

Appendix Operational Guideline

1. Transmission

Operational guideline of transmission should be referred to ABNT NBR 15608-1 with the modifications as follows.

- Delete or ignore all the descriptions of VHF
- Replace DQPSK with QPSK

For more detail, please refer to the table AP1-1.

Concerning the channel planning described in the above document, coverage parameters can be defined by Botswana based on other materials: The recommendation ITU-R BT.1368 is one of the useful materials for the planning criteria. The recommendation ITU-R BT.2036 is also useful for a reference receiving system. Available parameters according to hierarchical transmission mode should be referred to the table AP1-2.

Table AP1-1 Modifications from ABNT NBR 15608-1

Section No. and item	page	Original ISDB-T Standards	Botswana ISDB-T Standards
5.2 Frequency assignment	4	tables 2, 3, 4, 5 and 6	Table A1-3 8MHz/ch UHF channels
		table2 -VHF Channels	N/A
		table4-High VHF channels	N/A
	5	table 5 14ch-69ch	21-48ch
6.1 Outline	7	6.1 Outline DQPSK or 16QAM is employed	QPSK or 16QAM is employed
6.2.1 Multiplexing ...	7	6.2.1, DQPSK is preferable ...	Deleted
	8	table8	Ignore DQ and DQPSK
6.3 channel-coding...	12	DQPSK	QPSK
	16	Figure7, 8, 9 and 10 DQPSK	QPSK
8.3.1 Broadcasting...	19	0.3ppm	0.2ppm
9.4.3 Data arrangement...	38	d) EXEMPLO DQPSK	QPSK
10 Transmission...	42	Table 30 Delay time	Delay time values are to be replaced to the ones multiplied by 6/8
11.5 Example of link budget	57	Table42 DQPSK 1/2: 6.2 2/3: 7.7 3/4: 8.7 5/6: 9.6 7/8: 10.4	QPSK 1/2: 4.9 2/3: 6.6 3/4: 7.5 5/6: 8.5 7/8: 9.1
	58	Table43 DQPSK Data rate	QPSK All data rate are to be replaced to the one multiplied by 8/6

Table AP1-2 Available Parameters According to Hierarchical Transmission Mode

Patterns	Layer	Layer Name	Number of segments	Transmission (See Table AP1-3)
(1)	A	Low Protection Layer	13	a
(2)	A	Low Protection Layer	13	b
(3)	A	High Protection Layer	1 (Partial reception)	c
	B	Low Protection Layer	12	a
(4)	A	High Protection Layer	8 to 2	b
	B	Low Protection Layer	5 to 11	a
(5)	A	High Protection Layer	1 (Partial reception)	c
	B	Low Protection Layer	12	b
(6)	A	High Protection Layer	1 (Partial reception)	c
	B	Middle Protection Layer	7 to 1	b
	C	Low Protection Layer	5 to 11	a

(Note) With regard to combinations of transmission parameters, Type c of transmission mode shall take transmission parameters with an equal or lower CN ratio than Type b of transmission mode and Type b of transmission mode shall take transmission parameters with a lower CN ratio than Type a of transmission mode. The required CN ratios are shown in Table 42 of ABNT NBR 15608-1 modified according to the table AP1-1. For example, if layer A in (5) uses 16QAM and 1/2, layer B may use only 16QAM and 1/2, or 16QAM and 2/3 as shown in Type b in Table AP1-3 as modulation and error correction parameters.

Layers: A, B and C represent layers described in the TMCC signal.

Layer name: The name of the layer used in Hierarchical transmission described in ABNT NBR 15608-3.

The services provided by the layers to which transmission mode (Type a), transmission mode (Type b) and transmission mode (Type c) shown in Table AP1-2 are respectively applied may be called the "fixed service", "mobile service" and "portable service", respectively.

No digital audio service will be provided.

