



UGANDA  
COMMUNICATIONS  
COMMISSION

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The **Draft** Standard for Digital Audio Broadcast (DAB)  
Receivers

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**May 2026**

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## **SYMBOLS AND ACRONYMS**

AAC	Advanced Audio Coding
AU	Audio Unit
BER	Bit Error Rate
CA	Conditional Access
DAB	Digital Audio Broadcasting
DoC	Declaration of Conformity
DMB	Digital Multimedia Broadcasting
EMC	Electromagnetic Compatibility
ETSI	European Telecommunication Standards Institute
EWS	Emergency Warning System
FM	Frequency Modulation
F-PAD	Fixed Programme Associated Data
GNSS	Global Navigation Satellite Service
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
MCI	Multiplex Configuration Information
MOT	Multimedia Object Transfer
MPEG	Moving Pictures Expert Group
OLED	Organic Light-Emitting Diode
OTA	Over-the-air
PAD	Programme Associated Data
RF	Radio Frequency
SBR	Spectral Band Replication
SMBA	Smart Multimedia Broadcasting Association
UHF	Ultra High Frequency
USB	Universal Serial Bus
UTC	Universal Time Coordinated
VHF	Very High Frequency
X-PAD	extended Programme Associated Data

## **1 Introduction**

- 1.1. This standard has been developed under the provisions of the Uganda Communications Act, Cap 103, which vests authority in the Uganda Communications Commission to regulate the communications sector in Uganda.
- 1.2. Particularly, to set national standards while ensuring compliance with the national and international standards and obligations laid down by international agreements and treaties to which Uganda is a party.

## **2 Objective**

This standard establishes the technical and regulatory requirements for Digital Audio Broadcasting (DAB) receivers in Uganda. It ensures that all DAB receivers conform to national broadcasting regulations, deliver high-quality and reliable audio services to consumers, and safeguard the integrity and efficient use of the broadcast spectrum.

## **3 Scope**

This standard applies to DAB receivers categorised as follows:

- a) In-house (Domestic) receivers
- b) In-car (automotive) receivers
- c) Adapters and add-ons

This standard does not address the reception of services delivered through alternative platforms such as the internet or satellite systems. It also excludes digital sound broadcasting reception on television sets, DVB receivers/decoders, and computers. Furthermore, this standard does not apply to Digital Multimedia Broadcasting (DMB) or Digital Radio Mondiale (DRM) systems.

## **4 Applicability**

This standard applies to manufacturers, importers, distributors, and vendors of Digital Audio Broadcasting (DAB) receivers operating within Uganda. All DAB receivers intended for sale or use in Uganda shall comply with the specifications and requirements set out in this document. The standard is also applicable to organizations and entities involved in the deployment, testing, and evaluation of such devices.

## 5 Normative References

The following normative documents contain provisions which, through reference in this text, constitute mandatory elements of this standard.

<b>ETSI EN 300 401:</b>	<b>Digital Audio Broadcasting (DAB) to mobile, portable, and fixed receivers.</b>
<b>ISO/IEC 14496-3:</b>	Information technology - Coding of audio-visual objects - Part 3: Audio
<b>ETSI TS 102 563:</b>	Digital Audio Broadcasting (DAB); Transport of Advanced Audio Coding (AAC) audio
<b>ETSI TS 103 461:</b>	Digital Audio Broadcasting (DAB); Domestic and in-vehicle digital radio receivers; Minimum requirements and Test specifications for technologies and products
<b>IEC EN 62104:</b>	Characteristics of DAB receivers
<b>ETSI TS 103 466:</b>	Digital Audio Broadcasting (DAB); DAB audio coding (MPEG Layer II).

