(UNOFFICIAL TRANSLATION)

Notification of the National Broadcasting and Telecommunications Commission

Re: Technical Standard for Digital Terrestrial Television Receiver

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Whereas it is deemed appropriate to set out technical standard for digital terrestrial television receiver in order to ensure that the public are able to use such receiver to view the broadcast digital television programs in an efficient, standardized and quality manner with advanced technology as a way of protecting consumers and contributing to the industry as a whole;

Pursuant to Section 27 (10) and (24) and Section 37 of the Act on Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010), which contains certain provisions regarding the restriction of the rights and freedom of an individual as permitted to be done under the law by Article 29, together with Articles 35, 36, 41, 43, 45, 46, 47, 61 and 64 of the Constitution of the Kingdom of Thailand; the National Broadcasting and Telecommunications Commission hereby prescribes the technical standard for digital terrestrial television receiver, as detailed in the Technical Standard No. NBTC BS 4002-2555 appended hereto.

This Notification shall come into force as from the day following the date of its publication in the Government Gazette.

Announced on the 2nd day of November B.E. 2555 (2012)

Colonel

(Natee Sukonrat)

Chairman of the Broadcasting Committee

Officiating for Chairman of the National Broadcasting

and Telecommunications Commission

NBTC BS 4002-2555 (2012)

Technical Standard
for Digital Terrestrial Television Receiver

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1. Scope

This Technical Standard specifies the minimum technical specifications for digital terrestrial television receiver, including both receiver with display screen (Integrated Digital Television, iDTV) and receiver without display screen (Set-Top-Box), which are capable of receiving digital television signal in the Second Generation Digital Terrestrial Television Broadcasting System (DVB-T2) in both Standard Definition (SD) format and High Definition (HD) format.

2. General Requirements

2.1 Technical Requirements of Electrical Characteristics and Safety

The receiver shall comply with the electrical characteristics and safety requirements as defined in TIS 1195-2536 [1].

2.2 Technical Requirements of Electromagnetic Compatibility

The receiver shall comply with the electromagnetic compatibility standard as defined in CISPR 13 [2] or TIS 2185-2547 [3].

2.3 Installation and Usage

The receiver shall be supplied with an installation manual and instruction manual, available in both Thai and English languages.

2.4 Remote Control

The receiver shall be supplied with a remote control with tactile marking placed on the number '5' button.

3. Technical Requirements of Connectors and Interfaces

The receiver shall have connectors and interfaces in accordance with the specifications in Table 1.

Table 1 Technical requirements of connectors and interfaces

Type of Connectors	Requirements
RF input connector	Female connector shall be in accordance with IEC 60169-2 [4], with input impedance of 75 ohm. The receiver without display screen (Set-Top-Box) shall support DC power supply of 5V for active antenna, with users being able to set on/off by themselves, and the default shall be set to "off."
RF loop-through	The receiver without display screen shall have the male connector in accordance with IEC 60169-2.
Video and audio connectors	The receiver without display screen (Set-Top-Box) shall have output connectors as follows: 1. RCA-phono socket for stereo audio signal output bundled with cable. 2. RCA-phono socket for composite video signal output bundled with cable. 3. HDMI socket with HDCP for digital signal output bundled with cable.

4. RF Tuner and Decoder Requirements

4.1 Radio Frequency Requirements

Radio frequency requirements of RF tuner in the receiver shall comply with the requirements in Table 2.

Table 2 Properties and requirements of RF tuner in the receiver

Properties	Requirements
Frequency range of receiver	470-862 MHz
Bandwidth	8 MHz
Noise Figure (NF)	Not exceeding 6 dB
Receiver sensitivity	Below -78.3 dB for FFT 32K (extended), 256-QAM, code rate 2/3, SISO and pilot pattern PP7
Channel offset	Able to receive carriers within an offset of up to ±125 kHz from the nominal center frequency.

