



**NorDig**

**Unified Test Specifications**

for

**SD and HD Level  
Integrated Receiver Decoders**

**for use in cable, satellite, terrestrial and IP-based networks**

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## **Part I – Introduction**

## 1 Document History

Version	Date	Comments
Ver 1.0	11.2004	This is the first approved version of the complete NorDig Unified Test specification
Ver. 1.0.3	03.2007	This is the updated version of the complete NorDig Unified Test specification. This release is compliant with the NorDig Unified specification ver. 1.0.3
Ver 2.0	06.2008	This is the updated version of the complete NorDig Unified Test specification. This release is compliant with the NorDig Unified specification ver. 2.0. It also reflects that the NorDig logo is no more offered.

## 2 References

This test specification is related to the following documents:

- [1] NorDig Unified Requirements for Integrated Receiver Decoders, Version 2.0 June 2008.
- [2] NorDig Rules of Operation for NorDig Unified receiver networks, ver. 1.0 November 2004.
- [3] MHP Test Suite for MHP 1.1

## 3 Background

The NorDig group represents broadcasters and network operators in the Nordic countries. The members have agreed on common minimum decoder specifications and a migration plan towards the use of decoders that satisfy these requirements. For further info about NorDig, please see [www.nordig.org](http://www.nordig.org).

The various members of NorDig are independent of each other, but intend to transmit to IRDs that satisfy the specified common minimum requirements. The various networks may in addition specify network specific requirements.

Common test specifications are established in order to ensure that decoders comply with the common minimum requirements. Additional test specifications may apply for individual networks, especially networks with access-controlled transmissions.

The NorDig specifications are contained in the NorDig Unified specification [1] which covers and includes the following profiles; NorDig Basic, NorDig Enhanced and NorDig Interactive. Figure 1 and Figure 2 illustrate the relationships between the various NorDig profiles.

MHP-profile

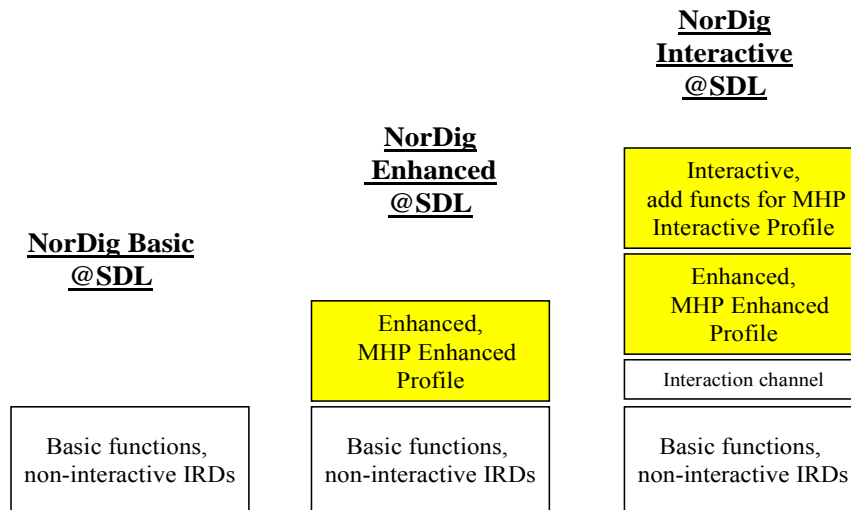


Figure 1 The NorDig specifications, indicating the various profiles on SD IRDs

MHP-profile

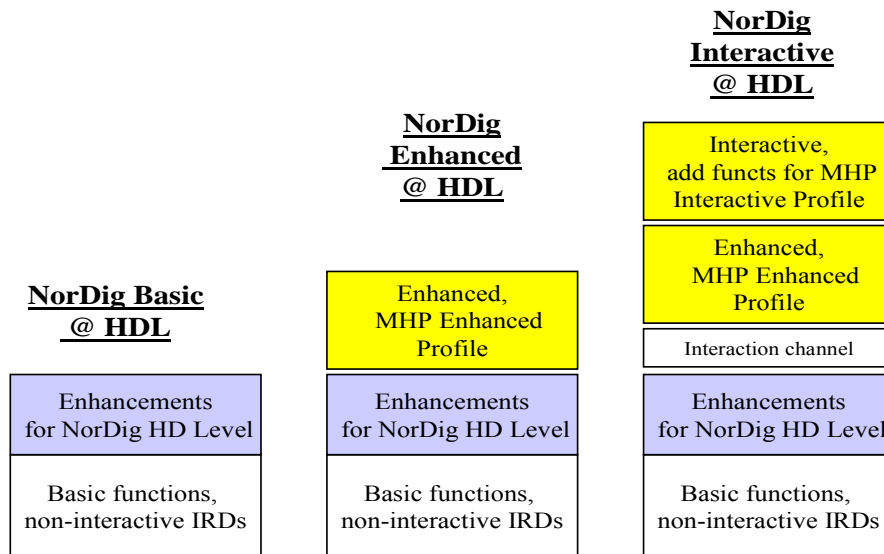


Figure 2 The NorDig specifications, indicating the various profiles on HD IRDs

#### 4 NorDig compliance testing

The NorDig Verification Test is open for all IRD manufacturers that want to claim that they have IRD products that comply with the NorDig IRD requirements. The IRD manufacturer can claim compliance with one or more NorDig profile(s), provided that

- (i) the IRD product complies with the NorDig profile(s) [1] referred to and,
- (ii) the IRD product passes the tests specified in this document.

The NorDig Verification Test shall ensure compliance with the NorDig requirements and NorDig transmissions, and comes in addition to the regular factory testing for general quality and functionality control.

In addition to the common NorDig requirements, the IRD-product has to comply with additional requirements and pass additional tests in case it is intended for use in a network that provides access controlled services. The additional requirements and tests will be available from the relevant Network Custodian.

The IRD Manufacturer shall furthermore contact the relevant Network Custodian(s) in case the IRD product shall be verified for networks with access controlled services. The relevant Network Custodian(s) will provide Network specific requirements (additional to the specified Unified NorDig Requirements) and the corresponding test specifications. Such further handling has to be agreed between the IRD Manufacturer and the relevant Network Custodian (Annex A).

## 5 Test specifications for NorDig compliance

The NorDig Unified test specification consists of three sets, including:

**Test Set A**, which includes the non-API and non-CA-parts.

**Test Set-B**, which includes the API-related parts.

**Test Set-C**, which includes the CA-related parts

The test set may be updated over time, as experience with self-testing is obtained.

The defined test procedures in each test case are only illustrations of the test setup and the manufacturer can use different setup to run the test cases. If other, than illustrated, test setup is used the manufactures shall describe used test setup in the test report. The defined test sets may not cover all NorDig Unified Requirements [1].

### ***Test Set A (non-API and non CA-parts)***

NorDig Test specifications for non-API and non-CA-parts (Test Set A) are established in Part II of this test specification. The tests are intended for self-testing by industry and cover testing of:

- Front-ends, Demultiplexer
- Video and Audio decoders
- Graphics and (external) Interfaces
- SI and Navigator functionality
- Teletext and subtitling
- Remote control

Test Set A is described in chapter: Introduction-Test Set A (page 14).

### ***Test Set B (API-parts)***

The Test suites for DVB-MHP are relevant for the NorDig Enhanced and NorDig Interactive profiles. The DVB test suites are available for the manufacturers from ETSI Custodian.

Testing for NorDig compliance of IRDs provided with MHP compliant APIs will thus be based on the test regime established by DVB, including the MHP Test suites and the handling of MHP compliance by the ETSI Custodian.

Test Set B is described in chapter: Introduction-Test Set B (page 228).

### ***Test Set C (CA-parts)***

The NorDig test specifications Test Set C are grouped into a test task, covering related tests:

- Test specifications for Common Interface

Tests for the Common Interface are mandatory for IDTV sets with a diameter larger than 30 cm, and are included in this Test Specification. Other CA-related tests will be provided by the relevant Network Custodian(s).

Test Set C is described in chapter: Introduction-Test Set C (page 230).



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## 6 Testing and test report for NorDig compliance

A Test Report should be made available to show compliance with the common NorDig requirements. Each individual test case should be performed; test results and conformity should be reported and signed.

In case that the test result indicates a non-compliance (with the specified requirement) the level of the non-compliance shall be evaluated and indicated by ticking the corresponding "box" in the conformity field. If such non-compliance can be removed by an upgrade of the IRD software, this shall be indicated by ticking the correct commentary field for the individual test. The manufacturer should describe the non-compliance and plans to correct it in the "Comments" row.

The Information specified for the "Test item" should be provided, see section 6.1.

## 6.1 Test item

The information of the Test Item shall be inserted to the following table. The tests shall be performed with the same IRD model (HW/SW) in all test cases.

**Table 6.1 Test Item**

<i>Test Item</i>	
<b>Manufacturer:</b>	
<b>Model:</b>	
<b>S/N(s):</b>	
<b>SW version:</b>	
<b>HW version:</b>	
<b>Front-End:</b>	
<b>Demux:</b>	
<b>Processor:</b>	
<b>Memory size:</b>	
<b>MHP Profile:</b>	
<b>NorDig Profile:</b>	
<b>Other relevant information:</b>	

Following information shall be entered to Table 6.1:

<b><i>Manufacturer:</i></b>	The name of the manufacturer of the tested IRD
<b><i>Model:</i></b>	The model (to be deployed to NorDig market) of the tested IRD
<b><i>S/N(s):</i></b>	The serial numbers of all IRDs which are used in the tests
<b><i>SW version:</i></b>	The SW version of the tested IRD model
<b><i>HW version:</i></b>	The HW version of the tested IRD model
<b><i>Front-End:</i></b>	The front-end type and model of the tested IRD
<b><i>Demux:</i></b>	The Demux type and model of the tested IRD
<b><i>Processor:</i></b>	The Processor type and model of the tested IRD
<b><i>Memory size:</i></b>	The memory size of the tested IRD
<b><i>MHP Profile:</i></b>	The MHP profile of the tested IRD (Not relevant for NorDig Basic/NorDig I)
<b><i>NorDig Profile</i></b>	The NorDig profile of the tested IRD
<b><i>Other relevant information:</i></b>	The other relevant information that the IRD manufacturer feels important



## **Part II - Test Set A**

## 1 Introduction-Test Set A

The NorDig test specifications Test Set A are grouped into a set of test tasks, covering related tests:

- A. **Front-end issues**
  - Task 1: Satellite tuner and demodulator
  - Task 2: Cable Tuner and Demodulator
  - Task 3: Terrestrial Tuner and Demodulator
  - Task 4: IP-Based Front-end
  
- B. **Hardware issues**
  - Task 5: MPEG2 demultiplexer and Video/Audio decoder
  - Task 6: The Bootloader (System Software Update)
  - Task 7: Graphics processing
  - Task 8: Interfaces, signal levels
  
- C. **System Software issues**
  - Task 9: SI and Navigator
  - Task 10: Teletext and subtitling
  - Task 11: The Remote Control
  - Task 12: User Preferences

Each of the main tasks defined above include a number of sub-tasks.

Table 1 maps the NorDig requirements [1] into the corresponding test tasks and shows the relevance per sub-task for the various NorDig profiles (“shall” indicates a mandatory requirement and a mandatory test).



## NorDig Table 1A. Task A: Front ends

Test spec relevant for NorDig IRDs, with reference to Unified NorDig requirements for profiles Basic TV, Enhanced and Interactive, version 2.0. All mandatory requirements marked "shall" shall be tested for the relevant profile.

Chapter	Description	NorDig Basic	NorDig Enhanced	NorDig Int'active	NorDig HDTV	Test Spec	Comments
		v2.0	v2.0	v2.0	v2.0	Test task no.	
<b>FRONT-END</b>							
<b>SATELLITE TUNER AND DEMODULATOR</b>							
NorDig Unified 3.1.1	General	shall	shall	shall	shall	Task 1:1	
NorDig Unified 3.1.2	General	shall	shall	shall	shall	Task 1:2	
NorDig Unified 3.1.3	Quality reception detector	shall	shall	shall	shall	Task 1:3	
NorDig Unified 3.2.2	HDTV - Symbol and FEC-rate (DVB-S2)	shall	shall	shall	shall	Task 1:4	
NorDig Unified 3.2.3	Input Frequency Range/Tuning range	shall	shall	shall	shall	Task 1:5	
NorDig Unified 3.2.4	Tuning/ Scanning Procedures (with NIT)	shall	shall	shall	shall	Task 1:6	
NorDig Unified 3.2.4	Tuning/ Scanning Procedures (without NIT)	shall	shall	shall	shall	Task 1:7	
NorDig Unified 3.2.5	Control signals	shall	shall	shall	shall	Task 1:8	
NorDig Unified 3.2.6	HDTV - Demodulation (DVB-S2)	shall	shall	shall	shall	Task 1:9	
NorDig Unified 3.2.7.2	RF Input Connector and Output Connector (option)	shall	shall	shall	shall	Task 1:10	
NorDig Unified 3.2.7.3	Input Signal Level	shall	shall	shall	shall	Task 1:11	
NorDig Unified 3.2.7.4	Power Supply and Control Signal (to RF unit)	shall	shall	shall	shall	Task 1:12	
NorDig Unified 3.2.8	Performance: Digital interference	shall	shall	shall	shall	Task 1:13	
NorDig Unified 3.2.8	Performance: Analogue interference	shall	shall	shall	shall	Task 1:14	
<b>CABLE TUNER AND DEMODULATOR</b>							
NorDig Unified 3.1.1	General	shall	shall	shall	shall	Task 2:1	
NorDig Unified 3.1.2	General	shall	shall	shall	shall	Task 2:2	
NorDig Unified 3.1.3	Quality reception detector	shall	shall	shall	shall	Task 2:3	
NorDig Unified 3.3.2	RF Characteristics: Input frequency range and input level. Digital channels	shall	shall	shall	shall	Task 2:4	
NorDig Unified 3.3.2	RF Characteristics: Channel bandwidth	shall	shall	shall	shall	Task 2:5	
NorDig Unified 3.3.2	RF Characteristics: Step size of the tuner	shall	shall	shall	shall	Task 2:6	
NorDig Unified 3.3.2	RF Characteristics: Input impedance	shall	shall	shall	shall	Task 2:7	
NorDig Unified 3.3.2	RF Characteristics: Symbol rate and modulation	shall	shall	shall	shall	Task 2:8	
NorDig Unified 3.3.3	Tuning/Scanning procedure	shall	shall	shall	shall	Task 2:9	
NorDig Unified 3.3.5.1	Performance Data: Return loss	shall	shall	shall	shall	Task 2:10	
NorDig Unified 3.3.5.1	Performance Data: Noise figure	shall	shall	shall	shall	Task 2:11	
NorDig Unified 3.3.5.2	Digital Signals: Bit error rate	shall	shall	shall	shall	Task 2:12	
<b>TERRESTRIAL TUNER AND DEMODULATOR</b>							
NorDig Unified 3.4.1	General	shall	shall	shall	shall	Task 3:1	
NorDig Unified 3.1.2	General	shall	shall	shall	shall	Task 3:2	
NorDig Unified 3.1.3	Quality reception detector	shall	shall	shall	shall	Task 3:3	
NorDig Unified 3.4.2	Frequencies: Centre frequencies	shall	shall	shall	shall	Task 3:4	
NorDig Unified 3.4.2	Frequencies: Frequency offset	shall	shall	shall	shall	Task 3:5	
NorDig Unified 3.4.2	Frequencies: Signal bandwidths	shall	shall	shall	shall	Task 3:6	
NorDig Unified 3.4.3	Modes	shall	shall	shall	shall	Task 3:7	
NorDig Unified 3.4.4.1	Tuning/Scanning Procedure: General	shall	shall	shall	shall	Task 3:8	
NorDig Unified 3.4.4.2	Tuning/Scanning Procedures: Basic status check	shall	shall	shall	shall	Task 3:9	
NorDig Unified 3.4.4.4	Tuning/Scanning Procedures: Automatic channel search for the same service bouquet	shall	shall	shall	shall	Task 3:10	
NorDig Unified 3.4.4.4	Tuning/Scanning: Automatic channel search for different service bouquets	shall	shall	shall	shall	Task 3:11	
NorDig Unified 3.4.4.5	Tuning/Scanning Procedures: Manual Channel Search	shall	shall	shall	shall	Task 3:12	
NorDig Unified 3.4.5	Changes In Modulation Parameters	shall	shall	shall	shall	Task 3:13	
NorDig Unified 3.4.6	RF input connector	shall	shall	shall	shall	Task 3:14	
NorDig Unified 3.4.7	RF output connector	shall	shall	shall	shall	Task 3:15	
NorDig Unified 3.4.8.1	Performance: BER vs C/N verification	shall	shall	shall	shall	Task 3:16	
NorDig Unified 3.4.8.2	Performance: C/N performance on Gaussian channel	shall	shall	shall	shall	Task 3:17	
NorDig Unified 3.4.8.2	Performance: C/N performance on 0dB echo channel	shall	shall	shall	shall	Task 3:18	
NorDig Unified 3.4.8.3	Performance: Minimum receiver signal input levels on Gaussian channel	shall	shall	shall	shall	Task 3:19	
NorDig Unified 3.4.8.3	Performance: Minimum IRD Signal Input Levels on 0dB echo channel	shall	shall	shall	shall	Task 3:20	
NorDig Unified 3.4.8.3	Performance: Noise figure on Gaussian channel	shall	shall	shall	shall	Task 3:21	
NorDig Unified 3.4.8.4	Performance: Maximum Receiver Signal Input Levels	shall	shall	shall	shall	Task 3:22	
NorDig Unified 3.4.8.5	Performance: Immunity to "analogue" signals in Other Channels	shall	shall	shall	shall	Task 3:23	
NorDig Unified 3.4.8.6	Performance: Immunity to "digital" signals in Other Channels	shall	shall	shall	shall	Task 3:24	
NorDig Unified 3.4.8.7	Performance: Immunity to Co-Channel Interference From Analogue TV Signals	shall	shall	shall	shall	Task 3:25	
NorDig Unified 3.4.8.8	Performance: Performance in Time-Varying Channels	shall	shall	shall	shall	Task 3:26	
NorDig Unified 3.4.8.9	Performance: Synchronisation for varying echo power levels in SFN	shall	shall	shall	shall	Task 3:27	
NorDig Unified 3.4.8.10	Performance: C/(N+) Performance in Single Frequency Networks for more than one echo	shall	shall	shall	shall	Task 3:28	
NorDig Unified 3.4.8.10	Performance: C/(N+) Performance in Single Frequency Networks inside the guard interval	--	--	--	--	Task 3:29	
NorDig Unified 3.4.8.10	Performance: C/(N+) Performance in Single Frequency Networks outside the guard interval	shall	shall	shall	shall	Task 3:30	
<b>IP-BASED FRONT-END</b>							
NorDig Unified 3.5	IP-based front-end	TBP	TBP	TBP		TBP	Spec TBPNew text for IP-based front-end

**Table 1B. Hardware Issues**

Test spec relevant for NorDig IRDs, with reference to Unified NorDig requirements for profiles Basic TV, Enhanced and Interactive, version 2.0.  
All mandatory requirements marked "shall" shall be tested for the relevant profile.

Chapter	Description	NorDig Basic v2.0	NorDig Enhanced v2.0	NorDig Int'active v2.0	NorDig HDTV v2.0	Test Spec Test task no.	Comments
<b>MPEG-2 DEMULTIPLEXER AND VIDEO/AUDIO DECODER</b>						<b>T5</b>	
NorDig Unified 4.1	SI utilization	shall	shall	shall	shall	Task 5:1	
NorDig Unified 4.1	CA descriptor interpretation	shall	shall	shall	shall	Task 5:2	
NorDig Unified 4.1 and 3	Maximum transport stream data rate	shall	shall	shall	shall	Task 5:3	
NorDig Unified 4.1	RS 232 or USB data	shall	shall	shall	shall	Task 5:4	
NorDig Unified 4.1	Number of elementary streams	shall	shall	shall	shall	Task 5:5	
NorDig Unified 4.1	Section filtering	shall	shall	shall	shall	Task 5:6	
NorDig Unified 4.1 and 5.1.2.7	Still picture support	shall	shall	shall	shall	Task 5:7	
NorDig Unified 4.1	Variable Bitrate Elementary Streams	shall	shall	shall	shall	Task 5:8	
NorDig Unified 4.1	Mixture of SD and HD services	shall	shall	shall	shall	Task 5:9	
NorDig Unified 4.2	Descrambler Performance	shall	shall	shall	shall	Task 5:10	
NorDig Unified 4.3	System clock recovery	shall	shall	shall	shall	Task 5:11	
NorDig Unified 5.1.1	Low MPEG-2 video bit rates	shall	shall	shall	shall	Task 5:12	
NorDig Unified 5.1.2.2	16:9 displayed on 4:3 monitors	shall	shall	shall	shall	Task 5:13	
NorDig Unified 5.1.2.2	Displaying 4:3 Material on 16:9 Monitors	shall	shall	shall	shall	Task 5:14	
NorDig Unified 5.1.2.3	16:9-Letterbox Conversion	shall	shall	shall	shall	Task 5:15	
NorDig Unified 5.1.2.5	Down-conversion	shall	shall	shall	shall	Task 5:16	
NorDig Unified 5.1.2.6	Up-conversion from lower resolutions	shall	shall	shall	shall	Task 5:17	
NorDig Unified 5.1.2.6	No up-conversion from 704x576 to 720x576	shall	shall	shall	shall	Task 5:18	
NorDig Unified 6.1	MPEG-2 Audio Decoder	shall	shall	shall	shall	Task 5:19	
NorDig Unified 6.1.1	Dual channel audio support	shall	shall	shall	shall	Task 5:20	
NorDig Unified 6.1.2.1	Audio video synchronization	shall	shall	shall	shall	Task 5:21	
NorDig Unified 6.1.2.3	SDTV - Multichannel audio	shall	shall	shall	shall	Task 5:23	
NorDig Unified 6.1.2.4	Digital audio output for digital input signals	shall	shall	shall	shall	Task 5:24	
NorDig Unified 6.1.3	Audio language support	shall	shall	shall	shall	Task 5:25	
NorDig Unified 6.1.3	Dynamic changes in audio components	shall	shall	shall	shall	Task 5:26	
NorDig Unified 6.1.3	Audio descriptors	shall	shall	shall	shall	Task 5:27	
NorDig Unified 5.2.1	HDTV - General				shall	Task 5:28	
NorDig Unified 5.2.2.2	HDTV - Video Decoder - Resolutions and Frame rates				shall	Task 5:29	
NorDig Unified 5.2.2.3	HDTV - Upconversion				shall	Task 5:30	
NorDig Unified 5.2.2.5	HDTV - Dynamic changes in video stream				shall	Task 5:32	
NorDig Unified 5.2.2.6	HDTV - AVC still picture				shall	Task 5:33	
NorDig Unified 5.2.2.7	HDTV - AVC video minimum bandwidth				shall	Task 5:34	
NorDig Unified 5.2.2.9	HDTV - Frame cropping				shall	Task 5:35	
NorDig Unified 5.2.2.11	HDTV - High Definition Video Output and Display				shall	Task 5:36	
NorDig Unified 5.2.2.12	HDTV - Down-conversion of High Definition Video for Standard Definition output				shall	Task 5:37	
NorDig Unified 6.2.1	HDTV - Audio Decoder (General)				shall	Task 5:38	
NorDig Unified 6.2.2.1	HDTV - Audio format support - E-AC3 with HDMI output interface				shall	Task 5:39	
NorDig Unified 6.2.2.1	HDTV - Audio format support - E-AC3 with S/PDIF output interface				shall	Task 5:40	
NorDig Unified 6.2.2.1	HDTV - Audio format support - E-AC3 requirements				shall	Task 5:41	
NorDig Unified 6.2.2.1	HDTV - Audio format support - E-AC3 metadata support requirements				shall	Task 5:42	
NorDig Unified 6.2.2.2	HDTV - Audio format support - HE AAC with HDMI output interface				shall	Task 5:43	
NorDig Unified 6.2.2.2	HDTV - Audio format support - HE AAC with S/PDIF output interface				shall	Task 5:44	
NorDig Unified 6.2.2.2	HDTV - Audio format support - HE AAC requirements				shall	Task 5:45	
NorDig Unified 6.2.2.2	HDTV - Audio format support - HE AAC metadata support requirements				shall	Task 5:46	
NorDig Unified 6.2.3	HDTV - Audio Prioritising				shall	Task 5:47	
NorDig Unified 6.2.4	HDTV - Support for "Clean audio" concept				shall	Task 5:48	
NorDig Unified 6.2.5	HDTV - Audio stream mixing				shall	Task 5:49	
NorDig Unified 6.2.7	HDTV - Video/audio delay settings				shall	Task 5:50	
NorDig Unified 6.2.8	HDTV - Audio handling when changing service or audio format				shall	Task 5:51	
<b>BOOTLOADER</b>						<b>T6</b>	
NorDig Unified 11.2.2	The Bootloader - Supported software download mechanism	shall	shall	shall	shall	Task 6:1	
NorDig Unified 11.2.1 and 11.2.2	The Bootloader: Initiation	shall	shall	shall	shall	Task 6:2	
NorDig Unified 11.2.1	The Bootloader: Over-the-air via Broadcast Download	shall	shall	shall	shall	Task 6:3	
<b>GRAPHICS PROCESSING</b>						<b>T7</b>	
NorDig Unified 8.1	NorDig Basic	shall	--	--	shall	Task 7:1	
NorDig Unified 8.2	NorDig Enhanced and Interactive	--	shall	shall	shall	Task 7:2	
NorDig Unified 8.2	HDTV - NorDig HDTV Level - Enhanced and Interactive	--	shall	shall	shall	Task 7:3	
<b>INTERFACES AND SIGNAL LEVELS</b>						<b>T8</b>	
NorDig Unified 9.3	Interaction Channel Interface	--	--	shall	shall	Task 8:1	
NorDig Unified 9.4	SCART Interface	shall	shall	shall	shall	Task 8:2	
NorDig Unified 12.2	Video performance	shall	shall	shall	shall	Task 8:3	
NorDig Unified 12.3	Audio performance	shall	shall	shall	shall	Task 8:4	
NorDig Unified 12.4	Zapping time	shall	shall	shall	shall	Task 8:5	
NorDig Unified 9.9.1	HDTV - HDMI interface - HD Ready				shall	Task 8:6	
NorDig Unified 9.9.2	HDTV - HDMI interface - EDID information				shall	Task 8:7	
NorDig Unified 9.9.2	HDTV - HDMI interface - Original format				shall	Task 8:8	
NorDig Unified 9.9.2	HDTV - HDMI - Manual setting for resolution				shall	Task 8:9	
NorDig Unified 9.9.4	HDTV - HDMI - Signal protection				shall	Task 8:10	
NorDig Unified 9.9.1	HDTV - Analogue video interface (option)				shall	Task 8:11	
NorDig Unified 10.3	Smart Card Interface	shall	shall	shall	shall	Task 8:12	
NorDig Unified 10.2	Transport Stream Input/Output (Common Interface)	shall	shall	shall	shall	Task 8:13	



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## Table 1C. System Software issues

Test spec relevant for NorDig IRDs, with reference to Unified NorDig requirements for profiles Basic TV, Enhanced and Interactive, version 2.0. All mandatory requirements marked "shall" shall be tested for the relevant profile.

