



CONFORMANCE TEST SPECIFICATION - RECOMMENDATIONS

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1 INTRODUCTION

This document is being prepared within SEE Digi.TV project¹, co-financed by the South-East Europe programme which helps to promote better integration between the Member States, candidate and potential candidate countries and neighbouring countries.

The aim of SEE Digi.TV project is to speed-up digitalization of broadcasting services, and to contribute to a wider use of ICT broadband services. As different stakeholders, especially broadcasters and industry are addressed by the project; positive impacts of the project should be reflected also in a broader business and social environment. The project is tackling issues of digital divide and social inclusion and aiming at creation of the region of equal opportunities. Project comprehends from 14 partners from 10 countries to whom APEK is acting as lead partner. The project partners are predominantly national regulatory bodies from Italy, Austria, Hungary, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Former Yugoslav Republic of Macedonia, Albania and Slovenia.

While the process of analogue switch-off is carried out, available specifications for the receivers and compliance test specifications are helpful to avoid inconsistencies between new digital networks and receivers available on the market. The aim of this document is therefore to help national institutions in developing conformity assessment procedures for receivers in the form of recommendations for the entire Digi.TV region, with a clear goal - to protect the market from use of non-compliant equipment.

The document is including short introduction listing also abbreviations, standards and other relevant documents used for test specifications. Second chapter is presenting the methodology and scope of test specifications. In the third chapter implementation guidelines are presented and in fourth chapter required equipment for performing the tests are listed. Fifth chapter is presenting quality measurement methods and definitions used in sixth chapter where test procedures are described and presented.

¹ <http://www.see-digi.tv/>

1.1 List of Abbreviations

AAC	Advanced Audio Coding
AC3	Digital audio compression standard, known as Dolby Digital
APEK	Post and Electronic Communications Agency of the Republic of Slovenia
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
DVB-T2	Digital Video Broadcasting – Second Generation Terrestrial
E-AC3	Enhanced AC3, known as Dolby Digital Plus
EDID	Extended Display Identification Data
EIT	Event Information Table
EN	European Norm
EPG	Electronic Programming Guide
ETSI	European Telecommunication Standards Institute
GMT	Greenwich Mean Time
HE-AAC	High Efficiency AAC
HDMI	High-Definition Multimedia Interface
HDTV	High Definition Television
HW	Hardware
iDTV	Integrated Digital TV set
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
ISQMM	Indirect subjective quality measurement method
ITU	International Telecommunication Union
MFN	Multi Frequency Network
MHP	Multimedia Home Platform
MIMO	Multiple-Input Multiple-Output
MPEG	Moving Pictures Expert Group
NID	Network ID
NIT	Network Information Table
ONID	Original Network ID
OSD	On-Screen Display
OTA	Over The Air
PAL	Phase Alternating Line

PAPR	Peak to Average Power Ratio
PAT	Program Association Table
PCM	Pulse Coded Modulation
PLP	Physical Layer Pipe
PMT	Program Map Table
PSI	Program Specific Information
QAM	Quadrature Amplitude Modulation
QEF	Quasi Error Free
QPSK	Quaternary Phase Shift Keying
RF	Radio Frequency
RGB	Red Green Blue
SDT	Service Description Table
SDTV	Standard Definition Television
SEE	South East Europe
SFN	Single Frequency Network
SI	Service Information
SISO	Single-Input and Single-Output
STB	Set-top Box
SW	Software
TDT	Time and Date Table
TOT	Time Offset Table
TPS	Transmission Parameters Signalling
TTX	Teletext
TS	Transport Stream
UHF	Ultra-High Frequency
VBI	Vertical Blanking Information
VBR	Variable Bitrate
VHF	Very-High Frequency

1.2 Reference documents

[1]	EN 300 744	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	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	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	Guidelines on Implementation and Usage of Service Information (SI)
[12]	ETSI TS 102 006	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	Human Factors (HF); User Interfaces; Character repertoires, ordering rules and assignments to the 12-key telephone keypad
[15]	ETSI EN 300 472	Conveying ITU-R System B Teletext in DVB bitstreams
[16]	ETSI EN 301 775	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
[22]	ETS 300 706	Enhanced Teletext Specification
[23]	ISO/IEC 8859-1	Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1
[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 Analog Component Video Interface
[27]	EN 300 743	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
[35]	EN 302 755	Frame structure channel coding and modulation for a second generation digital terrestrial television broadcasting system (DVB-T2).
[36]	ISO/IEC 8859-16	Information technology — 8-bit single-byte coded graphic

		character sets — Part 16: Latin alphabet No. 10
[37]	IRD GUIDELINES FOR THE DVB-T (S) PLATFORM AUSTRIA – Interactive profile	The Interactive Profile defines requirements to receive digital broadcast with support for enhanced applications and for an interaction channel.
[38]	IRD GUIDELINES FOR THE DVB-T (S) PLATFORM AUSTRIA – Enhanced profile	The Enhanced Profile defines requirements to receive digital broadcast with support for enhanced applications.
[39]	IRD GUIDELINES FOR THE DVB-T (S) PLATFORM AUSTRIA – Zapping profile	The Zapping Profile defines requirements to receive digital broadcast. The requirements for this profile are based on the DVB Specification.
[40]	Recommendation on minimum receiver technical requirements for the reception of DVB-T and DVB-T2 signal in the Republic of Croatia	The Croatian Post and Electronic Communications Agency (HAKOM) has issued this document as a recommendation regarding the minimum technical requirements to be met by DVB-T and DVB-T2 receivers in order to facilitate high-quality reception of basic digital terrestrial television services in the Republic of Croatia.
[41]	DGTVi D-Book 1.3 (rev.2)	Compatible DTV receivers for the Italian market: baseline requirements
[42]	DGTVi Z-Book 1.3 (rev.2)	Compatible DTV zapper receivers for the Italian market: baseline requirements
[43]	HD Book (final 1.0)	Compatible High Definition receivers for the Italian market: baseline requirements
[44]	Requirement specifications for DVB-T receivers used in Republic of Slovenia	The document represents minimum requirements for DVB-T receivers used in Republic of Slovenia.
[45]	Test specifications for DVB-T receivers used in Republic of Slovenia	Test specifications are established in order to ensure that decoders comply with the common minimum requirements for use in Republic of Slovenia.
[46]	NorDig unified requirements for integrated receiver decoders	document specifies a set of equipment requirements for reception of DVB-based and related services from cable, satellite and/or terrestrial broadcast networks
[47]	NorDig unified test specifications for integrated receiver decoders	Common test specifications are established in order to ensure that decoders comply with the common minimum requirements.
[48]	ISO/IEC 8859-2	Information technology — 8-bit single-byte coded graphic character sets — Part 2: Latin alphabet No. 2
[49]	ISO/IEC 8859-5	Information technology — 8-bit single-byte coded graphic character sets — Part 5: Latin/Cyrilic alphabet

2 METHODOLOGY AND SCOPE OF TEST SPECIFICATIONS

Conformance test specifications can be used as a basis for preparing national receivers testing specifications on the markets.

In general in SEE region and wider there are two approaches for performing testing of receivers:

- Testing by independent or national laboratory,
- Testing by manufacturers/importers.

Testing by independent or national laboratory is performed in countries where well organized system is in place and the receivers compliant to specifications can get special certificate for this market. In most cases this service is not free of charge for manufacturers due to high costs for equipment and testing procedure. Some independent laboratory or similar organization has to be authorized and responsible for performing the tests in order to guarantee repeatability and comparable level of results.

Testing by manufacturers or also self-testing is in most cases done in manufacturers own factory since advanced equipment is required to simulate the real environment. These tests are in most cases used for manufacturer to check that his products are compliant to national requirements. Extension of this method would be the self-labelling of equipment by receiver with appropriate label defined by national authority in order to provide information to end customers.

Testing procedures described in this document are prepared on a basis of requirements in document “Regional receiver specifications” and are including tests for conformance listed in that document. Test specifications shall be carefully evaluated and supplemented by national authorities in cooperation with experts and institution performing the tests in order to enable smooth execution of tests. All chapter of this document can be modified with the goal of providing more detailed information for the manufacturers related to implementation of special functionality which cannot be detailed enough defined in receiver requirements. National version of this document shall be also used by manufacturers for their implementation of functionality and self-testing.

3 IMPLEMENTATION GUIDELINES AND RECOMMENDATIONS

Guidelines for implementing test specifications on national level are presented in this chapter. It is important for each country or publishing authority to realize that receiver test specifications can be a basis of future development of digital terrestrial networks; in addition non-conformances between new digital networks and receivers on the market can be prevented.

Testing is more important in case of new network technologies such as DVB-T2 and also in case of new or not common functionalities used in a country (special characters, logical channel numbering, program time division, new coding standards etc). In cases more mature technologies are used testing is less important due to better implementation from manufacturers but still there can be some issues due low-cost equipment not complying with national requirements.

Detailed tests for receivers are described in chapter testing tasks. However the tests are not adapted to any particular country and are covering technical details defined in Regional receiver specifications. Test specifications are covering several standards and profiles of audio coding (MPEG-1L2, AAC, HE-AAC, AC3) and video coding standards and profiles (MPEG-2, MPEG-4). In addition two technologies of terrestrial DVB networks, DVB-T and DVB-T2 are considered inside the document.

For adaptation of the document to specific country it is required to consider what standards and functionality will be used in the country and to adopt the test specifications accordingly. Neighbouring countries should also be taken into consideration if viewers on border regions and national minorities should be enabled to receive cross-border programs.

Test specifications are actually extension of receiver specifications and are more precisely defining some functionality requested in receiver specifications. This document shall not be prepared as stand-alone or before publishing general receiver requirements. Inside test specifications it is possible to specify some functionality and receiver behaviour more in detail, especially this is valid for functionality related to behaviour in some exactly defined cases most likely to be problematic for receivers.

For adaptation to specific country responsible authority shall take into consideration general country circumstances in order to decide if the test specifications will be published or decision will be taken to leave this area to manufacturers/importers.

Best practices shows that countries usually adopt some model of certification procedures for compliant receivers, which is best way of preventing non-conformances on the market and keeping the end-users satisfied. Such practices were adopted in Austria, Croatia, Hungary, Italy and Slovenia, which all found different approach on certification or labelling procedures.

Austria, Italy and Slovenia gave certification process to certified labs that are responsible for tests of receivers according to their already adopted requirements and test specifications. If conformances are inside given tolerances, receiver is given a sticker which represents that it is applicable for receiving the signal in specific country without any major problems.

Croatia and Hungary adopted a little bit different process of certification. Croatia demands that each seller of receivers puts a sticker with pre-suggested technical details on the box, so that end-users are capable of finding out if receivers is matching their demands or not, while Hungary gave their requirements and test specifications to one of the producers of receivers which is now producing receivers according to country requirements. All in all it can be found that all certifications process have same goal on the end, which is preventing non-conformant receivers entering the market and through this preventing end-users to have difficulties when receiving signal.

4 EQUIPMENT USED FOR RECEIVER TESTING AND DESCRIPTION OF TRANSPORT STREAMS

In following 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.

4.1 Equipment used for receiver testing

Comment for implementation:

Current list of required equipment is containing also DVB-T2 equipment. In case of deciding for DVB-T only the equipment list shall be modified accordingly. In addition some specific equipment may be required for preparation of transport streams or generating some specific tests and is not included to this list.

1. MPEG-2 and MPEG-4 source (including sound and video content),
2. 2 x DVB-T (DVB-T2) Modulator with IF output,
3. DVB-T UP-converter for conversion from IF to RF,
4. Fading simulator,
5. Noise generator,
6. Analogue TV RF modulator with generator of PAL, STEREO and teletext,
7. Spectrum analyzer,
8. Power meter,
9. Universal measuring instrument for voltage and current,
10. TV/Monitor supporting 4:3 and 16:9 aspect ratio, HDMI interface,
11. Audio receiver with S/PDIF and HDMI interface,
12. Connection cables, dividers, connectors, attenuators and other accessories,
13. Digital STB receiver (standalone or integrated).

4.2 Description of transport streams

Comment for implementation:

This chapter is presenting required transport streams for performing the tests. Transport streams are required for simulating controlled environment and enabling repetition of testing tasks.

Detailed list of transport streams can be prepared based on national requirements and under consideration of execution of tests. It has to be evaluated exactly how the test will be executed and which tests can be done in parallel to avoid much extra work for preparation of specific test environments and execution of tests.

Description of test streams in this document should be used more for presentation which information/content is required to be included to transport streams in order to enable execution of tests.

Furthermore best option would be to have the transport streams descriptions prepared by laboratory or organisation actually performing the tests. Additional option would be also to offer to manufacturers the possibility to acquire or get the transport streams in order to enable performing of self-certification.

In this section of the document the main components of the test transport streams are described. Only the important parameters are commented. All transport streams shall be prepared according to ETSI TS 102 154 and shall consider all relevant technical data for execution of tests. Network Information Table (NIT), Original Network ID (ONID), Network ID (NID) shall be configured as per the country specific requirements.

Stream: A

- *Should include following PSI/SI tables: NIT, SDT, PAT, PMT, TDT and TOT*
- *Should include following services:*
 - *Synchronization content (Lipsync)*
 - *CBR content at 600 kbit/s – H.264/10 AVC + TTX*
 - *CBR content at 600 kbit/s – MPEG2*
 - *H.264/10 AVC+TTX*

Stream: B

- *Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT*
- *Should include following services with different resolutions:*
 - *H.264/10 AVC – 720x576 resolution*
 - *H.264/10 AVC – 544x576 resolution*
 - *H.264/10 AVC – 480x576 resolution*
 - *H.264/10 AVC – 352x576 resolution+TTX*

Stream: C

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC – 720x576 resolution
 - H.264/10 AVC – 480x576 resolution
 - H.264/10 AVC + TTX, without audio
 - MPEG2 + (TTX + DVB) Subtitling

Stream: D

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - TV service – H.264/10 AVC – 720x576 resolution
 - TV service – H.264/10 AVC – 720x576 resolution
 - TV service – H.264/10 AVC – 720x576 resolution, AAC
 - Radio service with AAC
 - Radio service with MPEG1 – Layer II
 - Radio service with MPEG1 – Layer II
 - Radio service with MPEG1 – Layer II
 - Radio service with MPEG1 – Layer II

Stream: E

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following content: statistical multiplex with VBR
- Should include following services:
 - H.264/10 AVC – 720x576 resolution with MPEG1 Layer II
 - H.264/10 AVC – 720x576 resolution with no audio
 - H.264/10 AVC – 720x576 resolution with no audio
 - H.264/10 AVC – 1920x1080i resolution with AC3-2/0
 - H.264/10 AVC – 1920x1080i resolution with AC3-3/2
 - MPEG2 – 720x576 resolution with MPEG1 Layer II (BEEP)

Stream: F

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC with 4:3 aspect ratio
 - MPEG2 – SD with 16:9 aspect ratio
 - H.264/10 AVC – HD with 16:9 aspect ratio and E-AC3
 - H.264/10 AVC – SD with 4:3 aspect ratio

Stream: G

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC – 720x576i with MPEG1 Layer II
 - H.264/10 AVC – 720x576i with no audio
 - H.264/10 AVC – 720x576i with no audio
 - H.264/10 AVC – 1920x1080i with AC3-2/0
 - H.264/10 AVC – 1920x1080i with AC3-3/2
 - MPEG2 – 720x576i with MPEG1 Layer II (BEEP)
 - H.264/10 AVC – 1920x1080i with E-AC3-2/0

