

TECHNICAL CODE

SPECIFICATION FOR DIRECT-TO-HOME (DTH) BROADCAST RECEIVER FOR SET TOP BOX (STB) (SECOND REVISION)

Developed by



Registered by



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Development of technical codes

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For further information on the technical code, please contact:

Malaysian Communications and Multimedia Commission (MCMC)

MCMC Tower 1
Jalan Impact
Cyber 6
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: +60 3 8688 8000
Fax: +60 3 8688 1000
<http://www.mcmc.gov.my>

OR

Malaysian Technical Standards Forum Bhd (MTSFB)

MCMC Centre of Excellence (CoE)
Off Persiaran Multimedia
Jalan Impact
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: +60 3 8320 0300
Fax: +60 3 8322 0115
<http://www.mtsfb.org.my>

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Committee representation

This technical code was developed by the Multimedia Broadcast Receiver Sub Working Group under the Broadcast Technology Working Group of the Malaysian Technical Standards Forum Bhd (MTSFB) which consists of representatives from the following organisations:

Fraunhofer IIS

LG Electronics (M) Sdn Bhd

Maxis Broadband Sdn Bhd

Measat Broadcast Network System Sdn Bhd

Media Prima Berhad

Multimedia University

MYTV Broadcasting Sdn Bhd

Samsung Malaysia Electronics (SME) Sdn Bhd

Sharp Electronics (M) Sdn Bhd

SIRIM Berhad

SmarDTV Global S.A.S

Sony EMCS Malaysia Sdn Bhd

Telekom Malaysia Berhad

Wideminds Pte Ltd

Foreword

This technical code for Specification for Direct-To-Home (DTH) Broadcast Receiver for Set Top Box (STB) ('this Technical Code') was developed pursuant to Section 95 and Section 185 of the Act 588 by the Malaysian Technical Standards Forum Bhd ('MTSFB') via its Broadcast Technology Working Group.

This Technical Code was developed for the purpose of certifying communications equipment under the Communications and Multimedia (Technical Standards) Regulations 2000.

Major modifications in this revision are as follows:

- a) Inclusion of new standard for Electromagnetic Compatibility (EMC), MS CISPR 32 (Clause 4.1.3).
- b) Update on Double Data Random Access Memory (DDRAM), flash processor and memory (Clause 4.2.1).
- c) Inclusion of the Network Download (NWDL) as one of the updates mechanisms besides Over Air Download (OAD) (Clause 4.2.1).
- d) Inclusion of High Efficiency Video Coding (HEVC) H.265 according to ISO/IEC 23008-2 or ITU-T H.265 for video codec (Clause 4.2.3.1).
- e) Inclusion of the Universal Serial Bus (USB) as an option for common interface slot according to ETSI TS 103 605 (Clause 4.2.8).
- f) Update on the Electronic Programme Guide (EPG) (Clause in 4.2.11).

This Technical Code replaces the SKMM MTSFB TC T006:2013, *Specification for Direct-to-Home (DTH) Satellite Broadcast Receiver*.

This Technical Code shall continue to be valid and effective from the date of its registration until it is replaced or revoked.

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SPECIFICATION FOR DIRECT-TO-HOME (DTH) BROADCAST RECEIVER FOR SET TOP BOX (STB)

1. Scope

This Technical Code specifies the requirements for the Direct-to-Home (DTH) broadcast receiver for Set Top Box (STB) to be used for Ku Band signals reception. The inputs to the STB are L-Band composite carriers in the frequency range of 950 MHz to 2 150 MHz coming from the Satellite Receiving Antenna (SRA) systems downlink.

This Technical Code is to ensure compatibility and interoperability of STB across different DTH service providers in Malaysia. All requirements defined in this Technical Code shall be supported as a minimum, except the requirements that are defined as optional.

2. Normative references

The following normative references are indispensable for the application of this Technical Code. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including any amendments) applies.

See Annex A.

3. Abbreviations

For the purposes of this Technical Code, the following abbreviations apply.

See Annex B.

4. Requirements

4.1 General requirements

The STB shall comply to all the requirements stated in this section.

In addition, if the STB supports other communication modules, the STB shall fulfil the additional requirements specified in other related technical codes (if any).

The STB is illustrated in Annex C.

4.1.1 Power supply

The STB may be Alternating Current (AC) or Direct Current (DC) powered. For AC powered equipment, the operating voltage shall be 240 V +5 %, -10 % and frequency 50 Hz \pm 1 % according to MS 406 or 230 V \pm 10 % and frequency 50 Hz \pm 1 % according to MS IEC 60038, whichever is current.