Table AP1-3 Transmission Parameters

Type	Mode ^(Note 1)			Guard Ratio ^(Note 1)				Time Interleave ^(Note 2)				Modulation and Error Correction														
												64QAM				16QAM				QPSK						
	1	2	3	1/4	1/8	1/16	1/32	I=0	I=1	I=2	I=4	7/8	5/6	3/4	2/3	1/2	7/8	5/6	3/4	2/3	1/2	7/8	5/6	3/4	2/3	1/2
a	X	X	O	O	O	O	X	X	O	O	O	O	X	X	O	O	X	X	X	X	X	X	X	X	X	X
b	X	X	O	O	O	O	X	X	O	O	O	X	X	X	X	O	O	X	X	X	X	O	X	X	O	O
c	X	X	O	O	O	O	X	X	O	O	O	X	X	X	X	X	X	X	X	X	X	O	X	X	O	O

O: Transmission parameters that can be used

X: Transmission parameters that cannot be used

Note 1: The mode and guard ratio are specified and applied to all layers and they cannot be individually specified for each layer.

Note 2: The use of "no time interleaving (I=0)" shall be restricted even in fixed reception, considering the tolerance to pulse noise.

2. Video Coding

The operational guideline of video coding should be referred to ABNT NBR 15608-2. However video coding parameters for full-seg services are applied to any layers except for the partial reception layer.

3. Audio Coding

The operational guideline of audio coding should be referred to ABNT NBR 15608-2. However audio coding parameters for full-seg services are applied to any layers except for the partial reception layer.

4. Multiplexing

The operational guideline of multiplexing should be referred to ABNT NBR 15608-3.

5. Service Information

Operational guideline of service information should be referred to ABNT NBR 15608-3 with the modifications as shown in Table AP5-1.

AP5-1 Modifications from ABNT NBR 15608-3

Section No. and item	Page	Original ISDB-T Standards	Botswana ISDB-T Standards
2 Normative references	1	ABNT NBR 15606-2, Digital terrestrial television	Deleted
5.1 Coding table	3	The PSI/SI table coding, including tis descriptors adheres to ISO/IEC 8859-15, as shown in Table 1.	The PSI/SI table coding, including tis descriptors adheres to UTF-8, as shown in Bullet 8. Table1, 2 and 3 should be ignored.
	4	For caption strings and data packages coding, the coding table and the control characters shown in Table 2 should be used.	For caption strings and data packages coding, the coding table and the control characters shown in Bullet 8 should be used.
	4	Furthermore, in caption string coding, it is recommended that the special G3 characters shown on Table 3 be used as specified in ABNT NBR 15606-1. Since the G3 special characters are attributed hexadecimal values coincident with the character map defined by ISO/IEC 8859-15, for correct decoding, it is recommended that each G3 special characters value be preceded by the control code <SG3> (0x1D).	Deleted
Table 28 — Attribution of	22	- 0x40 to 0x6F : Mono media and	- 0x40 to 0x7F : Mono media

Section No. and item	Page	Original ISDB-T Standards	Botswana ISDB-T Standards
component_tag values		objects carousel - 0x70 to 0x7F : Events messages and data carousel (DII and DDB)	- 0x40 to 0x7F : Events messages and data carousel (DII and DDB)
Table 30 — ES for transmission in different layers from that intended for partial reception	25	- MPEG-4 AAC Audio (48kHz) - Mono-media Component tag value : 0x40 to 0x6F - Objects carousel - Event messages and data carousel (DII and DDB) Component tag value : 0x70 to 0x7F	- MPEG-4 AAC Audio - Mono-media Component tag value : 0x40 to 0x7F - Deleted - Event messages and data carousel (DII and DDB) Component tag value : 0x40 to 0x7F
19.2 Local_offset_time_descriptor configuration	31-32	-BRA -0x425241 -UTC-3 -Brazilian	-BWA -0x425741 -UTC+2 - Botswana
Table 35 — Details of TOT sections	32	- UTC-3 - official Brazilian time - ="BRA"=0x425241 - See Table 36	- UTC+2 - official Botswana time - =" BWA"=0x425741 - =0
Table 36 – Sections of the local_offset_Time_descriptor	33	Table 36	Deleted
21.2 Additional specification concerning data components Table 39	37	- data_component_id 0x0007 Ginga_XML base multimedia coding - data_component_id 0x00A4 Ginga - Application executing engine - data_component_id 0x00A3 Ginga – Application - data_component_id 0x00A0 Ginga - Application executing engine information table	• data_component_id 0x000C A profile BML (for Home TV) • data_component_id 0x000D C profile BML (for One-seg)
Table 44 - Data structure of the data content descriptor	41	"por"=0x706F72 (defines the language used in "text char")	"eng"=0x656E67 or "tsn"=0x74736E can be used
23.5 Operating rules for transmission Table 49	46	- 0011: 480p - 0100: 480i - 0111: 288p - 1001 up to 1111: video_encode_format (extended)	- 0011: 480p or 576p - 0100: 480i or 576i - 0111: Reserved - 1001 up to 1011: Reserved - 1100 up to 1111: video_encode_format (extended)
29.5.1 SDTT Data structure	60	The identification should be made using the prefixes defined by ANATEL.	Deleted

