MINIMUM TECHNICAL SPECIFICATIONS

FOR

DIGITAL AUDIO BROADCASTING (DAB+) RADIO RECEIVERS

VERSION: DRAFT

MAY 2023

SCOPE

These specifications detail the minimum requirements for domestic and in-vehicle DAB+ digital radio receivers for use in Kenya. The specifications cover devices that can receive terrestrially transmitted DAB+ digital radio services including adapters whose primary function is to add digital radio capability to another device. Domestic digital radio receivers comprise portable devices, large receivers, and receivers incorporated into mobile phones and computers. In-vehicle products comprise many receivers, including those integrated into the dashboard and aftermarket products mounted in the dashboard, behind the dashboard, to the vehicle windscreen, or elsewhere within a motor vehicle.

The specifications do not cover any element of a receiver designed to receive digital services via alternative delivery platforms, such as the Internet or digital television. However, these specifications cover some aspects of analogue FM radio reception.

The specifications shall apply to all manufacturers, importers, and retailers who wish to sell radio receivers and all other products with built-in radio receivers intended for use within the Republic of Kenya.

The specifications shall be used to assess the eligibility of DAB+ products used in the country. However, the receivers may include additional features or increased performance compared to the minimum requirements specified in this document.

DOCUMENT CHANGE HISTORY

Date	Version	Changes
May 2023	Draft	The first draft of the Minimum Technical Specifications for Digital Audio Broadcasting (DAB+) Radio Receivers.

DEFINITIONS

The terms used in this document shall have the following meaning:

DAB means the standard for delivering terrestrial audio broadcasts specified in ETSI EN 300 401.

DAB+ means audio codec for 'Digital Audio Broadcasting', based on the new audio coding technology High-Efficiency Advanced Audio Coding version 2 (HE-AAC v2) according to ETSI TS 102 563.

Receiver means a device intended to receive and decode signals transmitted according to the DAB+ system specifications ETSI EN 300 401 and ETSI TS 102 563 designated for consumers.

Adaptor means a device that provides a DAB+ capability to another device.

Band scan means the user function to scan the whole of the tuning range to update the stored service list when required.

Adequate audio reception means the error rate of the output data stream of the Viterbi decoder is equal to or better than 10^{-4} when decoding a 128 kbit/s DAB+ audio service transmitted with error protection level EEP-3A.

In-vehicle digital receiver *means* a receiver designed specifically for use within a vehicle.

Capacity Unit *means* the smallest addressable unit of the Common Interleaved Frames (CIF), comprising 64 bits.

NORMATIVE REFERENCES

ETSI TS 103 461	Digital Audio Broadcasting (DAB); Domestic and in-vehicle digital radio receivers; Minimum requirements and Test specifications for technologies and products
ETSI EN 300 401	Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers
ETSI TS 102 563	Digital Audio Broadcasting (DAB); Transport of Advanced Audio Coding (AAC) audio
ETSI TS 101 756	Digital Audio Broadcasting (DAB); Registered Tables
ETSI TS 103 176	Digital Audio Broadcasting (DAB); Rules of implementation; Service information features
ETSI ETS 300 799	Digital Audio Broadcasting (DAB); Distribution interfaces; Ensemble Transport Interface (ETI)
ETSI ETS 300 384	Radio broadcasting systems; Very High Frequency (VHF), frequency modulated, sound broadcasting transmitters
IEC 62104:2015	Characteristics of DAB Receivers
ETSI TS 102 428	Digital Audio Broadcasting (DAB); DMB video service; User application specification
ITU-R BS 450-3	Transmission standards for FM sound broadcasting at VHF
ITU-R BS 1114-12	Systems for terrestrial digital sound broadcasting to vehicular, portable and fixed receivers in the frequency range of 30-3 000 MHz.
DRAP-TEG-002	Minimum Specifications for DAB and DAB+ Personal and Domestic Digital Radio Receivers
DRAP-TEG-03	Minimum Specifications for DAB and DAB+ In-Vehicle Digital Radio Receivers
TBA	Digital Sound Broadcasting Framework, Communications Authority of Kenya
KS/IEC 62104:2015	Characteristics of DAB Receivers

ABBREVIATIONS

AM	Amplitude Modulation
DAB	Digital Audio Broadcasting
dB	Decibel
dBi	Decibel-isotropic
dBm	Decibel-milliwatt
DMB	Digital Multimedia Broadcasting
DRAP	Digital Radio Action Plan
DRM	Digital Radio Mondiale
DSB	Digital Sound Broadcasting
EECC	European Electronic Communications Code
ETSI	European Telecommunications Standards Institute
FM	Frequency Modulation
HE-AAC	High High-Efficiency Advanced Audio Coding
IEC	International Electro-technical Commission
ITU	International Telecommunications Union
MPEG	Moving Picture Expert Group
RF	Radio Frequency
SId	Service Identifier
X-PAD	Extended Programme Associated Data

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1. Introduction

The Communications Authority of Kenya (CA) is responsible for facilitating the development of the information and communication technology sector in Kenya. The Kenya Information and Communications (Importation, Type Approval and Distribution of Communications Equipment) Regulations, 2010 mandate the Authority to ensure compliance with national and international regulatory standards and requirements, safeguard public communications infrastructure integrity, and protect consumers.