Stream: H

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, EIT, TDT and TOT
- Should include following services:
 - MPEG2 – 720x576i with MPEG1 Layer II, TTX and VPS
 - MPEG2 – 544x576i with MPEG1 Layer II, TTX and VPS
 - MPEG2 – 480x576i with MPEG1 Layer II, TTX and VPS
 - MPEG2 – 352x576i with MPEG1 Layer II, TTX and VPS

Stream: I

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, EIT, TDT and TOT
- Should use following EIT contents: current/following + parental rating
- End of show/ start of new show, changes in parental rating
- EPG language with desired language
- Should include following services:
 - H.264/10 AVC – 720x576i with MPEG1 Layer II, TTX and VPS
 - H.264/10 AVC – 720x576i with MPEG1 Layer II, TTX and VPS
 - H.264/10 AVC – 720x576i with MPEG1 Layer II
 - H.264/10 AVC – 720x576i with MPEG1 Layer II, TTX and VPS

Stream: K

- **Stream K is stream B without NIT table and is used for testing of signalization.**
- Should include following PSI/SI tables: PAT, **No NIT**, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC – 720x576 resolution
 - H.264/10 AVC – 544x576 resolution
 - H.264/10 AVC – 480x576 resolution
 - H.264/10 AVC – 352x576 resolution with TTX

Stream: L

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, EIT, TDT and TOT
- **Changes in PMT current_version, swiching of service components**
- Should include following services:
 - TV service with H.264/10 AVC with MPEG1 Layer II, TTX and VPS
 - TV service with H.264/10 AVC with AC3-2/0 audio
 - Radio service with MPEG1 Layer II
 - Radio service with MPEG1 Layer II

Stream: M

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC – 1920x1080i with E-AC3-2/0
 - H.264/10 AVC – 1280x720p with MPEG1 Layer II and AC3-3/2

Stream: N1

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC – 1920x1080i with E-AC3-2/0 (384 kbit/s)
 - H.264/10 AVC – 1920x1080i with E-AC3-3/2 (448 kbit/s)

Stream: N2

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC – 1920x1080i with E-AC3-2/0 (256 kbit/s)
 - H.264/10 AVC – 1920x1080i with E-AC3-3/2 (384 kbit/s)

Stream: N3

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC – 1920x1080i with E-AC3-2/0 (192 kbit/s)
 - H.264/10 AVC – 1920x1080i with E-AC3-3/2 (192 kbit/s)

Stream: O

- Should include following PSI/SI tables: PAT, NIT, PMT, SDT, CAT, EIT, TDT and TOT
- Should include following services:
 - H.264/10 AVC – 1920x1080i with:
 - HE-AAC3-2/0 (48 kbit/s)
 - HE-AAC3-2/0 (80 kbit/s)
 - HE-AAC3-2/0 (96 kbit/s)

Stream: P – dedicated DVB-T2 test streams

- *NOTE: this transport streams shall be prepared for testing DVB-T2 functionality and are not described more in detail. Since currently there are too many options to list them all inside this document please use also information provided by DVB organization² related to T2 transport streams. DVB organization also prepared some DVB-T2 test streams which are more detailed described in document published on their webpage³. Prepared transport streams shall include all national characteristics related to broadcasting.*

² <http://www.dvb.org/technology/dvbt2/>

³ http://www.dvb.org/technology/dvbt2/DVB-T2_ReferenceStream-Documentation.pdf

5 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; inside this document ISQMM method is foreseen to be used for performing this measurement.

ISQMM (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.

6 DESCRIPTION OF TEST PROCEDURES

Test specifications are used for testing functionality and compliancy with relevant standards listed inside national receiver specifications. Basis for the test specifications from this document shall be the document “REGIONAL RECEIVER SPECIFICATION –RECOMMENDATIONS”. Testing specifications cannot be used without adopted and published national receiver specifications.

In this document universal term “RECEIVER” refers to all devices capable to receive DVB-T/DVB-T2 signal in order to present AUDIO and VIDEO content (iDTV, STB, other devices). In case some tests or wording don’t apply for all device types it is noted for which types it is relevant.

In following table information about relevance of some test for receiver type is presented. The table shall be adopted accordingly in case of adopting national specifications and shall reflect information provided in regional receiver requirement specifications.

Req. spec.	Description	SDTV level	HDTV level	DVB-T	DVB-T2	Task	Comment
Chapter 6.2.1.1	Reception and automatic scan through the whole frequency range for DVB-T	shall	shall	shall	shall	1.1a	
Chapter 6.2.1.1	Reception and automatic scan through the whole frequency range for DVB-T2	shall	shall	-	shall	1.1b	
Chapter 6.2.1.1	Frequency band and offset for DVB-T	shall	shall	shall	shall	1.2a	
Chapter 6.2.1.1	Frequency band and offset for DVB-T2	shall	shall	-	shall	1.2b	
Chapter 6.2.1.1	Performance in Single Frequency Networks - echo inside the guard interval	shall	shall	shall	shall	1.3	
Chapter 6.2.1.1	Performance in Single Frequency Networks - echo outside the guard interval	shall	shall	shall	shall	1.4	
Chapter 6.2.1.1	Transmitting parameters for DVB-T	shall	shall	shall	shall	1.5a	
Chapter 6.2.1.1	Transmitting parameters for DVB-T2	shall	shall	-	shall	1.5b	
Chapter 6.2.1.1	Signal level and signal quality indicator	shall	shall	shall	shall	1.6	
Chapter 6.2.1.1	Performance in SFN networks on Gaussian channel with presence of noise in input signal	shall	shall	shall	shall	1.7	
Chapter 6.2.1.2	Maximum Receiver Signal Input Level	shall	shall	shall	shall	1.8	
Chapter 6.2.1.2	Immunity to »analogue« signals on neighbouring channels	shall	shall	shall	shall	1.9	

Req. spec.	Description	SDTV level	HDTV level	DVB-T	DVB-T2	Task	Comment
Chapter 6.2.1.2	Immunity to »digital« signals on neighbouring channels	shall	shall	shall	shall	1.10	
Chapter 6.2.1.3	RF input connector	shall	shall	shall	shall	1.11	
Chapter 6.2.1.3	RF output connector - loop trough	shall	shall	shall	shall	1.12	
Chapter 6.2.1.4	Automatic program search	shall	shall	shall	shall	2.1	
Chapter 6.2.1.4	Manual program search	shall	shall	shall	shall	2.2	
Chapter 6.2.1.4	Tuning and scanning - Changes in modulation parameters	shall	shall	shall	shall	2.3	
Chapter 6.2.1.5	Tuning and scanning - dynamic	shall	shall	shall	shall	2.4	
Chapter 6.2.2.1	SCART interface	shall	shall	shall	shall	3.1	
Chapter 6.2.2.3	Interface for Conditional Access	should	should	should	should	3.2	
Chapter 6.2.2.4	Digital Audio Output (S/PDIF)	shall	shall	shall	shall	3.3	
Chapter 6.2.2.6	HDMI interface – compliancy for »HD Ready«	-	shall	-	-	3.4	
Chapter 6.2.2.6	HDMI interface - EDID information	-	shall	-	-	3.5	
Chapter 6.2.2.6	HDMI interface - original format	-	shall	-	-	3.6	
Chapter 6.2.2.6	HDMI interface – Manual setting of resolution	-	shall	-	-	3.7	
Chapter 6.2.3	Real time clock	shall	shall	shall	shall	4.1	
Chapter 6.2.4	MPEG Demultiplexer – maximum transport stream data rate	shall	shall	shall	shall	5.1	
Chapter 6.2.4	MPEG Demultiplexer – support of variable bitrate (statistical multiplexing)	shall	shall	shall	shall	5.2	
Chapter 6.2.5	MPEG VIDEO Decoder - Audio video synchronization	shall	shall	shall	shall	6.1	
Chapter 6.2.5.1	MPEG VIDEO Decoder - decoding of MPEG-2 SD resolutions	shall	shall	shall	shall	6.2	
Chapter 6.2.5.1	MPEG VIDEO Decoder - decoding of MPEG-4 SD resolutions	shall	shall	shall	shall	6.3	
Chapter 6.2.5.1	MPEG VIDEO Decoder - minimum bitrate	shall	shall	shall	shall	6.4	
Chapter 6.2.5.2	MPEG VIDEO Decoder - decoding of MPEG-4 HD resolutions	-	shall	-	-	6.5	
Chapter 6.2.5.2	HDTV - Down-conversion of High Definition Video for Standard Definition output	-	shall	-	-	6.6	
Chapter 6.2.6.1	SDTV AUDIO - decoder	shall	shall	shall	shall	7.1	
Chapter 6.2.6.2	HDTV AUDIO - support for E-AC3 on HDMI output interface	-	shall	-	-	7.2	
Chapter 6.2.6.2	HDTV AUDIO - support for E-AC3 on S/PDIF output interface	-	shall	-	-	7.3	
Chapter 6.2.6.2	HDTV AUDIO - E-AC3 requirements	-	shall	-	-	7.4	

Req. spec.	Description	SDTV level	HDTV level	DVB-T	DVB-T2	Task	Comment
Chapter 6.2.6.2	HDTV AUDIO - E-AC3 metadata support	-	shall	-	-	7.5	
Chapter 6.2.6.2	HDTV AUDIO - support for HE AAC on HDMI output interface	-	shall	-	-	7.6	
Chapter 6.2.6.2	HDTV AUDIO - support for HE AAC on S/PDIF output interface	-	shall	-	-	7.7	
Chapter 6.2.6.2	HDTV AUDIO - HE AAC requirements	-	shall	-	-	7.8	
Chapter 6.2.6.2	HDTV AUDIO - HE AAC metadata support	-	shall	-	-	7.9	
Chapter 6.2.7	Radio mode - basic functionality	shall	shall	shall	shall	8.1	
Chapter 6.2.7	Radio mode - radio channel list	should	should	should	should	8.2	
Chapter 6.2.8	System software upgrade	shall	shall	shall	shall	9.1	
Chapter 6.2.9.1	Processing of PSI/SI tables.	shall	shall	shall	shall	10.1	
Chapter 6.2.9.1	EPG functionality for EIT actual and EIT other	shall	shall	shall	shall	10.2	
Chapter 6.2.9.2	Presentation of EPG in appropriate language	shall	shall	shall	shall	10.3	
Chapter 6.2.9.2	Default audio language support	shall	shall	shall	shall	10.4	
Chapter 6.2.9.3	CVBS teletext	shall	should	-	-	10.5	Task 10.5 or 10.6.
Chapter 6.2.9.3	Presentation of teletext within user interface for SDTV receivers	shall	-	-	-	10.6	Task 10.5 or 10.6.
Chapter 6.2.9.3.1	User interface based teletext for HDTV Level receiver	-	shall	-	-	10.7	
Chapter 6.2.9.4	DVB subtitling	shall	shall	shall	shall	10.8	
Chapter 6.2.9.5	Storing user preferences in persistent memory	shall	shall	shall	shall	10.9	
Chapter 6.2.9.5	Reset all parameters to factory mode	shall	shall	shall	shall	10.10	
Chapter 6.2.10	Remote control	shall	shall	shall	shall	11.1	
Chapter 6.2.11	Factory presets	shall	shall	shall	shall	12.1	

6.1 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.

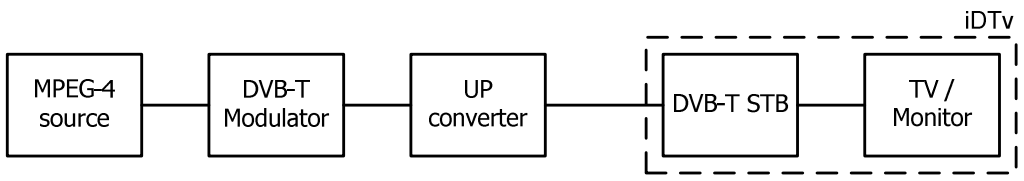
Table 1: Receiver data

Manufacturer:	
Model:	
S/N:	
SW version:	
HW version:	
Supported Content Type:	<input type="checkbox"/> SDTV <input type="checkbox"/> HDTV
Supported Network Type:	<input type="checkbox"/> DVB-T <input type="checkbox"/> DVB-T2
Other information:	

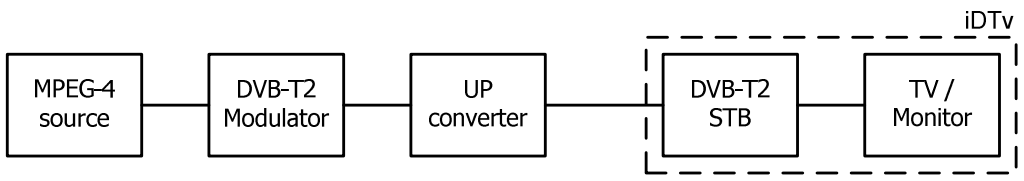
6.2 Testing tasks

Test	<i>Task 1.1a: Reception and automatic scan through the whole frequency range for DVB-T</i>	
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	<p>Purpose of test: To verify reception of DVB-T signal and scan through whole frequency range (VHF and UHF).</p> <p>Equipment: Receiver under test, monitor (TV) in case of STB, documentation.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: Receiver is capable of scanning whole frequency bands UHF and VHF.</p>	
Test results		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:	
Date:		Signature:

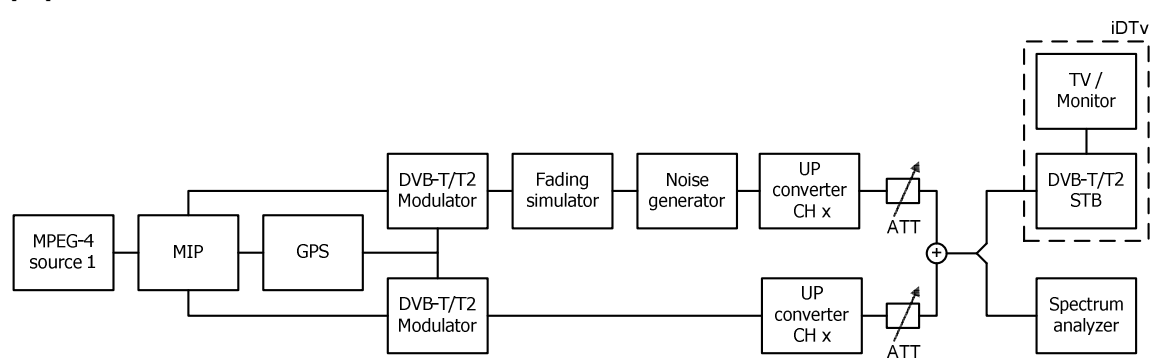
Test	<i>Task 1.1b: Reception and automatic scan through the whole frequency range for DVB-T2</i>	
Requirement	The receiver shall allow reception and demodulation of terrestrial signal transmitted by transmitter according to EN 302 755. The receiver shall be able to automatically scan through the whole 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	<p>Purpose of test: To verify reception of DVB-T2 signal and scan through whole frequency range (VHF and UHF).</p> <p>Equipment: Receiver under test, monitor (TV) in case of STB, documentation.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: Receiver is capable of scanning whole frequency bands UHF and VHF.</p>	
Test results		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:	
Date:		Signature:

Test	Task 1.2a: Frequency band and offset for DVB-T
Requirement	<p>Comment for implementation: In case the country will use also VHF band and other bandwidths the test shall be modified and extended accordingly.</p> <p>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: $f_c = 474 \text{ MHz} + (N-21) \times 8 \text{ MHz} + f_{\text{off}}$, $N \in \{21, \dots, 69\}$ (UHF channel number) $f_{\text{off}} \in [-10 \text{ kHz}, 10 \text{ kHz}]$</p>
Test Procedure	<p>Purpose of test: To verify the reception of DVB-T signal for UHF band considering frequency offset of receiving signal.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG-4 source] --- B[DVB-T Modulator] B --- C[UP converter] C --- D[DVB-T STB] D --- E[TV / Monitor] subgraph iDTv D E end </pre> <p>Transport stream used: Use transport stream B.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Test is performed in mode 8k, 64-QAM, $R=2/3$, $\Delta/T_u=1/4$, 3. Signal level on receiver input shall be set to -60 dBm, 4. Start the test on channel 21, $f_{\text{off}}=0$, 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 ISQMM, 8. Fill the table with test results: YES or NO <p>Expected result: The results shall be conforming for all values of frequency offset f_{off} on channels 21, 31, 41, 51, 61 in 69.</p>

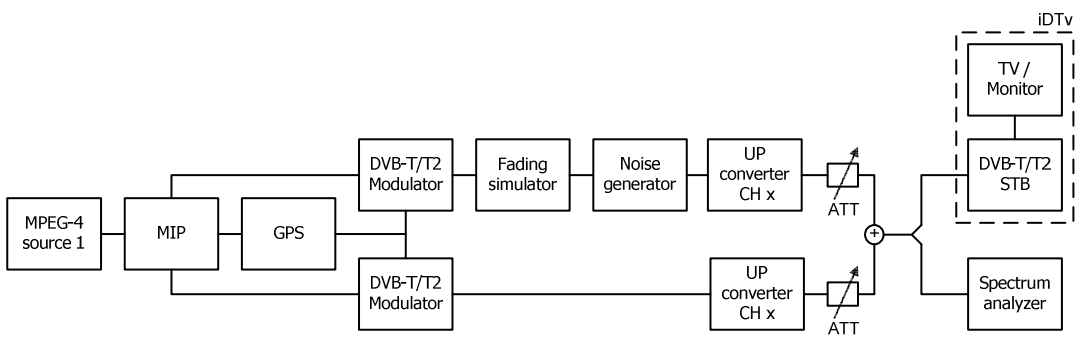
Test results	<table border="1"> <thead> <tr> <th>Channel</th> <th>Frequency (MHz)</th> <th>Frequency offset (kHz)</th> <th>Conformity</th> </tr> </thead> <tbody> <tr> <td rowspan="3">21</td> <td>474</td> <td>-10</td> <td></td> </tr> <tr> <td>474</td> <td>0</td> <td></td> </tr> <tr> <td>474</td> <td>+10</td> <td></td> </tr> <tr> <td>31</td> <td>554</td> <td>0</td> <td></td> </tr> <tr> <td>41</td> <td>634</td> <td>0</td> <td></td> </tr> <tr> <td>51</td> <td>714</td> <td>0</td> <td></td> </tr> <tr> <td>61</td> <td>794</td> <td>0</td> <td></td> </tr> <tr> <td rowspan="3">69</td> <td>858</td> <td>-10</td> <td></td> </tr> <tr> <td>858</td> <td>0</td> <td></td> </tr> <tr> <td>858</td> <td>+10</td> <td></td> </tr> </tbody> </table>			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	
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Test	Task 1.2b: Frequency band and offset for DVB-T2
Requirement	<p>Comment for implementation: In case the country will use also VHF band and other bandwidths the test shall be modified and extended accordingly.</p> <p>The receiver shall allow reception of terrestrial signal on UHF channels 21 – 69. The receiver shall tune to center frequency of receiving DVB-T2 signal also considering following frequency offset: $f_c = 474 \text{ MHz} + (N-21) \times 8 \text{ MHz} + f_{\text{off}}$, $N \in \{21, \dots, 69\}$ (UHF channel number) $f_{\text{off}} \in [-10 \text{ kHz}, 10 \text{ kHz}]$</p>
Test Procedure	<p>Purpose of test: To verify the reception of DVB-T2 signal for UHF band considering frequency offset of receiving signal.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG-4 source] --- B[DVB-T2 Modulator] B --- C[UP converter] C --- D[DVB-T2 STB] D --- E[TV / Monitor] subgraph iDTv D E end </pre> <p>Transport stream used: Use transport stream P.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Test is performed in mode 32k, 256-QAM, R=4/5, $\Delta/T_u=1/8$, 3. Signal level on receiver input shall be set to -60 dBm, 4. Start the test on channel 21, $f_{\text{off}}=0$, 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 ISQMM, 8. Fill the table with test results: YES or NO <p>Expected result: The results shall be conforming for all values of frequency offset f_{off} on channels 21, 31, 41, 51, 61 in 69.</p>

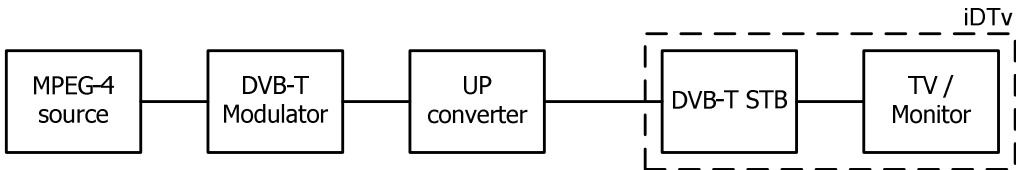
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Date:		Signature:																																									

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	<p>Comment for implementation: The test shall be modified accordingly to the exact modulation parameters used in the country; especially this is valid for DVB-T2. In case of populated areas with many reflections it is also advisable to extend the test with additional environments simulating the situation in the country.</p> <p>Purpose of test: To verify if receiver is capable of receiving the signal in simulated SFN networks according to conditions in this task.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream B for DVB-T and stream P for DVB-T2.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Use mode 8k, 64-QAM, $R=2/3$, $\Delta/Tu=1/4$ (GI value is $224\mu s$), for DVB-T Use also mode 32K, 256-QAM, $R=4/5$, $\Delta/Tu=1/8$ for DVB-T2 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.

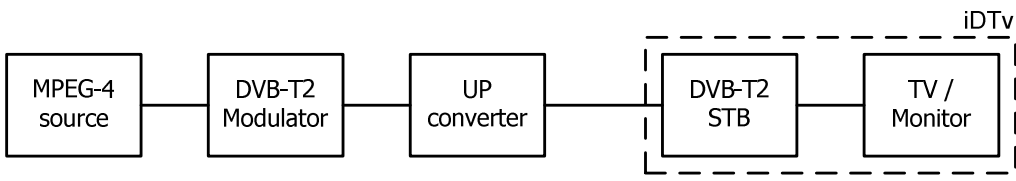
	<p>Expected result:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">Environment 1</th> <th colspan="3">Environment 3</th> </tr> <tr> <th>Track</th> <th>Delay(us)</th> <th>Attenuation(dB)</th> <th>Track</th> <th>Delay(us)</th> <th>Attenuation(dB)</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>3</td></tr> <tr><td>2</td><td>39</td><td>5</td><td>2</td><td>95</td><td>0</td></tr> <tr><td>3</td><td>82</td><td>11</td><td>3</td><td>180</td><td>15</td></tr> <tr><td>4</td><td>125</td><td>16</td><td></td><td></td><td></td></tr> <tr><td>5</td><td>167</td><td>15</td><td></td><td></td><td></td></tr> <tr><td>6</td><td>200</td><td>20</td><td></td><td></td><td></td></tr> <tr> <th colspan="3">Environment 2</th> <th colspan="3">Environment 4 – DVB-T2</th> </tr> <tr> <th>Track</th> <th>Delay(us)</th> <th>Attenuation(dB)</th> <th>Track</th> <th>Delay(us)</th> <th>Attenuation(dB)</th> </tr> <tr><td>1</td><td>0</td><td>11</td><td>1</td><td>10</td><td>11</td></tr> <tr><td>2</td><td>75</td><td>0</td><td>2</td><td>56</td><td>0</td></tr> <tr><td>3</td><td>107</td><td>13</td><td>3</td><td>112</td><td>6</td></tr> <tr><td>4</td><td>135</td><td>25</td><td>4</td><td>224</td><td>11</td></tr> <tr><td></td><td></td><td></td><td>5</td><td>384</td><td>16</td></tr> <tr><td></td><td></td><td></td><td>6</td><td>426</td><td>21</td></tr> </tbody> </table>					Environment 1			Environment 3			Track	Delay(us)	Attenuation(dB)	Track	Delay(us)	Attenuation(dB)	1	0	0	1	0	3	2	39	5	2	95	0	3	82	11	3	180	15	4	125	16				5	167	15				6	200	20				Environment 2			Environment 4 – DVB-T2			Track	Delay(us)	Attenuation(dB)	Track	Delay(us)	Attenuation(dB)	1	0	11	1	10	11	2	75	0	2	56	0	3	107	13	3	112	6	4	135	25	4	224	11				5	384	16				6	426	21
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Environment	Environment 1	Environment 2	Environment 3	Environment 4																																																																																																	
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Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment																																																																																																				
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:																																																																																																				
Date:				Signature:																																																																																																	

Test	<i>Task 1.4: Performance in Single Frequency Networks – echo outside the guard interval</i>
Requirement	The receiver shall be capable of receiving the signal in simulated SFN networks.
Test procedure	<p>Comment for implementation: <i>The test shall be modified accordingly to the exact modulation parameters used in the country; especially this is valid for DVB-T2. In case of environment with many reflections it is advisable to extend the test with additional environments simulating the situation in the country.</i></p> <p>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.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream B, P.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Use mode 8k, 64-QAM, $R=2/3$, $\Delta/Tu=1/4$ (GI value is 224μs) for DVB-T, Use mode 32k, 256-QAM, $R=4/5$, $\Delta/Tu=1/8$ for DVB-T2, 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. <p>Expected result: The receiver is capable of decoding the signal also in environment with echoes outside guard interval.</p>

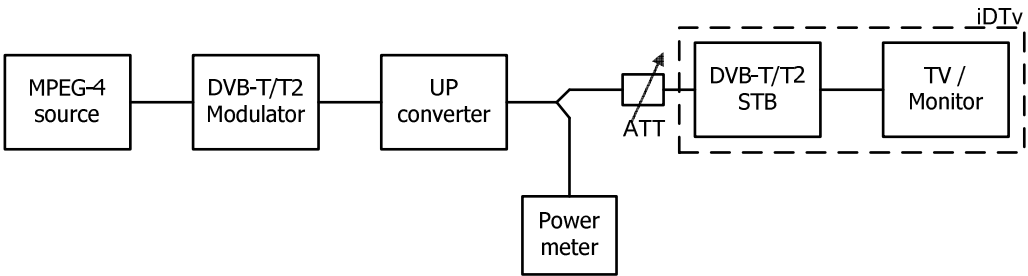
Test results	Environment DVB-T: 8k, 64-QAM, R=2/3, $\Delta/T_u=1/4$		
	Delay(μ s)	Attenuation(dB)	Conformity
	260		
	230		
	-230		
	-260		
	Environment DVB-T2: 32k, 256-QAM, R=4/5, $\Delta/T_u=1/8$		
	Delay(μ s)	Attenuation(dB)	Conformity
	608		
	512		
	-512		
	-608		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:		
Date:			Signature:

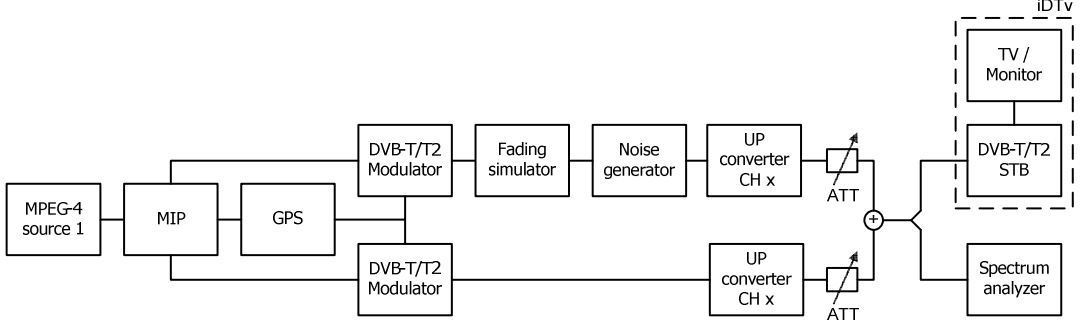
Test	<i>Task 1.5a: Transmitting parameters for DVB-T</i>																																				
Requirement	<p>The receiver shall be capable of operation with all combinations of following transmitting parameters:</p> <ul style="list-style-type: none"> - Mode: 2k, 8k - Modulation: QPSK, 16-QAM, 64-QAM - Code rate (R): 1/2, 2/3, 3/4, 5/6, 7/8 - Guard interval (Δ/T_u): 1/4, 1/8, 1/16, 1/32 - Hierarchical mode: not required 																																				
Test procedure	<p>Purpose of test: To verify the operation with different DVB-T transmitting parameters.</p> <p>Equipment:</p>  <pre> graph LR subgraph iDTV DVB_T_STB[DVB-T STB] --- TV_Monitor[TV / Monitor] end MPEG4[MPEG-4 source] --- DVB_T_Mod[DVB-T Modulator] DVB_T_Mod --- UP_converter[UP converter] UP_converter --- DVB_T_STB </pre> <p>Transport stream used: Use transport stream B.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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, $\Delta/T_u=1/32$, <ol style="list-style-type: none"> 1. Check the conformity using ISQMM, 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. <p>Expected result: The receiver is capable to operate with all combinations of transmitting parameters.</p>																																				
Test results	<table border="1" data-bbox="486 1612 1348 1859"> <thead> <tr> <th>8K</th> <th>R</th> <th>$\Delta/T_u=1/32$</th> <th>$\Delta/T_u=1/16$</th> <th>$\Delta/T_u=1/8$</th> <th>$\Delta/T_u=1/4$</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>1/2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>QPSK</td> <td>3/4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>16-QAM</td> <td>5/6</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>64-QAM</td> <td>2/3</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>64-QAM</td> <td>7/8</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	8K	R	$\Delta/T_u=1/32$	$\Delta/T_u=1/16$	$\Delta/T_u=1/8$	$\Delta/T_u=1/4$	QPSK	1/2					QPSK	3/4					16-QAM	5/6					64-QAM	2/3					64-QAM	7/8				
8K	R	$\Delta/T_u=1/32$	$\Delta/T_u=1/16$	$\Delta/T_u=1/8$	$\Delta/T_u=1/4$																																
QPSK	1/2																																				
QPSK	3/4																																				
16-QAM	5/6																																				
64-QAM	2/3																																				
64-QAM	7/8																																				
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment																																				

Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO		
	Describe more specific faults and/or other information:		
Date:		Signature:	