Chapter	Description	NorDig Basic	NorDig Enhanced	NorDig Int'active	NorDig HDTV	Test Spec	Comments
		v2.0	v2.0	v2.0	v2.0	Test task no.	
<b>SERVICE INFORMATION AND NAVIGATOR</b>							
-----							T9
2.9.1 General							
NorDig Unified 13.1	SI_General	shall	shall	shall	shall	Task 9:1	
NorDig Unified 13.1	SI_General - Undefined data structures	shall	shall	shall	shall	Task 9:2	
NorDig Unified 13.1	SI_General - Actual and Other tables	shall	shall	shall	shall	Task 9:3	
NorDig Unified 13.1	SI_SI data available through an API	shall	shall	shall	shall	Task 9:4	
NorDig Rules of operation 2.1.1	SI_Text strings and field size of the SI_descriptor	shall	shall	shall	shall	Task 9:5	
NorDig Unified 13.1	Navigator: General	shall	shall	shall	shall	Task 9:6	
2.9.2 Static PSI/SI data							
NorDig Unified 13.2.1	Service list - Automatic channel search	shall	shall	shall	shall	Task 9:7	
NorDig Unified 13.1.4 and 13.1.5	Service list - NIT_actual service types	shall	shall	shall	shall	Task 9:8	
NorDig Rules of Operation 2.6.2	Service list - Inconsistent of SDT_actual and NIT_actual information	shall	shall	shall	shall	Task 9:9	
NorDig Unified 13.2.1	Service list - NIT_actual interpretation	shall	shall	shall	shall	Task 9:10	
NorDig Unified 13.2.2	Service list - NIT_actual original_network_ID	shall	shall	shall	shall	Task 9:11	
NorDig Unified 13.2.2	Service list - NIT_actual network_ID	shall	shall	shall	shall	Task 9:12	
NorDig Unified 13.2.2 and 14.2.3	Service list - NIT_other and SDT_other	shall	shall	shall	shall	Task 9:13	
NorDig Unified 13.2.7.3	Service list - Simultaneous transmission of LCD v1 and v2	shall	shall	shall	shall	Task 9:14	
NorDig Unified 13.2.7.4	Service list - Simultaneous reception of multiple networks and NorDig LCD	shall	shall	shall	shall	Task 9:15	
NorDig Unified 13.2	Service list - Priority of LCN between SD and HDTV services	shall	shall	shall	shall	Task 9:16	
NorDig Unified 13.2.3	NIT_actual - frequency_list_descriptor	shall	shall	shall	shall	Task 9:17	
NorDig Unified 13.2.2	NIT_actual - Missing terrestrial_system_delivery_descriptor	shall	shall	shall	shall	Task 9:18	
NorDig Unified 13.2.2 and 13.3.3	SDT_actual service_descriptor and CA_identifier_descriptor	shall	shall	shall	shall	Task 9:19	
NorDig Unified 13.1	SDT_actual and service_identifier_descriptor	shall	shall	shall	shall	Task 9:20	
2.9.3 Quasi static PSI/SI data							
NorDig Unified 13.1	Quasi static update of SDT_actual	shall	shall	shall	shall	Task 9:21	
NorDig Unified 13.3.4	Quasi static update of SDT_actual	shall	shall	shall	shall	Task 9:22	
NorDig Unified 13.3.4	Quasi-static update of SDT_actual - linkage to NorDig simulcast replacement service	shall	shall	shall	shall	Task 9:23	
NorDig Unified 13.1 and 14.2.4	Quasi static update of service list - service addition	shall	shall	shall	shall	Task 9:24	
NorDig Unified 13.1 and 14.2.4	Quasi static update of service list - service remove	shall	shall	shall	shall	Task 9:25	
NorDig Unified 13.2.1 and 14.2.2	Quasi static update of NorDig LCN v1	shall	shall	shall	shall	Task 9:26	
NorDig Unified 13.2.7	Quasi static update of NorDig LCN v2	shall	shall	shall	shall	Task 9:27	
NorDig Unified 13.2.2	Quasi-static update of NIT_actual - Linkage to an information service about the network	shall	shall	shall	shall	Task 9:28	
NorDig Unified 13.2.2	Quasi-static update of NIT_actual - Linkage to EPG service	shall	shall	shall	shall	Task 9:29	
NorDig Unified 13.2.2	Quasi-static update of NIT_actual - Linkage to TS that carries EIT_sch information for all services	shall	shall	shall	shall	Task 9:30	
NorDig Unified 13.2.2	Quasi-static update of NIT_actual - Linkage to System Software Download service	shall	shall	shall	shall	Task 9:31	
2.9.4 Dynamic PSI/SI data							
NorDig Unified 13.1 and 13.3.4	Dynamic update of SDT_actual free_CA_mode and linkage to a CA replacement service	shall	shall	shall	shall	Task 9:32	
NorDig Unified 13.1 and 13.3.4	Dynamic update of SDT_actual running status and linkage to a service replacement service	shall	shall	shall	shall	Task 9:33	
NorDig Unified 13.3.2	Dynamic update of EIT_actual/other pfl	shall	shall	shall	shall	Task 9:34	
NorDig Unified 13.1 and 13.4.2	Dynamic update of EIT_actual pfl CA_identifier_descriptor	shall	shall	shall	shall	Task 9:35	
NorDig Unified 13.4	Dynamic update of EIT_actual/other pfl short_event_descriptor, extended_event_descriptor and content_descriptor	shall	shall	shall	shall	Task 9:36	
NorDig Unified 13.4	Dynamic update of EIT_actual/other pfl content_descriptor and component_descriptor	shall	shall	shall	shall	Task 9:37	
NorDig Unified 13.3.2	Dynamic update of EIT_actual/other pfl parental_rating_descriptor	shall	shall	shall	shall	Task 9:38	
NorDig Unified 13.5 and 13.3.1	Dynamic update of EIT_actual/other pfl and schedule in ESG using linkage	shall	shall	shall	shall	Task 9:39	
NorDig Unified 13.5 and 13.3.1	Dynamic update of EIT_actual/other pfl and schedule in ESG	shall	shall	shall	shall	Task 9:40	
NorDig Unified 13.7	PMT Descriptors - General	shall	shall	shall	shall	Task 9:41	
NorDig Unified 13.7	PMT Descriptors - teletext pages, teletext subtitling and DVB subtitling	shall	shall	shall	shall	Task 9:42	
NorDig Unified 13.7	PMT Descriptors - MHP API	shall	shall	shall	shall	Task 9:43	
NorDig Unified 13.1	Dynamic update of PMT_PID values	shall	shall	shall	shall	Task 9:44	
NorDig Unified 13.7.2	Dynamic update of PMT - Component priority	shall	shall	shall	shall	Task 9:45	
NorDig Unified 13.7.3	Dynamic update of PMT - Content_Protection_descriptor	shall	shall	shall	shall	Task 9:46	
NorDig Unified 13.6	Dynamic update of TDT/TOT	shall	shall	shall	shall	Task 9:47	
NorDig Unified 13.6	Internal timer	shall	shall	shall	shall	Task 9:48	
<b>TELETEXT AND SUBTITLING</b>							
-----							T10
NorDig Unified 7.1	Handling of teletext Level 1.5	shall	shall	shall	shall	Task 10:1	
NorDig Unified 7.1	Teletext decoding method	shall	shall	shall	shall	Task 10:2	
NorDig Unified 7.1	Teletext - teletext pages	shall	shall	shall	shall	Task 10:3	
NorDig Unified 7.1	Teletext - teletext subtitling	shall	shall	shall	shall	Task 10:4	
NorDig Unified 7.2	DVB Subtitling	shall	shall	shall	shall	Task 10:5	
NorDig Unified 7.2	DVB Subtitling -Hard of hearing	shall	shall	shall	shall	Task 10:6	
NorDig Unified 7.2	DVB Subtitling coexistent with MHP applications	shall	shall	shall	shall	Task 10:7	
NorDig Unified 7.2.1	DVB Subtitling - Subtitling subset	shall	shall	shall	shall	Task 10:8	
NorDig Unified 7.2.2	HDTV - DVB Subtitling - HDTV Subtitling subset				shall	Task 10:9	
NorDig Unified 7.2.2	HDTV - DVB Subtitling - HDTV Subtitling subset - DDS				shall	Task 10:10	
<b>REMOTE CONTROL AND REMOTE KEYBOARD</b>							
-----							T11
NorDig 9.7	Remote Control Function Keys	shall	shall	shall		Task 11:1	
<b>USER PREFERENCES</b>							
-----							T12
NorDig Unified 16.1	Stored preferences	shall	shall	shall	shall	Task 12:1	
NorDig Unified 16.2	Deletion of service lists	shall	shall	shall	shall	Task 12:2	
NorDig Unified 16.3	Reset to factory mode	shall	shall	shall	shall	Task 12:3	

## 2 Test Specification for NorDig-Test Set A

### 2.1 Task 1: Satellite tuner and demodulator

<b>Test Case</b>	<b>Task 1:1 General</b>	
<b>Section</b>	NorDig Unified 3.1.1	
<b>Requirement</b>	The NorDig IRD shall contain at least one Tuner/Demodulator for satellite DVB/MPEG-2 signals.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that IRD contains at least one Tuner/demodulator</p> <p><b>Equipment:</b> IRD Under test</p> <p><b>Test procedure:</b> This is common requirement and will be verified in the following tests.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 1:2 General</b>	
<b>Section</b>	NorDig Unified 3.1.2	
<b>Requirement</b>	The NorDig IRD shall be able to automatically scan through the whole frequency range available for each of the available Tuners/Demodulators and tune in to the correct DVB framing structure, channel coding and modulation to deliver the incoming transport stream to the next units. The tuning data shall be stored in a service list, in order to allow a quick tune in to the selected transport stream.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that IRD is able to scan through the whole frequency range.</p> <p><b>Test procedure:</b> This is common requirement and will be verified in the following tests.</p>	
<b>Test result(s)</b>	The manufacturer describes his specific setup for the test	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 1:3 Quality reception detector</b>	
<b>Section</b>	NorDig Unified 3.1.3	
<b>Requirement</b>	The NorDig Unified receiver shall be equipped with a reception quality detector.	



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<b>Test procedure</b>	<p><b>Equipment:</b> Test signal are created using the test bed shown below:</p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]             </pre> </div> <p><b>Test procedure:</b> Check that the IRD is equipped with a reception quality detector</p> <p><b>Expected result:</b> It shall be possible to access some kind of a reception quality detector</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 1:4 HDTV - Symbol and FEC-rate (DVB-S2)</b>
<b>Section</b>	NorDig Unified 3.2.2
<b>Requirement</b>	<p>The IRD accepts symbol rates between 10-30 Mbaud for DVB-S carriers.</p> <p>For DVB-S2 QPSK carriers the IRD accepts symbol rates between 7.5-45 Mbaud</p> <p>For DVB-S2 8PSK carriers the IRD accepts symbol rates between 5-30 Mbaud</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD accepts a transport stream with a symbol rate in the range 10 – 30 Mbaud</p> <p><b>Equipment:</b> Test signals are created using the test bed shown below:</p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]             </pre> </div> <p><b>Test procedure:</b></p> <p>DVB-S: Symbol rate: 10, 30 Mbaud FEC-rate: 1/2, 2/3, 3/4, 5/6, 7/8 No noise added Frequency: 1500 MHz IRD input level: - 45 dBm</p> <p>DVB-S2 QPSK carrier: Symbol rate: 7.5, 45 Mbaud FEC-rate: 1/2, 2/3, 3/4, 5/6, 7/8 No noise added Frequency: 1500 MHz IRD input level: - 45 dBm</p>



	<p>DVB-S2 8PSK carrier:          Symbol rate: 5, 30 Mbaud          FEC-rate: 1/2, 2/3, 3/4, 5/6, 7/8          No noise added          Frequency: 1500 MHz          IRD input level: - 45 dBm</p> <p><b>Expected result:</b>          IRD locks to carrier and decodes picture without any visible degradation.</p>														
<b>Test result(s)</b>	<table border="1"> <thead> <tr> <th>Test:</th> <th>Requirement:</th> <th>Result:</th> </tr> </thead> <tbody> <tr> <td>Symbol rate (DVB-S)</td> <td>10 - 30 Mbaud</td> <td></td> </tr> <tr> <td>Symbol rate (DVB-S2) QPSK carrier</td> <td>7.5 – 45 Mbaud</td> <td></td> </tr> <tr> <td>Symbol rate (DVB-S2) 8PSK carrier</td> <td>5 – 30 Mbaud</td> <td></td> </tr> </tbody> </table>			Test:	Requirement:	Result:	Symbol rate (DVB-S)	10 - 30 Mbaud		Symbol rate (DVB-S2) QPSK carrier	7.5 – 45 Mbaud		Symbol rate (DVB-S2) 8PSK carrier	5 – 30 Mbaud	
Test:	Requirement:	Result:													
Symbol rate (DVB-S)	10 - 30 Mbaud														
Symbol rate (DVB-S2) QPSK carrier	7.5 – 45 Mbaud														
Symbol rate (DVB-S2) 8PSK carrier	5 – 30 Mbaud														
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments														
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information														
<b>Date</b>		<b>Sign</b>													

<b>Test Case</b>	<b>Task 1:5 Input Frequency Range/Tuning range</b>		
<b>Section</b>	NorDig Unified 3.2.3		
<b>Requirement</b>	IRD locks to carrier and decodes picture without any visible degradation.		
<b>Test procedure</b>	<p><b>Purpose of test:</b>          To verify that IRD accepts an input signal in the range 950 – 2150 MHz</p> <p><b>Equipment:</b>          Test signals are created using the test bed shown below:</p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]           </pre> </div> <p><b>Test procedure:</b>          Symbol rate: SR = 30 Mbaud          FEC-rate: 7/8          No noise added          Frequency: 950 + SR/2 = 965, 2150 – SR/2 = 2135 MHz          IRD input level: - 45 dBm</p> <p><b>Expected result:</b>          IRD locks to carrier and decodes picture without any visible degradation.</p>		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	



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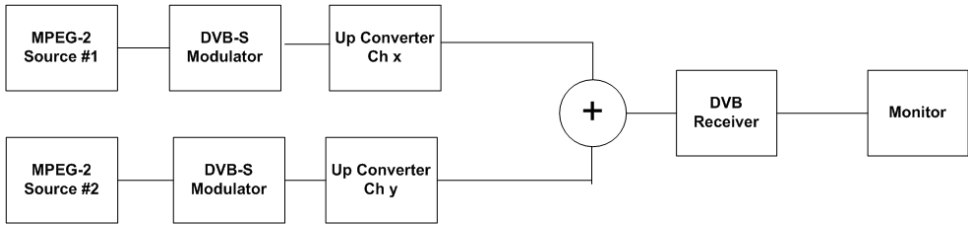
<b>Test Case</b>	<b>Task 1:6 Tuning/ Scanning Procedures (with NIT)</b>
<b>Section</b>	NorDig Unified 3.2.4
<b>Requirement</b>	A service list containing every service in every carrier pointed to by the NIT for the actual network is produced and installed in the IRD.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD use tuning data given in NIT.</p> <p><b>Equipment:</b> IRD under test, with service list deleted and using the test bed shown below:</p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --- B[DVB-S Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor]             </pre> </div> <p><b>Test procedure:</b> Start automatic tuning and installation of services, using Network Information Tables (NIT), and check found and installed channels.</p> <p><b>Expected result:</b> All signalled channels are found and installed.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	Sign

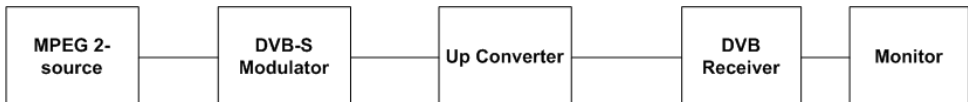
<b>Test Case</b>	<b>Task 1:7 Tuning/ Scanning Procedures (without NIT)</b>
<b>Section</b>	NorDig Unified 3.2.4
<b>Requirement</b>	A service list containing every service transmitted in the available carriers is produced and installed in the IRD.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD searches for - and installs services - without 'a priori' NIT information.</p> <p><b>Equipment:</b> IRD under test, with service list deleted and using the test bed shown below:</p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --- B[DVB-S Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor]             </pre> </div> <p><b>Test procedure:</b> Start automatic tuning and installation of services, without Network Information Tables (NIT), and check found and installed channels.</p> <p><b>Expected result:</b> All signalled channels are found and installed.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments



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<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 1:8 Control signals</b>		
<b>Section</b>	NorDig Unified 3.2.5		
<b>Requirement</b>	The IRD locks to digital carriers from two satellite positions. A service list is installed which contains services from both networks.		
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD is able to select between two RF-units.</p> <p><b>Equipment:</b> DTH antenna with dual-feed Universal LNBs, pointed at i.e. '1 degree W' and '5 degree E' or test signals are created using the test bed shown below:</p>  <p>A DiseqC-switch is used to select between the LNBs.</p> <p><b>Test procedure:</b> Check that tuning to carriers in both '1 degree W' and '5 degree E' (or test bed signals) is possible by DiseqC command.</p> <p><b>Expected result:</b> All signalled channels are installed and IRD decodes picture and sound without any visible degradation.</p>		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 1:9 HDTV - Demodulation (DVB-S2)</b>			
<b>Section</b>	NorDig Unified 3.2.6			
<b>Requirement</b>	IRD decodes picture and sound without any visible degradation.			
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the basic performance of the IRD.</p> <p><b>Equipment:</b> Test signals are created using the test bed shown below:</p> 			

	<p><b>Test procedure:</b></p> <p><b>Test signal configuration:</b>          Symbol rate (DVB-S): 10, 30 Mbaud          Symbol rate (DVB-S2) QPSK carrier: 7.5, 45 Mbaud          Symbol rate (DVB-S2) 8PSK carrier: 5, 30 Mbaud          Frequency: 1500 MHz          IRD input level: -25, -60 dBm          FEC-rate and <math>E_b/N_o</math>, see table below:</p> <table border="1"> <thead> <tr> <th>FEC</th> <th>Required <math>E_b/N_o</math> dB</th> </tr> </thead> <tbody> <tr> <td>1/2</td> <td>4.5</td> </tr> <tr> <td>2/3</td> <td>5.0</td> </tr> <tr> <td>3/4</td> <td>5.5</td> </tr> <tr> <td>5/6</td> <td>6.0</td> </tr> <tr> <td>7/8</td> <td>6.4</td> </tr> </tbody> </table> <p>Note:  <math>E_b/N_o</math> refers to useful bitrate, before RS coding. Includes a modem implementation margin of 0.8 dB and a margin for noise bandwidth increase due to the outer code. (See ETS 300 421, table 3)</p> <p><b>Expected result:</b>          IRD decodes picture and sound without any visible degradation.</p>	FEC	Required $E_b/N_o$ dB	1/2	4.5	2/3	5.0	3/4	5.5	5/6	6.0	7/8	6.4
FEC	Required $E_b/N_o$ dB												
1/2	4.5												
2/3	5.0												
3/4	5.5												
5/6	6.0												
7/8	6.4												
<b>Test result(s)</b>													
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments												
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information												
<b>Date</b>	<b>Sign</b>												

<b>Test Case</b>	<b>Task 1:10 RF Input Connector and Output Connector (option)</b>
<b>Section</b>	NorDig Unified 3.2.7.2
<b>Requirement</b>	The NorDig IRD shall include one input connector, type: IEC 60169-2, F-type, female, 75 ohms. The NorDig IRD should include one output connector, type: IEC 60169-2, F-type, female, 75 ohms. The RF output shall be available independently from the operational status of the IRD (operational or stand by), so that there is no restriction for the operation of the connected equipment. The control of the RF unit has to be solved for the case with one or more additional IRDs.



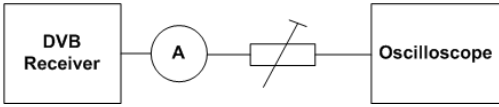
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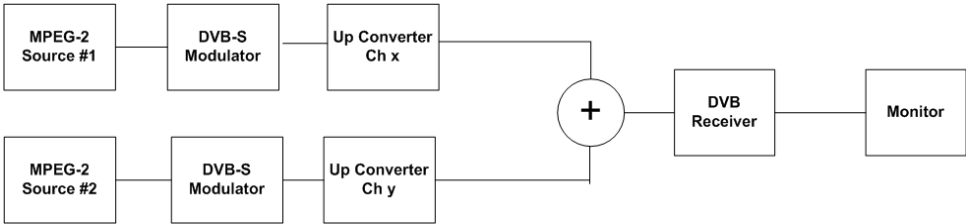
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver has a correct input connector for the reception of the DVB-S signals.</p> <p><b>Equipment:</b> IRD under test.</p> <p><b>Test procedure:</b> Verify that the RF input and output connectors are accordance the specification IEC 60169-2, F-type, female.</p> <p>Verify in the manufacturer's technical specification that the input impedance of the RF input is 75 ohm.</p> <p><b>Expected result:</b> RF input connector is as defined in specification IEC 60169-2 and the input impedance is 75ohm.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 1:11 Input Signal Level</b>	
<b>Section</b>	NorDig Unified 3.2.7.3	
<b>Requirement</b>	The NorDig IRD shall accept input signals with a level in the range -25 to -60 dBm.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver can receive input signals with a level in the range -25 to -60 dBm.</p> <p><b>Equipment:</b> Test signals are created using the test bed shown below:</p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S Modulator]     B --&gt; C[Up Converter]     C --&gt; D[Attenuator]     D --&gt; E[DVB Receiver]     E --&gt; F[Monitor]             </pre> </div> <p><b>Test procedure:</b> Verify that IRD can receive input signals with a level in the range -25 to -60 dBm</p> <p><b>Expected result:</b> IRD decodes picture and sound without any visible degradation.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>	<b>Sign</b>	

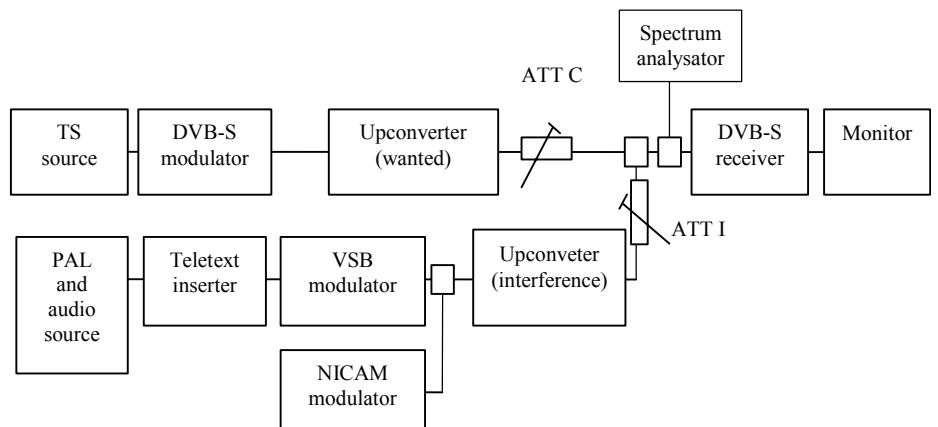


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<b>Test Case</b>	<b>Task 1:12 Power Supply and Control Signal (to RF unit)</b>	
<b>Section</b>	NorDig Unified 3.2.7.4	
<b>Requirement</b>	<p>The NorDig IRD shall provide power supply and control signals to the external RF-unit as specified below:</p> <ul style="list-style-type: none"> <li>• voltage: 13.5/18.5 V +/- 5%</li> <li>• current: at least 400 mA</li> <li>• control tone: amplitude: 0.65 V +/- 0.25V frequency: 22 kHz duty cycle: 50% +/- 10% (see also ref EN 61319-1 (DiSEqC)).</li> </ul>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that power supply and control signals to the external RF-unit are as specified.</p> <p><b>Equipment:</b></p>  <p><b>Test procedure:</b> Measure voltage, current and control tone from external RF unit connector</p> <p><b>Expected result:</b> The IRD provides power supply and control signals to the external RF-unit as specified.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	<p>If possible describe if fault 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>	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 1:13 Performance: Digital interference</b>	
<b>Section</b>	NorDig Unified 3.2.8	
<b>Requirement</b>	IRD decodes picture and sound without any visible degradation.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the performance of the IRD in a multi-carrier environment.</p> <p><b>Equipment:</b> Test signals are created using the test bed shown below:</p>  <p><b>Test procedure:</b> Wanted signal: Symbol rate: SR = e.g. 24.5 Mbaud FEC-rate: 7/8 <math>E_b/N_0 = 6.9</math> dB (Includes a margin of 0.5 dB)</p>	

	<p>Frequency: e.g. 1370.6 MHz          IRD input level: -60 dBm          UACI/LACI:          Symbol rate and power equal to wanted carrier. Frequency separation from wanted carrier: <math>\pm 1.25 \text{ SR} = \pm 30.625 \text{ MHz}</math></p> <p><b>Expected result:</b>          IRD decodes picture and sound without any visible degradation.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 1:14 Performance: Analogue interference</b>
<b>Section</b>	NorDig Unified 3.2.8
<b>Requirement</b>	IRD decodes picture and sound without any visible degradation.
<b>Test procedure</b>	<p><b>Purpose of test:</b>          To verify the performance of the IRD in a multi-carrier environment.</p> <p><b>Equipment:</b></p>  <p><b>Test procedure:</b>          Wanted signal:          Symbol rate: SR = 24.5 Mbaud          FEC-rate: 7/8  <math>E_b/N_0 = 6.9 \text{ dB}</math> (Includes a margin of 0.5 dB)          Frequency: 1370.6 MHz          IRD input level: -60 dBm          Lower adjacent channel:          D2MAC/PAL signal with frequency deviation 16 MHz/Volt and energy dispersal 600 kHz  <sup>p-p</sup>          Video signal: 75% Colour Bar          Frequency separation from wanted carrier: - 24.5 MHz.          Same level as wanted signal</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO



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	Describe more specific faults and/or other information		
<i>Date</i>		<i>Sign</i>	

## 2.2 Task 2: Cable Tuner and Demodulator

<b>Test Case</b>	<b>Task 2:1 General</b>	
<b>Section</b>	NorDig Unified 3.1.1	
<b>Requirement</b>	The NorDig IRD shall contain at least one Tuner/Demodulator for cable DVB/MPEG 2 signals.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that IRD contains at least one Tuner/demodulator</p> <p><b>Equipment:</b> IRD Under test.</p> <p><b>Test procedure:</b> This is common requirement and will be verified in the following tests.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 2:2 General</b>	
<b>Section</b>	NorDig Unified 3.1.2	
<b>Requirement</b>	The NorDig IRD shall be able to automatically scan through the whole frequency range available for each of the available Tuners/Demodulators and tune in to the correct DVB framing structure, channel coding and modulation to deliver the incoming transport stream to the next units. The tuning data shall be stored in a service list, in order to allow a quick tune in to the selected transport stream. For more detail see below.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that IRD is able to scan through the whole frequency range.</p> <p><b>Test procedure:</b> This is common requirement and will be verified in the following tests.</p>	
<b>Test result(s)</b>	The manufacturer describes his specific setup for the test	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 2:3 Quality reception detector</b>	
<b>Section</b>	NorDig Unified 3.1.3	
<b>Requirement</b>	The NorDig Unified receiver shall be equipped with a reception quality detector.	



