TEST SPECIFICATIONS FOR DVB-T RECEIVERS USED IN REPUBLIC OF SLOVENIA

PROFILE: BASIC,
SDTV – Standard definition television
HDTV – High definition television

Date: 29.07.2009

Document prepared for:

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Document history:

Version	Date	Comments
V1.0	08.01.2009	First approved version including SDTV and HDTV tests.
V1.1	29.07.2009	Editorial/typing changes performed. Reference document [10] version updated. Change in chapter 5 Used transport streams – description of streams and programs inside streams changed due to preparation of actual test streams. Additional description of used transport stream added to tests where this was missing until now or adopted according to changes in chapter 5. Change in chapter 5 Used transport streams – specification of transmitted service type according to updated version of ETSI EN 300 468 v1.9.1 [10] Change in test 10.8 – no priority between DVB and Teletext subtitling.

1 Introduction

Test specifications are established in order to ensure that decoders comply with the common minimum requirements for use in Republic of Slovenia. Background for the tests is the document »REQUIREMENT SPECIFICATIONS FOR DVB-T RECEIVERS USED IN REPUBLIC OF SLOVENIA VERSION 1.0, DATE: 28.10.2008«

In this document universal term "RECEIVER" refers to all devices capable to receive DVB-T signal in order to present AUDIO and VIDEO content (iDTV, STB, other devices). In case some tests or wording don't apply for all devices it is noted for which types it is relevant.

For receivers on the Slovenian market after 01.01.2010 for SDTV level devices support for audio decoding AAC is mandatory, for HDTV level devices additionally support for audio decoding of HE-AAC and E-AC3 is mandatory. It is recommended to support all standards already before listed date.

For evaluation of compliancy tests from the table has to be performed and the compliancy has to be documented and signed. In case of non-compliancy with requirements the deviation should be noted and additionally commented.

Req. spec.	Description	SDTV level	HDTV level	Task	Comment
Chapter 2.1.1	Automatic scan through the whole frequency range (UHF and VHF)	shall	shall	1.1	
Chapter 2.1.1	Frequency band and offset	shall	shall	1.2	
Chapter 2.1.1	Performance in Single Frequency Networks - echo inside the guard interval	shall	shall	1.3	
Chapter 2.1.1	Performance in Single Frequency Networks - echo outside the guard interval	shall	shall	1.4	
Chapter 2.1.1	Transmitting parameters	shall	shall	1.5	
Chapter 2.1.1	Maximum Receiver Signal Input Level	shall	shall	1.6	
Chapter 2.1.1	Signal level and signal quality indicator	shall	shall	1.7	
Chapter 2.1.1	Performance in SFN networks on Gaussian channel with presence of noise in input signal	shall	shall	1.8	
Chapter 2.1.1	Immunity to »analogue« signals on neighbouring channels	shall	shall	1.9	
Chapter 2.1.1	Immunity to »digital« signals on neighbouring channels	shall	shall	1.10	
Chapter 2.1.2	RF input connector	shall	shall	1.11	
Chapter 2.1.2	RF output connector - loop trough	shall	shall	1.12	
Chapter 3	Automated program search	shall	shall	2.1	
Chapter 3	Manual program search	shall	shall	2.2	
Chapter 3.1	Tuning and scanning - Changes in modulation parameters	shall	shall	2.3	
Chapter 3.2	Tuning and scanning - dynamic PMT	shall	shall	2.4	
Chapter 4.1	SCART interface	shall	shall	3.1	
Chapter 4.2	Interface for Conditional Access	should	should	3.2	
Chapter 4.3	Digital Audio Output (S/PDIF)	shall	shall	3.3	
Chapter 4.5	HDMI interface – compliancy for »HD Ready«		shall	3.4	Only for HDTV iDTv
Chapter 4.5	HDMI interface - EDID information		shall	3.5	Only for HDTV STB
Chapter 4.5	HDMI interface - original format		shall	3.6	Only for HDTV STB
Chapter 4.5	HDMI interface - Manual setting of resolution		shall	3.7	Only for HDTV STB

Chapter 5	Real time clock	shall	shall	4.1	
Chapter 6	MPEG Demultiplexer - maximum transport stream data rate	shall	shall	5.1	
Chapter 6	MPEG Demultiplexer – support of variable bitrate (statistical multiplexing)	shall	shall	5.2	
Chapter 7	MPEG VIDEO Decoder - Audio video synchronization	shall	shall	6.1	
Chapter 7.1	MPEG VIDEO Decoder - decoding of MPEG-2 SD resolutions	shall	shall	6.2	
Chapter 7.1	MPEG VIDEO Decoder - decoding of MPEG-4 SD resolutions	shall	shall	6.3	
Chapter 7.1	MPEG VIDEO Decoder - minimum bitrate	shall	shall	6.4	
Chapter 7.2	MPEG VIDEO Decoder - decoding of MPEG-4 HD resolutions		shall	6.5	
Chapter 7.2	HDTV - Down-conversion of High Definition Video for Standard Definition output		shall	6.6	
Chapter 8.1	SDTV AUDIO - decoder	shall	shall	7.1	
Chapter 8.2.2.1	HDTV AUDIO - support for E-AC3 on HDMI output interface		shall	7.2	
Chapter 8.2.2.1	HDTV AUDIO - support for E-AC3 on S/PDIF output interface		shall	7.3	
Chapter 8.2.2.1	HDTV AUDIO - E-AC3 requirements		shall	7.4	
Chapter 8.2.2.1	HDTV AUDIO - E-AC3 metadata support		shall	7.5	
Chapter 8.2.2.2	HDTV AUDIO - support for HE AAC on HDMI output interface		shall	7.6	
Chapter 8.2.2.2	HDTV AUDIO - support for HE AAC on S/PDIF output interface		shall	7.7	
Chapter 8.2.2.2	HDTV AUDIO - HE AAC requirements		shall	7.8	
Chapter 8.2.2.2	HDTV AUDIO - HE AAC metadata support		shall	7.9	
Chapter 9	Radio mode - basic functionality	shall	shall	8.1	
Chapter 9	Radio mode - radio channel list	shall	shall	8.2	
Chapter 10	System software upgrade	shall	shall	9.1	For HDTV level "OTA" mandatory
Chapter 11.1	Processing of PSI/SI tables.	shall	shall	10.1	
Chapter 11.1	EPG functionality for EIT actual and EIT other	shall	shall	10.2	
Chapter 11.2	Presentation of EPG in Slovene language	shall	shall	10.3	
Chapter 11.2	Default audio language support	shall	shall	10.4	
Chapter 11.3	CVBS teletext	shall	should	10.5	Task 10.5 or 10.6.
Chapter 11.3	Presentation of teletext within user interface for SDTV receivers	shall		10.6	Task 10.5 or 10.6.
Chapter 11.3.1	User interface based teletext for HDTV Level receiver		shall	10.7	
Chapter 11.4	DVB subtitling	shall	shall	10.8	
Chapter 11.5	Storing user preferences in persistent memory	shall	shall	10.9	
Chapter 11.5	Reset all parameters to factory mode	shall	shall	10.10	
Chapter 12	Remote control	shall	shall	11.1	
Chapter 13	Factory presets		shall	12.1	

2 List of Abbreviations

AAC	Advanced Audio Coding
AC3	Digital audio compression standard, known as Dolby Digital
AV	Audio Visual
AVC	Advanced Video Coding
CA	Conditional Access
CAT	Conditional Access Table
CBR	Constant Bitrate
CI	Common Interface
COFDM	Coded Orthogonal Frequency Division Multiplexing
CVBS	Composite Video Baseband Signal
DVB-T	Digital Video Broadcasting - Terrestrial
E-AC3	Enhanced AC3, known as Dolby Digital Plus
EIT	Event Information Table
EN	European Norm
EPG	Electronic Programming Guide
ETSI	European Telecommunication Standards Institute
HE-AAC	High Efficiency AAC
HDMI	High-Definition Multimedia Interface
HDTV	High Definition Television
iDTV	Integrated Digital TV set
ISO	International Organization for Standardization
ISMMK	Indirect subjective quality measurement method
ITU	International Telecommunication Union
MFN	Multi Frequency Network
MHP	Multimedia Home Platform
MPEG	Moving Pictures Expert Group
NIT	Network Information Table
PAT	Program Association Table
PCM	Pulse Coded Modulation
PMT	Program Map Table
PSI	Program Specific Information
QAM	Quadrature Amplitude Modulation
QPSK	Quaternary Phase Shift Keying
RF	Radio Frequency
RGB	Red Green Blue
SDT	Service Description Table
SDTV	Standard Definition Television
SFN	Single Frequency Network
SI	Service Information
STB	Set-top Box
TDT	Time and Date Table
TOT	Time Offset Table
TS	Transport Stream
UHF	Ultra-High Frequency
VBI	Vertical Blanking Information
VBR	Variable Bitrate
VHF	Very-High Frequency

3 Reference documents

[1]	EN 300 744 v1.5.1	DVB Framing structure, channel coding and modulation for digital terrestrial television. (ETSI)
[2]	IEC 60169-2, part 2	Radio-frequency connectors. Part 2: Coaxial unmatched connector
[3]	ETSI TS 101 154 v1.8.1	Digital Video Broadcasting (DVB); Implementation guidelines for the use of MPEG-2 Systems, Video and Audio in satellite, cable and terrestrial broadcasting applications
[4]	ISO/IEC 14496-10	Information technology — Coding of audio-visual objects — Part 10: Advanced Video Coding
[5]	ISO/IEC 13818-1	Information technology - Generic coding of moving pictures and associated audio information: Systems.
[6]	ISO 639.2	Code for the representation of names of languages
[7]	ITU-T V.92	Enhancements to Recommendation V.90
[8]	EN 50049-1	Domestic and similar electronic equipment interconnection requirements: Peritelevision connector
[9]	EN 50157-2-1	Domestic and similar equipment interconnection requirements: AV link-Part 2-1: Signal quality matching and automatic selection of source devices
[10]	EN 300 468 v1.9.1	Digital Broadcasting Systems for television, sound and data services; Specification for service information (SI) in Digital Video Broadcasting (DVB) Systems
[11]	ETSI TR 101 211 v1.7.1	Guidelines on Implementation and Usage of Service Information (SI)
[12]	ETSI TS 102 006 v1.3.1	Digital Video Broadcasting (DVB); Specification for System Software Update in DVB Systems
[13]	ETS 300 231	Television systems; Specification of the domestic video Programme Delivery Control system (PDC)
[14]	ETSI ES 202 130 v1.1.1	Human Factors (HF);User Interfaces; Character repertoires, ordering rules and assignments to the 12-key telephone keypad
[15]	ETSI EN 300 472 v1.3.1	Conveying ITU-R System B Teletext in DVB bitstreams
[16]	ETSI EN 301 775 v1.2.1	Conveying VBI data bitstreams
[17]	ISO/IEC 13818-2	Information technology - Generic coding of moving pictures and associated audio information - Part 2: Video
[18]	ITU-R BT.653-3	Teletext systems
[19]	EN 50221	Common Interface Specification for Conditional Access and other Digital Video Broadcasting Decoder Applications
[20]	IEC 60958	Digital Audio Interface
[21]	IEC 61937	Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 [21]
[22]	ETS 300 706	Enhanced Teletext Specification
[23]	ISO/IEC 8859-2	Information technology -- 8-bit single-byte coded graphic character sets -- Part 2: Latin alphabet No. 2
[24]	ETSI TS 102 114	DTS coherent acoustics; Core and extensions
[25]	IEC 62216-1	Digital terrestrial television receivers for the DVB-T system – Part 1: Baseline receiver specification
[26]	CEA 770.3	High Definition TV Analogue Component Video Interface
[27]	EN 300 743 V1.2.1	Subtitling systems
[28]	EN 50049-1	Domestic and similar electronic equipment interconnection requirement: Peritelevision Connector

[29]	HDMI	HDMI Licensing, LLC: HDMI , "High- Definition Multimedia Interface", rev. 1.3A, October 10, 2006
[30]	CEA 861- D	Consumer Electronics Association (CEA): A DTV Profile for Uncompressed High Speed Digital Interfaces, July 18, 2006
[31]	EICTA HD extension to IEC 62216-1	"High Definition" extensions to the IEC 62216-1 "Digital Terrestrial Television Receivers for the DVB-T System"
[32]	IEC 60603-14	Connectors for frequencies below 3 MHz for use with printed boards – Part 14: Detail specification for circular connectors for low-frequency audio and video applications such as audio, video and audio-visual equipment.
[33]	ETSI TS 102 366	Digital Audio Compression (AC-3, Enhanced AC-3) Standard
[34]	ISO/IEC 14496-3	ISO/IEC: Information technology -- Coding of audio-visual objects -- Part 3: Audio, 2005
[35]	-	REQUIREMENT SPECIFICATIONS FOR DVB-T RECEIVERS USED IN REPUBLIC OF SLOVENIA, v1.0, 28.10.2008
[36]	EICTA HD Ready	EICTA, European Information & Communications Technology Industry Association, "HD ready" Minimum Requirements, www.eicta.org

4 Data about receiver

The tests shall be performed with the same receiver model (HW/SW) in all test cases. Following table should contain data about receiver under test.

Table 1: Receiver data

Manufacturer:	
Model:	
S/N:	
SW version:	
HW version:	
Type:	☐ **SDTV** ☐ **HDTV**
Other information:	

5 Used transport streams

In this section of the document the main components of the test transport streams are described. Only the important parameters are commented.