4.2 DVB-T2 Operating Modes

The operation of DVB-T2 receiving and decoding modes shall comply with ETSI EN 302 755 [5] and shall support the minimum requirements in Table 3.

Table 3 Required DVB-T2 operating modes

Parameter	Minimum Requirements
FFT size	1K, 2K, 4K, 8K (normal), 8K (extended), 16K (normal), 16K (extended), 32K (normal), and 32K (extended)
Modulation	QPSK,16-QAM, 64-QAM, and 256-QAM
Code rate	1/2, 3/5, 2/3, 3/4, 4/5, and 5/6
Guard interval	1/128, 1/32, 1/16, 19/256, 1/8, 19/128, and 1/4
Pilot pattern	PP1 to PP7
Service type	1. Support both Single PLP (Mode A) and Multiple PLP (Mode B) 2. Support Single Frequency Network (SFN) in accordance with ETSI TS 101 191 [6]

5. Technical Requirements of De-multiplexing and Transport Stream

De-multiplexing and decoding for MPEG-2 transport stream of the receiver shall comply with ETSI TS 101 154 [7] and ISO/IEC 13818-1 [8].

6. Technical Requirements of Video and Audio Signals

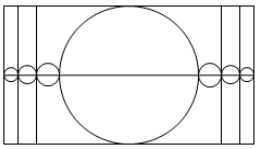
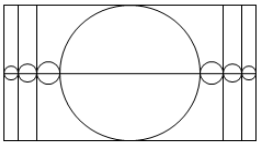
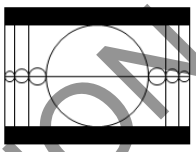
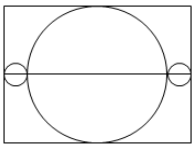
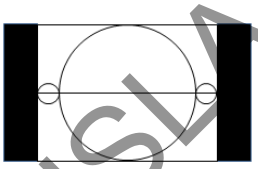
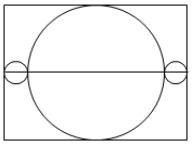
Technical specifications of video and audio signals shall comply with the requirements in Table 4.

Table 4 Video and audio requirements

Characteristics	Required Standards
Video decoder	MPEG-4 AVC/H.264 in accordance with ISO/IEC 14496-10 [9]
Video display	Support High Definition (HD) format with 1920x1080 interlaced (1080i) Frame rate : 25 frames/sec Aspect ratio : 16:9
	Support High Definition (HD) format with 1280x720 progressive (720p) Frame rate : 50 frames/sec Aspect ratio : 16:9
	Support Standard Definition (SD) format with 720x576 interlaced (576i) Frame rate : 25 frames/sec Aspect ratio : 16:9 and 4:3
Audio decoder	Decoding stereo audio signal, MPEG-4 HE AACv2, in accordance with ISO/IEC 14496-3 [10]

The video display shall support display types in accordance with the specification of Active Format Description (AFD) under the ETSI TS 101 154 standard, by supporting at least two types shown in Table 5.

Table 5 Video signal display formats

Input Video Signal				Output Video Display	
Source Video Signal		Broadcast Aspect Ratio	AFD Code		
Source Video Aspect Ratio	Source Image from Input Video Signal			16:9	4:3
16:9		16:9	1000		
4:3		4:3	1001		

7. Technical Requirements of Data Processing and Display

7.1 Processor and Memory

The receiver shall have processor and memory that are equal to or better than the following specifications:

1. DDRAM Memory : minimum 64 MB
2. Flash Memory : minimum 8 MB
3. CPU Processor Speed : minimum 300 MHz

7.2 Character Set

The receiver shall support character set as specified in ETSI EN 300 468[11] in Character Code Table 00 – Latin alphabet with Unicode equivalents and Character Code Table 07 - Latin/Thai alphabet with Unicode equivalents.

7.3 On Screen Display (OSD) Language

The receiver shall support Thai and English menu, with the default being set to Thai or the user being able to select language at the first time of use.