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<b>Test procedure</b>	<p><b>Test procedure:</b> Check that the IRD is equipped with a reception quality detector</p> <p><b>Expected result:</b> It shall be possible to access some kind of a reception quality detector</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 2:4 RF Characteristics: Input frequency range and input level, Digital channels</b>
<b>Section</b>	NorDig Unified 3.3.2
<b>Requirement</b>	The IRD shall have RF characteristics equal to or better than specified below: Input Frequency range: Digital signals 110 - 862 MHz
<b>Test procedure</b>	<p><b>Equipment:</b></p> <pre> graph LR     DVG[Digital Video generator] --- M[Multiplexer]     M --- DTT[Digital TV test transmitter]     DTT --- ANT[Antenna]     ANT --- IRD[IRD Under test]           </pre> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Generate one digital channel (64 QAM, 6,875 MS/s, 015 roll-off) at 114 MHz. Make the test for three different input levels, 60 dBuV, 47 dBuV and 70 dBuV.</li> <li>2. Generate one digital channel (64 QAM, 6,875 MS/s, 015 roll-off) at 858 MHz. Make the test for three different input levels, 60 dBuV, 47 dBuV and 70 dBuV.</li> <li>3. Generate one digital channel (128 QAM, 6,875 MS/s, 015 roll-off) at 114 MHz. Make the test for three different input levels, 60 dBuV, 47 dBuV and 70 dBuV.</li> <li>4. Generate one digital channel (128 QAM, 6,875 MS/s, 015 roll-off) at 858 MHz. Make the test for three different input levels, 60 dBuV, 47 dBuV and 70 dBuV.</li> <li>5. Generate one digital channel (256 QAM, 6,875 MS/s, 015 roll-off) at 114 MHz. Make the test for three different input levels, 60 dBuV, 47 dBuV and 70 dBuV.</li> <li>6. Generate one digital channel (256 QAM, 6,875 MS/s, 015 roll-off) at 858 MHz. Make the test for three different input levels, 60 dBuV, 47 dBuV and 70 dBuV.</li> </ol> <p><b>Expected result:</b> IRD locks to carrier and decodes picture without any visible degradation</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>



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<b>Test Case</b>	<b>Task 2:5 RF Characteristics: Channel bandwidth</b>
<b>Section</b>	NorDig Unified 3.3.2
<b>Requirement</b>	The IRD shall have RF characteristics equal to or better than specified below: Channel bandwidth : Digital signals 8 MHz Analogue signals 7 and 8 MHz
<b>Test procedure</b>	<b>This test case is tested in Task 2:9</b>

<b>Test Case</b>	<b>Task 2:6 RF Characteristics: Step size of the tuner</b>
<b>Section</b>	NorDig Unified 3.3.2
<b>Requirement</b>	The IRD shall have RF characteristics equal to or better than specified below: Step size of the Tuner: 62,5 k Hz or less
<b>Test procedure</b>	<p><b>Equipment:</b> Digital Video Generator TV test transmitter for cable</p> <pre> graph LR     A[Digital Video generator] --&gt; B[Multiplexor]     B --&gt; C[Digital TV test transmitter]     C --&gt; D[IRD Under test]     </pre> <p><b>Test procedure:</b> Generate a digital channel (64 QAM and 6,875 MS/s) at 442 MHz and then change input frequency in steps of 62,5 kHz and check that the IRD can tune correctly. Input level 60 dBuV.</p> <p><b>Expected result:</b> IRD locks to carrier and decodes picture without any visible degradation.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 2:7 RF Characteristics: Input impedance</b>
<b>Section</b>	NorDig Unified 3.3.2
<b>Requirement</b>	The IRD shall have RF characteristics equal to or better than specified below: Input connector : IEC 60169-2, female, 75 Ohms
<b>Test procedure</b>	The manufacturer verifies that the input impedance is 75 Ohms.
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>



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<b>Test Case</b>	<b>Task 2:8 RF Characteristics: Symbol rate and modulation</b>	
<b>Section</b>	NorDig Unified 3.3.2	
<b>Requirement</b>	The IRD shall have RF characteristics equal to or better than specified below: Symbolrate: Digital signals 4 Msymbols/s to 7 Msymbols/s Modulation: Digital signals 16-QAM, 64-QAM, 128-QAM and 256-QAM	
<b>Test procedure</b>	<p><b>Equipment:</b> Digital Video Generator TV test transmitter for cable</p> <pre> graph LR     DVG[Digital Video generator] --- M[Multiplexor]     M --- DTT[Digital TV test transmitter]     DTT --- Cable[ ]     Cable --- IRD[IRD Under test]     style Cable fill:none,stroke:none             </pre> <p><b>Test procedure:</b> Generate one digital channel at 442 MHz. Change modulation and symbol rate on one digital channel as follows: 16 QAM with 4 MS/s and 7 MS/s 64 QAM with 4 MS/s and 7 MS/s 128 QAM with 4 MS/s and 7 MS/s 256 QAM with 4 MS/s and 7 MS/s</p> <p><b>Expected result:</b> IRD locks to carrier and decodes picture without any visible degradation</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 2:9 Tuning/Scanning procedure</b>	
<b>Section</b>	NorDig Unified 3.3.3	
<b>Requirement</b>	The IRD shall either use the NIT information or the scanning procedure for retrieving the services available on the cable network.	
<b>Test procedure</b>	<p><b>Equipment:</b> Use the ordinary CATV network with both digital and analogue channels. The NIT shall describe all the digital channels. The used channel bandwidth :</p> <ul style="list-style-type: none"> <li>• Digital signals 8 MHz</li> <li>• Analogue signals 7 and 8 MHz</li> </ul> <p><b>Test procedure:</b> Make a new installation of the box.</p> <p><b>Expected result:</b> All digital and analogue channels in the network shall be found. If scanning is used both the digital and the analogue channels shall be found automatically.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	



**NorDig**

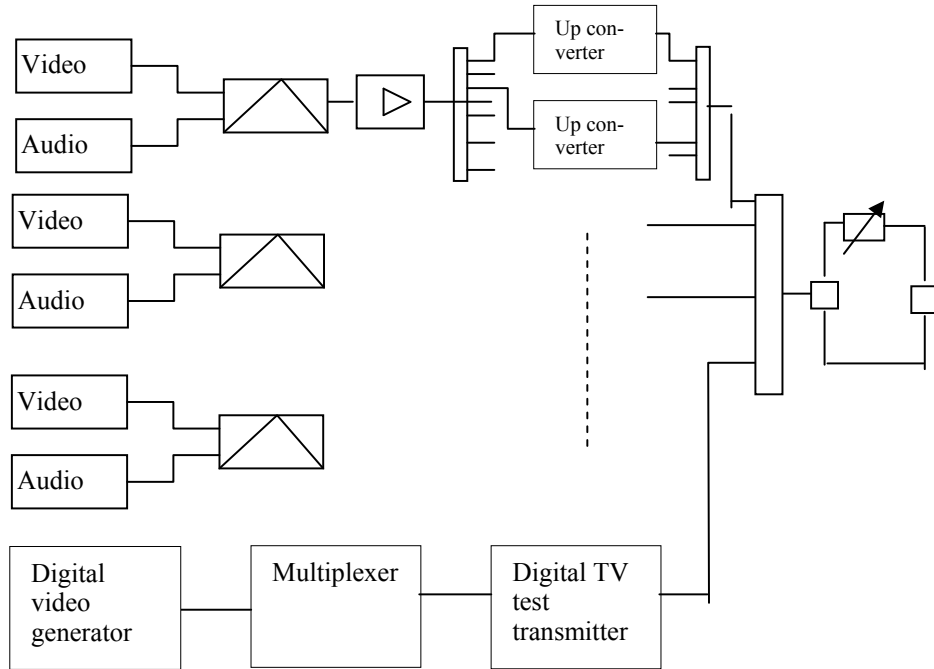
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 2:10 Performance Data: Return loss</b>		
<b>Section</b>	NorDig Unified 3.3.5.1		
<b>Requirement</b>	The performance data below shall be satisfied: Return loss: 10 dB (typically), in worst case 7 dB min.		
<b>Test procedure</b>	<p><b>Equipment:</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">Network analyzer</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">IRD Under test</div> </div> <p><b>Test procedure:</b> Measure return loss with a network analyser. Frequency interval 47 – 862 MHz.</p> <p><b>Expected result:</b> Better than 10 dB typically, in worst case 7 dB min.</p>		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 2:11 Performance Data: Noise figure</b>		
<b>Section</b>	NorDig Unified 3.3.5.1		
<b>Requirement</b>	The performance data below shall be satisfied: Noise figure: 8 dB (typically), in worst case 10 dB max.		
<b>Test procedure</b>	The IRD manufacturer shall describe the used test procedure		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 2:12 Digital Signals: Bit error rate</b>		
<b>Section</b>	NorDig Unified 3.3.5.2		
<b>Requirement</b>	The bit error rate before Reed Salomon decoding is used as the quality criterion. See NorDig Unified, 3.3.5.2		
<b>Test procedure</b>	<b>Equipment:</b> Video and audio generators		

Test site with 30 analogue modulators.  
 Digital Video Generator  
 TV test transmitter for cable at 330 MHz, 10 dB back off.  
 Two analogue channels at 319,25 and 335,25 MHz with NICAM stereo carrier.  
 Echo: a long cable connected in parallel with the ordinary path



**Test procedure:**

Test according to details in point 3.3.5.2. in the NorDig spec. CATV network with analogue plus one digital channel that shall be measured.  
 Measure with 16 QAM, 64 QAM, 128 QAM and 256 QAM respectively.  
 Apply an echo with 145 ns delay and -20 dB relative the main impulse.  
 Vary the noise on the measured channel until the box stops to work correctly and measure the C/N. Reduce the noise until the picture is decoded correctly and measure the C/N again.

**Expected result:**

C/N shall be less or equal to 20,5 dB for 16 QAM at the point where the box starts to work correctly.  
 C/N shall be less or equal to 26,5 dB for 64 QAM at the point where the box starts to work correctly.  
 C/N shall be less or equal to 29,5 dB for 128 QAM at the point where the box starts to work correctly.  
 C/N shall be less or equal to 32,5 dB for 256 QAM at the point where the box starts to work correctly.

**Test result(s)**

**Conformity**  OK  Fault  Major  Minor, define fail reason in comments

**Comments** If possible describe if fault can be fixed with software update:  YES  NO  
 Describe more specific faults and/or other information

**Date**

**Sign**

## 2.3 Task 3: Terrestrial Tuner and Demodulator

### 2.3.1 Test equipment summary

To configure the minimum test setups described in these test procedures the following functionalities are needed:

Video and audio source (MPEG-2)  
Re-multiplexers  
Broadband Fading simulator  
Noise generator  
DVB-T Exciter (DVB-T modulator and up-converter)  
Analog TV RF Exciter with PAL, NICAM and teletext generator.

DVB-T receiver with RF input  
Transport stream analyzers  
Power meter with thermo coupled 50ohm and 75ohm power sensor  
Video monitor

Note! The needed instruments may vary depending on the used system and can be purchased from many vendors in a compact all-in-one units. Different test setups are defined in every test case. However, most of the tests can be done using one general test setup.

### 2.3.2 QEF Quality Measurement Methods

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.

Direct measurements on the TS data packets are the preferred measurement method, but if this is not possible or acceptable for some reason, the indirect measurements can be used. The indirect measurement methods, which can be used, are objective BER measurement after Viterbi decoder or subjective quality measurement.

The RS decoder can correct up to 8 erroneous bytes in a 204 byte RS code word. If there are 9 byte errors, or more, in a codeword, the RS decoder will just pass on the 188 bytes of the TS packet without trying to decode the errors. For each error event there will therefore be (on average) at least  $9 \times 188/204 = 8.3$  byte errors per erroneous TS packet. If these erroneous bytes contain on average 4.5 erroneous bits there are on average at least 37 bit errors per error event. With a BER of  $10^{-11}$  and a bit rate of 22 Mbit/s the QEF reception corresponds to about 47 hours between error events.

In the indirect objective method the BER of  $2 \times 10^{-4}$  after Viterbi decoder is considered to correspond to an approximation of QEF reception quality for Gaussian type of channels. But for channels interfered by impulse like interference i.e. PAL signals or internal interference, the average BER of  $2 \times 10^{-4}$  after Viterbi decoder is not valid due to the fact that the RS decoder is not able to correct the burst of erroneous bytes caused by impulse like interference. Therefore, for impulse like interfered channels, the quality measurements shall be done by using the BER of  $10^{-11}$  measurement method at the TS level at MPEG-2 demultiplexer input or by using the subjective measurement method.

In the indirect subjective measurement method the certain period of time of error free video decoding is considered to correspond to a good reception quality. The specified video test sequence can be any containing movement everywhere, in order to minimise the number of errors not being observed due to error concealment techniques in the receiver. Such a relevant video sequences are e.g. 'Mobile and calendar' and 'Zoneplate'.

The result of the indirect quality measurements may differ. Therefore, the method that shall be used is specified in every test case. However, the reception quality shall be verified by using the subjective measurement method for every test case. The measurement methods (procedures) are defined below.

#### Direct objective quality measurement procedure

The measurement is performed doing measurements at the transport stream data level. The measurement configuration parameters are chosen like that there is less than one uncorrected error event per hour. This requirement corresponds to BER value  $10^{-11}$  at the TS data level at the input of the MPEG-2 demultiplexer. In addition to the BER measurement, the reception quality shall be verified subjectively.

The performance in every test case can be evaluated by using the direct quality measurement procedure.

#### Indirect subjective quality measurement procedure 1 (QMP1)

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**.

#### Indirect objective or subjective quality measurement procedure 2 (QMP2)

The measurement can be performed either by using

1. the embedded BER after Viterbi measurement provided by the receiver ,or
2. watching the decoded video for **60 seconds**.

If the BER after Viterbi measurement is chosen, the value for the approximation of the QEF reception is considered to correspond to the integrated BER after Viterbi decoder value  $2 \cdot 10^{-4}$ . The integrated BER after Viterbi measurement value  $2 \cdot 10^{-4}$  shall be verified that it corresponds an **error free video** decoding. In case of higher BER after Viterbi value than  $2 \cdot 10^{-4}$ , the change to the measurement configuration parameters shall be done. The change of the measurement configuration parameters shall result to a BER after Viterbi which is lower than or equal to  $2 \cdot 10^{-4}$ , Otherwise, the change of the measurement configuration parameters is repeated until a BER after Viterbi value lower than or equal to  $2 \cdot 10^{-4}$  is achieved.

If the **60 seconds** error free decoded video is chosen, 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 result to an error free decoding of the video where the minimum time between consecutive subjective errors is **60 seconds**. Otherwise, the change of the measurement configuration parameters is repeated until an error free decoding of video is achieved at least **60 seconds**.

The corresponding measurement value for profile and DVB-T mode shall be achieved from tables below.

Modulation	Code rate	C/N performance (dB)			
		Profile 1 : Gaussian		Profile 2 : 0 dB echo	
		“60 sec error free video”	BER 2E-4 after Viterbi	“60 sec error free video”	BER 2E-4 after Viterbi
QPSK	1/2	3.8	5.1	7.6	8.8
QPSK	2/3	5.6	6.9	11.9	13.7
QPSK	3/4	6.6	7.9	14.1	17.4
QPSK	5/6	7.6	8.9	-	-
QPSK	7/8	8.4	9.7	-	-
16-QAM	1/2	9.5	10.8	12.1	13.3
16-QAM	2/3	11.8	13.1	16.3	17.9
16-QAM	3/4	13.3	14.6	19.0	22.1
16-QAM	5/6	14.3	15.6	-	-
16-QAM	7/8	14.7	16.0	-	-
64-QAM	1/2	15.2	16.5	17.8	19.0
64-QAM	2/3	17.4	18.7	21.8	23.2
64-QAM	3/4	18.9	20.2	24.8	27.6
64-QAM	5/6	20.3	21.6	-	-
64-QAM	7/8	21.2	22.5	-	-

**Table 2.1 Maximum required C/N for “60 seconds error free video” and BER 2E-4 after Viterbi (with 1/4 guard interval and FFT size 8K) for profiles 1 and 2**

		Minimum input level (dBm)											
		Profile 1: Gaussian								Profile 2: 0 dB echo			
Frequency band		VHF Band III		VHF S Band I & II		VHF S Band I & II and UHF S Band III		UHF Band IV&V		VHF Band III		UHF Band IV&V	
		7 MHz signal		7 MHz signal		8 MHz signal		8 MHz signal		7 MHz signal		8 MHz signal	
Modulation	Code Rate	“60 sec error free video”	BER 2E-4 after Viterbi	“60 sec error free video”	BER 2E-4 after Viterbi	“60 sec error free video”	BER 2E-4 after Viterbi	“60 sec error free video”	BER 2E-4 after Viterbi	“60 sec error free video”	BER 2E-4 after Viterbi	“60 sec error free video”	BER 2E-4 after Viterbi”
QPSK	1/2	-94.9	-93.6	-91.9	-90.6	-91.4	-90.1	-94.4	-93.1	-91.1	-89.9	-90.6	-89.4
QPSK	2/3	-93.1	-91.8	-90.1	-88.8	-89.6	-88.3	-92.6	-91.3	-86.8	-85.0	-86.3	-84.5
QPSK	3/4	-92.1	-90.8	-89.1	-87.8	-88.6	-87.3	-91.6	-90.3	-84.6	-81.3	-84.1	-80.8
QPSK	5/6	-91.1	-89.8	-88.1	-86.8	-87.6	-86.3	-90.6	-89.3	-	-	-	-
QPSK	7/8	-90.3	-89.0	-87.3	-86.0	-86.8	-85.5	-89.8	-88.5	-	-	-	-
16-QAM	1/2	-89.2	-87.9	-86.2	-84.9	-85.7	-84.4	-88.7	-87.4	-86.6	-85.4	-86.1	-84.9
16-QAM	2/3	-86.9	-85.6	-83.9	-82.6	-83.4	-82.1	-86.4	-85.1	-82.4	-80.8	-81.9	-80.3
16-QAM	3/4	-85.4	-84.1	-82.4	-81.1	-81.9	-80.6	-84.9	-83.6	-79.7	-76.6	-79.2	-76.1
16-QAM	5/6	-84.4	-83.1	-81.4	-80.1	-80.9	-79.6	-83.9	-82.6	-	-	-	-
16-QAM	7/8	-84.0	-82.7	-81.0	-79.7	-80.5	-79.2	-83.5	-82.2	-	-	-	-
64-QAM	1/2	-83.5	-82.2	-80.5	-79.2	-80.0	-78.7	-83.0	-81.7	-80.9	-79.7	-80.4	-79.2
64-QAM	2/3	-81.3	-80.0	-78.3	-77.0	-77.8	-76.5	-80.8	-79.5	-76.9	-75.5	-76.4	-75.0
64-QAM	3/4	-79.8	-78.5	-76.8	-75.5	-76.3	-75.0	-79.3	-78.0	-73.9	-71.1	-73.4	-70.6
64-QAM	5/6	-78.4	-77.1	-75.4	-74.1	-74.9	-73.6	-77.9	-76.6	-	-	-	-
64-QAM	7/8	-77.5	-76.2	-74.5	-73.2	-74.0	-72.7	-77.0	-75.7	-	-	-	-

Table 2.2 Minimum signal input levels (Pmin) for “60 seconds error free video” and BER 2E-4 after Viterbi (with 1/4 guard interval and FFT size 8K) for profiles 1 and 2.

### 2.3.3 Bitrates

The different DVB-T modes define different bitrates for the transport stream. The following table defines the bitrates for the transport stream in Mbit/s.

8MHz, 2k / 8k					
Modulation	FEC	Tg=1/32	Tg=1/16	Tg=1/8	Tg=1/4
QPSK	1/2	6.032086	5.854671	5.529412	4.976471
QPSK	2/3	8.042781	7.806228	7.372549	6.635294
QPSK	3/4	9.048128	8.782007	8.294118	7.464706
QPSK	5/6	10.053476	9.757785	9.215686	8.294118
QPSK	7/8	10.556150	10.245675	9.676471	8.708824
16QAM	1/2	12.064171	11.709343	11.058824	9.952941
16QAM	2/3	16.085561	15.612457	14.745098	13.270588
16QAM	3/4	18.096257	17.564014	16.588235	14.929412
16QAM	5/6	20.106952	19.515571	18.431373	16.588235
16QAM	7/8	21.112299	20.491349	19.352941	17.417647
64QAM	1/2	18.096257	17.564014	16.588235	14.929412
64QAM	2/3	24.128342	23.418685	22.117647	19.905882
64QAM	3/4	27.144385	26.346021	24.882353	22.394118
64QAM	5/6	30.160428	29.273356	27.647059	24.882353
64QAM	7/8	31.668449	30.737024	29.029412	26.126471

**Table 2.3 Bitrates for the transport stream in Mbit/s for 8MHz DVB-T signal bandwidth.**

7MHz, 2k / 8k					
Modulation	FEC	Tg=1/32	Tg=1/16	Tg=1/8	Tg=1/4
QPSK	1/2	5.278075	5.122837	4.838235	4.354412
QPSK	2/3	7.037433	6.830450	6.450980	5.805882
QPSK	3/4	7.917112	7.684256	7.257353	6.531618
QPSK	5/6	8.796791	8.538062	8.063725	7.257353
QPSK	7/8	9.236631	8.964965	8.466912	7.620221
16QAM	1/2	10.556150	10.245675	9.676471	8.708824
16QAM	2/3	14.074866	13.660900	12.901961	11.611765
16QAM	3/4	15.834225	15.368512	14.514706	13.063235
16QAM	5/6	17.593583	17.076125	16.127451	14.514706
16QAM	7/8	18.473262	17.929931	16.933824	15.240441
64QAM	1/2	15.834225	15.368512	14.514706	13.063235
64QAM	2/3	21.112299	20.491349	19.352941	17.417647
64QAM	3/4	23.751337	23.052768	21.772059	19.594853
64QAM	5/6	26.390374	25.614187	24.191176	21.772059
64QAM	7/8	27.709893	26.894896	25.400735	22.860662

**Table 2.4 Bitrates for the transport stream in Mbit/s for 7MHz DVB-T signal bandwidth.**

The used video is MPEG-2 elementary stream in resolution 720x576. The video bitrate within transport stream is 4.0 Mbit/s.

The used audio is MPEG-1 elementary stream in stereo mode. The audio bitrate is 128kbit/s per channel.

MPEG-4 AVC video content is not used within transport stream in this task.



## NorDig 2.3.4 Receiver operability in SFN

The SFN synchronisation of the receiver depends on the echo delay and attenuation level in the SFN. The SFN synchronisation of the receiver may also depend of the state of the receiver. Therefore, it is important to evaluate if the receiver synchronises differently in the following situations:

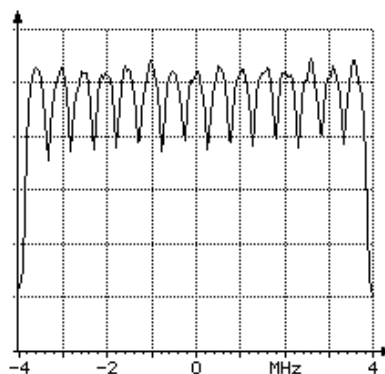
1. When the receiver is restarted completely (AC cord disconnected).
2. When the receiver is powered on in standby mode. The last good SFN synchronisation parameters can be saved to memory for faster SFN synchronisation leading that the dynamical change of the delay during the receiver is in standby mode gives bad result on power up.
3. During the channel search.
4. Connecting and disconnecting the input RF signal (closing and opening of the RF switch as in test cases). Discontinued input RF signal tests the SFN synchronisation algorithm e.g. when transmission is discontinued.
5. Zapping between services on different frequencies. Different frequencies have different echo delays and attenuation levels. This corresponds the real reception.
6. During the over-the-air software upgrade. If the demodulator is not correctly controlled during the software download, the SFN synchronisation problems can lead that the software cannot be updated.

Evaluation of the SFN synchronisation can be done e.g. when an echo delay and amplitude level combination is founded to be difficult to synchronise. In that case methods above are tested. Decide which method can be used to evaluate the SFN synchronisation algorithm of the receiver. Check also that all the other methods work. Independently of the state of the receiver all the listed methods above shall work.

The receiver shall detect correct synchronization in SFN, maintain it and provide reception quality at required quality level independently if the received signal changes from bad conditions to good conditions or vice versa. E.g. when testing and finding the required C/N in test cases, the receiver must be able to detect correct synchronization in SFN, maintain it and provide reception quality at defined quality level when C/N value is changed from low (bad reception condition) value to higher (better reception condition) value.

### 2.3.5 0dB echo

The 0 degree channel centre shall be used in fading simulator. In this context it means that the carriers from the direct and echo signal are cumulative. See figure below for 0dB 1.95 $\mu$ s echo.



### 2.3.6 Conditions for analogue TV

The level of the analog TV signal is defined to be the power during the sync pulse of the vision carrier. The power of the sync pulse of the vision carrier shall be measured when the video input of the analogue TV modulator is connected to 75ohm load, in other words, there is no modulation in the vision carrier. 10% modulation depth is used for vision carrier.

The level of the FM sound relative to the vision carrier is  $-13$  dB. The frequency of FM sound carrier is  $+5.5$  MHz relative to vision carrier.



The level of the NICAM signal relative to the vision carrier is -20 dB. The frequency of the NICAM carrier is +5.85MHz relative to vision carrier.

It shall be verified that the analog TV signal doesn't have too high out-of-band emissions, which could cause interference to other frequencies.

The equipment used for generation of the analog TV shall be connected to same frequency reference signal as the digital TV equipment.

### 2.3.7 Test cases

<b>Test Case</b>	<b>Task 3:1 General</b>	
<b>Section</b>	NorDig Unified 3.4.1	
<b>Requirement</b>	The NorDig IRD shall include one tuner/demodulator for reception of signals from terrestrial transmitters, broadcasting in accordance with EN 300 744 rev R1.4.1 [8].	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the possibility of the reception of the DVB-T signal.</p> <p><b>Equipment:</b> An IRD.</p> <p><b>Test procedure:</b> Make sure that the IRD has one tuner/demodulator for reception of terrestrial signals.</p> <p><b>Expected result:</b> IRD has one tuner/demodulator for terrestrial reception.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 3:2 General</b>	
<b>Section</b>	NorDig Unified 3.1.2	
<b>Requirement</b>	The NorDig IRD shall be able to automatically scan through the whole frequency range available for each of the available Tuners/Demodulators and tune in to the correct DVB framing structure, channel coding and modulation to deliver the incoming transport stream to the next units. The tuning data shall be stored in a service list, in order to allow a quick tune in to the selected transport stream. For more detail see below.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that IRD is able to scan through the whole frequency range.</p> <p><b>Test procedure:</b> This is common requirement and will be verified in the following tests.</p>	
<b>Test result(s)</b>	The manufacturer describes his specific setup for the test	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	



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<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 3:3 Quality reception detector</b>		
<b>Section</b>	NorDig Unified 3.1.3		
<b>Requirement</b>	The NorDig Unified receiver shall be equipped with a reception quality detector.		
<b>Test procedure</b>	<p><b>Equipment:</b> IRD under test.</p> <p><b>Test procedure:</b> Check that the IRD is equipped with a reception quality detector</p> <p><b>Expected result:</b> It shall be possible to access some kind of a reception quality detector.</p>		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 3:4 Frequencies: Centre frequencies</b>		
<b>Section</b>	NorDig Unified 3.4.2,		
<b>Requirement</b>	<p>The NorDig IRD shall be able to receive channels in VHF band III and UHF bands IV, V and should be able to receive channels in VHF S band I, VHF S band II, UHF S Band III.</p> <p>The front-end shall for the supported frequency ranges be capable of tuning to the centre frequency <math>f_c</math> of the incoming DVB-T RF signal, see below.</p> <p>8MHz raster: <math>f_c = 114 \text{ MHz} + K * 8 \text{ MHz}</math>, where <math>K = 0 \dots 93</math>            7MHz raster: <math>f_c = 107.5 \text{ MHz} + L * 7 \text{ MHz}</math>, where <math>L = 0 \dots 27</math></p>		
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the reception over the supported frequency range.</p> <p><b>Equipment:</b></p> <pre>           graph LR             A[MPEG-2 source] --- B[DVB-T modulator]             B --- C[Up-converter]             C --- D[DVB-T Receiver]             D --- E[Monitor]           </pre> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Set up the test instruments</li> <li>2. Use the following mode 8k 64QAM, HP Code rate=2/3, Guard interval <math>T_U/8</math></li> <li>3. Use input level of -60 dBm</li> <li>4. Start with frequency 474 MHz (K21)</li> <li>5. Use the quality measurement procedures 1</li> <li>6. Fill the result in the measurement record: <b>OK</b> or <b>NOK</b>.</li> </ol>		



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7. Repeat the test for all channels in the table 1 in the measurement record.
8. If the receiver supports optional frequency ranges, test all remaining channels in table 2 and 3 in the measurement record.

**Expected result:**

The result of the test shall be OK for all channels in table 1.

For the optionally supported frequency ranges, the tests shall be OK for the channels in the tables 2 and 3.



