Draft of 16 January 2025

REGULATION

OF THE MINISTER FOR DIGITAL AFFAIRS[1)]

of …….

on the technical and operational requirements for digital radio receivers[2), 3)]

Pursuant to Article 406(7) of the Act of 12 July 2024 - Electronic Communications Law (Journal of Laws, item 1221), the following is hereby decreed:

§ 1. Technical and operational requirements for digital radio receivers are laid down in the Annex to the Regulation.

§ 2. This Regulation shall enter into force 14 days after its publication.[4)]

MINISTER FOR DIGITAL AFFAIRS

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1)The Minister for Digital Affairs manages the government administration section — computerisation pursuant to § 1(2) of the Regulation of the Prime Minister of 18 December 2023 concerning the specific scope of activities of the Minister for Digital Affairs (Journal of Laws, item 2720).

2)For the matter covered by it, this Regulation implements Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (OJ L 321, 17.12.2018, p. 36; OJ L 334, 27.12.2019, p. 164; OJ L 419, 11.12.2020, p. 36; OJ L 137, 22.4.2021, p. 1 and OJ L 333, 27.12.2022, p. 80).

3)This Regulation was notified to the European Commission on …, under No …, pursuant to § 4 of the Regulation of the Council of Ministers of 23 December 2002 concerning the manner in which the national notification system of standards and legal acts functions (Journal of Laws, item 2039, and of 2004, item 597), which implements the provisions of Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services (OJ EU L 241, 17.9.2015, p. 1).

4)This Regulation was preceded by the Regulation of the Minister for Digital Affairs of 14 February 2020 on the technical and operational requirements for consumer equipment used for the reception of digital radio broadcasting (Journal of Laws of 2021, item 1647), which expires on the date of entry into force of this Regulation in accordance with Article 104(14)(b) of the Act of 12 July 2024 – Provisions implementing the Act – Electronic Communications Law (Journal of Laws, item 1222).

Annex to the Regulation of the
Minister for Digital Affairs of .....
(item ...)

TECHNICAL AND OPERATIONAL REQUIREMENTS FOR DIGITAL RADIO RECEIVERS

1. General provisions

The technical and operational requirements shall apply to equipment whose basic functionality is the reception of digital radio broadcasting. The technical and operational requirements are considered fulfilled when the digital radio receivers comply with the standards and documents specified in point 2 of the Annex to the extent indicated in the Annex. Digital radio receivers, including car radio receivers, enable receiving digital radio broadcasting in the DAB+ system in the VHF band III (174-230 MHz).

2. Standards and documents

2.1. The list of the standards and documents referenced in the Annex:

[1] PN-ETSI EN 300 401 V2.1.1:2017-08 Radio Broadcasting Systems - Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers, implementing ETSI EN 300 401 V2.1.1:2017

[2] ETSI TS 101 499 V3.2.1:2023-07 Hybrid Digital Audio (DAB, DRM, RadioDNS); SlideShow; User Application Specification

[3] ETSI TS 101 756 V2.4.1:2020-08 Digital Audio Broadcasting (DAB); Registered Tables

[4] ETSI TS 102 563 V2.1.1:2017-01 Digital Audio Broadcasting (DAB); DAB+ audio coding (MPEG HE-AACv2)

[5] ETSI TS 102 818 V3.5.1:2023-12 Hybrid Digital Radio (DAB, DRM, RadioDNS); XML Specification for Service and Programme Information (SPI)

[6] ETSI TS 102 979 V1.1.1:2008-06 Digital Audio Broadcasting (DAB); Journaline; User application specification

[7] ETSI TS 102 980 V2.1.2:2019-02 Digital Audio Broadcasting (DAB); Dynamic Label Plus (DL Plus); Application specification

[8] ETSI TS 103 176 V2.4.1:2020-08 Digital Audio Broadcasting (DAB); Rules of implementation; Service information features

[9] ETSI TS 103 461 V1.2.2:2020-10 Digital Audio Broadcasting (DAB); Domestic and in-vehicle digital radio receivers; Minimum requirements and Test specifications for technologies and products

[10] IEC 62104:2015-07 Characteristics of DAB receivers

[11] IEC 62106-2:2021 Radio data system (RDS) – VHF/FM sound broadcasting in the frequency range from 64.0 MHz to 108.0 MHz – Part 2: Message format: Coding and definition of RDS features

[12] ISO/IEC 14496-3:2019 Information technology – Coding of audio-visual objects – Part 3: Audio

[13] ISO/IEC 23003-1:2007 Information technology – MPEG audio technologies – Part 1: MPEG Surround

[14] Recommendation ITU-R BS.450-4 (10/2019) Transmission standards for FM sound broadcasting at VHF

2.2. If the list referred to in point 2.1. contains a reference to a specific version of the document (identified in particular by their publication date, edition number, version number), the requirements laid down in that version of the document shall apply. It is acceptable to meet the requirements specified in a newer version of the document.