## 6 Interpretations

In this standard, the following interpretations shall apply:

<b>Adapter</b>	<b>A device that provides DAB+ capability to another device, such as an analogue radio that does not natively support DAB+.</b>
<b>Adequate Audio Reception</b>	A condition where 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.
<b>DAB</b>	Digital Audio Broadcasting, as defined in ETSI EN 300 401.
<b>Receiver</b>	A device designed to receive and decode DAB signals for audio reproduction.
<b>Type Approval</b>	The process by which a DAB receiver is tested and certified as meeting the regulatory standards established by the Uganda Communications Commission.
<b>Conditional Access (CA)</b>	A mechanism by which user access to service components can be restricted.
<b>Programme</b>	A time slice of a programme service, corresponding to an entry in a programme schedule.
<b>Programme Associated Data (PAD)</b>	Information related to the audio data in terms of content and synchronization.
<b>Multiplex Configuration Information (MCI)</b>	Information defining the configuration of the multiplex.

<b>Extended Programme Associated Data (X-PAD)</b>	The extended part of PAD is conveyed at the end of the DAB audio frame, immediately preceding the Scale Factor Cyclic Redundancy Check (CRC).
<b>Fixed Programme Associated Data (F-PAD)</b>	The fixed part of PAD is contained in the last two bytes of the DAB audio frame.

## 7 Technical Specifications

The following technical specification shall apply:

<b>7.1 Audio decoder</b>	The DAB+ receiver shall apply the HE-AACv2 codec Profile as specified in ETSI TS 102 563.
<b>7.2 Frequency bands</b>	Receivers shall be capable of receiving DAB digital radio broadcasts in the frequency range of 174 MHz to 240 MHz (VHF Band III) as reserved in the Uganda Table of frequency Allocations.
<b>7.3 Analogue radio requirements</b>	Receivers, except adapters, shall also be able to receive FM analog radio broadcasts, as described in ETSI ETS 300 384, in the frequency range of 87.5 MHz to 108 MHz.
<b>7.4 Conditional Access</b>	Every DAB receiver shall check the "CA flag". A non-CA capable DAB receiver shall not try to decode the user application if the "CA flag" is set to 1 (ETSI EN 300 401).
<b>7.5 Antenna connection</b>	Domestic receivers shall support UHF FEMALE 75 Ohm as defined in IEC 61169-2:2007 or Type F FEMALE 75 Ohm as defined in IEC 61169-24 & ETSI TS 103 461. In-vehicle receivers shall be fitted with an antenna connection as follows: - RF standard core: Type SMB MALE 50 Ohm as defined in IEC 60169-10 or - Head shell, latch: Type Fakra (SMBA) with latch as defined in ISO 20860-1 & ETSI TS 103 461. Adapters shall include an antenna with specifications that support secure and versatile installations in vehicles. The antenna may be of an internal glass-mount type or an external magnetic-mount or roof-mount type.
<b>7.6 Initialization</b>	Domestic receivers shall provide an initialization mechanism that identifies all receivable EWS ensembles (ETSI TS 104 090).
<b>7.7 Tuner Capability</b>	In-vehicle receivers shall have a minimum of two DAB tuners so that they are able to play out audio and monitor DAB ensembles for alert signaling.
<b>7.8 Location Awareness</b>	In-vehicle receivers shall have the means to know their geographical location to a precision of at least 100 m. Typically, a GNSS receiver may be suitable.
<b>7.9 Hybrid Digital Radio services</b>	Receivers may support Hybrid Digital Radio services as specified in ETSI TS 101 499 and ETSI TS 102 818
<b>8 Performance Specifications</b>	

