TECHNICAL CODE

DIGITAL TERRESTRIAL TELEVISION BROADCAST SERVICE RECEIVER - COMMON TEST SUITE (SECOND REVISION)

Developed by

Registered by

Registered date:

6 May 2020

MCMC MTSFB TC T011:2020

Development of technical codes

The Communications and Multimedia Act 1998 ('the Act') provides for Technical Standards Forum designated under section 184 of the Act or the Malaysian Communications and Multimedia Commission ('the Commission') to prepare a technical code. The technical code prepared pursuant to section 185 of the Act shall consist of, at least, the requirement for network interoperability and the promotion of safety of network facilities.

Section 96 of the Act also provides for the Commission to determine a technical code in accordance with section 55 of the Act if the technical code is not developed under an applicable provision of the Act and it is unlikely to be developed by the Technical Standards Forum within a reasonable time.

In exercise of the power conferred by section 184 of the Act, the Commission has designated the Malaysian Technical Standards Forum Bhd (MTSFB) as a Technical Standards Forum which is obligated, among others, to prepare the technical code under section 185 of the Act.

A technical code prepared in accordance with section 185 shall not be effective until it is registered by the Commission pursuant to section 95 of the Act.

For further information on the technical code, please contact:

Malaysian Communications and Multimedia Commission (MCMC)
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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:

LG Electronics (M) Sdn Bhd

Media Prima Berhad

MYTV Broadcasting Sdn Bhd

Panasonic AVC Networks Kuala Lumpur Malaysia Sdn Bhd

Samsung Malaysia Electronics (SME) Sdn Bhd

Sharp (M) Sdn Bhd

SIRIM QAS International Sdn Bhd

Sony EMCS (Malaysia) Sdn Bhd

Foreword

This technical code for Digital Terrestrial Television Broadcast Service Receiver - Common Test Suite ('this Technical Code') was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standards Forum Bhd (MTSFB) via its Multimedia Broadcast Receiver Sub Working Group under the Broadcast Technology Working Group.

This Technical Code is intended to specify the common test suite for Digital Terrestrial Television Broadcast Service Receivers for the purpose of certifying the devices under the Communications and Multimedia (Technical Standards) Regulations 2000.

Major modifications in this revision is the inclusion of Hybrid Broadcast Broadband Television (HbbTV) localised test suite for HbbTV receiver in Malaysia.

This Technical Code cancels and replaces the MCMC MTFSB TC T011:2019, *Digital Terrestrial Television (DTT) Broadcast Service Receiver - Common Test Suite (First Revision).*

This Technical Code shall continue to be valid and effective until reviewed or cancelled.

DIGITAL TERRESTRIAL TELEVISION BROADCAST SERVICE RECEIVER - COMMON TEST SUITE

1. Scope

This Technical Code specifies the test methods for the Digital Terrestrial Television (DTT) broadcast receivers to ensure its interoperability, functionality, quality, safety and performance.

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 reference (including any amendments) applies.

SKMM MTSFB TC G001:2013, *Compression Table of Service Information (SI) Descriptions for Digital Terrestrial Television Broadcast Service*

MCMC MTSFB TC G002:2020, *Middleware Profile for Digital Terrestrial Television Broadcast Service*

SKMM MTSFB TC T004:2013, *Specification for Digital Terrestrial Television Broadcast Service Receiver*

HbbTV Test Suite Release Version 8.5

3. Abbreviations

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

AAC	Advanced Audio Coding
AFC	Automatic Frequency Control
AFD	Active Format Descriptor
AIT	Application Information Table
API	Application Protocol Interface
AVC	Advanced Video Coding
C/N	Carrier to Noise Ratio
CSS	Cascading Style Sheets
DASH	Dynamic Adaptive Streaming over HTTP
DDB	Download Data Block
DII	Download Info Indication
DRM	Digital Rights Management
DSI	Download Server Initiate
DSM-CC	Digital Storage Media Command and Control
DTT	Digital Terrestrial Television
DVB	Digital Video Broadcasting
DVB-T	Digital Video Broadcasting Terrestrial
DVB-T2	Digital Video Broadcasting Second Generation Terrestrial

EIT	Event Information Table
EIT [p/f]	Event Information Table (present/following)
EPG	Electronic Program Guide
FEC	Forward Error Correction
FFT	Fast Fourier Transforms
FM	Frequency Modulation
GI	Guard Intervals
G/PAL	System G Phase Alternating Line
HbbTV	Hybrid Broadcast Broadband Television
HE-AAC	High Efficiency Advanced Audio Coding
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
IDTV	Integrated Digital Television
iDTV	Integrated Digital Television (receiver)
IRD	Integrate Receiver Decoder
ISSY	Input Stream SYnchroniser
LCN	Logical Channel Number
MISO	Multiple Input Single Output
MPD	Minimum Product Distance
MPEG	Moving Picture Experts Group
MPLP	Multiple Physical Layer Pipe
MS	Malaysian Specification
NICAM	Near Instantaneous Companded Audio Multiplex
OAD	Over Air Download
OFDM	Orthogonal Frequency Division Multiplexing
OIPF	Open IPTV Forum
OUI	Organisationally Unique Identifier
PAL	Phase Alternating Line
PAPR	Peak to Average Power Ratio
PLP	Physical Layer Pipes
PSI	Program Service Information
PTS-PCR	Presentation Timestamp - Program Clock Reference
QAM	Quadrature Amplitude Modulation
QEF	Quasi Error Free
RF	Radio Frequency
RUT	Receiver Under Test
SFN	Single Frequency Network
SI/PSI	Service Information/Program Service Information
SISO	Single Input Single Output
SSU	System Software Update
STB	Set Top Box
TS	Transport Stream

TV	Television
UTF	Universal Transformation Format
UHF	Ultra-High Frequency
URL	Uniform Resource Locator
VHF	Very High Frequency
VSB	Vestigial Sideband
XML	eXtensible Markup Language

4. Requirements

4.1 General requirement

DTT broadcast receivers shall comply with the SKMM MTSFB TC T004, SKMM MTSFB TC G001 and MCMC MTSFB TC G002.

4.2 Radio Frequency (RF)

The receiver shall comply and pass the Radio Frequency (RF) tests as specified in Clause 5.

4.3 Service Information/Program Service Information (SI/PSI)

The receiver shall comply and pass the Service Information/Program Service Information (SI/PSI) tests as specified in Clause 6.

4.4 Over Air Download (OAD)

The receiver shall comply and pass the Over Air Download (OAD) tests as specified in Clause 8.

4.5 Hybrid Broadcast Broadband Television (HbbTV)

The receiver shall comply and pass the Hybrid Broadcast Broadband Television (HbbTV) tests as specified in Clause 9.

5. Radio Frequency (RF) performance test suite

5.1 Evaluation results

The evaluation results of RF performance test suite are tabulated in Table 1.

Table 1. Evaluation results

Section	Test category
1.0	C/N performance on Gaussian channel (dB)
2.0	C/N performance on 0 dB echo channel (dB)
3.0	Minimum receiver signal input levels on Gaussian channel (dBm)
4.0	Minimum Integrated Receiver Decoder (IRD) signal input levels on 0 dB echo channel
5.0	Maximum receiver signal input levels (dBm)

Table 1. Evaluation results *(continued)*

Section	Test category
6.0	Immunity to digital signals in other channels
7.0	Immunity to co-channel interference from analogue Television (TV) signals
8.0	Immunity to adjacent channel interference from analogue TV signals
9.0	Performance in time-varying channels 10 Hz doppler (5Hz after AFC) 20 μs 0 dB echo
10.0	Synchronisation for varying echo power levels in Single Frequency Network (SFN) (dB)
11.0	C/(N+I) performance in SFN for more than one echo (dB)
12.0	C/(N+I) Performance in SFN inside the guard interval (dB)
13.0	C/(N+I) Performance in SFN outside the guard interval (dB)

5.2 Radio Frequency (RF) modes and performance figure

5.2.1 Radio Frequency (RF) profile

The RF profile is tabulated in Table 2 where the specifications are categorised into 4 Malaysian Specifications (MS).

Table 2. Radio Frequency (RF) profile

Identifier	RF profile			
	MS 1	MS 2	MS 3	MS 4
Overall				
FFT size	32 K	32 K	32 K	32 K
GI	1/8	19/256	1/128	1/8
SISO/MISO	SISO	SISO	SISO	SISO
PAPR	TR	TR	TR	TR
Bandwidth	8 MHz	8 MHz	8 MHz	7 MHz
Carrier mode	Extended	Extended	Extended	Normal
Pilot pattern	PP2	PP4	PP7	PP2
L1 modulation	64 QAM	64 QAM	64 QAM	64 QAM
Data symbols per frame (Ldata)	43	61	59	43
OFDM symbols per frame (Lf)	44	62	60	44
Frame duration (ms)	178	239	217	203
Frames per superframe	2	2	2	2
PLP #0				
PLP type	1	1	1	1
Time Interleaver Type (TIME_IL_Type)	0	0	0	0
Modulation	256 QAM	256 QAM	256 QAM	256 QAM

Table 2. Radio Frequency (RF) profile *(continued)*

Identifier	RF profile			
	MS 1	**MS 2**	**MS 3**	**MS 4**
Rate	3/4	3/5	2/3	3/4
FEC type	64 LDPC	64 LDPC	64 LDPC	64 LDPC
Rotated QAM	Yes	Yes	Yes	Yes
FEC blocks per interleaving frame full channel (Trial mode)	135	200	200	132
TI blocks per frame (N_TI)	2	3	3	2
Frame_Interval (I_JUMP)	1	1	1	1
TIME_IL_LENGTH	2	3	3	2
Approx. time interleaving length (ms)	89	81	72	101
Data rate (Mbit/s)	36.925 6	32.491 16	39.816 5	31.591 9

5.2.2 Performance figures

The Performance figures is tabulated in Table 3.

Table 3. Performance figures

Test section	Section	Description	Performance figure			
			MS 1	**MS 2**	**MS 3**	**MS 4**
1.0	A.1	C/N performance on Gaussian channel (dB)	22.9	18.9	19.7	22.9
2.0	A.2	C/N performance on 0 dB echo channel (dB)	28.0	22.6	23.9	28.0
3.0	A.3	Minimum receiver signal input levels on Gaussian channel (dBm)	- 76.2	- 80.2	- 79.3	- 76.9
4.0	A.4	Minimum IRD signal input levels on 0 dB echo channel	- 71.1	- 76.5	- 75.1	- 71.8
	A.5	Receiver noise figure on Gaussian channel NOTE: No testing is required as this is purely calculation based	6.0	6.0	6.0	6.0
5.0	A.6	Maximum receiver signal input levels (dBm)	- 35	- 35	- 35	- 35
6.0	A.7	Immunity to digital signals in other channels				
		Digital ACI N ± 1 C/I (dB)	- 28.0	- 28.0	- 28.0	- 28.0
		Digital ACI N ± 2 C/I (dB)	- 38.0	- 38.0	- 38.0	- 38.0
		Digital ACI N + 9 C/I (dB)	- 28.0	- 28.0	- 28.0	- 28.0
7.0	A.8	Immunity to co-channel interference from analogue TV signals				
		PAL B/G CCI C/I (dB)	7.0	3.0	5.0	7.0

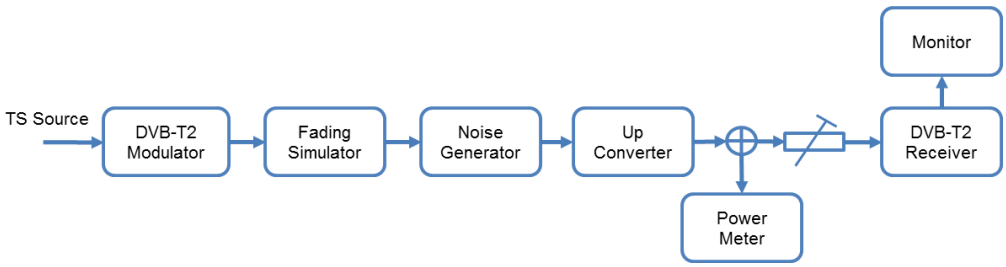
Table 3. Performance figures *(continued)*

Test section	Section	Description			Performance figure					
		Identifier			MS 1	MS 2	MS 3		MS 4	
8.0	A.9	Immunity to adjacent channel interference from analogue TV signals								
		PAL B/G ACI C/I N ± 1 (dB)			- 33.0	- 33.0	- 33.0		- 33.0	
		PAL B/G ACI C/I N ± 2 (dB)			- 44.0	- 44.0	- 44.0		- 44.0	
		PAL B/G ACI C/I N + 9 (dB)			- 44.0	- 44.0	- 44.0		- 44.0	
9.0	A.10	Performance in time-varying channels 10 Hz doppler (5 Hz after AFC) 20 μs 0 dB echo			3	3	3		3	
10.0	A.11	Synchronisation for varying echo power levels in SFN (dB)			31.0	26.1	28.1		31.0	
11.0	A.12	C/(N+I) performance in SFN for more than 1 dB echo			28.0	22.6	23.9		28.0	
12.0	A.13	C/(N+I) performance in SFN inside the guard interval (dB)			28.0	22.6	23.9		28.0	
13.0	A.14	C/(N+I) Performance in SFN outside the guard interval (dB)	**Echo delay (μs)**	**Echo level (dBc)**	**Echo delay (μs)**	**Echo level (dBc)**	**Echo delay (μs)**	**Echo level (dBc)**	**Echo delay (μs)**	**Echo level (dBc)**
			- 532	- 12.0	See NOTE		- 133	- 9.5	- 608	- 12.0
			- 525	- 11.5			- 120	- 9.0	- 600	- 11.5
			- 510	- 10.5			- 90	- 7.5	- 580	- 10.5
			- 490	- 9.0			- 60	- 5.0	- 560	- 9.0
			- 475	- 7.5			- 30	- 2.0	- 540	- 7.0
			- 448	- 2.0	- 266	- 2	- 28	- 2.0	- 512	- 2.0
			448	- 2.0	266	- 2	28	- 2.0	512	- 2.0
			475	- 7.5	See NOTE		30	- 2.0	540	- 7.0
			490	- 9.0			60	- 5.0	560	- 9.0
			510	- 10.5			90	- 7.5	580	- 10.5
			525	- 11.5			120	- 9.0	600	- 11.5
			532	- 12.0			133	- 9.5	608	- 12.0

NOTE: There is no allowance for echo outside guard for 19/256 PP4 in Nordig due to 19/256 guard (266 μs) being very close to the Nyquist limit for PP4 (298.67 μs). Nordig defines the max delay for echo outside guard to be 57/64*Nyquist which is equal to the guard interval of 266 μsec for 19/256 PP4.

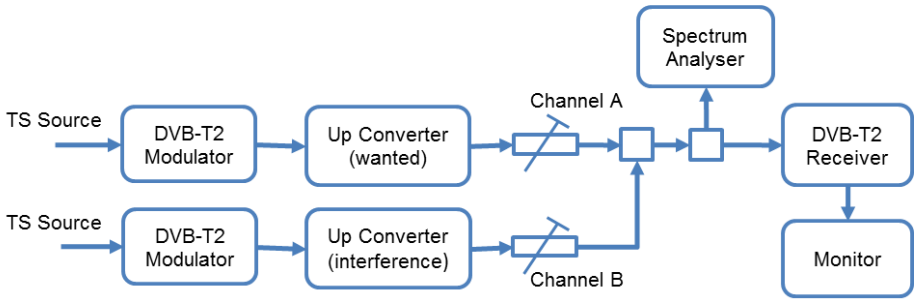
5.3 Test instrument set up

The test instrument set up for RF performance test as illustrated in Figure 1 will be referred in 5.4. The applicable section of performance figure shall be set up according to the respective figures.



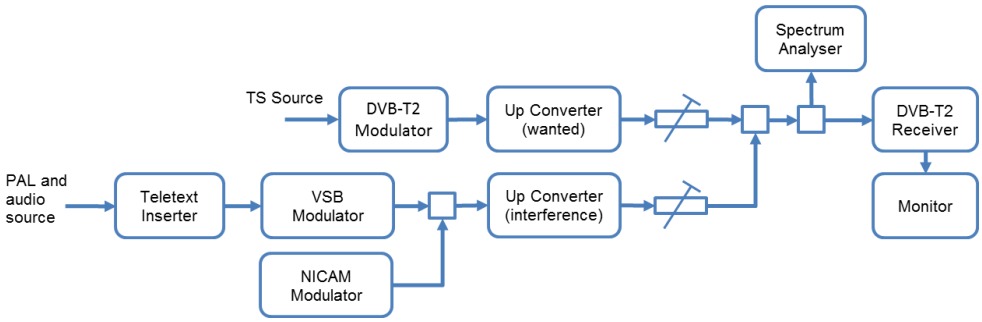
Applicable sections: 1.0, 2.0, 3.0, 4.0, 5.0, 9.0 and 10.0

Figure 1a. Test set up A



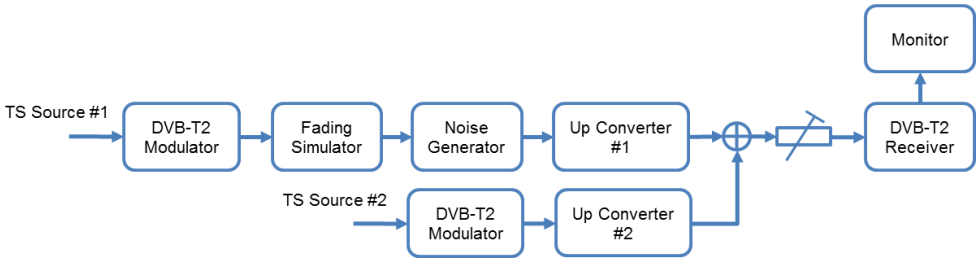
Applicable section: 6.0

Figure 1b. Test set up B



Applicable section: 7.0 and 8.0

Figure 1c. Test set up C



Applicable section: 11.0, 12.0 and 13.0

Figure 1d. Test set up D

Figure 1. Test instrument set up

5.4 Test category

5.4.1 Carrier to Noise Ratio (C/N) performance on Gaussian channel (test section 1.0)

<table>
<tr><td>Section</td><td colspan="2">1.0</td></tr>
<tr><td>Test case</td><td colspan="2">C/N performance on Gaussian channel.</td></tr>
<tr><td>Requirement</td><td colspan="2">Receiver shall have at least the Quasi Error Free (QEF) performance for the C/N ratios given in the performance figure outlined in Annex A of the SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Purpose</td><td colspan="2">To test the required C/N for QEF reception in Gaussian channel.</td></tr>
<tr><td>Expectation</td><td colspan="2">The required C/N for QEF reception in Gaussian channel shall be lesser than the figures specified in Annex A of the SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Test instrument set up</td><td colspan="2">See Figure 1a.</td></tr>
<tr><td rowspan="3">Calibration requirement</td><td>1</td><td>Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.</td></tr>
<tr><td>2</td><td>Ensure that the receiver signal input level (wanted signal) is set to - 50 dBm.</td></tr>
<tr><td>3</td><td>Perform a channel search (tune) on frequency 666 MHz.</td></tr>
<tr><td rowspan="2">Test outline</td><td>1</td><td>Adjust and measure the C/N for the range of frequencies and T2 modes defined below for QEF reception.</td></tr>
<tr><td>2</td><td>Remark
The performance requirement is based on 30 s error free video.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th colspan="2" rowspan="2">Centre frequency (MHz)</th><th colspan="5">C/N</th></tr>
<tr><th>474.0</th><th>570.0</th><th>666.0</th><th>762.0</th><th>858.0</th></tr>
<tr><td rowspan="4">Modes</td><td>MS 1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 3</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 4</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed
</td></tr>
</table>

5.4.2 C/N performance on 0 dB echo channel

<table>
<tr><td>Section</td><td colspan="2">2.0</td></tr>
<tr><td>Test case</td><td colspan="2">C/N performance on 0 dB echo channel.</td></tr>
<tr><td>Requirement</td><td colspan="2">Receiver shall have at least the QEF performance for the C/N ratios given in the Performance Figure outlined in Annex A of the SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Purpose:</td><td colspan="2">To test the required C/N for QEF reception in 0 dB echo channel.</td></tr>
<tr><td>Expectation</td><td colspan="2">The required C/N for QEF reception in 0 dB echo channel shall be lesser than the figures specified in Annex A of the SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Test instrument set up</td><td colspan="2">See Figure 1a.</td></tr>
<tr><td rowspan="4">Calibration requirement</td><td>1</td><td>Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.</td></tr>
<tr><td>2</td><td>Ensure that the fading simulator is set to 0 dB echo profile with a delay of 1.95 µs, 0° phase offsets from channel centre and 0 dB attenuation on the second path.</td></tr>
<tr><td>3</td><td>Ensure that the receiver signal input level (wanted signal) is set to - 50 dBm.</td></tr>
<tr><td>4</td><td>Perform a channel search (tune) on frequency 666 MHz.</td></tr>
<tr><td rowspan="2">Test outline</td><td>1</td><td>Adjust and measure the C/N for the range of T2 modes defined below for QEF reception in 0 dB echo channel.</td></tr>
<tr><td>2</td><td>Remark
The performance requirement is based on 30 s error free video.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th>Modes</th><th>C/N</th></tr>
<tr><td>MS 1</td><td></td></tr>
<tr><td>MS 2</td><td></td></tr>
<tr><td>MS 3</td><td></td></tr>
<tr><td>MS 4</td><td></td></tr>
</table>
Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed
</td></tr>
</table>

5.4.3 Minimum receiver signal input levels on Gaussian channel

<table>
<tr><td>Section</td><td colspan="2">3.0</td></tr>
<tr><td>Test case</td><td colspan="2">Minimum receiver signal input levels on Gaussian channel.</td></tr>
<tr><td>Requirement</td><td colspan="2">The receiver shall provide QEF reception for the minimum signal levels (P_{min}) for 8 MHz Extended bandwidth as given in the performance figure outlined in Annex A of the SKMM MTSFB TC T004:2013.
(P_{min} = - 105.1 dBm + NF [dB] + C/N [dB])</td></tr>
<tr><td>Purpose</td><td colspan="2">To verify the sensitivity of the receiver on Gaussian channel over the supported frequency range.</td></tr>
<tr><td>Expectation</td><td colspan="2">The sensitivity shall be equal or better for all measured frequencies (channels) and for all modes specified in Annex A of the SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Test instrument set up</td><td colspan="2">See Figure 1a.</td></tr>
<tr><td rowspan="3">Calibration requirement</td><td>1</td><td>Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.</td></tr>
<tr><td>2</td><td>Obtain the receiver signal (wanted signal) input level by taking consideration of the attenuation of the attenuator and cables.</td></tr>
<tr><td>3</td><td>Perform a channel search (tune) on frequency 666 MHz, with the wanted signal level set to - 50 dBm.</td></tr>
<tr><td rowspan="3">Test outline</td><td>1</td><td>Increase the received signal input level from low to higher value until QEF reception is achieved. This will be the minimum receiver signal input level.</td></tr>
<tr><td>2</td><td>Repeat the test for the range of frequencies and T2 modes defined below.</td></tr>
<tr><td>3</td><td>Remark
The performance requirement is based on 30 s error free video.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th colspan="2" rowspan="2"></th><th colspan="5">C/N</th></tr>
<tr><th colspan="2">Centre frequency (MHz)</th><th>474.0</th><th>570.0</th><th>666.0</th><th>762.0</th><th>858.0</th></tr>
<tr><td rowspan="4">Modes</td><td>MS 1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 3</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 4</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed
</td></tr>
</table>

5.4.4 Minimum Integrated Receiver Decoder (IRD) signal input levels on 0 db echo channel

<table>
<tr><td>Section</td><td colspan="2">4.0</td></tr>
<tr><td>Test case</td><td colspan="2">Minimum IRD signal input levels on 0 dB echo channel.</td></tr>
<tr><td>Requirement</td><td colspan="2">The receiver shall provide QEF reception for the minimum signal levels (P_{min}) for 8 MHz extended bandwidth as given in the performance figure outlined in Annex A of the SKMM MTSFB TC T004:2013.
(P_{min} = -105.1 dBm + NF [dB] + C/N [dB])</td></tr>
<tr><td>Purpose</td><td colspan="2">To verify the sensitivity of the receiver on frequency selective channel.</td></tr>
<tr><td>Expectation</td><td colspan="2">The minimum signal level shall be equal or lower in dBm for all modes specified in Annex A of the SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Test instrument set up</td><td colspan="2">See Figure 1a.</td></tr>
<tr><td rowspan="4">Calibration requirement</td><td>1</td><td>Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.</td></tr>
<tr><td>2</td><td>Ensure that the fading simulator is set to 0 dB echo profile with a delay of 1.95 µs, 0° phase offsets from channel centre and 0 dB attenuation on the second path.</td></tr>
<tr><td>3</td><td>Obtain the receiver signal (wanted signal) input level by taking consideration of the attenuation from the attenuator and cables.</td></tr>
<tr><td>4</td><td>Perform a channel search (tune) on frequency 666 MHz with the wanted signal level set to - 50 dBm.</td></tr>
<tr><td rowspan="3">Test outline</td><td>1</td><td>Increase the received signal input level from low to higher value until QEF reception is achieved. This will be the minimum receiver signal input level.</td></tr>
<tr><td>2</td><td>Repeat the test for the range of T2 modes defined below.</td></tr>
<tr><td>3</td><td>Remark
a) The performance requirement is based on 30 s error free video.
b) 0 dB echo profile shall be activated when measuring the power level.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th colspan="2"></th><th colspan="6">Minimum input signal levels</th></tr>
<tr><th colspan="2">0 db echo (µs)</th><th>10</th><th>26</th><th>133</th><th>224</th><th>253</th><th>426</th></tr>
<tr><td rowspan="4">Modes</td><td>MS 1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed
</td></tr>
</table>

5.4.5 Maximum receiver signal input levels

<table>
<tr><td>Section</td><td colspan="2">5.0</td></tr>
<tr><td>Test case</td><td colspan="2">Maximum receiver signal input levels.</td></tr>
<tr><td>Requirement</td><td colspan="2">The receiver shall provide QEF reception for Digital Video Broadcasting Terrestrial (DVB-T) and Digital Video Broadcasting Second Generation Terrestrial (DVB-T2) signals up to the level specified in Annex A of SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Purpose</td><td colspan="2">To test that the receiver is able to handle high power RF signals.</td></tr>
<tr><td>Expectation</td><td colspan="2">The reception shall be QEF for input level higher than or equal to the level for all modes specified in Annex A of SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Test instrument set up</td><td colspan="2">Figure 1a</td></tr>
<tr><td rowspan="3">Calibration requirement</td><td>1</td><td>Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.</td></tr>
<tr><td>2</td><td>Obtain the receiver signal (wanted signal) input level by taking consideration of the attenuation of the attenuator and cables.</td></tr>
<tr><td>3</td><td>Perform a channel search (tune) on frequency 666 MHz.</td></tr>
<tr><td rowspan="3">Test outline</td><td>1</td><td>Increase the received signal input level until QEF reception is achieved. Ensure that the receiver is able to output the content of the TS source as the receiver signal level increases.</td></tr>
<tr><td>2</td><td>Repeat the test for the range of T2 modes defined below.</td></tr>
<tr><td>3</td><td>Remark
The performance requirement is based on 30 s error free video with the receiver input signal level calculated as a function of attenuation.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th>Modes</th><th>Maximum input signal levels</th></tr>
<tr><td>MS 1</td><td></td></tr>
<tr><td>MS 2</td><td></td></tr>
<tr><td>MS 3</td><td></td></tr>
<tr><td>MS 4</td><td></td></tr>
</table>
Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed
</td></tr>
</table>

5.4.6 Immunity to digital signals in other channels

<table>
<tr><td>Section</td><td colspan="2">6.0</td></tr>
<tr><td>Test case</td><td colspan="2">Immunity to digital signals in other channels.</td></tr>
<tr><td>Requirement</td><td colspan="2">The receiver shall permit an interfering DVB-T or DVB-T2 signal for the supported frequencies outlined in Annex A of the SKMM MTSFB TC T004:2013 with a minimum interference to signal level ratio (I/C) while maintaining QEF reception.</td></tr>
<tr><td>Purpose</td><td colspan="2">To verify the QEF reception for digital signal interference on adjacent or other channels.</td></tr>
<tr><td>Expectation</td><td colspan="2">The wanted DVB-T2 signal shall be QEF for the interference signal levels specified for all modes outlined in Annex A of the SKMM MTSFB TC T004:2013.</td></tr>
<tr><td>Test instrument set up</td><td colspan="2">See Figure 1b.</td></tr>
<tr><td rowspan="4">Calibration requirement</td><td>1</td><td>Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.</td></tr>
<tr><td>2</td><td>Perform a channel search (tune) on frequency 666 MHz, with the interferer switched off.</td></tr>
<tr><td>3</td><td>With Channel B or the interferer signal level set to - 20 dBm, decrease the receiver signal input level (Channel A or the wanted signal) until QEF is obtained.</td></tr>
<tr><td>4</td><td>Remark
a) Require the interferer to operate at DVB-T2 extended mode for the worst-case testing.
b) Ensure that the interferer signal does not have too high shoulders to avoid out-of-band emissions in the reception of the wanted signal. Use a band pass filter on the interference signal if necessary.</td></tr>
<tr><td rowspan="3">Test outline</td><td>1</td><td>Select the frequencies for Channel A and Channel B based on the required values indicated in the result table.</td></tr>
<tr><td>2</td><td>The difference in signal level shall be measured at QEF reception.</td></tr>
<tr><td>3</td><td>Remark
The performance requirement is based on 30 s error free video.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th colspan="2">Centre frequency (MHz) - 666 MHz</th><th colspan="5">C/I</th></tr>
<tr><th colspan="2">Interferer centre frequency (MHz)</th><th>650</th><th>658</th><th>674</th><th>682</th><th>738</th></tr>
<tr><td rowspan="4">Modes</td><td>MS 1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 3</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 4</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>

Result

Centre frequency (MHz) - 786 MHz		C/I				
Interferer centre frequency (MHz)		770	778	794	802	858
Modes	MS 1					
	MS 2					
	MS 3					
	MS 4					

Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed

5.4.7 Immunity to co-channel interference from analogue TV signals

Section	7.0	
Test case	Immunity to co-channel interference from analogue TV signals.	
Requirement	The receiver shall perform better than the RF figure specified in Annex A of the SKMM MTSFB TC T004:2013, when the signal is exposed to interference from a co-channel System G Phase Alternating Line (G/PAL) signal including video with teletext, Frequency Modulation (FM) audio and a Near Instantaneous Companded Audio Multiplex (NICAM) sub carrier while maintaining QEF reception.	
Purpose	To verify the QEF reception for DVB-T2 receiver when there is a co-channel interference from analogue TV.	
Expectation	The received signal shall have a 30 s error free video for DVB-T2 modes with C/I equal or better than the requirement.	
Test instrument set up	See Figure 1c.	
Calibration requirement	1	Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.
	2	Ensure the following: a) 10 % modulation depth for vision carrier. b) NICAM signal level is at - 20 dB and + 5.85 MHz relative to the vision carrier. c) Insert 12 lines of teletext.
	3	Set the analogue TV source with the following requirements: a) The analogue TV source and DVB-T2 modulator shall be connected to the same reference signal (10 MHz). b) The analogue TV source shall have 0 Hz centre frequency offset from the digital TV source. c) The analogue TV source should not have too high out-of-band emissions to avoid interference to other frequencies.