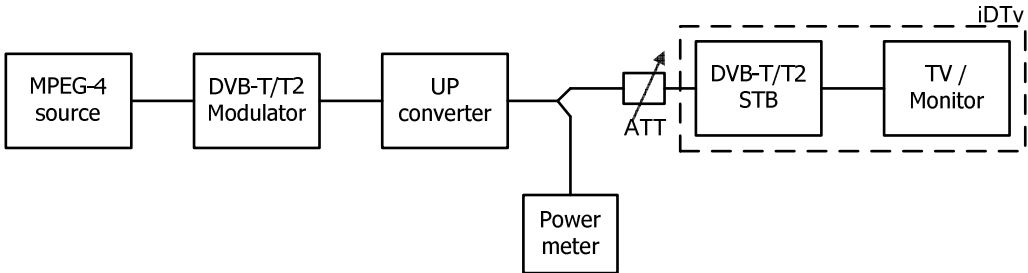
Test	<i>Task 1.5b: Transmitting parameters for DVB-T2</i>
Requirement	<p>The receiver shall be capable of operation with all combinations of following transmitting parameters:</p> <ul style="list-style-type: none"> - Mode: 1k,2k,4k,8k normal and extended, 16k normal and extended, 32k normal and extended COFDM - Modulation: QPSK, 16-QAM, 64-QAM, 256QAM both rotated and non-rotated - Code rate (R): 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 7/8 - Guard interval (Δ/T_u): 1/4, 19/256, 1/8, 19/128, 1/16, 1/32, 1/128
Test procedure	<p>Comment for implementation: <i>Testing procedure should include exact parameters used in your country and neighbouring countries (rotated constellation, PAPR, SISO/MISO, multiple PLP, auxiliary streams etc.) Currently only few modulation parameters combinations are documented inside this test and this should be extended to provide more accurate results; on the other hand the testing itself will require more time.</i></p> <p>Purpose of test: To verify the operation with different DVB-T2 transmitting parameters.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG-4 source] --- B[DVB-T2 Modulator] B --- C[UP converter] C --- D[DVB-T2 STB] D --- E[TV / Monitor] subgraph iDTv D E end </pre> <p>Transport stream used: Use transport stream P.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Use channel 45 and set the receiver input level to -60 dBm, 3. Start with first modulation from the table below, 2. Check the conformity using ISQMM, 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. <p>Expected result: The receiver is capable to operate with all combinations of transmitting parameters.</p>

Test results	Mode		Δ/Tu						
	32K	CR	1/128	1/32	1/16	19/256	1/8	19/128	1/4
	QPSK	1/2							
QPSK	3/4								
16-QAM	5/6								
16-QAM	5/6								
64-QAM	2/3								
64-QAM	7/8								
256-QAM	3/5								
256-QAM	2/3								
256-QAM	3/4								
256-QAM	4/5								
256-QAM	5/6								
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment								
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:								
Date:						Signature:			

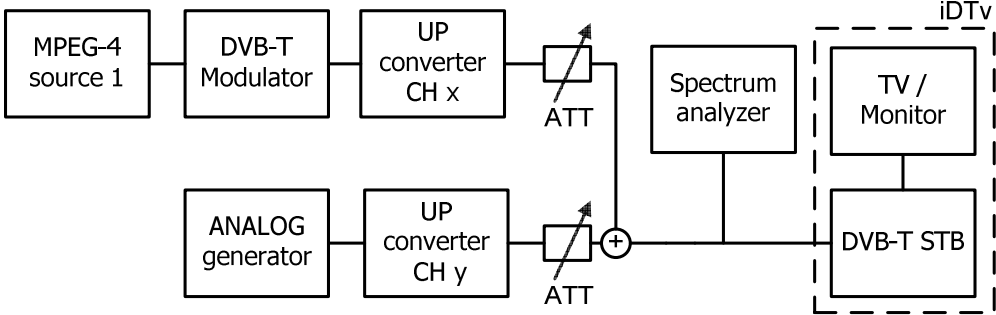
Test	<i>Task 1.6: Signal level and signal quality indicator</i>		
Requirement	Within the user interface the receiver shall provide the information of signal level and signal quality. The implementation of user interface is responsibility of the producer.		
Test procedure	<p>Comment for implementation: Testing procedure is requesting only informative indication of signal level and quality. In case of more specific request the test case should be modified so it is defined how much the indicator should change in case of defined change of input signal.</p> <p>Purpose of test: To verify function of signal indicator.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream B.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The indicator of input signal level and quality is reacting to actual signal level.</p>		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:		
Date:		Signature:	

Test	Task 1.7: 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	<p>Comment for implementation: The test should be supplemented with exact modulation parameters used in specific country. Limit values for signal/noise can be found in Nordig unified requirements [46].</p> <p>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 for DVB-T and 24dB for DVB-T2 mode specified in this test case.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream B.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Use mode 8k, 64-QAM, $R=2/3$, $\Delta/T_u=1/4$ (GI value is 224μs) for DVB-T, Use mode 32k, 256-QAM, $R=4/5$, $\Delta/T_u=1/8$ for DVB-T2, 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.

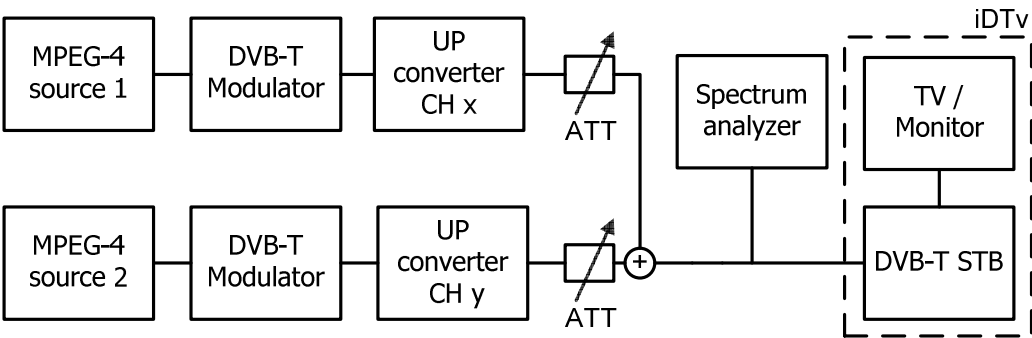
	<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">Environment 2</th> </tr> <tr> <th>Delay(us)</th> <th>Attenuation(dB)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">11</td> </tr> <tr> <td style="text-align: center;">75</td> <td style="text-align: center;">0</td> </tr> <tr> <td style="text-align: center;">107</td> <td style="text-align: center;">13</td> </tr> <tr> <td style="text-align: center;">135</td> <td style="text-align: center;">25</td> </tr> </tbody> </table>		Environment 2		Delay(us)	Attenuation(dB)	0	11	75	0	107	13	135	25
Environment 2														
Delay(us)	Attenuation(dB)													
0	11													
75	0													
107	13													
135	25													
	<p>Expected result: The receiver is working also in environments including noise level.</p>													
Test results	<p>Level of signal/noise ratio allowing QEF reception for DVB-T: _____dB Level of signal/noise ratio allowing QEF reception for DVB-T2: _____dB</p>													
Conformity	<p><input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment</p>													
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>													
Date:		Signature:												

Test	<i>Task 1.8: Maximum Receiver Signal Input Level</i>
Requirement	The receiver shall support at least -23 dBm (86 dB μ V at 75 Ω) of input signal without degradation.
Test procedure	<p>Comment for implementation: <i>The testing procedure should include exact modulation parameters used in your country and neighbouring countries.</i></p> <p>Purpose of test: To verify the capability of receiver in case of high input signal level.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream B, P.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Check the Attenuation of attenuator (ATT), 3. Use mode 8K, 64-QAM, $R=2/3$, $\Delta/T_u=1/4$ for DVB-T, Use mode 32K, 256-QAM, $R=4/5$, $\Delta/T_u=1/8$ for DVB-T2, 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 ISQMM, 11. Fill the table with test results: YES or NO, 12. Repeat the test for other parameters from the table. <p>Expected result: The reception shall be without failures according to QEF for input signal levels up to -23 dBm.</p>

Test results	<table border="1"> <thead> <tr> <th>Mode</th> <th>Input level (dBm)</th> <th>Conformity</th> </tr> </thead> <tbody> <tr> <td>8K, 64-QAM, R=2/3, $\Delta/T_u=1/8$</td> <td>-23</td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=2/3, $\Delta/T_u=1/4$</td> <td>-23</td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=3/4, $\Delta/T_u=1/4$</td> <td>-23</td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=3/4, $\Delta/T_u=1/8$</td> <td>-23</td> <td></td> </tr> <tr> <td>32K, 256-QAM, R=3/4, $\Delta/T_u=1/4$</td> <td>-23</td> <td></td> </tr> <tr> <td>32K, 256-QAM, R=4/5, $\Delta/T_u=1/8$</td> <td>-23</td> <td></td> </tr> </tbody> </table>			Mode	Input level (dBm)	Conformity	8K, 64-QAM, R=2/3, $\Delta/T_u=1/8$	-23		8K, 64-QAM, R=2/3, $\Delta/T_u=1/4$	-23		8K, 64-QAM, R=3/4, $\Delta/T_u=1/4$	-23		8K, 64-QAM, R=3/4, $\Delta/T_u=1/8$	-23		32K, 256-QAM, R=3/4, $\Delta/T_u=1/4$	-23		32K, 256-QAM, R=4/5, $\Delta/T_u=1/8$	-23	
Mode	Input level (dBm)	Conformity																						
8K, 64-QAM, R=2/3, $\Delta/T_u=1/8$	-23																							
8K, 64-QAM, R=2/3, $\Delta/T_u=1/4$	-23																							
8K, 64-QAM, R=3/4, $\Delta/T_u=1/4$	-23																							
8K, 64-QAM, R=3/4, $\Delta/T_u=1/8$	-23																							
32K, 256-QAM, R=3/4, $\Delta/T_u=1/4$	-23																							
32K, 256-QAM, R=4/5, $\Delta/T_u=1/8$	-23																							
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment																							
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:																							
Date:		Signature:																						

Test	Task 1.9: Immunity to »analogue« signals on neighbouring channels
Requirement	The receiver shall operate also when analogue signals are present on neighbouring or other channels.
Test procedure	<p>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 signal.</p> <p>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.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream C, P.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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, $R=2/3$, $\Delta/T_u=1/4$, Use mode 32k, 256-QAM, $R=4/5$, $\Delta/T_u=1/8$ for DVB-T2, 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 ISQMM 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. <p>Expected result: The receiver can operate at least under presence of analogue and digital signal on</p>


	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 Ratio of analogue/DVB-T2 signal up to which the receiver is working on C36: ____dB Ratio of analogue/DVB-T2 signal up to which the receiver is working on C46: ____dB		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:		
Date:		Signature:	

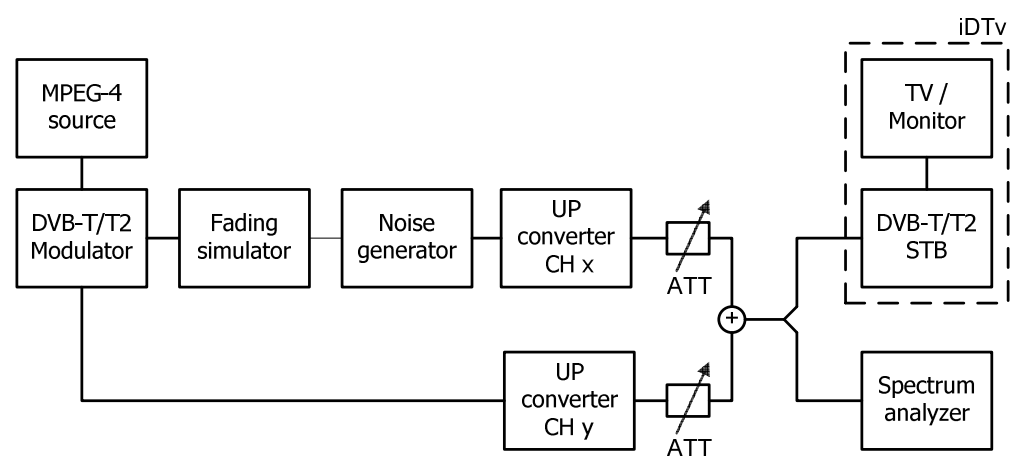
Test	<i>Task 1.10: Immunity to »digital« signals on neighbouring channels</i>
Requirement	The receiver shall operate also when digital signals are present on neighbouring or other channels.
Test procedure	<p>Purpose of test: Check the performance of receiver in case digital signal is present on neighbouring channel and the signal level of neighbouring channel is 22 dB higher than received DVB signal. The receiver shall operate according to QEF also in case of 38 dB or higher DVB 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.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream B and C.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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, $R=2/3$, $\Delta/T_u=1/4$, Use mode 32k, 256-QAM, $R=4/5$, $\Delta/T_u=1/8$ for DVB-T2, 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 QEF 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. <p>Expected result: The receiver is operating at least in required disturbing/useful signal ratios on</p>

	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	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:		
Date:		Signature:	

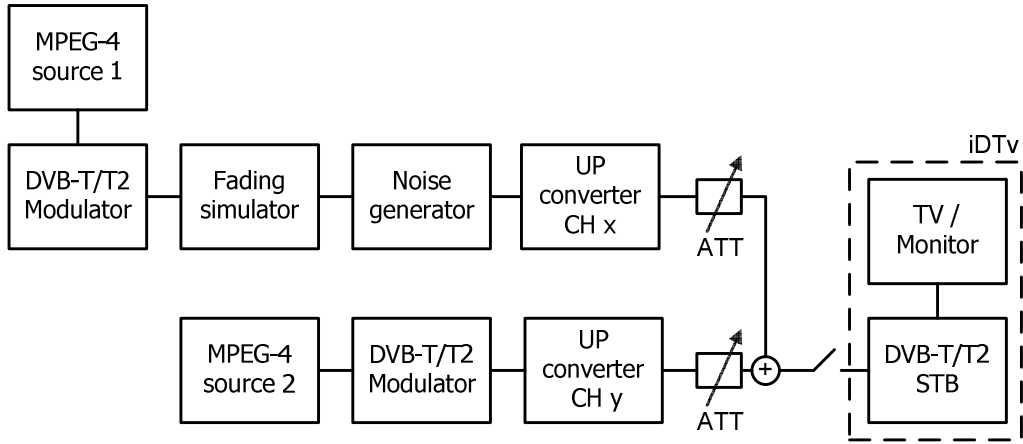
Test	<i>Task 1.11: RF input connector</i>
Requirement	The receiver shall have at least one tuner input connector in accordance with IEC 60169-2, part 2 and shall allow the connection to external antenna with connector type: IEC 169-2 male. The input impedance shall be 75 Ohm.
Test procedure	<p>Purpose of test: To verify that the receiver has a correct input connector for the reception of the signals.</p> <p>Equipment: Receiver under test.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Verify that the RF input connector is in accordance with the specification IEC 60169-2. 2. Verify in the manufacturer's technical specification and on the receiver that the input impedance of the RF input is 75Ω. <p>Expected result: RF input connector is as defined in specification IEC 60169-2 and the input impedance is 75Ω.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

Date:		Signature:	
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Test	<i>Task 1.12: RF output connector - loop trough</i>		
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	<p>Purpose of test:</p> <ol style="list-style-type: none"> To verify that the receiver has a correct output connector for the loop through of the RF signals. To test the attenuation/gain of the RF loop through for standby and operational modes. <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[Signal generator] --- B[DVB-T/T2 STB] B --- C[Spectrum analyzer or Power meter] </pre> </div> <p>Test procedure:</p> <ol style="list-style-type: none"> Prepare test environment and setup of instruments, If the receiver has the possibility of power supply over RF, turn this option OFF, Connect signal source to RF input of receiver and spectrum analyzer to RF output (take care for possible DC voltage on instruments input), Set the input level of the receiver to -50dBm, Power ON the receiver – test in »POWER ON MODE«, Test frequency range from 47 MHz to 860 MHz, Measure insertion loss trough complete frequency range. The insertion loss can be maximum $\pm 6\text{dB}$, Repeat the test while receiver in STANDBY, Check if the output connector complies with IEC 60169-2. <p>Expected result: RF output connector complies to IEC 60169-2, insertion loss of the loop is inside $\pm 6\text{dBm}$ and the forwarding of signal is possible in STANDBY and in POWER ON receiver mode.</p>		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:		
Date:		Signature:	