Stream: A

- PSI/SI: NIT, SDT, PAT, PMT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	LIPSYNC	TV	Lipsync content
2	MIN-H264	TV	CBR content at 600 kbit/s - H264/10 AVC+TTX (bad picture quality due low bitrate)
3	MIN-MPEG2	TV	CBR content at 600 kbit/s - MPEG2 (bad picture quality due low bitrate)
4	H264 with TTX	TV	H.264/10 AVC+TTX

Stream: B

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1	TV	H.264/10 AVC - 720x576 resolution
2	S2	TV	H.264/10 AVC - 544x576 resolution
3	S3	TV	H.264/10 AVC - 480x576 resolution
4	S4	TV	H.264/10 AVC - 352x576 resolution+TTX

Stream: C

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 36 (594 MHz), CH 40 (626 MHz), CH 46 (674 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1	TV	H.264/10 AVC – 720x576 resolution
4	S41	TV	H.264/10 AVC - 480x576 resolution
5	S5-TTX	TV	H.264/10 AVC +TTX, without audio
6	S6-SUBT	TV	MPEG2 + (TTX + DVB) Subtitling

Stream: D

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-TV	TV	TV service - H.264/10 AVC - 720x576 resolution
2	S2-TV	TV	TV service - H.264/10 AVC - 720x576 resolution
3	S3-TV	TV	TV service - H.264/10 AVC - 720x576 resolution, AAC
4	S4-RA-AAC	RA	RA service - AAC
5	S5-RA-SLO1	RA	RA service - MPEG1 - Layer II
6	S6-RA-SLO2	RA	RA service - MPEG1 - Layer II
7	S7- RA-SLO3	RA	RA service - MPEG1 - Layer II
8	S8- RA-SI	RA	RA service - MPEG1 - Layer II

Stream: E

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 3/4, Tu/8, CH 45 (666 MHz)
- Content: statistical multiplex with VBR
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-H264-SD	TV	H.264/10 AVC - 720x576 resolution, MPEG1 Layer II
2	S2-H264-SD	TV	H.264/10 AVC - 720x576 resolution, No audio
3	S3-H264-SD	TV	H.264/10 AVC - 720x576 resolution, No audio
4	S4-1080i-HD	TV	H.264/10 AVC - 1920x1080i resolution, AC3-2/0
5	S5-1080i-HD	TV	H.264/10 AVC - 1920x1080i resolution, AC3-3/2
6	S6-MPEG2	TV	MPEG 2 - 720x576 resolution, MPEG1 Layer II (BEEP)

Stream: F

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-H264-SD-4:3	TV	H.264/10 AVC - 4:3 aspect ratio
2	S2-MPG2-SD-16:9	TV	MPEG2 - SD - 16:9 aspect ratio
3	S3-H264-HD-16:9	TV	H.264/10 AVC - HD -16:9 aspect ratio, E-AC3
4	S4 -H264-SD-4:3	TV	H.264/10 AVC - SD - 4:3 aspect ratio

Stream: G

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 7/8, Tu/32, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-H264-SD	TV	H.264/10 AVC - 720x576i, MPEG1 Layer II
2	S2-H264-SD	TV	H.264/10 AVC - 720x576i, No audio
3	S3-H264-SD	TV	H.264/10 AVC - 720x576i, No audio
4	S4-H264-HD	TV	H.264/10 AVC - 1920x1080i, AC3-2/0
5	S5-H264-HD	TV	H.264/10 AVC - 1920x1080i, AC3-3/2
6	S6-MPEG2-SD	TV	MPEG 2 -720x576i, MPEG1 Layer II (BEEP)
7	S7-H264-HD	TV	H.264/10 AVC - 1920x1080i, E-AC3-2/0

Stream: H

- PSI/SI: PAT, NIT, PMT, SDT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, TU/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-720x576	TV	MPEG2 - 720x576i, MPEG1 Layer II, TTX, VPS
2	S2-544x576i	TV	MPEG2 - 544x576i, MPEG1 Layer II, TTX, VPS
3	S3-480x576i	TV	MPEG2 - 480x576i, MPEG1 Layer II, TTX, VPS
4	S4-352x576i	TV	MPEG2 - 352x576i, MPEG1 Layer II, TTX, VPS

Stream: I

- PSI/SI: PAT, NIT, PMT, SDT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- EIT contents: current/following + parental rating
- End of show/ start of new show, changes in parental rating
- EPG language SLV
- Services in the stream:

Service_id	Service_name	Type	Comments
1	SLO1	TV	H.264/10 AVC - 720x576i, MPEG1 Layer II, TTX, VPS
2	SLO2	TV	H.264/10 AVC - 720x576i, MPEG1 Layer II, TTX, VPS
3	SLO3	TV	H.264/10 AVC - 720x576i, MPEG1 Layer II
4	TEST	TV	H.264/10 AVC - 720x576i, MPEG1 Layer II, TTX, VPS

Stream: K

- **Stream K is stream B without NIT table and is used for testing of signalization.**
- PSI/SI: PAT, **No NIT**, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1	TV	H.264/10 AVC - 720x576 resolution
2	S2	TV	H.264/10 AVC - 544x576 resolution
3	S3	TV	H.264/10 AVC - 480x576 resolution
4	S4	TV	H.264/10 AVC - 352x576 resolution+TTX

Stream: L

- PSI/SI: PAT, NIT, PMT, SDT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- **Changes in PMT current_version, swiching of service components (service S2-TV)**
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-TV	TV	H.264/10 AVC, MPEG1 Layer II, TTX, VPS
2	S2-TV	TV	H.264/10 AVC - AC3-2/0 audio
5	S5-RA-SLO1	RA	MPEG1 Layer II
6	S6-RA-SLO2	RA	MPEG1 Layer II

Stream: M

- PSI/SI: PAT, NIT, PMT, SDT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 3/4, Tu/16, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-1080i	TV	H.264/10 AVC - 1920x1080i, E-AC3-2/0
2	S2-720p	TV	H.264/10 AVC - 1280x720p, MPEG1 Layer II, AC3-3/2

Stream: N1

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-H264-HD	TV	H.264/10 AVC - 1920x1080i, E-AC3-2/0-384 kbit/s
2	S2-H264-HD	TV	H.264/10 AVC - 1920x1080i, E-AC3-3/2-448 kbit/s

Stream: N2

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-H264-HD	TV	H.264/10 AVC - 1920x1080i, E-AC3-2/0-256 kbit/s
2	S2-H264-HD	TV	H.264/10 AVC - 1920x1080i, E-AC3-3/2-384 kbit/s

Stream: N3

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-H264-HD	TV	H.264/10 AVC - 1920x1080i, E-AC3-2/0-192 kbit/s
2	S2-H264-HD	TV	H.264/10 AVC - 1920x1080i, E-AC3-3/2-192 kbit/s

Stream: O

- PSI/SI: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- NIT-Terrestrial: 64 QAM, 2/3, Tu/4, CH 45 (666 MHz)
- Services in the stream:

Service_id	Service_name	Type	Comments
1	S1-H264-HD	TV	H.264/10 AVC - 1920x1080i -HE-AAC3-2/0-48 kbit/s
			HE-AAC3-2/0-80 kbit/s
			HE-AAC3-2/0-96 kbit/s

According to ANNEX I of ETSI EN 300 468 v1.9.1 [10] the service_type field is present within both the service_descriptor and service_list_descriptor and is used to specify the type of a transmitted service. The intention of this field, provided at a very high-level within DVB Service Information (SI) is first to allow the service provider to describe the nature of the service and second to allow the receiver to select as soon as possible after the discovery of a service (through re-scan or some other mechanism) about how, and indeed whether, to present the service to the viewer for selection.

There are two possibilities: standard and advanced codec. The advanced codec service_types have been allocated so as to be able to indicate that a service has been encoded using something other than MPEG-2. As Slovenia decided to use advanced codec, inside the streams advanced descriptors are used accordingly to used audio/video coding type. The following table lists the possible values:

Table A: Service type possibility

Service_type (Hex)	Description
0x01	digital television service (see NOTE 1)
0x02	digital radio sound service (see NOTE 2)
0x0A	advanced codec digital radio sound service
0X16	advanced codec SD digital television service
0x19	advanced codec HD digital television service

NOTE 1: MPEG-2 SD material should use this type.
NOTE 2: MPEG-1 Layer II audio material should use this type.

All television services encoded with:
- **MPEG-2 profiles for SD type video uses service_type 1 (0x01),**
- **H.264/AVC profiles for SD type video uses service_type 22 (0x16),**
- **H.264/AVC profiles for HD type video uses service type 25 (0x19).**

All radio services encoded with:
- **MPEG1 LAYER II uses service_type 2 (0x02),**
- **AAC (ISO/IEC 14496-3) uses service_type 10 (0x0A).**

For receivers on the Slovenian market after 01.01.2010 the advanced codec service_types descriptors are mandatory.

6 Quality measurement method

The quality limit in this specification is defined as Quasi Error Free (QEF) reception, where QEF means less than one uncorrected error event per hour. The definition of QEF is provided in EN 300 744 and corresponds to BER of 10-11 in the TS data at input of the MPEG-2 demultiplexer. In practice, it takes long time to measure such a low BER at TS data level. Therefore, the reception quality can be evaluated either indirectly by measuring the BER after Viterbi decoder or by subjectively inspecting the video screen for a certain period of time and looking for errors in the decoded video.

ISMMK (Indirect subjective quality measurement method)
The subjective measurement is performed during 15 seconds. During this time the decoded video shall be error free. In a case of an error in decoded video, the change to the measurement configuration parameters shall be done. The change of the measurement configuration parameters shall lead to an error free decoding of the video where the minimum time between consecutive subjective errors is 15 seconds. Otherwise, the change of the measurement configuration parameters is repeated until an error free decoding of video is reached at least 15 seconds.

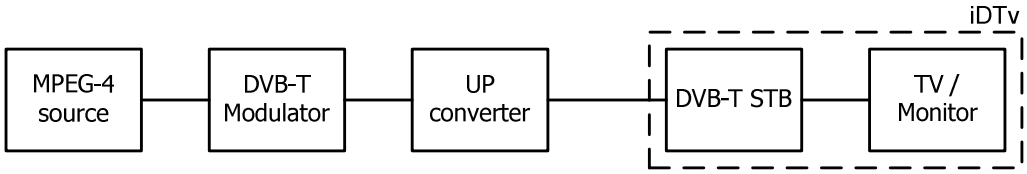
7 Test environment and accessories

1. MPEG-2 and MPEG-4 source (including sound and video content),
2. (re)multiplexer,
3. 2 x DVB-T Modulator with IF output,
4. Fading simulator,
5. Noise generator,
6. DVB-T UP-converter for conversion from IF to RF,
7. Analogue TV RF modulator with generator of PAL, STEREO and teletext,
8. Spectrum analyzer,
9. Power meter,
10. Universal measuring instrument for voltage and current,
11. TV/Monitor supporting 4:3 and 16:9 aspect ratio, HDMI interface,
12. Audio receiver with S/PDIF and HDMI interface,
13. Connection cables, dividers, connectors, attenuators and other accessories,
14. Digital STB receiver (standalone or integrated).

Note:
In this chapter basic equipment for performing the tests is listed. Also other types of equipment and instruments can be used depending from principle of performing the tests. Inside each test basic configuration for performing the test is presented.

8 Testing tasks

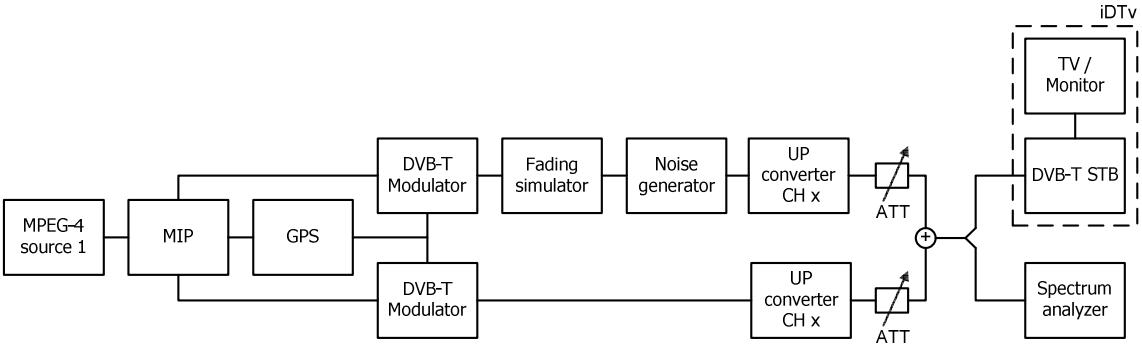
Test	*Task 1.1: Automatic scan through the whole frequency range (UHF and VHF)*		
Requirement	The receiver shall allow reception and demodulation of terrestrial signal transmitted by transmitter according to EN 300 744. The receiver shall be able to automatically scan through the whole frequency range (UHF and VHF) and tune in to the correct DVB parameters. The tuning data shall be stored in a service list, in order to allow a quick tune in to the selected transport stream.		
Test procedure	**Purpose of test:** To verify reception of DVB-T signal and scan through whole frequency range (VHF and UHF). **Equipment:** Receiver under test, monitor (TV) in case of STB, documentation. **Test procedure:** 1. Check the receiver documentation and verify the compatibility for reception of DVB-T signal. 2. Inside user interface check the possibility for automatic scan in VHF and UHF. **Expected result:** Receiver is capable of scanning whole frequency bands UHF and VHF.		
Test results			
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment		
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:		
Date:		***Signature:***	

Test	*Task 1.2: Frequency band and offset*
Requirement	The receiver shall allow reception of terrestrial signal on UHF channels 21 – 69. The receiver shall tune to center frequency of receiving DVB-T signal also considering following frequency offset: fc = 474 MHz + (N-21) x 8 MHz + f_{off}, N ∈ 21, ..., 69} (UHF channel number) f_{off} ∈ [-10 kHz, 10 kHz]
Test Procedure	**Purpose of test:** To verify the reception of DVB-T signal for UHF band considering frequency offset of receiving signal. **Equipment:**  **Transport stream used:** Use transport stream B. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Test is performed in mode 8k, 64-QAM, R=2/3, Δ/Tu=1/4, 3. Signal level on receiver input shall be set to -60 dBm, 4. Start the test on channel 21, f_{off}=0, 5. Connect the receiver, 6. Perform the test according to frequency values and offset values in this task. When changing the frequency and offset f_{off} disconnect the input signal from receiver input, 7. Check the conformity using ISMMK, 8. Fill the table with test results: YES or NO **Expected result:** The results shall be conforming for all values of frequency offset f_{off} on channels 21, 31, 41, 51, 61 in 69.
Test results	

Channel	Frequency (MHz)	Frequency offset (kHz)	Conformity
21	474	-10	
	474	0	
	474	+10	
31	554	0	
41	634	0	
51	714	0	
61	794	0	
69	858	-10	
	858	0	
	858	+10	

Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 1.3: Performance in Single Frequency Networks – echo inside the guard interval*
Requirement	The receiver shall be capable of receiving the signal in simulated SFN networks.
Test procedure	**Purpose of test:** To verify if receiver is capable of receiving the signal in simulated SFN networks according to conditions in this task. **Equipment:**



Transport stream used:
Use transport stream B.

Test procedure:

1. Prepare test environment and setup of instruments,
2. Use mode 8k, 64-QAM, R=2/3, Δ/Tu=1/4 (GI value is 224μs),
3. Signal level on receiver input shall be set to -50dBm,
4. Disconnect the receiver,
5. Set the fading simulator to parameters in tables,
6. Connect the receiver,
7. The receiver shall tune to transport stream,
8. Check the performance using QEF,
9. Repeat for different parameters from the table.