Where external power supply is used, e.g. AC adaptor, it shall not affect the capability of the STB to meet this specification. Adaptor shall be pre-approved by the relevant regulatory body before it can be used with the STB. Adaptor shall be subjected to test under tropical condition as specified in the related standard.

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4.1.2 Power supply cord and mains plug

If the STB is fitted with power supply cord and mains plug, the power supply cord and mains plug shall be pre-approved by the relevant regulatory body with the following requirements before being used with the equipment:

- a) The power supply cord shall be certified according to:
 - i) MS 2112-5 or BS EN 50525-2-11 or IEC 60227-5 (for Polyvinyl Chloride (PVC) insulated - flexible cables or cords); or
 - ii) MS 2127-4 or IEC 60245-4 (for rubber insulated - flexible cables or cords).
- b) The mains plug shall be certified according to:
 - i) MS 589-1 or BS 1363 (for 13 A, fused plugs); or
 - ii) MS 1577 (for 15 A, fused plugs); or
 - iii) MS 1578 or BS EN 50075 (for 2.5 A, 250 V, flat non-rewireable two-pole plugs with cord for the connection of class II equipment).

4.1.3 Electromagnetic Compatibility (EMC)

The STB shall comply with the Electromagnetic Compatibility (EMC) emissions requirements as defined in the MS CISPR 32 or equivalent international standards. The requirements shall cover radiated and conducted emissions.

4.1.4 Electrical safety

The STB shall comply with the safety requirements defined in MS IEC 60065, IEC 62368 or any equivalent standards.

4.1.5 Marking

The STB and/or its component shall be marked with the following information:

- a) service provider identification;
- b) supplier or manufacturer's name or identification mark;
- c) equipment's brand name or trademark and model;
- d) other markings as required by the relevant standards; and
- e) MCMC certification mark (shall be affixed once the STB is certified by certification body).

The markings shall be legible, indelible and readily visible. All information on the marking shall be either in Bahasa Malaysia or English.

All equipment shall be designed with the ability to be serviced. Ease of maintenance shall be a feature of the equipment.

The STB shall be supplied with an operation and installation manual in Bahasa Malaysia or English.

4.2 Technical requirements

4.2.1 Processor and memory

The processing power and memory configuration of the STB shall be suitable for the routine operation of Free-to-Air (FTA) or paid subscription of digital satellite reception via Digital Video Broadcasting - Satellite version 2 (DVB-S2) together with the embedded operation of the interactive application and the provision of the routine replacement of all software via Over-Air Download (OAD) or Network Direct Download (NDDL) update mechanism. The related parameter limits specified in Table 1 shall be complied with.

Table 1. Processor and memory requirement specifications

Parameter	Minimum requirements
Double Data Random Access Memory (DDRAM)	At least 256 MB, minimum baseline functionality
Flash	At least 256 MB, minimum baseline functionality
Central Processing Unit (CPU) processor speed	1,000 DMIPS, minimum baseline functionality

4.2.2 Spectrum

DTH services in Malaysia will be provided on Ku-band as in Table 2 below.

Table 2. Frequency spectrum for DTH services in Malaysia

Frequency range	Band	Polarisation
10.70 – 11.70 GHz	Lower	Vertical or horizontal
11.70 – 12.75 GHz	Upper	Vertical or horizontal

4.2.3 DTH Tuning

Upon boot up, the STB shall tune to the default entry point tuning parameter and acquire the required Program Specific Information (PSI) tables. From this tables, the STB shall build a channel list and electronic program guide information. The STB also shall support capability for manual entry tuning parameters.

4.2.4 Video

4.2.4.1 Video codec

The STB shall be supported with the following video codec:

- a) Moving Pictures Expert Group 2 (MPEG-2) video: MPEG-2 MP@ML
- b) Moving Pictures Expert Group 4 (MPEG-4) video: H.264 Advanced Video Coding (AVC) Encoding, as stipulated in ISO/IEC 14496-10 and ETSI TS 101 154.

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The profiles that shall be supported are as follows:

- a) MPEG-4 AVC MP@L3 SD Video stream; and
- b) MPEG-4 AVC HP@L4 HD Video stream.

4K video codec is an optional feature. However, for manufacturers opting to offer 4K, High Efficiency Video Coding (HEVC) H.265 as stipulated in ISO/IEC 23008-2 or ITU-T H.265 is mandatory.