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Test result(s)

Band	Channel	Frequency [MHz]	BW [MHz]	Result OK or NOK	
VHF III	K5	177.5	7		
	K6	184.5	7		
	K7	191.5	7		
	K8	198.5	7		
	K9	205.5	7		
	K10	212.5	7		
	K11	219.5	7		
	K12	226.5	7		
	UHF IV/V	K21	474	8	
		K22	482	8	
		K23	490	8	
		K24	498	8	
K25		506	8		
K26		514	8		
K27		522	8		
K28		530	8		
K29		538	8		
K30		546	8		
K31		554	8		
K32		562	8		
K33		570	8		
K34		578	8		
K35		586	8		
K36		594	8		
K37		602	8		
K38		610	8		
K39		618	8		
K40		626	8		
K41		634	8		
K42		642	8		
K43		650	8		
K44		658	8		
K45		666	8		
K46		674	8		
K47		682	8		
K48		690	8		
K49		698	8		
K50		706	8		
K51		714	8		
K52		722	8		
K53		730	8		
K54		738	8		
K55		746	8		
K56		754	8		
K57		762	8		
K58		770	8		
K59		778	8		
K60		786	8		
K61		794	8		
K62		802	8		
K63		810	8		
K64		818	8		
K65		826	8		
K66		834	8		
K67		842	8		
K68		850	8		
K69	858	8			

Table 1. Mandatory centre frequencies and signal bandwidths to receive



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Test result(s)

Band	Channel	Frequency [MHz]	BW [MHz]	Result 7MHz OK or NOK	BW [MHz]	Result 8MHz OK or NOK
VHF S I	D1	114.0	7		8	
	S2	114.5	7		8	
	S3	121.5	7		8	
	D2	122.0	7		8	
	S4	128.5	7		8	
	D3	130.0	7		8	
	S5	135.5	7		8	
	D4	138.0	7		8	
	S6	142.5	7		8	
	D5	146.0	7		8	
	S7	149.5	7		8	
	D6	154.0	7		8	
	S8	156.5	7		8	
	D7	162.0	7		8	
S9	163.5	7		8		
D8	170.0	7		8		
S10	170.5	7		8		
VHF III	K5	177.5	7		8	
	D9	178.0	7		8	
	K6	184.5	7		8	
	D10	186.0	7		8	
	K7	191.5	7		8	
	D11	194.0	7		8	
	K8	198.5	7		8	
	D12	202.0	7		8	
	K9	205.5	7		8	
	D13	210.0	7		8	
	K10	212.5	7		8	
	D14	218.0	7		8	
K11	219.5	7		8		
D15	226.0	7		8		
K12	226.5	7		8		
VHF S II	S11	233.5	7		8	
	D16	234.0	7		8	
	S12	240.5	7		8	
	D17	242.0	7		8	
	S13	247.5	7		8	
	D18	250.0	7		8	
	S14	254.5	7		8	
	D19	258.0	7		8	
	S15	261.5	7		8	
	D20	266.0	7		8	
	S16	268.5	7		8	
	D21	274.0	7		8	
	S17	275.5	7		8	
	D22	282.0	7		8	
S18	282.5	7		8		
S19	289.5	7		8		
D23	290.0	7		8		
S20	296.5	7		8		
D24	298.0	7		8		

Table 2 Optional VHF centre frequencies and signal bandwidths to receive.



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Test results(s)

Band	Channel	Frequency [MHz]	BW [MHz]	Result OK or NOK
UHF S III	S21	306.0	8	
	S22	314.0	8	
	S23	322.0	8	
	S24	330.0	8	
	S25	338.0	8	
	S26	346.0	8	
	S27	354.0	8	
	S28	362.0	8	
	S29	370.0	8	
	S30	378.0	8	
	S31	386.0	8	
	S32	394.0	8	
	S33	402.0	8	
	S34	410.0	8	
	S35	418.0	8	
	S36	426.0	8	
	S37	434.0	8	
S38	442.0	8		
S39	450.0	8		
S40	458.0	8		
S41	466.0	8		

Table 3 Optional UHF centre frequencies and signal bandwidth to receive.

<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

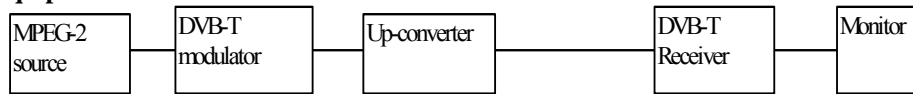
<b>Test Case</b>	<b>Task 3:5 Frequencies: Frequency offset</b>
<b>Section</b>	NorDig Unified 3.4.2
<b>Requirement</b>	The NorDig IRD shall be able to receive signals with an offset of up to 50kHz from the nominal frequency.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the reception is possible in specified frequency offset from nominal frequency.</p> <p>Equipment:</p> <pre> graph LR     TS[TS Source] --- DM[DVB-T modulator]     DM --- FS[Fading simulator]     FS --- NG[Noise generator]     NG --- UC[Up converter]     UC --- PM[Power meter]     UC --- SW[Switch]     SW --- DTR[DVB-T receiver]     DTR --- MON[Monitor]     </pre> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Set up the test instruments</li> <li>2. Use the following mode: 8k, 64QAM, HP Code rate=2/3, Guard interval T<sub>U</sub>/8</li> <li>3. Use input level of -60 dBm</li> <li>4. Set the centre frequency to 177.5 MHz and frequency offset to 0 kHz. Use signal bandwidth 7MHz.</li> </ol>

	<ol style="list-style-type: none"> <li>5. Connect receiver and do the channel search if needed.</li> <li>6. Test with the specified frequency offset values in the measurement record. Before changing the frequency offset, disconnect the receiver from the received RF signal.</li> <li>7. Do the change of frequency offset,</li> <li>8. Connect the received RF signal back to the receiver.</li> <li>9. Use the quality measurement procedure 1</li> <li>10. Fill the result in the measurement record: <b>OK</b> or <b>NOK</b>.</li> <li>11. Test the remaining frequency offset values on specified centre frequencies and signal bandwidths in the measurement record.</li> </ol> <p><b>Expected result:</b> The test shall be OK for all frequency offset values on specified centre frequencies and signal bandwidths.</p>																																																									
<i>Test result(s)</i>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Channel</th> <th>Signal BW [MHz]</th> <th>Frequency [MHz]</th> <th>Offset [kHz]</th> <th>Result OK or NOK</th> </tr> </thead> <tbody> <tr> <td rowspan="3">K5</td> <td>7</td> <td>177.5</td> <td>-50</td> <td></td> </tr> <tr> <td>7</td> <td>177.5</td> <td>0</td> <td></td> </tr> <tr> <td>7</td> <td>177.5</td> <td>+50</td> <td></td> </tr> <tr> <td rowspan="3">K12</td> <td>7</td> <td>226.5</td> <td>-50</td> <td></td> </tr> <tr> <td>7</td> <td>226.5</td> <td>0</td> <td></td> </tr> <tr> <td>7</td> <td>226.5</td> <td>+50</td> <td></td> </tr> <tr> <td rowspan="3">K21</td> <td>8</td> <td>474.0</td> <td>-50</td> <td></td> </tr> <tr> <td>8</td> <td>474.0</td> <td>0</td> <td></td> </tr> <tr> <td>8</td> <td>474.0</td> <td>+50</td> <td></td> </tr> <tr> <td rowspan="3">K69</td> <td>8</td> <td>858.0</td> <td>-50</td> <td></td> </tr> <tr> <td>8</td> <td>858.0</td> <td>0</td> <td></td> </tr> <tr> <td>8</td> <td>858.0</td> <td>+50</td> <td></td> </tr> </tbody> </table>	Channel	Signal BW [MHz]	Frequency [MHz]	Offset [kHz]	Result OK or NOK	K5	7	177.5	-50		7	177.5	0		7	177.5	+50		K12	7	226.5	-50		7	226.5	0		7	226.5	+50		K21	8	474.0	-50		8	474.0	0		8	474.0	+50		K69	8	858.0	-50		8	858.0	0		8	858.0	+50	
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<i>Test Case</i>	<b>Task 3:6 Frequencies: Signal bandwidths</b>
<i>Section</i>	NorDig Unified 3.4.2
<i>Requirement</i>	<p>VHF Bands: The NorDig IRD shall for the supported frequency ranges be able to receive 7 MHz and should be able to receive 8 MHz DVB-T signals. If 8 MHz bandwidth is supported it shall automatically detect which DVB-T signal bandwidth is being used, and it shall be possible to receive the 8 MHz DVB-T signals on the 7 MHz channel frequency raster.</p> <p>UHF Bands: The NorDig IRD shall for the supported frequency ranges be able to receive 8 MHz DVB-T signals.</p> <p>(For a DVB-T signal, an 8 MHz DVB-T signal corresponds to a signal bandwidth of 7.61 MHz and a 7 MHz DVB-T signal corresponds to a signal bandwidth of 6.66 MHz.)</p>
<i>Test procedure</i>	<p><b>Purpose of test:</b> To verify that the receiver is able to automatically detect the transmitted signal bandwidth and do the required adaptations for QEF reception.</p>

(The reception of the different signal bandwidths on supported frequency ranges are tested in previous test).

**Equipment:**



**Test procedure:**

1. Set up the test instruments.
2. Use the transmission frequency UHF IV/V 666 MHz (K45) and an input level of -60 dBm to the receiver.
3. Use the DVB-T mode 8k 64QAM FEC R=2/3  $\Delta/Tu=1/8$  and signal bandwidth 8MHz.
4. Connect the receiver and perform an automatic or manual channel search. The signal bandwidth initialization shall not be required by the user.
5. Use the quality measurement procedure 1.
6. Fill the result in the measurement record: **OK** or **NOK**.
7. Change the transmission frequency to VHF III channel 198.5 MHz (K8) and signal bandwidth to 7 MHz.
8. Verify that the channel list does not have any services installed by performing initialization to factory defaults or in such way.
9. Do an automatic or manual channel search. The signal bandwidth initialization shall not be required by the user.
10. Use the quality measurement procedure 1.
11. Fill the result in the measurement record: **OK** or **NOK**.

**Expected result:**

The test results shall be OK for all tests in the table 1 in the measurement record and user does not have to initialize the signal bandwidth for the successful channel search and QEF reception.

If 8MHz signal bandwidth in VHF is supported the test result shall be OK for the test in the table 2 in the measurement record. If the 8MHz signal bandwidth in VHF is not supported, this test result can be NOK.

**Test result(s)**

Measurement record:

Channel	Frequency [MHz]	Signal bandwidth [MHz]	Result OK or NOK
K8	198.5	7	
K45	666.0	8	

Table 1 Mandatory signal bandwidths to receive

Channel	Frequency [MHz]	Signal bandwidth [MHz]	Result OK or NOK
K8	198.5	8	

Table 2 Optional signal bandwidth to receive.

**Conformity**

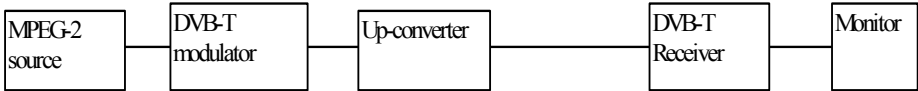
**OK**  **Fault**  Major  Minor, define fail reason in comments

**Comments**

If possible describe if fault can be fixed with software update:  **YES**  **NO**  
Describe more specific faults and/or other information

**Date**

**Sign**

<b>Test Case</b>	<b>Task 3:7 Modes</b>																																																																																																
<b>Section</b>	NorDig Unified 3.4.3																																																																																																
<b>Requirement</b>	<p>The NorDig IRD terrestrial front end shall be capable of correctly demodulating all non-hierarchical modes specified in EN 300 744.</p> <p>The front end shall therefore be able to work with any combination of constellation (QPSK, 16-QAM or 64-QAM), code rate (1/2, 2/3, 3/4, 5/6 or 7/8), guard interval (<math>T_u/4</math>, <math>T_u/8</math>, <math>T_u/16</math> or <math>T_u/32</math>) and transmission mode (2K or 8K).</p> <p>The IRD shall automatically detect which mode is being used.</p> <p>The NorDig IRD should be able to receiver the hierarchical modes in the DVB-T specification.</p>																																																																																																
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the reception of all non-hierarchical DVB-T modes.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG-2 source] --- B[DVB-T modulator]     B --- C[Up-converter]     C --- D[DVB-T Receiver]     D --- E[Monitor]   </pre> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Set up the test instruments.</li> <li>2. Use channel 45 and an input level of -60 dBm.</li> <li>3. Start with the mode 8k QPSK FEC R=1/2 <math>\Delta/T_u=1/32</math> and signal bandwidth 8 MHz.</li> <li>4. Use the quality measurement procedure 1.</li> <li>5. Fill the result in the measurement record: <b>OK</b> or <b>NOK</b>.</li> <li>6. Perform the same test for the remaining 119 8k and 2k modes.</li> </ol> <p><b>Expected result:</b> The test shall be OK for all modes.</p>																																																																																																
<b>Test result(s)</b>	<p>Measurement record:</p> <table border="1"> <thead> <tr> <th>8K</th> <th>FEC</th> <th>Tg=1/32</th> <th>Tg=1/16</th> <th>Tg=1/8</th> <th>Tg=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>2/3</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>QPSK</td><td>5/6</td><td></td><td></td><td></td><td></td></tr> <tr><td>QPSK</td><td>7/8</td><td></td><td></td><td></td><td></td></tr> <tr><td>16QAM</td><td>1/2</td><td></td><td></td><td></td><td></td></tr> <tr><td>16QAM</td><td>2/3</td><td></td><td></td><td></td><td></td></tr> <tr><td>16QAM</td><td>3/4</td><td></td><td></td><td></td><td></td></tr> <tr><td>16QAM</td><td>5/6</td><td></td><td></td><td></td><td></td></tr> <tr><td>16QAM</td><td>7/8</td><td></td><td></td><td></td><td></td></tr> <tr><td>64QAM</td><td>1/2</td><td></td><td></td><td></td><td></td></tr> <tr><td>64QAM</td><td>2/3</td><td></td><td></td><td></td><td></td></tr> <tr><td>64QAM</td><td>3/4</td><td></td><td></td><td></td><td></td></tr> <tr><td>64QAM</td><td>5/6</td><td></td><td></td><td></td><td></td></tr> <tr><td>64QAM</td><td>7/8</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	8K	FEC	Tg=1/32	Tg=1/16	Tg=1/8	Tg=1/4	QPSK	1/2					QPSK	2/3					QPSK	3/4					QPSK	5/6					QPSK	7/8					16QAM	1/2					16QAM	2/3					16QAM	3/4					16QAM	5/6					16QAM	7/8					64QAM	1/2					64QAM	2/3					64QAM	3/4					64QAM	5/6					64QAM	7/8				
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	2K	FEC	Tg=1/32	Tg=1/16	Tg=1/8	Tg=1/4
	QPSK	1/2				
	QPSK	2/3				
	QPSK	3/4				
	QPSK	5/6				
	QPSK	7/8				
	16QAM	1/2				
	16QAM	2/3				
	16QAM	3/4				
	16QAM	5/6				
	16QAM	7/8				
	64QAM	1/2				
	64QAM	2/3				
	64QAM	3/4				
	64QAM	5/6				
	64QAM	7/8				
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments					
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information					
<b>Date</b>				<b>Sign</b>		

<b>Test Case</b>	<b>Task 3:8 Tuning/Scanning Procedure: General</b>		
<b>Section</b>	NorDig Unified 3.4.4.1		
<b>Requirement</b>	The IRD shall be able to provide a scanning procedure over the whole frequency range.  It shall also be able to receive and react on tuning parameters found in PSI/SI (e.g. NIT information).		
<b>Test procedure</b>	<b>Purpose of test:</b> To verify that IRD is able to scan through the whole frequency range.  <b>Test procedure:</b> This is common requirement and will be verified in the following tests.		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>			<b>Sign</b>

<b>Test Case</b>	<b>Task 3:9 Tuning/Scanning Procedures: Basic status check</b>		
<b>Section</b>	NorDig Unified 3.4.4.2		
<b>Requirement</b>	The IRD shall provide at least a basic status check function (accessible through the Navigator) that presents reception quality information for a selected service (currently viewed by the user).  The basic status check should be presented on the OSD and shall include: channel id (or centre frequency) signal strength indicator and reception quality indicator		

with the classification “poor/fair/good” for the indicators e.g. displayed as bars.

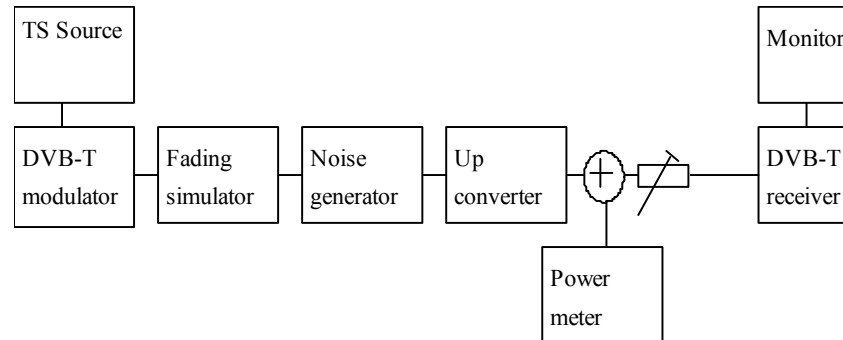
The algorithm to calculate the reception quality could be based on a combination of C/N and BER. The signal strength and quality reception indicators should be updated continuously (e.g. every second) in order to simplify the antenna installation.

**Test procedure**

**Purpose of test:**

To verify that all the specified status information is displayed.

**Equipment:**



**Test procedure:**

1. Use DVB-T mode 8k 64QAM R=3/4 Δ/Tu=1/4.
2. Tune the IRD to an arbitrary service.
3. Locate the status check function in the navigator and initiate it.
4. Check that the channel number, signal strength and the reception quality indicators are displayed.
5. Use gaussian channel configuration in fading simulator.
6. Try several input signal levels from such a low input level (no picture at all) to a high input level by changing the attenuation in the attenuator.
7. Decide if the indicated values of the signal strength indicator are reasonable.
8. After each change of input signal level check that the signal strength indicator is updated.
9. Configure 0dB 105μs echo in fading simulator and variate the C/N.
10. Evaluate if the reception quality corresponds the real reception quality by changing the C/N from a low value to a high value. After each change of C/N check that the reception quality indicator is updated.
11. Fill in the test protocol.

**Expected result:**

All test results are OK.

**Test result(s)**

Measurement record

Requirement	NOK or OK
Navigator has status check function.	
The function shows the channel id and/or centre frequency.	
The function shows signal strength indicator.	
Signal strength indicator classification is poor/fair/good.	
Signal strength indicator is updated continuously.	
The function has reception quality indicator.	
Signal quality indicator is updated continuously.	
Signal quality indicator classification is poor/fair/good.	



**NorDig**

<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 3:10 Tuning/Scanning Procedures: Automatic channel search for the same service bouquet</b>
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<b>Section</b>	NorDig Unified 3.4.4.4
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<b>Requirement</b>	<p>The IRD shall provide a function to perform an automatic search that finds all of the multiplexes and services in the whole frequency range (See section 3.4.2). Before the automatic search is started, all service lists shall be deleted (if present) (1).</p> <p>The IRD shall (1) only display a service once in the service list (i.e. avoiding duplicate of the same services), even if the same service (same triplet original_network_id, transport_stream_id and service_id) is received from multiple transmitters. If the same service can be reached from several transmitters the one with best quality criterion of RF-channel should be chosen. The criteria to select transport streams should be based on the reception quality, using a combination of C/N (“signal strength”) and signal quality (e.g. BER, CSI (Channel state information)).</p> <p>During the scanning procedure it is recommended that the IRD use, for each UHF channel, the priority defined in table 3.1, to speed up the scanning process.</p>
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<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the best service selection in automatic channel search when the content of the transport stream is the same on several transmitters.</p> <p><b>Equipment:</b></p>
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**Channels X and Y**  
**TS source #1**  
**ONID=8945**  
**Network ID=1000**  
**Network Name=Net1**  
**TSID=100**  
**Services**  
**Name SIDLogic Ch No**  
**S111**  
**S222**  
**S333**  
**S444**

The TS configuration idea in this test is that on terrestrial network there is possibility to receive several transmitters simultaneously. These transmitters can have the same content exactly, but are transmitted on different channels (frequencies). Therefore, it is important that the receiver can in automatic channel search choose the services which have the best reception quality.

Channels x and y shall not be equal.

Relative signal levels can be observed on spectrum analyser.

**Test procedure:**

The first part of this test procedure tests the selection criteria for the signal level. In practise, the carrier, which has the highest signal level shall be chosen in each case if the quality is the same.

1. Configure the transport stream and setup the instruments. Use the DVB-T mode 8k 64QAM R=2/3  $\Delta/T_u=1/8$ .
2. Set the signal level of the both carriers CH x and CH y to the same level. The signal level shall correspond good reception quality (no errors in decoded video).
3. Check that the channel list is empty. If it is not empty, delete all services.
4. Perform automatic channel search.
5. Check that the channel list has services configured in the transport stream.
6. Check that the services on the channel list is listed once and not duplicated. Check which channel is received by trying to attenuate the signal level. The services from received channel are frozen when the signal level is too low. Restore the attenuations to a level before you changed it.
7. Fill in OK or NOK in the measurement record depending if the services were deleted.  
Fill in also the received channel in the measurement record.
8. Attenuate the carrier you are receiving (in test point 6) to a level that the QMP1 is fulfilled.
9. Perform automatic channel search.
10. Check that the services on the channel list are from the other carrier (not the same as in test point 6) by trying to attenuate the signal level of that carrier. Restore the attenuation to a level before you changed it.
11. Fill in the received channel in the measurement record.
12. Attenuate the carrier you are receiving to a signal level that the QMP1 is fulfilled. Decrease the attenuation for the carrier received in test point 6 to a level which corresponds good reception quality and verify the signal level of that carrier is higher than the signal level of the received carrier.
13. Perform automatic channel search.
14. Check that the services on channel list are from the other carrier (same as in

- test point 6) by trying to attenuate the signal level of that carrier. Restore the attenuation to a level before you changed it.
15. Fill in the received channel in the measurement record.

The second part of this test procedure tests the selection criteria for the reception quality.

16. Use the DVB-T mode 8k 64QAM R=2/3  $\Delta/Tu=1/8$ .
17. Set the signal level of the carrier CH x to a signal level which correspond good reception quality (no errors in decoded video). Attenuate the carrier CH y to a signal level that it is not possible to be received.
18. Check that the channel list is empty. If it is not empty, delete all services.
19. Perform automatic channel search.
20. Check that the channel list has services configured in the transport stream and verify that the services are received on CH x.
21. Add noise on carrier CH x to a level that the QMP1 is fulfilled.
22. Decrease the attenuation of the carrier on CH y to a signal level which is the same as the signal level on carrier CH x.
23. Perform automatic channel search.
24. Check that the services on the channel list are from the carrier on CH y by trying to attenuate the signal level of that carrier. Restore the attenuation to a level before you changed it.

The third part of this test procedure tests the selection criteria for the combination of the signal level and the reception quality.

25. Use the DVB-T mode 8k 64QAM R=2/3  $\Delta/Tu=1/8$ .
26. Set the signal level of the carrier CH x to a signal level which is about 5dB **higher** than the signal level of the carrier CH y. Both signal levels shall correspond good reception quality (no errors in decoded video).
27. Add noise on carrier CH x to a level that the QMP1 is fulfilled (approximately the same C/N than in previous test).
28. Check that the channel list is empty. If it is not empty, delete all services.
29. Perform automatic channel search.
30. Check that the services on the channel list are from the carrier on CH y by trying to attenuate the signal level of that carrier.
31. Fill in the measurement record.

**Expected result:**  
All the test results are OK.

*Test result(s)*

Measurement records:

Requirement	Result	Result OK or NOK
Starting of automatic channel search deletes all services in the service lists. .		
After automatic channel search the channel lists do not contain duplicated services.		
Received channel in test point 6.		
Received channel in test point 11. Received channel shall be different than it was is point 6 for the OK result.		
Received channel in test point 14. Received channel shall be the same it was is point 6 for the OK result.		
Received channel in test point 24. Received channel shall be CH y for the OK result.		
Received channel in test point 30.		



<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

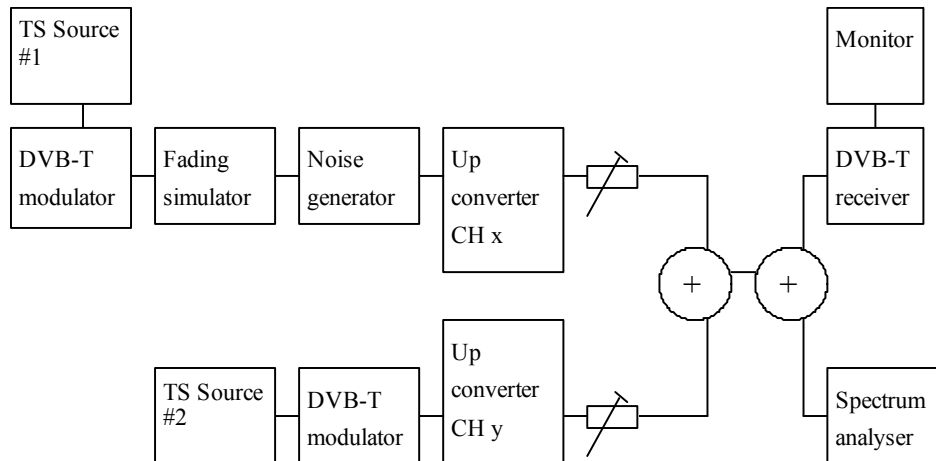
<b>Test Case</b>	<b>Task 3:11 Tuning/Scanning: Automatic channel search for different service bouquets</b>
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<b>Section</b>	NorDig Unified 3.4.4.4
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<b>Requirement</b>	<p>The IRD shall provide a function to perform an automatic search that finds all of the multiplexes and services in the whole frequency range (See section 3.4.2). Before the automatic search is started, all service lists shall be deleted (if present) (1).</p> <p>The IRD shall (1) only display a service once in the service list (i.e. avoiding duplicate of the same services), even if the same service (same triplet original_network_id, transport_stream_id and service_id) is received from multiple transmitters. If the same service can be reached from several transmitters the one with best quality criterion of RF-channel should be chosen. The criteria to select transport streams should be based on the reception quality, using a combination of C/N (“signal strength”) and signal quality (e.g. BER, CSI (Channel state information)).</p> <p>During the scanning procedure it is recommended that the IRD use, for each UHF channel, the priority defined in table 3.1, to speed up the scanning process.</p>
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<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the best service selection in automatic channel search when the content of the transport streams are different on several transmitters.</p>
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**Equipment:**



<p><b>Channel X</b>  <b>TS source #1</b>  <b>ONID=8945</b>  <b>Network ID=<u>1000</u></b>  <b>Network Name=Net1</b>  <b>TSID=100</b>  <b>Services</b>  <b>Name SIDLogic Ch No</b>  <b>S111</b>  <b>S222</b>  <b>S333</b>  <b>S444</b></p>	<p><b>Channel Y</b>  <b>TS source #2</b>  <b>ONID=8945</b>  <b>Network ID=<u>2000</u></b>  <b>Network Name=Net2</b>  <b>TSID=100</b>  <b>Services</b>  <b>NameSIDLogic Ch No</b>  <b>S111</b>  <b>S552</b>  <b>S666</b></p>
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The TS configuration idea in this test is that on terrestrial network there is possibility to receive several transmitters simultaneously. These transmitters can have partially same content (nationwide services) and partially different content (regionwide services). It is the ON\_id, TS\_id and Service\_id which define a service unique. The Network\_id can be analysed to distinguish the differences in the TS. Therefore, it is important that the receiver can in automatic channel search choose the services which have the best reception quality and even find the regionwide services.

Channels x and y shall not be equal.

**Test procedure:**

This test procedure tests combination of the signal level and reception quality.

1. Configure transport streams and setup the instruments. Use DVB-T mode 8k 64QAM R=2/3 Δ/Tu=1/8.
2. Set the signal level of the carrier CH x to a signal level which is about 5dB **higher** than the signal level of the carrier CH y. Both signal levels shall correspond good reception quality (no errors in decoded video).
3. Add noise on carrier CH x to a level that the QMP1 is fulfilled.
4. Check that the channel list is empty. If it is not empty, delete all services.
5. Perform automatic channel search.
6. Check that channel list has services configured in transport streams.

After performing the test the channel list shall be as below:

Position	Service	Channel
1	S1	Y
2	S5/S2 *	Y/X
3	S3	X
4	S4	X
6	S6	Y
7	S2/S5 *	X/Y

\*) Note that order of the services S2 and S5 on the channel list can be chosen by the manufacture. It's highly recommended that the S5 (service without visible errors) is stored in position 2 and the S2 (service with visible errors) is stored in position 7. And generally it is recommended that service detected by the receiver as "better" service is stored in that position which is signalled in Logic Channel No and the other services with same Logic Ch No stored later in the list).

**Expected result:**

All the tests are OK.