Test	Task 2.1: Automatic program search
Requirement	<p>Comment for implementation: Testing procedure is currently allowing either selecting best program according to input signal or saving both programs to program list in case same program is broadcasted on two channels. In case requirement would be changed to request automatic selection of programmes with best signal the procedure should be changed accordingly.</p> <p>The receiver shall provide function of automatic program search through whole frequency range. In case the receiver finds all 3 same identifiers:</p> <ul style="list-style-type: none"> • Original_network_id, • Transport_stream_id and • Service_id <p>on two or more different frequencies has to save both frequencies or select the frequency with better signal.</p> <p>Before the automatic search is started, all service lists shall be deleted.</p>
Test procedure	<p>Purpose of test:</p> <ol style="list-style-type: none"> 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. <p>Equipment:</p>  <p>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.</p> <p>Channels CH x and CH y shall not be equal. Relative signal levels can be observed with spectrum analyzer.</p>

	<p>Transport stream used: Use transport stream B, P.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments. Use transmitting mode 8k, 64-QAM R=2/3, $\Delta/T_u=1/4$ for DVB-T, 32K, 256-QAM, R=4/5, $\Delta/T_u=1/8$ for DVB-T2. 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. <p>Expected result: The receiver is capable of finding all services from transport streams and sorting them into program lists.</p>									
Test results	<table border="1"> <thead> <tr> <th>Requirements</th> <th>Result</th> <th>Conformity</th> </tr> </thead> <tbody> <tr> <td>After scanning all transmitted services are listed in program list.</td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>The service lists are not duplicated for both frequencies.</td> <td></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>	Requirements	Result	Conformity	After scanning all transmitted services are listed in program list.			The service lists are not duplicated for both frequencies.		
Requirements	Result	Conformity								
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The service lists are not duplicated for both frequencies.										
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment									
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>									
Date:	Signature:									

Test	<i>Task 2.2: Manual program search</i>																												
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	<p>Purpose of test: To verify the functionality of the manual channel search.</p> <p>Equipment:</p>  <table border="1" data-bbox="576 1182 1257 1615"> <thead> <tr> <th colspan="2">Channel CH x</th> <th colspan="2">Channel CH y</th> </tr> </thead> <tbody> <tr> <td colspan="2">TS B</td> <td colspan="2">TS C</td> </tr> <tr> <td>NAME</td> <td>ServID</td> <td>NAME</td> <td>ServID</td> </tr> <tr> <td>S1</td> <td>1</td> <td>S1</td> <td>1</td> </tr> <tr> <td>S2</td> <td>2</td> <td>S5</td> <td>4</td> </tr> <tr> <td>S3</td> <td>3</td> <td>S6</td> <td>5</td> </tr> <tr> <td>S4</td> <td>4</td> <td>S7</td> <td>6</td> </tr> </tbody> </table> <p>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.</p> <p>Transport stream used: Use transport streams B and C.</p>	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
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																										

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 ISQMM 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:

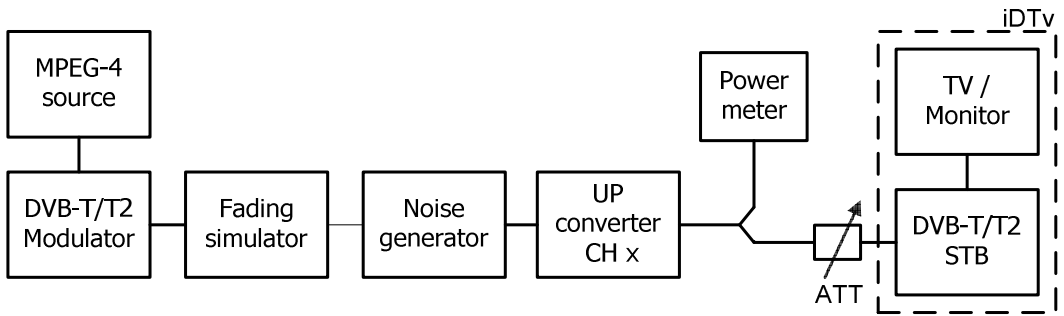
Position	Program	Channel
1	S1	CH X
2	S2	CH X
3	S3	CH X
4	S4	CH X
5*	S6	CH Y
6*	S7	CH Y
7*	S5	CH Y

* 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.

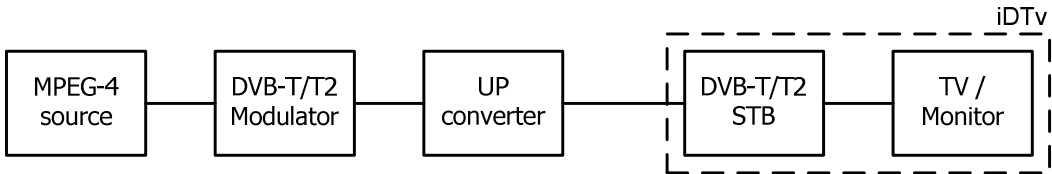
Expected result:

All test results shall be OK.

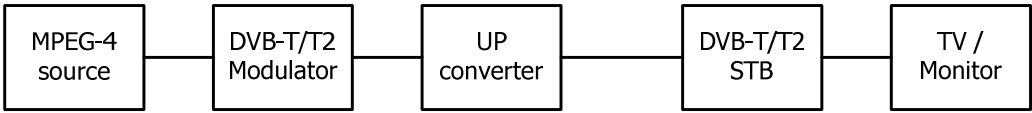
Test results	<table border="1"> <thead> <tr> <th>Requirement</th> <th>Conformity</th> </tr> </thead> <tbody> <tr> <td>Manual channel search can be performed successfully by only entering channel number</td> <td></td> </tr> <tr> <td>The channel list is as defined in test procedure</td> <td></td> </tr> <tr> <td>Service S1 in only listed once in the channel list</td> <td></td> </tr> </tbody> </table>		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	
Requirement	Conformity									
Manual channel search can be performed successfully by only entering channel number										
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Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment									
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> 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	<p>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 signal, in order to reduce the recovery time.</p> <p>Purpose of the test is to check if the receiver adapts to change of parameters automatically and starts to operate normally without any user action.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream I.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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, $R=3/4$, $\Delta/Tu=1/4$ for DVB-T, Use modulation parameters 32k, 256-QAM, $R=4/5$, $\Delta/Tu=1/8$ for DVB-T2, 5. Connect the input of receiver, 6. Use quality measurement according to ISQMM, 7. Fill in the results, 8. Repeat the test for other modes without disconnecting the receiver input according to the table »Test results« <p>Expected result: The receiver is able to detect change of the modes and re-synchronize to the changed mode within 3 seconds.</p>

Test results	<table border="1"> <thead> <tr> <th>Mode</th> <th>Conformity</th> </tr> </thead> <tbody> <tr> <td>8K, 64-QAM, R=3/4, $\Delta/T_u=1/4$</td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=3/4, $\Delta/T_u=1/8$</td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=2/3, $\Delta/T_u=1/8$</td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=2/3, $\Delta/T_u=1/4$</td> <td></td> </tr> <tr> <td>8K, 16-QAM, R=3/4, $\Delta/T_u=1/8$</td> <td></td> </tr> <tr> <td>32k, 256-QAM, R=3/4, $\Delta/T_u=1/4$</td> <td></td> </tr> <tr> <td>32k, 256-QAM, R=3/4, $\Delta/T_u=1/8$</td> <td></td> </tr> <tr> <td>32k, 256-QAM, R=2/3, $\Delta/T_u=1/4$</td> <td></td> </tr> <tr> <td>32k, 256-QAM, R=4/5, $\Delta/T_u=1/8$</td> <td></td> </tr> </tbody> </table>		Mode	Conformity	8K, 64-QAM, R=3/4, $\Delta/T_u=1/4$		8K, 64-QAM, R=3/4, $\Delta/T_u=1/8$		8K, 64-QAM, R=2/3, $\Delta/T_u=1/8$		8K, 64-QAM, R=2/3, $\Delta/T_u=1/4$		8K, 16-QAM, R=3/4, $\Delta/T_u=1/8$		32k, 256-QAM, R=3/4, $\Delta/T_u=1/4$		32k, 256-QAM, R=3/4, $\Delta/T_u=1/8$		32k, 256-QAM, R=2/3, $\Delta/T_u=1/4$		32k, 256-QAM, R=4/5, $\Delta/T_u=1/8$	
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	32k, 256-QAM, R=4/5, $\Delta/T_u=1/8$																					
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment																					
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:																					
Date:		Signature:																				

Test	<i>Task 2.4: Tuning and scanning – dynamic</i>
Requirement	<p>Dynamic changes in the PMT shall not produce any disturbances in the Audio/Video output.</p> <p>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.</p>
Test procedure	<p>Purpose of test:</p> <p>To verify if the receiver is capable of continuous reception in case of adding, changing or removing PID data in PMT table.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTV D E end </pre> </div> <p>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.</p> <p>Transport stream used:</p> <p>Use transport stream L.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Play transport stream and select service S1. 3. Remove program identifiers (PID) in following order: <ol style="list-style-type: none"> a. Teletext PID b. Audio PID c. Video PID 4. Add program identifiers (PID) in following order: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> a. Video PID b. Audio PID

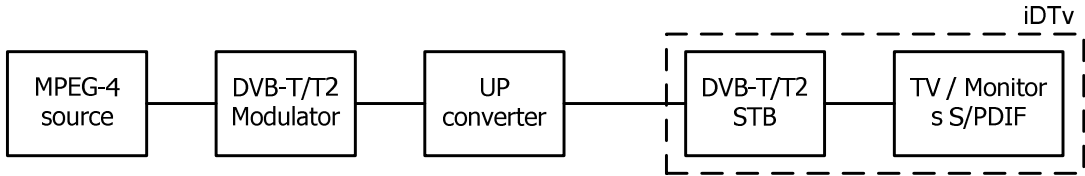
	<p>Expected result: After adding identifiers PID all components of program are decoded correctly. Change of identifiers is not affecting the decoding of program.</p>		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>		
Date:		Signature:	

Test	<i>Task 3.1: SCART interface</i>
Requirement	<p>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).</p> <p>The SCART interface shall deliver also analogue audio signal.</p>
Test procedure	<p>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).</p> <p>It is possible that some TV sets don't use this kind of signalling for switching between picture formats.</p> <p>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.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] </pre> <p>Test procedure:</p> <ol style="list-style-type: none"> 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 signalling, 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 signalling 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 signalling.

	<p>Transport stream used: Use transport stream F.</p> <p>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 signalling is made according to IEC 62216-1 (6.4.3 Active format description).</p>																		
Test results	<p>4:3 source aspect ratio signalled</p> <table border="1"> <thead> <tr> <th>Functionality / Display type</th> <th>4:3 display</th> <th>16:9 display</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>16:9 source aspect ratio signalled</p> <table border="1"> <thead> <tr> <th>Functionality / Display type</th> <th>4:3 display</th> <th>16:9 display</th> </tr> </thead> <tbody> <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> </tbody> </table>	Functionality / Display type	4:3 display	16:9 display	Voltage on SCART PIN 8 / WSS			Decoder format conversion			Functionality / Display type	4:3 display	16:9 display	Voltage on SCART PIN 8 / WSS			Decoder format conversion		
Functionality / Display type	4:3 display	16:9 display																	
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Functionality / Display type	4:3 display	16:9 display																	
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Decoder format conversion																			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment																		
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>																		
Date:	Signature:																		

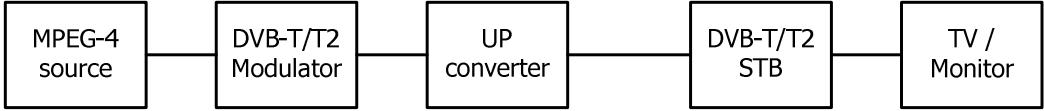
Test	<i>Task 3.2: Interface for Conditional Access</i>
Requirement	The receiver should support at least one DVB Common Interface (for CA module) for conditional access. CI-slot should comply with EN50221
Test procedure	<p>Purpose of test: To verify if an interface for Conditional Access is present and if the CI slot complies with requirement.</p> <p>Equipment: Receiver under test.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> Under consideration of receiver documentation and visual inspection check if the CI-slot complies with requirement. <p>Expected result: In case the receiver is equipped with CI-slot the CI-slot complies with requirement.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

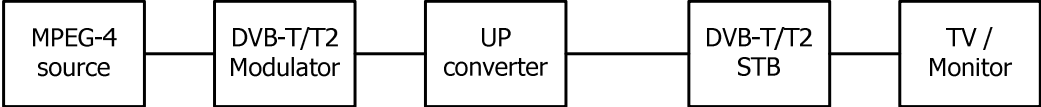
Date:		Signature:	
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Test	<i>Task 3.3: Digital Audio Output (S/PDIF)</i>
Requirement	The receiver shall have a coaxial or optical S/PDIF interface for digital audio to provide PCM signal according to IEC 60958 or non-linear PCM coded audio stream according to IEC 61937.
Test procedure	<p>Purpose of test: To verify the presence of coaxial or optical S/PDIF interface and compliancy with requirements.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --> B[DVB-T/T2 Modulator] B --> C[UP converter] C --> D[DVB-T/T2 STB] D --> E[TV / Monitors S/PDIF] subgraph iDTV D E end </pre> </div> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Transport stream used: Use transport stream D.</p> <p>Expected result: The functionality of S/PDIF interface complies with requirement.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	Non-compliancy can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:

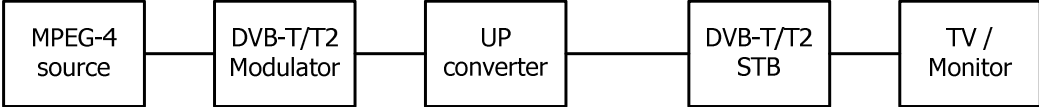
Date:		Signature:	
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Test	<i>Task 3.4: HDMI interface – compliancy for »HD Ready«</i>		
Requirement	<p>HDTV level receiver with display (iDTV) shall support the requirements that are specified for high definition video interfaces by EICTA for compliant HD Ready iDTV-sets.</p> <p>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.</p>		
Test procedure	<p>Test procedure: The Manufacturer shall verify the HD Ready certificate.</p> <p>Expected result: HDMI interface complies with requirements for HD Ready certificate.</p>		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	<p>Non-compliancy can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>		
Date:		Signature:	