<table>
<tr><td rowspan="3">Calibration requirement</td><td></td><td>d) Use a colour bar 75 % as the input for Phase Alternating Line (PAL) signal.
e) FM sound carrier can be modulated at a deviation of 1 kHz - 50 kHz tone, and the level set at - 13 dB relative to the vision carrier.</td></tr>
<tr><td>4</td><td>Calibrate the C/I level (Att C and Att I).</td></tr>
<tr><td>5</td><td>Ensure that the receiver signal input level (wanted signal) is set to - 50 dBm.</td></tr>
<tr><td rowspan="3">Test outline</td><td>1</td><td>Execute the test for the range of the frequencies and modes outlined in the Result Table.</td></tr>
<tr><td>2</td><td>Increase the C/I from low value to higher value until the QEF measurement is achieved.</td></tr>
<tr><td>3</td><td>Remark
The performance requirement is based on 30 s error free video.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th></th><th></th><th>C/I</th></tr>
<tr><th colspan="2">Centre frequency (MHz)</th><th>666</th></tr>
<tr><th rowspan="4">Modes</th><td>MS 1</td><td></td></tr>
<tr><td>MS 2</td><td></td></tr>
<tr><td>MS 3</td><td></td></tr>
<tr><td>MS 4</td><td></td></tr>
</table>
Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed
</td></tr>
</table>

5.4.8 Immunity to adjacent channel interference from analogue TV signals

Section	8.0
Test case	Immunity to adjacent channel interference from analogue TV signals.
Requirement	The receiver shall perform better than the RF figure specified in Annex A of the SKMM MTSFB TC T004:2013, when the signal is exposed to interference from adjacent G/PAL signal including video with teletext, FM audio and a NICAM sub carrier while maintaining QEF reception.
Purpose	To verify the QEF reception for DVB-T2 receiver when there is adjacent channel interference from analogue TV.
Expectation	The received signal shall have a 30 s error free video for DVB-T2 modes with C/I equal or better than the requirement.
Test instrument set up	See Figure 1c.

<table>
<tr><td rowspan="5">Calibration requirement</td><td>1</td><td>Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.</td></tr>
<tr><td>2</td><td>Ensure the following:
a) 10% modulation depth for vision carrier.
b) NICAM signal level is at - 20 dB and + 5.85 MHz relative to the vision carrier.
c) Insert 12 lines of teletext.</td></tr>
<tr><td>3</td><td>Set the analogue TV source with the following requirements:
a) The analogue TV source and DVB-T2 modulator shall be connected to the same reference signal (10 MHz).
b) The analogue TV source shall have a centre frequency value from the digital TV source as indicated in the result.
c) The analogue TV source should not have too high out-of-band emissions to avoid interference to other frequencies.
d) Use a colour bar 75 % as the input for PAL signal.
e) FM sound carrier can be modulated at a deviation of 1 kHz - 50 kHz tone, and the level set at - 13 dB relative to the vision carrier.</td></tr>
<tr><td>4</td><td>Calibrate the C/I level (Att C and Att I).</td></tr>
<tr><td>5</td><td>Ensure that the receiver input level for analogue TV (unwanted signal) is set to - 25 dBm (defined as the R.M.S value of the vision carrier at peaks of the modulated envelope).</td></tr>
<tr><td rowspan="3">Test outline</td><td>1</td><td>Execute the test for the range of the frequencies and modes outlined in the result.</td></tr>
<tr><td>2</td><td>Increase the C/I from high value to the lower value until the QEF measurement is achieved. This should be achieved by keeping the level of the unwanted signal and decreasing the level of the wanted signal.</td></tr>
<tr><td>3</td><td>Remark
The performance requirement is based on 30 s error free video.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th colspan="2">Centre Frequency (MHz) - 666 MHz</th><th colspan="5">C/I</th></tr>
<tr><th colspan="2">Interferer Centre Frequency (MHz)</th><th>650</th><th>658</th><th>674</th><th>682</th><th>738</th></tr>
<tr><td rowspan="4">Modes</td><td>MS 1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 3</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 4</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>

Result	

Centre Frequency (MHz) - 786 MHz		C/I				
Interferer Centre Frequency (MHz)		770	778	794	802	858
Modes	MS 1					
	MS 2					
	MS 3					
	MS 4					

Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed

5.4.9 Performance in time-varying channels 10 Hz doppler (5 Hz after Automatic Frequency Control (AFC)) 20 µs 0 dB echo

Section	9.0	
Test case	Performance in time-varying channels 10 Hz doppler (5 Hz after AFC) 20 µs 0 dB echo.	
Requirement	The receiver shall be able to operate with all signal time variations. The increase in required C/N for QEF reception shall be less than the RF figures specified in Annex A of the SKMM MTSFB TC T004:2013, corresponding to a Doppler shift of ± 10 Hz (5 Hz after AFC) compared to a 0 dB echo with a delay of 20 µs.	
Purpose	To verify the QEF reception for DVB-T2 receiver on a channel where time variation exists.	
Expectation	The increase in the required C/N shall be less than the RF figures specified in Annex A of the SKMM MTSFB TC T004:2013, for 0 dB 20 µs echo from frequency separation 1 Hz to 10 Hz.	
Test instrument set up	See Figure 1a.	
Calibration requirement	1	Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.
	2	Ensure that the fading simulator is set to 0dB echo profile with a delay of 20 µs, 0° phase offsets from channel centre and 0dB attenuation on the second path (for 1 Hz frequency separation).
	3	Configure the following: a) Path 1: Static, 0 dB attenuation, and 0 µs delay. b) Path 2: Pure Doppler, 0 dB attenuation, and 20 µs delay.
	4	Ensure that the receiver signal input level (wanted signal) is set to - 50 dBm (with no noise applied).
	5	Perform a channel search (tune) on frequency 666 MHz.

<table>
<tr><td rowspan="3">Test outline</td><td>1</td><td>Execute the test for the range of the frequencies and modes outlined in the Result Table.</td></tr>
<tr><td>2</td><td>Increase the C/I from low value to higher value until the QEF measurement is achieved.</td></tr>
<tr><td>3</td><td>Remark - The performance requirement is based on 30 s error free video.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th colspan="2">Centre frequency (MHz) - 666 MHz</th><th colspan="5">C/N</th></tr>
<tr><th colspan="2">Frequency separation (Hz)</th><th>1</th><th>5</th><th>10</th><th>Max difference dB</th><th>Pass/ Fail</th></tr>
<tr><td rowspan="4">Modes</td><td>MS 1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 3</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 4</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed
</td></tr>
</table>

5.4.10 Synchronisation for varying echo power levels in Single Frequency Networks (SFN)

<table>
<tr><td>Section</td><td colspan="2">10.0</td></tr>
<tr><td>Test case</td><td colspan="2">Synchronisation for varying echo power levels in SFN.</td></tr>
<tr><td>Requirement</td><td colspan="2">The required C/N value for QEF reception as specified in Annex A of the SKMM MTSFB TC T004:2013, shall be obtained when the channel contains two paths with relative delay from 1.95 µs up to 0.95 x GI length and the relative power levels of the two paths are dynamically varying including 0 dB echo level crossing.</td></tr>
<tr><td>Purpose</td><td colspan="2">To verify the SFN synchronisation when the amplitude of the echo compared to the amplitude of the direct signal varies in a function of time.</td></tr>
<tr><td>Expectation</td><td colspan="2">The receiver shall maintain SFN synchronisation and the C/N value shall not exceed the specified value outlined in Annex A of the SKMM MTSFB TC T004:2013, when the amplitude of the echo signal varies in time.</td></tr>
<tr><td>Test Instrument set up</td><td colspan="2">See Figure 1a.</td></tr>
<tr><td rowspan="2">Calibration requirement</td><td>1</td><td>Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.</td></tr>
<tr><td>2</td><td>Set up the fading simulator as follows, disconnecting and re-connecting the wanted signal after the echo delay is changed between each test.
1. Path 1 (direct): 0 dB attenuation, 0 µs delay.
2. Path 2 (1st echo): 0 dB attenuation and delay value from the Result Table.
3. Path 3 (2nd echo): 1 dB attenuation and delay value from the Result Table with 0.1 Hz frequency separation.</td></tr>
</table>

<table>
<tr><td rowspan="2">Calibration requirement</td><td>3</td><td>Ensure that the receiver signal input level (wanted signal) is set to - 50 dBm (with no noise applied).</td></tr>
<tr><td>4</td><td>Perform a channel search (tune) on frequency 666 MHz.</td></tr>
<tr><td rowspan="3">Test outline</td><td>1</td><td>Increase the C/N from low to higher value until QEF reception is achieved.</td></tr>
<tr><td>2</td><td>Repeat the test for the range of echo delay values and T2 modes defined in the Result Table below.</td></tr>
<tr><td>3</td><td>Remark
1. The performance requirement is based on 30 s error free video.
2. The QEF reception shall be obtained when the channel contains two paths with relative delay from 1.95 µs up to 0.95 x GI length and the relative power levels of the two paths are dynamically varying (inclusive of 0 dB echo level crossing).
3. RF input signal to the receiver shall be disconnected when changing the echo delay.</td></tr>
<tr><td>Result</td><td colspan="2">
<table>
<tr><th colspan="2" rowspan="2">0 db echo (µs)</th><th colspan="6">C/N</th></tr>
<tr><th>10</th><th>26</th><th>133</th><th>224</th><th>253</th><th>426</th></tr>
<tr><td rowspan="4">Modes</td><td>MS 1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MS 4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed
</td></tr>
</table>

5.4.11 C/(N+I) Performance in SFN for more than one echo

Section	11.0	
Test case	C/(N+I) Performance in SFN for more than one echo.	
Requirement	The required C/N value for QEF reception as specified in Annex A of SKMM MTSFB TC T004:2013, shall be obtained when the channel contains two static paths with relative delay from 1.95 µs up to 0.95 x GI length, independently of the relative amplitudes and phases of the two paths.	
Purpose	To verify the SFN synchronisation of the receiver when two echo signals are present.	
Expectation	The receiver shall synchronise all combinations defined in the result table, with the C/N values not exceeding the required C/N figured defined outlined in Annex A of the SKMM MTSFB TC T004:2013.	
Test instrument set up	See Figure 1d.	
Calibration requirement	1	Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.
	2	Set up the fading simulator as follows, disconnecting and re-connecting the wanted signal after the echo delay is changed between each test: a) Path 1 (static): 0 dB attenuation, 0 µs delay and 0 ° phase. b) Path 2 (Pre-echo): Follow the values specified in the table below (with 0 ° phase). c) Path 3 (Post echo): Follow the values specified in the table below (with 0 ° phase).
	3	Ensure that the receiver signal input level (wanted signal) is set to - 50 dBm (with no noise applied).
	4	Perform a channel search (tune) on frequency 666 MHz.
Test outline	1	Increase the C/N from low to higher value until QEF reception is achieved.
	2	Repeat the test for the range of echo delay values and T2 modes defined in the Result Table below.
	3	Remark a) The performance requirement is based on 30 s error free video. b) RF input signal to the receiver shall be disconnected when changing the echo delay.

Result

Modes			MS 1	MS 2	MS 3	MS 4
Relative delay difference		Path 2 pre-echo	- 200.1μs	- 120.1μs	- 13.1μs	
		Path 3 post echo	+ 200.0μs	+ 120.0μs	+ 13.0μs	
Attenuation (dB)	Path 2 pre-echo	Path 3 Post echo	C/N			
	0	0				
	3	3				
	6	6				
	9	9				
	12	2				
	15	15				
	18	18				
	21	21				
	15	0				
	15	3				
	15	6				
	15	9				
	15	12				
	15	18				
	15	21				
	0	15				
	3	15				
	6	15				
	9	15				
	12	15				
	18	15				
	21	15				

Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed

5.4.12 C/(N+I) Performance in single frequency networks inside the Guard Interval (GI)

Section	12.0	
Test Case	C/(N+I) Performance in SFN inside the guard interval.	
Requirement	The required C/N value for QEF reception as specified in Annex A of the SKMM MTSFB TC T004:2013, shall be obtained when the channel contains two static paths with relative delay from 1.95 µs up to 0.95 x GI length, independently of the relative amplitudes and phases of the two paths.	
Purpose	To verify the required C/N for echoes in SFN inside the guard interval.	
Expectation	The receiver shall synchronise in all echo attenuation and delay combinations defined in the result table, with the C/N values for 0dB echo not exceeding the required C/N figures outlined in Annex A of the SKMM MTSFB TC T004:2013.	
Test instrument set up	See Figure 1d.	
Calibration requirement	1	Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.
	2	Ensure that the fading simulator is set to 0 dB echo profile with a delay of 1.95 µs, 0° phase offsets from channel centre and 0 dB attenuation on the second path.
	3	Ensure that the receiver signal input level (wanted signal) is set to - 50 dBm.
	4	Perform a channel search (tune) on frequency 666 MHz.
Test outline	1	Apply the noise and increase the C/N from low to higher value until QEF reception is achieved.
	2	Repeat the test for the range of echo values and T2 modes defined in the Result Table below.
	3	Remark a) The performance requirement is based on 30 s error free video. b) RF input signal to the receiver shall be disconnected when changing the echo delay and attenuation level. c) The delay of the echo shall be maintained constant during the changes of attenuation.

Result

Delay (µs)		- 426		- 224		- 1.95		1.95		224		426	
Attenuation (dB)		0	20	0	20	0	20	0	20	0	20	0	20
Mode	MS 1												

Delay (µs)		- 253		- 133		- 1.95		1.95		133		253	
Attenuation (dB)		0	20	0	20	0	20	0	20	0	20	0	20
Mode	MS 2												

Delay (µs)		- 26		- 10		- 1.95		1.95		10		26	
Attenuation (dB)		0	20	0	20	0	20	0	20	0	20	0	20
Mode	MS 3												

Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed

5.4.13 C/(N+I) Performance in SFN outside the Guard Interval (GI)

Section	13.0	
Test case	C/(N+I) Performance in SFN outside the guard interval.	
Requirement	For echoes outside the guard interval, QEF reception shall be possible with echo levels up to the values outlined in Annex A of the SKMM MTSFB TC T004:2013.	
Purpose	To verify the SFN synchronisation in SFN for echoes outside guard interval.	
Expectation	The echo levels shall be equal or higher compared to the RF figures outlined in Annex A of the SKMM MTSFB TC T004:2013.	
Test instrument set up	See Figure 1d.	
Calibration requirement	1	Set up the equipment based on the modes outlined in Annex A of the SKMM MTSFB TC T004:2013. Start with MS 1.
	2	Configure the echo signal with channel simulator relative delay difference set at 448 µs.
	3	Set the echo level to 0 dB.
	4	Ensure that the receiver signal input level (wanted signal) is set to - 50 dBm.
	5	Perform a channel search (tune) on frequency 666 MHz.
Test outline	1	Decrease the echo level from high to the lower value until QEF reception is achieved.
	2	Repeat the test for the range of echo values and T2 modes defined in the Result Table below.
	3	Remark The performance requirement is based on 30 s error free video.

Result

Modes	MS 1		MS 2		MS 3		MS 4	
	Echo delay (µs)	Echo level (dBc)	Echo delay (µs)	Echo level (dBc)	Echo delay (µs)	Echo level (dBc)	Echo delay (µs)	Echo level (dBc)
	- 532				- 133		- 608	
	- 525				- 120		- 600	
	- 510				- 90		- 580	
	- 490				- 60		- 60	
	- 475				- 30		- 540	
	- 448		- 266		- 28		- 512	
	448		266		28		512	
	475				30		540	
	490				60		560	
	510				90		580	
	525				120		600	
	532				133		608	

Remark - If 'Failed', please indicate the level of failure (dB).

NOTE: Attach graph (if any)

Indicates no tested is needed

6. SI/PSI conformance test suite

The test category for the evaluation result are as follows:

a) basic SI/PSI;

b) logical channel numbering;

c) network evolution;

d) character test;

e) active format description;

f) Multiple Physical Layer Pipes (MPLP);

g) declaration; and

h) results total.

6.1 Basic SI/PSI test

The Basic SI/PSI test is tabulated in Table 4.

Table 4. Basic SI/PSI test

Description	Test streams	Stream configuration
This test contains the following sections: Section 1.1: Service installation & information Section 1.2: Event information Section 1.3: Codec information Section 1.4: Audio & subtitle language	MYS_SIPSI_1a.ts	Modulation type: DVB-T2 Channel frequency: 474 MHz - 858 MHz Bandwidth: 8 MHz Mode: 32 K Guard interval: 1/128 Modulation: 256 QAM Cell identifier: 0
NOTES: 1. Reference document (Ref.): SKMM MTSFB TC T004. 2. The test streams are available by the local certification body.		

6.1.1 Service installation and information

The service installation and information are tabulated in Table 5.

Table 5. Service installation and information

Section 1.1: Service installation and information			
No.	**Test instruction**	**Expectation**	**Ref.**
1.1.1	Play out MYS_SIPSI_1a.ts and perform receiver full scan. Enter each service and ensure that all of them are accessible via numerical keys. Confirm the correct service name and LCN numbering in each service.	Observe the service name and LCN numbering for each service in the service list and ensure they are correctly arranged in an ascending order as below: LCN 208: TV1_SD LCN 209: TV2_HD LCN 210: TV3_HD LCN 211: TV4_SD LCN 212: TV5_Radio LCN 213: TV6_Radio	3.2.11.1
1.1.2	Check clock information.	Thursday 12th April 21:00:00.	3.2.13

6.1.2 Event information

The event information is tabulated in Table 6.

Table 6. Event information

Section 1.2: Event information				
No.	**Test instruction**	**Expectation**		**Ref.**
1.2.1	Play out MYS_SIPSI_1a.ts and perform receiver full scan. Using numerical keys, press '208' to enter service LCN 208 TV1_SD. Access the banner and check the present (now) event information. NOTE: The event description may optionally be truncated by receiver when the character length exceeds the allocated area for display of the event description.	Service name	TV1_SD	3.2.12 3.2.12.1
1.2.2		Event start and end time	Thursday 12th April 21:00:00 - 21:30:00 (30 minutes).	
1.2.3		Event name	TV1_SD Present Event	
1.2.4		Short event description	Short Event Description for TV1_SD Present Event.	
1.2.5		Extended event description	Extended Event Description for TV1_SD Present Event: TV1_SD has a parental rating of 9 years and its genre is classified as Movie/Drama or Adult Movie/Drama.	
1.2.6	Next, access the banner again and check the following (next) event information. NOTE: The event description may optionally be truncated by receiver when the character length exceeds the allocated area for display of the event description.	Service name	TV1_SD	3.2.12 3.2.12.1
1.2.7		Event start and end time	Thursday 12th April 21:30:00 - 22:00:00 (30 minutes).	
1.2.8		Event name	TV1_SD Following Event	
1.2.9		Short event description	Short Event Description for TV1_SD Following Event.	
1.2.10		Extended event description	Extended Event Description for TV1_SD Following Event: TV1_SD has a parental rating of 15 years and its genre is classified as News/Current Affairs or Documentary.	

Table 6. Event information *(continued)*

Section 1.2: Event information				
No.	**Test instruction**	**Expectation**		**Ref.**
1.2.11	Using numerical keys, press '209' to enter service LCN 209 TV2_HD. Access the banner and check the present (now) event information. NOTE: The event description may optionally be truncated by receiver when the character length exceeds the allocated area for display of the event description.	Service name	TV2_HD	
1.2.12		Event start and end time	Thursday 12th April 2012 21:00:00 - 21:30:00 (30 minutes).	
1.2.13		Event name	TV2_HD Present Event	
1.2.14		Short event description	Short Event Description for TV2_HD Present Event.	
1.2.15		Extended event description	Extended Event Description for TV2_HD Present Event: TV2_HD has a parental rating of 11 years and its genre is classified as Show/Game Show or Variety Show.	

6.1.3 Codec information

The codec information is tabulated in Table 7.

Table 7. Codec information

Section 1.3: Codec information				
No.	**Test instruction**	**Expectation**		**Ref.**
1.3.1	Play out MYS_SIPSI_1a.ts and perform receiver full scan.	Video component	The 576i (16:9) MPEG-4 AVC MP@L3 SD “Flowers" video shall be presented.	3.2.3 3.2.3.1 3.2.3.2
1.3.2	Using numerical keys, press '208' to enter service LCN 208 TV1_SD.	Audio component	"Guitar Solo" audio shall be selectable when the audio selection is set to English.	3.2.4 3.2.4.1
1.3.3	Using numerical keys, press '209' to enter service LCN 209 TV2_HD.	Video component	The 1080i MPEG-4 AVC MP@L4 HD "Village" video shall be presented.	3.2.3 3.2.3.1 3.2.3.2
1.3.4	Using numerical keys, press '210' to enter service LCN 210 TV3_HD.	Video component	The 720p MPEG-4 AVC MP@L4 HD "Park" video shall be presented.	3.2.3 3.2.3.1 3.2.3.2
1.3.5	Using numerical keys, press '211' to enter service LCN 211 TV4_SD.	Video component	The 576i (4:3) MPEG-4 AVC MP@L3 SD "Bridge" video shall be presented.	3.2.3 3.2.3.1 3.2.3.2
1.3.6	Play out ChID_voices_swp_ddp_DVB_h264_25fps.trp and perform receiver full scan. Enter service Dolby Labs test stream	Audio component	Audio alternates between each channel should be presented. NOTE: Audio presentation is optional.	3.2.4 3.2.4.1

6.1.4 Audio and subtitle language

The audio and subtitle language are tabulated in Table 8.

Table 8. Audio and subtitle language

Section 1.4: Audio and subtitle language				
No.	**Test instruction**	**Expectation**		**Ref.**
1.4.1	Play out MYS_SIPSI_1a.ts and perform receiver full scan. Enter service TV_SD	Audio	"Keyboard" audio shall be selectable when the audio selection is set to Bahasa Melayu (MSA).	3.2.4 3.2.4.1 3.2.6.2
1.4.2	Firstly, perform the following setting: Enable subtitles NOTES: 1. All subtitles presented are in English. 2. If subtitles do not display due to PTS-PCR difference, then subtitle tests can be considered a pass. Please indicate in remarks if this is the case, and also ensure to make self-declaration in section 7.1 regarding the display of subtitles	Subtitle	Bahasa Melayu subtitles, “SIPSI Test. Subtitle 1, number…” shall be selectable when the subtitle selection is set to Bahasa Melayu (MSA).	3.2.5 3.2.6.1
1.4.3		Audio	"Bell rings" audio shall be selectable when the audio selection is set to Chinese (ZHO).	3.2.4 3.2.4.1 3.2.6.2
1.4.4		Subtitle	Chinese subtitles, “SIPSI Test. Subtitle 2, number…", shall be selectable when the subtitle selection is set to Chinese (ZHO).	3.2.5 3.2.6.1
1.4.5		Audio	"Drum Solo" audio shall be selectable when the audio selection is set to Tamil (TAM).	3.2.4 3.2.4.1 3.2.6.2
1.2.6		Subtitle	Tamil subtitles, “SIPSI Test. Subtitle 3, number…” shall be selectable when the subtitle selection is set to Tamil (TAM).	3.2.5 3.2.6.1
1.4.7		Audio	"Guitar Solo" audio shall be selectable when the audio selection is set to English.	3.2.4 3.2.4.1 3.2.6.2
1.4.8		Subtitle	English subtitles, "SIPSI Test. Subtitle 0, number…", shall be selectable when the subtitle selection is set to English.	3.2.5 3.2.6.1
1.4.9		Audio	Receiver shall present any of the following audio components when the audio selection is set to other languages besides Bahasa Melayu, English, Chinese and Tamil: English (ENG) - "Guitar Solo" Bahasa Melayu (MSA) - "Keyboard" Chinese (ZHO) - "Bell rings" Tamil (TAM) - "Drum Solo"	3.2.4 3.2.4.1 3.2.6.2

Table 8. Audio and subtitle language

Section 1.4: Audio and subtitle language				
No.	**Test instruction**	**Expectation**		**Ref.**
1.4.10	*(continue from above)*	Subtitle	Receiver shall present any of the following subtitle components when the subtitle selection is set to other languages besides Bahasa Melayu, English, Chinese and Tamil: English (ENG) Subtitles Bahasa Melayu (MSA) Subtitles Chinese (ZHO) Subtitles Tamil (TAM) Subtitles	3.2.5 3.2.6.1
1.4.11	Enter service TV2_HD. Firstly, perform the following settings: Enable subtitles	Audio	"Birds" audio shall be selectable when the audio selection is set to original audio (QAA).	3.2.4 3.2.4.1

6.2 Logical Channel Numbering (LCN) test

The Logical Channel Numbering (LCN) test tabulated in Table 9.

Table 9. Logical Channel Numbering (LCN) test

Description	Test streams	Stream configuration
This test contains the following sections: *Section 2.1: Decoding of LCN descriptors* *2.1.1 LCN V1 Descriptors* *2.1.2 LCN V2 Descriptors* *Section 2.2: Foreign services* *Section 2.3: No LCN descriptor* *Section 2.4: Regional broadcast management*	MYS_SIPSI_2.1a.ts MYS_SIPSI_2.1b.ts MYS_SIPSI_2.3.ts FGN_SIPSI_2.2.ts FGN_SIPSI_2.3.ts MYS_SIPSI_2.4.ts	Modulation type: DVB-T2 Channel frequency: 474 MHz - 858 MHz Bandwidth: 8 MHz Mode: 32 K Guard interval: 1/128 Modulation: 256 QAM Cell identifier: 0
NOTE: Reference document (Ref.): SKMM MTSFB TC T004.	NOTE: The test streams are available by the local certification body.	NOTE: In the case of simultaneous playing of two streams, the streams should be played out at different frequencies. For example, one stream is played out at 474 MHz and the other is played out at 858 MHz.

6.2.1 Decoding of Logical Channel Numbering (LCN) descriptors

The decoding of LCN descriptors is tabulated in Table 10.

Table 10. Decoding of LCN descriptors

Section 2.1: Decoding of LCN descriptors				
No.	**Test category**	**Instructions**	**Expectations**	**Ref.**
2.1.1	LCN V1 descriptors	Play out MYS_SIPSI_2.1a.ts and perform receiver auto scan.	Total of 6 services shall be visible in the service list and shall be in ascending order as below: LCN 010 MYS_TV 1 LCN 031 MYS_TV 4.1/MYS_TV 4.2 LCN 561 MYS_Radio 9 LCN 800++ MYS_TV 4.1/MYS_TV 4.2 LCN 800++ MYS_TV 6 LCN 800++ Service with no LCN Confirm that receiver shall be able to access each service normally via numeric button and service list. Using numerical keys, press '102' to enter service LCN 102 MYS_Radio 8. 'Drum Solo' audio shall be presented. This service is hidden and can only be selected using direct key entry. Using numerical keys, press '031' to enter service LCN 031 MYS_TV 4.1/ or MYS_TV 4.2. 'Bridge' video and 'Keyboard' audio shall be presented. Select 'Service with no LCN' service. LCN 800++ shall be assigned to this service. 'Bridge' video and 'Guitar Solo' audio shall be presented.	3.2.11.2 3.2.11.4 3.2.19
2.1.2	LCN V2 descriptors	Play out MYS_SIPSI_2.1b.ts and perform receiver auto scan.	Total of 6 services shall be visible in the service list and shall be in ascending order as below: LCN 005 TV 5 LCN 055 TV 55_A LCN 166 Radio 5 LCN 800++ TV 55_B LCN 800++ TV 132 LCN 800++ Service with no LCN Service with LCN 300 is hidden and shall not appear in the service list. Confirm that receiver is able to access each service normally via numerical keys.	3.2.11.3 3.2.11.4 3.2.19

Table 10. Decoding of LCN descriptors *(continued)*

Section 2.1: Decoding of LCN descriptors				
No.	**Test category**	**Instructions**	**Expectations**	**Ref.**
2.1.2	LCN V2 descriptors	Play out MYS_SIPSI_2.1b.ts and perform receiver auto scan.	Using numerical keys, press '300' to enter service LCN 300 Radio7. This service is hidden and can only be selected using direct key entry. 'Drum Solo' audio shall be presented. Using numerical keys, press '055' to enter service LCN 055 TV55_A. 'Bridge' video and 'Keyboard' audio shall be presented. Select 'Service with no LCN' service. LCN 800++ shall be assigned to this service. 'Bridge' video and 'Guitar Solo' audio shall be presented.	

6.2.2 Foreign services

The foreign services is tabulated in Table 11.

Table 11. Foreign services

Section 2.2: Foreign services				
No.	**Test category**	**Instructions**	**Expectations**	**Ref.**
2.2.1	Foreign service	Play out MYS_SIPSI_2.1b.ts and FGN_SIPSI_2.2.ts simultaneously and perform receiver's auto scan method. NOTE: Please refer to the stream configuration method as stated above.	Total of 12 services shall be visible in the service list and shall be an ascending order as below: LCN 005 TV 5 LCN 055 TV 55_A/TV 55_B LCN 166 Radio 5 LCN 800++ TV 55_A/TV 55_B LCN 800++ TV 132 LCN 800++ Service with no LCN LCN 800++ SI Television 100 LCN 800++ TV Service 101 LCN 800++ TV Service 102 LCN 800++ MI Television 201 LCN 800++ MI Television 202 LCN 800++ LL Television 300 Confirm that receiver is able to access to each service normally via numerical keys and service list.	3.2.11.4 3.2.19

Table 11. Foreign services *(continued)*

Section 2.2: Foreign services				
No.	**Test category**	**Instructions**	**Expectations**	**Ref.**
2.2.1	Foreign service	Play out MYS_SIPSI_2.1b.ts and FGN_SIPSI_2.2.ts simultaneously and perform receiver's auto scan method. NOTE: Please refer to the stream configuration method as stated above	Service with LCN 300 is hidden and shall not appear in the service list. Confirm that receiver is able to access each service normally via numerical keys. Using numerical keys, press '300' to enter service LCN 300 Radio7. This service is hidden and can only be selected using direct key entry. 'Drum Solo' audio shall be presented. Confirm that all of the foreign services are assigned with channel number 800++.	