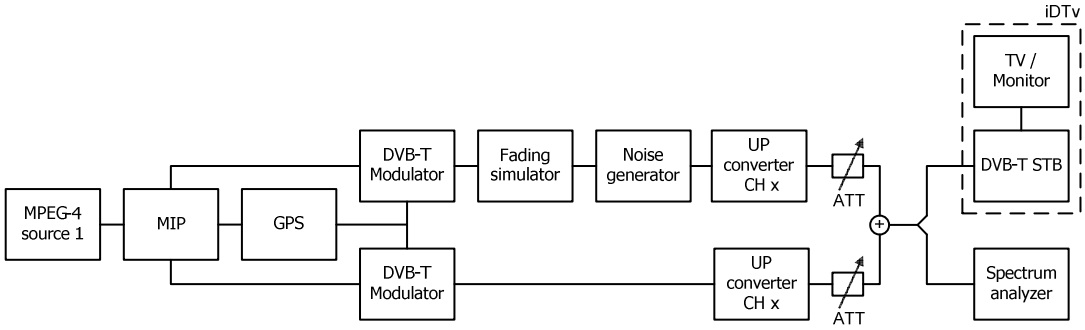
Expected result:

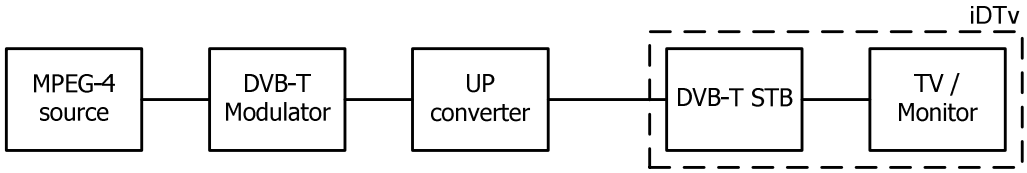
Environment 1		
Track	Delay(us)	Attenuation(dB)
1	0	0
2	39	5
3	82	11
4	125	16
5	167	15
6	200	20

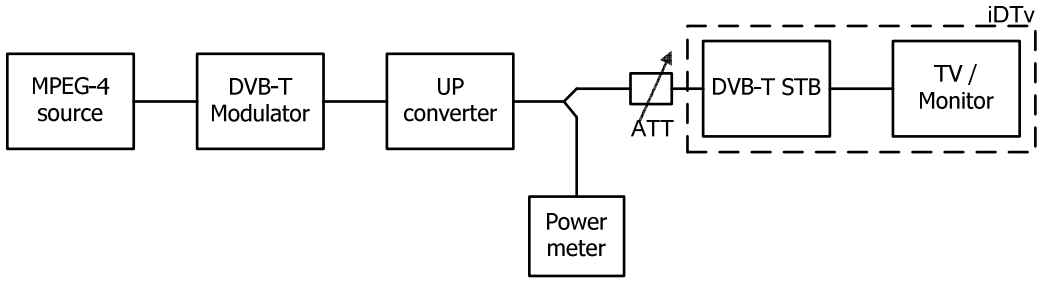
Environment 2		
Track	Delay(us)	Attenuation(dB)
1	0	11
2	75	0
3	107	13
4	135	25

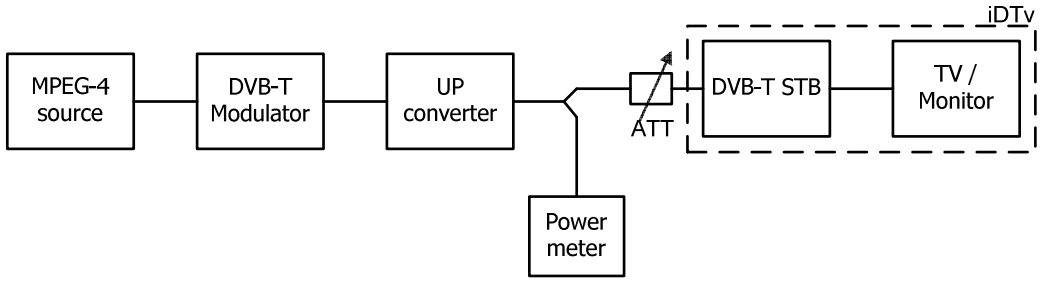
Environment 3		
Track	Delay(us)	Attenuation(dB)
1	0	3
2	95	0
3	180	15

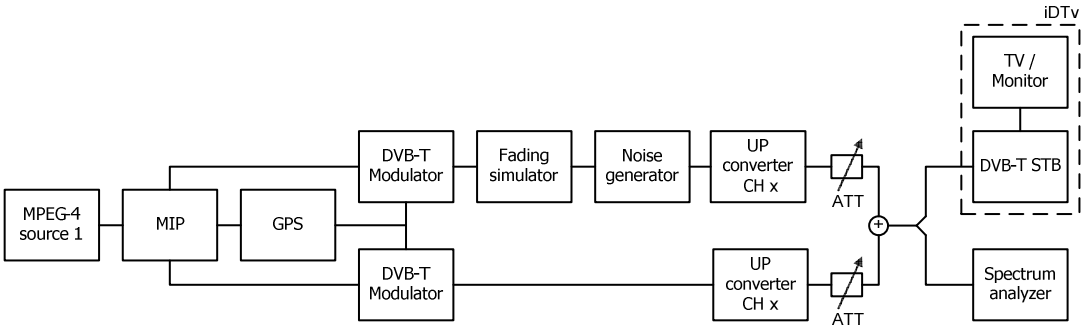
Test results	**Environment**	**Environment 1**	**Environment 2**	**Environment 3**
	Compliancy			
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment			
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:			
Date:		***Signature:***		

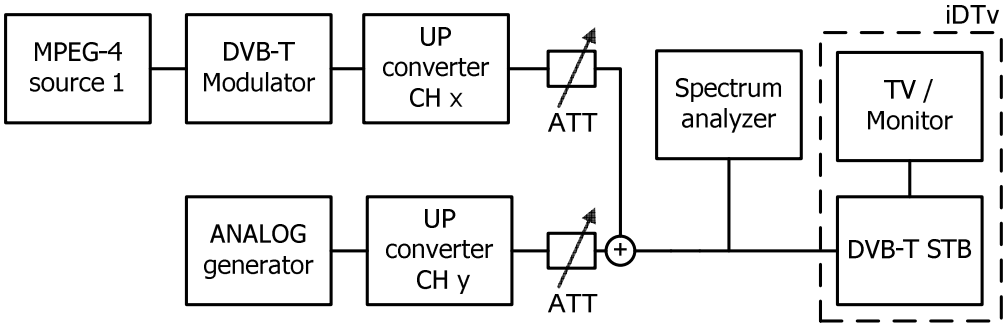
Test	*Task 1.4: Performance in Single Frequency Networks – echo outside the guard interval*
Requirement	The receiver shall be capable of receiving the signal in simulated SFN networks.
Test procedure	**Purpose of test:** To verify if receiver is capable of receiving the signal in simulated SFN networks according to conditions in this task. The echoes are at least 20dB lower than original signal. **Equipment:**  **Transport stream used:** Use transport stream B. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Use mode 8k, 64-QAM, R=2/3, Δ/Tu=1/4 (GI value is 224µs), 3. Use channel 45 and set the receiver input level to -50dBm, 4. Disconnect the receiver, 5. Set the fading simulator to parameters in tables, 6. Connect the receiver, 7. The receiver shall tune to transport stream, 8. Check the performance using QEF, 9. Repeat for different parameters from the table. **Expected result:** The receiver is capable of decoding the signal also in environment with echoes outside guard interval.
Test results	**Environment: 8k, 64-QAM, R=2/3, Δ/Tu=1/4** Delay(µs) / Attenuation(dB) / Conformity 260 / / / 230 / / / -230 / / / -260 / / /
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

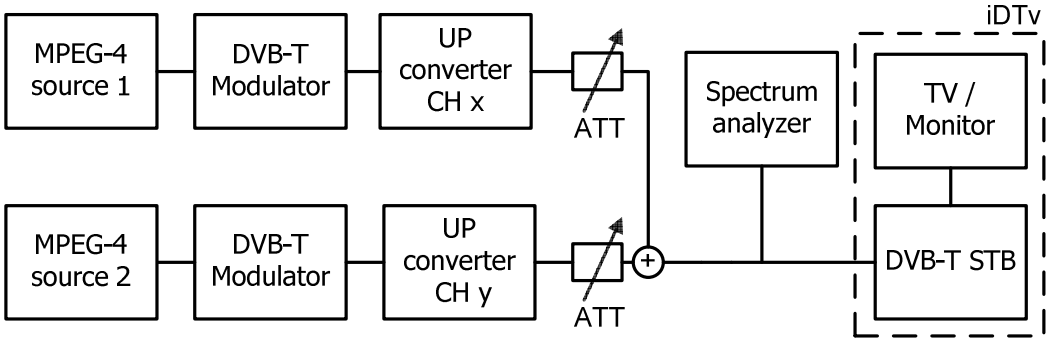
Test	*Task 1.5: Transmitting parameters*
Requirement	The receiver shall be capable of operation with all combinations of following transmitting parameters: - Mode: 2k or 8k COFDM - Modulation: QPSK, 16-QAM, 64-QAM - Code rate (R): 1/2, 2/3, 3/4, 5/6, 7/8 - Guard interval (Δ/Tu): 1/4, 1/8, 1/16, 1/32 - Hierarchical mode: not required
Test procedure	**Purpose of test:** To verify the operation with different DVB-T transmitting parameters. **Equipment:**  **Transport stream used:** Use transport stream B. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Use channel 45 and set the receiver input level to -60 dBm, 3. Start with 8K, QPSK, R=1/2, Δ/Tu=1/32, 1. Check the conformity using ISMMK, 4. Fill the table with test results: YES or NO, 5. The test shall be performed for all combinations of parameters in table TEST RESULTS. **Expected result:** The receiver is capable to operate with all combinations of transmitting parameters.
Test results	**8K** / **R** / **Δ/Tu=1/32** / **Δ/Tu=1/16** / **Δ/Tu=1/8** / **Δ/Tu=1/4** QPSK 1/2 QPSK 3/4 16-QAM 5/6 64-QAM 2/3 64-QAM 7/8
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 1.6: Maximum Receiver Signal Input Level*
Requirement	The receiver shall support at least -23 dBm (86 dBµV at 75 Ω) of input signal without degradation.
Test procedure	**Purpose of test:** To verify the capability of receiver in case of high input signal level. **Equipment:**  **Transport stream used:** Use transport stream B. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Check the Attenuation of attenuator (ATT), 3. Use mode 8K, 64-QAM, R=2/3, Δ/Tu=1/4, 4. On UP converter set channel 45, 5. Check the Attenuation of ATT and connection cables, 6. Turn the receiver ON, 7. Check appropriate decoding of picture, 8. Calculate receiver input signal as an function of Attenuation of ATT, 9. Set the receiver input level to -23 dBm considering Attenuation of ATT, 10. Check the functionality of receiver using ISMMK, 11. Fill the table with test results: YES or NO, 12. Repeat the test for other parameters from the table. **Expected result:** The reception shall be without failures according to QEF for input signal levels up to -23 dBm.
Test results	<table><tr><th>Mode</th><th>Input level (dBm)</th><th>Conformity</th></tr><tr><td>8K, 64-QAM, R=2/3, Δ/Tu=1/8</td><td>-23</td><td></td></tr><tr><td>8K, 64-QAM, R=2/3, Δ/Tu=1/4</td><td>-23</td><td></td></tr><tr><td>8K, 64-QAM, R=3/4, Δ/Tu=1/4</td><td>-23</td><td></td></tr><tr><td>8K, 64-QAM, R=3/4, Δ/Tu=1/8</td><td>-23</td><td></td></tr></table>
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 1.7: Signal level and signal quality indicator*
Requirement	Within the user interface the receiver shall provide the information of signal level and signal quality. The implementation of user interface is responsibility of the producer.
Test procedure	**Purpose of test:** To verify function of signal indicator. **Equipment:**  **Transport stream used:** Use transport stream B. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Tune the system to channel 45, 3. Set the receiver input level to -23 dBm, 4. Decrease the level of input signal step by step and check the reaction of signal level and quality indicator inside user interface. **Expected result:** The indicator of input signal level and quality is reacting to actual signal level.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

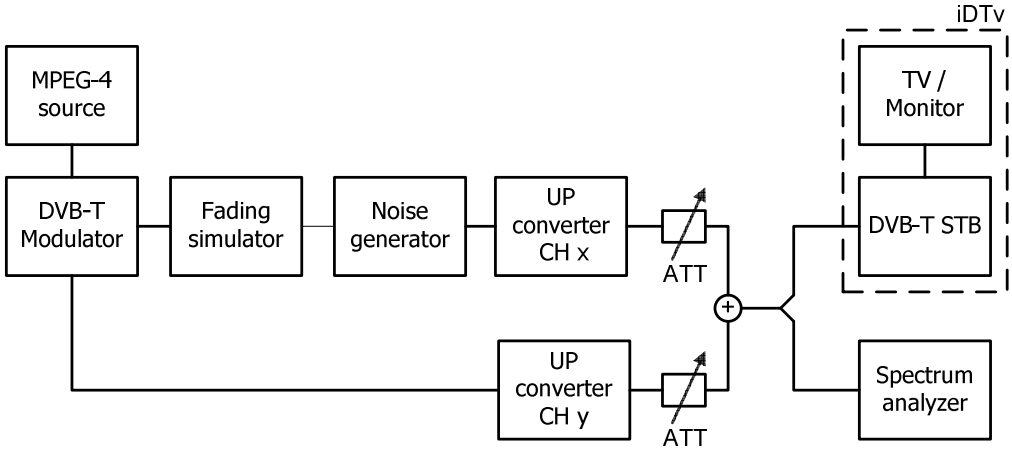
Test	*Task 1.8: Performance in SFN networks on Gaussian channel with presence of noise in input signal*
Requirement	The receiver shall be capable of receiving the signal on Gaussian channel in simulated SFN networks with presence of noise in input signal.
Test procedure	**Purpose of test:** To verify the performance of receiver in simulated SFN networks with present noise in input signal. The functionality of receiver shall be guaranteed from the signal/noise level of at least 18 dB. **Equipment:**  **Transport stream used:** Use transport stream B. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Use mode 8k, 64-QAM, R=2/3, Δ/Tu=1/4 (GI value is 224µs), 3. Set the input signal level to receiver on channel 45 to -50dBm, 4. Disconnect the receiver, 5. Set fading simulator parameters according to the table (Environment 2), 6. Connect the receiver, 7. The receiver shall tune to transport stream, 8. Check the performance using QEF, 9. Increase the noise level to a level the receiver is not capable of decoding according to QEF, 10. Write the signal/noise level at which the receiver stops operating according to QEF to the result field. **Environment 2** Delay(us) / Attenuation(dB) 0 / 11 75 / 0 107 / 13 135 / 25 **Expected result:** The receiver is working also in environments including noise level.
Test results	Level of signal/noise ratio allowing QEF reception: _____dB
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 1.9: Immunity to »analogue« signals on neighboring channels*
Requirement	The receiver shall operate also when analogue signals are present on neighboring or other channels.
Test procedure	**Purpose of test:** To verify the reception when there is interference from analogue TV on adjacent channel. The level of analogue signal shall be 33 dB or more higher than DVB-T signal. The receiver shall allow reception according to QEF also in presence of 44 dB or greater analogue signal on any other channel inside frequency band. The test is performed using DVB-T signal with modulation parameters 8K, 64-QAM, R=2/3, Δ/Tu =1/4. **Equipment:**  **Transport stream used:** Use transport stream C. **Test procedure:** 1. Prepare test environment and setup of instruments 2. Use analogue PAL signal with added teletext and 75% of colour program and FM stereo audio content, 3. The levels of analogue and digital signal should be checked using spectrum analyzer and set to the level of -28 dBm, 4. Use mode 8k, 64-QAM, R=2/3, Δ/Tu=1/4, 5. Set the reception of DVB-T signal to C36, 6. Set the analogue signal to channel C37, 7. DVB-T signal shall be attenuated using attenuator up to the level that the ISMMK method is fulfilled, 8. Write the difference of analogue and DVB-T signal level in dB into the results table, 9. Repeat the test for analogue signal on channel C46. **Expected result:** The receiver can operate at least under presence of analogue and digital signal on channels 36 and 46.
Test results	Ratio of analogue/DVB-T signal up to which the receiver is working on C36: _____dB Ratio of analogue/DVB-T signal up to which the receiver is working on C46: _____dB
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 1.10: Immunity to »digital« signals on neighbouring channels*
Requirement	The receiver shall operate also when digital signals are present on neighbouring or other channels.
Test procedure	**Purpose of test:** Check the performance of receiver in case digital signal is present on neighbouring channel and the signal level of neighbouring channel is 22 dB higher than received DVB-T signal. The receiver shall operate according to QEF also in case of 38 dB or higher DVB-T signal on any other channel of frequency band except on the channel representing image channel. Image channel is the channel which after mixing with the local oscillator will also produce the intermediate frequency. **Equipment:**  **Transport stream used:** Use transport stream B and C. **Test procedure:** 1. Prepare test environment and setup of instruments 2. The levels of digital signal shall be checked using spectrum analyzer and set to the level of -28 dBm, 3. Use mode 8k, 64-QAM, R=2/3, Δ/Tu=1/4, 4. Receiving DVB-T channel shall be set to channel C36, 5. Other DVB-T (disturbing) channel shall be set to channel C37, 6. Attenuate the level of receiving DVB-T signal until ISMMK is still fulfilled, 7. Write the difference of receiving and disturbing DVB-T signal level in dB into the results table, 8. Repeat the test using disturbing signal on channels C40 in C46. **Expected result:** The receiver is operating at least in required disturbing/useful signal ratios on channels 36, 40 and 46.
Test results	Ratio of disturbing/useful channel up to which the receiver operates on C36: _____dB Ratio of disturbing/useful channel up to which the receiver operates on C40: _____dB Ratio of disturbing/useful channel up to which the receiver operates on C46: _____dB
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 1.11: RF input connector*
Requirement	The receiver shall have at least one tuner input connector in accordance with IEC 60169-2, part 2 and shall allow the connection to external antenna with connector type: IEC 169-2 male. The input impedance shall be 75 Ohm.
Test procedure	**Purpose of test:** To verify that the receiver has a correct input connector for the reception of the DVB-T signals. **Equipment:** Receiver under test. **Test procedure:** 1. Verify that the RF input connector is accordance the specification IEC 60169-2. 2. Verify in the manufacturer's technical specification that the input impedance of the RF input is 75Ω. **Expected result:** RF input connector is as defined in specification IEC 60169-2 and the input impedance is 75Ω.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