The Authority plans to introduce digital sound broadcasting services to complement the existing analogue audio broadcasting services to enable the development and diversification of the radio broadcasting landscape. The successful adoption of digital audio broadcasting is based on, among other things, the availability of quality digital radio receivers. The Authority, therefore, has developed these minimum technical specifications as a guide on the performance of an acceptable digital radio receiver to provide quality assurance to consumers, and in line with technological advancements in sound broadcasting. These specifications are an extension of the KS/IEC 62104: 2015: Characteristics of DAB Receivers, which is the international standard, specifying the technical characteristics of DAB family receivers. KEBS TC 089 Communication Equipment and Systems adopted and approved for use in Kenya in August 2022.

In addition to meeting the technical characteristics specified in KS/IEC 62104:2015, the Authority wishes to specify the additional functional specifications to reflect market trends and local requirements.

ITU Recommendation ITU-R BS.1114-12 recommends six digital sound broadcasting systems to be used for terrestrial DSB services to vehicular, portable, and fixed receivers in the frequency range of 30 - 3000 MHz. System A, or DAB and its later upgrade DAB+, was the first such system to be recommended by ITU and is specified for deployment in VHF Band III (174 – 230 MHz). The band was planned under GE-06 initially for both digital audio broadcasting and television (DVB-T2). However, Kenya decided not to deploy television broadcasting in this band thus availing the entire band available for digital sound broadcasting services.

Kenya plans to deploy DAB+ which is an upgrade of DAB that replaced the MPEG-2 Layer II audio codec in DAB with a more efficient MPEG-4 HE-AACv2 audio codec. The adoption of the HE-AAC audio codec in DAB+ increased the spectrum efficiency by a factor of 2.5x enabling a single DAB+ multiplex to carry more than double the number of radio channels that can be carried by a DAB multiplex. DAB/DAB+ is the most widely adopted digital sound broadcasting standard currently being in use as a regular service in at least 30 countries with trials in at least 27 other countries according to Worlddab.

Arising from the DSB framework, these specifications only focus on the DAB+ receivers corresponding to the standard envisaged at the initial stages of DSB deployment. Additional receiver specifications for other technologies may be developed to facilitate the adoption of other digital sound broadcasting technologies based on future requirements.

2. Minimum Requirements for DAB+ Digital Radio Receivers

Table 1 outlines the minimum requirements for domestic and in-vehicle DAB+ digital radio receivers. The receivers may include additional features such as the reception of digital radio broadcasts delivered via other platforms or capabilities beyond the minimum requirements. The requirements outlined in the specifications are, however, the minimum requirements. The receivers may include additional features or increased performance compared to the minimum requirements specified in the specifications. Where the requirement does not apply to both domestic and in-vehicle receivers, the specific receiver for which the specific requirement applies is shown in italicized font.

Table 1: Minimum Requirements for DAB+ Digital Radio Receivers (Domestic + In-vehicle)		
S. No	**Feature**	**Specifications**
1	**TECHNICAL CHARACTERISTICS**	
1.1	RF Performance	The receiver must comply with the Band III provisions of **IEC 62104:2015**.
1.2	Channel Coding	The receiver must comply with the provisions of **IEC 62104:2015**.
2	**FUNCTIONAL REQUIREMENTS**	
2.1	**RETUNING**	
2.1.1	Retuning - Scan	Shall comply with the requirement of **KS/IEC 62104: 2015**. In addition, the retuning scan feature must: (a) Be initiated by the press of a single button on the device, or (b) If it is part of a menu feature must be at the top level of the menu or one level down.
2.2	**TEXT DISPLAY**	
2.2.1	Text Display - Basic presentation	Shall comply with the requirements of KS/IEC 62104: 2015 except that: (1) The text display shall only be required to display the following graphic symbols, correctly mapped, visually well-formed, and clear: ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789. (2) Lowercase characters may be mapped to upper-case equivalents.
2.2.2	Text Display - Full-range display	The receiver display may also implement the full range of Dynamic Label text, including symbols as specified in ETSI EN 300 401. If the receiver cannot display any graphic symbol correctly, then the graphical symbol shall be displayed as a "space" or "□" or, in any case, a similar distinctly non-alpha / numeric character.
3	**ANNOUNCEMENT, SIGNALING, AND SWITCHING**	
3.1	Announcement Switching	Shall comply with the requirement of KS/IEC 62104: 2015.

Table 1: Minimum Requirements for DAB+ Digital Radio Receivers (Domestic + In-vehicle)		
S. No	**Feature**	**Specifications**
3.2	Traffic Announcements	*In-vehicle receivers* shall switch from the selected service to an audio service carrying a Traffic Announcement if all the conditions specified in ETSI TS 103 176, clause 7.4 are met.
3.3	Service following	*In-vehicle receiver* shall support service following from DAB to FM and vice versa according to ETSI TS 103 176. A receiver will prefer digital where possible.
4	**ANALOGUE AUDIO RECEPTION**	
4.1	FM Broadcast Reception	Receivers, except adapters, shall be able to receive analogue FM radio broadcasts in the frequency band 87.5 to 108 MHz according to Recommendation ITU-R 450-3.
5	**OTHER REQUIREMENTS**	
5.1	Power Supply	*Domestic* digital radio receivers may be powered by 240V ±10%, 50Hz±1 mains, battery (maybe rechargeable built-in, or replaceable), or both. Where ac power is provided, the plug shall be Type G or compatible. The power supply for *in-vehicle* receivers shall be compatible with the motor vehicle auxiliary electrical system (non-traction).
5.2	PWD Accessibility	Include a braille keypad on the front panel at least. for tuning and volume control for the visually impaired
5.3	Operating Environment	Operating Temperature: 0~45°C, Operating Humidity: Up to 90%
5.5	Support Package	The following peripheral items shall be included in the basic package: • An easy-to-understand user manual in either English or Kiswahili. • Receivers supplied with remote control must the batteries for the remote control must be included.