6.2.3 No Logical Channel Numbering (LCN) descriptor

The No LCN descriptor tabulated in Table 12.

Table 12. No Logical Channel Numbering (LCN) descriptor

Section 2.3: No LCN descriptor				
No.	**Test category**	**Instructions**	**Expectations**	**Ref.**
2.3.1	No LCN descriptor	Play out MYS_SIPSI_2.3.ts and FGN_SIPSI_2.3.ts simultaneously and perform receiver's auto scan method.	Total of 12 services shall be visible in the service list and shall be an ascending order as below: LCN 001 TV 5 LCN 002 TV 55_A LCN 003 Radio 5 LCN 004 Radio 7 LCN 005 TV 55_B LCN 006 TV 132 LCN 007 SI Television 100 LCN 008 TV Service 101 LCN 009 TV Service 102 LCN 010 MI Television 201 LCN 011 MI Television 202 LCN 012 LL Television 300 Confirm that receiver is able to access each service normally via numerical keys and service list.	3.2.11.4 3.2.19

6.2.4 Regional broadcast management

The regional broadcast management is tabulated in Table 13.

Table 13. Regional broadcast management

Section 2.4: Regional broadcast management				
No.	**Test category**	**Instructions**	**Expectations**	**Ref.**
2.4.1	Regional broadcast management	Play out MYS_SIPSI_2.4.ts and perform receiver auto scan. a) Select the channel list for Central Region (ID: 0 x 0001) in the receiver's	Total of 9 services shall be visible in the service list and shall be in ascending order as below for the Central Region channel list (ID:0 x 0001) LCN 001 MY_TV 1 LCN 005 MY_TV 15 LCN 007 MY_TV 2 LCN 033 MY_HDTV 4 LCN 155 MYTV_10 LCN 431 MY Radio 6 LCN 611 MY_TV 5 LCN 701 MY_TV 7 LCN 800++ MY_TV 8 Confirm that receiver is able to access each service normally via numerical keys and service list NOTE: Data type service is optional.	3.2.11.5 3.2.19
		b) Perform receiver auto scan again and select the channel list for Southern region (ID: 0 x 0002) in the receiver's channel list menu.	Total of 9 services shall be visible in the service list and shall be in ascending order as below for the Southern Region channel list (ID:0 x 0002) LCN 002 MY_TV 2 LCN 006 MY_TV 15 LCN 010 MY_TV 1 LCN 036 MY_HDTV 4 LCN 105 MYTV_10 LCN 437 MY_Radio 6 LCN 617 MY_TV 5 LCN 770 MY_TV 7 LCN 800++ MY_TV 8 Confirm that receiver is able to access each service normally via numerical keys and service list. NOTE: Data type service is optional.	3.2.11.5 3.2.19

6.3 Network evolution

The Network evolution tabulated in Table 14.

Table 14. Network evolution

Description	Test streams	Stream configuration
This test contains the following sections: *Section 3.1: Service Addition and Deletion* *Section 3.2: Clash LCN Resolution* *Section 3.3: Multiplex Addition and Deletion* *Section 3.4: Service and Event Updates*	MYS_SIPSI_3.1a.ts MYS_SIPSI_3.1a_addition.ts MYS_SIPSI_3.1a_deletion.ts MYS_SIPSI_3.2a.ts MYS_SIPSI_3.2b.ts MYS_SIPSI_3.2a_02.ts MYS_SIPSI_3.2b_01.ts MYS_SIPSI_3.2b_02.ts MYS_SIPSI_3.3a.ts MYS_SIPSI_3.3a_mux.ts MYS_SIPSI_3.3b_mux.ts MYS_SIPSI_3.5.ts	Modulation type: DVB-T2 Channel frequency: 474 MHz - 858 MHz Bandwidth: 8 MHz Mode: 32 K Guard interval: 1/128 Modulation: 256 QAM Cell identifier: 0
NOTE: Reference document (Ref.): SKMM MTSFB TC T004.	NOTE: The test streams are available by the local certification body.	NOTE: In the case of simultaneous playing of two streams, the streams should be played out at different frequencies. For example, one stream is played out at 474 MHz and the other is played out at 858 MHz.

6.3.1 Service addition and deletion

The Service addition and deletion is tabulated in Table 15.

Table 15. Service addition and deletion

Section 3.1: Service addition and deletion			
No.	**Instruction**	**Expectation**	**Ref.**
3.1.1	Play out MYS_SIPSI_3.1a.ts and perform receiver auto scan.	A total of 4 services shall be presented as follows in ascending order: LCN 005 MY_TV Channel 1 LCN 013 MY_ Radio Channel 5 LCN 166 MY_TV Channel 11 LCN 180 MY_TV Channel 17 Confirm that receiver shall be able to access to each service normally via numerical keys and service list.	3.2.11.6
3.1.2	Stop MYS_SIPSI_3.1a.ts and play out MYS_SIPSI_3.1a_addition.ts at the same frequency as before. NOTE: Do not perform auto scan	At interval 0::121, same services shall be displayed in the service list as Ref. 3.1.1.	
3.1.3		Network update shall start within the interval 121::240. Perform receiver method of network configuration update, without user intervention or UI prompts. AC or RC ON/OFF is not considered a user intervention for this purpose. Therefore, network configuration update triggered by AC or RC off/on is acceptable. A total of 6 services shall be presented in the service list as follows in ascending order: LCN 005 MY_TV Channel 1 LCN 013 MY_ Radio Channel 5 LCN 166 MY_TV Channel 11 LCN 180 MY_TV Channel 17 LCN 290 MY_Radio Channel 32 LCN 351 MYS_TV Channel 106 Confirm that receiver shall be able to access to each service normally via numerical keys and service list.	
3.1.4	Next, stop MYS_SIPSI_3.1a_addition.ts and play out MYS_SIPSI_3.1a.ts again. Perform the receiver auto scan.	A total of 4 services shall be presented as follows in ascending order: LCN 005 MY_TV Channel 1 LCN 013 MY_ Radio Channel 5 LCN 166 MY_TV Channel 11 LCN 180 MY_TV Channel 17 Confirm that receiver shall be able to access to each service normally via numerical keys and service list.	3.2.11.6

Table 15. Service addition and deletion *(continued)*

Section 3.1: Service addition and deletion			
No.	**Instruction**	**Expectation**	**Ref.**
3.1.5	Stop MYS_SIPSI_3.1a.ts and play out MYS_SIPSI_3.1a_deletion.ts at the same frequency as before NOTE: Do not perform auto scan	At interval 0::121, same services shall be displayed in the service list as Ref. 3.1.4.	3.2.11.6
3.1.6		Network update shall start within the interval 121::240. Perform receiver method of network configuration update, without user intervention or UI prompts. AC or RC ON/OFF is not considered a user intervention for this purpose. Therefore, network configuration update triggered by AC or RC off/on is acceptable. Confirm that 2 services are deleted from the service list and the remaining service presented in the service list are as follows in ascending order: LCN 005 MY_TV Channel 1 LCN 013 MY_ Radio Channel 5 Confirm that receiver is able to access each service normally via numerical keys and service list.	

6.3.2 Clash Logical Channel Numbering (LCN) resolution

The Clash LCN resolution tabulated in Table 16.

Table 16. Clash Logical Channel Numbering (LCN) resolution

Section 3.2: Clash LCN Resolution			
No.	**Instruction**	**Expectation**	**Ref.**
3.2.1	Play out MYS_SIPSI_3.2a.ts and MYS_SIPSI_3.2b.ts simultaneously and perform receiver auto scan method.	Total of 9 services shall be visible in the service list and shall be an ascending order as below: LCN 100 Service_TV1_SD LCN 101 Service_TV2_SD LCN 102 Service_TV3_SD LCN 103 Service_Radio1 LCN 104 Service_Radio2 LCN 111 SD Service 1 LCN 222 SD Service 1_muxB LCN 333 SD Service 2_muxB LCN 444 SD Service 2 Confirm that receiver shall be able to access to each service normally via numerical keys and service list.	3.2.11.6

Table 16. Clash Logical Channel Numbering (LCN) resolution *(continued)*

Section 3.2: Clash LCN Resolution			
No.	**Instruction**	**Expectation**	**Ref.**
	Play out MYS_SIPSI_3.2a.ts and MYS_SIPSI_3.2b.ts simultaneously and perform receiver auto scan method.	Using numerical keys, press '222' to enter LCN 222 SD Service 1_muxB. 'Bridge' video and 'Bell Ring' audio shall be presented. Commence following test from LCN 222 SD Service 1_muxB.	3.2.11.6
3.2.2	Stop the streams and play out MYS_SIPSI_3.2a_02.ts and MYS_SIPSI_3.2b_01.ts simultaneously at the same frequency as before. Set power of multiplex to be such that MYS_SIPSI_3.2b_01.ts > MYS_SIPSI_3.2a_02.ts NOTE: Do not perform receiver auto scan.	Perform receiver method of network configuration update. Ensure the following services shall be listed: LCN 100 Service_TV1_SD LCN 101 Service_TV2_SD LCN 102 Service_TV3_SD LCN 103 Service_Radio1 LCN 104 Service_Radio2 LCN 111 SD Service 1 LCN 222 SD Service 1_muxB LCN 333 SD Service 2_muxB LCN 444 SD Service 2 LCN 555 Service_Radio10 LCN 666 Service_TV7_SD LCN 800++ SD_Service 2_muxA Using numerical keys, press '333', '555', and '666', and ensure the following components are available in the services: In LCN 333, 'Bell Ring' audio and 'Bridge' video shall be presented. In LCN 555, 'Keyboard' audio and 'Flowers' video shall be presented. In LCN 666, 'Keyboard' audio and 'Flowers' video shall be presented.	3.2.11.6

Table 16. Clash Logical Channel Numbering (LCN) resolution *(concluded)*

Section 3.2: Clash LCN Resolution			
No.	**Instruction**	**Expectation**	**Ref.**
3.2.3	Stop the streams and play out MYS_SIPSI_3.2a_02.ts and MYS_SIPSI_3.2b_02.ts simultaneously at the same frequency as before. NOTE: Do not perform receiver auto scan. Please refer to the stream configuration method as stated above.	Perform receiver method of network configuration update. Ensure that the following is displayed: LCN 100 Service_TV1_SD LCN 101 Service_TV2_SD LCN 102 Service_TV3_SD LCN 103 Service_Radio1 LCN 104 Service_Radio2 LCN 222 SD Service 1_muxB LCN 444 SD Service 2 LCN 555 Service_Radio10 LCN 666 Service_TV7_SD LCN 800++ SD Service 2_muxA Ensure that the below services are removed: a) LCN 111 SD Service 1 b) LCN 333 SD Service 2_muxB	3.2.11.6

6.3.3 Multiplex addition and deletion

The Multiplex addition and deletion tabulated in Table 17.

Table 17. Multiplex addition and deletion

Section 3.3: Multiplex addition and deletion			
No.	**Instruction**	**Expectation**	**Ref.**
3.3.1	<u>Static multiplex addition</u> Play out MYS_SIPSI_3.3a.ts and perform receiver auto scan.	A total of 6 services shall be presented as follows in ascending order: LCN 001 - TV1 LCN 002 - TV2 LCN 003 - TV3 LCN 004 - TV4 LCN 005 - TV5 LCN 006 - Radio6 Confirm that receiver shall be able to access to each service normally via numerical keys and service list. Using numerical keys, press '001' to enter LCN 001 TV1. 'Flowers' video and 'Guitar Solo' audio shall be presented. Commence following test from LCN001 TV1.	3.2.11.6

Table 17. Multiplex addition and deletion *(continued)*

Section 3.3: Multiplex addition and deletion			
No.	**Instruction**	**Expectation**	**Ref.**
3.3.2	Stop MYS_SIPSI_3.3a and play out MYS_SIPSI_3.3a_mux.ts and MYS_SIPSI_3.3b_mux.ts simultaneously.	Perform receiver method of network configuration update. NOTE: Do not perform receiver auto scan A total of 10 services shall be presented as follows in ascending order: LCN 001 - TV1 LCN 002 - TV2 LCN 003 - TV3 LCN 004 - TV4 LCN 005 - TV5 LCN 006 - Radio6 LCN 100 - TV11 LCN 200 - TV_12 LCN 501 - TV_15 LCN 502 - Radio 17 Confirm that receiver shall be able to access to each service normally via numerical keys and service list. Using numerical keys, press '001' to enter LCN 001 TV1. 'Flowers' video and 'Guitar Solo' audio shall be presented.	3.2.11.6
3.3.3	Multiplex Deletion/Addition Next, stop above streams and play out MYS_SIPSI_3.3a.ts at frequency 474 MHz and perform auto scan.	A total of 6 services shall be presented as follows in ascending order: LCN001 - TV1 LCN002 - TV2 LCN 003 - TV3 LCN 004 - TV4 LCN 005 - TV5 LCN 006 - Radio6 Confirm that receiver shall be able to access to each service normally via numerical keys and service list.	3.2.11.6
3.3.4	Stop MYS_SIPSI_3.3a.ts and change the frequency to 858MHz. Perform receiver method of service update.	A total of 6 services shall be presented as follows in ascending order: LCN001 - TV1 LCN002 - TV2 LCN 003 - TV3 LCN 004 - TV4 LCN 005 - TV5 LCN 006 - Radio6 Confirm that receiver shall be able to access to each service normally via numerical keys and service list.	3.2.11.6

6.3.4 Service and event updates

The service and event updates is tabulated in Table 18.

Table 18. Service and event updates

Section 3.4: Service and event updates			
No.	**Instruction**	**Expectation**	**Ref.**
3.4.1	Play out MYS_SIPSI_3.5.ts and perform receiver auto scan.	Using numerical keys, press '120' to enter LCN120 TV Channel 120. At interval 0::60s, 'Village' video with 'Keyboard' audio shall be presented. Ensure no juddering or erroneous effects in components during presentation. At interval 61::180s, audio and video shall stop. Receiver may optionally freeze the last image of the video during this interval. NOTE: Receiver shall handle clean transitions into and out of the active and inactive states during the interval 60-61 s.	3.2.2.1
3.4.2		Using numerical keys, press '131' to enter LCN131 TV Service 131. At interval 0::60s, no components shall be presented. At interval 61::180s, 'Park' video with 'Bell rings' audio shall be presented. Ensure no juddering or erroneous effects in components during presentation. NOTE: Receiver shall handle clean transitions into and out of the active and inactive states during the interval 60-61 s. Using numerical keys, press '131' to enter LCN131 TV Service 131. At interval 0::60s, no components shall be presented. At interval 61::180s, 'Park' video with 'Bell rings' audio shall be presented. Ensure no juddering or erroneous effects in components during presentation. NOTE: Receiver shall handle clean transitions into and out of the active and inactive states during the interval 60-61 s.	3.2.2.1
3.4.3		Using numerical keys, press '555' to enter LCN555 Channel 266. Press ‘Info' key to view 'Now' and 'Next' event information at banner and optionally at other user interface.	3.2.12.1

Table 18. Service and event updates *(continued)*

Section 3.4: Service and event updates			
No.	**Instruction**	**Expectation**	**Ref.**
	Play out MYS_SIPSI_3.5.ts and perform receiver auto scan.	Ensure the event information is as in expectations below and take note of the changes of this information at interval 61 s. At interval 0::60s, present event information are as follows: Event Name: News at TV1 Event Start/End Time: 9 April, 5:30 PM - 6:30 PM Event Description: News programme on air. Rating: Not defined At interval 61s, receiver shall detect version change in event p/f and event p/f information shall be updated accordingly. Present event information during interval 61::180s shall be presented as follows: Event Name: Movie programme Event Start/End Time: 9 April, 6:30 PM - 8:00 PM Event Description: Movie programme on air. Rating: Not defined	3.2.12.1

6.4 Character test

The Character test tabulated is in Table 19.

Table 19. Character test

Description	Test streams	Stream configuration
This test contains the following sections: Section 4.1: Event p/f Section 4.2: Event Schedule Section 4.3: Event p/f (Huffman Encoding) Section 4.4: Event Schedule (Huffman Encoding) Section 4.5: Huffman Encoding (Malay) Section 4.6: Huffman Encoding (ESC character) Section 4.7: No Table Definition	MYS_CHAR_4a.ts MYS_CHAR_4b.ts MYS_CHAR_4c.ts MYS_CHAR_4d.ts MYS_CHAR_4e.ts MYS_CHAR_4f.ts	Modulation Type: DVB-T2 Channel Frequency: 474 MHz - 858 MHz Bandwidth: 8 MHz Mode: 32K Guard Interval: 1/128 Modulation: 256 QAM Cell Identifier: 0
NOTE: Reference document (Ref.): SKMM MTSFB TC T004.	NOTE: The test streams are available by the local certification body.	

6.4.1 Event p/f

The Event p/f is tabulated in Table 20.

Table 20. Event p/f

Section 4.1: Event p/f					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.1.1	Play out stream MYS_CHAR_4a.ts and perform receiver auto scan method. Enter each service.	Ensure all services are populated correctly as in expectation. Ensure services are accessible via numerical keys. Confirm correct service name and LCN numbering in each service.	LCN 100 Test 1: Normal Encoding Character LCN 101 Test 2: Normal Encoding Character LCN 102 Test 3: Normal Encoding Character		3.2.8
4.1.2	Using numerical keys, press '100' to enter service LCN 100 Test 1: Normal Encoding Character. Access the banner and guide to view the present (now) event information. Access the following events on the banner.	Ensure all present event descriptions are presented as in expectations in the EPG.	Event name	"Event 1: Combination of long event name which consists many letter and number ranges 12abc" NOTE: Some truncation might occur.	3.2.8
4.1.3			Short event description	"Short Event Description: In 1987, statistics show that 43 percent of people in the world aged between 18 to 35 smoke 25 cigarettes per day. This is bad news."	
4.1.4			Extended event description	"Extended Description: Cigarettes contain a chemical called carcinogen which could endanger the human lungs. Not only does this endanger the smokers, it could be harmful to others as well for they are inhaling the smoke through second hand smoking." NOTE: Some truncation might occur.	
4.1.5		Ensure all following events are presented as in expectations in the EPG	Short event description	"Short Event Description: Zebras have many black stripes. It is said that they come from a species of the African horse family."	

Table 20. Event p/f *(continued)*

Section 4.1: Event p/f					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.1.6	*(continue from above)*	Ensure all following events are presented as in expectations in the EPG*)*	Extended event description	"Extended Event Description: They are united by their distinctive black and white stripes which comes in different patterns and are unique to each individual." NOTE: Some truncation might occur.	3.2.8
4.1.7	Using numerical keys, press '101' to enter service LCN101 Test 2: Normal Encoding Character.	Ensure all present event descriptions are presented as in expectations in the EPG.	Event Name	"Event 1: Character Test"	3.2.8
4.1.8			Short event description	"CAPITAL ALPHABET: ABCDEFGHIJKLMNOPQRSTUVWXYZ Numbers: 0123456789. abcdefghijklmnopqrstuvwxyz"	3.2.8
4.1.9	Access the banner and guide to view the present (now) event information. Access the following events on the banner	Ensure all following events are presented as in expectations in the EPG.	Extended event description	"SIX OF THE WOMEN QUIETLY GAVE BACK PRIZES TO THE JUDGE. THE JUDGE QUICKLY GAVE BACK SIX PRIZES TO THE WOMEN. Six of the women quietly gave back prizes to the judge. The judge quickly gave back six prizes to the women." NOTE: Some truncation might occur.	
4.1.10			Event Name	"Event 2: CharacterTest123"	
4.1.11			Short event description	"THE BOY WORE A RED SHIRT. HE WAS SEEN STROLLING IN THE ZOO WHILE FEEDING THE FLAMINGOES AND DUCKLINGS. HE WAS WITH HIS FAMILY WHEN SUDDENLY AN UNPREDICTED WEATHER OCCURRED. IT STARTED DRIZZLING BEFORE A HEAVY DOWNPOUR CAME."	

Table 20. Event p/f *(concluded)*

Section 4.1: Event p/f					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.1.12	*(continue from above)*	Ensure all following events are presented as in expectations in the EPG.	Extended event description	"The boy wore a red shirt. He was seen strolling in the zoo while feeding the flamingos and ducklings. He was with his family when suddenly an unpredicted weather occurred. It started drizzling before a heavy downpour came." NOTE: Some truncation might occur.	
4.1.13	Using numerical keys, press '102' to enter service LCN102 Test 3: Normal Encoding Character. Access the banner and guide to view the present (now) event information.	Ensure all present event descriptions are presented as in expectations in the EPG	Event name	"Event 1: Test NBSP and SHY code in description."	
4.1.14			Short event description	"NBSP: word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc word abc SHY: worddef worddef" Pass Criteria's: a) For NBSP, the line may only be broken after word "abc" such that "word abc" is kept together. b) For SHY, the word should be broken at the [SHY] Character position when the line needs to wrap and display a hyphenation Character "-", when no line wrap occurs then the [SHY] is not presented. Receivers not implementing SHY are likely to display a single line.	

6.4.2 Event schedule

The event schedule is tabulated in Table 21.

Table 21. Event schedule

Section 4.2: Event schedule					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.2.1	Using numerical keys, press '101' to enter service LCN 101 Test 2: Normal Encoding Character. Press the guide button to access the EPG information.	Ensure EPG is accessible.	EPG is able to be presented when Guide key is pressed.		3.2.8 3.2.12.2
4.2.2	Toggle keys to continue to next day event schedule and previous days.	Ensure 7 days of EPG are displayed.	7 days of Event Schedule shall be presented. If less than 7 days of Event Schedule is accessed, this test shall fail.		
4.2.3	Check the service names on the EPG.	Ensure services are correct.	All services shall be populated in the EPG with the same details as in expectations in section 4.1.1		
4.2.4	Toggle up, down, left, right keys	Ensure EPG is interactive with different key press.	No erroneous effects occur during different key press.		
4.2.5	Select event 3 in LCN 101.	Ensure correct event names, event description, and event start and end times are presented as in expectation.	Event name	"Event 3: Characters Row A-B-C"	
4.2.6			Short event description	"¡¢£€¥§¤‘“«←↑→↓°±²³ ×µ¶·÷’”»¼½¾¿"	3.2.8 3.2.12.2
4.2.7			Extended event description	"ÀÁÂÃĀĂÄÅĄ"	
4.2.8	Select event 4 in LCN 101	Ensure correct event names, event description, and event start and end times are presented as in expectation	Event name	"Event 4: Characters Row D-E"	

Table 21. Event schedule *(continued)*

Section 4.2: Event schedule					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.2.9	Select event 4 in LCN 101	Ensure correct event names, event description, and event start and end times are presented as in expectation	Short event description	"—¹®©™♪¬¦1⁄8 3⁄8 5⁄8 7⁄8 Ω ÆĐªĦIJĿŁØŒºÞŦŊʼn" NOTE: Characters 'ª', 'º' and 'Ŋ' may alternatively be shown in Unicode version, 'ª', 'º' and 'Ŋ'.	3.2.8 3.2.12.2
4.2.10			Extended event description	"Event information is not available."	
4.2.11	Select event 5 in LCN 101	Ensure correct event names, event description, and event start and end times are presented as in expectation	Event name	"Event 5: Characters Row F"	
4.2.12			Short event description	"kæððħıijlŀøœßþŧŋ"	
4.2.13			Extended event description	"Event information is not available."	

6.4.3 Event p/f (Huffman encoding)

The Event p/f (Huffman encoding) is tabulated in Table 22.

Table 22. Event p/f (Huffman encoding)

Section 4.3: Event p/f (Huffman encoding)					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.3.1	Play out stream MYS_CHAR_4 b.ts and perform receiver auto scan method. Enter each service.	Ensure all services are populated correctly as in expectation. Ensure services are accessible via numerical keys. Confirm correct service name and LCN numbering in each service.	LCN 100 Test 1: Huffman encoding character LCN 101 Test 2: Huffman encoding character LCN 102 Test 3: Huffman encoding character		3.2.8
4.3.2	Using numerical keys, press '100' to enter service LCN 100	Ensure all present event descriptions are presented as in expectations in the banner and the EPG	Event name	"Event 1: Combination of long event name which consists many letter and number ranges 12abc"	

Table 22. Event p/f (Huffman encoding) *(continued)*

Section 4.3: Event p/f (Huffman encoding)					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.3.3	Test 1: Huffman Encoding Character.	Ensure all following events are presented as in expectations in the banner and the EPG	Short event description	"Short Event Description: In 1987, statistics show that 43 percent of people in the world aged between18 to 35 smokes 25 cigarettes per day. This is bad news."	3.2.8
4.3.4	Access the banner and guide to view the present (now) event information. Access the following events on the banner.		Extended event description	"Extended Description: Cigarettes contain a chemical called carcinogen which could endanger the human lungs. Not only does this endanger the smokers, this could be harmful to others as well for they are inhaling the smoke through second hand smoking." NOTE: Some truncation might occur.	3.2.8
4.3.5			Short event description	"Short Event Description: Zebras have many black stripes. It is said that they come from a species of the African horse family."	3.2.8
4.3.6			Extended event description	"Extended Event Description: They are united by their distinctive black and white stripes which comes in different patterns and are unique to each individual." NOTE: Some truncation might occur.	
4.3.7	Using numerical keys, press '101' to enter service LCN101	Ensure all present event descriptions are presented as in the banner and the EPG.	Event Name	"Event 1: Character Test"	
4.3.8	Test 2: Huffman encoding character.		Short event description	"CAPITAL ALPHABET: ABCDEFGHIJKLMNOPQRSTUVWXYZ Numbers: 0123456789. abcdefghijklmnopqrstuvwxyz."	

Table 22. Event p/f (Huffman encoding) *(concluded)*

Section 4.3: Event p/f (Huffman encoding)					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.3.9	Access the banner and guide to view the present (now) event information. Access the following events on the banner	Ensure all present event descriptions are presented as in the banner and the EPG.	Extended event description	"SIX OF THE WOMEN QUIETLY GAVE BACK PRIZES TO THE JUDGE. THE JUDGE QUICKLY GAVE BACK SIX PRIZES TO THE WOMEN. Six of the women quietly gave back prizes to the judge. The judge quickly gave back six prizes to the women." NOTE: Some truncation might occur.	3.2.8
4.3.10		Ensure all following events are presented as in expectations in the banner and the EPG	Event name	"Event 2: CharacterTest123"	3.2.8
4.3.11			Short event description	"THE BOY WORE A RED SHIRT. HE WAS SEEN STROLLING IN THE ZOO WHILE FEEDING THE FLAMINGOES AND DUCKLINGS. HE WAS WITH HIS FAMILY WHEN SUDDENLY AN UNPREDICTED WEATHER OCCURRED."	
4.3.12			Extended event description	"The boy wore a red shirt. He was seen strolling in the zoo while feeding the flamingos and ducklings. He was with his family when suddenly an unpredicted weather occurred. It started drizzling before a heavy downpour came." NOTE: Some truncation might occur.	
4.3.13	Using numerical keys, press '102' to enter service LCN102 Test 3: Huffman Encoding Character. Access the banner and guide to view the present (now)event information.	Ensure all present event descriptions are presented as in expectations in the banner and the EPG	Event name	"Huffman English"	3.2.8
4.3.14			Short event description	"This is a verification test for English Huffman Encoding. If this text appears, then the encoding is successful."	

6.4.4 Event schedule (Huffman encoding)

The Event schedule (Huffman encoding) is tabulated in Table 23.

Table 23. Event schedule (Huffman encoding)

Section 4.4: Event schedule (Huffman Encoding)					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.4.1	Using numerical keys, press '101' to enter. Service LCN 101 Test 2: Huffman Encoding Character. Press the Guide button to access the EPG information	Ensure EPG is accessible.	EPG is able to be presented when Guide key is pressed.		3.2.8
4.4.2	Select event 3 in LCN 101.	Ensure correct event names, event description, and event start and end times are presented as in expectation.	Event name	"Event 3: Huffman EPG 1"	
4.4.3			Short event description	"Zebras have many black stripes. It is said that they come from a species of the African horse family. This text should display in the EPG with Huffman Encoding implemented."	
4.4.4	Select event 4 in LCN 101.		Event name	"Event 4: Huffman EPG 2"	
4.4.5			Short event description	"In 1987, statistics show that 43 percent of people in the world aged between 18 to 35 smoke 25 cigarettes per day. This text should display in the EPG with Huffman Encoding implemented."	
4.4.6	Select event 5 in LCN 101.		Event name	"Event 5: Huffman EPG 3"	3.2.8
4.4.7			Short event description	"The boy wore a red shirt. He was seen strolling in the zoo while feeding the flamingos and ducklings. This text should display in the EPG with Huffman Encoding implemented."	

6.4.5 Huffman encoding (Malay)

The Huffman encoding (Malay) is tabulated in Table 24.

Table 24. Huffman encoding (Malay)

Section 4.5: Huffman encoding (Malay)					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.5.1	Play out stream MYS_CHAR_4c .ts and perform receiver auto scan method. Enter service.	Ensure all services are populated correctly as in expectation. Ensure services are accessible via numerical keys. Confirm correct service name and LCN numbering in each service.	LCN 100 Huffman Malaysia Service		3.2.8
4.5.2	Using numerical keys, press '100' to enter service LCN 100 Test 1: Huffman Malaysia Service.	Ensure all present event descriptions are presented as in expectations in the banner and the EPG.	Event name	"Huffman Bahasa Malaysia"	
4.5.3			Short event description	"Ikuti berita yang memaparkan perkembangan terkini dan semasa termasuk berita ekonomi dan kewangan. Rancangan khas khusus untuk tontonan anda persembahan daripada TV6. Berhibur dengan kumpulan muzik tempatan dengan pilihan lagu-lagu." NOTE: Some truncation might occur.	
4.5.4	Access the banner and guide to view the present (now) event information.		Extended event description	"Istimewa Bersama Zaidi Zainal yang menyampaikan lagu-lagu popularnya. Saksikan Rentak Juara 2010 Konsert Peringkat Akhir untuk hiburan semua hanya di TV6. Nikmati klip-klip video tempatan pilihan peminat yang terdiri daripada pelbagai kaum dan etnik." NOTE: Some truncation might occur.	

6.4.6 Huffman encoding (ESC character)

The Huffman encoding (ESC character) is tabulated in Table 25.