Section No. and item	Page	Original ISDB-T Standards	Botswana ISDB-T Standards
29.9.1.6 Band width	71	-0.25/0.38 quantity -0,25 used segment $-10 \times 1024 \times 1024 \times 8 / (351.07 \times 1000) = 238,94 \text{ s}$ -The bandwidth of the network of 1 segment is 1 404,29 Kbit/s $-1404,29 \times 0,25 = 351,07 \text{ [Kbits/s]}$ $-86400 / 238,94 / 2 = 180,8 \text{ times}$	-0.18/0.28 quantity -0.18 used segment $-10 \times 1024 \times 1024 \times 8 / (337.03 \times 1000) = 248,90 \text{ s}$ - The bandwidth of the network of 1 segment is 1 872.39 Kbit/s $-1872.39 \times 0.18 = 337.03 \text{ [Kbits/s]}$. Note that the bandwidth limitation is 0.35207 Mbit/s as described above in order to keep consistency with 6 MHz countries about the bandwidth limitation. $-86400 / 248.9 / 2 = 173.5 \text{ times}$
29.9.5 Daylight saving time operations (SDTT method)	78	Brazilian time (UTC-3)	Botswana time (UTC+2)
31.2 Affiliation_id	83	The affiliation_id field allows identifying which network (Globo, SBT, Record, Band, RedeTV, etc.) a broadcaster belongs.	The affiliation_id field allows identifying which network a broadcaster belongs.
31.2 Affiliation_id	83	For standardization of affiliation_id value, the characters codes shown in Table 76 should be used in order to generate the affiliation_id value for each network. The mains TV networks and your affiliation_id are shown in Table 80.	Deleted
31.2 Affiliation_id	83	Table 80	Deleted
31.2 Affiliation_id	83	The networks that are not listed in Table 80 should request the affiliation_id value to the SBTVO Forum.	Deleted

6. Receiver

The operational guideline on receiver should be based on "ISDB-T HARMONIZATION DOCUMENT PART 1: HARDWARE" (at least mandatory and recommended items) (Note). Guard interval mask characteristics should be referred to the recommendation ITU-R BT.2036. Any other items should be in accordance with the Chapter 6 of the main body.

(Note) The "ISDB-T HARMONIZATION DOCUMENT PART 1: HARDWARE" doesn't correspond to 8MHz system. Japan is ready to propose the modifications to include 8MHz system for the next ISDB-T International Forum..

7. Security Issues

The operational guideline on Security Issues should be in accordance with the Chapter 7 of the main body.

8. Data broadcasting

Operational guideline of BML data broadcasting, subtitle and superimposed characters coding should be in accordance with ARIB TR-B14 Vol.3 "DIGITAL TERRESTRIAL TELEVISION BROADCASTING Specifications for Data Broadcasting Operations".

There are some modifications for the Botswana guideline as shown in the Table AP8-1. Data broadcasting guideline is referred also in Service Information guideline in point of data_component_descriptor. See Appendix 5 for the details.