<b>Test result(s)</b>	Measurement record: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th style="text-align: left;">Requirement</th> <th style="text-align: left;">Result OK or NOK</th> </tr> </thead> <tbody> <tr> <td>Starting of automatic channel search deletes all services in the service lists.</td> <td></td> </tr> <tr> <td>After automatic channel search the channel lists does not contain duplicated services.</td> <td></td> </tr> <tr> <td>The channel list is as defined in test procedure.</td> <td></td> </tr> </tbody> </table>	Requirement	Result OK or NOK	Starting of automatic channel search deletes all services in the service lists.		After automatic channel search the channel lists does not contain duplicated services.		The channel list is as defined in test procedure.	
Requirement	Result OK or NOK								
Starting of automatic channel search deletes all services in the service lists.									
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The channel list is as defined in test procedure.									
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments								
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information								
<b>Date</b>	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%; text-align: center;"><i>Sign</i></td> </tr> </table>		<i>Sign</i>						
	<i>Sign</i>								

<b>Test Case</b>	<b>Task 3:12 Tuning/Scanning Procedures: Manual Channel Search</b>
<b>Section</b>	NorDig Unified 3.4.4.5
<b>Requirement</b>	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 IRD 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).
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the functionality of the manual channel search.</p> <p><b>Equipment:</b></p>

<b>Channel X</b> <b>TS source #1</b> <b>ONID=8945</b> <b>Network ID=<u>1000</u></b> <b>Network Name=Net1</b> <b>TSID=100</b> <b>Services</b> <table border="1"> <thead> <tr> <th>Name</th> <th>SID</th> <th>Logic</th> <th>Ch</th> <th>No</th> </tr> </thead> <tbody> <tr> <td></td> <td>S111</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>S222</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>S333</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>S444</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	SID	Logic	Ch	No		S111					S222					S333					S444				<b>Channel Y</b> <b>TS source #2</b> <b>ONID=8945</b> <b>Network ID=<u>2000</u></b> <b>Network Name=Net2</b> <b>TSID=100</b> <b>Services</b> <table border="1"> <thead> <tr> <th>Name</th> <th>SID</th> <th>Logic</th> <th>Ch</th> <th>No</th> </tr> </thead> <tbody> <tr> <td></td> <td>S111</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>S552</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>S666</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	SID	Logic	Ch	No		S111					S552					S666			
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The TS configuration idea in this test is that on terrestrial network there is possibility to receive several transmitters simultaneously. These transmitters can have partially same content (nationwide services) and partially different content (regionwide services). It is the ON\_id, TS\_id and Service\_id which define a service unique. The Network\_id can be analysed to distinguish the differenciens in the TS. Therefore it is important that user can force the receive to search all services within TS by selecting the channel number and install services from that TS on channel list without any quality criteria.

**Test procedure:**

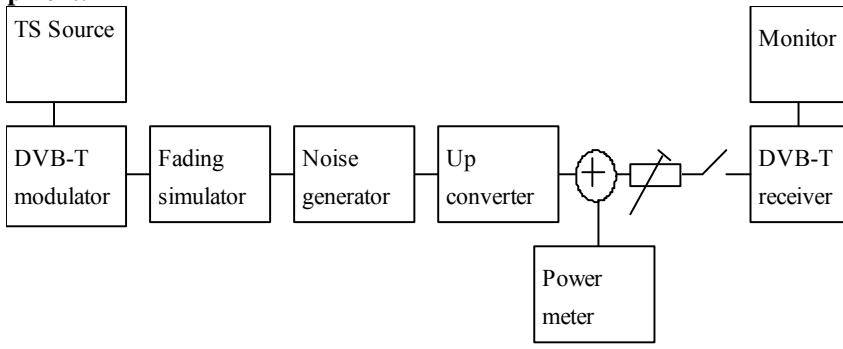
1. Configure transport streams and setup the instruments.
2. Check that channel list is empty. If it is not empty delete all services.
3. Attenuate the carrier on CH x to a signal level that it is not possible to receive.
4. Perform automatic channel search.
5. Check that the services S1, S5 and S6 on channel list are from carrier on CH y by attenuating the carrier on CH y. If the received channel is correct the services S1, S5 and S6 shall be frozen when the signal level is too low. Restore the attenuation level back to same level it was before you started to change it.
6. Decrease the attenuation of the carrier on CH x to a signal level that the carrier is possible to be received. Add noise on carrier CH x to a level that QMP1 is fulfilled.
7. Perform manual channel search. Check that the carrier, which is wanted to be searched, is given in channel number format.
8. Fill in the measurement record.
9. Check that services S1, S2, S3 and S4 on channel list are from carrier on CH x by attenuating the carrier on CH x. If the received channel is correct the services S1, S2, S3 and S4 shall be frozen when the signal level is too low. Restore the attenuation level back to same level it was before you started to change it.
10. Check that service S1 is not listed twice on channel list.

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

Position	Service	Channel
1	S1	X
2	S2	X
3	S3	X
4	S4	X
6	S6	Y
7	S5	Y

\*) Note that order of the services S2 and S5 shall be according to table above. Generally, the services found in last manual channel search are stored in the service list according to their signalling. 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.

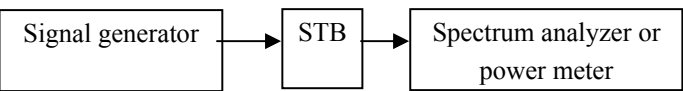
	<p><b>Expected result:</b> All test results shall be OK.</p>									
<b>Test result(s)</b>	<p>Measurement record:</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 70%;">Requirement</th> <th style="width: 30%;">Result OK or NOK</th> </tr> </thead> <tbody> <tr> <td>Manual channel 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 on the channel list</td> <td></td> </tr> </tbody> </table>		Requirement	Result OK or NOK	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 on the channel list	
Requirement	Result OK or NOK									
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<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments									
<b>Comments</b>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information</p>									
<b>Date</b>	<b>Sign</b>									

<b>Test Case</b>	<p><b>Task 3:13 Changes In Modulation Parameters</b></p>	
<b>Section</b>	<p>NorDig Unified 3.4.5</p>	
<b>Requirement</b>	<p>NorDig IRD should recover from changes in modulation parameters and output an error free TS. This should take less than one second for any change. The receiver should be able to detect a change of modulation parameters signalled in the TPS data of the DVB-T signal, in order to reduce the recovery time.</p>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that receiver can detect a change in the DVB-T mode and re-synchronise without any user action in certain period of time.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --- DM[DVB-T modulator]     DM --- FS[Fading simulator]     FS --- NG[Noise generator]     NG --- UC[Up converter]     UC --- PM((+))     PM --- SW[Switch]     SW --- DTR[DVB-T receiver]     DTR --- MON[Monitor]     PM --- PMeter[Power meter]   </pre> <p>The DVB-T modulator shall have a bitrate adaptation to test this test, or, alternatively the TS source shall have capability to change the output transport stream bitrate to correspond the DVB-T mode. See bitrates in chapter 2.3.3.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Set up the instruments.</li> <li>2. Use frequency 666 MHz (K45).</li> <li>3. Set the RF input level to receiver to -50dBm.</li> <li>4. Set up DVB-T mode 8k 64QAM R3/4 G1/4 and signal bandwidth 8 MHz in DVB-T modulator.</li> </ol>	

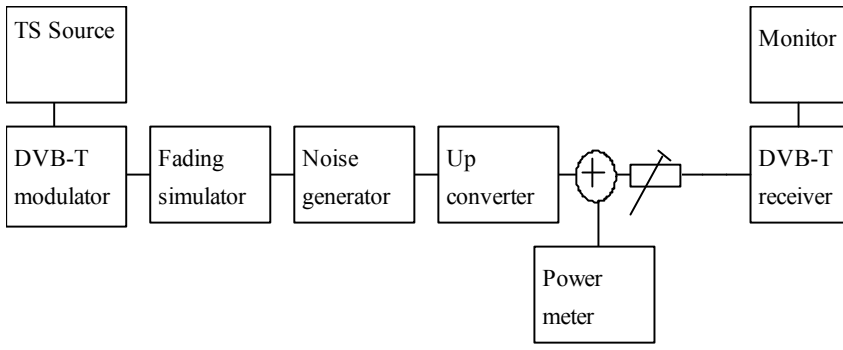
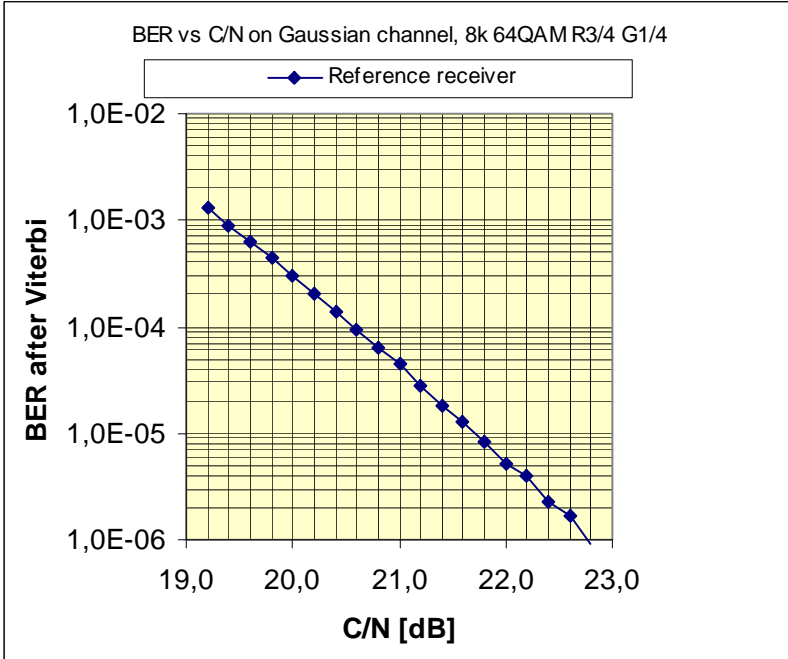
	<ol style="list-style-type: none"> <li>5. Verify that the switch is closed.</li> <li>6. Use the quality measurement procedure 1.</li> <li>7. Fill in the measurement record.</li> <li>8. Test the rest of the DVB-T modes defined in measurement record without disconnecting the RF input signal. With other words the parameters in the DVB-T mode is changed on the fly.</li> </ol> <p><b>Expected result:</b> The receiver is able to detect change of the DVB-T modes defined in measurement record and re-synchronise to the changed DVB-T mode within 1 second.</p>																
<b>Test result(s)</b>	<p>Measurement record:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Mode</th> <th>NOK or OK</th> </tr> </thead> <tbody> <tr> <td>8k 64QAM R3/4 G1/4</td> <td></td> </tr> <tr> <td>8k 64QAM R2/3 G1/4</td> <td></td> </tr> <tr> <td>8k 64QAM R2/3 G1/8</td> <td></td> </tr> <tr> <td>8k 16QAM R2/3 G1/8</td> <td></td> </tr> <tr> <td>8k QPSK R1/2 G1/8</td> <td></td> </tr> <tr> <td>2k QPSK R1/2 G1/16</td> <td></td> </tr> <tr> <td>2k 16QAM R2/3 G1/32</td> <td></td> </tr> </tbody> </table>	Mode	NOK or OK	8k 64QAM R3/4 G1/4		8k 64QAM R2/3 G1/4		8k 64QAM R2/3 G1/8		8k 16QAM R2/3 G1/8		8k QPSK R1/2 G1/8		2k QPSK R1/2 G1/16		2k 16QAM R2/3 G1/32	
Mode	NOK or OK																
8k 64QAM R3/4 G1/4																	
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8k QPSK R1/2 G1/8																	
2k QPSK R1/2 G1/16																	
2k 16QAM R2/3 G1/32																	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																
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	<i>Sign</i>																

<b>Test Case</b>	<b>Task 3:14 RF input connector</b>
<b>Section</b>	NorDig Unified 3.4.6
<b>Requirement</b>	The NorDig IRD shall have one input tuner connector, type: IEC female in accordance with IEC 60169-2, part 2 [28]. The input impedance shall be 75 ohm.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver has a correct input connector for the reception of the DVB-T signals.</p> <p><b>Equipment:</b></p> <p><b>Test procedure:</b></p> <p>Verify that the RF input connector is accordance the specification IEC 60169-2. (With other words the connector is similar as RF input connector used in TV sets RF input).</p> <p>Verify in the manufacturer's technical specification that the input impedance of the RF input is 75 ohm.</p> <p><b>Expected result:</b></p> <p>RF input connector is as defined in specification IEC 60169-2 and the input impedance is 75ohm.</p>
<b>Test result(s)</b>	The manufacturer describes his specific setup for the test

<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

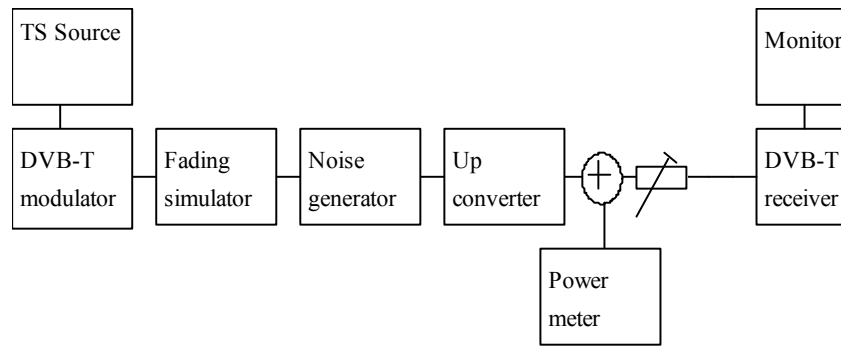
<b>Test Case</b>	<b>Task 3:15 RF output connector</b>
<b>Section</b>	NorDig Unified 3.4.7
<b>Requirement</b>	<p>For a NorDig IRDs equipped with a RF bypass (RF<sub>in</sub> - RF<sub>out</sub>), the connector shall be of type: IEC male in accordance with IEC 60169, part 2 [28]. The frequency range for the RF bypass should be from 47 MHz to 862 MHz and the RF bypass gain should be from -1 dB to +3 dB.</p> <p>The RF signals should be bypassed from RF<sub>in</sub> to RF<sub>out</sub> independently from the status of the NorDig IRD (operational or stand by), so that connected equipment (e.g. TV set) can operate even if the NorDig IRD is in stand by.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check 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 oprational modes.</p> <p><b>Equipment:</b></p> <div style="text-align: center;">  <pre> graph LR     A[Signal generator] --&gt; B[STB]     B --&gt; C[Spectrum analyzer or power meter]           </pre> </div> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Connect signal generator to receiver RF input and spectrum analyser to RF output (may need DC block).</li> <li>2. Set the input level to the receiver -50dBm. Use CW.</li> <li>3. Sweep the frequency of the signal generator from 47 MHz to 869 MHz.</li> <li>4. Measure the attenuation of the loop through over the frequency range.</li> <li>5. Repeat the test for the standby mode.</li> </ol> <p>Verify that the RF output connector is accordance the specification IEC 60169-2.</p> <p><b>Expected result:</b></p> <p>RF output connector is as defined in specification IEC 60169, the attenuation of the loop through shall not be too low or high and the looppthrough works in operational and standby mode.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	
	<b>Sign</b>

NorDig

<b>Test Case</b>	<b>Task 3:16 Performance: BER vs C/N verification</b>
<b>Section</b>	NorDig Unified 3.4.8.1
<b>Requirement</b>	Verify the internal BER measurement of the NorDig IRD for objective measurements (QMP3).
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check that the internal BER value measured by the receiver to reference BER value in a function of C/N on Gaussian channel is correct.</p> <p><b>Equipment:</b></p>  <p><b>BER vs C/N on Gaussian channel, 8k 64QAM R3/4 G1/4</b></p>  <p>Reference BER in a function of the C/N on Gaussian channel.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Setup the instruments.</li> <li>2. Use channel 45 and DVB-T mode 8k 64QAM R3/4 G1/4. Set the RF input level to <math>-50\text{dBm}</math>.</li> <li>3. Use the quality measurement procedure 2.</li> <li>4. Compare the BER measured by the receiver to reference BER in a function of the C/N measurement on Gaussian channel.</li> <li>5. Fill in the BER value in measurement record.</li> <li>6. Adjust the required C/N that it corresponds BER <math>2\text{E-}4</math> after viterbi.</li> </ol>

	<p>7. Decrease the required C/N by 1dB. Check that it corresponds approximately BER 2E-3 after viterbi and QMP1.</p> <p><b>Expected result:</b>          The measured BER in a function of required C/N shall have the same slope as with the reference BER in a function of required C/N.          The decrease of the required C/N corresponding BER 2E-4 after Viterbi by 1dB shall result approximately to BER 2E-3 after Viterbi corresponding QMP1.</p>																																																			
<i>Test result(s)</i>	<p>Measurement record:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>C/N</th> <th>Reference BER</th> <th>Measured BER</th> </tr> </thead> <tbody> <tr><td>18.0</td><td>-</td><td></td></tr> <tr><td>18.2</td><td>-</td><td></td></tr> <tr><td>18.4</td><td>-</td><td></td></tr> <tr><td>18.6</td><td>-</td><td></td></tr> <tr><td>18.8</td><td>-</td><td></td></tr> <tr><td>19.0</td><td>-</td><td></td></tr> <tr><td>19.2</td><td>-</td><td></td></tr> <tr><td>19.4</td><td>-</td><td></td></tr> <tr><td>19.6</td><td>6.3E-4</td><td></td></tr> <tr><td>20.0</td><td>3.0E-4</td><td></td></tr> <tr><td>20.2</td><td>2.0E-4</td><td></td></tr> <tr><td>20.6</td><td>9.3E-5</td><td></td></tr> <tr><td>21.0</td><td>6.2E-5</td><td></td></tr> <tr><td>21.6</td><td>1.3E-5</td><td></td></tr> <tr><td>22.0</td><td>5.1E-6</td><td></td></tr> <tr><td>22.6</td><td>1.7E-6</td><td></td></tr> </tbody> </table>	C/N	Reference BER	Measured BER	18.0	-		18.2	-		18.4	-		18.6	-		18.8	-		19.0	-		19.2	-		19.4	-		19.6	6.3E-4		20.0	3.0E-4		20.2	2.0E-4		20.6	9.3E-5		21.0	6.2E-5		21.6	1.3E-5		22.0	5.1E-6		22.6	1.7E-6	
C/N	Reference BER	Measured BER																																																		
18.0	-																																																			
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<i>Date</i>	<i>Sign</i>																																																			

<i>Test Case</i>	<b>Task 3:17 Performance: C/N performance on Gaussian channel</b>
<i>Section</i>	NorDig Unified 3.4.8.2
<i>Requirement</i>	The NorDig IRD shall have a QEF performance for the C/N ratios given in Table 3.3 (NorDig Unified 3.4.8.2 v1.0.3), or better performance.
<i>Test procedure</i>	<p><b>Purpose of test:</b>          To test the required C/N for quasi error free reception in Gaussian channel.</p> <p><b>Equipment:</b></p>



**Test procedure for Gaussian channel:**

1. Set up the test instruments
2. Use the following mode {8K, 64QAM, R=2/3,  $\Delta/T_U=1/8$ }
3. Set the up-converter to channel 21
4. Measure the input level to the attenuator.
5. Determine the attenuation of the attenuator and the cables.
6. Calculate the receiver input signal level and set it to  $-50\text{dBm}$ .
7. Use the value for the required C/N specified for the DVB-T mode in table 3.3 (NorDig Unified v1.0.3).
8. Do the channel search.
9. Increase the C/N from low value to higher value until the quality measurement procedure 2 fulfils.
10. Fill in the measured value in dB in the measurement record.
11. Repeat the test for the rest of the frequencies, signal bandwidths and DVB-T modes defined in the measurement record.

**Expected result:**

The required C/N for quasi error free reception in gaussian channel is less than specified in table 3.3 (NorDig Unified 3.4.8.2 v1.0.3).

<b>Test result(s)</b>	Measurement record: See tables below.
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>



**NorDig**

Measurement record:

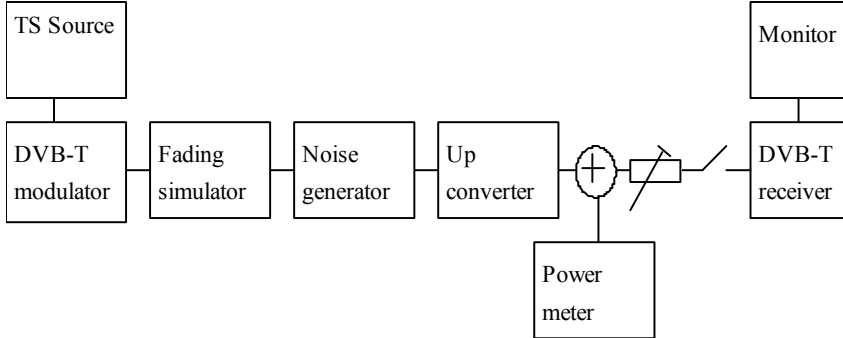
NorDig Unified Test specification, ver 2.0

Signal bandwidth	7 MHz			8 MHz								
Centre frequency [MHz]	177.5	198.5	226.5	474.0	522.0	570.0	618.0	666.0	714.0	762.0	810.0	858.0
DVB-T mode / Channel Id	K5	K8	K12	K21	K27	K33	K39	K45	K51	K57	K63	K69
8k QPSK R1/2 G1/4												
8k QPSK R2/3 G1/4												
8k QPSK R3/4 G1/4												
8k QPSK R5/6 G1/4												
8k QPSK R7/8 G1/4												
8k 16QAM R1/2 G1/4												
8k 16QAM R2/3 G1/4												
8k 16QAM R3/4 G1/4												
8k 16QAM R5/6 G1/4												
8k 16QAM R7/8 G1/4												
8k 64QAM R1/2 G1/4												
8k 64QAM R2/3 G1/4												
8k 64QAM R2/3 G1/8												
8k 64QAM R3/4 G1/4												
8k 64QAM R5/6 G1/4												
8k 64QAM R7/8 G1/4												

Table 1. Mandatory frequencies and signal bandwidths to support.

Signal bandwidth	8 MHz														
Centre frequency [MHz]	114.0	114.5	170.0	170.5	177.5	178.0	226.0	226.5	233.5	234.0	296.5	298.0	306.0	386.0	466.0
DVB-T mode / Channel Id	D1	S2	D8	S10	K5	D9	D15	K12	S11	D16	S20	D24	S21	S31	S41
8k 64QAM R2/3 G1/8															
8k 64QAM R3/4 G1/4															

Table 2. Optional frequencies and signal bandwidths to support.

<b>Test Case</b>	<b>Task 3:18 Performance: C/N performance on 0dB echo channel</b>
<b>Section</b>	NorDig Unified 3.4.8.2
<b>Requirement</b>	The NorDig IRD shall have a QEF performance for the C/N ratios given in Table 3.3 (NorDig Unified 3.4.8.2), or better performance.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To test the required C/N for quasi error free reception in 0 dB echo channel.</p> <p><b>Equipment:</b></p>  <p>The 0 degree channel centre shall be used in fading simulator (see 2.3.5 0dB echo).</p> <p><b>Test procedure for 0 dB echo channel:</b></p> <p>Check the different SFN synchronization issues from 2.3.4 Receiver operability in SFN.</p> <ol style="list-style-type: none"> <li>1. Set up the test instruments</li> <li>2. Use the following mode {8K, 64QAM, R=2/3, <math>\Delta/T_U=1/8</math>} and signal bandwidth 8MHz.</li> <li>3. Set the up-converter to frequency 666MHz (K45)</li> <li>4. Set the fading simulator to 0dB echo profile. (Delay 1.95us, 0 degree phase at channel centre and attenuation 0dB for the second path.)</li> <li>5. Measure the input level to the attenuator.</li> <li>6. Determine the attenuation of the attenuator and the cables.</li> <li>7. Calculate the receiver input signal level and set it to -50dBm.</li> <li>8. Increase the C/N from low value to higher value until the quality measurement procedure 2 is fulfilled.</li> <li>9. Fill in the measured value in dB in the measurement record.</li> <li>10. Verify also that the channel search finds the services at the measured C/N.</li> <li>11. Repeat the test for the mode {8K, 64QAM, R=3/4, <math>\Delta/T_U=1/4</math>} and signal bandwidth 8MHz.</li> <li>12. Repeat the test for rest of the DVB-T modes combinations with 8MHz signal bandwidth in measurement record.</li> <li>13. Set the up-converter to frequency 198.5MHz (K8).</li> <li>14. Use the following mode {8K, 64QAM, R=2/3, <math>\Delta/T_U=1/8</math>} and signal bandwidth 7MHz.</li> <li>15. Repeat the test for rest of the DVB-T mode combinations with 7MHz signal bandwidth in measurement record.</li> </ol> <p>(Measurement can be done by changing the modulation/code rate first and after that echo delay depending of the measurement equipment).</p> <p><b>Expected result:</b> The required C/N for quasi error free reception in 0 dB echo channel is less than specified in table 3.3 (NorDig Unified 3.4.8.2).</p>

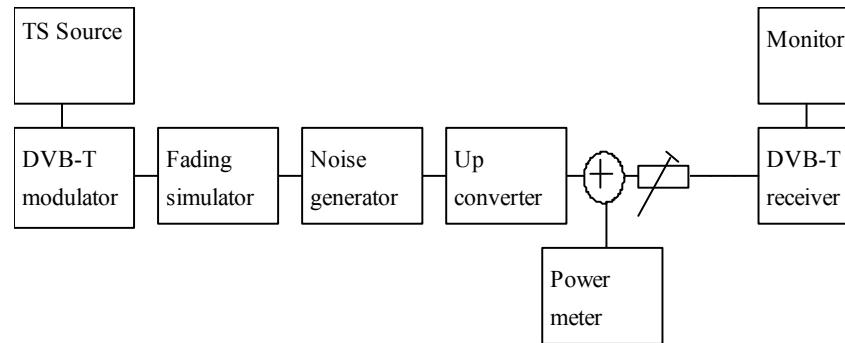


**NorDig**

<b>Test result(s)</b>	Measurement record:																							
	<table border="1"> <thead> <tr> <th colspan="2">8MHz signal bandwidth at f=666MHz</th> </tr> <tr> <th>DVB-T mode</th> <th>Required C/N (0dB 1.95µs)</th> </tr> </thead> <tbody> <tr><td>8k QPSK R1/2 G1/4</td><td></td></tr> <tr><td>8k QPSK R2/3 G1/4</td><td></td></tr> <tr><td>8k QPSK R3/4 G1/4</td><td></td></tr> <tr><td>8k 16QAM R1/2 G1/4</td><td></td></tr> <tr><td>8k 16QAM R2/3 G1/4</td><td></td></tr> <tr><td>8k 16QAM R3/4 G1/4</td><td></td></tr> <tr><td>8k 64QAM R1/2 G1/4</td><td></td></tr> <tr><td>8k 64QAM R2/3 G1/4</td><td></td></tr> <tr><td>8k 64QAM R3/4 G1/4</td><td></td></tr> </tbody> </table>	8MHz signal bandwidth at f=666MHz		DVB-T mode	Required C/N (0dB 1.95µs)	8k QPSK R1/2 G1/4		8k QPSK R2/3 G1/4		8k QPSK R3/4 G1/4		8k 16QAM R1/2 G1/4		8k 16QAM R2/3 G1/4		8k 16QAM R3/4 G1/4		8k 64QAM R1/2 G1/4		8k 64QAM R2/3 G1/4		8k 64QAM R3/4 G1/4		
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	DVB-T mode	Required C/N (0dB 1.95µs)																						
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	8k 16QAM R1/2 G1/4																							
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Table 1. Required C/N for 0dB 1.95µs echo in signal bandwidth 8MHz.																								
<table border="1"> <thead> <tr> <th colspan="2">7MHz signal bandwidth at f=198.5MHz</th> </tr> <tr> <th>DVB-T mode</th> <th>Required C/N (0dB 1.95µs)</th> </tr> </thead> <tbody> <tr><td>8k QPSK R1/2 G1/4</td><td></td></tr> <tr><td>8k QPSK R2/3 G1/4</td><td></td></tr> <tr><td>8k QPSK R3/4 G1/4</td><td></td></tr> <tr><td>8k 16QAM R1/2 G1/4</td><td></td></tr> <tr><td>8k 16QAM R2/3 G1/4</td><td></td></tr> <tr><td>8k 16QAM R3/4 G1/4</td><td></td></tr> <tr><td>8k 64QAM R1/2 G1/4</td><td></td></tr> <tr><td>8k 64QAM R2/3 G1/8</td><td></td></tr> <tr><td>8k 64QAM R2/3 G1/4</td><td></td></tr> <tr><td>8k 64QAM R3/4 G1/4</td><td></td></tr> </tbody> </table>	7MHz signal bandwidth at f=198.5MHz		DVB-T mode	Required C/N (0dB 1.95µs)	8k QPSK R1/2 G1/4		8k QPSK R2/3 G1/4		8k QPSK R3/4 G1/4		8k 16QAM R1/2 G1/4		8k 16QAM R2/3 G1/4		8k 16QAM R3/4 G1/4		8k 64QAM R1/2 G1/4		8k 64QAM R2/3 G1/8		8k 64QAM R2/3 G1/4		8k 64QAM R3/4 G1/4	
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8k 64QAM R3/4 G1/4																								
Table 2. Required C/N for 0dB 1.95µs echo in signal bandwidth 7MHz.																								
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																							
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information																							
<b>Date</b>	<b>Sign</b>																							

<b>Test Case</b>	<b>Task 3:19 Performance: Minimum receiver signal input levels on Gaussian channel</b>
<b>Section</b>	NorDig Unified 3.4.8.3
<b>Requirement</b>	<p>The NorDig IRD shall have at least the performance for the signal input levels for the supported frequency range and should have a performance which is one dB better than specified in Table 3.5 (NorDig Unified v1.0.3). The NorDig IRD shall provide QEF reception for the minimum signal levels (<math>P_{min}</math>) stated below.</p> <p>For 7MHz DVB-T signal: <math>P_{min} = -105.7 \text{ dBm} + \text{NF} [\text{dB}] + \text{C/N} [\text{dB}]</math>, and For 8MHz DVB-T signal: <math>P_{min} = -105.2 \text{ dBm} + \text{NF} [\text{dB}] + \text{C/N} [\text{dB}]</math>, where</p> <p>C/N is specified in Table 3.3 (NorDig Unified v1.0.3) and NF is specified in table 3.4 (NorDig Unified v1.0.3)</p>
<b>Test procedure</b>	<b>Purpose of test:</b> To verify the sensitivity of the receiver on Gaussian channel over the supported frequency range.