Table 25. Huffman encoding (ESC character)

Section 4.6: Huffman encoding (ESC character)					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.6.1	Play out stream MYS_CHAR_4f.ts and perform Enter service.	Ensure all services are populated correctly as in expectation. Ensure services are accessible via numerical keys. Confirm correct service name and LCN numbering in each service.	LCN 100 Huffman Malaysia Service		3.2.8
4.6.2	Using numerical keys, press '100' to enter service LCN 100 Test 1: Huffman Malaysia Service.	Ensure all present event descriptions are presented as in expectations in the banner and the EPG.	Event name	"Huffman Bahasa Malaysia"	3.2.8
4.6.3			Short event description	"RM10 adalah bersamaan dengan £2.05 atau ¥278.34"	
4.6.4	Access the banner and guide to view the present (now) event information. Access the following events on the banner.	Ensure all following events are presented as in expectations in the banner and the EPG.	Event name	"Huffman English"	
4.6.5			Short event description	"RM10 adalah bersamaan dengan £2.05 atau ¥278.34"	

6.4.7 No table definition

The no table definition is tabulated in Table 26.

Table 26. No table definition

Section 4.7: No Table Definition				
No.	**Test instructions**	**Checkpoints**	**Expectations**	**Ref.**
4.7.1	Play out stream MYS_CHAR_4d.ts and perform receiver auto scan method. Enter service.	Ensure all services are populated correctly as in expectation. Ensure services are accessible via numerical keys. Confirm correct service name and LCN numbering in each service.	LCN 100 Test 1: No Table Defined	3.2.8

Table 26. No table definition *(continued)*

Section 4.7: No Table Definition					
No.	**Test instructions**	**Checkpoints**	**Expectations**		**Ref.**
4.7.2	Using numerical keys, press '100' to enter service LCN 100	Ensure all present event descriptions are presented as in expectations in the banner and the EPG.	Event name	"Event 1: No Table Defined"	3.2.8
4.7.3	Test 1: No character table. Access the banner and guide to view the present (now) event information.		Short event description	"ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklmnopqrstuvwxyz.!#$%&'()*+,-./:;<=>?[\]^_@{|}~ ¡¢£€¥§¤‘“«←↑→↓°±²³×µ¶·÷’”»¼½¾¿ÀÁÂÃĀĂÄÅĄ—¹®©™♪¬¦⅛⅝⅞ΩÆĐªĦIJĿŁØŒºÞŦŊʼnĸæđðħıijłøœßþŧŋ" NOTE: Characters 'ª', 'º' and 'Ŋ' may alternatively be shown in Unicode version, 'ª', 'º' and 'Ŋ'.	3.2.8

6.5 Active Format Descriptor (AFD) test

The Active Format Descriptor (AFD) test is tabulated in Table 27.

Table 27. Active Format Descriptor (AFD) test

Description	Test stream	Stream configuration
This test contains the following sections: Section 5.1: AFD test	MYS_AFD.ts	Modulation type: DVB-T2 Channel frequency: 474 MHz - 858 MHz Bandwidth: 8 MHz Cell identifier: 0 Guard interval: 1/128 Mode: 32 K Modulation: 256 QAM
NOTE: Reference document (Ref.): SKMM MTSFB TC T004.	NOTE: The test streams are available by the local certification body.	

6.5.1 Active Format Descriptor (AFD)

The Active Format Descriptor (AFD) is tabulated in Table 28.

Table 28. Active Format Descriptor (AFD)

<table>
<tr><th colspan="5">Section 5.1: AFD</th></tr>
<tr><th>No.</th><th>Test instructions</th><th>Checkpoints</th><th>Expectations</th><th>Ref.</th></tr>
<tr><td>5.1.1</td><td>Play out stream MYS_AFD.ts and perform receiver auto scan method

NOTE: Configure the receiver screen setting to display the video as coded frame.</td><td>Ensure all services appear in the service list.</td><td>LCN 100 AFD (1000)
LCN 200 AFD (1011)
LCN 300 AFD (1001)</td><td rowspan="2">3.2.3.5</td></tr>
<tr><td>5.1.2</td><td>Enter service 'AFD (1000)' by pressing 100.</td><td>Observe that the video is displayed accordingly.

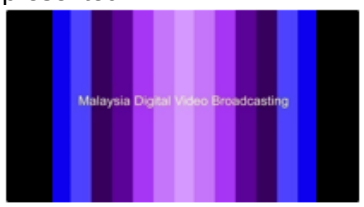
NOTES:
1. For a 16:9 iDTV or STB connected to a 16:9 display, it shall follow Figure 2b.

2. For an STB connected to a 4:3 display, it shall follow Figure 2a</td><td>4:3 display
Video as in Figure 2a shall be presented:
 

Figure 2a. AFD 1000 4:3 display
16:9 display
Video as in Figure 2b shall be presented:
 

Figure 2b. AFD 1000 16:9 display</td></tr>
</table>

Table 28. Active Format Descriptor (AFD) *(continued)*

Section 5.1: AFD				
No.	**Test instructions**	**Checkpoints**	**Expectations**	**Ref.**
5.1.3	Enter service 'AFD (1011)' by pressing 200.	Observe that the video is displayed accordingly. NOTES: 1. For a 16:9 iDTV or STB connected to a 16:9 display, it shall follow Figure 3a. 2. For an STB connected to a 4:3 display, it shall follow Figure 3b.	**4:3 display** Video as in Figure 3a shall be presented:  **Figure 3a. AFD 1011 4:3 display** **16:9 display** Video as in Figure 3b shall be presented :  **Figure 3b. AFD 1011 16:9 display**	3.2.3.5
5.1.4	Enter service 'AFD (1001)' by pressing 300.	Observe that the video is displayed accordingly. NOTES: 1. For a 16:9 iDTV or STB connected to a 16:9 display, it shall follow Figure 4a. 2. For an STB connected to a 4:3 display, it shall follow Figure 4b.	**4:3 Display** Video as in Figure 4a shall be presented:  **Figure 4a. AFD 1001 4:3 display** **16:9 Display** Video as in Figure 4b shall be presented:  **Figure 4b. AFD 1001 16:9 display**	3.2.3.5

6.6 Multiple physical layer

This test contains the following sections:

Section 6.1: Multiple physical layer pipes

NOTE: Reference Document (Ref.): SKMM MTSFB TC T004.

Test streams:

MYS_MPLP_HD.ts
MYS_MPLP_SD.ts
MYS_MPLP_Radio.ts

NOTE: The Test Streams are available with the Communication and Multimedia Certification Section, SIRIM QAS International Sdn Bhd

Stream configuration :

Playback settings:

Modulation type : DVB-T2
Guard Interval : 1/128
Channel frequency : 474 MHz - 858 MHz
Mode : 32 K
Bandwidth : 8 MHz
Modulation : 64 QAM

Recommended PLP parameters:

Numbers of PLPs	3		
Stream	MYS_MPLP_HD.ts	MYS_MPLP_SD.ts	MYS_MPLP_Radio.ts
PLP ID	0	1	2
Group	1	1	1
PLP type	2	2	2
Modulation	256 QAM	64 QAM	16 QAM
Code rate	4/5	4/5	4/5
FEC type	64K	64K	64K
Baseband mode	HEM	HEM	HEM
BUFS	1,517.14	476.313	476.313
Design delay	674.934	674.934	674.934
ISSY	Long	Long	Long
Time interleaver type	0	0	0
Time interleaver type	3	3	3
Interleaver frame	1	1	1
1st frame	0	0	0
In band signalling	Disabled	Disabled	Disabled
Constellation rotation	YES	YES	YES
Number of blocks	84	28	28
NOTE: T2Xpress file configuration setting is provided in the test stream folder as a reference setting.			

6.6.1 Multiple physical layer pipes

The multiple physical layer pipes is tabulated in Table 29.

Table 29. Multiple physical layer pipes

Section 6.1: Multiple physical layer pipes			
No.	**Test instructions**	**Expectations**	**Ref.**
6.1.1	Ensure L1 post scrambling is disabled. Play out streams MYS_MPLP_HD.ts, MYS_MPLP_SD.ts, and MYS_MPLP_Radio.ts and perform receiver auto scan method.	Total of 9 services shall be visible in the service list and shall be in ascending order as below: LCN 001 MPLP HD Service 1 LCN 002 MPLP HD Service 2 LCN 003 MPLP HD Service 3 LCN 004 MPLP SD Service 1 LCN 005 MPLP SD Service 2 LCN 006 MPLP SD Service 3 LCN 007 MPLP Radio Service 1 LCN 008 MPLP Radio Service 2 LCN 009 MPLP Radio Service 3 Confirm that receiver shall be able to access to each service normally via numerical keys and service list. Enter each service and ensure video and audio components are available. For Radio service types, only audio components shall be available. NOTE: This is a functional test and as such it is acceptable if artefacts are observed when the stream loops around.	3.2.10.5 3.2.10.6
.1.2	Ensure L1 post scrambling is enabled. Play out streams MYS_MPLP_HD.ts, MYS_MPLP_SD.ts, and MYS_MPLP_Radio.ts and perform receiver auto scan method.	Total of 9 services shall be visible in the service list and shall be an ascending order as below: LCN 001 MPLP HD Service 1 LCN 002 MPLP HD Service 2 LCN 003 MPLP HD Service 3 LCN 004 MPLP SD Service 1 LCN 005 MPLP SD Service 2 LCN 006 MPLP SD Service 3 LCN 007 MPLP Radio Service 1 LCN 008 MPLP Radio Service 2 LCN 009 MPLP Radio Service 3 Confirm that receiver shall be able to access to each service normally via numerical keys and service list. Enter each service and ensure video and audio components are available. For Radio service types, only audio components shall be available. NOTE: This is a functional test and as such it is acceptable if artefacts are observed when the stream loops around.	3.2.10.5 3.2.10.6

6.7 Self declaration

This section is to declare that this receiver confirms to the Malaysia Specification as in Table 30 following.

Table 30. Self-declaration

No	Section	Section name
7.1	3.2.4	Decoding of audio
7.2	3.2.5	Display of subtitles
7.3	3.2.15	Outputs
7.4	3.2.16	Remote control
7.5	3.2.17	Maintenance & upgrade: summary

6.7.1 T2Xpress settings

The T2Xpress settings tabulated in Table 31.

Table 31. T2Xpress settings

Number of PLPs	3		
Stream	MYS_MPLP_HD.ts	MYS_MPLP_SD.ts	MYS_MPLP_Radio.ts
PLP ID	0	1	2
Group	1	1	1
PLP type	2	2	2
Modulation	256 QAM	64 QAM	16 QAM
Code rate	4/5	4/5	4/5
FEC type	64K	64K	64K
Baseband mode	HEM	HEM	HEM
BUFS	1,517.14	476.313	476.313
Design delay	674.934	674.934	674.934
ISSY	Long	Long	Long
Time interleaver type	0	0	0
Time interleaver length	3	3	3
Interleaver frame	1	1	1
1st frame	0	0	0
In band signalling	Disabled	Disabled	Disabled
Constellation rotation	YES	YES	YES
Number of blocks	84	28	28

7. SI/PSI test requirement

This Technical Code contains the general test requirements covers all the mandatory test items that are required in the test suite. This Technical Code is categorised into multiple sections covering test elements which are mandated in the specification.

7.1 Frequency range

The frequency range is tabulated in Table 32.

Table 32. Frequency range

Sec	Category	Purpose and outcome	Ref	Classification
1	**Frequency range**			
	1.1 Channel bandwidth	**Purpose:** To ensure the channels are captured within the frequency range specified in the Malaysia Specification, as defined below: Bandwidth: 8 MHz UHF IV & V: 470 MHz - 860 MHz **Outcome:** When tuning is performed, receiver shall be able to capture all the services correctly with the above configuration.	3.2.10.4	Mandatory
	1.2 Operating modes	**Purpose:** To ensure the operating modes in the Malaysia Specification are fulfilled. (These include MPLP and L1 Post Scrambling functionalities.) **Outcome:** When tuning is performed, receiver shall be able to capture all the services signalled with the parameters set as in the Malaysia Specification.	3.2.10.5 3.2.10.6	Mandatory

7.2 Service installation

The service installation is tabulated in Table 33.

Table 33. Service installation

Sec	Category	Purpose and outcome	Ref	Classification
2	**Service installation**			
	2.1 Automatic tuning	**Purpose:** To ensure receiver is able to perform automatic tuning and installed all the services. **Outcome:** Captured services are successfully presented in the service list.	3.2.11.1	Mandatory

7.3 Video decoding

The video decoding tabulated in Table 34.

Table 34. Video decoding

Sec	Category	Purpose and outcome	Ref	Classification
3	**Video decoding**			
	3.1 Video resolution, video aspect ratio and profile	**Purpose:** To ensure that the receiver shall support and display video resolution, aspect ratio and profile as below: 1080i/25Hz; 16:9; AVC HP@L4 720p/50Hz; 16:9; AVC HP@L4 576i/25Hz; 4:3 & 16:9; AVC MP@L3 **Outcome:** The receiver shall correctly present the video component in the supported resolutions as specified above.	3.2.3 3.2.3.1 3.2.3.2	Mandatory
	3.2 Active Format Description (AFD)	**Purpose:** To ensure AFD is supported as mentioned in the Malaysia Specification. **General outcome:** Receiver shall be able to process the AFD information and display the correct AFD.	3.2.3.5	Mandatory

7.4 Audio decoding

The audio decoding tabulated in Table 35.

Table 35. Audio decoding

Sec	Category	Purpose and outcome	Ref	Classification
4	**Audio decoding**			
	4.1 Audio formats	**Purpose:** To ensure that the receivers are able to support the following audio requirements as defined in the Malaysia Specification: a) MPEG-4 HE-AAC v2L2 (Stereo) b) MPEG-4 HE-AAC multi-channel **Outcome:** The audio formats as defined above shall be decoded correctly by the receiver.	3.2.4 3.2.4.1	Mandatory

7.5 Subtitling

The subtitling is tabulated in Table 36.

Table 36. Subtitling

Sec	Category	Purpose and outcome	Ref	Classification
5	**Subtitling**			
	5.1 Subtitle support	**Purpose:** To ensure the receiver is able to decode Digital Video Broadcasting (DVB) subtitles according to the Malaysia Specification. **Outcome:** The receiver shall be able to display the subtitles correctly as signalled in the stream.	3.2.5	Mandatory

7.6 Time and date information

The time and date information is tabulated in Table 37.

Table 37. Time and date information

Sec	Category	Purpose and outcome	Ref	Classification
6	**Time and date information**			
	6.1 Time and date information	**Purpose:** To ensure receiver shall display the time and date information carried in the relevant SI tables. **Outcome:** The receiver shall be able to display the information on the screen correctly.	3.2.13	Mandatory

7.7 Event Information Table (EIT) presentation

The Event Information Table (EIT) presentation is tabulated in Table 38.

Table 38. EIT presentation

Sec	Category	Purpose and outcome	Ref	Classification
7	**EIT presentation**			
	7.1 Event information (present and following)	**Purpose:** To ensure that the receiver is able to present the event Information based on the EIT p/f tables as mentioned in the Malaysia Specification. **Outcome:** The receiver shall display the content of the event Information correctly in the 'Now/Next' screen guide.	3.2.12 3.2.12.1	Mandatory

Table 38. Event Information Table (EIT) presentation *(continued)*

Sec	Category	Purpose and outcome	Ref	Classification
7	**EIT presentation**			
	7.2 Event schedule	**Purpose:** To ensure the receiver is able to display 7 days of EPG information **Outcome:** The event schedule presented for 7 days contains complete information.	3.2.12.2	Mandatory
	7.3 Character transmission	**Purpose:** To ensure the receiver is able to support the Character Sets specified in Malaysia Specification. **Outcome:** The receiver is able to display the correct characters signalled in the Program Service Information (PSI) tables which are related to the character transmission.	3.2.8	Mandatory

7.8 Audio and subtitle language support

The audio and subtitle language support is tabulated in Table 39.

Table 39. Audio and subtitle language support

Sec	Category	Purpose and outcome	Ref	Classification
8	**Audio and subtitle language support**			
	8.1 Multiple subtitle language support	**Purpose:** To ensure the receiver is able to support multiple subtitles within the same service. **Outcome:** The receiver shall be able to present the correct subtitle languages according to user settings.	3.2.6	Mandatory
	8.2 Multiple audio language support	**Purpose:** To ensure the receiver is able to support multiple audio languages within the same service. **Outcome:** The receiver shall be able to present the correct audio languages according to user settings.	3.2.6	Mandatory

7.9 Logical Channel Numbering (LCN)

The Logical Channel Numbering (LCN) is tabulated in Table 40.

Table 40. Logical Channel Numbering (LCN)

Sec	Category	Purpose and Outcome	Ref	Classification
9	**Logical Channel Numbering (LCN)**			
	9.1 LCN Version 1	**Purpose:** To ensure receivers are able to process the LCN Version 1 descriptor. **Outcome:** The receiver shall be able to solve duplicate and conflicted LCN conditions and access hidden services via numerical keys with the usage of the LCN Version 1 descriptor.	3.2.11.2 3.2.11.4 3.2.19	Mandatory
	9.2 LCN version 2	**Purpose:** To ensure receivers are able to process the LCN version 2 descriptor. **Outcome:** The receiver shall be able to solve duplicate and conflicted LCN conditions, access hidden services via numerical keys, and select preferred channel list with the usage of the LCN version 2 descriptor.	3.2.11.3 3.2.11.4 3.2.19	Mandatory
	9.3 Regional broadcast management	**Purpose:** To ensure receivers are able to collate all channel lists and the services are presented based on preferred channel list. **Outcome:** Services with correct logical channel number are presented.	3.2.11.5 3.2.19	Mandatory

7.10 Network evolution

The network evolution is tabulated in Table 41.

Table 41. Network evolution

Sec	Category	Purpose and outcome	Ref	Classification
10	**Network evolution**			
	10.1 Service Addition/ Deletion	**Purpose:** To ensure receiver is able to perform service addition and deletion when network scan is performed. **Outcome:** The added services shall be presented in the service list. The deleted services shall not be available to user.	3.2.11.6	Mandatory
	10.2 Multiplex reconfiguration	**Purpose:** To ensure the receiver shall automatically detect configuration changes to the network, such as addition of new multiplexes. **Outcome:** Services from newly added multiplex shall populate the service list after network scanning.	3.2.11.6	Mandatory
	10.3 Clash resolution	**Purpose:** To ensure the receiver is able to behave according to the Malaysian Specification in the case of clash resolution. **Outcome:** The receiver shall give precedence to the service belonging to the multiplex with the best RF when as LCN Conflict is detected.	3.2.11.6	Mandatory
	10.4 Event p/f transitions	**Purpose:** To ensure receiver is able to perform event p/f transitions with version updates. **Outcome:** Receiver shall display the event p/f information according to the version updates.	3.2.12.1	Mandatory

7.11 Time exclusive services

The time exclusive services is tabulated in Table 42.

Table 42. Time exclusive services

Sec	Category	Purpose and outcome	Ref	Classification
11	**Time exclusive services**			
	11.1 Transition between active and inactive state	**Purpose:** To ensure the receiver is able to handle transition between the active and inactive states of time exclusive service orderly. **Outcome:** Receiver shall present clean transition into and out of the service presentation.	3.2.2.1	Mandatory

8. Over Air Download (OAD) test suite

8.1 Evaluation results

The evaluation results is tabulated in Table 43.

Table 43. Evaluation results

No.	Test descriptions
1.	Stream with SSU matches target receiver (Valid OUI) and model tested. NOTE: Higher package version.
2.	Stream with SSU does not match target receiver (Invalid OUI).
3.	Stream with SSU matches target receiver (Valid OUI) and but with different model tested. NOTE: Higher package version.
4.	Stream with SSU matches target receiver (Valid OUI) and model tested. NOTE: Same package version
5.	Interruption while OAD downloading/updating

8.2 Over Air Download (OAD)

The Over Air Download (OAD) is tabulated in Table 44.

Table 44. Over Air Download (OAD)

Test ID	Test description	Test environment (TS name, etc.)	Test procedure	Expected behaviour
1	Stream with SSU matches target receiver (valid OUI) and model tested. NOTE: Higher package version	Modulate TS1 (any frequency is acceptable, i.e. 650 MHz)	a) Check the receiver base software version in the menu system and place receiver to the shipping condition (e.g. Factory Reset). b) Play stream and perform installation. c) Perform receiver mechanism to initiate OAD download (e.g. Put receiver into standby). NOTE: The OAD download shall not be initiated from the system menu.	Receiver shall be capable to download OAD data completely and update the new software version correctly.
2	Stream with SSU does not match target receiver (invalid OUI).	Modulate TS2 (any frequency is acceptable, i.e. 650 MHz)	a) Check the receiver base software version in the menu system and place receiver to the shipping condition (e.g. Factory Reset). b) Play stream and perform installation. c) Perform receiver mechanism to initiate OAD download (e.g. Put receiver into standby). NOTE: The OAD download shall not be initiated from the system menu.	Receiver shall not detect any OAD data and prompt any software update notification Software version in receiver system menu shall remain the same.
3	Stream with SSU matches target receiver (valid OUI) and but with different model tested. NOTE: Higher package version	Modulate TS3 (any frequency is acceptable, i.e. 650MHz)	a) Check the receiver base software version in the menu system and place receiver to the shipping condition (e.g. Factory Reset). b) Play stream and perform installation. c) Perform receiver mechanism to initiate OAD download (e.g. Put receiver into standby). NOTE: The OAD download shall not be initiated from the system menu.	Receiver shall not detect any OAD data and prompt any software update notification. Software version in receiver system menu shall remain the same.

Table 44. Over Air Download (OAD) *(continued)*

Test ID	Test description	Test environment (TS name, etc.)	Test procedure	Expected behaviour
4	Stream with SSU matches target receiver (Valid OUI) and model tested. NOTE: Same package version	Modulate TS4 (any frequency is acceptable, i.e. 650 MHz)	a) Check the receiver base software version in the menu system and place receiver to the shipping condition (e.g. Factory Reset). b) Play stream and perform installation. c) Perform receiver mechanism to initiate OAD download (e.g. Put receiver into standby).	Receiver shall not detect any OAD data and prompt any software update notification. Software version in receiver system menu shall remain the same.
5	Interruption while OAD downloading/ updating i.e. unplug power cord NOTE: Stream with SSU matches target receiver (Valid OUI) and model with higher package version tested.	Modulate TS1 (any frequency is acceptable, i.e. 650MHz)	a) Check the receiver base software version in the menu system and place receiver to the shipping condition (e.g. Factory Reset). b) Play stream and perform installation. c) Perform receiver mechanism to initiate OAD download (e.g. Put receiver into standby). d) While receiver is downloading the OAD, unplug the power cord of the receiver. e) Then, plug in the power cord again and confirm the receiver is operational. f) Perform receiver mechanism to initiate OAD download (e.g. put receiver into standby). NOTE: The OAD download shall not be initiated from the system menu.	Receiver shall restart OAD downloading until completion and update the new software version correctly.

8.3 Test environment

The Test environment tabulated in Table 45.

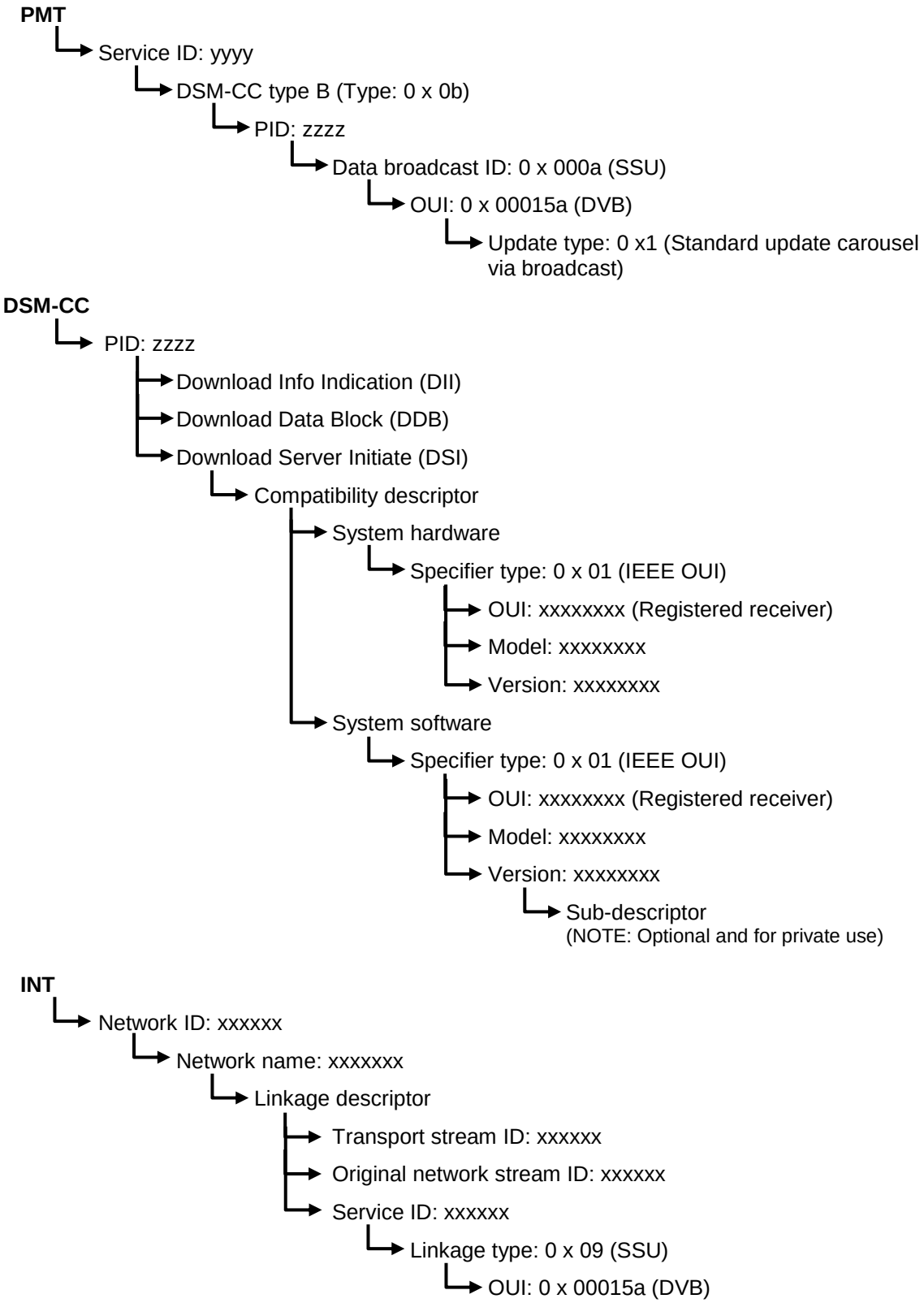
Table 45. Test environment

No	Name	TS Description
1	TS1	a) TS1 contains valid target receiver OUI in PMT and the OAD data for the target receiver in DSM-CC. b) OAD data includes higher package version than the base version.
2	TS2	a) TS2 contains invalid OUI, which does not match the target receiver and model type. b) OAD data includes higher package version than the base version.
3	TS3	a) TS3 contains valid OUI, which matches the target receiver but does not match the model type. b) OAD data includes higher package version than the base version.
4	TS4	a) TS4 includes valid OUI which matches the target receiver and model type. b) OAD data includes same package version than the base version.

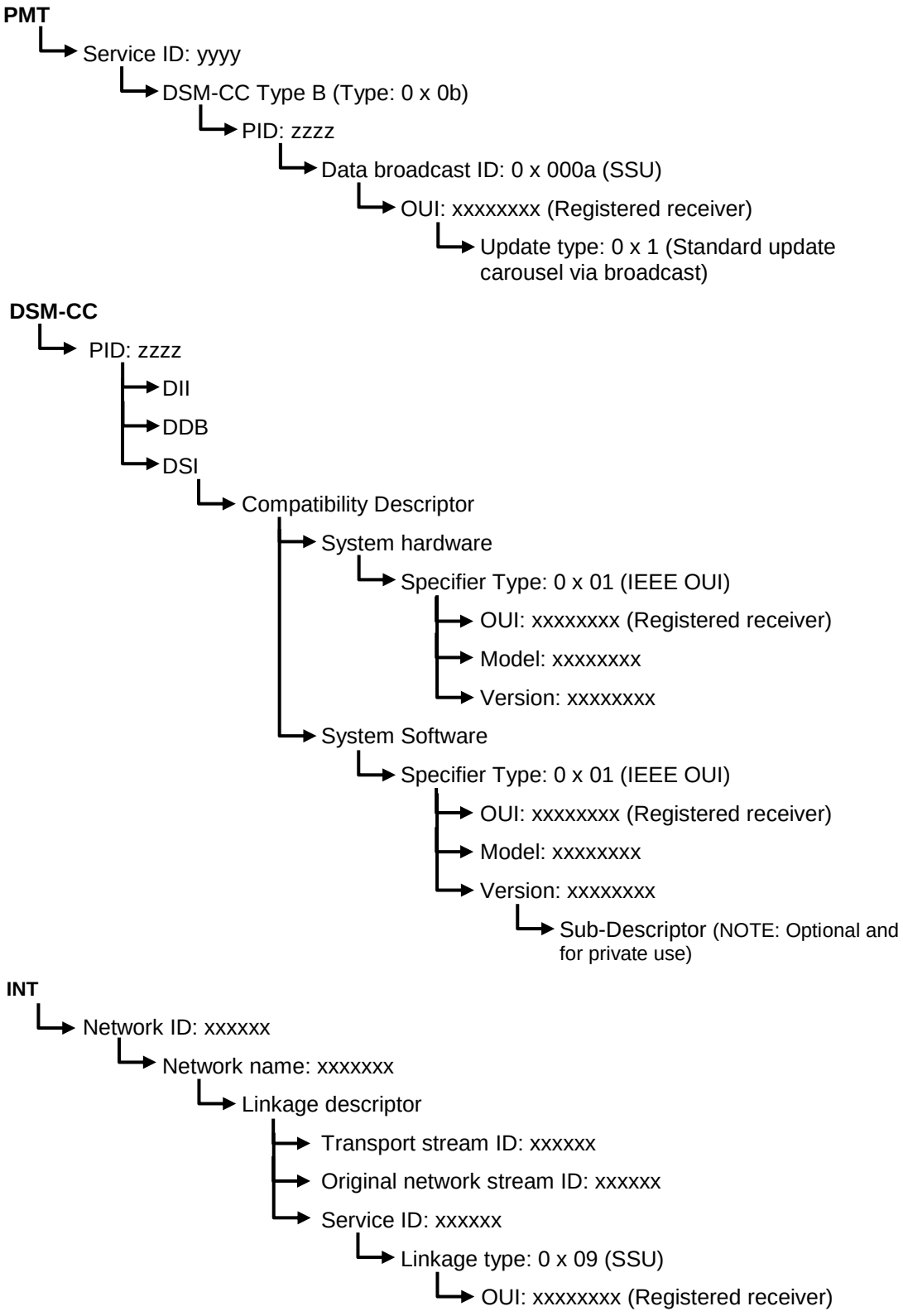
NOTE: It is the responsibility of each manufacturer to create their own transport streams.