Table AP8-1 Modifications from ARIB TR-B14

Section No. and item	Page	Original ISDB-T Standards	Botswana ISDB-T Standards
3 Definitions	3-2	- 8-bit character encoding - DRCS - EUC-JP	Deleted Deleted UTF-8
	3-3	- Kana-Kanji conversion	Deleted
1.2.1 Table 1-2 Presentation restrictions on the screen plane	3-16	- MPEG-2 - MPEG-1 - 8-bit character codes including (*)EUC-JP - 8-bit character codes	H.264 Deleted UTF-8 UTF-8.
1.2.3 Table 1-4 Overview of restriction conditions for mono-media encoding presented in each screen plane	3-21	- MPEG-2 - Stream format identification = 0x02 - MPEG-1 - 8-bit character codes(*) Including EUC-JP	- H.264 MPEG-4 AVC - Stream format identification = 0x1B - Deleted - UTF-8
1.2.4 Table 1-5 Audio playing function	3-25	- AAC-LC - Audio PES; Stream format identification = 0x0F - 48kHz,32kHz	- MPEG4-AAC standard - Audio PES; Stream format identification = 0x11 - 48kHz,44.1kHz
1.2.5 Table 1-6 Fonts	3-25	Character type	See Annex8 Table A8-1-2 for Character set for Botswana
1.4.2 Table 1-9 Type and capacity of BproNV	3-27	Whole of Table	The number of affiliations has been fixed as 24.
1.6 Character entry function	3-28	Functions not defined in this document such as the kana kanji conversion function are implementation dependent.	Deleted
1.6.1 Table 1-12 "character type" attribute	3-30	- hankaku - zenkaku - katakana - hiragana	- Deleted - Deleted - Deleted - Deleted

Section No. and item	Page	Original ISDB-T Standards	Botswana ISDB-T Standards
1.6.1 Function specifications	3-30	EUC-JP encoding	UTF-8 encoding
1.6.2 Table 1-14 character type	3-32	- 2 byte characters	- Deleted
1.6.3 Kana Kanji conversion function	3-32	Whole of section	Deleted
3.1.1 MPEG-1 Video	3-80	Whole of section	Deleted
3.1.2 MPEG-2 Video	3-80	Whole of section	Deleted
3.1.3 MPEG-4 Visual	3-85	Encoding methods using MPEG-4 Visual are not operated.	Adding H.264 MPEG-4 AVC operation. Details in ABNT NBR 15608-2.
3.3.1 MPEG-2 AAC	3-88	Whole of section	Deleted
3.3.2 AIFF-C	3-89	Whole of section	Deleted
3.3.3 MPEG-4 Audio	3-89	Audio encoding method using MPEG-4 is not operated.	Adding MPEG4-AAC operation. Details in ABNT NBR 15608-2.
3.3.6.2 Simultaneous playable encoding method	3-90	- AAC-LC	- MPEG-4 AAC
3.4 Character encoding	3-91	Whole of section	No use in Botswana
Volume 3 Section 2 4.2.8.7 Data Contents Descriptor Table 4-10 Setup parameters of the Data Content Descriptor for caption	3-107	Fixed to jpn(Japanese).	"eng"=0x656E67 or "tsn"=0x74736E can be used
Volume 3 Section 2 4.4.1 Character codes	3-109	The character encoding method used for caption/superimpose is 8-bit character codes.	The character encoding method used for caption/superimpose is UTF-8 character code.
Volume 3 Section 2 4.4.3 Character size control	3-109	Restrictions related to character display are stipulated in Table 4-14	Deleted
Volume 3 Section 2 4.4.3 Character size control Table 4-14 Area of coding group that can be used for specification of display format and specification of character size controls	3-110	Whole table	Deleted
Volume 3 Section 2 4.4.3 Character size control	3-111	Whole of paragraph (1)	