2.3. If the list referred to in point 2.1 does not contain a reference to a specific version of the document, the latest version of the document shall be used.

2.4. The document referred to in subdivision [1] of point 2.1 is made available free of charge in a ‘read-only’ form in the Polish Committee for Standardization reading rooms, and can be purchased at sklep.pkn.pl.

2.5. The documents referred to in sections [1]-[9] of point 2.1 are available on the European Telecommunications Standards Institute (ETSI) website — www.etsi.org.

2.6. The documents referred to in sections [10]-[13] of point 2.1 are available (for a fee) on the International Electrotechnical Commission's website — www.iec.ch.

2.7. The document referred to in section [14] of point 2.1 is available on the International Telecommunication Union (ITU) website — www.itu.int.

3. Definitions

The terms used in the Annex have the following meanings:

1) Adapter – a digital radio receiver converting DAB+ signal to VHF/FM, Bluetooth, fitted with an AUX audio output or another technological solution.

2) Multimedia receiver – a digital radio receiver for receiving digital radio broadcasting, equipped with a colour display with a resolution of at least 320 x 240 pixels and a colour depth of at least 8 bits, used for displaying multimedia content, in particular slides;

3) Standard receiver – a digital radio receiver for receiving digital radio broadcasting, equipped at least with an alphanumeric display.

4. Abbreviations and acronyms

1) AAC – Advanced Audio Coding in line with ISO/IEC 14496-3:2019 [12]

2) CU – Capacity Unit

3) DAB – Digital Audio Broadcasting

4) DAB+ – Digital radio broadcasting that uses MPEG-4 HE AACv2 audio coding in line with ETSI TS 102 563 V2.1.1:2017-01 [4]

5) DL – Dynamic Label

6) DL PLUS – Dynamic Label Plus, an extension of the dynamic label function

7) EN –European Norm

8) EPG – Electronic Program Guide

9) ETSI – European Telecommunications Standards Institute

10) FM – Frequency Modulation

11) FTA – Free-to-Air – uncoded programmes available to all

12) HE AAC v2 – High-Efficiency Advanced Audio Coding v2 Profile as defined in ISO/IEC 14496-3:2019 [12]

13) IEC – International Electrotechnical Commission

14) ISO – International Organization for Standardization

15) ITU – International Telecommunication Union

16) ITU-R – Radiocommunications Sector ITU;

17) MOT – protocol for the transmission of multimedia objects

18) MPEG – a set of coding standards for image and sound accompanying it, validated by the Group of Experts for Moving Images

19) MPEG-4 – a set of MPEG audio and video coding standards described in ISO/IEC 14496-

3:2019 [12]

20) MSC – Main Service Channel

21) RDS – Radio Data System (for VHF FM)

22) TS – Technical Specification

23) VHF – Very-High Frequency (30–300 MHz);

24) VHF FM – analogue FM radio broadcasting in the 87.5–108 MHz band.

5. Reception capacity

A digital radio receiver ensures the reception of DAB+ signals that fulfil the requirements arising from PN-ETSI EN 300 401 V2.1.1:2017-08 [1] and ETSI TS 102 563 V2.1.1:2017-01 [4], broadcast in the VHF band III (174-230 MHz).