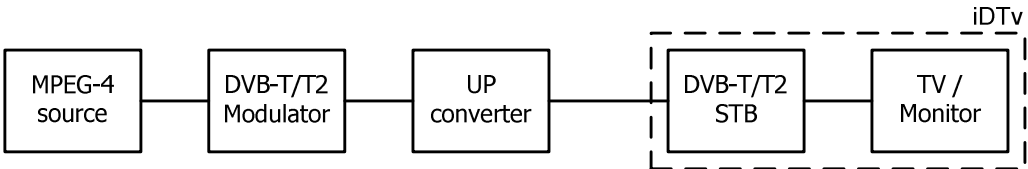
Test	<i>Task 3.5: HDMI interface - EDID information</i>		
Requirement	HDTV level receiver shall be able to use the EDID information provided by the display to automatically determine the STB output.		
Test procedure	<p>Purpose of test: To verify that the receiver is able to use the EDID information.</p> <p>This test is relevant for STB only.</p> <p>For other receivers having HDMI output interface this test is optional.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] </pre> </div> <p>Test procedure: Power On the receiver.</p> <p>Verify that the receiver selects the display parameters according the EDID information.</p> <p>Expected result: The receiver uses the EDID information for the display parameters.</p>		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>		
Date:		Signature:	

Test	<i>Task 3.6: HDMI interface – original format</i>
Requirement	<p>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.</p> <p>This is to avoid the STB output to go black, if there is a mismatch between received format and display capabilities.</p>
Test procedure	<p>Purpose of test: To verify that the receiver is able to use the EDID information.</p> <p>This test is relevant for STB only.</p> <p>For other receivers having HDMI output interface this test is optional.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] </pre> </div> <p>Transport stream used: Use transport stream B and M. Transport stream shall include programs with following picture resolutions:</p> <ul style="list-style-type: none"> • 720 x 576i 25, • 1280 x 720p 50, • 1920 x 1080i 25. <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The receiver shall negotiate the display parameters according the input signal.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

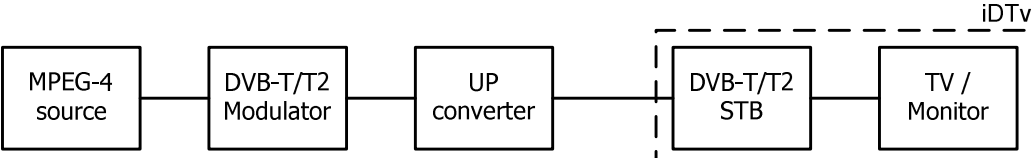
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Test	<i>Task 3.7: HDMI interface – Manual setting of resolution</i>									
Requirement	<p>The HDTV level STB It shall have the possibility to manually set the default output format to a fixed format. The fixed format shall include at least one of the following formats:</p> <ul style="list-style-type: none"> • 1920x1080i@25Hz / 1920x1080p@25Hz, • 1920x1080p@50Hz, • 1280x720p@50Hz. 									
Test procedure	<p>Purpose of test: To verify that the STB is able to use the EDID information.</p> <p>This test is relevant for STB only. For other receivers having HDMI output interface this test is optional.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] </pre> </div> <p>Transport stream used: Use transport stream B and M.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Manually set the display format to 1280x720p@50Hz. 2. Verify that format is set. 3. Repeat the test with other resolutions: <ul style="list-style-type: none"> • 1920x1080i@25Hz / 1920x1080p@25Hz and • 1920x1080p@50Hz. <p>Fill in the test results.</p> <p>Expected result: It shall be possible to set output format manually.</p>									
Test results		<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Resolution</th> <th style="width: 40%;">Conformity</th> </tr> </thead> <tbody> <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> </tbody> </table>	Resolution	Conformity	1280x720p@50Hz		1920x1080i@25Hz / 1920x1080p@25Hz		1920x1080p@50Hz	
Resolution	Conformity									
1280x720p@50Hz										
1920x1080i@25Hz / 1920x1080p@25Hz										
1920x1080p@50Hz										
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment									
Comments	<p>Non-compliancy can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>									

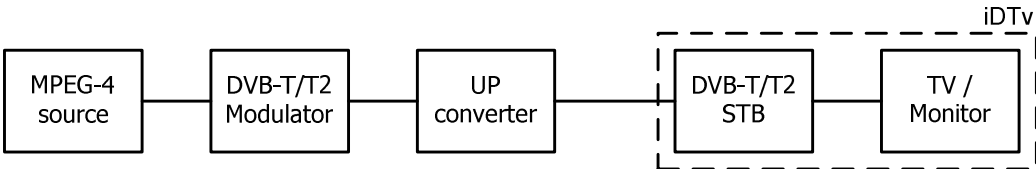
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Test	<i>Task 4.1: Real time clock</i>
Requirement	The receiver shall have a real time clock and the clock shall be updated by incoming TDT and TOT data.
Test procedure	<p>Purpose of test: To verify that the real time clock runs continuously and it is updated from data in transport stream.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iTv D E end </pre> </div> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>TOT can be used but this is not mandatory. In any case the receiver shall provide option to manually set offset according to GMT.</p> <p>Transport stream used: Use transport stream A.</p> <p>Expected result: The real time clock and date is updated from transport stream information.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

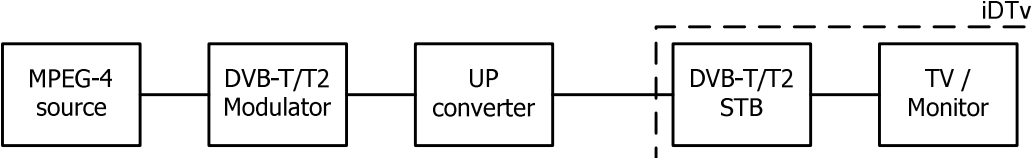
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Test	<i>Task 5.1: MPEG Demultiplexer – maximum transport stream data rate</i>
Requirement	The demultiplexer shall be compliant to the MPEG-2 transport layer defined in ISO/IEC 13818-1 and ETSI TS 101 154 and shall be able to decode an ISO/IEC 13818-1 stream with data rates up to 32 Mbit/s for DVB-T signal and data rates up to 50,34 Mbit/s for DVB-T2 signals.
Test procedure	<p>Purpose of test: Purpose of the test is to verify that demultiplexer operates at highest transport stream data rates (32 Mbit/s or 50,34 Mbit/s), including one or more programs including sound and teletext components.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --> B[DVB-T/T2 Modulator] B --> C[UP converter] C --> D[DVB-T/T2 STB] D --> E[TV / Monitor] subgraph iDTV D E end </pre> </div> <p>Transport stream used: Use transport stream G, P.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and instruments, 2. On UP converter select channel C45 and use modulation parameters 8k, 64-QAM, R=7/8, $\Delta/Tu=1/8$ for DVB-T and use modulation parameters 32k, 256-QAM, R=5/6, $\Delta/Tu=1/128$ for DVB-T2. 3. Select program from transport stream with high data rate, 4. Check the conformity according to ISQMM <p>Expected result: All programs inside transport stream are decoded correctly.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

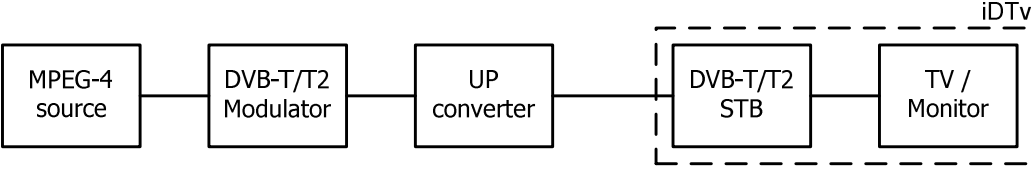
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Test	<i>Task 5.2: MPEG Demultiplexer – support of variable bitrate (statistical multiplexing)</i>
Requirement	The demultiplexer shall be compliant to the MPEG-2 transport layer defined in ISO/IEC 13818-1 and ETSI TS 101 154 and shall support variable bitrate elementary streams within a constant bitrate transport stream.
Test procedure	<p>Purpose of test: To verify that the receiver can decode a variable bitrate video stream (statistical multiplexing).</p> <p>Equipment:</p> <div data-bbox="389 741 1430 909" style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTV D E end </pre> </div> <p>Transport stream used: Use transport stream E.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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 ISQMM. <p>Expected result: The receiver is capable displaying an error-free picture during 5 minutes.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

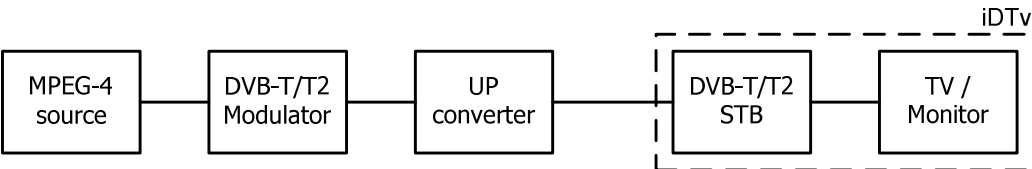
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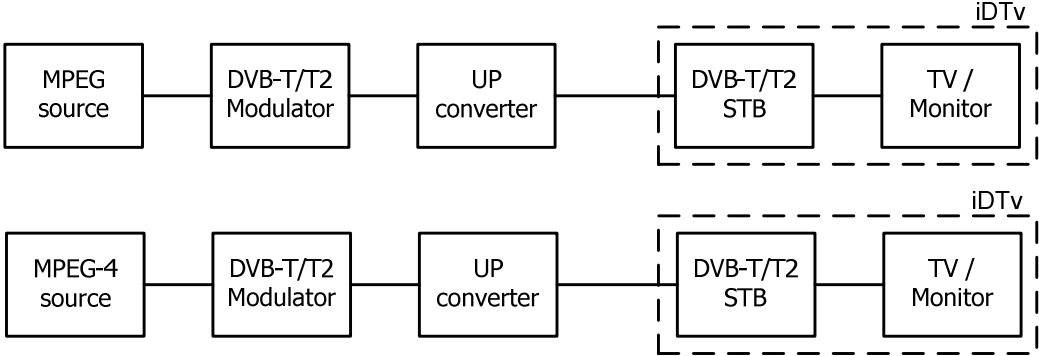
Test	<i>Task 6.1: MPEG VIDEO Decoder - Audio video synchronization</i>
Requirement	The decoder of receiver shall ensure synchronization between AUDIO and VIDEO as follows: audio shall never lead the video program by more than 20 ms, and shall never lag the video by more than 45 ms.
Test procedure	<p>Purpose of test: To verify if relative position between audio and video content complies with requirement.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTV D E end </pre> </div> <p>Transport stream used: Use transport stream A.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>For iDTV:</p> <ol style="list-style-type: none"> 1. Prepare test environment and connect the components, 2. Perform subjective validation of sound and picture synchronization. <p>Expected result: Relative difference of audio and video shall be inside limits +25 ms and -45 ms.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:

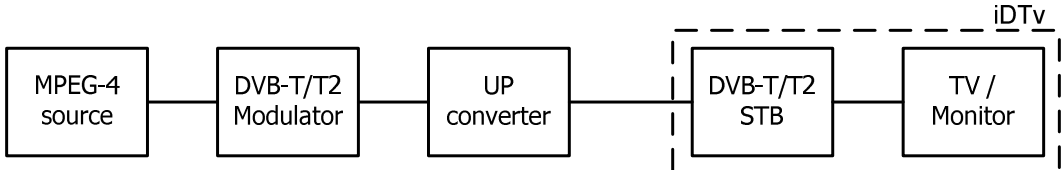
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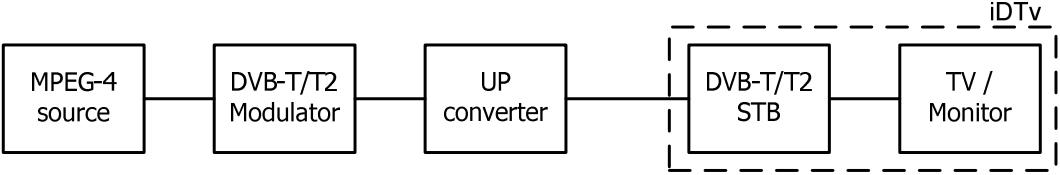
Test	<i>Task 6.2: MPEG VIDEO Decoder – decoding of MPEG-2 SD resolutions</i>										
Requirement	<p>The decoder of receiver shall fully comply with standard ISO IEC 13818-2 for decoding of MPEG-2 coded signal.</p> <p>The decoder shall also comply with ETSI TS 101 154 and shall support VBR and CBR.</p>										
Test procedure	<p>Purpose of test: To verify if receiver is capable of decoding MPEG-2 video services in different resolutions.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDtv D E end </pre> </div> <p>Transport stream used: Use transport stream H.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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 ISQMM and check all resolutions. Fill in the results. <p>Expected result: Receiver is capable of decoding all listed picture resolutions.</p>										
Test results	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Resolution</th> <th>720x576</th> <th>544x576</th> <th>480x576</th> <th>352x576</th> </tr> </thead> <tbody> <tr> <td>Conformity</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Resolution	720x576	544x576	480x576	352x576	Conformity				
Resolution	720x576	544x576	480x576	352x576							
Conformity											
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment										
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>										

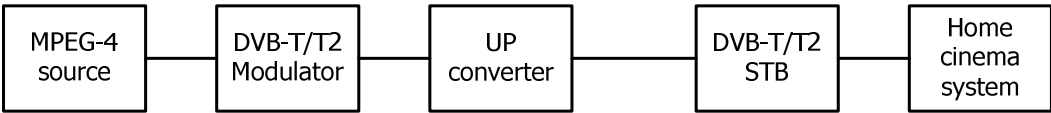
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Test	<i>Task 6.3: MPEG VIDEO Decoder – decoding of MPEG-4 SD resolutions</i>													
Requirement	The decoder of the receiver shall fully comply with standard ISO IEC 14496-10 for decoding MPEG-4 and shall support profile »H.264/AVC Main Profile 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	<p>Purpose of test: To verify if receiver is capable of decoding MPEG-4 SD video services in different resolutions.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTV D E end </pre> </div> <p>Transport stream used: Use transport stream B.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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 ISQMM and check all resolutions. Fill in the results. <p>Expected result: Receiver is capable of decoding all listed picture resolutions.</p>													
Test results	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Resolution</th> <th>720x576</th> <th>544x576</th> <th>480x576</th> <th>352x576</th> </tr> </thead> <tbody> <tr> <td>Conformity</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Resolution	720x576	544x576	480x576	352x576	Conformity				
Resolution	720x576	544x576	480x576	352x576										
Conformity														
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment													
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:													
Date:			Signature:											

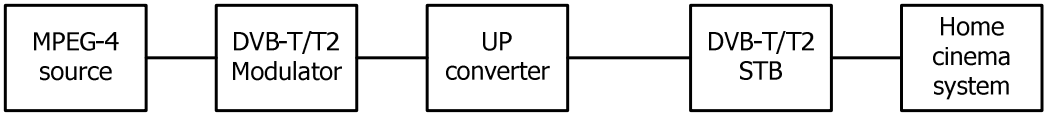
Test	<i>Task 6.4: MPEG VIDEO Decoder – minimum bitrate</i>	
Requirement	The decoder of receiver shall decode pictures in resolution of 720x576 pixels with minimum data rate of 600 kbit/s.	
Test procedure	<p>Purpose of test: To verify the receiver can decode picture at minimum bitrate of transport stream.</p> <p>Equipment:</p>  <p>Transport stream used: Use transport stream A, P.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: Inside transport stream it is possible to receive all programs.</p>	
Test results		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:	
Date:		Signature:

Test	<i>Task 6.5: MPEG VIDEO Decoder - decoding of MPEG-4 HD resolutions</i>								
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	<p>Purpose of test: To verify if receiver is capable of decoding MPEG-4 HD video services in different resolutions.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDtv D E end </pre> </div> <p>Transport stream used: Use transport stream M.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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 ISQMM and check all resolutions. Fill in the results. <p>Expected result: Receiver is capable of decoding all listed picture resolutions.</p>								
Test results	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Resolution</th> <th>1920x1080</th> <th>1280x720</th> </tr> </thead> <tbody> <tr> <td>Conformity</td> <td></td> <td></td> </tr> </tbody> </table>			Resolution	1920x1080	1280x720	Conformity		
Resolution	1920x1080	1280x720							
Conformity									
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment								
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:								
Date:		Signature:							

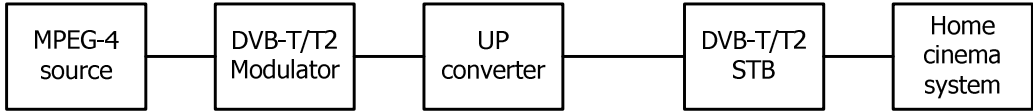
Test	<i>Task 6.6 HDTV - Down-conversion of High Definition Video for Standard Definition output</i>			
Requirement	In case of SCART, or if any other analogue video output (Y, Pb, Pr or other) is available, the decoded High Definition video shall be down-converted by SD format converter to standard definition (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	<p>Purpose of test: To verify that the receiver down converts the HD video signal to analogue video connectors.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iTv D E end </pre> </div> <p>Transport stream used: Use transport stream M.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup, 2. Play transport stream including resolution 1920x1080 and 1280x720, 3. Use ISQMM and check delivering SDTV signal for all Standard Definition outputs. <p>Expected result: The SCART or any other analogue video output (not higher than 576i) is delivering SDTV signalling.</p>			
Test results		Resolution	1920x1080	1280x720
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment			
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:			
Date:			Signature:	

Test	<i>Task 7.1: SDTV AUDIO - decoder</i>
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.
Test procedure	<p>Purpose of test:</p> <p>To verify decoding of audio content coded with different procedures.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> <p>Transport stream used: Use transport streams D, I and M.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: Audio decoder complies with requirement for audio coding.</p>
Test results	

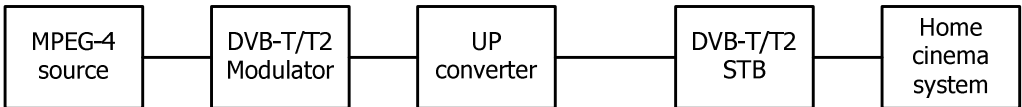
	Requirements	Conformity
	Receiver is capable to decode MPEG1 layer II bitstream.	
	Receiver is capable to switch decoding of audio from AC3 to MPEG-1 Layer II in case there is no AC3 bitstream in receiving service and the user selected AC3 on digital output.	
	Receiver is capable to decode AC3 bitstream.	
	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	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:	
Date:		Signature:

Test	<i>Task 7.2: HDTV AUDIO - support for E-AC3 on HDMI output interface</i>
Requirement	<p>The receiver shall be capable of providing the following formats on the HDMI connector:</p> <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • PCM multi-channel from the decoded bitstream (optional), • Pass-through of DTS bitstream (optional).
Test procedure	<p>Purpose of test: To verify that the receiver supports E-AC3 and HDMI interfaces.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> <p>Transport stream used: Use transport stream M.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: When in receiver menu stereo is selected, decoding of E-AC3 shall be available at HDMI output as PCM stereo.</p> <p>When in receiver menu multichannel is selected, decoding of E-AC3 shall be supported in all formats according to below:</p> <ul style="list-style-type: none"> • E-AC3 pass through • Transcoded to AC3

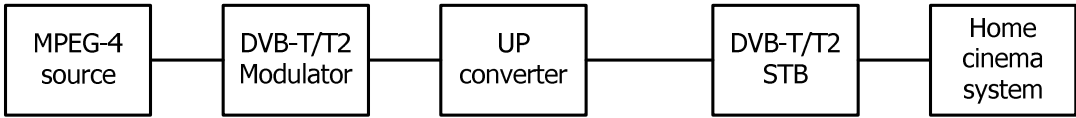
	<ul style="list-style-type: none"> PCM stereo downmix 		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:		
Date:		Signature:	

Test	<i>Task 7.3: HDTV AUDIO - support for E-AC3 on S/PDIF output interface</i>						
Requirement	<p>The receiver shall be capable of providing the following formats on the S/PDIF connector:</p> <ul style="list-style-type: none"> • 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). 						
Test procedure	<p>Purpose of test: To verify that the receiver supports E-AC3 on S/PDIF interfaces.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> </div> <p>Transport stream used: Use transport stream M.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The receiver will support E-AC3 on S/PDIF output according to requirements.</p>						
Test results	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 20%; text-align: center;">Conformity</th> </tr> </thead> <tbody> <tr> <td>PCM stereo from the decoded or down-mixed bitstream</td> <td style="text-align: center;"> </td> </tr> <tr> <td>Multichannel E-AC3 bitstream transcoded to AC3 or DTS</td> <td style="text-align: center;"> </td> </tr> </tbody> </table>		Conformity	PCM stereo from the decoded or down-mixed bitstream		Multichannel E-AC3 bitstream transcoded to AC3 or DTS	
	Conformity						
PCM stereo from the decoded or down-mixed bitstream							
Multichannel E-AC3 bitstream transcoded to AC3 or DTS							
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment						
Comments	<p>Non-compliancy can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>						

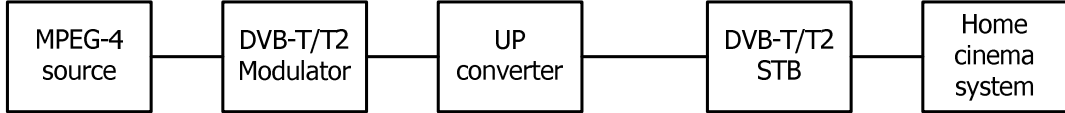
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Test	<i>Task 7.4: HDTV AUDIO - E-AC3 requirements</i>
Requirement	<p>The receiver shall:</p> <ul style="list-style-type: none"> • Decode AC3 streams at all bitrates and sampling rates listed in ETSI TS 102 366 (not including Annex E). • (additionally) 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. <p>Transcoding to AC3 audio streams shall be at a fixed bitrate of at least 640 kbit/s.</p>
Test procedure	<p>Purpose of test: To verify that the receiver supports E-AC3.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> </div> <p>The TS shall contain services, which has</p> <ul style="list-style-type: none"> • 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. <p>Transport stream used: Use transport stream N1, N2 and N3.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: Receiver supports the required audio formats.</p>

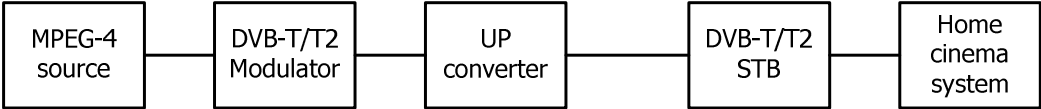
Test results	E-AC3 stereo			
	Sampling/bitrates	192 kbit/s	256 kbit/s	384 kbit/s
	48 kHz			
	E-AC3 multichannel (5.1)			
	Sampling/bitrates	192 kbit/s	384 kbit/s	448 kbit/s
	48 kHz			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment			
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:			
Date:		Signature:		

Test	<i>Task 7.5: HDTV AUDIO - E-AC3 metadata support</i>
Requirement	<p>The receiver shall support the use of Dolby metadata embedded in the audio stream when:</p> <ul style="list-style-type: none"> • Decoding AC3 or E-AC3 bitstreams, • Transcoding E-AC3 bitstreams to AC3 or • Generating a PCM stereo downmix from a decoded E-AC3 or AC3 bitstream.
Test procedure	<p>Purpose of test: To verify that the receiver supports Dolby metadata.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> </div> <p>The TS shall contain a service E-AC3, which has the following metadata included in audio component:</p> <ul style="list-style-type: none"> • Dolby Dynamic Range Control, • Dolby Dialogue Normalization according to ISO/IEC 14496-3 : 2005 (Audio 3rd edition), • Down Mix parameters. <p>Transport stream used: Use transport stream N1.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The receiver supports E-AC3 metadata according to requirements.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

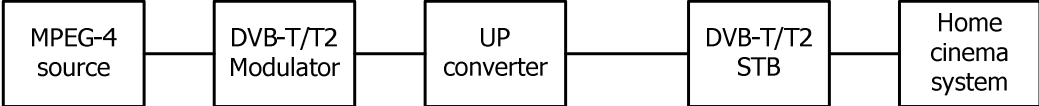
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Test	<i>Task 7.6: HDTV AUDIO - support for HE AAC on HDMI output interface</i>
Requirement	<p>The receiver shall be capable of providing the following formats on the HDMI connector:</p> <ul style="list-style-type: none"> • Pass-through of native bitstream 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).
Test procedure	<p>Purpose of test: To verify that the receiver supports HE AAC on HDMI interfaces.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> </div> <p>The TS shall contain services, which has</p> <ul style="list-style-type: none"> • HE AAC Level2 @48kHz (mono, stereo) audio component with relevant signalling. • HE AAC Level4 @48kHz (multichannel) audio component with relevant signalling. <p>Transport stream used: Use transport stream O.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result:</p>

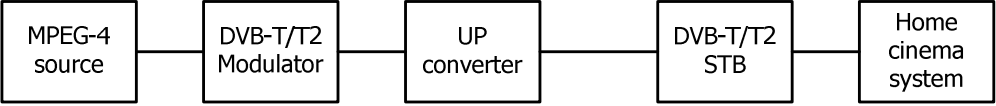
	<p>When in receiver menu stereo is selected, decoding of HE AAC Level 2 (stereo) shall be available at HDMI output as PCM stereo.</p> <p>When in receiver menu multichannel is selected, decoding of HE AAC Level 4 (multichannel) shall be supported in all formats according to below:</p> <ul style="list-style-type: none"> • HE AAC pass through • Transcoded to AC3 • Transcoded to DTS • PCM stereo downmix 	
Test results		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>	
Date:		Signature:

Test	<i>Task 7.7: HDTV AUDIO - support for HE AAC on S/PDIF output interface</i>
Requirement	<p>The receiver shall be capable of providing the following formats on the S/PDIF connector:</p> <ul style="list-style-type: none"> • 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).
Test procedure	<p>Purpose of test: To verify that the receiver supports HE AAC in S/PDIF interfaces.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> <p>The TS shall contain services, which has</p> <ul style="list-style-type: none"> • HE AAC Level2 @48kHz (mono, stereo) audio component with relevant signalling. • HE AAC Level4 @48kHz (multichannel) audio component with relevant signalling. <p>Transport stream used: Use transport stream O.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The receiver supports the HE AAC on S/PDIF according to requirements.</p>

Test results	<table border="1"> <thead> <tr> <th></th> <th>Conformity</th> </tr> </thead> <tbody> <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> </tbody> </table>			Conformity	PCM stereo from the decoded or down-mixed bitstream		Multichannel HE AAC bitstream transcoded to AC3 or DTS	
	Conformity							
PCM stereo from the decoded or down-mixed bitstream								
Multichannel HE AAC bitstream transcoded to AC3 or DTS								
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment							
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:							
Date:		Signature:						

Test	<i>Task 7.8: HDTV AUDIO - HE AAC requirements</i>
Requirement	<p>The receiver shall:</p> <ul style="list-style-type: none"> • 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. <p>If supported, transcoding to AC3 audio streams shall be according to ETSI TS 102 366 at a fixed bitrate of 640 kbit/s.</p> <p>If supported, transcoding to DTS audio streams shall be according to TS 102 114 at a fixed bitrate of 1,536 Mbit/s.</p>
Test procedure	<p>Purpose of test: To verify that the receiver supports HE AAC requirements.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> <p>The TS shall contain services, which has</p> <ul style="list-style-type: none"> • HE AAC Level2 @48kHz (mono, stereo) audio component with relevant signalling. • HE AAC Level4 @ 48kHz (multichannel) audio component with relevant signalling. <p>Transport stream used: Use transport stream O.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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,

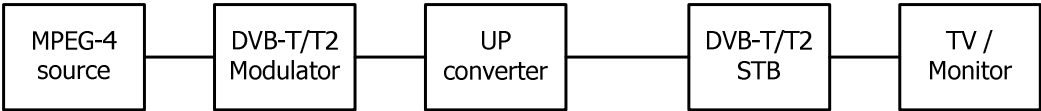
	<p>7. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analogue audio outputs for the selected bitrates and sampling rates.</p> <p>Expected result: Receiver supports decoding of HE AAC Level2 and 4 @48 kHz and transcoding of it to AC3 or DTS and supports down-mixing.</p>													
Test results	<table border="1"> <thead> <tr> <th>Functionality</th> <th>Compliance</th> </tr> </thead> <tbody> <tr> <td>Decoding of HE AAC L2@48kHz</td> <td></td> </tr> <tr> <td>Decoding of HE AAC L4@48kHz</td> <td></td> </tr> <tr> <td>Transcoding of HE AAC L4@48kHz to AC3 at 640kbps</td> <td></td> </tr> <tr> <td>Transcoding of HE AAC L4@48kHz to DTS 1,536Mbps</td> <td></td> </tr> <tr> <td>Down-mixing of HE AAC L4@48kHz</td> <td></td> </tr> </tbody> </table>		Functionality	Compliance	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		Down-mixing of HE AAC L4@48kHz	
Functionality	Compliance													
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														
Down-mixing of HE AAC L4@48kHz														
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment													
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>													
Date:		Signature:												

Test	<i>Task 7.9: HDTV AUDIO - HE AAC metadata support</i>
Requirement	<p>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:</p> <ul style="list-style-type: none"> • 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	<p>Purpose of test: To verify that the receiver supports HE AAC metadata.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[Home cinema system] </pre> </div> <p>The TS shall contain a service, which has the following metadata included in audio component:</p> <ul style="list-style-type: none"> • [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 <p>Transport stream used: Use transport stream O.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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 <p>Expected result: The receiver shall support HE AAC metadata according to requirements.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

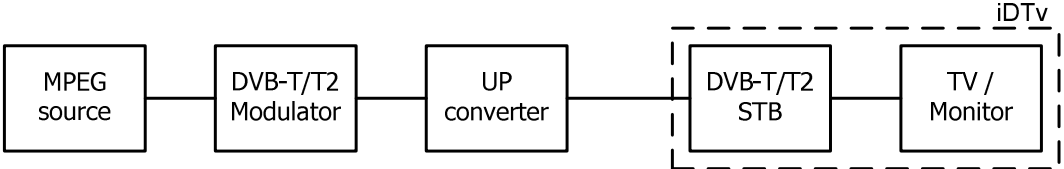
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Test	<i>Task 8.1: Radio mode – basic functionality</i>
Requirement	The STB shall allow basic DVB-T RADIO reception and operation (switching between channels) without a TV screen. This can be done with a Radio/TV button on the front plate or on the remote control.
Test procedure	<p>Purpose of test: To verify the radio functionality of STB.</p> <p>Equipment: Receiver under test.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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). <p>Transport stream used: Use transport stream D.</p> <p>Expected result: STB is capable of reception and switching between radio services.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