Section No. and item	Page	Original ISDB-T Standards	Botswana ISDB-T Standards
Volume 3 Section 2 4.4.3 Character size control	3-111	(2)	Deleted
Volume 3 Section 2 4.5.1 Control codes	3-123	Control codes used in caption are in compliance with ARIB STD-B24 Vol. 1 Part 2, 7.1.2.	Control codes used in caption are in compliance with Annex A8-1 in this document
Volume 3 Section 2 4.5.2 Operation of flashing	3-132	Flashing of the 8-bit character codes character string does the character flashing	Flashing string ("FLC") of the UTF-8 enables the character flashing
Volume 3 Section 2 4.6 Operation of the DRCS	3-135 3-136	Whole section	Deleted
5.2 Operation of NVRAM	3-142	Table 5-1 NVRAM used in Digital Terrestrial Television Broadcasting	The maximum number of Affiliations and Networks in one broadcasting area should be set as 24. See Table AP8-2 as the exact list of NVRAM when using the number of 24.
5.5 Operation of character codes	3-159	Refer to ARIB STD-B24 Vol. 2 Appendix 2 "4.1. Character codes".	UTF-8
5.5.1 Transmission of DRCS pattern data	3-159	Whole of section	Deleted
5.6 Operation area of media type and mono-media	3-160	charset='euc-jp'	charset='UTF-8'
5.7.3 Table 5-9 Operational guidelines relating to the attributes of elements	3-164	- Fixed to "ja" - Fixed to "EUC-JP" - ...and type attribute is either "audio/X-arib-aiff" or "audio/X-arib-mpeg2-aac".	- Fixed to "tn" - Fixed to "UTF-8" - ...and type attribute is "audio/X-arib-mpeg4-aac".
5.11 Presentation control of BML document	3-175	- "video/X-arib-mpeg1" or "video/X-arib-mpeg2" - "audio/X-arib-mpeg2-aac"	- "video/X-arib-H264-high" - "audio/X-arib-mpeg4-aac"
5.14.6.6 Interaction channel function-TCP/IP	3-201 3-202	EUC-JP	UTF-8
5.14.6.12 External character function	3-209	Whole of section	Deleted
5.14.8 Operation guideline for transmission of communication contents	3-215 ~3-220	- ja - audio/X-arib-mpeg2-aac - audio/X-arib-aiff - application/X-arib-drccs - EUC-JP	- tn - audio/X-arib-mpeg4-aac - Deleted - Deleted - UTF-8
Appendix 5-1 DTD	3-280	EUC-JP	UTF-8
1 Introduction	3-301	MPEG-2 AAC	MPEG-4 AAC

Section No. and item	Page	Original ISDB-T Standards	Botswana ISDB-T Standards
3.2.4 Table 3-6 Desired audio mono-media to be presented	3-310	- MPEG-2 AAC - stream format identifier = 0x0F - Sampling frequency 24kHz, 48kHz	- MPEG-4 AAC - stream format identifier = 0x11 - Sampling frequency 32kHz, 44.1kHz, 48kHz
3.2.5 Table 3-7 Fonts	3-310	- Kanji (level 1, 2) - Hirakana - Katakana	- Deleted - Deleted - Deleted
3.4.2 Table 3-10 Type and capacity of BproNV	3-313	- 288KB(12 affiliations x 24KB)	The number of affiliations has been fixed as 24.
3.6.3 Character types	3-314	- refer to ARIB STD-B24, Vol. 1, Part 2, 7.3 - Kanji	- refer to ARIB STD-B24, Vol. 1, Part 2, 7.2 (Refer Annex8 A8-1) - Deleted
3.6.4 Kana Kanji conversion function	3-314	Whole of section	Deleted
4.1.2.4 Configuration of the ES transmitted by 1 service	3-330	MPEG-2 AAC	MPEG-4 AAC
4.1.5.1 Receiver operation at the beginning of data broadcasting	3-333	Moreover, Playback is executed as an audio stream of MPEG-2 AAC (sampling frequency = 24KHz) if the component of the component_tag=0x83 or 0x84 is included. Similarly, Playback is executed out as an audio stream of MPEG-2 AAC (sampling frequency = 48KHz) if the component of the component_tag=0x85 or 0x86 is included.	Moreover, Playback is executed as an audio stream of MPEG-4 AAC (sampling frequency = 48KHz) if the component of the component_tag=0x83 or 0x84 is included. Similarly, Playback is executed out as an audio stream of MPEG-4 AAC (sampling frequency = 44.1KHz) if the component of the component_tag=0x85 or 0x86 is included. Similarly, Playback is executed out as an audio stream of MPEG-4 AAC (sampling frequency = 32KHz) if the component of the component_tag=0x90 or 0x91 is included.
5.1.1 H.264 MPEG-4 AVC	3-355	Whole of section	Details in ABNT NBR 15608-2.
5.3.1 MPEG-2 AAC	3-369	Whole of section	MPEG-4 AAC Follows ABNT NBR 15608-2
5.3.5 Audiosynthesis of receiver units	3-371	MPEG-2 AAC	-MPEG-4 AAC
5.4 Character codes	3-372	- 5.4.1 8-bit character codes for C-profile - 5.4.2 Shift JIS	- Deleted - 5.4.1 UTF-8
Volume 3 Section 4 6.2.4 Operation of closed caption management data Table 6-3: Closed caption management data parameters	3-376	Used language code ("jpn" fixed)	Used language code ("eng"=0x656E67 or "tsn"=0x74736E can be used)