4.2.4.2 Video decoding

The following resolutions as described in Table 3 shall be supported according to video codecs above where applicable.

Table 3. Codec specifications

Resolution	Frame rate	Scanning	Aspect ratio	Profile
720 x 576	25	Interlaced	4:3 or 16:9	MPEG-4 AVC HP @ L3 H.264
1 280 x 720	50	Progressive	16:9	MPEG-4 AVC HP @ L4 H.264
1 440 x 1 080	25	Interlaced	16:9	MPEG-4 AVC HP @ L4 H.264
1 920 x 1 080	25	Interlaced	16:9	MPEG-4 AVC HP @ L4 H.264
1 920 x 1 080	25	Progressive	16:9	MPEG-4 AVC HP @ L4 H.264
1 920 x 1 080	50	Progressive	16:9	H.264

For the Ultra High Definition (UHD) STB, the following resolutions as described in Table 4 shall be supported.

Table 4. Codec specifications for UHD STB

Resolution	Frame rate	Scanning	Aspect ratio	Profile
960 x 540	25/50	Progressive	16:9	H.265
960 x 720	25/50	Progressive	16:9	H.265
1 280 x 720	25/50	Progressive	16:9	H.265
1 440 x 1 080	25	Interlaced	16:9	H.265
1 920 x 1 080	25	Interlaced	16:9	H.265
1 440 x 1 080	25/50	Progressive	16:9	H.265
1 920 x 1 080	25/50	Progressive	16:9	H.265
3 840 x 2 160	25/50	Progressive	16:9	H.264 or H.265

The STB shall support both 16:9 (widescreen) and 4:3 picture format changes, including support for the correct aspect ratio and use of the Active Format Descriptor (AFD) as defined in ETSI TS 101 154.

For High Definition (HD) and UHD outputs, the STB should be able to use the Extended Display Identification Data (EDID) information provided by the sink device to automatically determine the STB output.

The STB shall provide an original format option, i.e. to output the same format as received if supported by the display, as indicated by the EDID information. If the received format is not supported; the STB should select the display mode providing the best possible video quality. This is to avoid the blank STB output if there is a mismatch between received format and display capabilities. It shall also be possible to manually set the default output format from the STB to a fixed format.

4.2.5 Audio

4.2.5.1 Audio codec

Moving Pictures Expert Group 1 (MPEG-1) Layer II or MPEG-2 Layer II (MP 2) audio for services will be encoded according to ISO/IEC 11172-3. The sampling rate is 32, 44.1 and 48 kHz while the bit rates are 32, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 and 384 kbps.

MPEG-4 High-Efficiency Advanced Audio Coding (HE AAC) audio for services will be encoded according to ISO/IEC 14496-3 and signalled or constrained by clause 6.4 and Annex C.5 of ETSI TS 101 154.

Dolby Digital (AC3) shall support both AC3 decoder and pass-through mode. AC3 shall be supported via Sony/Philips Digital Interface (S/PDIF) interface in pass-through mode only for a connection to home theatre systems as depicted in Figure 1 below.

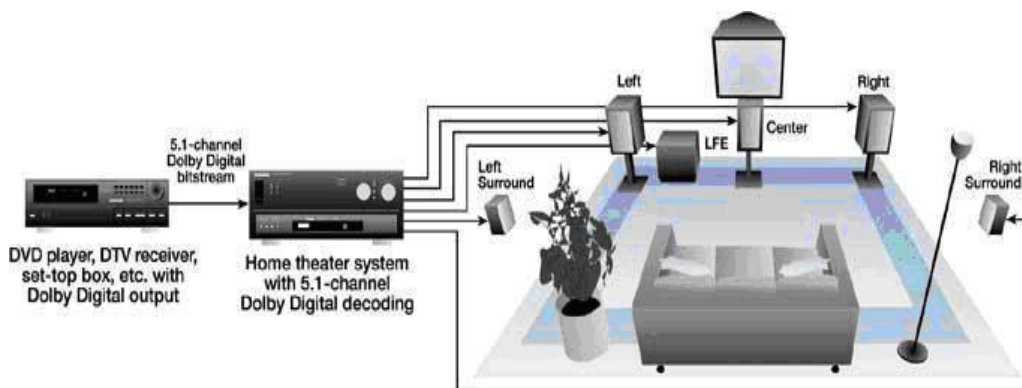


Figure 1. AC3 connection for home-theatre system

The Enhanced Surround Sound Technology Dolby Digital (E-AC3) is based on ETSI TS 102 366 and signalled by ETSI TS 101 154, Annex C and constrained by clause 6.2. Sampling rates should be restricted to 32, 44.1 and 48kHz.