6. Access to services

1) A digital radio receiver provides access to the following services:
   a) FTA (*Free-To-Air*) reception,
   b) the reception of text messages: the name of the station and DL,
   c) in the case of car radio receivers, reception of *announcements* (announcement b0, b1, b2, b3, b4 and b5 in accordance with ETSI TS 101 756 V2.4.1:2020-08 [3]), as defined in point 6.11 of ETSI TS 103 461 V1.2.2:2020-10 [9],
2) Moreover, a multimedia receiver ensures access to the following services:
   a) reception of the advanced EPG profile in accordance with ETSI TS 102 818 V3.5.1:2023-12[5], excluding the reception of that profile in a car radio receiver,
   b) reception of DL Plus messages (optional) in accordance with ETSI TS 102 980 V2.1.2:2019-02 [7] and of slideshows at least in the normal mode and simple profile of MOT transmission in accordance with ETSI TS 101 499 V3.2.1:2023-07 [2], with the possibility for the vehicle user to enable and disable the slideshow;

3) if a digital radio receiver features the *Journaline* and *announcement* EPG functions, the receiver implements them according to the following rules:
   a) the reception of a basic EPG profile for basic receivers in line with ETSI TS 102 818 V3.5.1:2023-12[5],
   b) the reception of *Journaline* in line with ETSI TS 102 979 V1.1.1:2008-06[6],
   c) the reception of *announcements* defined in subparagraph 6.11 of ETSI TS 103 461 V1.2.2:2020-10 [9].

7. Requirements for the radio interface and the digital radio receiver tuning principle

7.1. Received frequency range

Table 1

Centre frequencies of the 174-230 MHz range for each DAB frequency block.

DAB block number	Centre frequency (MHz)	Frequency range (MHz)
5A	174,28	174,160 - 175,696
5B	176,640	175,872 - 177,408
5C	178,352	177,584 - 179,120
5D	180,064	179,296 - 180,832
6A	181,936	181,168 - 182,704
6B	183,648	182,880 - 184,416
6C	185,360	184,592 - 186,128
6D	187,072	186,304 - 187,840
7A	188,928	188,160 - 189,696
7B	190,640	189,872 - 191,408
7C	192,352	191,584 - 193,120
7D	194,064	193,296 - 194,832
8A	195,936	195,168 - 196,704
8B	197,648	196,880 - 198,416
8C	199,360	198,592 - 200,128
8D	201,072	200,304 - 201,840
9A	202,928	202,160 - 203,696
9B	204,640	203,872 - 205,408
9C	206,352	205,584 - 207,120
9D	208,064	207,296 - 208,832
10A	209,936	209,168 - 210,704
10B	211,648	210,880 - 212,416
10C	213,360	212,592 - 214,128
10D	215,072	214,304 - 215,840
11A	216,928	216,160 - 217,696
11B	218,640	217,872 - 219,408
11C	220,352	219,584 - 221,120
11D	222,064	221,296 - 222,832
12A	223,936	223,168 - 224,704
12B	225,648	224,880 - 226,416
12C	227,360	226,592 - 228,128
12D	229,072	228,304 - 229,840

7.2. Tuning and selecting services

A digital radio receiver enables searching automatically the entire frequency range referred to in point 7.1 and tuning to the correct DAB+ frequency block in order to create a list of

available services. A digital radio receiver provides a function consisting in searching a band with the use of an automatic background function, a separate button, or a top-level or second-level function in the menu.

A car radio receiver moving between areas with a different frequency range automatically switches to a DAB+ frequency block of a neighbouring area where the same group of programmes is broadcast, with a view to ensuring a continuous reception of a selected service, provided that the received data streams contain a *service-following* signal broadcast in line with ETSI TS 103 176 V2.4.1:2020-08[8].

A car radio receiver that also receives VHF FM analogue radio broadcast in the range of 87.5-108 MHz in line with ITU-R BS.450-4 (10/2019)[14], equipped with an RDS decoder in line with IEC 62106-2:2021[11], ensures automatic switching to VHF FM reception upon leaving the area covered by DAB+ signal range, and vice versa if the received data streams contain *service-following* signal broadcast in line with ETSI TS 103 176 V2.4.1:2020-08[8]. If a particular programme can be received by both VHF FM and DAB+ broadcasting, DAB+ reception is preferred.

7.3. Reception quality indicator

If a digital radio receiver is equipped with a reception quality indicator, it must use a calculated *Bit Error Rate* (BER) over an MSC. The information is presented in such a manner as to facilitate the optimisation of the configuration of the receiving antenna.

8. Requirements for a digital radio receiver decoder

8.1. Channel decoder

In line with chapter 4.3 IEC 62104:2015-07[10]:

1) a channel decoder of a standard receiver decodes at least one of constituent MSC channels and allows for decoding at least 144 CU (i.e. 256 kbps@EEP3B, 192 kbps@EEP3A, 96 kbps@EEP1A);

2) channel decoder of a multimedia receiver allows for a simultaneous decoding of at least four constituent MSC channels and decode at least 288 CU.