Section No. and item	Page	Original ISDB-T Standards	Botswana ISDB-T Standards
Volume 3 Section 4 6.4.1 Character entity	3-379	Whole sentences and Table 6-2	Deleted
Volume 3 Section 4 6.4.1 Character entity	3-379		The character encoding method used for closed caption is UTF-8 character code. Control code range is from 0x0000 to 0x001F (inclusive) and from 0xC280 to 0xC29F (inclusive).
Volume 3 Section 4 6.5 Control code used in closed caption	3-381	The control code used in the closed caption is compliant with ARIB STD-B24, Vol. 1, Part 2, 7.1.2.	The control code used in the closed caption is compliant with Annex A8-1 in this document.
7.2 Operation of NVRAM in Digital Terrestrial Television C-profile broadcasting	3-388	Table 7-1 NVRAM used by Digital Terrestrial Television C-profile broadcasting	The maximum number of Affiliations and Networks in one broadcasting area should be set as 24. See Table AP8-3 as the exact list of NVRAM when using the number of 24.
7.5 Operation of character coding schemes	3-393	See ARIB STD-B24, Vol. 2, Appendix 4, "4.1. Character Coding Schemes".	Using UTF-8
7.7.1 Declaration of XML and DOCTYPE	3-393	Shift_JIS	UTF-8
7.7.3 Table 7-5 Operations for attributes of elements	3-397	- Shift_JIS - audio/X-arib-mpeg2-aac	- UTF-8 - audio/X-arib-mpeg4-aac
7.9 extended property specification	3-414	- Refer to the ARIB STD-B24, Vol. 1, Part 2, Chapter 7, 7.3 "Shift-JIS character codes" - Kanji set	- Refer to ARIB STD-B24, Vol. 1, Part 2, 7.2 (Refer Annex8 A8-1) - Deleted
7.10.7 Extended function provided by digital terrestrial broadcasting (2)	3-447	- tokyo_dgree - tokyo_dms	- Deleted - Deleted
7.12.6.1 Table 7-27 Attribute operation related to stream presentation	3-465	audio/X-arib-mpeg2-aac	audio/X-arib-mpeg4-aac

Table AP8-2 NVRAM usage for Botswana A-profile Data broadcasting
(See Table AP8-1 Column 5.2 Operation of NVRAM)

Type	Meaning	NVRAM amount
A-profile memory area for all the broadcasters	Common area available for use by all terrestrial digital broadcasters.	2KB (Fixed length block of 64bytes * 32)
A-profile memory area for the affiliation	Common area available for use by broadcasters that belong to the same system.	•4KB for one Affiliation (Fixed length block of 64bytes * 64) •Number of systems: more than 24

Type	Meaning	NVRAM amount
A-profile memory area for the specified broadcaster	Area occupied by each broadcaster	<ul style="list-style-type: none"> •4KB for one broadcaster (Fixed length block of 64bytes * 64) •Number of broadcasters that should be secured by receiver units simultaneously: more than 24
A-profile memory area of communication purpose for the specified broadcaster	Area to share information with broadcasting contents and communication contents	<ul style="list-style-type: none"> •2KB for 1 broadcaster. (Fixed length block of 64bytes *32) •Number of broadcasters that should be secured by receiver simultaneously: more than 24
Memory area for bookmark service	Area available to use for the bookmark service	•Total of more than 50 blocks of variable length block with maximum of 320 bytes.
Memory area for root CA certificates	Area to store root CA certificate of general purpose transmitted by carousels in memory.	<ul style="list-style-type: none"> •3KB for one certificate •Quantity : 8
Memory area for registration transmission	Area to store messages that carry out registration transmission	•More than 3 blocks of variable length block with maximum of 1.5 KB.