Only pass through of AC3 audio to the digital audio connector shall be required when E-AC3 is supported.

E-AC3 shall also be supported to work with H.264/MPEG-4 or HEVC video content supporting data rates from 30 kbps to 640 kbps. It shall support only up to 7.1 full-range channels.

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4.2.5.2 Audio decoding

Stereo only receivers shall support audio codecs above decoding including optional downmix and support of metadata as defined in clause 6.4.3 and Annex C.5 of ETSI TS 101 154.

Multichannel capable receivers shall support audio codecs above decoding including optional transcoding into either AC-3 or Digital Theatre System (DTS) and support of metadata as defined in clause 6.4.3 and Annex C.5 of ETSI TS 101 154.

The STB shall support decoding of audio bit streams. Receivers should support conversion of HE-AAC v2 Level 4 streams to either an AC3 or DTS bit stream for output via S/PDIF or High-Definition Multimedia Interface - Audio Return Channel (HDMI ARC). Pass through of the HE-AAC v2 Level 4-bit stream over S/PDIF or HDMI ARC may be supported.

The STB should support decoding of E-AC-3 elementary streams. Receivers should also support conversion of E-AC-3 elementary streams to an AC-3 bitstream for output via High-Definition Multimedia Interface (HDMI) and S/PDIF. If this option is supported, the decoding and conversion of an E-AC3 elementary stream shall conform to the requirements defined in ETSI TS 102 366 including its Annex E.

4.2.6 Subtitle

A compliant STB shall be able to decode Digital Video Broadcasting (DVB) subtitles according to the specification outlined in ETSI EN 300 743. DVB subtitles shall be invoked from a suitable labelled remote-control key which is always under the control of the STB and not controlled by the middleware application.

4.2.6.1 Display of subtitles during enhanced programming

Subtitles shall be displayed on a separate logical graphics plane separate from that used for the interactive application.

4.2.7 Multi-language support

The user shall be provided with primary and secondary language options for both subtitles and audio selection. The minimum requirements for subtitles and audio selection languages are outlined in the Table 5 below.

Table 5. Multi-language support

Language	ISO 639-3
English	ENG
Bahasa Malaysia	MSA
Chinese	ZHO
Tamil	TAM
Original Audio	QAA*
NOTE: Original audio is only applicable for Audio.	

4.2.7.1 Subtitle selection

The order of priority for subtitle selection shall be as follows:

- a) primary language;
- b) secondary language (optional); and
- c) receivers' own selection criteria (optional).

The STB may implement its own selection criteria after (a) and (b) fail to provide a language match.

The STB shall automatically choose the primary audio language and if not, choose the secondary if available. The user shall be able to select the primary and secondary language via the menu and select the preferred audio language while watching a given service.

4.2.7.2 Audio selection

The order of priority for audio selection shall be as follows:

- a) primary language;
- b) secondary language (optional); and
- c) receivers' own selection criteria (optional).

The STB may implement its own selection criteria after (a) and (b) fail to provide a language match.

The STB shall automatically choose the primary audio language and if not, choose the secondary if available. The user shall be able to select the primary and secondary language via the menu and select the preferred audio language while watching a given service.

4.2.8 Receiver character set

The text strings shall be coded using the character code table 00 - Latin Alphabet as specified in ISO 6937 and Annex A of EN 300 468. It is required that the STB embedded character set is character code table 00 - Latin Alphabet. It is not required for receivers to support any other character sets within native SI.

4.2.9 Conditional Access (CA)

The STB shall have at least one common interface slot, example Universal Serial Bus (USB) complying with ETSI TS 103 605 v1.1.1 Alternatively, a smartcard or mini-Subscriber Identification Module (SIM) card reader can be fitted in complying to the ISO/IEC 7810 and/or ISO/IEC 7816.

4.2.10 Modulation and Radio Frequency (RF)

The STB shall support the requirements of reception signalling as outlined in Table 6 below.