<p><b>8.1 Automatic mode selection</b></p>	<p>The receivers shall be able to find the same FM broadcasting automatically when the current DAB broadcasting is disconnected, and when listening to the FM radio, the system shall switch automatically to DAB mode when it finds the same DAB broadcasting.</p> <p>Also, the receiver shall still automatically find and switch to the same FM station with a better signal if the signal of the current FM station is not good.</p>
<p><b>8.2 Service following</b></p>	<p>Receivers shall support service following to maintain the same audio or data content that the user has selected, despite the varying reception conditions that occur as specified in the ETSI document ETSI TS 103 176 Digital Audio Broadcasting (DAB) - Rules of implementation; Service information features</p>
<p><b>8.3 Receiver reactions to a multiplex reconfiguration</b></p>	<p>The receivers shall ensure service every time a complete MCI of the future multiplex configuration is sent in advance and the MCI for the current configuration, both in stream mode and packet mode (ETSI EN 300 401).</p>
<p><b>8.4 Automatic switching to another ensemble</b></p>	<p>The receivers shall be able to decode more than one service component from the same ensemble, e.g., an audio program in parallel with a data service, and automatically switch between ensembles for more or other service components, where necessary, for example in case of announcements.</p>
<p><b>8.5 Receiver Sensitivity</b></p>	<p>Receivers without an antenna shall provide adequate audio reception with an input power level of -92.2 dBm when fed by a DAB signal with Rayleigh transmission channel characteristics.</p> <p>Receivers without an antenna shall provide adequate audio reception with an input power level of -97.7 dBm when fed by a DAB signal with Gaussian transmission channel characteristics.</p> <p>Receivers with a packaged antenna will have a frequency-dependent threshold to provide adequate audio reception of the DAB signal.</p> <p>Domestic receivers' external antenna shall have at least -8.1 dBi gain.</p>

<p><b>8.6 Receiver Selectivity (Adjacent Channel Interference)</b></p>	<p>Receivers shall provide adequate audio reception in the presence of interfering DAB signals at specified levels on other frequencies.</p> <p>The wanted signal shall be a DAB signal at a level of -70 dBm. The interfering signal shall be a DAB signal with a frequency offset and amplitude as described in the table below.</p> <table border="1" data-bbox="683 436 1500 852"> <thead> <tr> <th data-bbox="683 436 1105 537">Frequency of interfering DAB signal</th> <th data-bbox="1105 436 1500 537">Interfering signal level, relative to the wanted signal</th> </tr> </thead> <tbody> <tr> <td data-bbox="683 537 1105 611">±1.712 MHz relative to the wanted signal</td> <td data-bbox="1105 537 1500 611">+35 dB</td> </tr> <tr> <td data-bbox="683 611 1105 684">±3.424 MHz relative to the wanted signal</td> <td data-bbox="1105 611 1500 684">+40 dB</td> </tr> <tr> <td data-bbox="683 684 1105 758">±5.136 MHz relative to the wanted signal</td> <td data-bbox="1105 684 1500 758">+45 dB</td> </tr> <tr> <td data-bbox="683 758 1105 852">All DAB center frequencies with more than 6 MHz offset from the wanted signal</td> <td data-bbox="1105 758 1500 852">+45 dB</td> </tr> </tbody> </table>	Frequency of interfering DAB signal	Interfering signal level, relative to the wanted signal	±1.712 MHz relative to the wanted signal	+35 dB	±3.424 MHz relative to the wanted signal	+40 dB	±5.136 MHz relative to the wanted signal	+45 dB	All DAB center frequencies with more than 6 MHz offset from the wanted signal	+45 dB
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<p><b>8.7 DAB+ Channel decoding</b></p>	<p>A receiver must be able to decode a DAB+ audio service contained in a sub-channel of a size up to and including 144 Capacity Units (e.g. 96 kbps@EEP1A). DAB+ audio services are defined in ETSI TS 102 563</p>										
<p><b>9 User Experience Requirements</b></p>											
<p><b>9.1 Retuning</b></p>	<p>DAB receivers that store a list of services shall provide a "band scan" user function that scans the whole tuning range and updates the stored list when required as described in ETSI TS 103 461.</p>										