8.4 Transport stream structure

8.4.1 Transport stream (option 1)



8.4.2 Transport stream (option 2)



9. HbbTV test suite

9.1 HbbTV 8.5 test cases

The table 46 lists a subset of HbbTV test cases based on HbbTV Test Suite Release version 8.5 which are mandatory to pass to comply to this Technical Code. An individual test case may use version 8.5 or a higher version of the Test Suite to perform the compliance test, as long as, all Test IDs indicated in Table 46 are covered. Where a test case is categorised as optional, it means that it must pass only if the optional feature or behaviour being tested is implemented by the middleware.

Table 46. HbbTV 8.5 test case

No.	Test ID	Title	Category
1.	org.hbbtv_00000020	Test for running PRESENT application after service selection (Service Bound)	Mandatory
2.	org.hbbtv_00000030	Test for running AUTOSTART application after service selection (Not Service Bound)	Mandatory
3.	org.hbbtv_00000040	Test for running PRESENT application after service selection (Not Service Bound)	Mandatory
4.	org.hbbtv_00000050	Test for running DISABLED application after service selection (Not Service Bound)	Mandatory
5.	org.hbbtv_00000060	Test for KILLED application after service selection (Not Service Bound)	Mandatory
6.	org.hbbtv_00000070	Test for NOT SIGNALLED application after service selection (Not Service Bound)	Mandatory
7.	org.hbbtv_00000110	AIT changes while no broadcast related application is running, AUTOSTART application from DSMCC signalled, part 1	Mandatory
8.	org.hbbtv_00000160	AIT changes while no broadcast related application is running, multiple AUTOSTART applications signalled, broadband and broadcast, part 1	Mandatory
9.	org.hbbtv_00000170	AIT changes while no broadcast related application is running, multiple AUTOSTART applications signalled, broadband and broadcast, part 2	Mandatory
10.	org.hbbtv_00000190	AIT changes while no broadcast related application is running, multiple AUTOSTART applications signalled, broadband, part 1	Mandatory
11.	org.hbbtv_00000200	AIT changes while no broadcast related application is running, multiple AUTOSTART applications, broadband signalled, part 2	Mandatory
12.	org.hbbtv_00000210	AIT changes while no broadcast related application is running, AUTOSTART application signalled on broadband and broadcast, part 1	Mandatory
13.	org.hbbtv_00000220	AIT changes while no broadcast related application is running, AUTOSTART application signalled on broadband and broadcast, part 2	Mandatory
14.	org.hbbtv_00000240	AIT changes while no broadcast related application is running, AUTOSTART application signalled on broadcast (higher priority) and broadband, part 1	Mandatory
15.	org.hbbtv_00000250	AIT changes while no broadcast related application is running, AUTOSTART application signalled on broadcast (higher prio) and broadband, part 2 (failure)	Mandatory
16.	org.hbbtv_00000260	AIT update with no AUTOSTART applications, broadband and broadcast, part 3	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No.	Test ID	Title	Category
17.	org.hbbtv_00000270	AIT changes while broadcast related application is running, application still signalled	Mandatory
18.	org.hbbtv_00000280	AIT changes while broadcast related application is running, application signaled with KILL	Mandatory
19.	org.hbbtv_00000290	AIT changes while broadcast related application is running, application not signalled	Mandatory
20.	org.hbbtv_00000300	AIT changes while no broadcast related application is running, AUTOSTART application from HTTP signalled.	Mandatory
21.	org.hbbtv_00000310	Application exits	Mandatory
22.	org.hbbtv_00000320	Triggering ChannelChangeSucceededEvent when transitioning from Broadcast Related to Broadcast Independent state	Mandatory
23.	org.hbbtv_00000330	Broadcast independent applications created from an HTML page accessed over HTTP	Mandatory
24.	org.hbbtv_00000340	A broadcast-independent application transitioning to a broadcast-related application shall not be killed if all specified conditions are met	Mandatory
25.	org.hbbtv_00000350	A broadcast-independent application transitioning to a broadcast-related application shall be killed if the first of the specified conditions are not met	Mandatory
26.	org.hbbtv_00000360	A broadcast-independent application transitioning to a broadcast-related application shall be killed if the second of the specified conditions are not met	Mandatory
27.	org.hbbtv_00000370	A broadcast-independent application transitioning to a broadcast-related application shall be killed if the third of the specified conditions are not met	Mandatory
28.	org.hbbtv_00000400	Broadcast Independent Applications created from an XML AIT over HTTP and with no boundary defined	Mandatory
29.	org.hbbtv_00000440	Broadcast Independent Applications started from a Broadcast Related application	Mandatory
30.	org.hbbtv_00000450	Transition of an Application from Broadcast Related to Broadcast Independent state using Set Channel	Mandatory
31.	org.hbbtv_00000460	A broadcast-independent application transitioning to a broadcast-related application shall be killed if the fifth of the specified conditions are not met	Mandatory
32.	org.hbbtv_00000570	User input - VK_BACK	Mandatory
33.	org.hbbtv_00000580	User input - VK_0	Mandatory
34.	org.hbbtv_00000590	User input - VK_1	Mandatory
35.	org.hbbtv_00000600	User input - VK_2	Mandatory
36.	org.hbbtv_00000610	User input - VK_3	Mandatory
37.	org.hbbtv_00000620	User input - VK_4	Mandatory
38.	org.hbbtv_00000630	User input - VK_REWIND	Mandatory
39.	org.hbbtv_00000640	User input - VK_RED	Mandatory
40.	org.hbbtv_00000650	User input - VK_GREEN	Mandatory
41.	org.hbbtv_00000660	User input - VK_YELLOW	Mandatory
42.	org.hbbtv_00000670	User input - VK_BLUE	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No.	Test ID	Title	Category
43.	org.hbbtv_00000680	User input - VK_UP	Mandatory
44.	org.hbbtv_00000690	User input - VK_DOWN	Mandatory
45.	org.hbbtv_00000700	User input - VK_LEFT	Mandatory
46.	org.hbbtv_00000710	User input - VK_RIGHT	Mandatory
47.	org.hbbtv_00000720	User input - VK_ENTER	Mandatory
48.	org.hbbtv_00000730	User input - VK_5	Mandatory
49.	org.hbbtv_00000740	User input - VK_6	Mandatory
50.	org.hbbtv_00000750	User input - VK_7	Mandatory
51.	org.hbbtv_00000760	User input - VK_8	Mandatory
52.	org.hbbtv_00000770	User input - VK_9	Mandatory
53.	org.hbbtv_00000780	User input - VK_STOP	Mandatory
54.	org.hbbtv_00000790	User input - VK_PLAY	Mandatory
55.	org.hbbtv_00000800	User input - VK_PAUSE	Mandatory
56.	org.hbbtv_00000810	User input - VK_PLAY_PAUSE	Optional
57.	org.hbbtv_00000820	User input - VK_FAST_FWD	Optional
58.	org.hbbtv_00000830	User input - CSS3 directional focus navigation - VK_UP	Mandatory
59.	org.hbbtv_00000840	User input - CSS3 directional focus navigation - VK_DOWN	Mandatory
60.	org.hbbtv_00000850	User input - CSS3 directional focus navigation - VK_LEFT	Mandatory
61.	org.hbbtv_00000860	User input - CSS3 directional focus navigation - VK_RIGHT	Mandatory
62.	org.hbbtv_00000910	User input - Javascript navigation - VK_UP	Mandatory
63.	org.hbbtv_00000920	User input - Javascript navigation - VK_DOWN	Mandatory
64.	org.hbbtv_00000930	User input - Javascript navigation - VK_LEFT	Mandatory
65.	org.hbbtv_00000940	User input - Javascript navigation - VK_RIGHT	Mandatory
66.	org.hbbtv_00000950	User input - Navigation priority - VK_RIGHT	Mandatory
67.	org.hbbtv_00000960	User input - Navigation priority - VK_UP	Mandatory
68.	org.hbbtv_00000970	User input - Navigation priority - VK_DOWN	Mandatory
69.	org.hbbtv_00000980	User input - Navigation priority - VK_LEFT	Mandatory
70.	org.hbbtv_00000990	Access to resources inside the boundary of an application loaded from carousel	Optional
71.	org.hbbtv_00001000	Loading a document outside the boundary of an application loaded via HTTP	Optional
72.	org.hbbtv_00001010	Loading a document from outside the application boundary including a document from within the application boundary	Optional
73.	org.hbbtv_00001020	Access to resources within the Application domain via XMLHttpRequest	Mandatory
74.	org.hbbtv_00001030	Access to resources outside the application domain via XmlHttpRequest	Mandatory
75.	org.hbbtv_00001040	Access to "trusted" API from within an iframe loaded from inside the application domain	Optional