7.4 Subtitling System

The receiver shall support the subtitling system in accordance with ETSI EN 300 743 [12] and shall also be able to decode and display in Display Definition Segment (DDS) under such standard.

7.5 Support of Multi-Language Display

The receiver shall support multi-language audio output and subtitling and allow users to choose the primary language of their own, and shall at least support the languages specified in Table 6.

Table 6 Support languages

Language	ISO 639-3 [13] Code
Thai	THA
English	ENG
Original Audio	QAA

7.6 Service and Channel Number

The receiver shall be able to receive all signals in each service area by scanning through frequency range specified in Clause 4.1.

All services shall have a logical channel number (LCN), and the digital terrestrial television channel with original network ID (ONID) of Thailand shall be arranged as the first priority. The channel plan shall cover from number 1 through number 999 and shall be assigned as follows:

(1) Number 1 to 799 shall be reserved for domestic channels which have ONID of 0x22FC.
(2) Number 800 to 999 shall be reserved for channels which have other ONID.

If the digital terrestrial television network is updated or changed as follows:

(1) addition or deletion of multiplexes,
(2) change in frequency of multiplex,
(3) addition or deletion of television channels,
(4) change in channel number, or
(5) any other change that affects the television channel,

the receiver shall be fully updated and correctly display television channels.

7.7 Logical Channel Descriptor

The receiver shall support the Logical Channel Descriptor Version 2, which is the information on channel list in service area, as detailed in Table 7.

Table 7 Structure of local channel descriptor

Structure	Bit	Data Type
Logical_channel_v2_descriptor (){		
descriptor_tag	8	Uimsbf
descriptor_length	8	Uimsbf
for (i=0;i<N;i++){		
channel_list_id	8	Uimsbf
channel_list_name_length	8	Uimsbf
for (i=0;i<N;i++) {		
char	8	Uimsbf
}		
country_code	24	Uimsbf
descriptor_length	8	Uimsbf
for (i=0;i<number_of_services;i++){		
service_id	16	Uimsbf
visible_service_flag	1	Bslbf
reserved_future_use	5	Bslbf
logical_channel_number	10	Uimsbf
}		
}		
}		

Following are parameter descriptions:

Descriptor_tag shall be 0x87 (or 135 in decimal).

Descriptor_length is 8-bit field for specifying the length of descriptor.

Channel_list_id is 8-bit field and is used for specifying a channel list for each service area. Such value shall be unique within the Original Network.

In case more than one list of channels is found when scanning, users shall be able to select their desired list. The receiver shall arrange the channels according to each list.

Channel_list_name_length is 8-bit field and is used for identifying number of bytes that follow this field (name of the channel list) that specifies the number of characters in the name of the channel list. Such name is limited to a maximum of 23 bytes.

Char is 8-bit character. A String of characters is used for describing the name of the channel list. Such information shall be in reference to the character set defined in Character Code Table 00 – Latin alphabet with Unicode equivalent in accordance with ETSI EN 300 468.

Country_code is 24-bit field used for specifying country name in a three-character type in accordance with ISO 3166 [14]. Each character shall be coded into 8 bits in accordance with ISO 8859-1 [15] and shall be inserted respectively in this 24-bit field. This field must be set to "THA."

Service_id is used for specifying service ID on the transport stream.

Visible_service_flag is set to 1 when desiring to display the television channel (visible) and is set to 0 when desiring not to display the television channel (not visible).

Reserved_future_use shall be set to 1. The receiver must ignore this field.

Logic_channel_number is channel number.

7.8 Electronic Program Guide (EPG)

The receiver shall support processing and display of electronic program guide (EPG) from DVB SI EIT p/f Table and DVB SI EIT Schedule in accordance with ETSI EN 300 468. The display must include at least the following data:

(1) Current date (day/month/year) and time
(2) Start time of present program (now/present) and next program (next/follow)
(3) End time of present program (now/present) and next program (next/follow)
(4) Logical Channel Number (LCN)
(5) Event name and/or title of program
(6) Short description
(7) Program category

The receiver shall be able to store and display EPG in advance of at least 7 days (24 hours/day).