<p><b>9.2 Text display</b></p>	<p>Receivers shall have a means of displaying text to the user. The text display shall display the name of the audio components available for selection. Receivers shall display the complete 16-character label in preference to the shorter 8-character label (if available).</p> <p>Receivers shall display the service label when a primary audio component is selected. Products shall display the service component label when a secondary audio component is selected.</p> <p>Receivers shall decode the dynamic label from the X-PAD (short X-PAD, variable length X-PAD, whether the dynamic label is the only PAD application or if it is one of a number of PAD applications) of the currently selected service and display it to the user legibly.</p> <p>Receivers shall act upon the command to remove the label from the display by immediately removing the label, even if it has only been partially displayed.</p> <p>Receivers shall have a display capable of rendering all the requirements of the Africa regional profile, as specified in ETSI TS 101 756, annex E.4, correctly mapped, visually well-formed and clear. [This assumes existence of ETSI TS 101 756 v2.5.1 currently in draft form]</p>
<p><b>9.3 Audio mode</b></p>	<p>When put into operation, domestic receivers shall tune to an EWS ensemble and select a service and this may be the last tuned service, a service allocated to a preset, or some other service that the user has shown previous interest in (ETSI TS 104 090).</p>
<p><b>9.4 Date and time (d&amp;t)</b></p>	<p>Receivers shall display d&amp;t in UTC format i.e., they shall display time in hours, minutes, seconds, and milliseconds or the short form by just displaying hours and minutes.</p> <p>Note: This feature is essential for the synchronization of additional elements and data services.</p>
<p><b>9.5 Service and Programme Information (SPI)</b></p>	<p>The receiver may support SPI that provides service names, identification, frequency, and multimedia (station logo) using the Multimedia Object Transfer (MOT) protocol (ETSI TS 102 371)</p>

<p><b>9.6 Slide show</b></p>	<p>Receivers shall support slideshow transmitted in either X-PAD or packet mode, effective at data rates from well under 1kbit/s upwards. Slides shall be 320x240 pixels in size and shown at an interval between 10-30 seconds per image.</p> <p>Optional features include animation via the PNG format and 'Categorized Slideshow', which provides for caching and browsing images by category (ETSI TS 101 499)</p>	
<p><b>9.7 Traffic Information</b></p>	<p>Receivers shall support and display transport traffic services using the TPEG protocol, which provides services ranging from essential traffic event information, traffic flow, and parking to more advanced information such as public transport or electromobility-oriented information (ETSI TS 103 551).</p> <p>Receivers may have to respond to announcements that are signalled as being present in other Ensembles. Whether they do or not is a design choice for the manufacturer, and the manufacturer may provide the user with an option to disable this feature.</p>	
<p><b>9.8 Journaline</b></p>	<p>Receivers may support Journaline for instant and interactive access to all information provided by the radio station, comparable to Teletext for TV (ETSI TS 102 979)</p>	
<p><b>9.9 Other features</b></p>	<p>9.9.1 Alarm announcements</p>	<p>Receivers shall switch from the selected service component to a signaled "Alarm" announcement when all the conditions specified in ETSI TS 103 176 are met. This feature allows a listener to be temporarily re-directed from the currently selected audio service component to another audio service component that provides a (largely) spoken message in the form of a short announcement as defined in ETSI EN 300 401.</p>