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
76.	org.hbbtv_00001050	Block access to trusted API from document outside the application boundary	Optional
77.	org.hbbtv_00001060	Access to trusted APIs from a document inside the application boundary of a trusted application loaded via HTTP	Optional
78.	org.hbbtv_00001150	Access to trusted API from a document outside the application boundary (app loaded via HTTP)	Optional
79.	org.hbbtv_00001160	Access to trusted API from a document outside the application boundary (app loaded via carousel)	Optional
80.	org.hbbtv_00001170	Access to trusted API from a document inside the application boundary (app loaded via carousel)	Optional
81.	org.hbbtv_00001190	Access to resources outside the application domain via XMLHttpRequest	Mandatory
82.	org.hbbtv_00001200	Access to trusted API from a document inside the application domain (app loaded via carousel)	Optional
83.	org.hbbtv_00001210	Blocking access to trusted API from a document outside the application boundary (app loaded via carousel)	Optional
84.	org.hbbtv_00001220	Stopping applications: Application.destroyApplication	Mandatory
85.	org.hbbtv_00001240	Starting broadcast related applications invisible	Mandatory
86.	org.hbbtv_00001260	Starting broadcast independent applications	Mandatory
87.	org.hbbtv_00001450	Calls to getAllResponseHeaders() return an empty string when accessing DSM-CC objects with XMLHttpRequest	Mandatory
88.	org.hbbtv_00001460	When accessing a DSM-CC File object with XMLHttpRequest, responseText returns the content of the requested file	Mandatory
89.	org.hbbtv_00001470	When accessing a DSM-CC Directory object with XMLHttpRequest, responseText returns a comma-separated list of objects in the directory	Mandatory
90.	org.hbbtv_00001480	When accessing a DSM-CC File object with ".xml" extension with XMLHttpRequest, responseXML returns an XML document object	Mandatory
91.	org.hbbtv_00001490	When accessing a DSM-CC Directory object with XMLHttpRequest, responseXML returns null	Mandatory
92.	org.hbbtv_00001500	When accessing a DSM-CC Stream Event object with XMLHttpRequest, responseXML returns null	Mandatory
93.	org.hbbtv_00001520	Test of minimum terminal capabilities. Supported proportional font	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
94.	org.hbbtv_00001530	Test of minimum terminal capabilities. Supported proportional font	Mandatory
95.	org.hbbtv_00001540	Test of minimum terminal capabilities. Supported proportional font	Mandatory
96.	org.hbbtv_00001550	Test of minimum terminal capabilities. Supported proportional font	Mandatory
97.	org.hbbtv_00001560	Test of minimum terminal capabilities. Supported non-proportional font	Mandatory
98.	org.hbbtv_00001570	Test of minimum terminal capabilities. Supported non-proportional font	Mandatory
99.	org.hbbtv_00001580	Test of minimum terminal capabilities. Supported non-proportional font	Mandatory
100.	org.hbbtv_00001590	Test of minimum terminal capabilities. Text entry method	Mandatory
101.	org.hbbtv_00001600	Test of minimum terminal capabilities, text entry method	Mandatory
102.	org.hbbtv_00001620	Test of minimum terminal capabilities, PVR management	Optional
103.	org.hbbtv_00001630	Test of minimum terminal capabilities, download management	Optional
104.	org.hbbtv_00001680	State of a video/broadcast object when it is instantiated	Mandatory
105.	org.hbbtv_00001720	Change of state of a video/broadcast object when the release() method is called while it is in the unrealized state	Mandatory
106.	org.hbbtv_00001730	Change of state of a video/broadcast object when the stop() method is called while it is in the unrealized state	Mandatory
107.	org.hbbtv_00001810	Change of state of a video/broadcast object when the nextChannel() method is called while it is in the presenting state	Mandatory
108.	org.hbbtv_00001830	Change of state of a video/broadcast object when the bindToCurrentChannel() method is called while it is in the presenting state	Mandatory
109.	org.hbbtv_00001840	Change of state of a video/broadcast object when the release() method is called while it is in the presenting state	Mandatory
110.	org.hbbtv_00001850	Change of state of a video/broadcast object when the stop() method is called while it is in the presenting state	Mandatory
111.	org.hbbtv_00001920	Change of state of a video/broadcast object when the stop() method is called while it is in the stopped state	Mandatory
112.	org.hbbtv_00001940	video/broadcast object presentation - presenting state	Mandatory
113.	org.hbbtv_00001950	video/broadcast object presentation - stopped state	Mandatory
114.	org.hbbtv_00001970	Change of state of a video/broadcast object when the setChannel() method is called (with a null parameter) while it is in the unrealized state	Mandatory
115.	org.hbbtv_00002000	Change of state of a video/broadcast object when the setChannel() method is called (with a correct parameter) while it is in the presenting state	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
116.	org.hbbtv_00002010	Change of state of a video/broadcast object when the setChannel() method is called (with a null parameter) while it is in the presenting state	Mandatory
117.	org.hbbtv_00002020	Change of state of a video/broadcast object when the setChannel() method is called (with a correct parameter) while it is in the stopped state	Mandatory
118.	org.hbbtv_00002030	Change of state of a video/broadcast object when the setChannel() method is called (with a null parameter) while it is in the stopped state	Mandatory
119.	org.hbbtv_00002230	AV Object Overlap (Partial overlap of object with a higher Z index)	Mandatory
120.	org.hbbtv_00002240	AV Object Overlap (Partial overlap of object with a lower Z index)	Mandatory
121.	org.hbbtv_00002250	AV Object Overlap (Total overlap of object with a higher Z index)	Mandatory
122.	org.hbbtv_00002260	AV Object Overlap (Total overlap of object with a lower Z index)	Mandatory
123.	org.hbbtv_00002270	AV Object Scaling (1/8; Video Res 1280x720; 16:9)	Mandatory
124.	org.hbbtv_00002280	AV Object Scaling (1/8; Video Res 640x720; 16:9)	Mandatory
125.	org.hbbtv_00002290	AV Object Scaling (1/8; Video Res 720x576; 16:9)	Mandatory
126.	org.hbbtv_00002300	AV Object Scaling (1/8; Video Res 352x288; 4:3)	Mandatory
127.	org.hbbtv_00002310	AV Object Scaling (2/13; Video Res 1280x720; 16:9)	Mandatory
128.	org.hbbtv_00002320	AV Object Scaling (2/13; Video Res 640x720; 16:9)	Mandatory
129.	org.hbbtv_00002330	AV Object Scaling (2/13; Video Res 720x576; 16:9)	Mandatory
130.	org.hbbtv_00002340	AV Object Scaling (2/13; Video Res 352x288; 4:3)	Mandatory
131.	org.hbbtv_00002350	AV Object Scaling (x2; Video Res 1280x720)	Mandatory
132.	org.hbbtv_00002360	AV Object Scaling (x2; Video Res 640x720)	Mandatory
133.	org.hbbtv_00002370	AV Object Scaling (x2; Video Res 720x576)	Mandatory
134.	org.hbbtv_00002380	AV Object Scaling (x2; Video Res 352x288)	Mandatory
135.	org.hbbtv_00002390	AV Object Scaling (1/2x1/4; Video Res 1280x720)	Mandatory
136.	org.hbbtv_00002400	AV Object Scaling (1/2x1/4; Video Res 640x720)	Mandatory
137.	org.hbbtv_00002410	AV Object Scaling (1/2x1/4; Video Res 720x576)	Mandatory
138.	org.hbbtv_00002420	AV Object Scaling (1/2x1/4; Video Res 352x288)	Mandatory
139.	org.hbbtv_00002440	Cookies expire at the correct time	Mandatory
140.	org.hbbtv_00002450	Terminal supports cookies of 4096 bytes	Mandatory
141.	org.hbbtv_00002460	Terminal supports at least 100 cookies	Mandatory
142.	org.hbbtv_00002470	Terminal supports at least 100 x 4KB cookies	Mandatory
143.	org.hbbtv_00002480	Terminal supports 20 cookies per domain	Mandatory
144.	org.hbbtv_00002490	Memory Audio - Infinite Looping	Mandatory
145.	org.hbbtv_00002500	Memory Audio - Stopping looping playback	Mandatory
146.	org.hbbtv_00002510	Test of support for MP4 File Format streamed over HTTP; 1280x720p@25, 16:9	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
147.	org.hbbtv_00002520	Test of support for MP4 File Format streamed over HTTP; 352x288i@25, 4:3	Mandatory
148.	org.hbbtv_00002530	Test of support for MPEG-2 TS streamed over HTTP; 1280x720p@25, 16:9	Mandatory
149.	org.hbbtv_00002540	Test of support for MPEG-2 TS streamed over HTTP; 352x288i@25, 4:3	Mandatory
150.	org.hbbtv_00002590	Test of High Bitrate Streaming; MP4 File Format	Mandatory
151.	org.hbbtv_00002600	Test of High Bitrate Streaming; MPEG-2 TS	Mandatory
152.	org.hbbtv_00002610	Test that terminal ignores any AIT signalling present in MPEG-2 TS streamed over HTTP	Mandatory
153.	org.hbbtv_00002630	Test of support for AVC_SD_25; 720x576p@25, 16:9	Mandatory
154.	org.hbbtv_00002640	Test of support for AVC_SD_25; 544x576p@25, 16:9	Mandatory
155.	org.hbbtv_00002650	Test of support for AVC_SD_25; 480x576p@25, 16:9	Mandatory
156.	org.hbbtv_00002660	Test of support for AVC_SD_25; 352x576p@25, 16:9	Mandatory
157.	org.hbbtv_00002670	Test of support for AVC_SD_25; 352x288p@25, 16:9	Mandatory
158.	org.hbbtv_00002680	Test of support for AVC_SD_25; 720x576i@25, 16:9	Mandatory
159.	org.hbbtv_00002690	Test of support for AVC_SD_25; 544x576i@25, 16:9	Mandatory
160.	org.hbbtv_00002700	Test of support for AVC_SD_25; 480x576i@25, 16:9	Mandatory
161.	org.hbbtv_00002710	Test of support for AVC_SD_25; 352x576i@25, 16:9	Mandatory
162.	org.hbbtv_00002720	Test of support for AVC_SD_25; 352x288i@25, 16:9	Mandatory
163.	org.hbbtv_00002730	Test of support for AVC_SD_25; 720x576p@25, 4:3	Mandatory
164.	org.hbbtv_00002740	Test of support for AVC_SD_25; 544x576p@25, 4:3	Mandatory
165.	org.hbbtv_00002750	Test of support for AVC_SD_25; 480x576p@25, 4:3	Mandatory
166.	org.hbbtv_00002760	Test of support for AVC_SD_25; 352x576p@25, 4:3	Mandatory
167.	org.hbbtv_00002770	Test of support for AVC_SD_25; 352x288p@25, 4:3	Mandatory
168.	org.hbbtv_00002780	Test of support for AVC_SD_25; 720x576i@25, 4:3	Mandatory
169.	org.hbbtv_00002790	Test of support for AVC_SD_25; 544x576i@25, 4:3	Mandatory
170.	org.hbbtv_00002800	Test of support for AVC_SD_25; 480x576i@25, 4:3	Mandatory
171.	org.hbbtv_00002810	Test of support for AVC_SD_25; 352x576i@25, 4:3	Mandatory
172.	org.hbbtv_00002820	Test of support for AVC_SD_25; 352x288i@25, 4:3	Mandatory
173.	org.hbbtv_00002830	Test of support for AVC_HD_25; 1280x720p@25, 16:9	Mandatory
174.	org.hbbtv_00002840	Test of support for AVC_HD_25; 960x720p@25, 16:9	Mandatory
175.	org.hbbtv_00002850	Test of support for AVC_HD_25; 640x720p@25, 16:9	Mandatory
176.	org.hbbtv_00002860	Test of support for AVC_HD_25; 1280x720i@25, 16:9	Mandatory
177.	org.hbbtv_00002870	Test of support for AVC_HD_25; 960x720i@25, 16:9	Mandatory
178.	org.hbbtv_00002880	Test of support for AVC_HD_25; 640x720i@25, 16:9	Mandatory
179.	org.hbbtv_00002890	Test of support for AVC_HD_25; 1920x1080p@25, 16:9	Mandatory
180.	org.hbbtv_00002900	Test of support for AVC_HD_25; 1440x1080p@25, 16:9	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
181.	org.hbbtv_00002910	Test of support for AVC_HD_25; 1280x1080p@25, 16:9	Mandatory
182.	org.hbbtv_00002920	Test of support for AVC_HD_25; 960x1080p@25, 16:9	Mandatory
183.	org.hbbtv_00002930	Test of support for AVC_HD_25; 1920x1080i@25, 16:9	Mandatory
184.	org.hbbtv_00002940	Test of support for AVC_HD_25; 1440x1080i@25, 16:9	Mandatory
185.	org.hbbtv_00002950	Test of support for AVC_HD_25; 1280x1080i@25, 16:9	Mandatory
186.	org.hbbtv_00002960	Test of support for AVC_HD_25; 960x1080i@25, 16:9	Mandatory
187.	org.hbbtv_00002970	Test of support for AVC_HD_25; 1280x720p@50, 16:9	Mandatory
188.	org.hbbtv_00002980	Test of support for AVC_HD_25; 960x720p@50, 16:9	Mandatory
189.	org.hbbtv_00002990	Test of support for AVC_HD_25; 640x720p@50, 16:9	Mandatory
190.	org.hbbtv_00003000	Test of support for HE-AAC; Mono, AV Content, Streamed over HTTP	Mandatory
191.	org.hbbtv_00003010	Test of support for HE-AAC; Stereo, AV Content, Streamed over HTTP	Mandatory
192.	org.hbbtv_00003020	Test of support for HE-AAC; Multichannel, AV Content, Streamed over HTTP	Mandatory
193.	org.hbbtv_00003030	Test of support for AAC; Mono, AV Content, Streamed over HTTP	Mandatory
194.	org.hbbtv_00003040	Test of support for AAC; Stereo, AV Content, Streamed over HTTP	Mandatory
195.	org.hbbtv_00003050	Test of support for AAC; Multichannel, AV Content, Streamed over HTTP	Mandatory
196.	org.hbbtv_00003060	Test of support for AC-3; Mono, AV Content, Streamed over HTTP	Mandatory
197.	org.hbbtv_00003070	Test of support for AC-3; Stereo, AV Content, Streamed over HTTP	Mandatory
198.	org.hbbtv_00003080	Test of support for AC-3; Multichannel, AV Content, Streamed over HTTP	Mandatory
199.	org.hbbtv_00003090	Test of support for MP4 E-AC-3; Mono, AV Content, Streamed over HTTP	Mandatory
200.	org.hbbtv_00003100	Test of support for MP4 E-AC-3; Stereo, AV Content, Streamed over HTTP	Mandatory
201.	org.hbbtv_00003110	Test of support for MP4 E-AC-3; Multichannel, AV Content, Streamed over HTTP	Mandatory
202.	org.hbbtv_00003120	Test of support for HE-AAC; Mono, Audio Only (Radio) Content, Streamed over HTTP	Mandatory
203.	org.hbbtv_00003130	Test of support for HE-AAC; Stereo, Audio Only (Radio) Content, Streamed over HTTP	Mandatory
204.	org.hbbtv_00003140	Test of support for HE-AAC; Multichannel, Audio Only (Radio) Content, Streamed over HTTP	Mandatory
205.	org.hbbtv_00003170	Test of support for MP4 AAC; Multichannel, Audio Only (Radio) Content, Streamed over HTTP	Mandatory
206.	org.hbbtv_00003180	Test of support for MP3; Mono, Audio Only (Radio) Content, Streamed over HTTP	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
207.	org.hbbtv_00003190	Test of support for MP3; Stereo, Audio Only (Radio) Content, Streamed over HTTP	Mandatory
208.	org.hbbtv_00003400	Test of downmixing Multichannel HE-AAC (AV Content) Streamed over HTTP	Mandatory
209.	org.hbbtv_00003410	Test of downmixing Multichannel AAC (AV Content) Streamed over HTTP	Mandatory
210.	org.hbbtv_00003420	Test of downmixing Multichannel AC-3 (AV Content) Streamed over HTTP	Mandatory
211.	org.hbbtv_00003430	Test of downmixing Multichannel E-AC-3 (AV Content) Streamed over HTTP	Mandatory
212.	org.hbbtv_00003500	Test of passthrough of AC-3 (AV Content) Streamed over HTTP	Mandatory
213.	org.hbbtv_00003520	Transcoding to AC3 from HE-AAC v1	Mandatory
214.	org.hbbtv_00003530	Transcoding to AC3 from AAC LC	Mandatory
215.	org.hbbtv_00003540	AV Object Seeking Within Buffer (MP4 Forward 5s)	Mandatory
216.	org.hbbtv_00003560	AV Object Seeking Outside Buffer (MP4 Forward)	Mandatory
217.	org.hbbtv_00003580	AV Object Seeking Outside Buffer (MP4 Backward)	Mandatory
218.	org.hbbtv_00003600	AV Object Seeking Within Buffer (MP4 Backward 5s)	Mandatory
219.	org.hbbtv_00003630	AV Streaming Tests: AV Object (Pause)	Mandatory
220.	org.hbbtv_00003640	AV Streaming Tests: AV Object (Stop)	Mandatory
221.	org.hbbtv_00003650	Test for onPlayStateChanged event when transitioning from Play to Pause	Mandatory
222.	org.hbbtv_00003660	Test for onPlayStateChanged event when transitioning from Play to Stop	Mandatory
223.	org.hbbtv_00003670	Test for onPlayStateChanged event when transitioning from Paused to Playing	Mandatory
224.	org.hbbtv_00003680	Test for onPlayStateChanged event when transitioning from Paused to Stop	Mandatory
225.	org.hbbtv_00003690	Test for onPlayStateChanged event when transitioning from Stop to Play	Mandatory
226.	org.hbbtv_00003700	Test for onPlayStateChanged event when transitioning from Stopped to Pause	Mandatory
227.	org.hbbtv_00003710	the application.privateData.currentChannel after application start	Mandatory
228.	org.hbbtv_00003730	the application.privateData.currentChannel after channel selection by application	Mandatory
229.	org.hbbtv_00003740	CreateApplication with parameters in URL	Mandatory
230.	org.hbbtv_00003750	CreateApplication with hash in URL	Mandatory
231.	org.hbbtv_00003760	video.currentChannel after channel selection by application	Mandatory
232.	org.hbbtv_00003780	video.currentChannel after application start	Mandatory
233.	org.hbbtv_00003790	EIT p/f	Mandatory
234.	org.hbbtv_00003800	Letter Gothic font rendering width	Mandatory
235.	org.hbbtv_00003810	Line-height CSS style	Mandatory
236.	org.hbbtv_00003820	Tiresias font rendering width	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
237.	org.hbbtv_00003830	OIPF capabilities: hasCapability()	Mandatory
238.	org.hbbtv_00003840	OIPF Capabilities: extra decodes	Mandatory
239.	org.hbbtv_00003851	OIPF Configuration: preferredAudioLanguage	Mandatory
240.	org.hbbtv_00003861	OIPF Configuration: preferredSubtitleLanguage	Mandatory
241.	org.hbbtv_00003870	OIPF Configuration: countryId	Mandatory
242.	org.hbbtv_00003901	Browser user agent test	Optional
243.	org.hbbtv_00003911	Video player user agent test	Optional
244.	org.hbbtv_00003920	invalid video playback: A/V format	Mandatory
245.	org.hbbtv_00003930	invalid video playback: cannot connect	Mandatory
246.	org.hbbtv_00003940	invalid video playback: video not found	Mandatory
247.	org.hbbtv_00003950	Playback of video without content-range support	Mandatory
248.	org.hbbtv_00003960	Video playTime	Mandatory
249.	org.hbbtv_00003970	video queue	Mandatory
250.	org.hbbtv_00003980	seek in broadband video playback	Mandatory
251.	org.hbbtv_00003990	video/mp4 keeps aspect ratio	Mandatory
252.	org.hbbtv_00004000	video/broadcast keeps aspect ratio	Mandatory
253.	org.hbbtv_00007005	DASH: mpd outside of application boundary.	Mandatory
254.	org.hbbtv_00007009	DASH: playing state of A/V Control object.	Mandatory
255.	org.hbbtv_00007110	DASH: connecting state of A/V Control object.	Mandatory
256.	org.hbbtv_00007120	DASH: buffering state of A/V Control	Mandatory
257.	org.hbbtv_00007121	DASH: MPD file size 100 kB	Mandatory
258.	org.hbbtv_00007122	Terminal plays MPEG DASH video segment files that are fifteen seconds long.	Mandatory
259.	org.hbbtv_00007124	Terminal plays last MPEG DASH video fragment that is shorter than 1 second.	Mandatory
260.	org.hbbtv_00007181	DASH, change dimmesions of A/V player.	Mandatory
261.	org.hbbtv_00007201	DASH: maximum number of Adaptation Sets (16).	Mandatory
262.	org.hbbtv_00007236	hasCapability method returns +DRM string for terminal supporting DRM feature	Mandatory
263.	org.hbbtv_00007375	DASH: update with non-overlapping Periods.	Mandatory
264.	org.hbbtv_00007377	DASH: update baseURL on MPD level.	Mandatory
265.	org.hbbtv_00007378	DASH: update of SegmentTimeline on AdaptationSet level.	Mandatory
266.	org.hbbtv_00007402	DASH: BaseURL at the Adaptation Set, SegmentTemplates at Representation.	Mandatory
267.	org.hbbtv_00007403	DASH: BaseURL at the MPD level, SegmentTemplates in Adaptation Set.	Mandatory
268.	org.hbbtv_00020041	The Window object supports close() method.	Mandatory
269.	org.hbbtv_00020042	The Window object supports debug() method.	Mandatory
270.	org.hbbtv_00021000	Test for on-demand support of AVC - 1280 x 720 px MP4 - with moov box size = 2.5 Mb	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
271.	org.hbbtv_00021010	A/V Control object - HTTP chunked transfer coding	Mandatory
272.	org.hbbtv_00021020	HTTP Status Code 302 (Found) - MP4 AVC	Mandatory
273.	org.hbbtv_00021030	HTTP Status Code 307 (Temporary Redirect) - MP4 AVC file	Mandatory
274.	org.hbbtv_00027213	DASH video transitions: profile and level, over Period boundaries.	Mandatory
275.	org.hbbtv_00027215	DASH video transitions: full-screen resolution (high to low), over Period boundaries.	Mandatory
276.	org.hbbtv_00027216	DASH video transitions: full-screen resolution (low to high), over Period boundaries.	Mandatory
277.	org.hbbtv_00027223	DASH video transitions: bitrate - low to high, over Period boundaries.	Mandatory
278.	org.hbbtv_00027224	Terminal supports video transitions between MPEG DASH Representations which differ by bitrate, from high bitrate to low bitrate during playback over Period boundaries.	Mandatory
279.	org.hbbtv_02003101	The Window object supports "document" property.	Mandatory
280.	org.hbbtv_02003102	The Window object supports "frames" property.	Mandatory
281.	org.hbbtv_02003103	The Window object supports "history" property	Mandatory
282.	org.hbbtv_02003104	The Window object supports "innerHeight" and "innerWidth" properties	Mandatory
283.	org.hbbtv_02003105	The Window object supports "location" property	Mandatory
284.	org.hbbtv_02003107	The Window object supports "name" property	Mandatory
285.	org.hbbtv_02003108	The Window object supports "navigator" property	Mandatory
286.	org.hbbtv_02003109	The Window object supports "oipfObjectFactory" property	Mandatory
287.	org.hbbtv_02003111	The Window object supports "onkeydown", "onkeyup" and "onkeypress" properties	Mandatory
288.	org.hbbtv_02003112	The Window object supports "parent" property	Mandatory
289.	org.hbbtv_02003114	The Window object supports "self" property	Mandatory
290.	org.hbbtv_02003115	The Window object supports "top" property	Mandatory
291.	org.hbbtv_02003116	The Window object supports "XMLHttpRequest" property	Mandatory
292.	org.hbbtv_02003117	The Window object supports setTimeout() method.	Mandatory
293.	org.hbbtv_02003118	The Window object supports setInterval() method.	Mandatory
294.	org.hbbtv_02003119	The Window object supports clearTimeout() method.	Mandatory
295.	org.hbbtv_02003120	The Window object supports clearInterval() method.	Mandatory
296.	org.hbbtv_02003121	The Window object supports addEventListener() method.	Mandatory
297.	org.hbbtv_02003122	The Window object supports removeEventListener() method.	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
298.	org.hbbtv_02003123	The Window object supports "onfocus" callback.	Mandatory
299.	org.hbbtv_02003124	The Window object supports "onblur" callback.	Mandatory
300.	org.hbbtv_02003125	The Window object supports "frameElement" property.	Mandatory
301.	org.hbbtv_ADD00010	AV Object Toggle Fullscreen (MP4 640x720i HP@L4)	Mandatory
302.	org.hbbtv_ADD00020	AV Object Toggle Fullscreen (MP4 720x576i MP@L3)	Mandatory
303.	org.hbbtv_ADD00030	AV Object Toggle Fullscreen (MP4 352x288i MP@L3)	Mandatory
304.	org.hbbtv_AVC00010	video/broadcast object supports media playback extensions API.	Mandatory
305.	org.hbbtv_AVC00020	Correct collection of AVcomponents is returned by getComponents(null) method of video/broadcast.	Mandatory
306.	org.hbbtv_AVC00030	video/broadcast object correctly converts component_tag field in the stream_identifier_descriptor in PMT into componentTag property of AVComponent.	Mandatory
307.	org.hbbtv_AVC00040	video/broadcast object correctly converts elementary_pid field in the stream_identifier_descriptor in PMT into pid property of AVComponent.	Mandatory
308.	org.hbbtv_AVC00045	Terminal correctly recognizes type of AVComponent.	Mandatory
309.	org.hbbtv_AVC00050	getComponents(COMPONENT_TYPE_VIDEO) method of video/broadcast object returns correct collection of video AVcomponents.	Mandatory
310.	org.hbbtv_AVC00060	getComponents(COMPONENT_TYPE_AUDIO) method of video/broadcast object returns correct collection of audio AVcomponents.	Mandatory
311.	org.hbbtv_AVC00070	getComponents(COMPONENT_TYPE_SUBTITLE) method of video/broadcast object returns correct collection of subtitle AVcomponents.	Mandatory
312.	org.hbbtv_AVC00085	Terminal correctly recognizes scrambling of AVComponent.	Mandatory
313.	org.hbbtv_AVC00090	Terminal correctly calculates 'aspectRatio' property of AVVideoComponents	Mandatory
314.	org.hbbtv_AVC00100	Terminal correctly recognizes language of audio AVComponents.	Mandatory
315.	org.hbbtv_AVC00110	Terminal correctly sets audioDescription of audio AVComponent.	Mandatory
316.	org.hbbtv_AVC00130	Terminal correctly recognizes language of subtitle AVComponent.	Mandatory
317.	org.hbbtv_AVC00140	Terminal correctly recognizes hearing impaired of subtitle AVComponent.	Mandatory
318.	org.hbbtv_AVC00145	Terminal correctly returns active AVComponents using getCurrentActiveComponents (componentType) method of video/broadcast object.	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
319.	org.hbbtv_AVC00150	Terminal correctly switches AVComponents using selectComponent (AVComponent component) method of video/broadcast object.	Mandatory
320.	org.hbbtv_AVC00155	Terminal correctly updates active AVComponents collection.	Mandatory
321.	org.hbbtv_AVC00160	SelectedComponentChange callback is called when selectComponent switches AVComponents.	Mandatory
322.	org.hbbtv_AVC00170	Unselecting COMPONENT_TYPE_VIDEO stops rendering video AVComponent.	Mandatory
323.	org.hbbtv_AVC00180	Terminal stops presenting audio AV component when unselectComponent(COMPONENT_TYPE_AUDIO) of video/broadcast object is called.	Mandatory
324.	org.hbbtv_AVC00190	Unselecting COMPONENT_TYPE_SUBTITLE stops rendering subtitle AVComponent.	Mandatory
325.	org.hbbtv_AVC00200	Terminal restore rendering video AVComponents after selectComponent(COMPONENT_TYPE_VIDEO) calling.	Mandatory
326.	org.hbbtv_AVC00201	Terminal restores rendering audio AVComponents after selectComponent(COMPONENT_TYPE_AUDIO) calling.	Mandatory
327.	org.hbbtv_AVC00210	Terminal selects by default audio AV component with language equal preferredAudioLanguage property of Configuration object.	Mandatory
328.	org.hbbtv_AVC00220	Terminal selects by default subtitle AVcomponent with language equal preferredSubtitleLanguage property of Configuration object.	Mandatory
329.	org.hbbtv_AVC00230	video/broadcast object updates component collection, if broadcasted data related to AV components changes.	Mandatory
330.	org.hbbtv_AVC00235	SelectedComponentChange is called, if AVcomponent being presented is no longer available.	Mandatory
331.	org.hbbtv_AVC01010	A/V Control object supports media playback extensions API.	Mandatory
332.	org.hbbtv_AVC01020	getComponents(null) method of A/V control object returns collection of AVcomponents defined in played MPEG-2 TS file.	Mandatory
333.	org.hbbtv_AVC01030	getComponents(null) method of A/V control object returns correct collection of AVcomponents defined mp4 file.	Mandatory
334.	org.hbbtv_AVC01040	A/V Control object correctly converts trackID of mp4 file into pid property of AVComponent.	Mandatory
335.	org.hbbtv_AVC01050	getComponents(COMPONENT_TYPE_VIDEO) method of A/V control object returns correct collection of video AVcomponents from mp4 file.	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
336.	org.hbbtv_AVC01060	getComponents(COMPONENT_TYPE_AUDIO) method of A/V control object returns correct collection of audio AVcomponents from mp4 file.	Mandatory
337.	org.hbbtv_AVC01070	A/V Control object correctly sets language of audio AVComponents.	Mandatory
338.	org.hbbtv_AVC01080	Terminal correctly reads active AVComponents using getCurrentActiveComponents(componentType) method of A/V Control object.	Mandatory
339.	org.hbbtv_AVC01099	onSelectedComponentChanged callback is called when terminal switches AVComponents using unselectComponent(AVComponent component) method of A/V Control object.	Mandatory
340.	org.hbbtv_AVC01101	Terminal correctly switches AVComponents using selectComponent(AVComponent) method of A/V control object	Mandatory
341.	org.hbbtv_AVC01110	Terminal stops presenting video AV component when unselectComponent(COMPONENT_TYPE_VIDEO) of A/V Control object is called.	Mandatory
342.	org.hbbtv_AVC01120	Terminal stops presenting audio AVcomponent when unselectComponent(COMPONENT_TYPE_AUDIO) of A/V Control object is called.	Mandatory
343.	org.hbbtv_AVC01130	Terminal starts to render AVComponents using selectComponent(componentType) method of A/V Control object.	Mandatory
344.	org.hbbtv_D00007040	The A/V Control have state stopped when transitioning from playing to stopped on video (MPEG DASH).	Mandatory
345.	org.hbbtv_D00007050	DASH: finished state of A/V Control object	Mandatory
346.	org.hbbtv_D00007060	DASH: error state reporting when mpd contains invalid xml.	Mandatory
347.	org.hbbtv_D1000020	Update of BaseURL at the Period level.	Mandatory
348.	org.hbbtv_D1000030	Update of BaseURL at the Adaptation Set level.	Mandatory
349.	org.hbbtv_D1000110	DASH: Increasing @availabilityEndTime	Mandatory
350.	org.hbbtv_D1000200	DASH: update of playPosition.	Mandatory
351.	org.hbbtv_D1000230	Request for segments shall respect format tag when $Number$ identifier is used.	Mandatory
352.	org.hbbtv_D1000231	Request for segments shall respect format tag when $Bandwidth$ identifier is used.	Mandatory
353.	org.hbbtv_D1000233	Request for segments shall contain not truncated number, even if $Number$ value have more digits than format tag.	Mandatory
354.	org.hbbtv_DA540340	DASH streams with HE-AAC Broadcast-mix Audio Description (main audio only)	Mandatory
355.	org.hbbtv_DA540341	DASH streams with HE-AAC Broadcast-mix Audio Description (audio description only)	Mandatory
356.	org.hbbtv_DA540405	DASH streaming with two contiguous periods, both with start and duration attributes (audio check)	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
357.	org.hbbtv_DA540420	DASH streaming with three contiguous periods, one with start and duration attributes, the others with start attribute and SegmentTimeline	Mandatory
358.	org.hbbtv_DA540430	DASH streaming with 32 contiguous periods, each with start and duration attributes	Mandatory
359.	org.hbbtv_DA540440	DASH stream with 'lmsg' compatibility brand in last segment of one period	Mandatory
360.	org.hbbtv_DA540550	Test that dynamic MPD updates are requested	Mandatory
361.	org.hbbtv_DA540560	Test dynamic MPD with @mediaPresentationDuration attribute	Mandatory
362.	org.hbbtv_DA540570	Early available period - Test dynamic MPDs with the addition of content to an empty Period.	Mandatory
363.	org.hbbtv_DA540580	Addition of a Period to a dynamic MPD with 1 Period.	Mandatory
364.	org.hbbtv_DA540590	Added Period in a Dynamic MPD - Low to High	Mandatory
365.	org.hbbtv_DA540595	Added Period in a Dynamic MPD - High to Low	Mandatory
366.	org.hbbtv_DA540600	Removal of a completed period from a dynamic MPD	Mandatory
367.	org.hbbtv_DA540605	Removal of a completed period from a dynamic MPD (Audio check)	Mandatory
368.	org.hbbtv_DA540610	Addition of a new representation to a dynamic MPD	Mandatory
369.	org.hbbtv_DA540640	Termination of MPD updates when @mediaPresentationDuration is set	Mandatory
370.	org.hbbtv_DA540700	DASH stream transitioning from 576i to 1080i video content	Mandatory
371.	org.hbbtv_DA540710	DASH stream transitioning from 1080i to 576i video content	Mandatory
372.	org.hbbtv_DA540720	DASH stream transitioning video content from luminance resolution 480x576 to luminance resolution 720x576	Mandatory
373.	org.hbbtv_DA540730	DASH stream transitioning video content from luminance resolution 720x576 to luminance resolution 480x576	Mandatory
374.	org.hbbtv_DA540740	DASH stream transitioning from interlaced to progressive video content	Mandatory
375.	org.hbbtv_DA540750	DASH stream transitioning from progressive to interlaced video content	Mandatory
376.	org.hbbtv_DA540760	DASH stream transitioning from 25fps video to 50fps video content	Mandatory
377.	org.hbbtv_DA540770	DASH stream transitioning from 50fps video to 25fps video content	Mandatory
378.	org.hbbtv_DA540780	DASH stream transitioning HEAAC audio content from low to high bitrate Representations	Mandatory
379.	org.hbbtv_DA540790	DASH stream transitioning HEAAC audio content from high to low bitrate Representations	Mandatory
380.	org.hbbtv_DA540840	DASH stream transitioning from an audio representation with 2 channels to one with 5.1 channels	Mandatory
381.	org.hbbtv_DA540850	DASH stream transitioning from an audio representation with 5.1 channels to one with 2 channels	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
382.	org.hbbtv_DA540880	MPEG DASH - Redirect to an MPD - HTTP 302 (Found)	Mandatory
383.	org.hbbtv_DA540890	MPEG DASH - Redirect to an MPD - HTTP 307 (Temporary Redirect)	Mandatory
384.	org.hbbtv_DA540910	HTTP 502 error when trying to load a DASH MPD	Mandatory
385.	org.hbbtv_DA540920	HTTP 401 error when trying to load a DASH MPD	Mandatory
386.	org.hbbtv_DA540930	HTTP 404 error when trying to load a DASH initialization segment	Mandatory
387.	org.hbbtv_DA540950	MPEG DASH - Redirect to a Video Segment - HTTP 302 (Found)	Mandatory
388.	org.hbbtv_DA540960	MPEG DASH - Redirect to a Video Segment - HTTP 307 (Temporary Redirect)	Mandatory
389.	org.hbbtv_DA541000	Playback of DASH stream with 1 second segments	Mandatory
390.	org.hbbtv_DA541005	Playback of DASH stream with 1 second segments (audio check)	Mandatory
391.	org.hbbtv_DA541010	Playback of DASH stream with 15 second segments	Mandatory
392.	org.hbbtv_DA541015	Playback of DASH stream with 15 second segments (audio check)	Mandatory
393.	org.hbbtv_DA541020	Playback of DASH stream with 3 second video segments and 15 second audio segments (video check)	Mandatory
394.	org.hbbtv_DA541025	Playback of DASH stream with 3 second video segments and 15 second audio segments (audio check)	Mandatory
395.	org.hbbtv_DA541030	Playback of DASH stream with 15 second video segments and 3 second audio segments (video check)	Mandatory
396.	org.hbbtv_DA541035	Playback of DASH stream with 15 second video segments and 3 second audio segments (audio check)	Mandatory
397.	org.hbbtv_DA541150	Play with speed specified as 4x for DASH encoded clear content	Mandatory
398.	org.hbbtv_DA541160	Play with speed specified as -4x for DASH encoded clear content	Optional
399.	org.hbbtv_DA541170	Play with speed specified as 0.5x for DASH encoded clear content	Mandatory
400.	org.hbbtv_DA541180	Play with speed specified as -0.5x for DASH encoded clear content	Optional
401.	org.hbbtv_DA541190	Support for normal playback of DASH encoded clear content streamed over HTTP	Mandatory
402.	org.hbbtv_DA541200	Support for pausing DASH encoded clear content streamed over HTTP.	Mandatory
403.	org.hbbtv_DA541220	AV Object Seeking (Forward 5s) in DASH encoded clear content streamed over HTTP	Mandatory
404.	org.hbbtv_DA541230	AV Object Seeking Outside Buffer (Forward 6 minutes) in DASH encoded clear content streamed over HTTP.	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
405.	org.hbbtv_DA541480	Enforcement of the default value @maxPlayoutRate=1 for DASH encoded clear content streamed over HTTP	Mandatory
406.	org.hbbtv_DA541500	Support for trick mode Fast Forward for DASH encoded clear content with multiple representations	Mandatory
407.	org.hbbtv_DA541510	Support for trick mode Fast Rewind for DASH encoded clear content with multiple representations	Optional
408.	org.hbbtv_DA541800	'language' property of the AVAudioComponent is undefined if the audio component's 'lang' attribute in the MPD is not primary language subtag	Mandatory
409.	org.hbbtv_DA541830	AVComponent's componentTag property is equal to the adaptation sets @id property	Mandatory
410.	org.hbbtv_DA541850	<AdaptationSet> element with Role@value of 'main' - Lower element position	Mandatory
411.	org.hbbtv_DA541870	DASH MPD with Multiple Profiles	Mandatory
412.	org.hbbtv_DA541880	DASH - AVC_SD_25	Mandatory
413.	org.hbbtv_DA541890	DASH - AVC_HD_25	Mandatory
414.	org.hbbtv_DDP-GC-CODEC-MP4	AV Components: getComponents() returns correct the 'encoding' strings for DD+ (E-AC3) and HEAAC in an mp4 stream	Mandatory
415.	org.hbbtv_DDP-GC-CODEC-TS	AV Components: getComponents() returns correct the 'encoding' strings for DD+ (E-AC3) and HEAAC in a TS stream	Mandatory
416.	org.hbbtv_DDP-GC-LANG-MP4	AV Components: getComponents() returns correct the 'language' strings for multiple DD+ (EAC3) audio components in an mp4 stream	Mandatory
417.	org.hbbtv_DDP-GC-LANG-TS	AV Components: getComponents() returns correct the 'language' strings for multiple DD+ (EAC3) audio components in a TS stream	Mandatory
418.	org.hbbtv_DDP-SC-CODEC-DASH	AV Components: Selecting audio components from a DASH stream with DD+ (E-AC3) and HE-AAC audio components	Mandatory
419.	org.hbbtv_DDP-SC-CODEC-MP4	AV Components: Selecting audio components from an mp4 stream with DD+ (E-AC3) and HE-AAC audio components	Mandatory
420.	org.hbbtv_DDP-SC-CODEC-TS	AV Components: Selecting audio components from a TS stream with DD+ (E-AC3) and HE-AAC audio components	Mandatory
421.	org.hbbtv_DDP-SC-LANG-MP4	AV Components: Selecting audio components from an mp4 stream with multiple language DD+ (EAC3) audio components	Mandatory
422.	org.hbbtv_DDP-SC-LANG-TS	AV Components: Selecting audio components from a TS stream with multiple language DD+ (EAC3) audio components	Mandatory
423.	org.hbbtv_DSMCC001	Adding stream event listeners: valid stream event	Mandatory
424.	org.hbbtv_DSMCC002	Adding stream event listeners: malformed targetURL	Mandatory
425.	org.hbbtv_DSMCC003	Adding stream event listeners: malformed eventName	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
426.	org.hbbtv_DSMCC004	Adding stream event listeners: eventName not found	Mandatory
427.	org.hbbtv_DSMCC005	Removing stream event listeners with an altered eventName	Mandatory
428.	org.hbbtv_DSMCC006	Adding stream event listeners: identical instances	Mandatory
429.	org.hbbtv_DSMCC007	Adding stream event listeners: different version numbers	Mandatory
430.	org.hbbtv_DSMCC008	Removing stream event listeners with matching parameters	Mandatory
431.	org.hbbtv_DSMCC009	Removing stream event listeners with an altered targetURL value	Mandatory
432.	org.hbbtv_DSMCC010	Removing stream event listeners with an altered listener function value	Mandatory
433.	org.hbbtv_DSMCC011	DSM-CC StreamEvent event: returns valid name	Mandatory
434.	org.hbbtv_DSMCC012	DSM-CC StreamEvent event: returns well formed data element	Mandatory
435.	org.hbbtv_DSMCC013	DSM-CC StreamEvent event: returns well formed text element	Mandatory
436.	org.hbbtv_DSMCC014	Carousel objects access with XMLHttpRequest: XML file via relative URL	Mandatory
437.	org.hbbtv_DSMCC015	Carousel objects access with XMLHttpRequest: A directory via relative URL	Mandatory
438.	org.hbbtv_DSMCC016	Carousel objects access with XMLHttpRequest: XML file via absolute URL	Mandatory
439.	org.hbbtv_DSMCC017	Carousel objects access with XMLHttpRequest: A directory via absolute URL	Mandatory
440.	org.hbbtv_DSMCC018	Carousel objects access with XMLHttpRequest: stream event listing via relative URL	Mandatory
441.	org.hbbtv_DSMCC019	Carousel objects access with XMLHttpRequest: stream event listing via absolute URL	Mandatory
442.	org.hbbtv_DSMCC040	Mounting carousel via broadcasting initial page in the same transport stream.	Mandatory
443.	org.hbbtv_DSMCC042	Mounting carousel via the component_tag of a carousel containing service gateway.	Mandatory
444.	org.hbbtv_DSMCC043	Mounting carousel via the component_tag of a carousel containing no service gateway.	Mandatory
445.	org.hbbtv_DSMCC044	Mounting the carousel in broadcast-independent application	Mandatory
446.	org.hbbtv_DSMCC045	One carousel mounted for a running application	Mandatory
447.	org.hbbtv_DSMCC046	Carousel update	Mandatory
448.	org.hbbtv_DSMCC047	Carousel split across: Minimum 3 elementary streams	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
449.	org.hbbtv_DSMCC048	Carousel split across: minimum 3 elementary streams plus one reserved for StreamEvent.	Mandatory
450.	org.hbbtv_DSMCC049	Subsequent carousel mounting in the same transport stream.	Mandatory
451.	org.hbbtv_DSMCC051	Subsequent carousel mounting in the same transport stream: The pending requests	Mandatory
452.	org.hbbtv_DSMCC053	The length constraint of DSM-CC object reference: File object	Mandatory
453.	org.hbbtv_DSMCC054	The length constraint of DSM-CC object reference: StreamEvent object	Mandatory
454.	org.hbbtv_DSMCC101	CRC errors in DSM-CC sections	Mandatory
455.	org.hbbtv_DSMCC102	last_section_number for DDB sections is 0xFE	Mandatory
456.	org.hbbtv_DSMCC103	Maximum DSM-CC section length is 4096 bytes	Mandatory
457.	org.hbbtv_DSMCC104	Maximum number of four DSM-CC sections per TS packet	Mandatory
458.	org.hbbtv_DSMCC105	Ignore dsmccAdaptationHeader	Mandatory
459.	org.hbbtv_DSMCC106	Maximum size 4066 bytes for DII blockSize	Mandatory
460.	org.hbbtv_DSMCC107	Ignore privateData field in DII messages	Mandatory
461.	org.hbbtv_DSMCC108	Ignore id and selector fields of BIOP::ModuleInfo::Taps	Mandatory
462.	org.hbbtv_DSMCC109	Ignore additional taps in the BIOP::ModuleInfo::Taps.	Mandatory
463.	org.hbbtv_DSMCC110	Support compressed modules in DSM-CC object carousels	Mandatory
464.	org.hbbtv_DSMCC111	Ignore unknown descriptors in BIOP::ModuleInfo::UserInfo	Mandatory
465.	org.hbbtv_DSMCC112	BIOP::ModuleInfo::moduleTimeOut, blockTimeOut and minBlockTime	Mandatory
466.	org.hbbtv_DSMCC113	Ignore BIOP::ServiceGatewayInfo::downloadTaps	Mandatory
467.	org.hbbtv_DSMCC114	Ignore BIOP::ServiceGatewayInfo::serviceContextList	Mandatory
468.	org.hbbtv_DSMCC115	Ignore BIOP::ServiceGatewayInfo::UserInfo	Mandatory
469.	org.hbbtv_DSMCC116	Ignore DownloadCancel messages in DSM-CC object carousels	Mandatory
470.	org.hbbtv_DSMCC117	BIOP::FileMessage with empty MessageSubHeader::ObjectInfo	Mandatory
471.	org.hbbtv_DSMCC118	BIOP:FileMessage with MessageSubHeader::ObjectInfo with DSM::File::ContentSize	Mandatory
472.	org.hbbtv_DSMCC119	BIOP:FileMessage with MessageSubHeader::ObjectInfo with content_type descriptor	Mandatory
473.	org.hbbtv_DSMCC120	BIOP:FileMessage with MessageSubHeader::ObjectInfo unknown descriptors	Mandatory
474.	org.hbbtv_DSMCC121	Ignore the MessageSubHeader::ServiceContextList in a BIOP::FileMessage	Mandatory
475.	org.hbbtv_DSMCC122	Ignore MessageSubHeader::ObjectInfo in a BIOP::DirectoryMessage	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
476.	org.hbbtv_DSMCC123	Ignore MessageSubHeader::ServiceContextList in a BIOP::DirectoryMessage	Mandatory
477.	org.hbbtv_DSMCC125	BIOP::DirectoryMessage with empty BIOP::Binding::ObjectInfo	Mandatory
478.	org.hbbtv_DSMCC126	BIOP::DirectoryMessage with BIOP::Binding::ObjectInfo with DSM::File::ContentSize	Mandatory
479.	org.hbbtv_DSMCC127	BIOP::DirectoryMessage with BIOP::Binding::ObjectInfo with content_type_descriptor	Mandatory
480.	org.hbbtv_DSMCC128	Ignore unknown descriptors in BIOP::Binding::ObjectInfo in BIOP::DirectoryMessage	Mandatory
481.	org.hbbtv_DSMCC129	Ignore BIOP::IOR with unknown profile	Mandatory
482.	org.hbbtv_DSMCC130	BIOP::IOR: Ignore additional IOP::taggedProfiles	Mandatory
483.	org.hbbtv_DSMCC131	BiopProfileBody: ignore additional BIOP::LiteComponents	Mandatory
484.	org.hbbtv_DSMCC132	Ignore BIOP object reference with wrong tap type in DSM::ConnBinder	Mandatory
485.	org.hbbtv_DSMCC133	BiopProfileBody: Ignore additional taps in DSM::ConnBinder	Mandatory
486.	org.hbbtv_DSMCC134	BiopProfileBody: Ignore id field of tap in a DSM::ConnBinder	Mandatory
487.	org.hbbtv_DSMCC135	LiteOptionsProfileBody: ignore additional BIOP::LiteComponents	Mandatory
488.	org.hbbtv_DSMCC136	LiteOptionsProfileBody: ignore DSM::ServiceLocation::InitialContext	Mandatory
489.	org.hbbtv_DSMCC137	Add file to DSM-CC object carousel	Mandatory
490.	org.hbbtv_DSMCC138	Update file of DSM-CC object carousel	Mandatory
491.	org.hbbtv_DSMCC139	Add directory to DSM-CC object carousel	Mandatory
492.	org.hbbtv_DSMCC140	Update directory of DSM-CC object carousel	Mandatory
493.	org.hbbtv_DSMCC141	Move file object to different module in DSM-CC object carousel	Mandatory
494.	org.hbbtv_DSMCC142	Change PID of DSM-CC object carousel	Mandatory
495.	org.hbbtv_DSMCC143	Add new PID for DSM-CC object carousel	Mandatory
496.	org.hbbtv_E1210040	Correct graphics display and aspect ratio when showing broadband video which contains 4:3 to 16:9 transition.	Mandatory
497.	org.hbbtv_E1210050	Correct graphics display and aspect ratio when showing broadband video which contains 16:9 to 4:3 transition.	Mandatory
498.	org.hbbtv_E1210060	Correct graphics display and aspect ratio when showing broadcast video which contains 4:3 to 16:9 transition.	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
499.	org.hbbtv_E1210080	Correct graphics display and aspect ratio when transitioning from 4:3 broadband video to 16:9 broadcast video	Mandatory
500.	org.hbbtv_E1210090	Correct graphics display and aspect ratio when transitioning from 16:9 broadband video to 4:3 broadcast video	Mandatory
501.	org.hbbtv_E12100A0	Correct graphics display and aspect ratio when transitioning from 4:3 broadcast video to 16:9 broadband video	Mandatory
502.	org.hbbtv_E12100B0	Correct graphics display and aspect ratio when transitioning from 16:9 broadcast video to 4:3 broadband video	Mandatory
503.	org.hbbtv_EAC30001	Test of support for E-AC3 stereo, Streamed over HTTP. MP4 container.	Mandatory
504.	org.hbbtv_EAC30002	Test of support for down-mixed E-AC3; 5.1 channel, AV Content, Streamed over HTTP. MP4 container.	Mandatory
505.	org.hbbtv_EAC30003	Test of support for down-mixed E-AC3; 7.1 channel, AV Content, Streamed over HTTP. MP4 container.	Mandatory
506.	org.hbbtv_EAC30004	Test of support for E-AC-3 stereo. HbbTV ISOBMFF Live profile	Mandatory
507.	org.hbbtv_EAC30005	Test of support for down-mixed E-AC3; 5.1 channel, AV Content, HbbTV ISOBMFF Live profile	Mandatory
508.	org.hbbtv_EAC30006	Test of support for down-mixed E-AC3; 7.1 channel, AV Content, HbbTV ISOBMFF Live profile	Mandatory
509.	org.hbbtv_EAC30007	Test of support for E-AC3 stereo, Streamed over HTTP. MPEG-2 TS container.	Mandatory
510.	org.hbbtv_EAC30008	Test of support for down-mixed E-AC3; 5.1 channel, AV Content, Streamed over HTTP. MPEG-2 TS container.	Mandatory
511.	org.hbbtv_EAC30009	Test of support for down-mixed E-AC3; 7.1 channel, AV Content, Streamed over HTTP. MPEG-2 TS container.	Mandatory
512.	org.hbbtv_EAC3000F	HbbTV ISOBMFF Live profile, DD+ 5.1, single bitrate, contradicting channel layout metadata	Mandatory
513.	org.hbbtv_EAC30010	DASH Live Profile, DD+ 5.1, single bitrate, contradicting codec metadata	Mandatory
514.	org.hbbtv_EAC30013	Test of support for Multiple Languages from multiple E-AC-3 elementary streams, MP4 container (audio language change during test)	Optional
515.	org.hbbtv_EAC30013_2	Test of support for Multiple Languages from multiple E-AC-3 elementary streams, MP4 container (English) (audio language change before test)	Mandatory
516.	org.hbbtv_EAC30013_3	Test of support for Multiple Languages from multiple E-AC-3 elementary streams, MP4 container (French) (audio language change before test)	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
517.	org.hbbtv_EAC30014	Test of support for Multiple Languages from multiple E-AC-3 elementary streams, HbbTV ISOBMFF Live profile (English) (audio language change during test)	Optional
518.	org.hbbtv_EAC30014_2	Test of support for Multiple Languages from multiple E-AC-3 elementary streams, HbbTV ISOBMFF Live profile (English) (audio language change before test)	Mandatory
519.	org.hbbtv_EAC30014_3	Test of support for Multiple Languages from multiple E-AC-3 elementary streams, HbbTV ISOBMFF Live profile (French) (audio language change before test)	Mandatory
520.	org.hbbtv_EAC30017	HbbTV ISOBMFF Live profile, DD+ Stereo MultiRate, High to Low	Mandatory
521.	org.hbbtv_MSR09010	"application/oipfSearchManager" implements API functions: "createSearch", "getChannelConfig".	Mandatory
522.	org.hbbtv_MSR09020	Calling the getChannelConfig function on "application/oipfSearchManager" and "video/broadcast" embedded objects return identical objects.	Mandatory
523.	org.hbbtv_MSR09030	Function "createSearch(1)" of "application/oipfSearchManager" embedded object returns MetadataSearch type object.	Mandatory
524.	org.hbbtv_MSR09060	onMetadataSearch callback shall be called with correct parameters.	Mandatory
525.	org.hbbtv_MSR09061	onMetadataSearch callback shall be called asynchronously.	Mandatory
526.	org.hbbtv_MSR09062	When search is finished, onMetadataSearch callback with argument state=0 is called.	Mandatory
527.	org.hbbtv_MSR09064	When search is finished, the state argument of event object send to MetadataSearch listener is equal 0.	Mandatory
528.	org.hbbtv_MSR09065	DOM2 'MetadataSearch' listener shall be called with correct event parameter.	Mandatory
529.	org.hbbtv_MSR09066	DOM2 'MetadataSearch' listener shall be dispatched asynchronously.	Mandatory
530.	org.hbbtv_MSR09067	MetadataSearch results are based on the updated metadata, if EIT table changes.	Mandatory
531.	org.hbbtv_MSR09068	Update of metadata due to EIT table changes shall not affect on the data exposed via the SearchResult.item() of MetadataSearch.	Mandatory
532.	org.hbbtv_MSR09080	"SearchResults" type object implements API functions: "item", "getResults", "abort".	Mandatory
533.	org.hbbtv_MSR09090	"offset" argument of getResults(offset,....) shift result set.	Mandatory
534.	org.hbbtv_MSR09091	Subsequent calls of getResults() method retrieves specified subset of items.	Mandatory
535.	org.hbbtv_MSR09092	'offset' parameter of result property.	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
536.	org.hbbtv_MSR09093	'totalSize' parameter is not altered after subsequent calls of getResults().	Mandatory
537.	org.hbbtv_MSR09100	Result property of MetadataSearch class shall be empty until getResults() is used.	Mandatory
538.	org.hbbtv_MSR09130	Value of "totalSize" property of "SearchResults" type object is equal to number of results found by MetadataSearch.	Mandatory
539.	org.hbbtv_MSR092111	Terminal correctly implements comparison type '1' in Metadata APIs for "Programme.startTime" parameter.	Mandatory
540.	org.hbbtv_MSR092112	Terminal correctly implements comparison type '1' in Metadata APIs for "Programme.programmeID" parameter.	Mandatory
541.	org.hbbtv_MSR09243	Two independent "findProgrammesFromStream()" searches.	Mandatory
542.	org.hbbtv_MSR09260	findProgrammesFromStream(currentChannel, startTime,...) of Metadata API shall retrieve programme showing at the startTime on current channel.	Mandatory
543.	org.hbbtv_MSR09262	findProgrammesFromStream() removes channel constraints.	Mandatory
544.	org.hbbtv_MSR09263	findProgrammesFromStream(Channel, startTime,...) of Metadata API shall retrieve programme showing at the startTime from given (not current) Channel.	Mandatory
545.	org.hbbtv_MSR09270	The "and()" method of query object performs the logical AND operation on queries.	Mandatory
546.	org.hbbtv_MSR09280	The "or()" method of query object performes the logical OR operation on queries.	Mandatory
547.	org.hbbtv_MSR09295	Complex queries using the Metadata API "not" "and" and "or" method of query object are supported.	Mandatory
548.	org.hbbtv_MSR09300	All search results of MetadataSearch type object shall be returned ordered first by channel, in the same order as presented to applications through a ChannelList object, then by start time in ascending order.	Mandatory
549.	org.hbbtv_MSR09510	MetadataSearch: Idle state after channel constraint adding.	Mandatory
550.	org.hbbtv_MSR09511	MetadataSearch: Idle state after channel constraint removing.	Mandatory
551.	org.hbbtv_MSR09530	getResults(.., count): results limited to count.	Mandatory
552.	org.hbbtv_OBF08170	Method oipfObjectFactory.isObjectSupported() shall return true for all mandatory embedded objects.	Mandatory
553.	tv.oipf_AVC-AAC-003	Audio From Memory - HE-AAC	Mandatory
554.	tv.oipf_AVC-AAC-004-001	5.1 multi-channel audio output on S/PDIF	Mandatory
555.	tv.oipf_AVC-AAC-004-002	5.1 multi-channel audio with DRC parameters output on S/PDIF	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
556.	tv.oipf_AVC-AAC-004-003	5.1 multi-channel audio with DRC parameters and prog_ref_level unspecified output on S/PDIF	Mandatory
557.	tv.oipf_AVC-AAC-005-001	HE-AAC downmixing - matrix coefficient = 0	Mandatory
558.	tv.oipf_AVC-AAC-005-002	HE-AAC downmixing - matrix coefficient = 1	Mandatory
559.	tv.oipf_AVC-AAC-005-003	HE-AAC downmixing - matrix coefficient = 2	Mandatory
560.	tv.oipf_AVC-AAC-005-005	HE-AAC downmixing - center_mix_level = 0 dB (000), surround_mix_level = 0 dB (000)	Mandatory
561.	tv.oipf_AVC-AAC-005-006	HE-AAC downmixing - center_mix_level = -3 dB (010), surround_mix_level = -3 dB (010)	Mandatory
562.	tv.oipf_AVC-AAC-005-007	HE-AAC downmixing - center_mix_level = -6 dB (100), surround_mix_level = -6 dB (100)	Mandatory
563.	tv.oipf_AVC-AAC-005-008	HE-AAC downmixing - center_mix_level = -6 dB (100), surround_mix_level = -4.5 dB (011)	Mandatory
564.	tv.oipf_AVC-AAC-005-009	HE-AAC downmixing - center_mix_level = -3 dB (010), surround_mix_level = -7.5 dB (101)	Mandatory
565.	tv.oipf_AVC-AC3-001	Decode AC-3 audio from an MPEG-2 transport stream	Mandatory
566.	tv.oipf_AVC-CPT-001-001	DVB subtitles	Mandatory
567.	tv.oipf_AVC-CPT-001-002	DVB subtitles (HD)	Mandatory
568.	tv.oipf_AVC-GIF-001-001	Image rendering - GIF - 20 x 20 px	Mandatory
569.	tv.oipf_AVC-GIF-001-002	Image rendering - GIF - 40 x 20 px	Mandatory
570.	tv.oipf_AVC-GIF-001-003	Image rendering - GIF - 20 x 40 px	Mandatory
571.	tv.oipf_AVC-GIF-001-004	Image rendering - GIF - 40 x 40 px	Mandatory
572.	tv.oipf_AVC-GIF-001-005	Image rendering - GIF - 347 x 131 px	Mandatory
573.	tv.oipf_AVC-GIF-001-006	Image rendering - GIF - 640 x 50 px	Mandatory
574.	tv.oipf_AVC-GIF-001-007	Image rendering - GIF - 50 x 480 px	Mandatory
575.	tv.oipf_AVC-GIF-001-008	Image rendering - GIF - 320 x 240 px	Mandatory
576.	tv.oipf_AVC-GIF-001-009	Image rendering - GIF - 240 x 320 px	Mandatory
577.	tv.oipf_AVC-GIF-001-010	Image rendering - GIF - 640 x 480 px	Mandatory
578.	tv.oipf_AVC-GIF-001-011	Image rendering - GIF (Animated) - 50 x 50 px	Mandatory
579.	tv.oipf_AVC-GIF-001-012	Image rendering - GIF (Transparent) - 50 x 50 px	Mandatory
580.	tv.oipf_AVC-GIF-002	Image rendering - GIF - 720 x 576 px	Mandatory
581.	tv.oipf_AVC-GIF-004-001	Image rendering - GIF - 1024 x 768 px	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
582.	tv.oipf_AVC-GIF-004-002	Image rendering - GIF - 1920 x 1080 px	Mandatory
583.	tv.oipf_AVC-JPG-001-001	Image rendering - JPEG - 20 x 20 px	Mandatory
584.	tv.oipf_AVC-JPG-001-002	Image rendering - JPEG - 40 x 20 px	Mandatory
585.	tv.oipf_AVC-JPG-001-003	Image rendering - JPEG - 20 x 40 px	Mandatory
586.	tv.oipf_AVC-JPG-001-004	Image rendering - JPEG - 40 x 40 px	Mandatory
587.	tv.oipf_AVC-JPG-001-005	Image rendering - JPEG - 347 x 131 px	Mandatory
588.	tv.oipf_AVC-JPG-001-006	Image rendering - JPEG - 640 x 50 px	Mandatory
589.	tv.oipf_AVC-JPG-001-007	Image rendering - JPEG - 50 x 480 px	Mandatory
590.	tv.oipf_AVC-JPG-001-008	Image rendering - JPEG - 320 x 240 px	Mandatory
591.	tv.oipf_AVC-JPG-001-009	Image rendering - JPEG - 240 x 320 px	Mandatory
592.	tv.oipf_AVC-JPG-001-010	Image rendering - JPEG - 640 x 480 px	Mandatory
593.	tv.oipf_AVC-JPG-002	Image rendering - JPEG - 720 x 576 px	Mandatory
594.	tv.oipf_AVC-JPG-004-001	Image rendering - JPEG - 1024 x 768 px	Mandatory
595.	tv.oipf_AVC-JPG-004-002	Image rendering - JPEG - 1920 x 1080 px	Mandatory
596.	tv.oipf_AVC-PNG-001-001	Image rendering - PNG - 20 x 20 px	Mandatory
597.	tv.oipf_AVC-PNG-001-002	Image rendering - PNG - 40 x 20 px	Mandatory
598.	tv.oipf_AVC-PNG-001-003	Image rendering - PNG - 20 x 40 px	Mandatory
599.	tv.oipf_AVC-PNG-001-004	Image rendering - PNG - 40 x 40 px	Mandatory
600.	tv.oipf_AVC-PNG-001-005	Image rendering - PNG - 347 x 131 px	Mandatory
601.	tv.oipf_AVC-PNG-001-006	Image rendering - PNG - 640 x 50 px	Mandatory
602.	tv.oipf_AVC-PNG-001-007	Image rendering - PNG - 50 x 480 px	Mandatory
603.	tv.oipf_AVC-PNG-001-008	Image rendering - PNG - 320 x 240 px	Mandatory
604.	tv.oipf_AVC-PNG-001-009	Image rendering - PNG - 240 x 320 px	Mandatory
605.	tv.oipf_AVC-PNG-001-010	Image rendering - PNG - 640 x 480 px	Mandatory
606.	tv.oipf_AVC-PNG-002	Image rendering - PNG - 720 x 576 px	Mandatory
607.	tv.oipf_AVC-PNG-004-001	Image rendering - PNG - 1024 x 768 px	Mandatory