Table 6. Reception of signals

RF/IF frequency range	950 MHz - 2 150 MHz
Input signal level or receiver sensitivity	-65 dBm to -25 dBm
Supply Low-Noise Block Downconverter (LNB) current	Up to a maximum of 500 mA with overload protection; with a minimum capability of 150 mA
Supply LNB volts	Vertical polarisation: 13 Vdc Horizontal polarisation: 18 Vdc
Signalling	13/18 V and 22 kHz tone switching
Digital Satellite Equipment Control (DiSEqC)	Support for 1.x or 2.x
Demodulation	Quadrature Phase Shift Keying (QPSK) 8PSK 16APSK 32APSK
Input symbol rates	15 - 30 MS/s
Forward Error Correction (FEC) codes	LDPC + BCH 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 6/7, 8/9, 9/10
LNB Local Oscillator (LO) frequency	Lower band: 10.7 GHz - 11.7 GHz Upper band: 11.7 GHz - 12.75 GHz
NOTE: Reception of signals is according to ETSI EN 302 307	

The STB shall recover from changes in modulation parameters and output an error free Transport Stream (TS). This shall take less than one second for any change.

4.2.11 Service list

After a receiver is installed, it shall offer the viewer all services that may be received in that geographic region compliant with the regional services requirement. The services being broadcast may change over time. To ensure that the viewer will always be able to access all services being broadcast to the selected region, the receiver shall detect and reflect to the viewer any such changes with minimal viewer involvement.

All services have an associated Logical Channel Number (LCN). Use of the LCN ensures that the viewer becomes familiar with a specific remote control unit button number for each channel. Access to, and use of, accurate service information is essential if the viewer is to enjoy all of the content being broadcast.

4.2.12 Electronic Program Guide (EPG)

Receiver middleware shall receive an Electronic Program Guide (EPG) broadcast in DVB Event Information Table (EIT) schedule tables. The middleware application shall render the EPG on screen according to the User Interface (UI) specification. Through the UI, the user shall be able to browse Television (TV) listings and perform associated functions such as setting reminders (optional) and recordings (optional).

The STB shall be able to capture and display at least 7 days of EPG based on broadcasted EIT schedule information. EIT information capture shall be done in the background continuously (optional). This will enable the STB to display the Full EPG as soon as the EPG button is pressed.

4.2.13 Software upgrade

The STB shall support the following requirements as stated below:

- a) The STB shall be capable of supporting over the air download from satellite;
- b) All devices with network capability are required to support download from Internet (optional);
- c) All devices are required to support USB upgrade (optional).

4.2.14 Input and output

The STB shall have the following ports as below.

- a) Fast ethernet RJ45 IEEE 802.3 or WiFi IEEE 802.11n as minimum;
- b) USB 2.0 as minimum; and
- c) HDMI - High-bandwidth Digital Content Protection (HDCP) for all HD and UHD broadcasts where applicable.

4.2.14.1 High-Definition Multimedia Interface (HDMI)

The STB shall support HDMI female output connector or an intermediate connector that provides the capable connectivity. All the features available under HDMI v1.3a specification with the HDMI Compliance Test Specification (CTS) v1.3c shall be supported.

The STB should also support the Video Electronics Standards Association - Extended display identification data (VESA-EDID) standard.

4.2.14.2 HDCP protection

The STB HDMI output shall be protected with HDCP version 1.4 for all HD video content and HDCP version 2.2 for all UHD content digital content protection for content licenses requiring HDCP protection.

HDCP copy protection shall be enabled at all times but under the control of Conditional Access (CA) or middleware. The HDMI output shall be constrained or muted under the CA or middleware control if an HDCP connection cannot be established. The HDCP management shall be enabled by default.

HDCP copy protection shall be enabled and disabled under the control of CA or middleware. If not required by the content provider, HDCP is not applicable.

4.2.14.3 CVBS RCA

If the manufacturer wishes to include RCA into the STB, the STB shall have a standard Composite Video Baseband Signal (CVBS) RCA output capable of PAL 576i output to compatible TV or video sink.

4.2.14.4 S/PDIF connector

The Dolby Digital 5.1 audio should be output via S/PDIF connector as described in Table 7. Only coaxial or optical TOS link connector shall be supported.

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Table 7. S/PDIF connector

Cabling	75 Ω coaxial
Connector	RCA (orange colour) or TOSLink
Signal level	0.5 V - 1V
Modulation	Biphase-mark-code
Sub code information	Serial Copy Management System (SCMS) copy protection info
Max. resolution	20 bits (24 bit optional)

It shall be possible to mute the analogue and digital audio outputs simultaneously under application control. The Dolby approved logo shall be printed on the STB subject to service provider's approval.