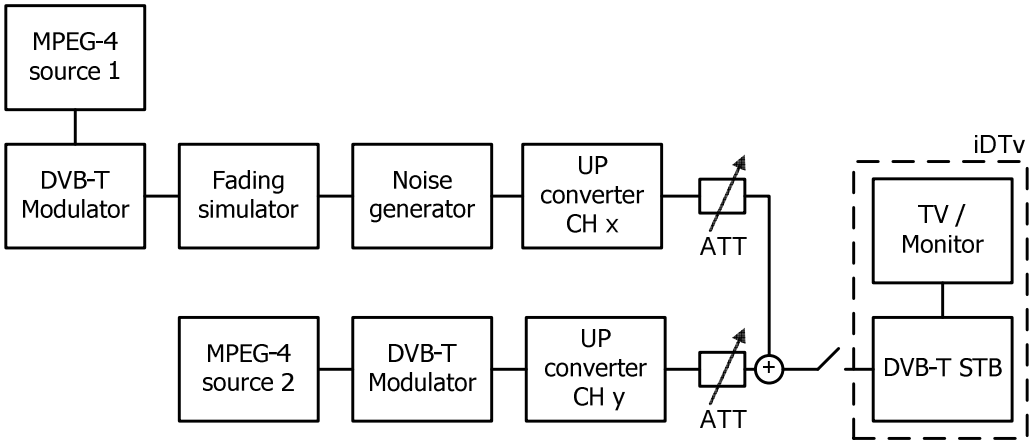
Test	*Task 1.12: RF output connector - loop trough*
Requirement	The RF signals should be bypassed from RFin to RFout independently from the status of the receiver. Test is optional for iDTv.
Test procedure	**Purpose of test:** 1. To verify that the receiver has a correct output connector for the loop through of the RF signals. 2. To test the attenuation/gain of the RF loop through for standby and operational modes. **Equipment:**  **Test procedure:** 1. Prepare test environment and setup of instruments, 2. If the receiver has the possibility of power supply over RF, turn this option OFF, 3. Connect signal source to RF input of receiver and spectrum analyzer to RF output (take care for possible DC voltage on instruments input), 4. Set the input level of the receiver to –50dBm, 5. Power ON the receiver – test in »POWER ON MODE«, 6. Test frequency range from 47 MHz to 869 MHz, 7. Measure insertion loss trough complete frequency range. The insertion loss can be maximum +- 6dB, 8. Repeat the test while receiver in STANDBY, 9. Check if the output connector complies with IEC 60169-2. **Expected result:** RF output connector complies to IEC 60169-2, insertion loss of the loop is inside +-6dBm and the forwarding of signal is possible in STANDBY and in POWER ON receiver mode.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 2.1: Automatic program search*
Requirement	The receiver shall provide function of automatic program search trough whole frequency range. In case the receiver finds all 3 same identifiers: • Original_network_id, • Transport_stream_id and • Service_id on two or more different frequencies has to save both frequencies or select the frequency with better signal. Before the automatic search is started, all service lists shall be deleted.
Test procedure	**Purpose of test:** 1. To verify that receiver is capable of scanning whole frequency band, 2. To verify the best service selection in automatic channel search when the content of the transport stream is the same on several transmitters. **Equipment:**  On terrestrial network there is possibility to receive several transmitters simultaneously. These transmitters can have the same content exactly, but are transmitted on different channels (frequencies). Therefore, it is important that the receiver can in automatic channel search choose the services which have the best reception quality. Channels CH x and CH y shall not be equal. Relative signal levels can be observed with spectrum analyzer. **Transport stream used:** Use transport stream B. **Test procedure:** 1. Prepare test environment and setup of instruments. Use transmitting mode 8k, 64-QAM R=2/3, Δ/Tu=1/4. 2. Attenuate signal level of CH x for 5dB related to the level of CH y. Both levels shall assure error-free decoding of picture, 3. Check if program lists are empty. In case not, delete the lists, 4. Perform automatic channel search, 5. Check if the list of programs includes all programs inside transport stream, 6. Check if the lists are (partially) duplicated. Write into the table Channel (*CH X/CH Y)*, in case found programs are not duplicated. **Expected result:** The receiver is capable of finding all services from transport streams and sorting them into program lists.

<table>
<tr><td>Test results</td><td>
<table>
<tr><th>Requirements</th><th>Result</th><th>Conformity</th></tr>
<tr><td>After scanning all transmitted services are listed in program list.</td><td></td><td></td></tr>
<tr><td>The service lists are not duplicated for both frequencies.</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Conformity</td><td>☐ Compliant
☐ Non-compliant ☐ Major deviation ☐ Minor deviation, comment</td></tr>
<tr><td>Comments</td><td>Non-compliancy can be fixed with software update: ☐ YES ☐ NO

Describe more specific faults and/or other information:</td></tr>
<tr><td>Date:</td><td></td><td>Signature:</td><td></td></tr>
</table>

Test	*Task 2.2: Manual program search*
Requirement	In addition to the automatic search, it shall be possible to perform a manual search where the channel number (only) is entered by the end user. The receiver shall tune to this channel, search all available COFDM modes, add all new services and replace existing services in the service list (without considering any quality criteria).
Test procedure	**Purpose of test:** To verify the functionality of the manual channel search. **Equipment:**



Channel CH x		**Channel CH y**	
TS B		TS C	
NAME	**ServID**	**NAME**	**ServID**
S1	1	S1	1
S2	2	S5	4
S3	3	S6	5
S4	4	S7	6

On terrestrial network there is possibility to receive several transmitters simultaneously. These transmitters can have same content but transmitted on different channels. The content can be partially local and therefore different and it is important to have the possibility of manual channel selection without considering any quality criteria.

Transport stream used:
Use transport streams B and C.

Test procedure:

1. Prepare test environment and setup of instruments,
2. Check if program list is empty – delete the list if it is not empty,
3. Attenuate signal on CH X so the reception is not more possible,
4. Perform automated channel search,
5. Check that programs S1, S5, S6 and S7 listed in program list are actually from CH Y (attenuate signal of CH Y). If received channel is correct programs S1, S5, S6 and S7 shall freeze when signal level is too low. Move the attenuator to start position,
6. Reduce the attenuation of channel CH X to the level that reception is possible. Add noise to carrier on channel CH X, so requirement ISMMK is fulfilled,
7. Perform manual program setup. Check that carrier of channel that should be deleted is listed in program list and manual setup is successful,
8. Fill the data into the table,
9. Check that programs S1, S2, S3 and S4 on program list are transmitted in CH X

using attenuator. If received channel is correct programs S1, S2, S3 and S4 shall freeze when signal level is too low. Move the attenuator to start position,

10. Check if program S1 is listen only once in program list.

The channel list shall look like this after performing this procedure:

Position	Program	Channel
1	S1	CH X
2	S2	CH X
3	S3	CH X
4	S4	CH X
5*	S6	CH Y
6*	S7	CH Y
7*	S5	CH Y

* The services found in last manual channel search are stored in the service list according to their signalization. If the service list was not empty before manual search, the services in service list shall be replaced if they are the same or moved to other positions. Sorting of programs on CH y can be defined by manufacturer.

Expected result:
All test results shall be OK.

Test results

Requirement	Conformity
Manual channel search can be performed successfully by only entering channel number	
The channel list is as defined in test procedure	
Service S1 in only listed once in the channel list	

Conformity

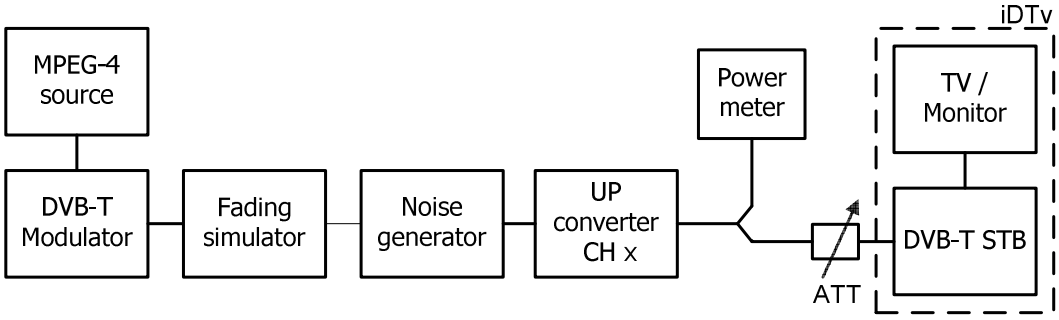
☐ **Compliant**
☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment

Comments

Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO**

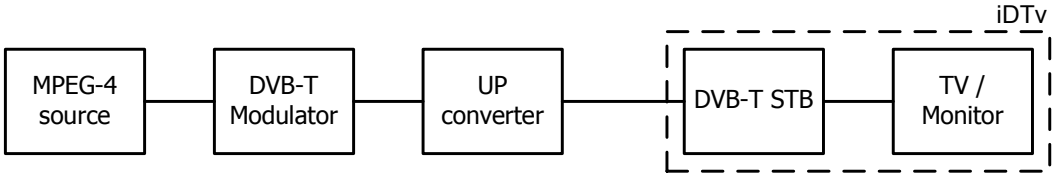
Describe more specific faults and/or other information:

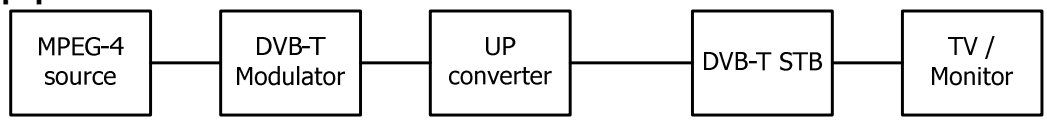
Date:		***Signature:***	

Test	*Task 2.3: Tuning and scanning – Changes in modulation parameters*
Requirement	The receiver shall receive and react to changes in TPS.
Test procedure	**Purpose of test:** The receiver shall recover from changes in modulation parameters and output an error free TS. This should take less than 3 seconds for any change. The receiver should be able to detect a change of modulation parameters signalled in the TPS data of the DVB-T signal, in order to reduce the recovery time. Purpose of the test is to check if the receiver adopts to change of DVB-T parameters automatically and starts to operate normally without any user action. **Equipment:**  **Transport stream used:** Use transport stream I. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Use channel C45, 3. Set the RF input level of receiver to –50 dBm, 4. Use modulation parameters 8K, 64-QAM, R=3/4, Δ/Tu=1/4, 5. Connect the input of receiver, 6. Use quality measurement according to ISMMK, 7. Fill in the results, 8. Repeat the test for other modes without disconnecting the receiver input according to the table »Test results« **Expected result:** The receiver is able to detect change of the DVB-T modes and re-synchronize to the changed DVB-T mode within 3 seconds.
Test results	

Mode	**Conformity**
8K, 64-QAM, R=3/4, Δ/Tu=1/4	
8K, 64-QAM, R=3/4, Δ/Tu=1/8	
8K, 64-QAM, R=2/3, Δ/Tu=1/8	
8K, 64-QAM, R=2/3, Δ/Tu=1/4	
8K, 16-QAM, R=3/4, Δ/Tu=1/8	

Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 2.4: Tuning and scanning – dynamic PMT*
Requirement	Dynamic changes in the PMT shall not produce any disturbances in the Audio/Video output. In case switching of elementary audio and/or video streams is triggered, the maximum switching time (measured from PMT update to clear picture) shall be 3 seconds. For triggering the change in descriptor version_id shall be used.
Test procedure	**Purpose of test:** To verify if the receiver is capable of continuous reception in case of adding, changing or removing PID data in PMT table. **Equipment:**  Network operator can occasionally add, change or remove some regional program. In case the scenario happens also descriptor version version_id inside PMT is changed. **Transport stream used:** Use transport stream L. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Play transport stream and select service S1. 3. Remove program identifiers (PID) in following order: a. Teletext PID b. Audio PID c. Video PID 4. Add program identifiers (PID) in following order: a. Video PID b. Audio PID c. Teletext PID 5. Check the picture and sound continuously and verify that decoding of service is correct, 6. Change following program identifiers PID: a. Video PID b. Audio PID **Expected result:** After adding identifiers PID all components of program are decoded correctly. Change of identifiers is not affecting the decoding of program.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