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
608.	tv.oipf_AVC-PNG-004-002	Image rendering - PNG - 1920 x 1080 px	Mandatory
609.	tv.oipf_CSP-CSPG-CIPLUS-002-001	Signalling of CSPG-CI+ support using CEA-2014 capability negotiation and extensions with no CI+ CAM inserted	Optional
610.	tv.oipf_CSP-CSPG-CIPLUS-002-003	Signalling of CSPG-CI+ support using CEA-2014 capability negotiation and extensions following unsuccessful CSPG-CI+ discovery	Optional
611.	tv.oipf_CSP-CSPG-CIPLUS-007-001	Correct DRMMessageResult event sent (0x00) when a 'reply_msg' with an oipf_status of 0x00 "Successful" is received from the CICAM	Optional
612.	tv.oipf_CSP-CSPG-CIPLUS-007-002	Correct DRMMessageResult event sent (0x00) when a 'reply_msg' with an oipf_status of 0x00 "Successful" and oipf_ca_vendor_specific_information present is received from the CICAM	Optional
613.	tv.oipf_CSP-CSPG-CIPLUS-007-003	Correct DRMMessageResult event sent (0x01) when a 'reply_msg' with an oipf_status of 0x01 "Unspecified error" and oipf_ca_vendor_specific_information present is received from the CICAM	Optional
614.	tv.oipf_CSP-CSPG-CIPLUS-007-004	Correct DRMMessageResult event sent (0x02) when a 'reply_msg' with an oipf_status of 0x02 "Out of time" is received from the CICAM	Optional
615.	tv.oipf_CSP-CSPG-CIPLUS-007-005	Correct DRMMessageResult event sent (0x03) and send_msg not sent when a sendDRMMessage is attempted with an unknown MIME type	Optional
616.	tv.oipf_CSP-CSPG-CIPLUS-007-006	Correct DRMMessageResult event sent (0x04) when a 'reply_msg' with an oipf_status of 0x04 "User consent needed" is received from the CICAM	Optional
617.	tv.oipf_CSP-CSPG-CIPLUS-007-007	Correct DRMMessageResult event sent (0x05) when a 'reply_msg' with an oipf_status of 0x05 "Unknown DRM system" is received from the CICAM	Optional
618.	tv.oipf_CSP-CSPG-CIPLUS-007-008	Correct DRMMessageResult event sent (0x05) and send_msg not sent when a sendDRMMessage is attempted with a non matching DRMSystemId	Optional
619.	tv.oipf_CSP-CSPG-CIPLUS-007-009	Correct DRMMessageResult event sent (0x06) when a 'reply_msg' with an oipf_status of 0x03 "Wrong format" is received from the CICAM	Optional
620.	tv.oipf_CSP-CSPG-CIPLUS-007-010	'send_msg' is sent to CICAM when sendDRMMessage is called with an empty 'msg'	Optional
621.	tv.oipf_CSP-CSPG-CIPLUS-007-011	'send_msg' is sent to CICAM when sendDRMMessage is called with 'msg' data present	Optional
622.	tv.oipf_CSP-CSPG-CIPLUS-009-001	DRMRightsError handling following a CICAM rights_info message with a null 'oipf-rights_issuer_url', where descrambling is stopped	Optional
623.	tv.oipf_CSP-CSPG-CIPLUS-009-003	DRMRightsError handling following a CICAM rights_info message with a null 'oipf-rights_issuer_url', where descrambling is stopped and then re-enabled	Optional

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
624.	tv.oipf_CSP-CSPG-CIPLUS-009-004	DRMRightsError handling following a CICAM rights_info message with a valid 'oipf-rights_issuer_url' HTTP URL where descrambling is stopped	Optional
625.	tv.oipf_CSP-CSPG-CIPLUS-011-001	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x00 (mandatory DVB parental rating type) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
626.	tv.oipf_CSP-CSPG-CIPLUS-011-004	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x01 (Japanese Motion Picture Parental Rating) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
627.	tv.oipf_CSP-CSPG-CIPLUS-011-005	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x02 (Internet Content Rating Association Parental Rating) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
628.	tv.oipf_CSP-CSPG-CIPLUS-011-006	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x03 (MPAA Parental Rating) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
629.	tv.oipf_CSP-CSPG-CIPLUS-011-007	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x04 (Internet Content Rating Association Parental Rating for Nudity) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
630.	tv.oipf_CSP-CSPG-CIPLUS-011-008	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x05 (RIAA Parental Rating) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
631.	tv.oipf_CSP-CSPG-CIPLUS-011-009	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x06 (Internet Content Rating Association Parental Rating for Sex) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
632.	tv.oipf_CSP-CSPG-CIPLUS-011-010	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x07 (MPAA Parental Rating for TV) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
633.	tv.oipf_CSP-CSPG-CIPLUS-011-011	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x08 (Internet Content Rating Association Parental Rating for Violence) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
634.	tv.oipf_CSP-CSPG-CIPLUS-011-012	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x09 (German Freiwillige Selbstkontrolle der Filmwirtschaft Rating System) and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
635.	tv.oipf_CSP-CSPG-CIPLUS-011-013	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x01 (Japanese Motion Picture Parental Rating) that is unsupported by the terminal and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
636.	tv.oipf_CSP-CSPG-CIPLUS-011-014	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x02 (Internet Content Rating Association Parental Rating) that is unsupported by the terminal and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
637.	tv.oipf_CSP-CSPG-CIPLUS-011-015	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x03 (MPAA Parental Rating) that is unsupported by the terminal and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
638.	tv.oipf_CSP-CSPG-CIPLUS-011-016	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x04 (Internet Content Rating Association Parental Rating for Nudity) that is unsupported by the terminal and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
639.	tv.oipf_CSP-CSPG-CIPLUS-011-017	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x05 (RIAA Parental Rating) that is unsupported by the terminal and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
640.	tv.oipf_CSP-CSPG-CIPLUS-011-018	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x06 (Internet Content Rating Association Parental Rating for Sex) that is unsupported by the terminal and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
641.	tv.oipf_CSP-CSPG-CIPLUS-011-019	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x07 (MPAA Parental Rating for TV) that is unsupported by the terminal and a null 'oipf_parental_control_url' where descrambling is stopped	Optional
642.	tv.oipf_CSP-CSPG-CIPLUS-011-020	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x08 (Internet Content Rating Association Parental Rating for Violence) that is unsupported by the terminal and a null 'oipf_parental_control_url' where descrambling is stopped	Optional

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
643.	tv.oipf_CSP-CSPG-CIPLUS-011-021	Management of parental_control_info message sent by the CICAM with oipf_rating_type 0x09 (German Freiwillige Selbstkontrolle der Filmwirtschaft Rating System) that is unsupported by the terminal with a null 'oipf_parental_control_url' where descrambling is stopped	Optional
644.	tv.oipf_DAE-APP_MGMT-002	getOwnerApplication() method of application/oipfApplicationManager	Mandatory
645.	tv.oipf_DAE-APP_MGMT-010	A/V Control object audio is silenced when destroyApplication() is called	Mandatory
646.	tv.oipf_DAE-APP_MGMT-013	Application only receives registered key set events	Mandatory
647.	tv.oipf_DAE-CAPABILITY-003-001	HD output supports HD graphics with HD video	Optional
648.	tv.oipf_DAE-CAPABILITY-005	PNG / A/V Control object - Per-pixel alpha	Mandatory
649.	tv.oipf_DAE-CE_HTML_DEV-040-001	A/V Control object - play() - Unsupported A/V Format	Mandatory
650.	tv.oipf_DAE-CE_HTML_DEV-040-002	A/V Control object - play() - Content Corrupt or Invalid	Mandatory
651.	tv.oipf_DAE-CONFIGURATION_SETTING-021	Configuration - preferredAudioLanguage	Mandatory
652.	tv.oipf_DAE-CONFIGURATION_SETTING-022-001	Configuration - preferredSubtitleLanguage (OIPF 1)	Mandatory
653.	tv.oipf_DAE-CONFIGURATION_SETTING-023	Configuration - preferredUILanguage	Mandatory
654.	tv.oipf_DAE-MEDIA_PLAYBACK-006-001	Audio plays if A/V object is positioned outside of viewport	Mandatory
655.	tv.oipf_DAE-MEDIA_PLAYBACK-006-002	Audio still plays if an A/V Control object's 'visibility' style attribute is set to 'hidden'	Mandatory
656.	tv.oipf_DAE-MEDIA_PLAYBACK-007-001	Calling play(0) on A/V Control object in 'buffering' state puts the object into 'paused' state	Mandatory
657.	tv.oipf_DAE-MEDIA_PLAYBACK-007-002	Calling play(0) on A/V Control object in 'connecting' state puts the object into 'paused' state	Mandatory
658.	tv.oipf_DAE-MEDIA_PLAYBACK-007-003	Calling play(0) on A/V Control object in 'stopped' state puts the object into 'paused' state	Mandatory
659.	tv.oipf_DAE-MEDIA_PLAYBACK-008	play() method of A/V Control called before sufficient data is available for 'playable_download' acquisition	Optional

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
660.	tv.oipf_DAE-MEDIA_PLAYBACK-009	play() method of A/V Control called before sufficient data is available for 'full_download' acquisition	Optional
661.	tv.oipf_DAE-MEDIA_PLAYBACK-023	HE-AAC memory audio loop parameter	Mandatory
662.	tv.oipf_DAE-MEDIA_PLAYBACK-025-001	Stopping playing memory audio	Mandatory
663.	tv.oipf_DAE-MEDIA_PLAYBACK-025-002	<param> element is accessible through the A/V control object	Mandatory
664.	tv.oipf_DAE-MEDIA_PLAYBACK-026	Audio from memory - Playing after previously stopped (HE-AAC)	Mandatory
665.	tv.oipf_DAE-MEDIA_PLAYBACK-027	AV Object Seeking (MP4 Forward 5s) correctly reports its position via onPlayPositionChanged	Mandatory
666.	tv.oipf_DAE-MEDIA_PLAYBACK-028	AV Object Seeking (MP4 Forward 180s) correctly reports its position via onPlayPositionChanged	Mandatory
667.	tv.oipf_DAE-MEDIA_PLAYBACK-029	AV Object Seeking (MP4 Backward 180s) correctly reports its position via onPlayPositionChanged	Mandatory
668.	tv.oipf_DAE-MEDIA_PLAYBACK-030	AV Object Seeking (MP4 Backward 5s) correctly reports its position via onPlayPositionChanged	Mandatory
669.	tv.oipf_DAE-MISCELLANEOUS-010-002-001	hasCapability() - +PVR - Supported	Optional
670.	tv.oipf_DAE-MISCELLANEOUS-010-002-002	hasCapability() - +PVR - Not Supported	Mandatory
671.	tv.oipf_DAE-OBJECT_FACTORY-001-001	isObjectSupported() (true) - application/oipfApplicationManager	Mandatory
672.	tv.oipf_DAE-OBJECT_FACTORY-001-002	isObjectSupported() (true) - application/oipfCapabilities	Mandatory
673.	tv.oipf_DAE-OBJECT_FACTORY-001-003	isObjectSupported() (true) - application/oipfConfiguration	Mandatory
674.	tv.oipf_DAE-OBJECT_FACTORY-001-004	isObjectSupported() (true) - application/oipfDownloadManager	Optional
675.	tv.oipf_DAE-OBJECT_FACTORY-001-005	isObjectSupported() (true) - application/oipfDownloadTrigger	Optional

Table 46. HbbTV 8.5 test case *(continued)*

No	Test ID	Title	Category
676.	tv.oipf_DAE-OBJECT_FACTORY-001-006	isObjectSupported() (true) - application/oipfDrmAgent	Mandatory
677.	tv.oipf_DAE-OBJECT_FACTORY-001-007	isObjectSupported() (true) - application/oipfParentalControlManager	Mandatory
678.	tv.oipf_DAE-OBJECT_FACTORY-001-008	isObjectSupported() (true) - application/oipfRecordingScheduler	Optional
679.	tv.oipf_DAE-OBJECT_FACTORY-001-009	isObjectSupported() (true) - application/oipfSearchManager	Mandatory
680.	tv.oipf_DAE-OBJECT_FACTORY-001-010	isObjectSupported() (true) - video/broadcast	Mandatory
681.	tv.oipf_DAE-OBJECT_FACTORY-001-011	isObjectSupported() (true) - video/mpeg	Mandatory
682.	tv.oipf_DAE-OBJECT_FACTORY-001-012	isObjectSupported() (true) - video/mp4	Mandatory
683.	tv.oipf_DAE-OBJECT_FACTORY-001-013	isObjectSupported() (true) - audio/mpeg	Mandatory
684.	tv.oipf_DAE-OBJECT_FACTORY-001-014	isObjectSupported() (true) - audio/mp4	Mandatory
685.	tv.oipf_DAE-OBJECT_FACTORY-001-018	isObjectSupported() (false) - application/oipfDownloadManager	Mandatory
686.	tv.oipf_DAE-OBJECT_FACTORY-001-019	isObjectSupported() (false) - application/oipfDownloadTrigger	Mandatory
687.	tv.oipf_DAE-OBJECT_FACTORY-001-020	isObjectSupported() (false) - application/oipfDrmAgent	Optional
688.	tv.oipf_DAE-OBJECT_FACTORY-001-022	isObjectSupported() (false) - application/oipfRecordingScheduler	Mandatory
689.	tv.oipf_DAE-OBJECT_FACTORY-002-001	OipfObjectFactory - createVideoBroadcastObject()	Mandatory
690.	tv.oipf_DAE-OBJECT_FACTORY-003	OipfObjectFactory - createVideoMpegObject()	Mandatory
691.	tv.oipf_DAE-OBJECT_FACTORY-007-001	OipfObjectFactory - createConfigurationObject()	Mandatory

Table 46. HbbTV 8.5 test case *(concluded)*

No	Test ID	Title	Category
692.	tv.oipf_DAE-OBJECT_FACTORY-009	createDownloadTriggerObject() API method	Optional
693.	tv.oipf_DAE-OBJECT_FACTORY-015-001	OipfObjectFactory - createRecordingSchedulerObject()	Optional
694.	tv.oipf_DAE-OBJECT_FACTORY-015-002	OipfObjectFactory - createRecordingSchedulerObject() - TypeError	Mandatory
695.	tv.oipf_DAE-OBJECT_FACTORY-017-001	OipfObjectFactory - createSearchManagerObject()	Mandatory
696.	tv.oipf_DAE-OBJECT_FACTORY-018	OipfObjectFactory - createCapabilitiesObject()	Mandatory
697.	tv.oipf_DAE-OVERVIEW-018	Download resumes after a power cycle	Optional

10. Localised test for HbbTV

The Malaysian localised test for HbbTV contains the following 4 sections as follows:

a) full type test compliance (Section 1);

b) functionality test (Section 2);

c) static test applications (Section 3); and

d) live signal test (Section 4).

10.1 Full type test compliance (Section 1)

Full type test compliance as tabulate in Table 47.

Table 47. Full type test compliance

Test case	**HBB-1.1 Interactive application (HbbTV)**
Section	SKMM MTSFB TC T004, MCMC MTSFB TC G002, MCMC MTSFB TC T011
Requirement	HbbTV DTT receiver shall support at least all mandatory features and requirements of HbbTV v1.5 as specified in ETSI TS 102 796 v1.2.1, SKMM MTSFB TC T004 and MCMC MTSFB TC G002.
Test procedure	**Purpose of test:** To verify HbbTV DTT receiver conformance to the HbbTV v1.5 as specified in ETSI TS 102 796 1.2.1. **Test procedure:** Certificate holder shall provide statement or any evidence that the HbbTV DTT receiver is in compliance with HbbTV v1.5. **Expected result:** The statement or evidence provided shall indicate that the HbbTV DTT receiver comply with HbbTV v1.5 (ETSI TS 102 796 V1.2.1).

Table 47. Full type test compliance *(concluded)*

Test case	**HBB-1.2 HbbTV Malaysian test suite compliance**
Section	MCMC MTSFB TC T011
Requirement	HbbTV DTT receiver shall comply with MCMC MTSFB TC T011. Certificate holder shall present HbbTV full test report whereby the test is tested by official Test Suite version 8.5 or higher released by the HbbTV Consortium. Minimum of selected test cases as stated in MCMC MTSFB TC T011 shall be performed. As for the optional test cases, the HbbTV DTT receiver shall pass the test if the feature is supported by the HbbTV DTT receiver.
Test procedure	**Purpose of test:** To verify HbbTV DTT receiver conformance to specified test cases as outlined under Clause 9 of MCMC MTSFB TC T011. **Test procedure:** Certificate Holder shall provide HbbTV Full Test Report whereby the full test is tested by official Test Suite released by HbbTV Consortium and the test report shall be verified by SIRIM. **Expected result:** The HbbTV DTT receiver shall pass the all test cases as specified in MCMC MTSFB TC T011. The HbbTV full test report is presented as an attestation of compliance.

10.2 Functionality test (Section 2)

The functionality test is presented as in Table 48.

Table 48. Functionality test

Test case	**HBB-2.1 HbbTV enabled setting**
Section	MCMC MTSFB TC G002
Requirement	HbbTV shall be enabled by default when factory setting is performed.
Test procedure	**Purpose of test:** To verify that the HbbTV function is enabled after factory setting. **Test procedure:** 1. Perform factory reset. 2. Select country as “Malaysia”, if not automatically selected. 3. Go through the internet connectivity settings 4. Perform auto-tuning 5. After first time installation, check that HbbTV is enabled for every channel. **Expected result:** HbbTV DTT receiver shall enable HbbTV function by default after the factory setting is performed.

Table 48. Functionality test (*continued*)

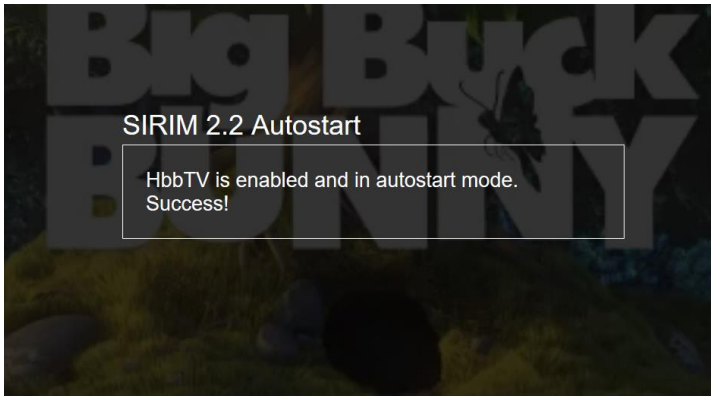
Test case	**HBB-2.2 HbbTV autostart setting**
Section	MCMC MTSFB TC G002
Requirement	HbbTV autostart shall be enabled for all available services.
Test procedure	**Purpose of test:** To verify that autostart option is enabled after factory reset. **Test procedure:** The receiver shall successfully complete test case HBB-2.2. Tune the HbbTV DTT receiver to channel “SIRIM 2.02 AUTOSTART” with the graphics of the application presenting on the screen on top of the broadcast video. The HbbTV service shall start automatically after the broadcasted service is selected. **Expected result:** HbbTV DTT receiver shall launch the HbbTV services. The following application output (background video may differ) shall be displayed on the receiver: 

Table 48. Functionality test (*continued*)

Test case	**HBB-2.3 Close application**
Section	Clause 3.2.16 of SKMM MTSFB TC T004
Requirement	The Remote Commander (RC) shall as a minimum have all the keys mandated for the middleware application as specified in SKMM MTSFB TC T004. The RC shall implement a function to close the HbbTV application.
Test procedure	**Purpose of test:** To verify the functionality of the RC key to close the application. **Test procedure:** 1. Tune the HbbTV DTT receiver to Channel “SIRIM 2.03 EXIT” where the application is loaded. 2. Perform the close function with remote commander. **Expected result:** HbbTV DTT receiver shall meet the requirement by having the RC key to close application Either physical EXIT key or equivalent key such as <HOME> key, BACK button long press with functionality to perform the same function. After application has closed, the same application shall be reloaded automatically.