7.9 Display of Signal Strength and Signal Quality

The receiver shall be able to display the signal strength and signal quality on panel of the receiver or through the display screen.

8. System Software Update (SSU)

The receiver shall support the software update functions as specified in ETSI TS 102 006 [16] and shall at least support simple profile.

9. Conformity of Technical Standard

The receiver shall demonstrate the conformity of technical standard as described in Notification of the National Broadcasting and Telecommunications Commission with respect to conformity assessment of radiocommunication equipment and equipment for broadcasting service. While the said notification has not yet come into force, the Supplier's Declaration of Conformity (SDoC) shall apply, whereby the operator, the producer, the merchandiser or the importer of digital terrestrial television receiver who is responsible for such device shall issue the official confirmation to certify that the receiver complies with the technical standard specified herein.

Glossary

AFD	Active Format Description
AVC	Advanced Video Coding
Bslbf	Bit serial, leftmost bit first
DDS	Display Definition Segment
DVB-T2	Second Generation Digital Terrestrial Television Broadcasting System
EPG	Electronic Program Guide
EIT	Event Information Table
ETSI	European Telecommunication Standards Institute
FFT	Fast Fourier Transform
HDCP	High-Bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDTV	High Definition Television
iDTV	Integrated Digital Television
LCN	Logical Channel Number
MPEG	Moving Pictures Expert Group
OSD	On Screen Display
ONID	Original Network ID
PLP	Physical Layer Pipe
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RCA	Radio Corporation of America
RF	Radio Frequency
SD	Standard Definition
SDoC	Supplier's Declaration of Conformity
SDTV	Standard Definition Television
SFN	Single Frequency Network
SI	Service Information
SSU	System Software Update

STB	Set-Top-Box, which is equivalent to a digital terrestrial receiver
Uimsbf	Unsigned integer most significant bit first

References

[1] TIS 1195-2536: Mains Operated Electronic and Related Apparatus for Household and Similar General Use: Safety Requirements

[2] CISPR 13:2009: Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and methods of measurement

[3] TIS 2185-2547: Sound and television broadcast receivers and associated equipment: Radio disturbance limits

[4] IEC 60169-2: Radio-frequency connectors, Part 2: Coaxial unmatched connector

[5] ETSI EN 302 755 v1.3.1 (2012-04): Digital Video Broadcasting (DVB); Frame structure channel coding and modulation for a second generation digital terrestrial television broadcasting system (DVB-T2)

[6] ETSI TS 101 191 v1.4.1 (2004-06): Digital Video Broadcasting (DVB); DVB mega-frame for Single Frequency Network (SFN) synchronization

[7] ETSI TS 101 154 v1.10.1 (2011-06): Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream

[8] ISO/IEC 13818-1:2007: Information technology - Generic coding of moving pictures and associated audio information: Systems

[9] ISO/IEC 14496-10:2012: Information technology - Coding of audio-visual objects - Part 10: Advanced video coding

[10] ISO/IEC 14496-3:2009: Information technology - Coding of audio-visual objects - Part 3: Audio

[11] ETSI EN 300 468 v1.13.1 (2012-08): Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems

[12] ETSI EN 300 743 v1.4.1 (2011-10): Digital Video Broadcasting (DVB); Subtitling systems

[13] ISO 639-3: Codes for the representation of names of languages - Part 3: Alpha-3 code for comprehensive coverage of languages

[14] ISO 3166: Codes for the representation of names of countries and their subdivisions

[15] ISO 8859-1: Information technology - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1

[16] ETSI TS 102 006 v1.3.2 (2008-07): Digital Video Broadcasting (DVB); Specification for System Software Update in DVB Systems

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This English Translation is prepared with the sole purpose of facilitating the comprehension of foreign participants in the broadcasting rules and regulations and shall not in any event be construed or interpreted as having effect in substitution for or supplementary to the Thai version thereof.

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