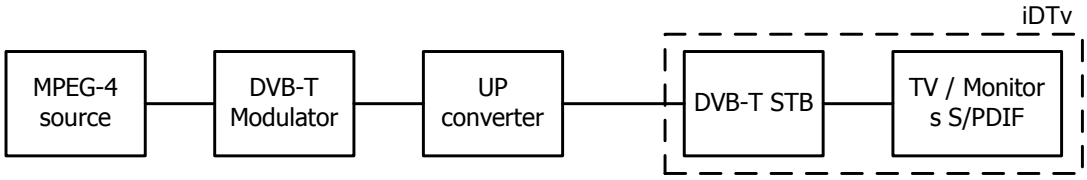
Test	*Task 3.1: SCART interface*
Requirement	The receiver shall have at least one SCART Interface in accordance with EN 50049-1 and EN 50157-2-1. On the SCART interface CVBS and RGB signal shall be present including correct signalling with either LINE23 WSS and/or voltage levels on a SCART PIN8 as defined by IEC 62216-1 (6.4.3 Active format description). The SCART interface shall deliver also analogue audio signal.
Test procedure	**Purpose of test:** To verify the presence and functionality of SCART interface and signalling of appropriate picture formats on SCART PIN 8 and/or with WSS defined by IEC 62216-1 (6.4.3 Active format description). It is possible that some TV sets don't use this kind of signalling for switching between picture formats. Test is not directly applicable for iDTV. However the response of an iDTV to the broadcasted active formats shall be equivalent to the combined response of a STB and a 16:9 connected monitor except for the signalling on the SCART interface. **Equipment:**  **Test procedure:** 1. Prepare the test environment, 2. Verify that receiver has at least one analogue audio and analogue video interface with SCART connector, 3. Inside user interface select 4:3 setting for output picture format, 4. Play transport stream, 5. Select service including 4:3 content with appropriate AFD signaling, 6. Verify the presence of analogue video and audio signal on SCART interface, 7. Check the decoded and converted analogue video output format and fill the data into the table, 8. Check the voltage on PIN 8 and the WSS signaling on the SCART interface and fill the data into the table, 9. Inside user interface select 16:9 setting for output picture format and repeat steps from 4 to 8, 10. Inside user interface select 4:3 setting for output picture format, 11. Repeat the steps from 6 to 9 for service including 16:9 content and with appropriate AFD signaling. **Transport stream used:** Use transport stream F. **Expected result:** The receiver has functional SCART interface with analogue stereo audio output and RGB (CVBS or other) video signals present. The decoded output picture has correct format and signaling is made according to IEC 62216-1 (6.4.3 Active format description).
Test results	4:3 source aspect ratio signaled **Functionality / Display type** | 4:3 display | 16:9 display Voltage on SCART PIN 8 / WSS | | | Decoder format conversion | | |

<table>
<tr><td></td><td>16:9 source aspect ratio signaled

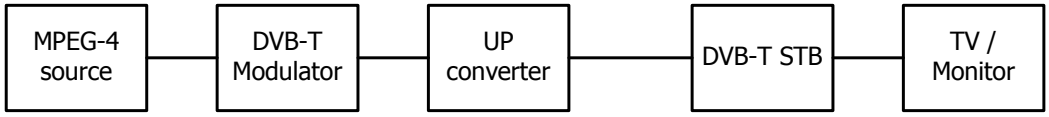
<table><tr><th>Functionality / Display type</th><td>4:3 display</td><td>16:9 display</td></tr><tr><td>Voltage on SCART PIN 8 / WSS</td><td></td><td></td></tr><tr><td>Decoder format conversion</td><td></td><td></td></tr></table></td></tr>
<tr><td>Conformity</td><td>☐ Compliant
☐ Non-compliant ☐ Major deviation ☐ Minor deviation, comment</td></tr>
<tr><td>Comments</td><td>Non-compliancy can be fixed with software update: ☐ YES ☐ NO

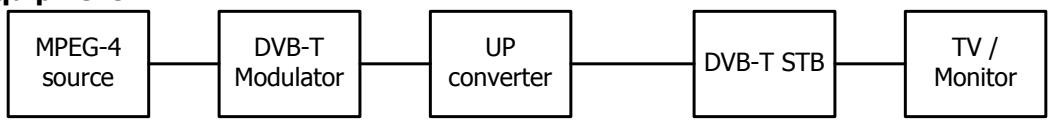
Describe more specific faults and/or other information:</td></tr>
<tr><td>Date:</td><td></td><td>Signature:</td><td></td></tr>
</table>

Test	*Task 3.2: Interface for Conditional Access*
Requirement	The receiver should support at least one DVB Common Interface (for CA module) for conditional access. CI-slot should comply with EN50221
Test procedure	**Purpose of test:** To verify if an interface for Conditional Access is present and if the CI slot complies with requirement. **Equipment:** Receiver under test. **Test procedure:** 1. Under consideration of receiver documentation and visual inspection check if the CI-slot complies with requirement. **Expected result:** In case the receiver is equipped with CI-slot the CI-slot complies with requirement.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 3.3: Digital Audio Output (S/PDIF)*
Requirement	The receiver shall have a coaxial or optical S/PDIF interface for digital audio to provide PCM signal according to IEC 60958 or non-linear PCM coded audio stream according to IEC 61937.
Test procedure	**Purpose of test:** To verify the presence of coaxial or optical S/PDIF interface and compliancy with requirements. **Equipment:**  **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Transport stream shall include one or more services with video content, teletext and multichannel audio, 3. Connect signal from S/PDIF output of STB to audio amplifier and verify the reproduction of sound, 4. In any case the sound shall be present regardless if TV or radio program is selected and if selected service includes multichannel audio or not. **Transport stream used:** Use transport stream D. **Expected result:** The functionality of S/PDIF interface complies to requirement.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 3.4: HDMI interface – compliancy for »HD Ready«*		
Requirement	HDTV level receiver with display (iDTV) shall support the requirements that are specified for high definition video interfaces by EICTA for compliant HD Ready iDTV-sets. HDTV level receiver without display (STB) shall have at least one High-Definition Multimedia Interface (HDMI) with type A connector, supporting displays that comply with the EICTA HD-Ready requirements.		
Test procedure	**Test procedure:** The Manufacturer shall verify the HD Ready certificate. **Expected result:** HDMI interface complies to requirements for HD Ready certificate.		
Test results			
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment		
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:		
Date:		***Signature:***	

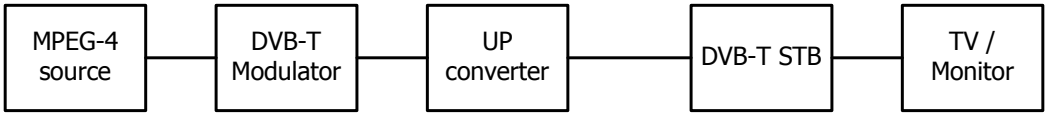
Test	*Task 3.5: HDMI interface - EDID information*
Requirement	HDTV level receiver shall be able to use the EDID information provided by the display to automatically determine the STB output.
Test procedure	**Purpose of test:** To verify that the receiver is able to use the EDID information. This test is relevant for STB only. For other receivers having HDMI output interface this test is optional. **Equipment:**  **Test procedure:** Power On the receiver. Verify that the receiver selects the display parameters according the EDID information. **Expected result:** The receiver uses the EDID information for the display parameters.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 3.6: HDMI interface – original format*
Requirement	The HDTV Level STB shall provide an »Original Format« option, i.e. to output the same format as received if supported by the display, as indicated by the EDID information. If the received format is not supported, the STB shall select the display mode providing the best possible video quality. This is to avoid the STB output to go black, if there is a mismatch between received format and display capabilities.
Test procedure	**Purpose of test:** To verify that the receiver is able to use the EDID information. This test is relevant for STB only. For other receivers having HDMI output interface this test is optional. **Equipment:**  **Transport stream used:** Use transport stream B and M. Transport stream shall include programs with following picture resolutions: • 720 x 576i 25, • 1280 x 720p 50, • 1920 x 1080i 25. **Test procedure:** 1. Play transport stream, 2. Power On the receiver, 3. Tune to the service in test stream, 4. Verify that video is displayed in original format if possible for the display. **Expected result:** The receiver shall negotiate the display parameters according the input signal.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

<table>
<tr><td>Test</td><td>Task 3.7: HDMI interface – Manual setting of resolution</td></tr>
<tr><td>Requirement</td><td>The HDTV level STB It shall have the possibility to manually set the default output format to a fixed format. The fixed format shall include at least one of the following formats:
• 1920x1080i@25Hz / 1920x1080p@25Hz,
• 1920x1080p@50Hz,
• 1280x720p@50Hz.</td></tr>
<tr><td>Test procedure</td><td>Purpose of test:
To verify that the receiver is able to use the EDID information.

This test is relevant for STB only.

For other receivers having HDMI output interface this test is optional.

Equipment:
 

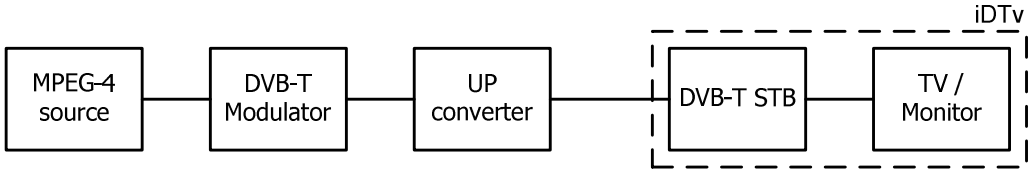
Transport stream used:
Use transport stream B and M.

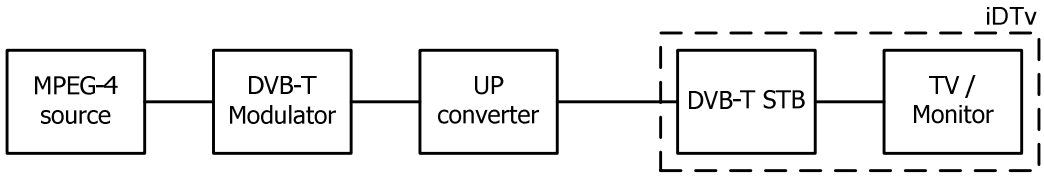
Test procedure:
1. Manually set the display format to 1280x720p@50Hz.
2. Verify that format is set.
3. Repeat the test with other resolutions:
• 1920x1080i@25Hz / 1920x1080p@25Hz and
• 1920x1080p@50Hz.

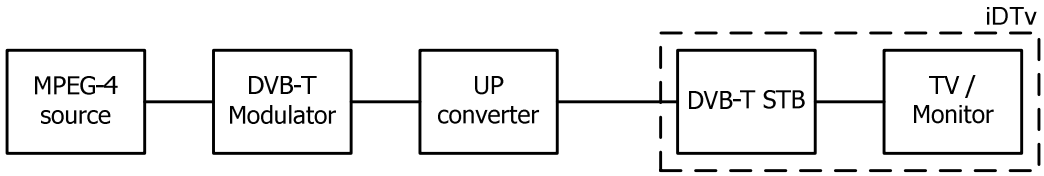
Fill in the test results.

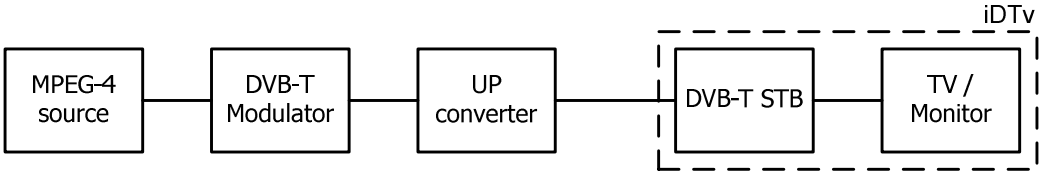
Expected result:
It shall be possible to set output format manually.</td></tr>
<tr><td>Test results</td><td>
<table>
<tr><th>Resolution</th><th>Conformity</th></tr>
<tr><td>1280x720p@50Hz</td><td></td></tr>
<tr><td>1920x1080i@25Hz / 1920x1080p@25Hz</td><td></td></tr>
<tr><td>1920x1080p@50Hz</td><td></td></tr>
</table>
</td></tr>
<tr><td>Conformity</td><td>☐ Compliant
☐ Non-compliant ☐ Major deviation ☐ Minor deviation, comment</td></tr>
<tr><td>Comments</td><td>Non-compliancy can be fixed with software update: ☐ YES ☐ NO

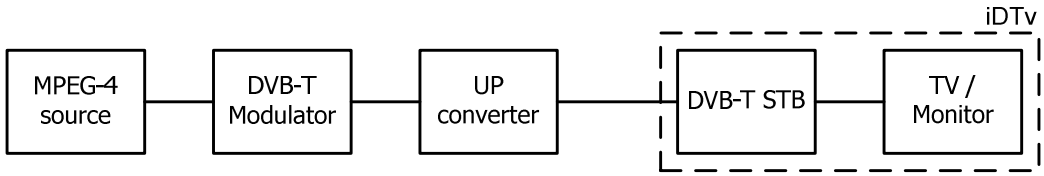
Describe more specific faults and/or other information:</td></tr>
<tr><td>Date:</td><td>Signature:</td></tr>
</table>

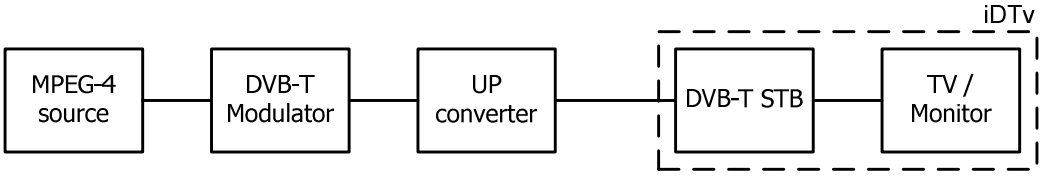
Test	*Task 4.1: Real time clock*
Requirement	The receiver shall have a real time clock and the clock shall be updated by incoming TDT and TOT data.
Test procedure	**Purpose of test:** To verify that the real time clock runs continuously and it is updated from data in transport stream. **Equipment:**  **Test procedure:** 1. Connect and start up the instruments, 2. Locate the time and date displayed inside user interface, 3. Make sure that the TDT (Time and Date Table) and TOT (Time Offset Table) are present in the transport stream, 4. After connecting signal to receiver check if time and date display updated according to data in transport stream. TOT can be used but this is not mandatory. In any case the receiver shall provide option to manually set offset according to GMT. **Transport stream used:** Use transport stream A. **Expected result:** The real time clock and date is updated from transport stream information.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

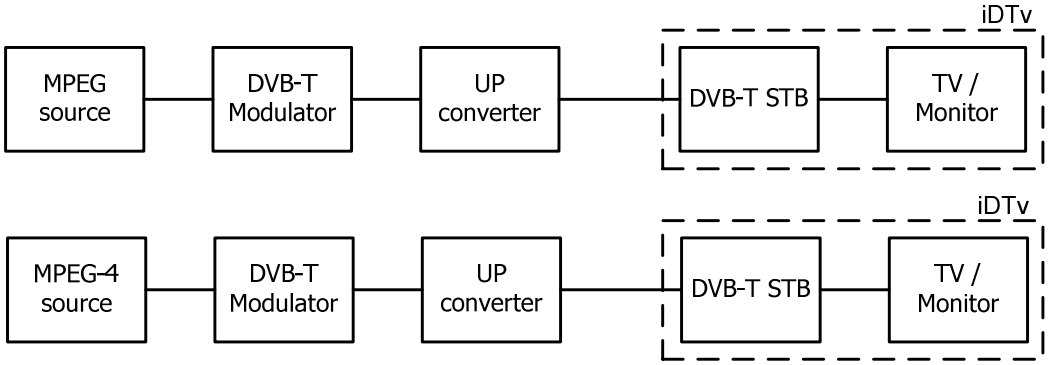
Test	*Task 5.1: MPEG Demultiplexer – maximum transport stream data rate*
Requirement	The demultiplexer shall be compliant to the MPEG-2 transport layer defined in ISO/IEC 13818-1 and ETSI TS 101 154 and shall be able to decode an ISO/IEC 13818-1 stream with data rates up to 32 Mbit/s.
Test procedure	**Purpose of test:** Purpose of the test is to verify that demultiplexer operates at highest transport stream data rates (32 Mbit/s), including one or more programs including sound and teletext components. **Equipment:**  **Transport stream used:** Use transport stream G. **Test procedure:** 1. Prepare test environment and instruments, 2. On UP converter select channel C45 and use modulation parameters 8k, 64-QAM, R=7/8, Δ/Tu=1/8 3. Select program prom transport stream with high data rate, 4. Check the conformity according to ISMMK **Expected result:** All programs inside transport stream are decoded correctly.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