Table 48. Functionality test (*continued*)

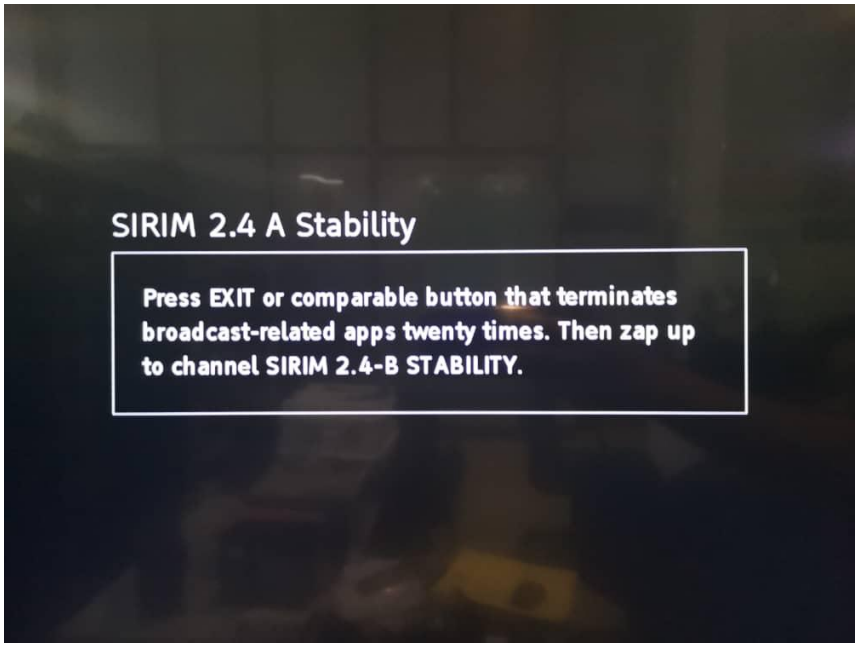
Test case	**HBB-2.4 Receiver stability**
Section	Clause 3.2.2 of SKMM MTSFB-TC-T004
Requirement	The HbbTV DTT receiver shall provide access to all HbbTV applications. This shall include the capability to efficiently present interactive elements of HbbTV services.
Test procedure	**Purpose of test:** To verify the stability of the HbbTV stack when the application is behaving as follows: 1. Repeatedly opened and closed 2. Channel is constantly changed 3. Broadband connectivity is disturbed. **Test procedure:** 1. Tune Channel “SIRIM STABILITY 2.04-A”. 2. After the application appears, press EXIT. Repeat 20 times:  3. Zap between TV channels with autostart applications. a) Tune to Channel “SIRIM STABILITY 2.4-A” and verify next channel (CH UP / DOWN in the channel list) is Channel “SIRIM TEST 2.04-B”. b) Repeatedly, going through the channels at least 20 times by repeat step 1 and 2. 4. Tune to channel “SIRIM STABILITY 2.04-A” and change to Channel “SIRIM STABILITY 2.04-B”. Disconnect and re-connect the broadband connection after each channel change at least 20 times.

Table 48. Functionality test *(continued)*

	 Multiple HbbTV applications may be performed during 'Live Signal Test' in case if the services launched by broadcasters have multiple applications in TV channels. E.g. switching the service between TV2 and TV3 at least 20 times. **Expected result:** The stability of the HbbTV DTT receiver remains to perform in the stable condition and does not reboot itself. The HbbTV applications can be loaded and the A/V remain to perform faultless. Receiver performance stay good and does not reset or reboot itself.

Table 48. Functionality test (*continued*)

Test case	**HBB-2.5 Application lifecycle shall not disturb A/V**
Section	Clause 3.2.2.1 of SKMM MTSFB-TC-T004
Requirement	The HbbTV DTT receiver shall handle the transition between the active and inactive states of a time exclusive service in an orderly fashion. The HbbTV DTT receiver shall present clean transition in and out of the video. Start and stop of the applications shall not cause any A/V glitch for broadcast video when the application has not modified the broadcast video.
Test procedure	**Purpose of test:** To verify that the start and stop of HbbTV applications do not interfere with A/V presentation of the HbbTV DTT receiver. **Test procedure:** 1. Tune to a service “SIRIM 2.05 AV” 2. Press Red button to commence the test 3. Check that the four rectangles are drawn correctly to the edges of the screen. Note if the overscan feature is present, i.e. check that the white lines are visible for all four sides of the rectangle.  4. Check that the scaling of the video to the upper left corner does not disturb the A/V quality. 5. Verify that A/V presentation remains undisturbed. **Expected result:** HbbTV DTT receiver shall present a quality audio and video on the TV screen.

Table 48. Functionality test (*continued*)

Test case	**HBB-2.6 Adaptive streaming - MPEG DASH VOD support**
Section	Clause 4.3.1 of MCMC MTSFB TC G002:2020
Requirement	HbbTV DTT receiver shall provide support for DASH HbbTV ISO BMFF Live profile as defined in ETSI TS 102 796 1.2.1. Other MPEG DASH profiles may be supported.
Test procedure	**Purpose of test:** To verify that the HbbTV DTT receiver supports the appropriate DASH profile. **Test procedure:** 1. Tune the HbbTV DTT receiver to channel "SIRIM REF APP" and follow the instructions from the HbbTV DRM-DASH Reference app. (https://github.com/HbbTV-Association/ReferenceApplication) 2. Verify the receiver is in HbbTV 1.5 mode, if not change the mode to HbbTV 1.5 from Reference app settings tab. a) Navigate to video TEST 1.1 (NoDRM/AVC 1080p video) and start it by pressing OK. b) Wait until the end of the video 3. Restart same video TEST 1.1 and after playback started, test seeking in the video timeline forward / backward, and Pause/Play function using the remote controller.  **Expected result:** HbbTV DTT receiver shall be able to implement MPEG DASH VOD TEST 1.1. Videos are able to function from beginning to the end. Playback continues after seeking forward and backward as well as after pause state. In good network conditions, video is played at the maximum quality.

Table 48. Functionality test (*continued*)

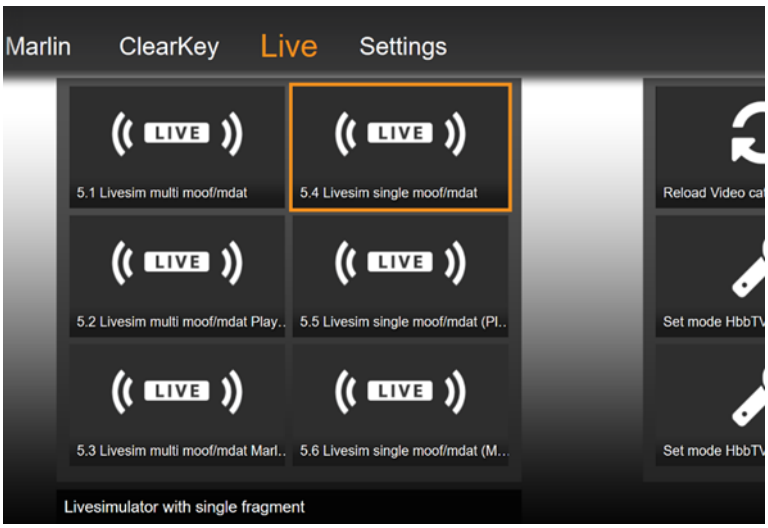
Test case	**HBB-2.7 Adaptive streaming - MPEG DASH LIVE streaming support**
Section	Clause 4.3.1 of MCMC MTSFB TC G002:2020
Requirement	HBBTV DTT receiver shall provide support for DASH HbbTV ISOBMFF Live profile as defined in ETSI TS 102 796 1.2.1. Other MPEG DASH profiles may be supported.
Test procedure	**Purpose of test:** To verify that the HbbTV DTT receiver supports the appropriate DASH profile. **Test Procedure:** 1. Tune the HbbTV receiver to channel “SIRIM REF APP” and follow the instructions from the HbbTV DRM-DASH Reference app. (https://github.com/HbbTV-Association/ReferenceApplication) 2. Verify the receiver is in HbbTV 1.5 mode, if not change the mode to HbbTV 1.5 from Reference app settings. 3. Navigate to LIVE-tab in the application. 4. Start TEST 5.4 for single fragment Live DASH:  **Expected result:** HbbTV DTT receiver shall be able to implement MPEG DASH Live. The live video starts playing in the receiver and continuously playing at least 120s.

Table 48. Functionality test (*continued*)

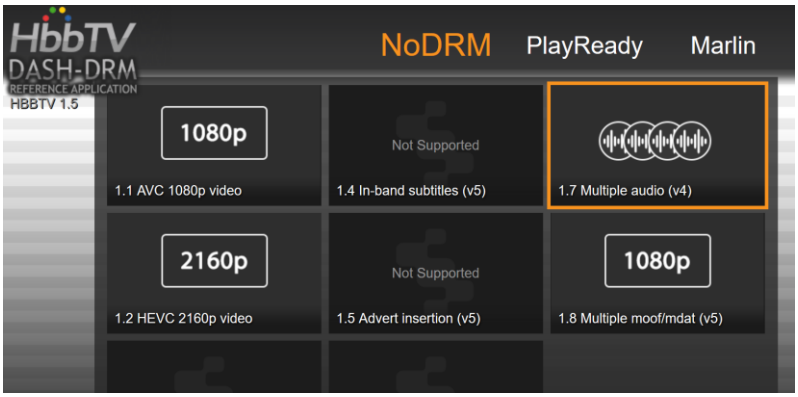
Test case	**HBB-2.8 MPEG DASH audio playback switching**
Section	Clause 4.3 of MCMC MTSFB TC G002:2020
Requirement	The HbbTV DTT receiver shall provide support for DASH Multiple Audio with selection of audio component. The HbbTV DTT receiver shall support MPEG DASH as specified in ISO/IEC 23009-1 as profiled in Annex B of HbbTV Specification Version 1.5.
Test procedure	**Purpose of test:** To verify that the HbbTV DTT receiver supports the appropriate DASH profile. **Test procedure:** 1. Tune the HBBTV DTT Receiver to channel “SIRIM REF APP” and follow the instructions from the HbbTV DRM-DASH Reference app. (https://github.com/HbbTV-Association/ReferenceApplication) 2. Verify the receiver is in HbbTV 1.5 mode, if not change the mode to HbbTV 1.5 from reference app settings. a) Select No DRM/TEST 1.7 “multiple audio track”.  b) The DASH stream should be able to start playing c) Listen the current audio language spoken in current audio track d) Audio track switching should be possible using the colour buttons in remote controller **Expected result:** HbbTV DTT receiver shall be able to implement MPEG DASH audio playback with selection of preferred audio track. The receiver shall be able to switch between languages available in the test stream TEST 1.7, “No DRM / Multiple audio”.

Table 48. Functionality test (*continued*)

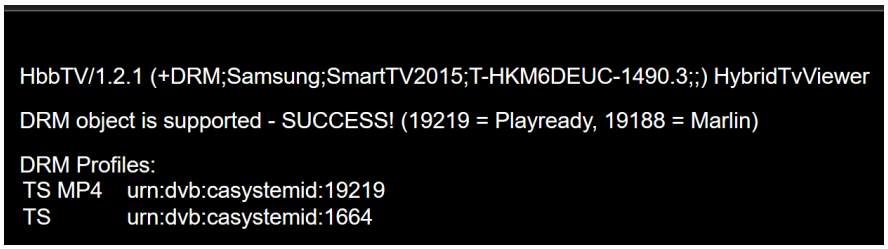
Test case	**HBB-2.9 Device capabilities and DRM**
Section	Clause 4.5 of MCMC MTSFB TC G002:2020
Requirement	The HbbTV DTT receiver shall implement Marlin Simple Secure Streaming (MS3) and/ or PlayReady. The xmlCapabilities property of the application/oipfCapabilities object shall provide the DRMSystemID of the DRM supported by the receiver. In the case where the optional requirements are implemented, the capabilities shall be returned in the oipfCapabilities object.
Test procedure	**Purpose of test:** To verify the output of HbbTV DTT receiver on the oipfCapabilities and DRMSystemID properties. **Test procedure:** 1. Select service “SIRIM 2.09 CAPABILITIES”. 2. Press Red button to start the analysis. 3. Check the output of “DRM ID”, if either one below is listed, result is success:  19219 = PlayReady 19188 = Marlin **Expected result:** HbbTV DTT receiver shall be able to display the oipfCapabilities object results and DRM object is supported.

Table 48. Functionality test (*continued*)

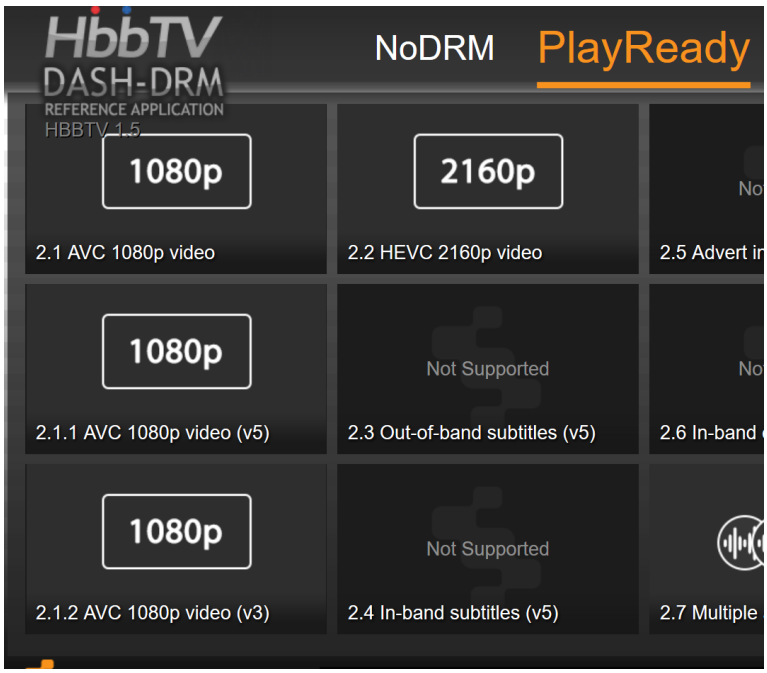
Test case	**HBB-2.10 Media encryption with MPEG DASH DRM**
Section	Clause 4.3.2 of MCMC MTSFB TC G002:2020
Requirement	The HbbTV DTT receiver shall implement media encryption (see ISO/IEC 23001-7) for ISOBMFF (see ISO/IEC 14496-12) [10] with the requirements specified in Annex B of ETSI TS 102 796 V1.2.1.
Test procedure	**Purpose of test:** To verify the correct behaviour of DRM-DASH Reference App test tasks. **Test procedure:** 1. Tune the HBBTV DTT Receiver to channel “REFAPP TEST” and follow the instructions from the HbbTV DRM-DASH Reference app. 2. Navigate to tests Playready/2.1/2.1.1/2.1.2 (Playready AVC 1080p) and/or Marlin/3.1 (Marlin AVC 1080p).  According the device capabilities (at least one listed DRM system must be supported). **Expected Result:** HbbTV DTT Receiver shall be able to implement MPEG DASH DRM, playback of the TEST videos 2.1, 2.1.1, 2.1.2 and/or 3.1 using the HbbTV MPEG DASH reference application. Videos shall be able to play from beginning to the end.

Table 48. Functionality test (*continued*)

Test case	**HBB-2.11 Font test – Downloadable fonts**
Section	Clause 3.2.6 of SKMM MTSFB TC T004
Requirement	The HbbTV DTT receiver shall support multiple fonts / character set according to broadcaster's implementation for example Chinese and Arabic language when HbbTV application is launched. The receiver shall follow the Clause 5.3 of the Open IPTV Forum Release 2 - Volume 5a - Web Standards TV Profile.
Test procedure	**Purpose of test:** To verify the HbbTV DTT receiver support required fonts/ characters. **Test procedure:** 1. Navigate to service "SIRIM 2.11 FONTS" 2. Press Red to start the test Compare the font and text rendering to the reference image provided below:  **Expected result:** HbbTV DTT Receiver shall be able to display the required fonts/characters correctly. Note the vertical alignment. NOTE: The test number 2, the support of text direction from bottom to up is optional.

Table 48. Functionality test (c*ontinued*)

Test case	**HBB-2.12 Subtitles display during enhanced programming**
Section	Clause 3.2.2 and 3.2.5.1 of SKMM MTSFB TC T004
Requirement	Subtitles shall be displayed on a separate logical graphics plane separate from that used for the interactive application. Where possible, receivers shall be able to present both subtitles and interactive graphics simultaneously. However, not all receivers may be able to do this, the result being that interactive content will not always be available to viewers that wish subtitles to be presented.
Test procedure	**Purpose of test:** To verify HbbTV DTT receiver supports DVB subtitles during the Enhanced Programming. Subtitles appearance shall not make the interactive application graphics to disappear and subtitles shall not be displayed in front of the application graphics. **Test procedure:** 1. Firstly, perform the following settings to Enable Subtitles for the default user language. Default language shall be Malay. 2. Tune to the Channel “SIRIM 2.12 SUBS-1” with Malay DVB subtitles. 3. The autostart application shall first scale the video to 1/8 size to upper left corner. a) Observe that the subtitles either remain visible and scaled correctly or are not displayed. b) Press yellow button to scale video to ¼. Check that subtitles remain correctly scaled or remain hidden. c) Press yellow button to scale video to fullscreen. Check that subtitles are enabled and appear on the screen synced with the talking head. d) Repeat the scaling steps with the yellow button and observe subtitle behaviour. 4. Tune to the Channel “SIRIM 2.12 SUBS-2” with DVB subtitles. a) The application shall draw on the graphics plane a box, which can be hidden and brought back with the yellow colour key. Observe that the application graphics are not disturbed by the DVB subtitles. **Expected result:** HBBTV DTT Receiver shall be able to display subtitles appropriately by not appearing on top of the Interactive application or not causing interactive application graphics disappear even partially.

Table 48. Functionality test (*continued*)

Test case	**HBB-2.13a Application loading over DSM-CC carousel (TXT)**
Section	MCMC MTSFB TC G002
Requirement	HbbTV DTT receiver shall be able to load interactive application from DSM-CC carousel.
Test procedure	**Purpose of test:** To verify that the HbbTV DTT receiver is able to load typical application from broadcast data carousel. Application and carousel size to be verified with typical HbbTV application like for example Superteks and Rich EPG application. The carousel loading performance should be reasonable (less than 30 seconds). It is acceptable if the loading time is less than 3 times the cycle time. **Test procedure:** Tune to the Channel “SIRIM 2.13-A DSMCC TXT” with application signalled in the carousel. Run the Test application to see the application data and graphics are displaying correctly. **Expected result:** HBBTV DTT RECEIVER must show all the data and graphics according the reference image below. 

Table 48. Functionality test (*concluded*)

Test case	**HBB-2.13b Application loading over DSM-CC carousel (EPG)**
Section	MCMC MTSFB TC G002
Requirement	HbbTV DTT receiver shall be able to load interactive application from DSM-CC carousel.
Test procedure	**Purpose of test:** To verify that the HbbTV DTT receiver is able to load typical application from broadcast data carousel. Application and carousel size to be verified with typical HbbTV application like for example Rich EPG application. The carousel loading performance should be reasonable (less than 30 seconds). **Test procedure:** Tune to the Channel “SIRIM 2.13-B DSMCC EPG” with application signalled in the carousel. Run the Test application to see the application data and graphics are displaying correctly. **Expected result:** HBBTV DTT RECEIVER must show all the data and graphics roughly according the reference image below. The actual time and date may differ slightly. 

10.3 Static test application (Section 3)

Static application test as tabulate at Table 49.

Table 49. Static Malaysian application test

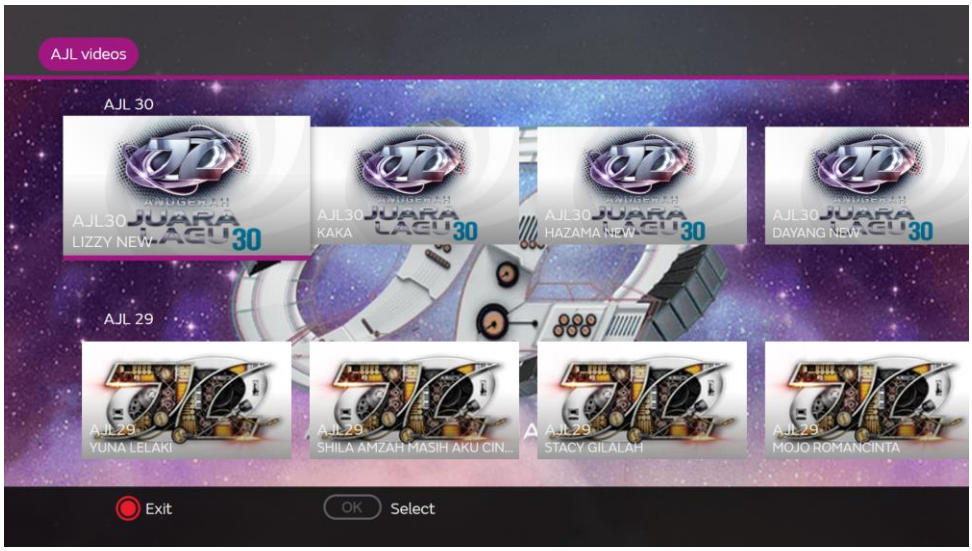
Test Case	**HBB-3:1 Video on Demand**
Section	
Requirement	HbbTV DTT receiver shall be able to implement Malaysian HbbTV applications.
Test Procedure	**Purpose of test:** To verify that the HbbTV DTT receiver is able to perform HbbTV applications provided by the Malaysian broadcasters. **Test procedure:** Tune to the service SIRIM 3.1 AJL and wait the application to launch. Select the first video and check it plays ok. The reference video is the same for all selections. **Expected result:** Application shall be able to function correctly. Verify the application screen with reference image. Video is able to be played. 

Table 49. Static Malaysian application test (*continued*)

Test Case	**HBB-3:2 Superteks**
Section	
Requirement	HbbTV DTT receiver shall be able to implement Malaysian HbbTV applications.
Test procedure	**Purpose of test:** To verify that the HbbTV DTT receiver is able to perform HbbTV applications provided by the Malaysian broadcasters. **Test procedure:** Tune to the service SIRIM 3.2 RTM SUPERTEKS with the application. Wait for the application **Expected result:** Application can be effectively and correctly implemented. Verify the application screen matches with the reference image. There should be five categories on the left and three news items (with two images) available. News items can be scrolled from left to right in each category. 

Table 49. Static Malaysian application test (*continued*)

Test case	**HBB-3:3 Weather**
Section	
Requirement	HbbTV DTT receiver shall be able to implement Malaysian HbbTV applications.
Test procedure	**Purpose of test:** To verify that the HbbTV DTT receiver is able to perform HbbTV applications provided by the Malaysian broadcasters. **Test Procedure:** Tune to the service SIRIM 3.3 RTM WEATHER and wait for the application to launch. Refer to below screenshot for reference. **Expected Result:** Application can be effectively and correctly implemented. Verify the application screen with reference picture. NOTES: 1. The weather information is static and not current. 2. Date and time and advertisement banner images may different from the reference picture below. 

Table 49. Static Malaysian application test (*continued*)

Test case	**HBB-3:4 Doa harian**
Section	
Requirement	HbbTV DTT receiver shall be able to implement Malaysian HbbTV applications.
Test procedure	**Purpose of test:** To verify that the HbbTV DTT receiver is able to perform HbbTV applications provided by the Malaysian broadcasters. **Test Procedure:** Tune to the service SIRIM 3.04 DOA HARIAN and wait for the application to launch. Refer to below screenshot for reference. **Expected Result:** Application can be effectively and correctly implemented. Verify the application screen with reference image.  Verify all menu items can be successfully launch by selecting each option and ensure the selecting DOA are displayed correctly as below images: a) Doa Sebelum Makan 

Table 49. Static Malaysian application test (*continued*)

Test procedure	b) Doa Penerang Hati  c) Doa Untuk Ibu Bapa  d) Doa Naik Kenderaan 

Table 49. Static Malaysian application test (*concluded*)

Test procedure	e) Ayat Seribu Dinar 

10.4 Live signal test (Section 4)

Live signal test as tabulate at Table 50.

Table 50. Live signal test

Test case	**HBB-4.1 Field test**
Section	Clause 3.2.2 of SKMM MTSFB-TC-T004
Requirement	The HbbTV DTT receiver should implement all HbbTV applications / services launched by Malaysian broadcasters.
Test procedure	**Purpose of test:** To verify the launching of the available broadcasters HbbTV applications. **Test Procedure:** Scan Malaysian DVB-T2 network channels with good signal reception quality. Verify the red button is appearing in all the TV channels available in the network. Press the red button to open the services. **Expected Result:** HbbTV DTT Receiver should implement HbbTV applications appropriately.

Table 50. Live signal test *(continued)*

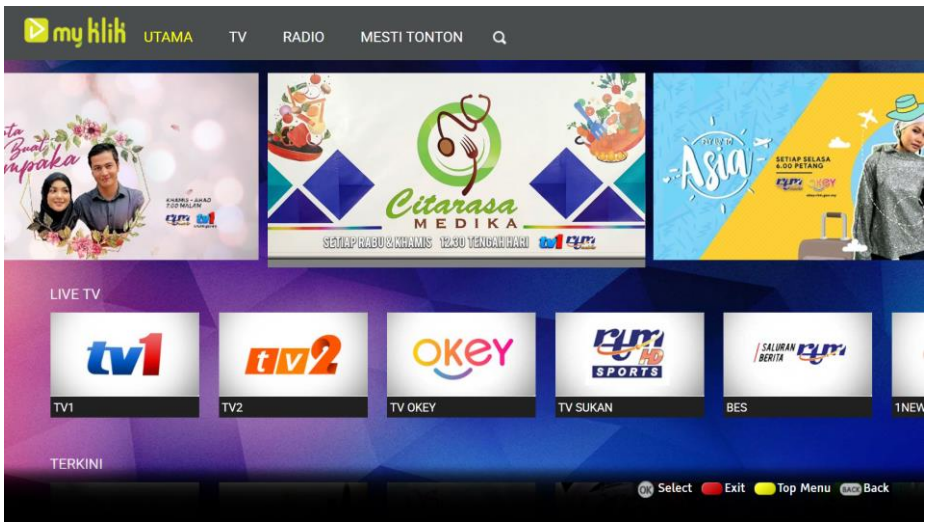
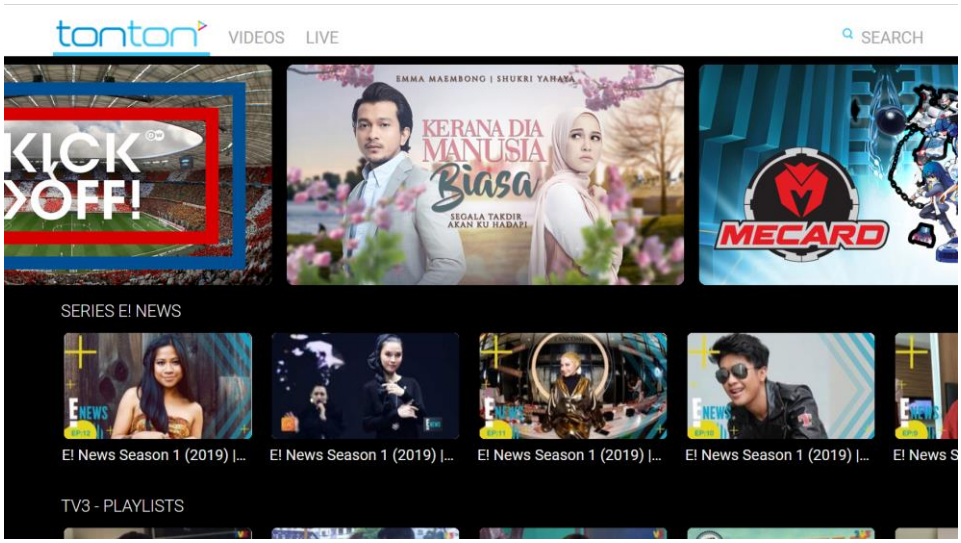
Test case	**HBB-4.2 Field test of RTM MyKlik**
Section	
Requirement	The HbbTV DTT receiver should implement all HbbTV applications / services launched by Malaysian broadcasters.
Test procedure	**Purpose of test:** To verify the launching of the available RTM MyKlik HbbTV application. **Test Procedure:** Scan Malaysian DVB-T2 network channels with good signal reception quality. Verify Channels from MyTV multiplex A and Multiplex B are found. Tune to RTM channels, either for example TV1 or TV2. Wait the red button to appear and press the red button to open the application menu. Start MyKlik Application from the menu and try launching several video clips in the application and live streaming services (i.e. One News channel). **Expected Result:** HBBTV DTT receiver should be able to implement HbbTV applications and streaming media content appropriately.  NOTE: the contents of the LIVE application may change time-to-time.

Table 50. Live signal test (*concluded*)

Test case	**HBB-4.3 Field test of tonton application**
Section	
Requirement	The HbbTV DTT receiver should be able to implement Malaysian Media Prima tonton Catch-up TV Application.
Test procedure	**Purpose of test:** To verify the launching of the available tonton application. **Test Procedure:** Scan Malaysian DVB-T2 network channels with good signal reception quality. Verify Channels from MyTV multiplex A and Multiplex B are found. Tune to Media Prima channels, for example TV3. Wait the red button to appear and press the red button to open the application menu. Start tonton Application from the menu and try launching several video clips in the application. **Expected Result:** HbbTV DTT receiver should be able to implement HbbTV applications and streaming media content appropriately.  NOTE: the contents of the LIVE application may change time-to-time.

Acknowledgements

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