**Equipment:**



Be careful in impedance matching of cables, adapters and etc.

**Test procedure for the sensitivity on the gaussian channel:**

1. Set up the test instruments
2. Use the following DVB-T mode {8K, 64QAM, R=2/3,  $\Delta/T_U=1/8$ } and signal bandwidth 8MHz.
3. Set the up-converter to frequency 474MHz (K21).
4. Measure the input level to the attenuator.
5. Determine the attenuation of the attenuator and the cables.
6. Calculate the receiver input signal.
7. Do the channel search.
8. Increase the received input level from low value to higher value until the quality measurement procedure 2 is fulfilled.
9. Fill in the measured value in the measurement record.
10. Repeat the test for the rest of the frequencies, DVB-T modes and signal bandwidths on measurement record.

**Expected result:**

Sensitivity shall be equal or better for all measured frequencies (channels) and for all DVB-T modes and signal bandwidths as specified in Table 3.5 (NorDig Unified v1.0.3).

<b>Test result(s)</b>	Measurement record: See following page.
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>



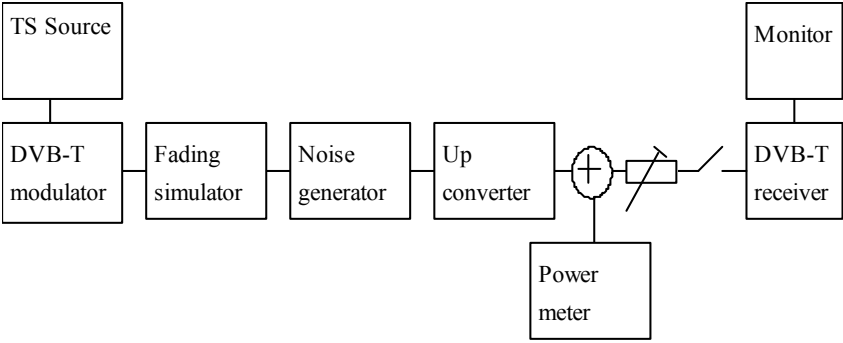
Measurement records:

Signal bandwidth	7 MHz			8 MHz								
Centre frequency [MHz]	177.5	198.5	226.5	474.0	522.0	570.0	618.0	666.0	714.0	762.0	810.0	858.0
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8k QPSK R1/2 G1/4												
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8k QPSK R7/8 G1/4												
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8k 64QAM R1/2 G1/4												
8k 64QAM R2/3 G1/4												
8k 64QAM R2/3 G1/8												
8k 64QAM R3/4 G1/4												
8k 64QAM R5/6 G1/4												
8k 64QAM R7/8 G1/4												

Table 1. Mandatory frequencies and signal bandwidths to support.

Signal bandwidth	8 MHz														
Centre frequency [MHz]	114.0	114.5	170.0	170.5	177.5	178.0	226.0	226.5	233.5	234.0	296.5	298.0	306.0	386.0	466.0
DVB-T mode / Channel Id	D1	S2	D8	S10	K5	D9	D15	K12	S11	D16	S20	D24	S21	S31	S41
8k 64QAM R2/3 G1/8															
8k 64QAM R3/4 G1/4															

Table 2. Optional frequencies and signal bandwidths to support.

<b>Test Case</b>	<b>Task 3:20 Performance: Minimum IRD Signal Input Levels on 0dB echo channel</b>
<b>Section</b>	NorDig Unified 3.4.8.3
<b>Requirement</b>	The NorDig IRD shall have at least the performance for the signal input level for the supported frequency range and should have a performance which is 1dB better than specified in Table 3.5 (NorDig Unified v1.0.3).
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the sensitivity of the receiver on frequency selective channel.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; DVB_T_mod[DVB-T modulator]     DVB_T_mod --&gt; Fading[Fading simulator]     Fading --&gt; Noise[Noise generator]     Noise --&gt; Up[Up converter]     Up --&gt; Circulator((+))     Circulator --&gt; DVB_T_rec[DVB-T receiver]     Circulator --&gt; Power[Power meter]     DVB_T_rec --&gt; Monitor[Monitor]     </pre> <p>The 0 degree channel centre shall be used in fading simulator (see 2.3.4) 0dB echo. Be careful in impedance matching of cables, adapters and etc. The 0dB echo profile must be activated when measuring the power level of the signal.</p> <p><b>Test procedure for the sensitivity on the frequency selective channel:</b></p> <p>Check the different SFN synchronisation issues from 2.3.4 Receiver operability in SFN.</p> <ol style="list-style-type: none"> <li>1. Set up the test instruments</li> <li>2. Use the following DVB-T mode {8K, 64QAM, R=2/3, <math>\Delta/T_U=1/8</math>} and signal bandwidth 8MHz.</li> <li>3. Set the up-converter to frequency 666.0 MHz (K45).</li> <li>4. Set the fading simulator to 0dB echo profile. (Delay 1.95us, 0 degree phase at channel centre and attenuation 0dB for the second path.)</li> <li>5. Determine the attenuation of the attenuator and the cables.</li> <li>6. Measure the input level to the attenuator.</li> <li>7. Calculate the receiver input signal level.</li> <li>8. Increase the received input level from low value to higher value until the quality measurement procedure 2 is fulfilled.</li> <li>9. Fill in the measured value in the measurement record.</li> <li>10. Verify that the channel search finds the services on measured minimum input signal level.</li> <li>11. Repeat the test for the rest of the DVB-T modes on the measurement record.</li> <li>12. Set the up-converter to frequency 198.5 MHz (K8) and signal bandwidth to 7MHz.</li> <li>13. Repeat the test for the rest of the DVB-T modes in the measurement record.</li> </ol> <p>(Measurement can be done by changing the modulation/code rate first and after that echo delay depending of the measurement equipment).</p>



	8k QPSK R3/4 G1/4												
	8k 16QAM R1/2 G1/4												
	8k 16QAM R2/3 G1/4												
	8k 16QAM R3/4 G1/4												
	8k 64QAM R1/2 G1/4												
	8k 64QAM R2/3 G1/4												
	8k 64QAM R2/3 G1/8												
	8k 64QAM R3/4 G1/4												
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments												
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information												
<b>Date</b>								<b>Sign</b>					

<b>Test Case</b>	<b>Task 3:21 Performance: Noise figure on Gaussian channel</b>
<b>Section</b>	NorDig Unified 3.4.8.3
<b>Requirement</b>	The NorDig IRD shall have a noise figure (NF) for supported frequency ranges better than specified in table 3.4 (NorDig Unified v1.0.3).
<b>Test procedure</b>	<p><b>Purpose of test:</b> To calculate the noise figure of the receiver for gaussian channel.</p> <p><b>Equipment:</b> No equipment needed.</p> <p><b>Test procedure for evaluation of the noise figure:</b> Determine the minimum carrier levels <math>C_{min}</math> for the gaussian channel measured in last test Task 3:19 (Performance - Minimum IRD Signal Input Levels on Gaussian channel).</p>

Determine the required  $C/N_{\min}$  for the gaussian channel measured in last test Task 3:17 (Performance - C/N performance on Gaussian channel).

Calculate the noise figure NF[dB] for the supported frequencies using the formulas

For 8MHz DVB-T signal:  $NF[dB] = N + 105.2dBm = C_{\min} - C/N_{\min} + 105.2dBm$   
 For 7MHz DVB-T signal:  $NF[dB] = N + 105.7dBm = C_{\min} - C/N_{\min} + 105.7dBm$

**Expected result:**

The noise figure is less than or equal to table 3.4 (NorDig Unified v1.0.3).

**Test result(s)** Measurement record:

Frequency	177.5	198.5	226.5
Channel id	K5	K8	K12
Signal bandwidth	7MHz		
Mode	NF [dB]		
8k 64QAM R2/3			
8k 64QAM R3/4			

Frequency	474.0	522.0	570.0	618.0	666.0	714.0	762.0	810.0	858.0
Channel id	K21	K27	K33	K39	K45	K51	K57	K63	K69
Signal bandwidth	8MHz								
Mode	NF [dB]								
8k 64QAM R2/3									
8k 64QAM R3/4									

Table 1. Mandatory frequencies and signal bandwidths to support.

Frequency	114.0	114.5	170.0	170.5	177.5	178.0	226.0	226.5
Channel id	D1	S2	D8	S10	K5	D9	D15	K12
Signal bandwidth	8MHz							
Mode	NF [dB]							
8k 64QAM R2/3								
8k 64QAM R3/4								

Frequency	233.5	234.0	296.5	298.0	306.0	386.0	466.0
Channel id	S11	D16	S20	D24	S21	S31	S41
Signal bandwidth	8MHz						
Mode	NF [dB]						
8k 64QAM R2/3							
8k 64QAM R3/4							

Table 2. Optional frequencies and signal bandwidths to support.

**Conformity**  OK  Fault  Major  Minor, define fail reason in comments



**NorDig**

<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>	<b>Sign</b>		

<b>Test Case</b>	<b>Task 3:22 Performance: Maximum Receiver Signal Input Levels</b>		
<b>Section</b>	NorDig Unified 3.4.8.4		
<b>Requirement</b>	<p>The receiver shall provide QEF reception for DVB-T signals up to a level of <math>-35\text{dBm}</math>.</p> <p>The maximum analogue TV signal level is restricted to <math>-20\text{ dBm}</math> defined as the r.m.s (root mean square) value of the vision carrier at peaks of the modulated envelope.</p> <p>The DVB-T signal level is valid for the modes <math>\{8\text{K}, 64\text{-QAM}, R=2/3, \Delta/T_u=1/8\}</math>, <math>\{8\text{K}, 64\text{-QAM}, R=2/3, \Delta/T_u=1/4\}</math> and <math>\{8\text{K}, 64\text{-QAM}, R=3/4, \Delta/T_u=1/4\}</math>.</p>		
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>To test that the receiver is able to handle RF signals with high value.</p> <p><b>Equipment:</b></p> <pre> graph LR     A[MPEG-2 source] --&gt; B[DVB-T modulator]     B --&gt; C[Up-converter]     C --&gt; D((+))     D --- E[Power meter]     D --&gt; F[/ /]     F --&gt; G[DVB-T Receiver]     G --&gt; H[Monitor]     </pre> <p><b>Test procedure</b></p> <ol style="list-style-type: none"> <li>1. Set up the test instruments.</li> <li>2. Determine the attenuation of the attenuator.</li> <li>3. Use the following mode <math>\{8\text{K}, 64\text{-QAM}, R=2/3, \Delta/T_u=1/8\}</math>.</li> <li>4. Set the up-converter to channel 45.</li> <li>5. Determine the attenuation of the attenuator and the cables.</li> <li>6. Turn on the receiver.</li> <li>7. Check that the picture is decoded correctly.</li> <li>8. Calculate the receiver input signal level as a function of attenuation in attenuator.</li> <li>9. Increase the receiver input signal level. until the quality measurement procedure 1 is fulfilled.</li> <li>10. Fill in the result in the measurement record.</li> <li>11. Repeat the test for the modes <math>\{8\text{K}, 64\text{-QAM}, R=2/3, \Delta/T_u=1/4\}</math> and <math>\{8\text{K}, 64\text{-QAM}, R=3/4, \Delta/T_u=1/4\}</math>.</li> </ol> <p><b>Expected result:</b></p> <p>The reception shall be QEF for input level higher than or equal to <math>-35\text{dBm}</math> for defined DVB-T modes.</p>		



<b>Test result(s)</b>	Measurement record:		
	Mode	Requirement dBm	Result
	8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$	-35	
	8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$	-35	
	8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$	-35	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

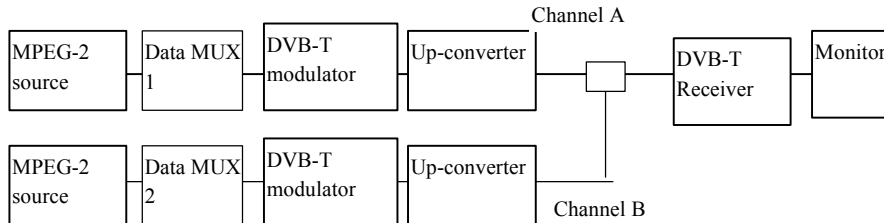
<b>Test Case</b>	<b>Task 3:23 Performance: Immunity to “analogue” signals in Other Channels</b>
<b>Section</b>	NorDig Unified 3.4.8.5
<b>Requirement</b>	<p>The NorDig IRD shall permit adjacent VSB/PAL carriers with up to 33 dB higher power with QEF reception. (The level of the FM sound relative to the vision carrier is -13 dB. The level of the NICAM signal relative to the vision carrier is -20 dB).</p> <p>On any other channels QEF reception shall be possible with “analogue” signals with up to 44 dB higher level than the DVB-T signal.</p> <p>The requirements in this paragraph refer to the modes {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/8</math>} and {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/4</math>} and {8K, 64-QAM, R=3/4, <math>\Delta/T_U=1/4</math>}.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the reception when there is an interference from analogue TV on adjacent and other channels.</p> <p><b>Equipment:</b></p> <p>For the test configuration see 2.3.6.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Set up the test instruments</li> <li>2. Use the following PAL signal: Colour bar 75%</li> <li>3. Insert 12 lines of Teletext.</li> <li>4. Modulate the FM sound carrier with 1kHz ton to deviation of 50 kHz.</li> <li>5. Verify that the signal levels of the DVB-T signal and the analogue signal are</li> </ol>

	<p>correct e.g. by using the spectrum analyser.</p> <ol style="list-style-type: none"> <li>6. Adjust the level of the FM carrier to -13 dB relative to the vision carrier</li> <li>7. Adjust the level from NICAM modulator to -20 dB relative to the vision carrier.</li> <li>8. Use the following DVB-T mode: {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/8</math>} and signal bandwidth 8MHz.</li> <li>9. Set the upconverter (wanted) for DVB-T carrier to 666.0MHz (K45)</li> <li>10. Set the upconverter (interference) for analog TV carrier to channel 46</li> <li>11. Set the receiver input level for the analog TV signal to -25 dBm using "ATT I"</li> <li>12. Decrease the DVB-T signal level using "ATT C" to a signal level when quality measurement procedure 2 "60s error free video" is fulfilled.</li> <li>13. Fill in the measured signal level difference between analogue TV and DVB-T signals in dB in the measurement record.</li> <li>14. Repeat the test for analog TV on frequency 658.0 MHz (K44).</li> <li>15. Repeat the test for analog TV on frequencies 650.0 MHz (K43), 682.0 MHz (K47) and 738.0 MHz (image channel K54 <sup>1)</sup>).</li> <li>16. Repeat the test for the DVB-T modes {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/4</math>} and {8K, 64-QAM, R=3/4, <math>\Delta/T_U=1/4</math>}</li> </ol> <p><sup>1)</sup> Example: if intermediate frequency IF is 36.15MHz, the image channel is calculated for channel 45 as <math>666\text{MHz} + 2 * 36.15\text{MHz} = 738.3\text{MHz}</math> which is close to channel 54.</p> <p><b>Expected result:</b></p> <p>The protection ratios shall be achieved for the received DVB-T signal at the requested quality level for all three modes on measured channels.</p>																														
<b>Test result(s)</b>	<p>Measurement record:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Frequency [MHz]</th> <th>650.0</th> <th>658.0</th> <th>674.0</th> <th>682.0</th> <th>738.0</th> </tr> </thead> <tbody> <tr> <td>DVB-T mode / channel id</td> <td>K43</td> <td>K44</td> <td>K46</td> <td>K47</td> <td>K54</td> </tr> <tr> <td>8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/8</math></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/4</math></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=3/4, <math>\Delta/T_U=1/4</math></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Frequency [MHz]	650.0	658.0	674.0	682.0	738.0	DVB-T mode / channel id	K43	K44	K46	K47	K54	8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$						8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$						8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$					
Frequency [MHz]	650.0	658.0	674.0	682.0	738.0																										
DVB-T mode / channel id	K43	K44	K46	K47	K54																										
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$																															
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$																															
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$																															
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																														
<b>Comments</b>	<p>If possible describe if fault 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>																														
<b>Date</b>	<b>Sign</b>																														

<b>Test Case</b>	<b>Task 3:24 Performance: Immunity to "digital" signals in Other Channels</b>
<b>Section</b>	NorDig Unified 3.4.8.6
<b>Requirement</b>	<p>The NorDig IRD shall, for the supported frequency ranges, permit an interfering DVB-T signal with a minimum interference to signal level ratio (I/C) as stated in table 3.6 (NorDig Unified v1.0.3) while maintaining QEF reception.</p> <p>The requirements in this paragraph refer to the modes {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/8</math>} and {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/4</math>} and {8K, 64-QAM, R=3/4, <math>\Delta/T_U=1/4</math>}</p>

**Purpose of test:**

To verify the QEF reception when there is interference from DVB-T signal on adjacent or other channels.

**Equipment:**

Verify that the digital TV signal on the adjacent or the other channels don't have too high shoulders, which could cause out-of-band emissions in the reception of the wanted digital TV signal.

**Test procedure:**

1. Set up the test instruments
2. Use the following DVB-T mode {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/8$ } and signal bandwidth 8MHz.
3. Set the channel A up-converter to 666.0MHz (K45).
4. Set the channel B up-converter to 674.0MHz (K46).
5. Set the receiver input level for the DVB-T signal in channel B to -30 dBm.
6. Decrease the DVB-T signal level in channel A to a signal level when the quality measurement procedure 2 "60s error free video" is still fulfilled.
7. Fill in the measured signal level difference between channel A and channel B signals in dB in measurement record.
8. Repeat the test when the channel B up-converter is set to frequencies 658.0 MHz (K44), 650.0 MHz (K43), 682.0 MHz (K47).
9. Repeat the test according to procedure above for the image channel<sup>1)</sup>. Set the receiver input level for the DVB-T signal in channel B to -30dBm.
10. Repeat the test for the DVB-T modes {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/4$ } and {8K, 64-QAM, R=3/4,  $\Delta/T_U=1/4$ } using signal bandwidth 8MHz,
11. Change the signal bandwidth to 7MHz.
12. Set the channel A up-converter to frequency 198.5 MHz (K8).
13. Set the channel B up-converter to frequency 205.5 MHz (K9).
14. Set the receiver input level of the DVB-T signal in channel B to -30dBm.
15. Decrease the DVB-T signal level in channel A to a signal level when the quality measurement procedure 2 is fulfilled.
16. Fill in the measured signal level difference between channel A and channel B signals in dB in measurement record.
17. Repeat the test when the channel B up-converter is set to frequencies 191.5 MHz (K7), 184.5 MHz (K6) and 212.5 MHz (K10).
18. Repeat the test for the DVB-T modes {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/4$ } and {8K, 64-QAM, R=3/4,  $\Delta/T_U=1/4$ } using signal bandwidth 7MHz,

<sup>1)</sup> Example: if intermediate frequency IF is 36.15MHz, the image channel is calculated for channel 45 as  $666\text{MHz} + 2 * 36.15\text{MHz} = 738.3\text{MHz}$  which is close to channel 54.

**Expected result:**

The protection ratios shall be fulfilled for received signal at the requested quality level for specified DVB-T modes, signal bandwidths and supported frequencies.



Measurement record:

7 MHz signal bandwidth				
Interferer centre frequency [MHz]	184.5	191.5	205.5	212.5
DVB-T mode / Channel id	K6	K7	K9	K10
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$				
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$				
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$				

Table 1. Mandatory VHF Band III frequencies and signal bandwidth to support

8 MHz signal bandwidth					
Interferer centre frequency [MHz]	650.0	658.0	674.0	682.0	738.0
DVB-T mode / Channel id	K43	K44	K46	K47	K54
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$					
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$					
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$					

Table 2. Mandatory UHF Band IV/V frequencies and signal bandwidth to support

7 MHz signal bandwidth				
Centre frequency [MHz]	128.5	135.5	149.5	156.5
DVB-T mode / Channel id	S4	S5	S7	S8
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$				
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$				
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$				

Table 3. Optional VHF S Band I frequencies and signal bandwidth to support

8 MHz signal bandwidth				
Centre frequency [MHz]	122.0	130.0	146.0	154.0
DVB-T mode / Channel id	D2	D3	D5	D6
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$				
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$				
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$				

Table 4. Optional VHF S Band I frequencies and signal bandwidth to support

8 MHz signal bandwidth				
Centre frequency [MHz]	186.0	194.0	210.0	218.0
DVB-T mode / Channel id	D10	D11	D13	D14
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$				
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$				
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$				

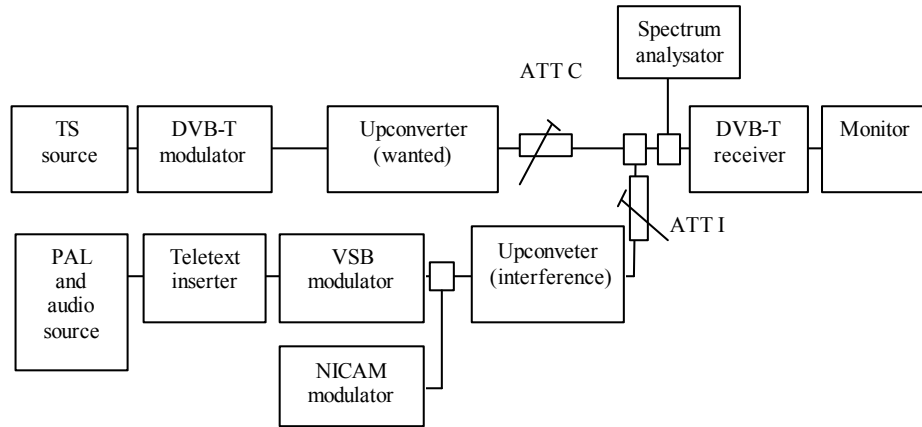
Table 5. Optional VHF Band III frequencies and signal bandwidth to support

7 MHz signal bandwidth				
Centre frequency [MHz]	247.5	254.5	268.5	275.5
DVB-T mode / Channel id	S13	S14	S16	S17
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$				
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$				
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$				

Table 6. Optional VHF S Band II frequencies and signal bandwidth to support

8 MHz signal bandwidth				
Centre frequency [MHz]	250.0	258.0	274.0	282.0
DVB-T mode / Channel id	D18	D19	D21	D22
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$				
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$				
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$				

	Table 7. Optional VHF S Band II frequencies and signal bandwidth to support				
		8 MHz signal bandwidth			
	Centre frequency [MHz]	370.0	378.0	394.0	402.0
	DVB-T mode / Channel id	S29	S30	S32	S33
	8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$				
8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$					
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$					
	Table 8. Optional UHF S Band III frequencies and signal bandwidth to support				
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments				
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information				
<b>Date</b>		<b>Sign</b>			

<b>Test Case</b>	<b>Task 3:25 Performance: Immunity to Co-Channel Interference From Analogue TV Signals</b>
<b>Section</b>	NorDig Unified 3.4.8.7
<b>Requirement</b>	The sensitivity for interference from analogue TV is specified as the minimum carrier to interference ratio, C/I, required for a QEF reception. The NorDig IRD shall perform better than specified in Table 3.4 when exposed to interference from a co-channel VSB/PAL signal including video with teletext, an FM sound and a NICAM sub carrier as specified above (see section 3.4.8.5), measured in the signal bandwidth of 7.61 MHz.
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>To verify the reception when there is a co-channel interference from analogue TV.</p> <p><b>Equipment:</b></p>  <p>For the test configuration see 2.3.6. Frequency offset between DVB-T carrier and analog TV carrier is 0Hz. DVB-T source and analog TV source must be connected to same reference signal (10MHz).</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Set up the test instruments.</li> <li>2. Set the up-converter for DVB-T to frequency 666.0MHz (K45).</li> </ol>

	<ol style="list-style-type: none"> <li>3. Set the up-converter for analog TV corresponding video carrier frequency 663.25MHz (K45).</li> <li>4. Use the following PAL signal: Colour bar 75%.</li> <li>5. Insert 12 lines of Teletext.</li> <li>6. Modulate the FM sound carrier with 1kHz tone to deviation of 50 kHz.</li> <li>7. Adjust the level of the FM carrier to -13 dB relative to the vision carrier.</li> <li>8. Adjust the level from NICAM modulator to -20 dB relative to the vision carrier.</li> <li>9. Use the following mode for DVB-T modulator: {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/8</math>} and signal bandwidth of 8MHz.</li> <li>10. Calibrate the C/I level using the two attenuators "ATT C" and "ATT P".</li> <li>11. Measure the levels of the DVB-T signal and the analogue signal (i.e. with the spectrum analyzer or suitable power meter).</li> <li>12. Set the receiver input level to -60 dBm for the DVB-T signal.</li> <li>13. Increase the C/I from low value to higher value until the quality measurement procedure 2 "60s error free video" is fulfilled.</li> <li>14. Fill in the C/I in measurement record.</li> <li>15. Repeat the test for the mode: {8K, 64-QAM, R=3/4, <math>\Delta/T_U=1/4</math>}.</li> </ol> <p><b>Expected result:</b></p> <p>The received signal shall be QEF for mode {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/8</math>} at a C/I of 3 dB or less. For the mode {8K, 64-QAM, R=3/4, <math>\Delta/T_U=1/4</math>} the C/I shall be 7dB or less.</p>						
<b>Test result(s)</b>	<p>Measurement record for C/I:</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%;">Mode</th> <th style="width: 50%;">C/I [dB] for QEF reception</th> </tr> </thead> <tbody> <tr> <td>8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/8</math></td> <td></td> </tr> <tr> <td>8K, 64-QAM, R=3/4, <math>\Delta/T_U=1/4</math></td> <td></td> </tr> </tbody> </table>	Mode	C/I [dB] for QEF reception	8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$		8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$	
Mode	C/I [dB] for QEF reception						
8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$							
8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$							
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments						
<b>Comments</b>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b></p> <p>Describe more specific faults and/or other information</p>						
<b>Date</b>	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%; text-align: center;"><i>Sign</i></td> </tr> </table>		<i>Sign</i>				
	<i>Sign</i>						

<b>Test Case</b>	<b>Task 3:26 Performance: Performance in Time-Varying Channels</b>
<b>Section</b>	NorDig Unified 3.4.8.8
<b>Requirement</b>	<p>The NorDig IRD shall be able to operate with all signal time variations that naturally exist in connection with fixed roof-top reception (e.g. mast sway, antenna sway) and in-house portable reception (e.g. people walking around the receiving antenna). None of the above mentioned performance parameters should be significantly negatively affected when such channel time variations exist.</p> <p>The increase in required C/N for QEF reception shall be less than 3 dB for a 0 dB echo with frequency separation equal to 20 Hz and a delay of 20 <math>\mu</math>s, corresponding to a Doppler shift of +/- 10 Hz (after AFC), compared to a 0 dB echo with frequency separation equal to 1 Hz and a delay of 20 <math>\mu</math>s, corresponding to a Doppler shift of +/- 0.5 Hz (after AFC). The requirements in this paragraph refer to the modes {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/8</math>} and {8K, 64-QAM, R=2/3, <math>\Delta/T_U=1/4</math>}.</p> <p>The increase in required C/N for QEF reception shall be less than 3 dB for a 0 dB echo with frequency separation equal to 10 Hz and a delay of 20 <math>\mu</math>s, corresponding to a Doppler shift of +/- 5 Hz (after AFC), compared to a 0 dB echo with frequency separation equal to 1 Hz and a delay of 20 <math>\mu</math>s, corresponding to a Doppler shift of +/- 0.5 Hz (after AFC). The requirement in this paragraph refer to the mode {8K, 64-QAM,</p>



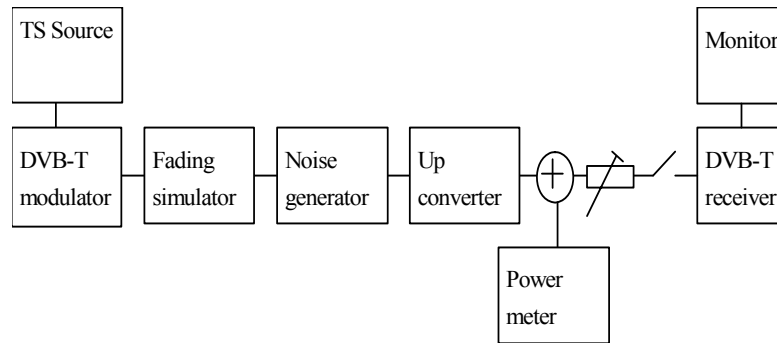


**NorDig**

<b>Test result(s)</b>	Measurement record:			
	Mode	0dB echo delay [ $\mu$ s]	Frequency separation [Hz]	C/N [dB]
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$ }	20 $\mu$ s	0Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$ }	20 $\mu$ s	1Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$ }	20 $\mu$ s	5Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$ }	20 $\mu$ s	10Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$ }	20 $\mu$ s	15Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$ }	20 $\mu$ s	20Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$ }	20 $\mu$ s	0Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$ }	20 $\mu$ s	1Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$ }	20 $\mu$ s	5Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$ }	20 $\mu$ s	10Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$ }	20 $\mu$ s	15Hz	
	{8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$ }	20 $\mu$ s	20Hz	
	{8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$ }	20 $\mu$ s	0Hz	
	{8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$ }	20 $\mu$ s	1Hz	
	{8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$ }	20 $\mu$ s	5Hz	
	{8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$ }	20 $\mu$ s	10Hz	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments			
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information			
<b>Date</b>		<b>Sign</b>		

<b>Test Case</b>	<b>Task 3:27 Performance: Synchronisation for varying echo power levels in SFN</b>
<b>Section</b>	NorDig Unified 3.4.8.9
<b>Requirement</b>	For the modes {8K, 64-QAM, R=2/3, $\Delta/T_U=1/8$ }, {8K, 64-QAM, R=2/3, $\Delta/T_U=1/4$ } and {8K, 64-QAM, R=3/4, $\Delta/T_U=1/4$ }, the required C/N value for subjective error free reception shall be obtained when the channel contains two paths with relative delay from 1.95 $\mu$ s up to 0.95 times guard interval length and the relative power levels of the two paths are dynamically varying including 0dB echo level crossing. The C/N value is defined at 0 dB level crossing.
<b>Test procedure</b>	<b>Purpose of test:</b> To verify the SFN synchronisation when the amplitude of the echo compared to the amplitude of the direct signal varies in a function of time.