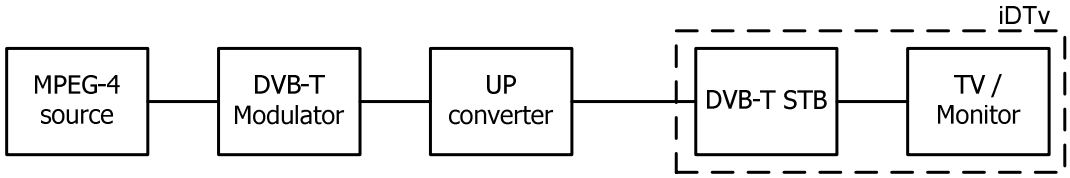
Test	*Task 5.2: MPEG Demultiplexer – support of variable bitrate (statistical multiplexing)*
Requirement	The demultiplexer shall be compliant to the MPEG-2 transport layer defined in ISO/IEC 13818-1 and ETSI TS 101 154 and shall support variable bitrate elementary streams within a constant bitrate transport stream.
Test procedure	**Purpose of test:** To verify that the receiver can decode a variable bitrate video stream (statistical multiplexing). **Equipment:**  **Transport stream used:** Use transport stream E. **Test procedure:** 1. Prepare test environment and instruments, 2. In receiver menus select program using variable bitrate, 3. No noise added, 4. Signal level on receiver input shall be set to -60 dBm, 5. Check the picture for 5 minutes according to ISMMK. **Expected result:** The receiver is capable displaying an error-free picture during 5 minutes.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

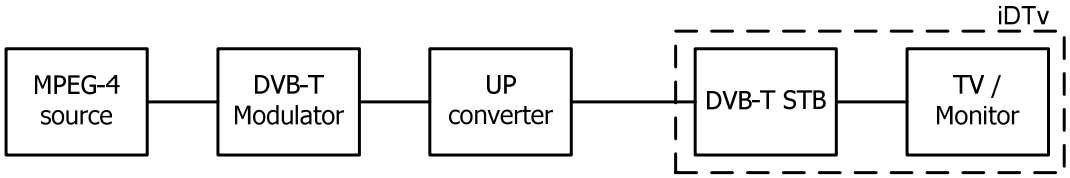
Test	*Task 6.1: MPEG VIDEO Decoder - Audio video synchronization*
Requirement	The decoder of receiver shall ensure synchronization between AUDIO and VIDEO as follows: audio shall never lead the video program by more than 20 ms, and shall never lag the video by more than 45 ms.
Test procedure	**Purpose of test:** To verify if relative position between audio and video content complies with requirement. **Equipment:**  **Transport stream used:** Use transport stream A. **Test procedure:** 1. Prepare test environment and instruments, 2. Signal level on receiver input shall be set to -50 dBm, 3. Play transport stream including test sequence for measuring delay of audio and video, 4. Delay shall be measured with instruments, 5. Verify that the deviation is inside prescribed limits. **For iDTV:** 1. Prepare test environment and connect the components, 2. Perform subjective validation of sound and picture synchronization. **Expected result:** Relative difference of audio and video shall be inside limits +25 ms and -45 ms.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

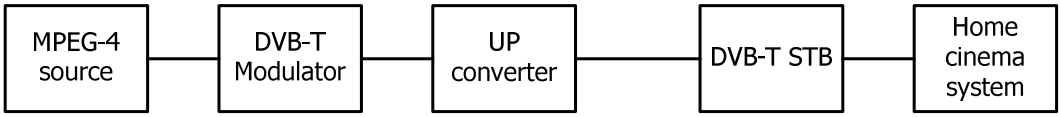
Test	*Task 6.2: MPEG VIDEO Decoder – decoding of MPEG-2 SD resolutions*
Requirement	The decoder of receiver shall fully comply with standard ISO IEC 13818-2 for decoding of MPEG-2 coded signal. The decoder shall also comply with ETSI TS 101 154 and shall support VBR and CBR.
Test procedure	**Purpose of test:** To verify if receiver is capable of decoding MPEG-2 video services in different resolutions. **Equipment:**  **Transport stream used:** Use transport stream H. **Test procedure:** 1. Prepare test environment and setup, 2. In receiver select MPEG-2 coded TV program, 3. Set the receiver input level to -50dBm. 4. Use ISMMK and check all resolutions. Fill in the results. **Expected result:** Receiver is capable of decoding all listed picture resolutions.
Test results	<table><tr><th>Resolution</th><th>720x576</th><th>544x576</th><th>480x576</th><th>352x576</th></tr><tr><td>Conformity</td><td></td><td></td><td></td><td></td></tr></table>
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 6.3: MPEG VIDEO Decoder – decoding of MPEG-4 SD resolutions*
Requirement	The decoder of the receiver shall fully comply with standard ISO IEC 14496-10 for decoding MPEG-4 and shall support profile »H.264/AVC Main Profile at Level 3« (used for H.264/AVC SDTV) and comply with ETSI TS 101 154 (chapters 5.5 and 5.6; 25 Hz SDTV).
Test procedure	**Purpose of test:** To verify if receiver is capable of decoding MPEG-4 SD video services in different resolutions. **Equipment:**  **Transport stream used:** Use transport stream B. **Test procedure:** 1. Prepare test environment and setup, 2. In receiver select MPEG-4 SD coded TV program, 3. Set the receiver input level to -50dBm, 4. Use ISMMK and check all resolutions. Fill in the results. **Expected result:** Receiver is capable of decoding all listed picture resolutions.
Test results	**Resolution** | **720x576** | **544x576** | **480x576** | **352x576** Conformity | | | |
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 6.4: MPEG VIDEO Decoder – minimum bitrate*
Requirement	The decoder of receiver shall decode pictures in resolution of 720x576 pixels with minimum data rate of 600 kbit/s.
Test procedure	**Purpose of test:** To verify the receiver can decode picture at minimum bitrate of transport stream. **Equipment:**  **Transport stream used:** Use transport stream A. **Test procedure:** 1. Prepare test environment and connect the components, 2. Select program from transport stream with bitrate of 600kbit/s including video in resolution 720x576, audio and teletext, 3. Check correct decoding of picture. **Expected result:** Inside transport stream it is possible to receive all programs.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

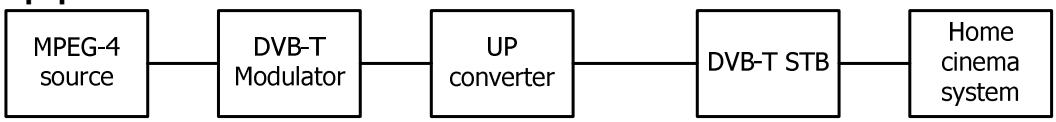
Test	*Task 6.5: MPEG VIDEO Decoder - decoding of MPEG-4 HD resolutions*
Requirement	The decoder of the receiver shall fully comply with standard ISO IEC 14496-10 for decoding MPEG-4 and shall support "H.264/AVC High Profile at Level 4" and comply with ETSI TS 101 154 (chapter 5.7 H.264/AVC HDTV).
Test procedure	**Purpose of test:** To verify if receiver is capable of decoding MPEG-4 HD video services in different resolutions. **Equipment:**  **Transport stream used:** Use transport stream M. **Test procedure:** 1. Prepare test environment and setup, 2. In receiver select MPEG-4 HD coded TV program, 3. Set the receiver input level to -50dBm, 4. Use ISMMK and check all resolutions. Fill in the results. **Expected result:** Receiver is capable of decoding all listed picture resolutions.
Test results	**Resolution** | **1920x1080** | **1280x720** Conformity | |
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 6.6 HDTV - Down-conversion of High Definition Video for Standard Definition output*
Requirement	In case of SCART, or if any other analogue video output (Y, Pb, Pr or other) is available, the decoded High Definition video shall be down-converted by SD format converter to standard definition (SD) resolution for output via these interfaces. Picture down-conversion shall be implemented from any of the incoming encoded HD full screen luminance resolution of 1920x1080 and 1280x720 (as an OPTION also from 1440x1080, 1280x1080, 960x1080, 960x720 and 640x720) to 720x576 standard definition (SD) resolution. Down-converted video shall be displayed as 16:9 letterbox on 4:3 displays. The SD format converter should apply appropriate re-interlacing.
Test procedure	**Purpose of test:** To verify that the receiver down converts the HD video signal to analogue video connectors **Equipment:**  **Transport stream used:** Use transport stream M. **Test procedure:** 1. Prepare test environment and setup, 2. Play transport stream including resolution 1920x1080 and 1280x720, 3. Use ISMMK and check delivering SDTV signal for all Standard Definition outputs. **Expected result:** The SCART or any other analogue video output (not higher than 576i) is delivering SDTV signalling.
Test results	**Resolution** | **1920x1080** | **1280x720** Conformity | |
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 7.1: SDTV AUDIO - decoder*
Requirement	The receiver shall provide at least one stereo audio decoder that is able to meet minimum decoding requirements based on MPEG 1 Layer II ("Musicam" ISO/IEC 11172-3) and decoder for AC3. Audio decoder shall support also AAC* decoding according to ISO/IEC 14496-3 subpart 4. (*mandatory for devices on Slovenian market from 01.01.2010).
Test procedure	**Purpose of test:** To verify decoding of audio content coded with different procedures. **Equipment:**  **Transport stream used:** Use transport streams D, I and M. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Tune the receiver to the service including only audio content coded with MPEG-1 Layer II, 3. In user interface set the stereo audio output to MPEG-1 Layer II, 4. Verify the presence of sound on stereo output and fill in the results, 5. In user interface select AC-3 audio for digital output, 6. Verify the functionality of AC3 coder on digital (optical or coaxial) output and fill in the results, 7. Tune the receiver to service including multichannel AC3 coded audio, 8. In user interface select AC-3 audio for digital output, 9. Verify the functionality of AC3 coder on digital (optical or coaxial) output and fill in the results, 10. Verify the presence of sound on stereo output and fill in the results, 11. Tune the receiver to service including AAC coded audio, 12. In user interface set AAC as source for stereo audio output, 13. Verify the presence of sound on stereo output and fill in the results, 14. In user interface select AC-3 audio for digital output, 15. Verify the functionality of AC3 coder on digital (optical or coaxial) output and fill in the results. **Expected result:** Audio decoder complies with requirement for audio coding.
Test results	

Requirements	Conformity
Receiver is capable to decode MPEG1 layer II bitstream.	
Receiver is capable to switch decoding of audio from AC3 to MPEG-1 Layer II in case there is no AC3 bitstream in receiving service and the user selected AC3 on digital output.	
Receiver is capable to decode AC3 bitstream.	
Receiver supports stereo downmix from multichannel AC3 bitstream	
Receiver is capable to decode AAC bitstream	
Receiver is capable to switch decoding of audio from AC3 to AAC in case there is no AC3 bitstream in receiving service and the user selected AC3 on digital output.	

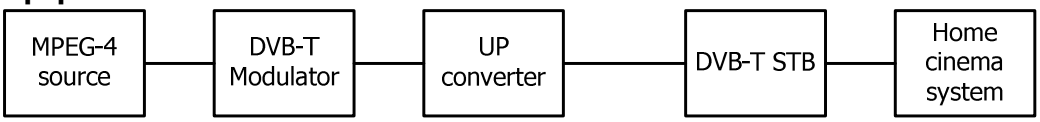
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment		
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:		
Date:		***Signature:***	

Test	*Task 7.2: HDTV AUDIO - support for E-AC3 on HDMI output interface*
Requirement	The receiver shall be capable of providing the following formats on the HDMI connector: • Pass-through of native bitstream AC3 and E-AC3*, • E-AC3* bitstream transcoded to AC3, • Pass-through of HE AAC** bitstream, • Multichannel HE AAC** bitstream transcoded to AC3 or DTS, • PCM stereo from the decoded or down-mixed bitstream • PCM multi-channel from the decoded bitstream (optional), • Pass-through of DTS bitstream (optional). * E-AC3 mandatory after 01.01.2010 ** HE-AAC mandatory after 01.01.2010
Test procedure	**Purpose of test:** To verify that the receiver supports E-AC3 and HDMI interfaces. **Equipment:**  **Transport stream used:** Use transport stream M. **Test procedure:** 1. Setup the system, 2. Verify the HDMI output has correct bitstream format and audio is hearable correctly, 3. Select stereo mode for the audio in the menu system, 4. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs, 5. Select multichannel mode for the audio in the menu system, 6. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs. **Expected result:** When in receiver menu stereo is selected, decoding of E-AC3 shall be available at HDMI output as PCM stereo. When in receiver menu multichannel is selected, decoding of E-AC3 shall be supported in all formats according to below: • E-AC3 pass through • Transcoded to AC3 • PCM stereo downmix
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

<table>
<tr><td>Test</td><td>Task 7.3: HDTV AUDIO - support for E-AC3 on S/PDIF output interface</td></tr>
<tr><td>Requirement</td><td>The receiver shall be capable of providing the following formats on the S/PDIF connector:
• E-AC3* bitstream transcoded to AC3,
• Pass-through of AC3 bitstream,
• Multichannel HE AAC** bitstream transcoded to AC3 or DTS,
• PCM stereo from the decoded or down-mixed bitstream.

• Pass-through of DTS bitstream (optional).

* E-AC3 mandatory after 01.01.2010
** HE-AAC mandatory after 01.01.2010</td></tr>
<tr><td>Test procedure</td><td>Purpose of test:
To verify that the receiver supports E-AC3 on S/PDIF interfaces.

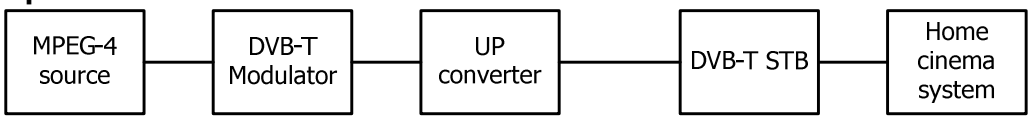
Equipment:
 

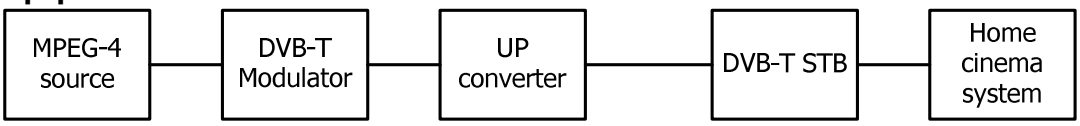
Transport stream used:
Use transport stream M.