	9.9.2 Dynamic label	<p>Receivers shall decode the dynamic label (DL) from the X-PAD (short X-PAD, variable length X-PAD, whether the dynamic label is the only PAD application or if it is one of many PAD applications) of the currently selected service and display it to the user legibly (ETSI TS 103 461).</p> <p>DL feature is specified in ETSI EN300 401 Section 7 – Audio Coding (Clause 7.4.5.2 (Dynamic Label Segment)), ETSI TR 101 496 part 2 Section 3 – Implementation and Operation of System Features (Clauses 3.2.4 (Programme Associated Data (PAD)), 3.5.6 (Dynamic Label)) and ETSI TR102 563 Section 5 – Audio (Clause 5.4 (Programme Associated Data))</p> <p>Note: In-car receivers are exempted from this requirement.</p>
	9.9.3 Help information	<p>Receivers may require this feature to provide alternatives to the tuned Programme as the receiver moves around. In accordance with TS 103 176 V2.4.1</p>
<b>9.10 Support Package</b>	9.10.1 Remote Control	<p>Receivers may have a remote control with PRESET, SHIFT, SLEEP, Down or UP keys, ENTER, FM LIST, SCAN, MODE, DAB or FM tuner, MENU, and INFO buttons for operating the receiver from a distance, and others the manufacturer may include to improve the receiver's performance.</p> <p>The support package should also include the following peripherals:</p> <ul style="list-style-type: none"> <li><i>i).</i> Batteries for Remote control (if included)</li> <li><i>ii).</i> An easy-to-understand user manual in English</li> <li><i>iii).</i> Receive antenna for supported band(s) (if the antenna is not integrated).</li> </ul> <p>Note: These may not be included for in-vehicle receivers.</p>
<b>10 Connectivity Specifications</b>		
<b>10.1 Antenna connector</b>	Receivers shall have antenna connectors for DAB and FM antennas.	

<b>10.2 Audio output</b>	Receivers shall output the audio signal to loudspeakers and/or provide outputs to one of the interfaces specified in Clause 5 of IEC 62104:2015 Receivers may provide an output of the selected audio service component according to IEC 60958-3.	
<b>10.3 Power connector</b>	Receivers shall have power connectors for the main power with 100V – 250V to 12V DC, where the nominal frequency shall be 50Hz. Note: In-car receivers may be exempted from this requirement.	
<b>11 Compliance Requirements</b>		
<b>11.1 Declaration of Conformity (DoC)</b>	A DoC from the manufacturer will be required, clearly indicating the DAB receiver's model number, brand, and type.	
<b>11.2 Digital Radio Certification Mark</b>	The purpose of the Mark is to ensure that consumers can readily identify receivers that are suitable for the reception of digital radio services and that provide features at a sufficiently high level of performance.	
<b>11.3 Type Approval Certificate</b>	The DAB receiver shall be type-approved by the Uganda Communications Commission.	
<b>11.4 EMC requirement</b>	The Receivers shall comply with the relevant Electromagnetic Compatibility (EMC) as specified in: CISPR (CISPR 137, CISPR-208, CISPR-229), EN (EN 5501311, EN 5502012, EN 5502213, EN 5502414) or Any other equivalent international Electromagnetic Compatibility (EMC) standards	
<b>11.5 Safety requirement</b>	The Receivers shall comply with the relevant International Safety Standard, i.e., ETSI EN 300 401, and/or any other acceptable standard.	
<b>11.6 Support Packages</b>	User Manual	Receivers should have a detailed guide on how to set up, operate, and troubleshoot the receiver
<b>12 Environmental Requirements</b>		
<b>12.1 Temperature</b>	The temperature of the environment in which the receiver can be used should be specified to avoid extreme temperatures, either hot or cold, which can deteriorate the receiver's performance.	

<b>12.2 Moisture and Humidity</b>	The moisture and humidity level of the environment in which the receiver can be used should be specified to avoid deteriorating the receiver's performance.
<b>13 Energy Requirements</b>	
<b>13.1 Power Source</b>	In-home receivers may be mains, battery-powered, or both. Aftermarket in-car receivers designed to be self-installed by the consumer should ensure that proper consideration is given to ensuring that power adapters, etc., do not cause interference in the FM and DAB broadcast bands. (ETSI TS 103 461).
<b>13.2 Sleep/Monitor duty cycle</b>	Receivers shall implement a sleep/monitor duty cycle, synchronized to the time provided in FIG 0/10, that shall be operational whenever the receiver is not outputting audio (ETSI TS 104 090).
<b>14 Software Requirements</b>	
<b>14.1 Firmware upgrades</b>	Receivers should support over-the-air (OTA) firmware updates or provide options to update the firmware via USB. This ensures future compatibility with new features or improvements.