4.2.14.5 USB port

The STB should have a minimum of 1 USB port. The USB interface shall be a USB type A and compliant with USB revision 2.0 specification at a minimum.

4.2.15 Remote control interface

A remote control shall be simple and easy to use. Basic functionality such as power, volume control shall be placed on prominent locations on the remote control. Colour-coded multifunctional buttons can be included to enhance user experience and ease the navigation on the STB.

4.2.16 Renewable security

The STB design should not preclude the ability to revise or replace the CA algorithm for control word generation, if the system becomes compromised.

4.2.17 Middleware

The STB shall support middleware system with EPG application as specified by the operators.

4.2.18 Transport

The transport shall be compatible with a minimum of ISO/IEC 13818-1, MPEG-2-systems layer standard. The STB shall be able to decode MPEG-2 system layer bitstream.

4.2.19 Environmental conditions

The unit shall operate with an ambient temperature range of 5 - 60 °C without forced air cooling. The STB shall meet all of the performance requirements of this standard when operated intermittently or continuously under the following conditions as stated in Table 8 below.

Table 8. Environmental conditions

Ambient temperature	5 °C to 60 °C (operating) 0 °C to 60 °C (non-operating)
Relative humidity	65% non-condensing

Annex A
(normative)

Normative references

MS 406, *Specification for voltages and frequency for alternating current transmission and distribution systems*

MS 589-1, *13 A plugs, socket-outlets, adaptors and connection units - Part 1: Specification for rewirable and non-rewirable 13 A fused plugs*

MS 1577, *Specification for 15 A plugs and socket-outlets for domestic and similar purposes*

MS 1578, *Specification for flat non-rewirable two-pole plugs, 2.5 A, 250 V with cord, for the connection of class II - Equipment for household and similar purposes*

MS 2112-5, *Electric cable and wire - Polyvinyl Chloride (PVC) insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables*

MS 2127-4, *Rubber insulated cables of rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables*

MS CISPR 32, *Electromagnetic compatibility of multimedia equipment - Emission requirements*

MS IEC 60065, *Audio, video and similar electronic apparatus – Safety requirements*

MS IEC 60038, *IEC Standard Voltages*

Recommendation ITU-T H.265, *Infrastructure of audiovisual services – Coding of moving video - High efficiency video coding*

IEC 60227-5, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords)*

IEC 60245-4, *Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables*

IEC 62368-1, *Audio/video, information and communication technology equipment - Part 1: Safety requirements*

ISO 639 (all parts), *Codes for the Representation of Names of Languages*

ISO 6937, *Information technology - Coded graphic character set for text communication - Latin alphabet*

ISO/IEC 7810, *Identification cards - Physical characteristics*

ISO/IEC 7816, *Identification cards - Integrated circuit cards - Part 8: Commands and mechanisms for security operations*

ISO/IEC 11172-3, *Information technology - Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s - Part 3: Audio*

ISO/IEC 13818-1, *Information technology - Generic coding of moving pictures and associated audio information - Part 1: Systems*

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ISO/IEC 14496-3, *Information technology – Coding of audio-visual objects – Part 3: Audio*

ISO/IEC 14496-10, *Information technology - Coding of audio-visual objects - Part 10: Advanced video coding*

ISO/IEC 23008-2, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 2: High efficiency video coding*

ETSI EN 300 743, *Digital Video Broadcasting (DVB); DVB subtitling systems*

ETSI EN 300 468, *Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems*

ETSI EN 302 307-1, *Digital Video Broadcasting (DVB); Second Generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications; Part 1: DVB-S2*

ETSI TS 101 154, *Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcast and Broadband Applications*

ETSI TS 102 366, *Digital Audio Compression (AC-3, Enhanced AC-3) Standard*

ETSI TS 103 605, *Digital Video Broadcasting (DVB); Second Generation Common Interface (CI); Implementation Using the Universal Serial Bus (USB)*

BS 1363: Part 1, *13 A plugs, socket-outlets, adaptors and connection units. Specification for rewirable and non-rewirable 13 A fused plugs*

BS EN 50075, *Specification for flat non-wirable two-pole plugs 2.5 A 250 V, with cord, for the connection of class II-equipment for household and similar purposes*

BS EN 50525-2-11, *Electric cables. Low voltage energy cables of rated voltages up to and including 450/750V (U0/U) - Cables for general applications. Flexible cables with thermoplastic PVC insulation*