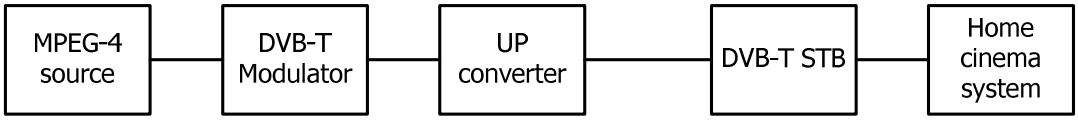
Test procedure:
1. Setup the system,
2. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly,
3. Select stereo mode for the audio in the menu system,
4. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs,
5. Select multichannel mode for the audio in the menu system,
6. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs.

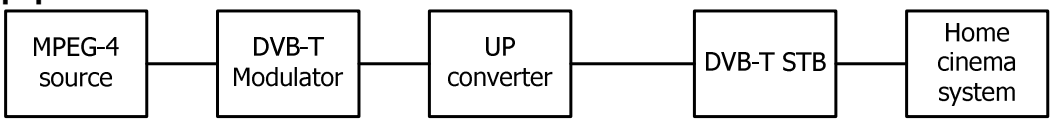
Expected result:
The receiver will support E-AC3 on S/PDIF output according to requirements.</td></tr>
<tr><td>Test results</td><td><table><tr><th></th><th>Conformity</th></tr><tr><td>PCM stereo from the decoded or down-mixed bitstream</td><td></td></tr><tr><td>Multichannel E-AC3 bitstream transcoded to AC3 or DTS</td><td></td></tr></table></td></tr>
<tr><td>Conformity</td><td>☐ Compliant
☐ Non-compliant ☐ Major deviation ☐ Minor deviation, comment</td></tr>
<tr><td>Comments</td><td>Non-compliancy can be fixed with software update: ☐ YES ☐ NO

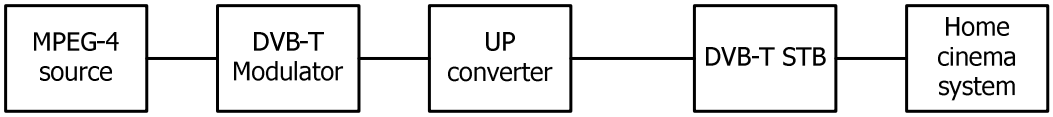
Describe more specific faults and/or other information:</td></tr>
<tr><td>Date:</td><td></td><td>Signature:</td><td></td></tr>
</table>

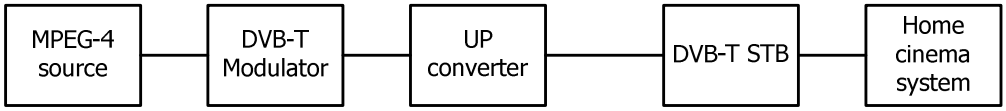
Test	*Task 7.4: HDTV AUDIO - E-AC3 requirements*
Requirement	The receiver shall: • Decode AC3 streams at all bitrates and sampling rates listed in ETSI TS 102 366 (not including Annex E). • (additionally) decode E-AC3 streams with data rates from 32 kbit/s to 3024 kbit/s and support all sample rates listed in TS 102 366 Annex E. • Be capable of transcoding E-AC3 bitstreams to AC3 bitstreams according to ETSI TS 102 366. Transcoding to AC3 audio streams shall be at a fixed bitrate of at least 640 kbit/s.
Test procedure	**Purpose of test:** To verify that the receiver supports E-AC3. **Equipment:**  The TS shall contain services, which has • E-AC3 (mono, stereo) audio component with relevant signalling at the 192, 256 and 384 kbit/s bitrates at 48kHz sampling rates, • E-AC3 (multichannel) audio component with relevant signalling at 384, 512 and 640 kbit/s bitrates at 48kHz sampling rates. **Transport stream used:** Use transport stream N1, N2 and N3. **Test procedure:** 1. Setup the system, 2. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly, 3. Select stereo mode for the audio in the menu system, 4. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs for the selected bitrates and sampling rates, 5. Select multichannel mode for the audio in the menu system, 6. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs for the selected bitrates and sampling rates. **Expected result:** Receiver supports the required audio formats.
Test results	E-AC3 stereo **Sampling/bitrates** | **192 kbit/s** | **256 kbit/s** | **384 kbit/s** 48 kHz | | | E-AC3 multichannel (5.1) **Sampling/bitrates** | **192 kbit/s** | **384 kbit/s** | **448 kbit/s** 48 kHz | | |
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 7.5: HDTV AUDIO - E-AC3 metadata support*
Requirement	The receiver shall support the use of Dolby metadata embedded in the audio stream when: • decoding AC3 or E-AC3 bitstreams, • transcoding E-AC3 bitstreams to AC3 or • creating a PCM stereo downmix from a decoded E-AC3 or AC3 bitstream.
Test procedure	**Purpose of test:** To verify that the receiver supports Dolby metadata. **Equipment:**  The TS shall contain a service E-AC3, which has the following metadata included in audio component: • Dolby Dynamic Range Control, • Dolby Dialogue Normalization according to ISO/IEC 14496-3 : 2005 (Audio 3rd edition), • Down Mix parameters. **Transport stream used:** Use transport stream N1. **Test procedure:** 1. Setup the system, 2. Connect audio decoder to HDMI output, 3. Verify that the receiver supports metadata correctly for decoding of the E-AC3 stereo 4. Verify that the receiver supports metadata correctly for transcoding E-AC3 multichannel to AC3, 5. Verify that the receiver supports metadata correctly for creating PCM stereo downmix. **Expected result:** The receiver supports E-AC3 metadata according to requirements.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

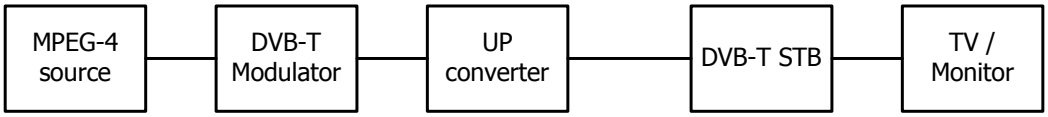
Test	*Task 7.6: HDTV AUDIO - support for HE AAC on HDMI output interface*
Requirement	The receiver shall be capable of providing the following formats on the HDMI connector: • Pass-through of native bitstream AC3 and E-AC3*, • E-AC3 bitstream transcoded to AC3, • Pass-through of HE AAC** bitstream, • Multichannel HE AAC bitstream transcoded to AC3 or DTS, • PCM stereo from the decoded or down-mixed bitstream, • PCM multi-channel from the decoded bitstream (optional), • Pass-through of DTS bitstream (optional). * E-AC3 mandatory after 01.01.2010 ** HE-AAC mandatory after 01.01.2010
Test procedure	**Purpose of test:** To verify that the receiver supports HE AAC on HDMI interfaces. **Equipment:**  The TS shall contain services, which has • HE AAC Level2 @48kHz (mono, stereo) audio component with relevant signalling. • HE AAC Level4 @48kHz (multichannel) audio component with relevant signalling. **Transport stream used:** Use transport stream O. **Test procedure:** 1. Setup the system, 2. Verify the HDMI output has correct bitstream format and audio is hearable correctly, 3. Select stereo mode for the audio in the menu system, 4. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs, 5. Select multichannel mode for the audio in the menu system, 6. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs. **Expected result:** When in receiver menu stereo is selected, decoding of HE AAC Level 2 (stereo) shall be available at HDMI output as PCM stereo. When in receiver menu multichannel is selected, decoding of HE AAC Level 4 (multichannel) shall be supported in all formats according to below: • HE AAC pass through • Transcoded to AC3 • Transcoded to DTS • PCM stereo downmix
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 7.7: HDTV AUDIO - support for HE AAC on S/PDIF output interface*
Requirement	The receiver shall be capable of providing the following formats on the S/PDIF connector: • E-AC3* bitstream transcoded to AC3, • Pass-through of AC3 bitstream, • Multichannel HE AAC** bitstream transcoded to AC3 or DTS, • PCM stereo from the decoded or down-mixed bitstream, • Pass-through of DTS bitstream (optional). * E-AC3 mandatory after 01.01.2010 ** HE-AAC mandatory after 01.01.2010
Test procedure	**Purpose of test:** To verify that the receiver supports HE AAC in S/PDIF interfaces. **Equipment:**  The TS shall contain services, which has • HE AAC Level2 @48kHz (mono, stereo)audio component with relevant signalling. • HE AAC Level4 @48kHz (multichannel)audio component with relevant signalling. **Transport stream used:** Use transport stream O. **Test procedure:** 1. Setup the system, 2. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly, 3. Select stereo mode for the audio in the menu system, 4. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs, 5. Select multichannel mode for the audio in the menu system, 6. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs. **Expected result:** The receiver supports the HE AAC on S/PDIF according to requirements.
Test results	<table><tr><th></th><th>Conformity</th></tr><tr><td>PCM stereo from the decoded or down-mixed bitstream</td><td></td></tr><tr><td>Multichannel HE AAC bitstream transcoded to AC3 or DTS</td><td></td></tr></table>
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

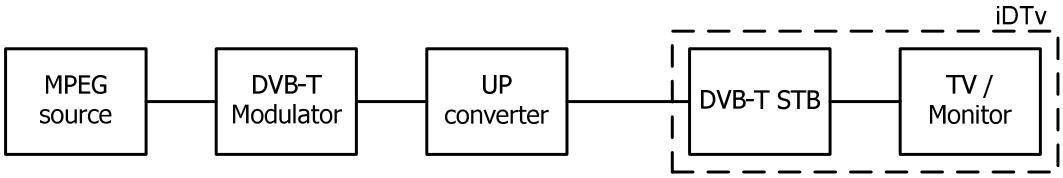
Test	*Task 7.8: HDTV AUDIO - HE AAC requirements*
Requirement	The receiver shall: • be capable of decoding HE AAC Level 2 (mono, stereo) at sampling rates of 48 kHz according to ETSI TS 101 154, Annex H. • be capable of decoding HE AAC Level 4 (multi-channel, up to 5.1) at sampling rates of 48 kHz according to ETSI TS 101 154, Annex H (downmix). • be capable of transcoding HE AAC Level 4 (multi-channel, up to 5.1) at sampling rates of 48 kHz according to ETSI TS 101 154, Annex H to AC3 or DTS. If supported, transcoding to AC3 audio streams shall be according to ETSI TS 102 366 at a fixed bitrate of 640 kbit/s. If supported, transcoding to DTS audio streams shall be according to TS 102 114 at a fixed bitrate of 1,536 Mbit/s.
Test procedure	**Purpose of test:** To verify that the receiver supports HE AAC requirements. **Equipment:**  The TS shall contain services, which has • HE AAC Level2 @48kHz (mono, stereo) audio component with relevant signalling. • HE AAC Level4 @ 48kHz (multichannel) audio component with relevant signalling. **Transport stream used:** Use transport stream O. **Test procedure:** 1. Setup the system, 2. Play the transport stream and select the appropriate service, 3. Verify the HDMI output has correct bitstream format and audio is hearable correctly, 4. Select stereo mode for the audio in the menu system, 5. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs for the selected bitrates and sampling rates, 6. Select multichannel mode for the audio in the menu system, 7. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs for the selected bitrates and sampling rates. **Expected result:** Receiver supports decoding of HE AAC Level2 and 4 @48 kHz and transcoding of it to AC3 or DTS and supports down-mixing.
Test results	**Functionality** / **Compliancy** Decoding of HE AAC L2@48kHz Decoding of HE AAC L4@48kHz Transcoding of HE AAC L4@48kHz to AC3 at 640kbps Transcoding of HE AAC L4@48kHz to DTS 1,536Mbps
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

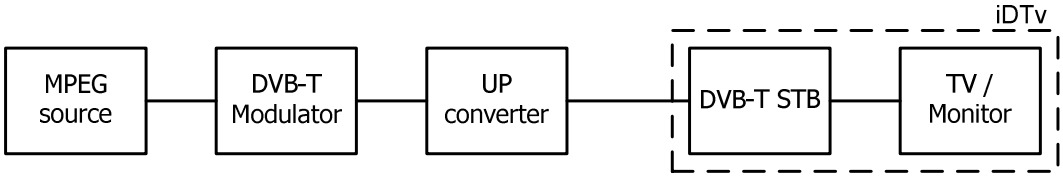
Test	*Task 7.9: HDTV AUDIO - HE AAC metadata support*
Requirement	The HDTV level receiver shall support the use of the following metadata embedded in the audio stream when decoding HE AAC and transcoding multichannel HE AAC to AC3 or DTS: • Dynamic Range Control according to ISO/IEC 14496-3 • Program Reference Level according to ISO/IEC 14496-3 • Mix Down Parameters according to "Transmission of MPEG4 Ancillary Data" part of DVB specification ETSI TS 101 154.
Test procedure	**Purpose of test:** To verify that the receiver supports HE AAC metadata. **Equipment:**  The TS shall contain a service, which has the following metadata included in audio component: • [aacPlus] Dynamic Range Control (equivalent to [Dolby] Dynamic Range Control) • [aacPlus] Program Reference Level (equivalent to [Dolby] Dialogue Normalization) according to ISO/IEC 14496-3 : 2005 (Audio 3rd edition) • Mix Down Parameters **Transport stream used:** Use transport stream O. **Test procedure:** 1. Setup the system 2. Connect audio decoder to HDMI output. 3. Verify that the receiver supports metadata correctly for decoding of the HE AAC stereo or transcoding HE AAC multichannel to AC3 or DTS. 4. Verify that the receiver supports down-mixing to stereo output **Expected result:** The receiver shall support HE AAC metadata according to requirements.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 8.1: Radio mode – basic functionality*
Requirement	The STB shall allow basic DVB-T RADIO reception and operation (switching between channels) without a TV screen. This can be done with a Radio/TV button on the front plate or on the remote control.
Test procedure	**Purpose of test:** To verify the radio functionality of STB. **Equipment:** Receiver under test. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Play transport stream including video (MPEG-4 and MPEG-2) and also radio services. The reception of radio services shall be checked and possibilities of radio service selection over user interface or display (if any). **Transport stream used:** Use transport stream D. **Expected result:** STB is capable of reception and switching between radio services.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 8.2: Radio mode - radio channel list*
Requirement	If a DVB stream is labeled as a „Radio Service", it should always be shown by the STB in the radio channel list, even if there might be an elementary video stream sent along.
Test procedure	**Purpose of test:** To verify if STB includes in service list all services labeled as »Radio service«. **Equipment:** Receiver under test.  **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Play transport stream including radio services and video stream, 3. Check if the radio services are listed in radio services list. **Transport stream used:** Use transport stream D. **Expected result:** Radio services are in all cases listed in radio lists.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