**Equipment:**



The 0 degree channel centre shall be used in fading simulator (see 2.3.5).

**Test procedure for variations of the echo attenuation in a function of time:**

Check the different SFN synchronisation issues from 2.3.4 Receiver operability in SFN.

1. Set up the test instruments.
2. Use the following mode {8K, 64-QAM, R=3/4,  $\Delta/T_U=1/4$ }.
3. Open the switch.
4. Configure the first path signal (direct) with following parameters: 0dB attenuation and 0 $\mu$ s delay.
5. Configure the second path signal (1<sup>st</sup> echo) with following parameters: 0dB attenuation and first delay value from the measurement record. .
6. Set the receiver input level to -50 dBm.
7. Configure the third path signal (2nd echo) with following parameters: 1dB attenuation and delay same as for the second path and 0.1Hz frequency separation.
8. Close the switch.
9. Increase the C/N from low value to higher value until the quality measurement procedure 2 “60s error free video” is fulfilled.
10. Fill in the measured required C/N value in dB in the measurement record.
11. Repeat the test for the rest of the echo delay values in the measurement record following the procedure above. Between change of the echo delay, RF input signal to the receiver shall be disconnect.
12. Repeat the test for the DVB-T modes {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/8$ } and {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/4$ }.

**Expected result:**

The IRD shall maintain the SFN synchronisation when the amplitude of the echo signal varies in a function of time. The required C/N shall not exceed the specified value in table 3.8 (NorDig Unified v1.0.3).

**Test result(s)**

Measurement record:

F = 666.0 MHz (K45) and signal bandwidth 8 MHz.							
Mode	10 $\mu$ s	56 $\mu$ s	105 $\mu$ s	112.1 $\mu$ s	130 $\mu$ s	170 $\mu$ s	212 $\mu$ s
8k 64QAM R2/3 G1/8							
8k 64QAM R3/4 G1/4							
8k 64QAM R2/3 G1/4							

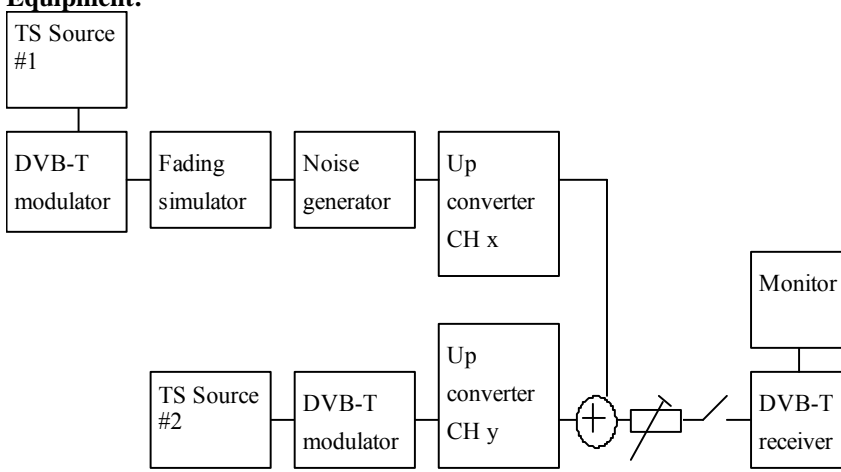
**Conformity**

**OK**  **Fault**  Major  Minor, define fail reason in comments

**Comments**

If possible describe if fault can be fixed with software update:  **YES**  **NO**  
Describe more specific faults and/or other information

<i>Date</i>		<i>Sign</i>	

<b>Test Case</b>	<b>Task 3:28 Performance: C/(N+I) Performance in Single Frequency Networks for more than one echo</b>
<b>Section</b>	NorDig Unified 3.4.8.10
<b>Requirement</b>	<p>If there exists one or more FFT window positions for the time synchronisation that will give an aggregate available C/(N+I) larger than or equal to the required EPT (Effective Protection Target), the NorDig IRD shall be able to find one of these positions, independently of echo profile. The NorDig IRD shall also be able to correctly equalise the signal for echoes up to <math>7T_U/24</math> (260 <math>\mu</math>s) (Interval of correct equalisation), independently of the echo profile.</p> <p><sup>1)</sup> EPT = Effective Protection Target</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>To verify the SFN synchronization of the receiver when two echo signals are present.</p> <p><b>Equipment:</b></p>  <p>The 0 degree at channel centre shall be used in fading simulator (see 2.3.5).</p> <p><b>Test procedure:</b></p> <p>Check the different SFN synchronisation issues from 2.3.4 Receiver operability in SFN.</p> <ol style="list-style-type: none"> <li>1. Set up the test instruments.</li> <li>2. Use the following DVB-T mode {8K, 64-QAM, R=3/4, <math>\Delta/T_U=1/4</math>} and signal bandwidth 8MHz.</li> <li>3. Open the switch.</li> <li>4. Configure one path of the channel simulator to have a 0dB attenuation, 0<math>\mu</math>s delay and 0 degree phase.</li> <li>5. Configure the second path of the channel simulator to have relative delay difference -100.1<math>\mu</math>s and attenuation 21dB (pre echo) and 0 degree phase.</li> <li>6. Configure the third path of the channel simulator to have relative delay</li> </ol>

- difference +100.0 $\mu$ s and attenuation 15 dB (post echo) and 0 degree phase.
7. Set the receiver input level to -50 dBm.
  8. Close the switch.
  9. Increase the required C/N value from low value to higher value until the quality measurement procedure 2 is fulfilled.
  10. Fill in the required C/N value in dB in the measurement record.
  11. Measure the rest of the required C/N values starting at the bottom of the table and upward.
  12. Fill in the results in the measurement record. During the change of the delay and the attenuation, the input RF signal to receiver shall be disconnected.
  13. Repeat the test for the DVB-T mode {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/8$ }.
  14. Repeat the test for the DVB-T mode {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/4$ }.

**Expected result:**

The IRD shall synchronize in all combinations defined in measurement record and the required C/N value shall not exceed the required C/N defined for profile 2: 0dB echo in table 3.3 (NorDig Unified).

*Test result(s)*

Measurement record:

8k 64QAM R=3/4 $\Delta/T_U=1/4$ , 8MHz						
Main path		Pre echo		Post echo		C/N [dB]
Att [dB]	Delay [us]	Att [dB]	Delay [us]	Att [dB]	Delay [us]	
0	0	0	-100.1	0	100	
0	0	3	-100.1	3	100	
0	0	6	-100.1	6	100	
0	0	9	-100.1	9	100	
0	0	12	-100.1	12	100	
0	0	15	-100.1	15	100	
0	0	18	-100.1	18	100	
0	0	21	-100.1	21	100	
0	0	15	-100.1	0	100	
0	0	15	-100.1	3	100	
0	0	15	-100.1	6	100	
0	0	15	-100.1	9	100	
0	0	15	-100.1	12	100	
0	0	15	-100.1	18	100	
0	0	15	-100.1	21	100	
0	0	0	-100.1	15	100	
0	0	3	-100.1	15	100	
0	0	6	-100.1	15	100	
0	0	9	-100.1	15	100	
0	0	12	-100.1	15	100	
0	0	18	-100.1	15	100	
0	0	21	-100.1	15	100	

8k 64QAM R=2/3 $\Delta/T_U=1/8$ , 8MHz						
Main path		Pre echo		Post echo		C/N [dB]
Att [dB]	Delay [us]	Att [dB]	Delay [us]	Att [dB]	Delay [us]	
0	0	0	-50.1	0	50	
0	0	3	-50.1	3	50	
0	0	6	-50.1	6	50	

0	0	9	-50.1	9	50	
0	0	12	-50.1	12	50	
0	0	15	-50.1	15	50	
0	0	18	-50.1	18	50	
0	0	21	-50.1	21	50	
0	0	15	-50.1	0	50	
0	0	15	-50.1	3	50	
0	0	15	-50.1	6	50	
0	0	15	-50.1	9	50	
0	0	15	-50.1	12	50	
0	0	15	-50.1	18	50	
0	0	15	-50.1	21	50	
0	0	0	-50.1	15	50	
0	0	3	-50.1	15	50	
0	0	6	-50.1	15	50	
0	0	9	-50.1	15	50	
0	0	12	-50.1	15	50	
0	0	15	-50.1	15	50	
0	0	18	-50.1	15	50	
0	0	21	-50.1	15	50	

8k 64QAM R=2/3 ΔT <sub>1</sub> =1/4, 8MHz						
Main path		Pre echo		Post echo		C/N [dB]
Att [dB]	Delay [us]	Att [dB]	Delay [us]	Att [dB]	Delay [us]	
0	0	0	-100.1	0	100	
0	0	3	-100.1	3	100	
0	0	6	-100.1	6	100	
0	0	9	-100.1	9	100	
0	0	12	-100.1	12	100	
0	0	15	-100.1	15	100	
0	0	18	-100.1	18	100	
0	0	21	-100.1	21	100	
0	0	15	-100.1	0	100	
0	0	15	-100.1	3	100	
0	0	15	-100.1	6	100	
0	0	15	-100.1	9	100	
0	0	15	-100.1	12	100	
0	0	15	-100.1	18	100	
0	0	15	-100.1	21	100	
0	0	0	-100.1	15	100	
0	0	3	-100.1	15	100	
0	0	6	-100.1	15	100	
0	0	9	-100.1	15	100	
0	0	12	-100.1	15	100	
0	0	18	-100.1	15	100	
0	0	21	-100.1	15	100	

Conformity  OK  Fault  Major  Minor, define fail reason in comments



<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>	<b>Sign</b>		

<b>Test Case</b>	<b>Task 3:29 Performance: C/(N+I) Performance in Single Frequency Networks inside the guard interval</b>		
<b>Section</b>	NorDig Unified 3.4.8.10		
<b>Requirement</b>	<p>For the modes {8K, 64-QAM, R=2/3, <math>\Delta/T_u=1/8</math>}, {8K, 64-QAM, R=2/3, <math>\Delta/T_u=1/4</math>} and {8K, 64-QAM, R=3/4, <math>\Delta/T_u=1/4</math>}, the required C/N value for profile 2 (specified in Table 3.2) for QEF reception shall be obtained when the channel contains two static paths with relative delay from 1.95 <math>\mu</math>s up to 0.95 times guard interval length, independently of the relative amplitudes and phases of the two paths.</p> <p>For a specific echo attenuation the required C/N shall have approximately the same value, independent of the actual delay length. The deviation in required C/N from the median value shall be less than 1 dB, for any echo length from 1.95 <math>\mu</math>s up to 0.95 times guard interval length.</p>		
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the required C/N for echoes in SFN inside the guard interval.</p> <p><b>Equipment:</b></p> <p>The 0 degree channel center shall be used in fading simulator (see 2.3.5).</p> <p><b>Test procedure for required C/N in SFN for echoes inside guard interval:</b></p> <p>Check the different SFN synchronisation issues from 2.3.4 Receiver operability in SFN.</p> <ol style="list-style-type: none"> <li>1. Set up the test instruments.</li> <li>2. Use the following DVB-T mode {8K, 64-QAM, R=3/4, <math>\Delta/T_u=1/4</math>} and signal bandwidth 8MHz.</li> <li>3. Set the up-converter to center frequency 666MHz (K45).</li> <li>4. Open the switch.</li> <li>5. Set the receiver input level to -50 dBm for the wanted signal.</li> <li>6. Set the channel simulator relative delay difference to 1.95 <math>\mu</math>s for the echo signal.</li> <li>7. Set the channel simulator relative attenuation level to 0 dB for the echo signal.</li> <li>8. Close the switch.</li> </ol>		













1. Set up the test instruments.
2. Use the following mode {8K, 64-QAM, R=3/4,  $\Delta/T_U=1/4$ } and signal bandwidth 8MHz.
3. Open the switch.
4. Set the receiver input level to -50 dBm for the wanted signal.
5. Set the channel simulator relative delay difference to 230us for the echo signal.
6. Close the switch.
7. Increase the echo attenuation from low value to higher value until quality measurement procedure 2 “60 seconds error free video” is fulfilled.
8. Fill in echo attenuation result in dB in the measurement record.
9. Repeat the test the rest of the combinations of the relative delays and attenuation levels defined in measurement record.. Open the switch before changing the delay and attenuation level.
10. Repeat the test for the DVB-T modes {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/8$ } and {8K, 64-QAM, R=2/3,  $\Delta/T_U=1/4$ }.
11. Set the up-converter to center frequency 198.5MHz (K8).
12. Follow the test procedure and repeat the test for the 7 MHz signal bandwidth and DVB-T modes defined in the measurement record according to procedure above.

**Expected result:**

All the echo attenuation values shall be equal or lower compared to NorDig Unified values in tables 3.9 and 3.10 (NorDig Unified v1.0.3).

**Test result(s)**

Measurement record:

7 MHz signal bandwidth							
DVB-T mode	Echo delay [ $\mu$ s]						
	-298	-266	-256	-215	-165	-135	-128
8k 64QAM R2/3 G1/8							
8k 64QAM R2/3 G1/4							
8k 64QAM R3/4 G1/4							
Echo delay [ $\mu$ s]							
	298	266	256	215	165	135	128
8k 64QAM R2/3 G1/8							
8k 64QAM R2/3 G1/4							
8k 64QAM R3/4 G1/4							

8 MHz signal bandwidth					
DVB-T mode	Echo delay [ $\mu$ s]				
	-260	-230	-200	-150	-120
8k 64QAM R2/3 G1/8					
8k 64QAM R2/3 G1/4					
8k 64QAM R3/4 G1/4					
Echo delay [ $\mu$ s]					
	260	230	200	150	120
8k 64QAM R2/3 G1/8					
8k 64QAM R2/3 G1/4					
8k 64QAM R3/4 G1/4					

**Conformity**

OK Fault  Major  Minor, define fail reason in comments

**Comments**

If possible describe if fault can be fixed with software update:  YES  NO  
Describe more specific faults and/or other information

**Date**

**Sign**



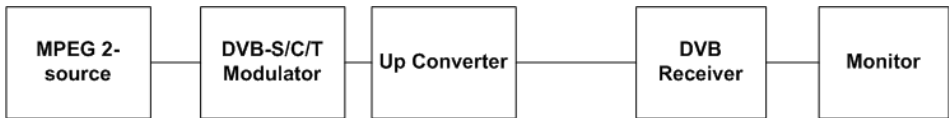
## **2.4 Task 4: IP-Based Front-end**

- Not yet available-

## 2.5 Task 5: MPEG2 demultiplexer and Video/Audio decoder

<b>Test Case</b>	<b>Task 5:1 SI utilization</b>		
<b>Section</b>	NorDig Unified 4.1		
<b>Requirement</b>			
<b>Test procedure</b>	Utilization of MPEG-2 Service Information shall be tested under Task 9.		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 5:2 CA descriptor interpretation</b>		
<b>Section</b>	NorDig Unified 4.1		
<b>Requirement</b>	The NorDig IRD shall interpret the CA descriptor as defined in ETR 289		
<b>Test procedure</b>	<b>This test is covered with tests Task 9:41 and Task 13:</b>		

<b>Test Case</b>	<b>Task 5:3 Maximum transport stream data rate</b>		
<b>Section</b>	NorDig Unified 4.1 and 3		
<b>Requirement</b>	The NorDig IRD <b>shall</b> be able to decode an ISO/IEC 13818-1 stream with data rates up to that include all rates that the front-end may deliver as defined in NorDig Unified chapter 3. Note: The satellite front-end may deliver up to 80.4 Mbps after error correction		
<b>Test procedure</b>	<p><b>Purpose of test:</b> Purpose of the test is to verify that IRD supports maximum transport stream data rate.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]           </pre> <p><b>Terrestrial front-end (DVB-T) only:</b> Test multiplex with the maximum bitrate of 31.67 Mbit/s and carrying one or more services with video/audio content and teletext components.</p> <p><b>Satellite front-ends only:</b> Test multiplex with the maximum bitrate of 72 Mbit/s and carrying one or more services with video/audio content and teletext components.</p> <p><b>Cable front-ends only:</b> Test multiplex with the maximum bitrate of 58 Mbit/s and carrying one or more services with video/audio content and teletext components.</p> <p><b>IP-front-end only:</b></p>		

	<b>TBD</b>	
	<b>Test procedure:</b> Tune to a service within the multiplex.	
	<b>Expected result:</b> Verify that all components can be decoded and viewed.	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<i>Date</i>		<i>Sign</i>

<i>Test Case</i>	<b>Task 5:4 RS 232 or USB data</b>	
<i>Section</i>	NorDig Unified 4.1	
<i>Requirement</i>	It should be possible to select one or many section-based data streams and output them as data on RS232 or USB.	
<i>Test procedure</i>	<p><b>Purpose of test:</b> To verify if the IRD has implemented support of outputting data on the RSR232/USB port.</p> <p><b>Test procedure:</b> The RS232 or USB data output can only be tested if an application for selection of data is available in the embedded software or as a download application for the specific API of the IRD. If this is the case, the IRD should be tuned to an error free Transport Stream which includes a data stream targeted for the RS232/USB port. The output stream is measured with an RS232/USB bit error rate tester.</p> <p><b>Expected result:</b> The RS232/USB transmission are able to output quasi error-free data on the RS232/USB port.</p>	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<i>Date</i>		<i>Sign</i>

<i>Test Case</i>	<b>Task 5:5 Number of elementary streams</b>	
<i>Section</i>	NorDig Unified 4.1	
<i>Requirement</i>	The NorDig IRD shall be capable to utilise at least 32 elementary streams simultaneously, which requires 32 PID filters.	
<i>Test procedure</i>	<p><b>Purpose of test:</b> To verify IRD's capability to utilize at least 32 elementary streams simultaneously.</p> <p><b>Equipment:</b> The manufacturer describes his specific set-up for the test</p>	



	<p><b>Test procedure:</b>          Due to the complexity to test the ability to handle 32 elementary streams simultaneously, this test should not be performed. Instead the supplier shall ensure that this requirement is met. If no such statement of conformance is issued, a test containing the maximum number of components used in the broadcast network should be performed. Today this comprises audio, video, teletext and DVB subtitling. In the future up to three PID's for data applications and one for multi-cannel audio could be included.</p> <p>Note: The number simultaneously elementary streams used in the test shall be stated in the comments below.</p>	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<i>Date</i>		<i>Sign</i>

<i>Test Case</i>	<b>Task 5:6 Section filtering</b>	
<i>Section</i>	NorDig Unified 4.1	
<i>Requirement</i>	The NorDig IRD shall provide at least 32 section filters.	
<i>Test procedure</i>	<p><b>Purpose of test:</b>          To verify IRD's capability to utilize at least 32 sections.</p> <p><b>Equipment:</b>          The manufacturer describes his specific set-up for the test</p> <p><b>Test procedure:</b>           The stream_type 0x05 corresponds private sections. One section is 4096 bytes. Therefore, the requirement is up 32 * 4096 bytes.</p> <p>All PSI/SI data transmitted in sections. Therefore, the requirement of amount PSI/SI sections to handle is 32 * 4096 bytes.</p> <p><b>Expected result:</b>          The supplier shall ensure that this requirement is met.</p>	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<i>Date</i>		<i>Sign</i>

<i>Test Case</i>	<b>Task 5:7 Still picture support</b>	
<i>Section</i>	NorDig Unified 4.1 and 5.1.2.7	



<p><b>NorDig</b> <i>Requirement</i></p>	<p>The NorDig IRD (1) shall support the decoding and displaying of still pictures (frame). A still picture is a video sequence containing exactly one intra-coded picture. Such a video bit stream will cause the buffer to under flow. In this situation, while the decoding process shall continue to examine the buffer, the display process associated with the decoder shall repeat the previously decoded picture until the normal operation of the buffer can resume.</p> <p>The NorDig IRD shall use the video stream descriptor to recognise still picture data</p> <p>Note 1:Recommended for NorDig Basic.</p> <p>If still pictures are transmitted this shall be indicated by setting the “still_picture_flag” in the video_stream_descriptor in the PMT to “1”. The video_stream_descriptor is mandatory in the PMT whenever still pictures are transmitted.</p>																								
<p><i>Test procedure</i></p>	<p><b>Purpose of test:</b> To test the functionality of the receiver when the video includes still pictures.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     A[MPEG-2 encoder with still picture source] --&gt; B[MUX]     B --&gt; C[Exciter]     C --&gt; D[DVB Receiver]             </pre> </div> <table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>MUX</td> <td>SID 1100</td> <td>SID 1200</td> <td rowspan="5">Can be chosen depending of the distribution media.</td> </tr> <tr> <td>TS_id 1</td> <td>S_name Test11</td> <td>S_name Test12</td> </tr> <tr> <td>Network_id 1</td> <td>PMT PID 1100</td> <td>PMT PID 1200</td> </tr> <tr> <td>ON_id<sup>1)</sup></td> <td>V PID 1109</td> <td>V PID 1209</td> </tr> <tr> <td></td> <td>A PID 1108</td> <td>A PID 1208</td> </tr> <tr> <td></td> <td>Logical_chan_desc 1 visible</td> <td>Logical_chan_desc 2 visible</td> <td></td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p>Configure still video to the output of MPEG-2 coder. Configure still_picture_flag to “1” in video_stream_descriptor in service1 in its PMT.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Turn on receiver.</li> <li>2. Do re-initialization or make sure there are no services in channel list or in ESG.</li> <li>3. Do channel search.</li> <li>4. Check that the still picture service is working.</li> </ol> <p><b>Expected result:</b> Still picture functionality is working.</p>		Service1	Service2	Frequency	MUX	SID 1100	SID 1200	Can be chosen depending of the distribution media.	TS_id 1	S_name Test11	S_name Test12	Network_id 1	PMT PID 1100	PMT PID 1200	ON_id <sup>1)</sup>	V PID 1109	V PID 1209		A PID 1108	A PID 1208		Logical_chan_desc 1 visible	Logical_chan_desc 2 visible	
	Service1	Service2	Frequency																						
MUX	SID 1100	SID 1200	Can be chosen depending of the distribution media.																						
TS_id 1	S_name Test11	S_name Test12																							
Network_id 1	PMT PID 1100	PMT PID 1200																							
ON_id <sup>1)</sup>	V PID 1109	V PID 1209																							
	A PID 1108	A PID 1208																							
	Logical_chan_desc 1 visible	Logical_chan_desc 2 visible																							
<p><i>Test result(s)</i></p>																									
<p><i>Conformity</i></p>	<p><input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments</p>																								
<p><i>Comments</i></p>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information</p>																								
<p><i>Date</i></p>	<p style="text-align: right;"><i>Sign</i></p>																								



NorDig

<b>Test Case</b>	<b>Task 5:8 Variable Bitrate Elementary Streams</b>	
<b>Section</b>	NorDig Unified 4.1	
<b>Requirement</b>	The NorDig IRD shall support variable bitrate elementary streams within a constant bitrate transport stream (excluding audio).	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD can decode a variable bitrate video stream (statistical multiplexing).</p> <p><b>Test Equipment:</b> Test signals are created using the test bed shown below:</p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]             </pre> </div> <p><b>Test signal configuration:</b></p> <p>The bitrate variation range in test streams shall be e.g.:</p> <ul style="list-style-type: none"> <li>- 6 – 11 Mbit/s</li> <li>- 2 – 6 Mbit/s</li> <li>- 2 – 6 Mbit/s</li> <li>- 3 – 11 Mbit/s</li> </ul> <p><b>Test procedure:</b> The IRD is tuned to a Transport Stream that contains variable bitrate Elementary Streams (statistical multiplexing of video). No noise added IRD input level: -60 dBm RGB pictures displayed on a monitor is observed.</p> <p><b>Expected result:</b> The IRD is capable of displaying an error-free picture during 5 minutes. The audio and video shall be muted during acquisition.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

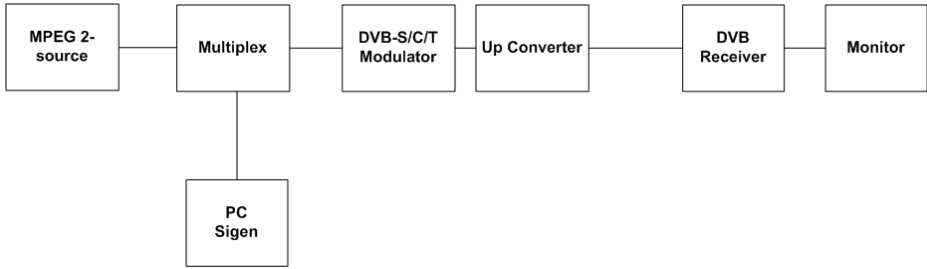
<b>Test Case</b>	<b>Task 5:9 Mixture of SD and HD services</b>
<b>Section</b>	NorDig Unified 4.1
<b>Requirement</b>	The NorDig HDTV IRD shall support a mixture of service types within the same ISO/IEC 13818-1[42] MPEG-2 transport stream (i.e. MPEG-2 SDTV service, MPEG-4 AVC SDTV and HDTV and Radio services may be multiplexed into the same transport stream).