Annex B
(informative)

Abbreviations

AC	Alternating Current
AC3	Dolby Digital
AFD	Active Format Descriptor
AVC	Advanced Video Coding
CA	Conditional Access
CPU	Central Processing Unit
CTS	Compliance Test Specification
CVBS	Composite Video Baseband Signal
DC	Direct Current
DDRAM	Double Data Random Access Memory
DiSEqC	Digital Satellite Equipment Control
DTH	Direct-to-Home
DTS	Digital Theatre System
DVB	Digital Video Broadcasting
DVB-S2	Digital Video Broadcasting - Satellite version 2
E-AC3	Enhanced Surround Sound Technology Dolby Digital
EDID	Extended Display Identification Data
EIT	Event Information Table
EMC	Electromagnetic Compatibility
EPG	Electronic Program Guide
FEC	Forward Error Correction
FTA	Free-to-Air
HD	High Definition
HDCP	High-bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDMI ARC	High-Definition Multimedia Interface - Audio Return Channel
HE-AAC	High-Efficiency Advanced Audio Coding
HEVC	High Efficiency Video Coding
LCN	Logical Channel Number
LNB	Low-Noise Block Downconverter
LO	Local Oscillator
MP 2	MPEG-2 Layer II

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MPEG-1	Moving Pictures Expert Group 1
MPEG-2	Moving Pictures Expert Group 2
MPEG-4	Moving Pictures Expert Group 4
NWDL	Network Direct Download
OAD	Over-Air Download
PSI	Program Specific Information
PVC	Polyvinyl Chloride
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
S/PDIF	Sony/Philips Digital Interface
SCMS	Serial Copy Management System
SIM	Subscriber Identification Module
SRA	Satellite Receiving Antenna
STB	Set Top Box
TS	Transport Stream
TV	Television
UHD	Ultra High Definition
UI	User Interface
USB	Universal Serial Bus
VESA-EDID	Video Electronics Standards Association - Extended display identification data

Annex C
(informative)

Illustration of Set Top Box (STB) and their interfaces

Figure C.1 shows the illustration of STB and their interface. The design shall not be limited to this figure since it is provided as for the purpose of the illustration only.