8.2. Audio decoder

In line with chapter 4.6 of IEC 62104:2015-07 [10], a decoder allows for a correct decoding of audio signals MPEG-4 AAC in line with ISO/IEC 14496-3:2019 [12] with the limitations referred to in ETSI TS 102 563 V2.1.1:2017-01[4].

The decoder allows for a correct handling of audio streams containing surround sound

described in ISO/IEC 23003-1:2007 [13] (MPEG Surround). If the decoding of full surround sounds is impossible, the decoder correctly decodes signals as mono- or stereophonic.
The decoder masks transmission errors and where the signal may not be reproduced, it mutes the sound output.

9. Analogue radio broadcasting reception

All digital radio receivers (except for adapters) also enable reception of VHF FM radio signals in the 87.5–108 MHz range, broadcast in accordance with ITU-R BS.450-4 (10/2019) [14].

10. Requirements for a digital radio receiver display

10.1. Displaying programme names

A DAB+ digital radio receiver display displays in a correct and legible manner the name of a selected component of a programme (*Component Label*), and if the broadcaster does not transmit it, the name of the programme (*Service Label*).
The display displays the name of a selected component or a programme both in the short (8 characters) and in the preferred long form (16 characters).
The set of alphanumeric characters used by the broadcasters in the Republic of Poland for transmitting programme names, programme components and the multiplex is defined in Annex C to ETSI TS 101 756 V2.4.1:2020-08[3].

Table 2

The set of alphanumeric characters used by the broadcasters in the Republic of Poland for transmitting programme names, programme components and the multiplex.

	Character code (hexadecimal)															
	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-	NULL	0118 Ę	012E Į	0172 Ų	0102 Ă	0116 Ė	010E Ď	0218 Ș	021A Ț	010A Ċ	PLB	EoH	0120 Ġ	0139 Ĺ	017B Ż	0143 Ń
1-	0105 ą	0119 ę	012F į	0173 ų	0103 ă	0117 ė	010F ď	0219 ș	021B ț	010B ċ	0147 Ň	011A Ě	0121 ġ	013A í	017C ż	PWB
2-	0020	0021 !	0022 "	0023 #	0142 ł	0025 %	0026 &	0027 '	0028 (	0029)	002A *	002B +	002C ,	002D -	002E .	002F /
3-	0030 0	0031 1	0032 2	0033 3	0034 4	0035 5	0036 6	0037 7	0038 8	0039 9	003A :	003B ;	003C <	003D =	003E >	003F ?
4-	0040 @	0041 A	0042 B	0043 C	0044 D	0045 E	0046 F	0047 G	0048 H	0049 I	004A J	004B K	004C L	004D M	004E N	004F O
5-	0050 P	0051 Q	0052 R	0053 S	0054 T	0055 U	0056 V	0057 W	0058 X	0059 Y	005A Z	005B [	016E Ů	005D]	0141 Ł	005F _
6-	0104 Ą	0061 a	0062 b	0063 c	0064 d	0065 e	0066 f	0067 g	0068 h	0069 i	006A j	006B k	006C l	006D m	006E n	006F o
7-	0070 p	0071 q	0072 r	0073 s	0074 t	0075 u	0076 v	0077 w	0078 x	0079 y	007A z	00AB «	016F ů	00BB »	013D Ľ	0126 Ħ
8-	00E1 á	00E0 à	00E9 é	00E8 è	00ED í	00EC ì	00F3 ó	00F2 ò	00FA ú	00F9 ù	00D1 Ñ	00C7 Ç	015E Ş	00DF ß	00A1 ¡	0178 Ÿ
9-	00E2 â	00E4 ä	00EA ê	00EB ë	00EE î	00EF ï	00F4 ô	00F6 ö	00FB û	00FC ü	00F1 ñ	00E7 ç	015F ş	011F ğ	0131 ı	00FF ÿ
A-	0136 Ķ	0145 Ņ	00A9 ©	0122 Ģ	011E Ğ	011B ě	0148 ň	0151 ő	0150 Ő	20AC €	00A3 £	0024 $	0100 Ā	0112 Ē	012A Ī	016A Ū
B-	0137 ķ	0146 ņ	013B Ļ	0123 ģ	013C ļ	0130 İ	0144 ń	0171 ű	0170 Ű	00BF ¿	013E ľ	00B0 °	0101 ā	0113 ē	012B ī	016B ū
C-	00C1 Á	00C0 À	00C9 É	00C8 È	00CD Í	00CC Ì	00D3 Ó	00D2 Ò	00DA Ú	00D9 Ù	0158 Ř	010C Č	0160 Š	017D Ž	00D0 Đ	013F Ŀ
D-	00C2 Â	00C4 Ä	00CA Ê	00CB Ë	00CE Î	00CF Ï	00D4 Ô	00D6 Ö	00DB Û	00DC Ü	0159 ř	010D č	0161 š	017E ž	0111 đ	0140 ŀ
E-	00C3 Ã	00C5 Å	00C6 Æ	0152 Œ	0177 ŷ	00DD Ý	00D5 Õ	00D8 Ø	00DE Þ	014A Ŋ	0154 Ŕ	0106 Ć	015A Ś	0179 Ź	0164 Ť	00F0 ð
F-	00E3 ã	00E5 å	00E6 æ	0153 œ	0175 ŵ	00FD ý	00F5 õ	00F8 ø	00FE þ	014B ŋ	0155 ŕ	0107 ć	015B ś	017A ź	0165 ť	0127 ħ

