that is current and usable in the digital terrestrial television broadcast. All the necessary documentation and approval procedures shall be submitted to the Authority for approval with the Portable and Mobile Receiver.

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