Table AP8-3 NVRAM usage for Botswana C-profile Data broadcasting
(See Table AP8-1 Column 7.2 Operation of NVRAM in Digital Terrestrial Television C-profile broadcasting)

Class	Purpose	Capacity of NVRAM
Digital Terrestrial Television C-profile area for the affiliation	Area used commonly by operators belonging to the same affiliation area	<ul style="list-style-type: none"> • 24KB per affiliation (64 byte fixed block * 384) • 8KB out of 24KB is for inner affiliation common area, and the remaining 16KB is divided by 8 and used as the individual operator area. • Affiliation number: 24 affiliations
TVlink area	Area used for TVlink service	<ul style="list-style-type: none"> • Maximum of 256 bytes variable block • Writable block number: 50 or more

9. Interactive channel

The operational guideline on the Interactive channel should be in accordance with the Chapter 9 of the main body.

10. EWBS

The operational guideline on EWBS should be in accordance with the Chapter 10 of the main body.

If there is a TV broadcaster not operating the EWBS, the TV receivers tuned to that channel cannot receive the EWBS signal. Therefore it is required that all broadcasters should operate the EWBS.

Area codes in Botswana are as follows.

AP10-1 Area code

For the EWBS application purpose, receivers should pre-store the area code allocation table. In accordance with ABNT15603, area code uses a 12-bit string, with the left bit first, as shown in Figure AP10-1

b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
-----	-----	----	----	----	----	----	----	----	----	----	----

Figure AP10-1 12-bit string for area code

AP10-2 Actual allocation table

The actual allocation table of area code in Botswana is shown in Table AP10-1.

Table AP10-1 Area code allocation Table

Common	District	Sub-District / Area	Area Code (Binary)	Area Code (Decimal)
National	Central District		00001100100	100
	Central District	Francistown	000011001001	201
		Serowe/Palapye	000011001010	202
		Tutume	000011001011	203
		Bobonong	000011001100	204
		Letlhakane	000011001101	205
		Mahalapye	000011001110	206
		Selebi-Phikwe	000011001111	207
		Sowa Town	000011010000	208
		Tonota	000011010001	209
	Ghanzi District		000100101100	300
	Ghanzi District	Charleshill	000100101101	301
		Ghanzi	000100101110	302
	Kgalagadi District		000110010000	400
	Kgalagadi District	Hukuntsi	000110010001	401
		Tsabong	000110010010	402
		Kang	000110010011	403
		Bokspits	000110010100	404
	Kgatleng District		000111110100	500
	Kgatleng District	Mochudi	000111110101	501

Table AP10-1 Area code allocation Table (Cont.)

Common	District	Sub-District / Area	Area Code (Binary)	Area Code (Decimal)
	Kweneng District		001001011000	600
		Letlhakeng	001001011001	601
		Mogoditshane	001001011010	602
		Molepolole/ Lentsweletau	001001011011	603
		Thamaga	001001011100	604
	North-East District		001010111100	700
		Masunga	001010111101	701
	Chobe		001100100000	800
		Kasane	001100100001	801
		Pandamatenga	001100100010	802
	North-West District		001110000100	900
		Gumare	001110000101	901
		Maun	001110000110	902
		Shakawe	001110000111	903
	South-East District		001111101000	1000
		Gaborone	001111101001	1001
		Ramotswa	001111101010	1002
	Southern District		010001001100	1100
		Goodhope	010001001101	1101
		Jwaneng	010001001110	1102
		Kanye	010001001111	1103
		Mabutsane	010001010000	1104
		Lobatse	010001010001	1105
		Moshopa	010001010010	1106

11. Outline of operational parameters

Some operation parameters for Botswana digital terrestrial television broadcasting are shown in Table AP11-1