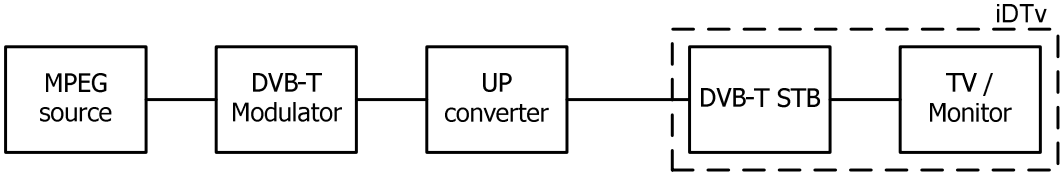
Test	*Task 9.1: System software upgrade*
Requirement	The receiver shall provide at least one mechanism for upgrading system software. HDTV Level receivers shall support and use OTA System Software Update procedure according to the ETSI TS 102 006. The manufacturer shall provide procedure and functions carrying out upgrade in the receiver.
Test procedure	**Purpose of test:** To verify if the receiver provides at least one mechanism for upgrading system software. To verify if HDTV level receiver supports and use OTA System Software Update procedure according to the ETSI TS 102 006. **Equipment:** Receiver under test, SW, user manual, cables. **Test procedure:** 1. Prepare test environment and setup of instruments – depending on upgrade method, 2. Get the upgrade file (in case of upgrade via RS232/USB), 3. Perform the upgrade according to user manual of manufacturer (in case of upgrade via RS232/USB), 4. In user interface select option for automatic upgrade over DVB-T network (mandatory for HDTV level receivers), 5. Check in user manual if prescribed upgrade procedure is supported by manufacturer. **Expected result:** Using one of upgrade methods it is possible to upgrade the receiver.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

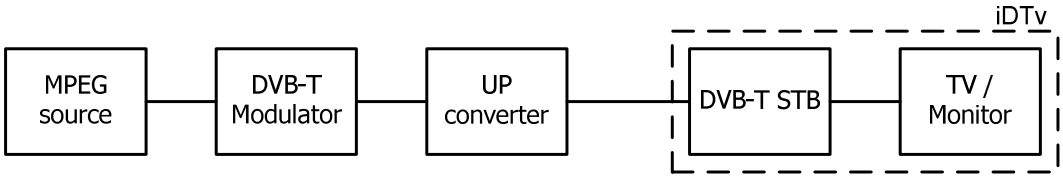
Test	*Task 10.1: Processing of PSI/SI tables.*
Requirement	The receiver shall have system software for interpretation and handling of the active service information and control of the local hardware/software according to EN 300 468 and ETSI TR 101 211. The following tables are a mandatory set of tables the receiver shall be able to process: NIT, CAT(option), PAT, PMT, SDT, EIT, TDT, TOT.
Test procedure	**Purpose of test:** To verify static and dynamic processing of PSI/SI tables. **Equipment:**  **Transport stream used:** Use transport streams H and I. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Play transport stream H and write down the content of NIT, EIT (parental), SDT, 3. Put the receiver to "Standby", 4. Play transport stream I, 5. Turn the receiver "ON", 6. Verify that the content of the information is updated in the receiver service list, 7. Repeat the test and in point 2 disconnect the power from receiver. **Expected result:** Changes generated in transport streams are processed.
Test results	<table><tr><th></th><th>Conformity</th></tr><tr><td>Toggling from "ON-Standby"</td><td></td></tr><tr><td>Toggling "ON-Power OFF"</td><td></td></tr></table>
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

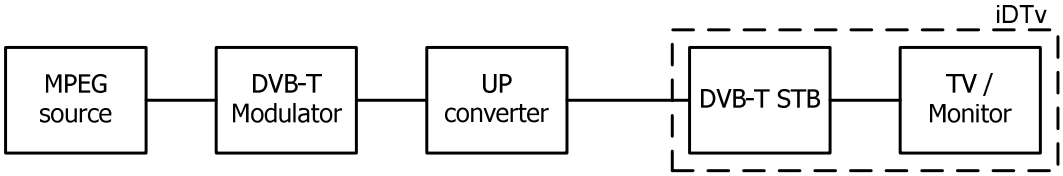
Test	*Task 10.2: EPG functionality for EIT actual and EIT other*
Requirement	The receiver shall offer basic functionality of EPG in order to present following: • EIT actual (present/following/scheduled) • EIT other (present/following/scheduled)
Test procedure	**Purpose of test:** To verify the EPG functionality of receiver. **Equipment:**  **Transport stream used:** Use transport stream I. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Play transport stream and check the presenting of EPG. **Expected result:** The receiver is presenting EPG information correctly.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

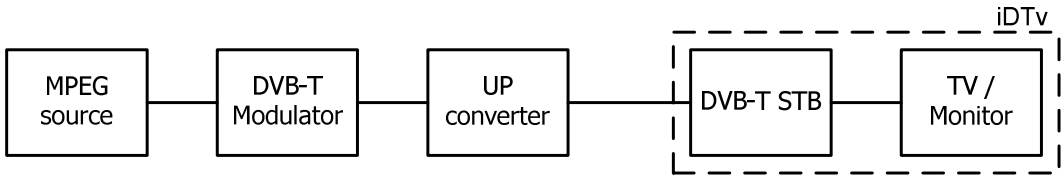
Test	*Task 10.3: Presentation of EPG in Slovene language*
Requirement	The navigator shall be presented in SLOVENE language and EPG shall support characters from code table ISO/IEC 8859-2.
Test procedure	**Purpose of test:** To verify if the navigator is presented in SLOVENE language and supports characters from code table ISO/IEC 8859-2. **Equipment:** Receiver under test. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Inside user interface check the correct displaying of Slovene characters according to requirement. **Transport stream used:** Use transport stream I. **Expected result:** The receiver is using code table ISO/IEC 8859-2 and presents Slovene characters correctly.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 10.4: Default audio language support*
Requirement	The receiver shall be able to use the default preferences for audio language. If an audio stream for the default audio language is available for the service, the receiver shall automatically choose that audio-stream.
Test procedure	**Purpose of test:** To verify the possibility of auto selecting the audio according to the language settings. **Equipment:** Receiver under test. **Transport stream used:** Use transport stream I. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Play transport stream, 3. Inside user interface select the language for presentation of AUDIO content, 4. Tune to service including different languages, 5. Check if audio is presented in the language set in point 3. **Expected result:** The receiver automatically selects the audio content according to saved user preference.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 10.5: CVBS teletext*
Requirement	The SDTV Level receiver shall offer at least one of following options for presentation of Teletext: - By insertion of the Teletext data in the VBI of the analogue CVBS video output. Insertion shall conform to ITU-R BT.653-3 and to requirements for level 1.5 defined in ETS 300 706; - By presentation of Teletext within the navigator of the receiver.
Test procedure	**Purpose of test:** To verify the presentation of teletext using insertion in the VBI of the analogue CVBS video output. **Equipment:**  **Transport stream used:** Use transport stream C. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Inside user interface select program that includes teletext, 3. On external monitor/TV connected using SCART or CVBS interface check the presentation of teletext, 4. With remote control select teletext page 704 and check correct presentation of Slovene characters. **Expected result:** The teletext data are inserted in the VBI of the analogue CVBS video output using lines 6-22 and 320-335.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 10.6: Presentation of teletext within user interface for SDTV receivers*
Requirement	The SDTV Level receiver shall offer at least one of following options for presentation of Teletext: - By insertion of the Teletext data in the VBI of the analogue CVBS video output. Insertion shall conform to ITU-R BT.653-3 and to requirements for level 1.5 defined in ETS 300 706; - By presentation of Teletext within the navigator of the receiver.
Test procedure	**Purpose of test:** To verify the presentation of teletext within the navigator of the receiver. **Equipment:**  **Transport stream used:** Use transport stream C. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. On receiver input connect signal with included teletext, 3. By pressing button for teletext on receiver remote control check the teletext presentation, 4. Check the presentation of Slovene characters. **Expected result:** The teletext data is presented correctly inside user interface of receiver.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 10.7: User interface based teletext for HDTV Level receiver*
Requirement	HDTV Level receiver shall be able to display (EBU) Teletext (both normal teletext pages and teletext subtitling pages) using the OSD, meeting the requirements for level 1.5 in ETSI EN 300 706 "Enhanced Teletext Specification".
Test procedure	**Purpose of test:** To verify if HDTV Level receiver displays (EBU) Teletext (both normal teletext pages and teletext subtitling pages) using the OSD, meeting the requirements for level 1.5 in ETSI EN 300 706 "Enhanced Teletext Specification". **Equipment:**  **Transport stream used:** Use transport stream C. **Test procedure:** 1. Prepare test environment and setup of instruments. Connect Monitor/TV using HDMI interface, 2. Connect signal including teletext to receiver input, 3. By pressing button for teletext on receiver remote control check the teletext presentation, 4. Check the presentation of Slovene characters. **Expected result:** The teletext data is presented correctly inside user interface of receiver by using HDMI and SCART interface.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 10.8: DVB subtitling*
Requirement	The receiver shall be capable of decoding and displaying DVB subtitle services which are transmitted in conformance with ETSI EN 300 743 including characters from code table ISO/IEC 8859-2. The HDTV Level receiver shall include default font(s) with good readability for all output video resolution modes for SDTV and HDTV. The HDTV Level receiver should be able to up-scale DVB SDTV subtitling and EBU Teletext subtitling for a service with HDTV video, with the target to keep the same relative size as the DVB SDTV subtitling and Teletext subtitling has within a SDTV video grid. Up-scaling should be done with a good readable result at the HDTV output.
Test procedure	**Purpose of test:** To verify that DVB subtitling is implemented and functional. **Equipment:**  **Transport stream used:** Use transport stream C. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Play transport stream, 3. Perform automatic program search, 4. Select service including only teletext subtitling (without DVB teletext), 5. Fill-in the test protocol, 6. Switch to service including both subtitling types: using teletext and using DVB subtitling, 7. Verify that the DVB subtitling is the only component that the receiver displays, 8. Fill-in the test protocol, 9. Verify that the DVB subtitling is in synchronization with the video, 10. Fill-in the test protocol, 11. Inside user interface disable the subtitling, 12. Verify there is no subtitling or only teletext subtitling is active (in case still transmitted), 13. Inside user interface enable the subtitling and verify the functionality (DVB subtitles default), 14. Fill-in the test protocol. **Expected result:** All test results are OK.

<table>
<tr><td>Test results</td><td>Procedure point 5

<table><tr><th>Expected result</th><th>Compliancy</th></tr><tr><td>Teletext subtitling active</td><td></td></tr></table>
Procedure point 8

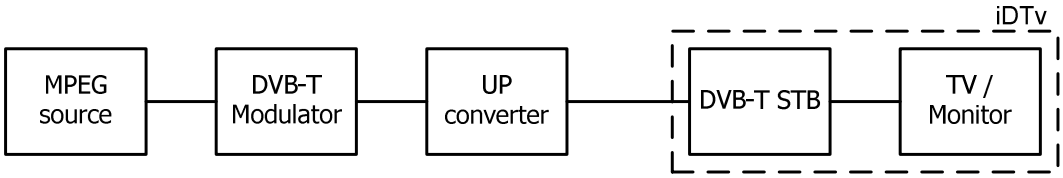
<table><tr><th>Expected result</th><th>Compliancy</th></tr><tr><td>DVB subtitling active</td><td></td></tr></table>

Procedure point 10

<table><tr><th>Expected result</th><th>Compliancy</th></tr><tr><td>DVB subtitling in synchronism with video</td><td></td></tr></table>
Procedure point 14

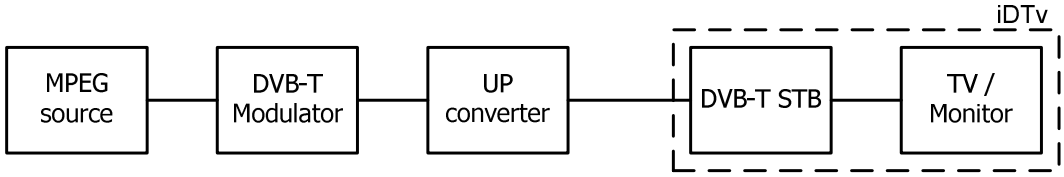
<table><tr><th>Expected result</th><th>Compliancy</th></tr><tr><td>It is possible to turn DVB subtitling ON/OFF</td><td></td></tr></table></td></tr>
<tr><td>Conformity</td><td>☐ Compliant
☐ Non-compliant ☐ Major deviation ☐ Minor deviation, comment</td></tr>
<tr><td>Comments</td><td>Non-compliancy can be fixed with software update: ☐ YES ☐ NO

Describe more specific faults and/or other information:</td></tr>
<tr><td>Date:</td><td></td><td>Signature:</td><td></td></tr>
</table>

Test	*Task 10.9: Storing user preferences in persistent memory*
Requirement	The user shall be able to store preferences in persistent memory.
Test procedure	**Purpose of test:** To verify saving of settings also in case of switching off power supply. **Equipment:**  **Transport stream used:** Use transport stream C. **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Set video format different from default, 3. Set audio format different from default, 4. Set user interface language different form default, 5. Set program list, 6. Switch the receiver OFF and disconnect power supply, 7. Turn receiver ON and verify that all settings from previous steps are still set. **Expected result:** User preferences are stored in persistent memory and are not affected by disconnecting power supply.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 10.10: Reset all parameters to factory mode*
Requirement	The receiver shall provide a function to reset all parameters to factory mode, thus removing all service lists, user preferences, etc. After reset, the receiver shall enter installation state.
Test procedure	**Purpose of test:** To verify the function of reset to factory mode. **Equipment:** Receiver under test. **Test procedure:** 1. Inside user interface find the function for reset of all parameters and activate the function, 2. Check if user settings and program lists are in installation state or deleted. **Expected result:** The receiver provides reset function and it is functioning OK.
Test results	
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***

Test	*Task 11.1: Remote control*		
Requirement	The receiver shall include remote control for managing and using the receiver.		
Test procedure	**Purpose of test:** To verify the conformity of remote control with manufacturer specifications. **Equipment:** Receiver under test. **Test procedure:** 1. Verify the functionality of remote control according to user manual (test is done also while performing all other tests because remote control is required for tests) **Expected result:** Remote control complies with requirement.		
Test results			
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment		
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:		
Date:		***Signature:***	

Test	*Task 12.1: Factory presets*
Requirement	For HDTV Level receivers following pre-settings shall be enabled: • Default language for User interface and subtitling set to "SLOVENE" • Default codepage for Slovene language IEC 8859-2 • Subtitling: ON (enabled) • Analogue video output format: 4:3 • "16:9 letterbox" conversion: ON • OTA System Software Upgrade: ON (enabled) • Default digital audio output set to PCM Stereo according to IEC 60958.
Test procedure	**Purpose of test:** To verify that parameters settings from requirement are selected according to country selection. **Equipment:**  **Test procedure:** 1. Prepare test environment and setup of instruments, 2. Perform factory reset of receiver, 3. Select »first use« and follow the procedure, 4. Verify if all required parameters are set according to requirement and fill the test results. **Expected result:** All presets are implemented.
Test results	**Expected result** / **Compliancy** Default codepage for Slovene language IEC 8859-2 Subtitling: ON (enabled) Analogue video output format: 4:3 set to"16:9 letterbox" conversion OTA System Software Upgrade: ON (enabled) Default digital audio output set to PCM
Conformity	☐ **Compliant** ☐ **Non-compliant** ☐ Major deviation ☐ Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: ☐ **YES** ☐ **NO** Describe more specific faults and/or other information:
Date:	***Signature:***