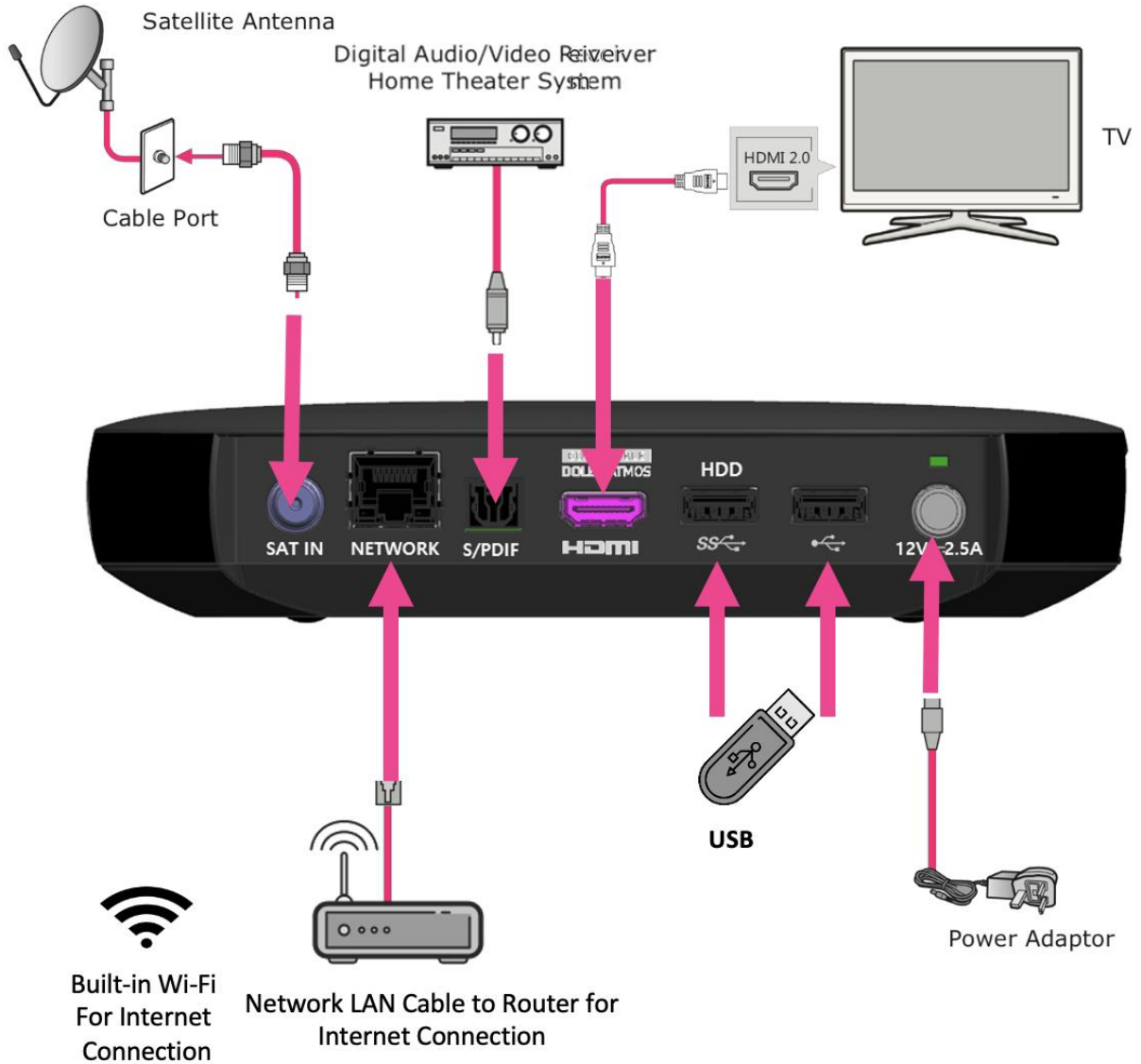


Figure C.1. Illustration of STB and their interfaces

Acknowledgements

Members of the Multimedia Broadcast Receiver Sub Working Group

Ts Mazlan Mahdi (Chairman)	MYTV Broadcasting Sdn Bhd
Ms Syaida Syarafina Sohaimi (Vice Chairman / Draft Lead)	SIRIM Berhad
Ts Mohammad Hafiz Halal / Mr Muhaimin Mat Salleh (Secretariat)	Malaysian Technical Standards Forum Bhd
Mr Sharad Sadhu	Fraunhofer IIS
Mr Mohd Suhairi Mohd Noor	LG Electronics (M) Sdn Bhd
Dr Mun Wai Yuen	Maxis Broadband Sdn Bhd
Mr Adrian Van Win Sen / Mr Mohamad Isa Mohd Razhali / Mr. Sheikh Azhar Sheikh Razak	Measat Broadcast Network System Sdn Bhd
Dr Ahmad Zaki Mohd Salleh / Mr Asri Abd Rahman / Ms Imaliana Muzni / Mr Mohd Sharil Duki	Media Prima Berhad
Ir Dr Lim Heng Siong	Multimedia University
Mr Mohd Khairul Abdul Kadir / Mr Shamsul Najib Mohtar	MYTV Broadcasting Sdn Bhd
Mr Navin Kumar / Mr Zainuddin Mohd Zainon	Samsung Malaysia Electronics (SME) Sdn Bhd
Mr Chin Ket Ming	Sharp Electronics (M) Sdn Bhd
Mr Al Hafiz Bin Abu Bakar / Ms Hafizah Zainal Abiddin / Ms Norhanisah Mohd Basri / Ms Nurhafenah Abdul Jalil / Mr Zul Jaafar	SIRIM Berhad
Mr Bertrand Pennachio / Mr Erik Gazzoni	SmarDTV Global S.A.S
Mr Muhd Kamarul Hafiz Mohd Tang / Mr Stephen Anthony Cleary	Sony EMCS Malaysia Sdn Bhd
Mr Najib Fadil Mohd Bisri @ Bisri	Telekom Malaysia Berhad
Mr Low Wei Yap	Wideminds Pte Ltd

By invitation:

Mr Mohamad Hafizal Mohamed Ariffin

Ts Amirah Jaafar Mad Ariff /

Mr Karim Sadiran /

Ts Khairuddin Hj Osman /

Ms Norhanim Yahya /

Mr Wan Ariffin Wan Hussin

Mr Mohd Fakhruzzaman Bin Mohd Noor /

Mr Sallehuddin Wagimen

Al Hijrah Media Corporation (TV Alhijrah)

Jabatan Penyiaran Malaysia

Smart Digital International Sdn. Bhd. (Sirius TV)