Table AP11-1

Item		Contents
DTTB system		ISDB-T system
Operating channel		470–694MHz (channels 21 to 48)
Channel bandwidth	Full-seg	7.6 MHz
	One-seg	0.58 MHz
Central carrier frequency		474 –690
Transmission mode		Mode 3
Guard Interval ratio		1/4, 1/8, 1/16
Carrier Modulation	Full-seg	QPSK, 16QAM, 64QAM
	One-seg	QPSK, 16QAM
Error Correction (Inner Code)		Convolutional Code (Coding Rate: 1/2, 2/3, 3/4, 5/6 or 7/8)
Error Correction (Outer Code)		(204,188) Reed-Solomon Code
Interleave	Full-seg	Frequency and Time Interleave
	One-seg	Time interleaving length: I=1,2 or 4
Video Coding		H.264 MPEG-4 AVC (ISO/IEC 14496-10)
Video profile	Full-seg	Up to HP @ L4.0
	One-seg	Up to BP @ L1.3
Video format	Full-seg	576i, 576p, 720p, 1080i, 1080p
	One-seg	SQVGA, QVGA, CIF
Video frame rate	Full-seg	25, 50fps
	One-seg	5, 10, 12, 15, 24, 25, 30fps
Audio Coding		MPEG-4 AAC (ISO/IEC 14496-3)
Audio Profile	Full-seg	LC AAC @L2, L4 HE-AAC+SBR v.1 @ L2, L4
	One-seg	HE-AAC+SBR+PS v.2 @ L2
Audio sampling frequency	Full-seg	48kHz, 44.1kHz
	One-seg	48kHz, 44.1kHz, 32kHz (AAC sampling frequency: 24kHz, 22.05kHz, 16kHz)
Multiplexing		MPEG-2 Systems (ISO/IEC 13818-1)
Data Broadcasting		BML
EWBS		ISDB-T Harmonization Document PART 3

12. ARIB Standards

ARIB Standards

http://www.arib.or.jp/english/html/overview/sb_ej.html

The versions of ARIB Standards referred in the Botswana ISDB-T Standards are as follows.

Standrd		Version
Number	Title	
ARIB STD-B24	Data Coding and Transmission Specification for Digital Broadcasting	5.2
ARIB STD-B31	Transmission system for digital terrestrial television broadcasting	2.2
ARIB TR-B14	Operational guidelines for digital terrestrial television broadcasting	3.8

Bibliography

(ITU Recommendation)

<http://www.itu.int/en/publications/Pages/default.aspx>

(ISO/IEC standards)

http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45316

(ABNT Standards)

<http://forumsbtvd.org.br/acervo-online/normas-brasileiras-de-tv-digital/>

The versions of ABNT Standards referred in the Botswana ISDB-T Standards are as follows.

Standrd		Version
Number	Title	
ABNT NBR 15601	Digital terrestrial television – Transmission system	2007
ABNT NBR 15602-1	Digital terrestrial television – Video coding, audio coding and multiplexing Part 1: Video coding	2007
ABNT NBR 15602-2	Digital terrestrial television – Video coding, audio coding and multiplexing Part 2: Audio coding	2007
ABNT NBR 15602-3	Digital terrestrial television – Video coding, audio coding and multiplexing Part 3: Signal multiplexing systems	2007
ABNT NBR 15603-1	Digital terrestrial television – Multiplexing and service information (SI) Part 1: SI for digital broadcasting systems	2008
ABNT NBR 15603-2	Digital terrestrial television – Multiplexing and service information (SI) Part 2: Data structure and definitions of basic information of SI Descriptors:	2009
ABNT NBR 15603-3	Digital terrestrial television – Multiplexing and service information (SI) Part 3: Syntaxes and definitions of extension information of SI Descriptors:	2009
ABNT NBR 15604	Digital terrestrial television – Receivers	2007
ABNT NBR 15605-1	Digital terrestrial television — Security issues Part 1: Copy control	2009
ABNT NBR 15607-1	Digital terrestrial television — Interactive channel Part 1: Protocols, physical interfaces and software interfaces	2011
ABNT NBR 15608-1	Digital terrestrial television – Operational guideline Part 1: Transmission system – Guide for implementation of ABNT NBR 15601:2007	2008
ABNT NBR 15608-2	Digital terrestrial television – Operational guideline Part 2: Video coding, audio coding and multiplexing – Guideline for implementation of ABNT NBR 15602:2007	2010
ABNT NBR 15608-3	Digital terrestrial television — Operational guideline Part 3: Multiplexing and service information (SI) – Guideline for implementation of ABNT NBR 15603:2007	2012

(ISDB-T Harmonization Document)

<http://www.dibeg.org/techp/aribstd/harmonization.html>