10.2. DL and other text services

A digital radio receiver allows for the decoding of DL whether or not other services

associated with the program are transmitted (PAD – *Programme-Associated Data*: DL Plus, slide show).

A digital radio receiver correctly formats DL, in line with the decoded 0x0A and 0x0B characters and PN-ETSI EN 300 401 V2.1.1:2017-08[1].

Upon receiving a message cancelling a label, a digital radio receiver immediately removes that label from the display, even if it has not been presented in its entirety yet. This concerns both label-scrolling and multi-line displays that present the label in its entirety.

Where it is not technically possible to display special characters with diacritical marks (i.e. in the case of segment displays), the display substitutes them with their respective diacritical-less counterparts as follows:

decoded sign	Ą	Ć	Ę	Ł	Ń	Ó	Ś	Ż	Ź	ą	ć	ę	ł	ń	ó	ś	ż	ź
displayed sign	A	C	E	L	N	O	S	Z	Z	a	c	e	l	n	o	s	z	z
displayed sign (option)	A	C	E	L	N	O	S	Z	Z	A	C	E	L	N	O	S	Z	Z

11. Requirements for a digital radio receiver tuner

Gaussian sensitivity of a digital radio receiver (FSG_{min}) is determined using the following formula:

FSG_{min} = [34,4 + 20log(F/220)] dBµV/m, where F is the centre frequency in MHz.

In the case of a car radio receiver, the Gaussian sensitivity is determined with the use of the following formula:

FSG_{min} = [29,2 + 20log(F/220)] dBµV/m, where F is the centre frequency in MHz.

A digital radio receiver sold with no antenna ensures a correct reception quality at the power level of -97.7 dBm in a Gaussian channel.

Digital radio receiver sensitivity in the Rayleigh channel (FSR_{min}) is determined with the use of the following formula:

FSR_{min} = [39,9 + 20log(F/220)] dBµV/m, where F is the centre frequency in MHz.

In the case of a car radio receiver, the Rayleigh sensitivity is determined with the use of the following formula:

FSR_{min} = [34,7 + 20log(F/220)] dBµV/m, where F is the centre frequency in MHz.

A digital radio receiver sold with no antenna ensures a correct reception quality at the power level of -92.2 dBm in a Rayleigh channel.

Rayleigh fading channel characteristics are defined in Appendix D to ETSI TS 103 461 V1.2.2:2020-10 [9]

Receiver selectivity requirements are laid down in the table below. The DAB+ signal level considered as desired for selectivity testing was -70 dBm.

Table 3

Receiver selectivity requirements

Centre frequency of DAB+ spurious response	**Permissible level of DAB+ spurious response in relation to the desired signal**
±1.712 MHz in relation to the desired signal	+35 dB
±3.428 MHz in relation to the desired signal	+40 dB
±5.136 MHz in relation to the desired signal	+45 dB
For all spurious response frequencies with an offset of over 6 MHz in relation to the desired signal	+45 dB

In the case of digital radio receivers equipped with antenna connectors, a connector impedance of 75 Ω for fixed receivers and 50 Ω for car radio receivers is required.