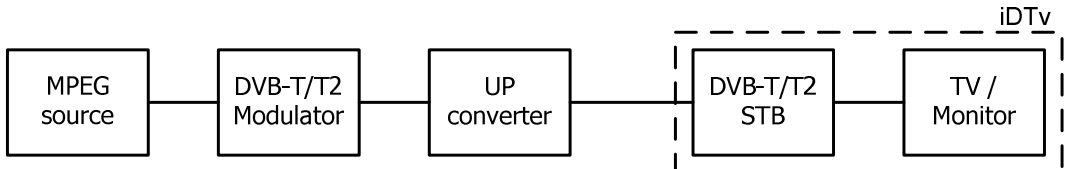
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Test	<i>Task 8.2: Radio mode - radio channel list</i>	
Requirement	If a DVB stream is labelled as a „Radio Service“, it should always be shown by the STB in the radio channel list, even if there might be an elementary video stream sent along.	
Test procedure	<p>Purpose of test: To verify if STB includes in service list all services labelled as »Radio service«.</p> <p>Equipment: Receiver under test.</p> <div style="text-align: center;">  <pre> graph LR A[MPEG-4 source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] </pre> </div> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Transport stream used: Use transport stream D.</p> <p>Expected result: Radio services are in all cases listed in radio lists.</p>	
Test results		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:	
Date:		Signature:

Test	<i>Task 9.1: System software upgrade</i>	
Requirement	<p>The receiver shall provide at least one mechanism for upgrading system software.</p> <p>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.</p>	
Test procedure	<p>Purpose of test: To verify if the receiver provides at least one mechanism for upgrading system software.</p> <p>To verify if HDTV level receiver supports and use OTA System Software Update procedure according to the ETSI TS 102 006.</p> <p>Equipment: Receiver under test, SW, user manual, cables.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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/T2 network (mandatory for HDTV level receivers), note current SW version, 5. Check in user manual if prescribed upgrade procedure is supported by manufacturer and play the transport stream with SW upgrade, 6. After following the upgrade procedure check if the upgraded version of SW is higher as noted in point 4. <p>Expected result: It is possible to upgrade the receiver according to requirements.</p>	
Test results		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>	
Date:		Signature:

Test	<i>Task 10.1: Processing of PSI/SI tables.</i>						
Requirement	<p>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.</p> <p>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.</p>						
Test procedure	<p>Purpose of test: To verify static and dynamic processing of PSI/SI tables.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG source] --> B[DVB-T/T2 Modulator] B --> C[UP converter] C --> D[DVB-T/T2 STB] D --> E[TV / Monitor] subgraph iDTV D E end </pre> </div> <p>Transport stream used: Use transport streams H and I.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: Changes generated in transport streams are processed.</p>						
Test results	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 20%; text-align: center;">Conformity</th> </tr> </thead> <tbody> <tr> <td>Toggling from "ON-Standby"</td> <td></td> </tr> <tr> <td>Toggling "ON-Power OFF"</td> <td></td> </tr> </tbody> </table>		Conformity	Toggling from "ON-Standby"		Toggling "ON-Power OFF"	
	Conformity						
Toggling from "ON-Standby"							
Toggling "ON-Power OFF"							
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment						
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>						

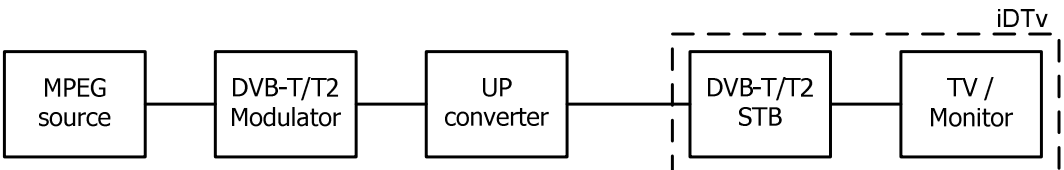
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Test	<i>Task 10.2: EPG functionality for EIT actual and EIT other</i>		
Requirement	The receiver shall offer basic functionality of EPG in order to present following: <ul style="list-style-type: none"> EIT actual (present/following/scheduled) EIT other (present/following/scheduled) 		
Test procedure	<p>Purpose of test: To verify the EPG functionality of receiver.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTv D E end </pre> </div> <p>Transport stream used: Use transport stream I.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> Prepare test environment and setup of instruments, Play transport stream and check the presenting of EPG. <p>Expected result: The receiver is presenting EPG information correctly.</p>		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:		
Date:		Signature:	

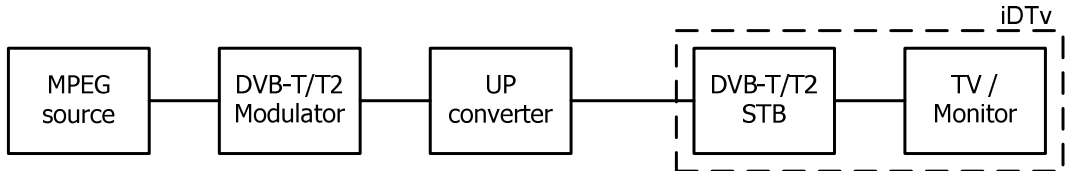
Test	<i>Task 10.3: Presentation of EPG in appropriate language</i>	
Requirement	The navigator shall be presented in appropriate language for country and EPG shall support characters from code table ISO/IEC 8859-xx specific for each country.	
Test procedure	<p>Purpose of test: To verify if the navigator is presented in appropriate language and supports characters from code table ISO/IEC 8859-xx specific to country</p> <p>Equipment: Receiver under test.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 1. Prepare test environment and setup of instruments, 2. Inside user interface check the correct displaying of specific characters according to requirement. <p>Transport stream used: Use transport stream I.</p> <p>Expected result: The receiver is using code table ISO/IEC 8859-xx and presents characters correctly.</p>	
Test results		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>	
Date:		Signature:

Test	<i>Task 10.4: Default audio language support</i>
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	<p>Purpose of test: To verify the possibility of auto selecting the audio according to the language settings.</p> <p>Equipment: Receiver under test.</p> <p>Transport stream used: Use transport stream I.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The receiver automatically selects the audio content according to saved user preference.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

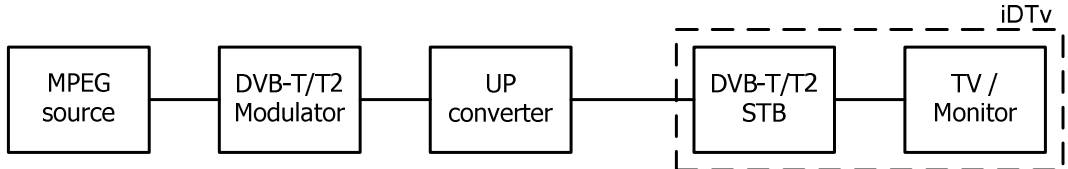
Date:		Signature:	
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Test	<i>Task 10.5: CVBS teletext</i>
Requirement	<p>The SDTV Level receiver shall offer at least one of following options for presentation of Teletext:</p> <ul style="list-style-type: none"> - By insertion of the Teletext data in 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	<p>Purpose of test: To verify the presentation of teletext using insertion in the VBI of the analogue CVBS video output.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTV D E end </pre> </div> <p>Transport stream used: Use transport stream C.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The teletext data are inserted in the VBI of the analogue CVBS video output using lines 6-22 and 320-335.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

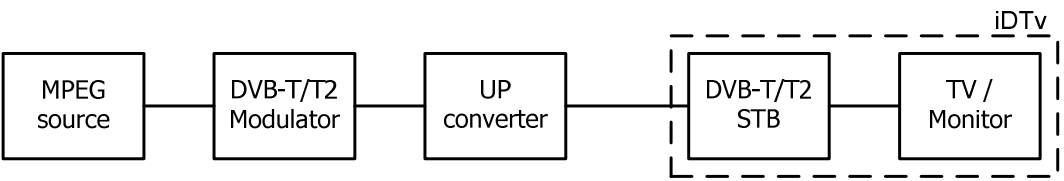
Date:		Signature:	
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Test	<i>Task 10.6: Presentation of teletext within user interface for SDTV receivers</i>
Requirement	<p>The SDTV Level receiver shall offer at least one of following options for presentation of Teletext:</p> <ul style="list-style-type: none"> - 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	<p>Purpose of test: To verify the presentation of teletext within the navigator of the receiver.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTv D E end </pre> </div> <p>Transport stream used: Use transport stream C.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The teletext data is presented correctly inside user interface of receiver.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

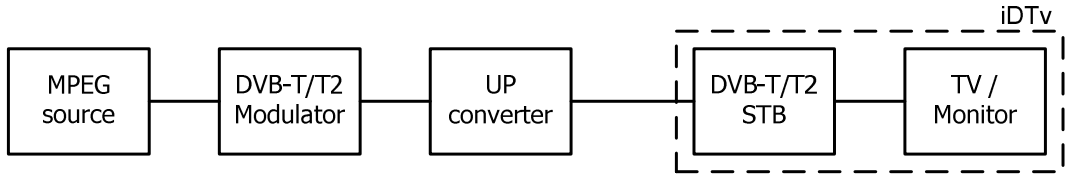
Date:		Signature:	
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Test	<i>Task 10.7: User interface based teletext for HDTV Level receiver</i>
Requirement	HDTV Level receiver shall be able to display (EBU) Teletext (both normal teletext pages and teletext subtitling pages) using the OSD, meeting the requirements for level 1.5 in ETSI EN 300 706 "Enhanced Teletext Specification".
Test procedure	<p>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".</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTV D E end </pre> </div> <p>Transport stream used: Use transport stream C.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The teletext data is presented correctly inside user interface of receiver by using HDMI and SCART interface.</p>
Test results	
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>

Date:		Signature:	
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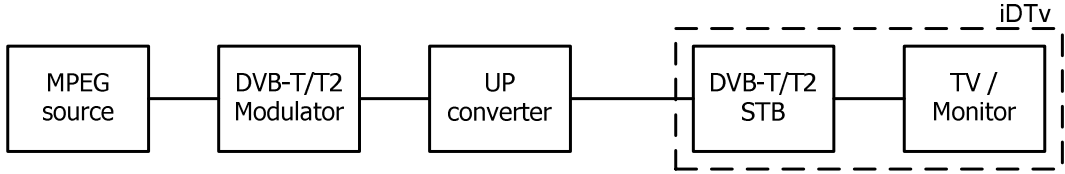
Test	<i>Task 10.8: DVB subtitling</i>
Requirement	<p>The receiver shall be capable of decoding and displaying DVB subtitle services which are transmitted in conformance with ETSI EN 300 743 including country specific characters from code table ISO/IEC 8859-xx.</p> <p>The HDTV Level receiver shall include default font(s) with good readability for all output video resolution modes for SDTV and HDTV.</p> <p>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.</p>
Test procedure	<p>Purpose of test: To verify that DVB subtitling is implemented and functional.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG source] --> B[DVB-T/T2 Modulator] B --> C[UP converter] C --> D[DVB-T/T2 STB] D --> E[TV / Monitor] subgraph iDTV D E end </pre> <p>Transport stream used: Use transport stream C.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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),

	<p>14. Fill-in the test protocol.</p> <p>Expected result: All test results are OK.</p>																	
Test results	<p>Procedure point 5</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Expected result</th> <th style="text-align: center;">Compliance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Teletext subtitling active</td> <td></td> </tr> </tbody> </table> <p>Procedure point 8</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Expected result</th> <th style="text-align: center;">Compliance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">DVB subtitling active</td> <td></td> </tr> </tbody> </table> <p>Procedure point 10</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Expected result</th> <th style="text-align: center;">Compliance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">DVB subtitling in synchronism with video</td> <td></td> </tr> </tbody> </table> <p>Procedure point 14</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Expected result</th> <th style="text-align: center;">Compliance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">It is possible to turn DVB subtitling ON/OFF</td> <td></td> </tr> </tbody> </table>		Expected result	Compliance	Teletext subtitling active		Expected result	Compliance	DVB subtitling active		Expected result	Compliance	DVB subtitling in synchronism with video		Expected result	Compliance	It is possible to turn DVB subtitling ON/OFF	
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Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>																	
Date:		Signature:																

Test	<i>Task 10.9: Storing user preferences in persistent memory</i>	
Requirement	The user shall be able to store preferences in persistent memory.	
Test procedure	<p>Purpose of test: To verify saving of settings also in case of switching off power supply.</p> <p>Equipment:</p>  <pre> graph LR A[MPEG source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iDTV D E end </pre> <p>Transport stream used: Use transport stream C.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: User preferences are stored in persistent memory and are not affected by disconnecting power supply.</p>	
Test results		
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment	
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:	
Date:		Signature:

Test	<i>Task 10.10: Reset all parameters to factory mode</i>		
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	<p>Purpose of test: To verify the function of reset to factory mode.</p> <p>Equipment: Receiver under test.</p> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: The receiver provides reset function and it is functioning OK.</p>		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information:		
Date:		Signature:	

Test	<i>Task 11.1: Remote control</i>		
Requirement	The receiver shall include remote control for managing and using the receiver.		
Test procedure	<p>Purpose of test: To verify the conformity of remote control with manufacturer specifications.</p> <p>Equipment: Receiver under test.</p> <p>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)</p> <p>Expected result: Remote control complies with requirement.</p>		
Test results			
Conformity	<input type="checkbox"/> Compliant <input type="checkbox"/> Non-compliant <input type="checkbox"/> Major deviation <input type="checkbox"/> Minor deviation, comment		
Comments	<p>Non-compliance can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Describe more specific faults and/or other information:</p>		
Date:		Signature:	

Test	<i>Task 12.1: Factory presets</i>														
Requirement	<p>For HDTV Level receivers following pre-settings shall be enabled:</p> <ul style="list-style-type: none"> • Default language for User interface and subtitling set to official country language • Default codepage for country language according to IEC 8859-xx • 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	<p>Comment for implementation: <i>The test and the requirement shall be modified according to national receiver requirement.</i></p> <p>Purpose of test: To verify that parameters settings from requirement are selected according to country selection.</p> <p>Equipment:</p> <div style="text-align: center;">  <pre> graph LR A[MPEG source] --- B[DVB-T/T2 Modulator] B --- C[UP converter] C --- D[DVB-T/T2 STB] D --- E[TV / Monitor] subgraph iTv D E end </pre> </div> <p>Test procedure:</p> <ol style="list-style-type: none"> 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. <p>Expected result: All presets are implemented.</p>														
Test results		<table border="1"> <thead> <tr> <th data-bbox="432 1473 1241 1514">Expected result</th> <th data-bbox="1241 1473 1401 1514">Compliance</th> </tr> </thead> <tbody> <tr> <td data-bbox="432 1514 1241 1547">Default codepage for country official language IEC 8859-xx</td> <td data-bbox="1241 1514 1401 1547"></td> </tr> <tr> <td data-bbox="432 1547 1241 1581">Subtitling: ON (enabled)</td> <td data-bbox="1241 1547 1401 1581"></td> </tr> <tr> <td data-bbox="432 1581 1241 1615">Analogue video output format: 4:3 set to "16:9 letterbox" conversion</td> <td data-bbox="1241 1581 1401 1615"></td> </tr> <tr> <td data-bbox="432 1615 1241 1648">OTA System Software Upgrade: ON (enabled)</td> <td data-bbox="1241 1615 1401 1648"></td> </tr> <tr> <td data-bbox="432 1648 1241 1693">Default digital audio output set to PCM Stereo</td> <td data-bbox="1241 1648 1401 1693"></td> </tr> </tbody> </table>	Expected result	Compliance	Default codepage for country official language IEC 8859-xx		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 Stereo		
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Date:		Signature:													