Test procedure	<p><b>Purpose of test:</b> To verify the receiver is able to decode mixture of SD and HD services.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --- B[DVB-S/C/T Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor]             </pre> </div> <p>Transport stream(s) containing:</p> <ul style="list-style-type: none"> <li>• Digital tv service (0x01) with MPEG-2 720x576i 25Hz video component (SD service)</li> <li>• Advanced codec SD digital tv service (0x16) with MPEG-4 AVC 720x576i 25Hz video component (SD service)</li> <li>• Advanced codec HD digital tv Service (0x19) with MPEG-4 AVC 1280x720p 50Hz video component (HD service)</li> <li>• Digital radio sound service (0x02) with MPEG-1 Layer II audio component</li> <li>• Advanced codec digital radio sound service (0x0A) with MPEG-4 HE.AAC Level 4 audio component.</li> <li>• Advanced codec digital radio sound service (0x0A) with E-AC3 audio component.</li> </ul> <p><b>Test procedure:</b> Tune to the services and verify that the service is decoded correctly.</p> <p><b>Expected result:</b> SDTV receiver doesn't react anyway to HD services. HDTV Level IRD is able to decode both HD and SD services.</p>
Test result(s)	
Conformity	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
Comments	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
Date	<i>Sign</i>

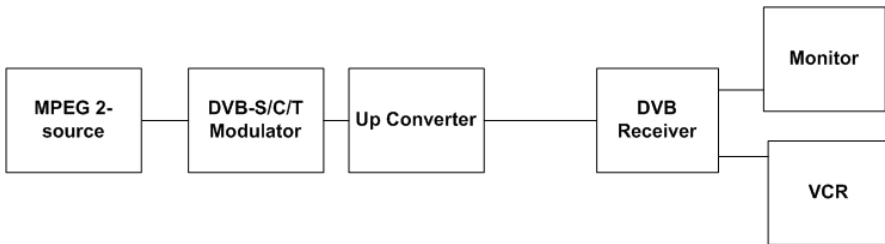
<b>Test Case</b>	<b>Task 5:10 Descrambler Performance</b>
<b>Section</b>	NorDig Unified 4.2
<b>Requirement</b>	The descrambler unit is based on the common scrambling algorithm as specified by DVB, see DVB A 011. See also NorDig Unified section 15.3.2 (ECM and EMM Filtering). It shall be able to descramble on transport level and on PES format. The NorDig IRD shall be able to process in parallel up to at least 6 different streams (either PES or transport level) with different access conditions. Data streams without access control shall be bypassed by the descrambling unit.
<b>Test procedure</b>	<b>This test is tested in Task 13:</b>

<b>Test Case</b>	<b>Task 5:11 System clock recovery</b>
<b>Section</b>	NorDig Unified 4.3
<b>Requirement</b>	During the system time clock (STC) acquisition audio and video shall be muted. (The transition shall be smooth and seamless when the customer changes the channel). The

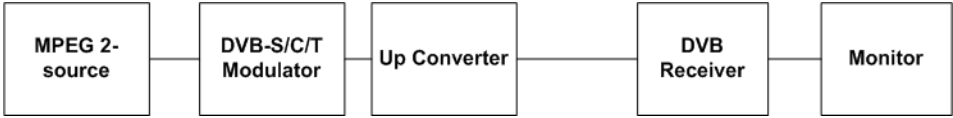
	<p>decoder shall be able to:</p> <ul style="list-style-type: none"> <li>•recover the STC using PCR with maximum jitter of +/- 10 <math>\mu</math>s.</li> <li>•track long-term variations in the frequency of the encoder's STC.</li> </ul> <p>For each service, the demultiplexer shall recover the source clock by extracting the associated PCR values received within the incoming multiplex and insert them into the appropriate Phase Locked Loop.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD is able to recover system clock with PCR jitter amplitudes of +/- 10 <math>\mu</math>s.</p> <p><b>Test Equipment:</b> Test signals are created using the test bed shown below:</p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[Multiplex]     B --&gt; C[DVB-S/C/T Modulator]     C --&gt; D[Up Converter]     D --&gt; E[DVB Receiver]     E --&gt; F[Monitor]     G[PC Sigen] --- B   </pre> <p><b>Test signal configuration:</b> IRD input level: -60 dBm Transport stream: Jitter with random amplitudes in the range +/- 10 <math>\mu</math>s is added to the PCR fields for two of the video services</p> <p><b>Test procedure:</b> The IRD is tuned to a Transport Stream which includes programmes with PCR jitter of +/-10 <math>\mu</math>s. The PAL picture signal is observed on a monitor.</p> <p><b>Expected result:</b> The IRD is capable of displaying an error-free picture during 5 minutes. The audio and video shall be muted during acquisition.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:12 Low MPEG-2 video bit rates</b>
<b>Section</b>	NorDig Unified 5.1.1
<b>Requirement</b>	The video decoder shall (1) be able to decode at bit rates down to 1.0 Mbps for video resolutions up to full resolution video (720x576).
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the receiver is able to decode MPEG-2 video at bit rate of 1Mbit/s for video content at resolution 720x576.</p> <p><b>Equipment:</b> Transport stream containing a service with MPEG-2 video at a bit rate of 1.0Mbit/s and resolution 720x576.</p>

	<b>Test procedure:</b> Tune to the service and verify that the video content is decoded correctly.  <b>Expected result:</b> Receiver is able to decode MPEG-2 video specified in requirement.	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

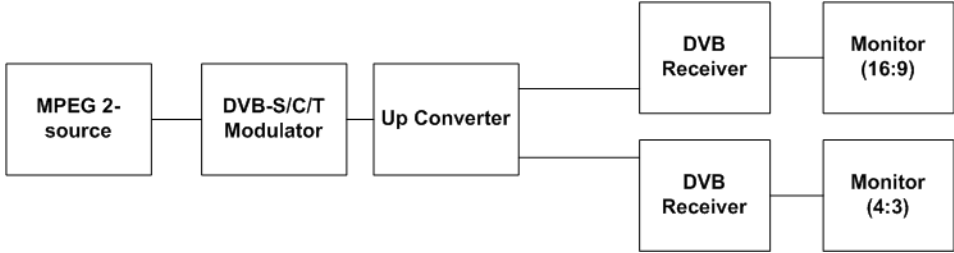
<b>Test Case</b>	<b>Task 5:13 16:9 displayed on 4:3 monitors</b>	
<b>Section</b>	NorDig Unified 5.1.2.2	
<b>Requirement</b>	<p>The viewer shall be able to choose at least one of the following storable display mode preferences:</p> <ol style="list-style-type: none"> <li>display picture part by use of transmitted pan vectors or if the pan-vectors are not present display with letterbox conversion (default mode in decoder settings when this mode is present).</li> <li>display 16:9 material as 16:9 letterbox regardless of pan-vectors.</li> </ol> <p>The viewer should be able display 16:9 material as 14:9 letterbox regardless of pan-vectors.</p>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD can output suitable picture signals for the 4:3 screen.</p> <p><b>Test Equipment:</b> Test signals are created using the test bed shown below:</p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]     D --&gt; F[VCR]           </pre> <p>The multiplex should contain a number of services with 4:3 picture aspect ratio, and one service with 16:9 aspect ratio. All services in the multiplex are descrambled before recording.</p> <p><b>Test procedure:</b></p> <p>This test is not relevant for idTV receivers in case when the video is decoded to the integrated screen.. However, if the video is available in the extern video connector, like RCA, the video aspect ratio shall be formatted from 16:9 to 4:3 if asked by the user due to the e.g . video recorders which supports 4:3 aspect ratio commonly. In case of when extern video is available in SCART connector, the aspect ratio is signaled in this connector, see test Task 8:4.</p> <p>In case of PC based receiver the aspect ratio conversion may be relevant depending of the monitor. However, the video aspect ratio conversion shall be able to be performed to the extern video output connector if asked by the user.</p> <p>The IRD is tuned to a transport stream which contains a 16:9 aspect ratio video service.</p>	

	<p>It is verified that the receiver can deliver at least one suitable display signal for the 4:3 screen. Suitable signals include the following formats: - letterbox picture format</p> <p><b>Expected result:</b> Verify that the behaviour described in the requirement is obtained.</p>
<i>Test result(s)</i>	
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<i>Comments</i>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information</p>
<i>Date</i>	<i>Sign</i>

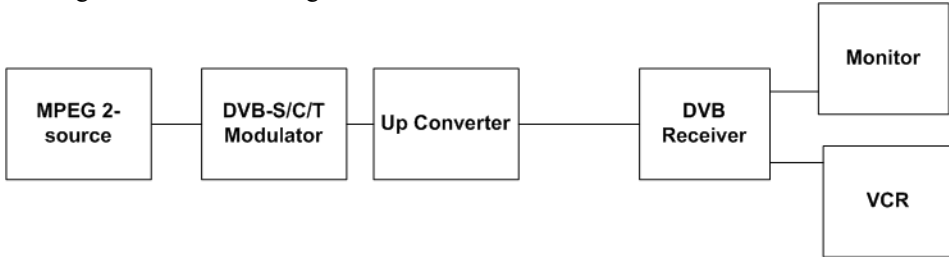
<i>Test Case</i>	<b>Task 5:14 Displaying 4:3 Material on 16:9 Monitors</b>
<i>Section</i>	NorDig Unified 5.1.2.2
<i>Requirement</i>	The NorDig IRD shall signal 4:3 material as specified in NorDig Unified section 9.6 for SCART signalling and equivalent for iDTV.
<i>Test procedure</i>	<p><b>Purpose of test:</b> To verify that the IRD can output suitable picture signals for the 16:9 screen.</p> <p><b>Equipment:</b> Test signals are created using the test bed shown below:</p> <div style="text-align: center;">  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]             </pre> </div> <p><b>Test procedure:</b> This test can be done in parallel with Task 8:4.</p> <p>In case of IDTV it is recommended that the user is able to select if the 4:3 aspect ratio video is converted to 16:9 or not.</p> <p>The IRD is tuned to a transport stream which contains a 4:3 aspect ratio video service. It is verified that the receiver can deliver at least one suitable display signal for the 16:9 screen.</p> <p><b>Expected result:</b> Verify that the behaviour described in the requirement is obtained.</p>
<i>Test result(s)</i>	
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<i>Comments</i>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information</p>
<i>Date</i>	<i>Sign</i>



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<b>Test Case</b>	<b>Task 5:15 16:9-Letterbox Conversion</b>	
<b>Section</b>	NorDig Unified 5.1.2.3	
<b>Requirement</b>	16:9 letterbox conversion (i.e. 16:9 broadcast, which the IRD converts into 16:9 letterbox inside a 4:3 frame raster edge) shall be implemented for the display of video using the 16:9 aspect ratio on 4:3 monitors. This conversion shall be implemented by vertical filtering. Signal degradation due to the filtering should be subjectively imperceptible. Line 23 and line 623 should be masked before the letterbox conversion to avoid the irritating half lines.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify letterbox conversion on 4:3 monitor, Signal degradation due to the filtering is subjectively imperceptible. Line 23 and line 623 should be masked before the letterbox conversion to avoid the irritating half lines.</p> <p><b>Equipment:</b> Test signals are created using the test bed shown below:</p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     C --&gt; E[DVB Receiver]     D --&gt; F[Monitor 16:9]     E --&gt; G[Monitor 4:3]     </pre> <p><b>Test procedure:</b> Using two receivers one displaying the 16:9 image and the other one the 4:3 letterbox version.</p> <p><b>Expected result:</b> Do a subjective judgement of the picture quality to verify that the signal degradation is subjectively imperceptible.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 5:16 Down-conversion</b>	
<b>Section</b>	NorDig Unified 5.1.2.5	
<b>Requirement</b>	Down-conversion from any valid full input resolution (720x576, 544x576, 480x576, 352x576 or 352x288 pixels) to 1/4 respective 1/16 of displayed screen size (360x288 and 180x144) shall(1) be implemented. It shall be possible to locate the down-converted video anywhere on the screen.  Note 1:Not relevant for NorDig Basic. Note 2:The control of down-conversion (size and position) is handled by DVB-MHP APIs, see NorDig Unified chapter 11.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify down-conversion from any valid full input resolution (720x576, 544x576, 480x576, 352x576 or 352x288 pixels) to 1/4 respective 1/16 of displayed screen size.</p> <p><b>Equipment:</b></p>	

	<p>Test signals are created using the test bed shown below:</p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]     D --&gt; F[VCR]           </pre> <p><b>Test procedure:</b> The IRD is tuned to a transport stream which contains video services with valid full input resolution (720x576, 544x576, 480x576, 352x576 or 352x288 pixels) and output resolution is down-converted to 1/4 respective 1/16 of displayed screen size (360x288 and 180x144).</p> <p>The down-converted video can be located anywhere on the screen.</p> <p><b>Expected result:</b> Verify that the behaviour described in the requirement is obtained.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:17 Up-conversion from lower resolutions</b>
<b>Section</b>	NorDig Unified 5.1.2.6
<b>Requirement</b>	The video decoder shall provide Capability of an up-conversion from decoded signals with 544x576, 480x576, 352x576 or 352x288 pixels to a full screen signal.
<b>Test procedure</b>	<p><b>Purpose of test:</b> This test verifies a subset of the requirement in NorDig Unified 5.2.</p> <p><b>Equipment:</b> Generate a test multiplex using a MPEG-2 encoder capable of encoding the formats: 544x576, 480x576, 352x576 or 352x288 pixels. Formats can be changed in one service one by one.</p> <p><b>Test procedure:</b> Tune to the four different video streams one by one.</p> <p><b>Expected result:</b> Verify that the video is decoded and up-converted to a full screen signal.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

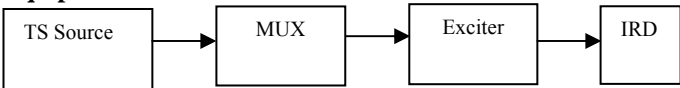


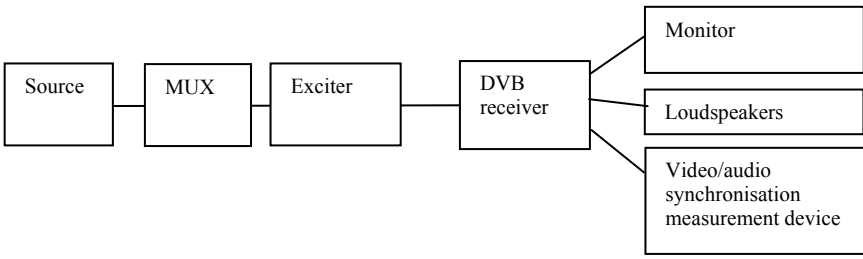
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<b>Test Case</b>	<b>Task 5:18 No up-conversion from 704x576 to 720x576</b>	
<b>Section</b>	NorDig Unified 5.1.2.6	
<b>Requirement</b>	There shall be no conversion between 704x576 and 720x576.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that there is no up-conversion between 704x576 and 720x576.</p> <p><b>Equipment:</b> Test signals are created using the test bed shown below:</p> <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]     D --&gt; F[VCR]     </pre> <p><b>Test procedure:</b> Use a video encoder to generate 704x756 video and verify with a professional monitor that no up conversion is performed on this material. Provide also 720x576 video in the same multiplex as reference material.</p> <p><b>Expected result:</b> There is no up-conversion between 704x576 and 720x576.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

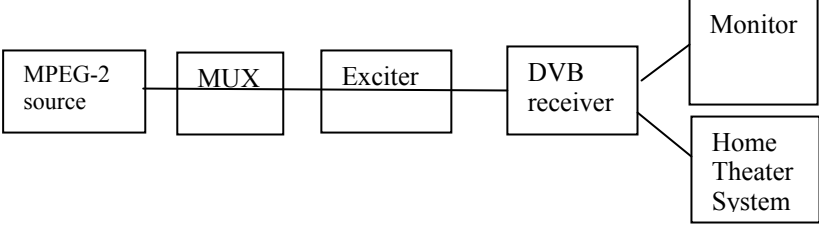
<b>Test Case</b>	<b>Task 5:19 MPEG-2 Audio Decoder</b>	
<b>Section</b>	NorDig Unified 6.1	
<b>Requirement</b>	The NorDig IRD shall provide at least one stereo audio decoder that is able to meet the minimum decoding requirements based on MPEG 1 level II ("Musicam" ISO/IEC 11172-3) [69]. The Audio decoders shall fully comply with the DVB Implementation Guidelines for the use of MPEG-2 Systems, Video and Audio in Terrestrial, Satellite and Cable Broadcasting Applications ETSI TS 101 154.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check that the IRD is capable of decoding MPEG-1 Layer II audio.</p> <p><b>Test Equipment:</b></p> <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]     </pre> <p>Transport stream containing:</p> <ul style="list-style-type: none"> <li>Service with MPEG-1 Layer II audio component with following parameters:             <ul style="list-style-type: none"> <li>audio_mode = '0' (stereo), data rate = 192 kbit/s, sampling frequency: 32, 44.1 and 48 kHz</li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>o audio_mode = '3' (single channel), data rate: 96 kbit/s, sampling frequency: 48 kHz</li> </ul> <p><b>Test procedure:</b> The IRD is tuned to a service containing all the combinations of the MPEG-1 Layer II audio parameters above.</p> <p><b>Expected result:</b> IRD supports MPEG-1 Layer II audio decoding.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

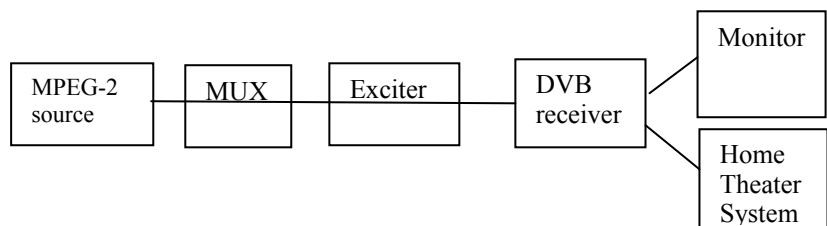
<b>Test Case</b>	<b>Task 5:20 Dual channel audio support</b>
<b>Section</b>	NorDig Unified 6.1.1
<b>Requirement</b>	If "Dual Channel" is used two Language Descriptors are signalled in PSI: the first are referring to the left channel the second to the right channel.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD interpretes language descriptors signaled in PSI mapped to physical audio channels.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]   </pre> <p>The TS shall contain a service which has an audio component (one PID, dual mono) with</p> <ul style="list-style-type: none"> <li>• Two component_descriptors signaled in EIT</li> <li>• One ISO_639_language_descriptor with two loops signaled in PMT</li> </ul> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Setup system according to signaling above</li> <li>2. Verify the IRD can display correct language information for the left and right channels</li> <li>3. Verify the first language_descriptor definition corresponds physical left channel and second language_descriptor definition corresponds physical right channel.</li> </ol> <p><b>Expected result:</b> IRD dedicates language_descriptors to left and right channels correctly.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:21 Audio video synchronization</b>
<b>Section</b>	NorDig Unified 6.1.2.1
<b>Requirement</b>	<p>The NorDig IRDs shall not introduce more than <math>\pm 5</math> ms of relative delay between the audio and video components on the primary output and not more than <math>\pm 25</math> ms on an up or down converted secondary output.</p> <p>If the NorDig IRD as a part of an integrated digital TV set (IDTV) has an analogue stereo audio output on a cinch connector the audio shall be in sync with the video display.</p> <p>Where audio leaves the IRD in an encoded form (such as in IEC61937 [33] outputs), the IRD should compensate for the decoding latency of a reference decoder for the system under test (e.g HE AAC, AC3 or E-AC3), such that the output of the reference decoder would be within <math>\pm 5</math> ms with respect to the decoded video</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the relative time delay difference between video and audio satisfies the specification.</p> <p><b>Equipment:</b></p>  <pre> graph LR     Source[Source] --- MUX[MUX]     MUX --- Exciter[Exciter]     Exciter --- DVB[DVB receiver]     DVB --- Monitor[Monitor]     DVB --- Loudspeakers[Loudspeakers]     DVB --- Measurement[Video/audio synchronisation measurement device]   </pre> <p>Transport stream containing:</p> <ul style="list-style-type: none"> <li>• a ‘Bounce’ video signal (fully black and white pictures).</li> <li>• The audio (sound bursts) is synchronized with the video.</li> </ul> <p><b>Test procedure:</b></p> <p>For any IRD:</p> <ol style="list-style-type: none"> <li>1. Connect monitor and loudspeakers to IRD primary output</li> <li>2. Subjectively verify the video content is in synchronization with the audio content.</li> <li>3. If any doubt is arisen for the synchronisation accuracy, measure the synchronization with the dedicated measurement equipment.</li> <li>4. Repeat the test with the secondary output</li> </ol> <p>If the IRD is iDTV:</p> <ol style="list-style-type: none"> <li>1. Connect loudspeakers to analog audio output.</li> <li>2. Subjectively verify the video content in the integrated display is in synchronization with the audio content.</li> </ol> <p><b>Expected result:</b> The measured relative delay between video and audio is less than <math>\pm 5</math> ms on primary display and less <math>\pm 25</math> ms on secondary display.</p> <p>If the IRD is an iDTV, verify the audio content in the analog audio output is in sync with video content in the integrated display.</p>

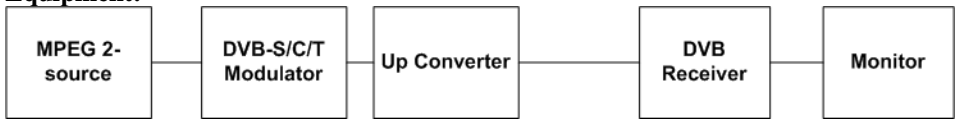
	Video audio synchronization for digital audio throughput is not tested.	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 5:23 SDTV - Multichannel audio</b>
<b>Section</b>	NorDig Unified 6.1.2.3
<b>Requirement</b>	The NorDig IRD should be able to output an audio stream as non-PCM encoded audio to the digital audio interface (see section 9.7) according to IEC 61937 [43] if there is a AC3 (AC-3), DTS or HE AACMPEG2 BC (ISO/IEC 13818-3 [43]) stream present for the chosen service in the incoming transport stream.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the support for the multichannel audio AC-3.</p> <p>This test is relevant only for receivers supporting AC-3.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG-2 source] --- B[MUX]     B --- C[Exciter]     C --- D[DVB receiver]     D --- E[Monitor]     D --- F[Home Theater System]   </pre> <p>Transport stream containing at least one service with MPEG-2 Layer II and AC3 (AC-3) audio components.</p> <p><b>Test procedure:</b></p> <p>This test can be done parallel with Task 5:24</p> <ol style="list-style-type: none"> <li>1. Verify a service with both MPEG-2 Layer II and AC-3 audio components is broadcasted.</li> <li>2. In receiver menu, select MPEG-2 Layer II audio. (Sometimes called PCM).</li> <li>3. If the receiver supports a digital audio output, the audio from the MPEG-2 Layer II components should be available in that output.</li> <li>4. In receiver menu, select AC-3 audio.</li> <li>5. If the receiver supports a digital audio output, the audio from the AC-3 components should be available in that output.</li> <li>6. Drop the AC-3 audio component PID, i.e. remove it from the service.</li> <li>7. Verify if the receiver continues decoding of the MPEG-2 Layer II audio.</li> <li>8. Add the AC-3 audio component PID within the service.</li> <li>9. Verify if the receiver change the audio decoding to AC-3 component.</li> <li>10. In receiver menu, select the MPEG-2 Layer II audio.</li> <li>11. Drop the MPEG-2 Layer II audio component , i.e. remove it from the service.</li> <li>12. Verify if the receiver continues decoding of the AC-3 audio.</li> </ol>

	<p>13. Add the AC-3 audio component PID within the service.          14. Verify if the receiver continues decoding of the AC-3 audio.          15. Verify if the receiver supports stereo downmix from the AC-3 component in analog audio output.</p> <p><b>Expected result:</b>          The receiver is able to output audio format selected by the user.          The audio format shall changed from the AC-3 to MPEG-2 Layer II in case of the AC-3 audio is not broadcasted but the audio AC-3 is selected in receiver preferences.</p> <p>If the audio format is some other format than AC-3 (e.g. HE AAC and E-AC3) the receiver shall handle it gracefully and shall select MPEG-2 Layer II audio.</p>										
<b>Test result(s)</b>	<table border="1"> <thead> <tr> <th>Requirement</th> <th>NOK or OK</th> </tr> </thead> <tbody> <tr> <td>Receiver supports AC-3 multichannel audio</td> <td></td> </tr> <tr> <td>Receiver is able to switch the decoding of the audio from AC-3 to MPEG-2 Layer II audio in case of AC-3 audio component is missing and user has selected AC-3 audio to be available in digital audio output.</td> <td></td> </tr> <tr> <td>Receiver is able to switch the decoding of the audio from MPEG-2 Layer II to AC-3 audio in case of MPEG-2 Layer II audio component is missing and user has selected MPEG-2 Layer II audio to be available in digital audio output.</td> <td></td> </tr> <tr> <td>Receiver supports AC-3 multichannel audio stereo downmix in analog audio output</td> <td></td> </tr> </tbody> </table>	Requirement	NOK or OK	Receiver supports AC-3 multichannel audio		Receiver is able to switch the decoding of the audio from AC-3 to MPEG-2 Layer II audio in case of AC-3 audio component is missing and user has selected AC-3 audio to be available in digital audio output.		Receiver is able to switch the decoding of the audio from MPEG-2 Layer II to AC-3 audio in case of MPEG-2 Layer II audio component is missing and user has selected MPEG-2 Layer II audio to be available in digital audio output.		Receiver supports AC-3 multichannel audio stereo downmix in analog audio output	
Requirement	NOK or OK										
Receiver supports AC-3 multichannel audio											
Receiver is able to switch the decoding of the audio from AC-3 to MPEG-2 Layer II audio in case of AC-3 audio component is missing and user has selected AC-3 audio to be available in digital audio output.											
Receiver is able to switch the decoding of the audio from MPEG-2 Layer II to AC-3 audio in case of MPEG-2 Layer II audio component is missing and user has selected MPEG-2 Layer II audio to be available in digital audio output.											
Receiver supports AC-3 multichannel audio stereo downmix in analog audio output											
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments										
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information										
<b>Date</b>	<b>Sign</b>										

<b>Test Case</b>	<b>Task 5:24 Digital audio output for digital input signals</b>
<b>Section</b>	NorDig Unified 6.1.2.4
<b>Requirement</b>	The NorDig IRD should be able to output an audio stream as non-PCM encoded audio to the digital audio interface (see section 9.7) according to IEC 61937 if there is a AC3, DTS or HE AAC stream present for the chosen service in the incoming transport stream.
<b>Test procedure</b>	<p><b>Purpose of test:</b>          To verify the audio format in the digital audio output.</p> <ul style="list-style-type: none"> <li>Throughput of digital multichannel audio data to digital audio interface</li> </ul> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG-2 source] --&gt; B[MUX]     B --&gt; C[Exciter]     C --&gt; D[DVB receiver]     D --&gt; E[Monitor]     D --&gt; F[Home Theater System]           </pre>

	<p>Transport stream containing at least one service with MPEG-2 Layer II and AC3 (AC-3) audio components.</p> <p><b>Test procedure:</b></p> <p>This test can be done parallel with Task 5:23</p> <ol style="list-style-type: none"> <li>1. Verify a service with both MPEG-2 Layer II and AC-3 audio components is broadcasted.</li> <li>2. In receiver menu, select MPEG-2 Layer II audio. (Sometimes called PCM).</li> <li>3. If the receiver supports a digital audio output, the audio from the MPEG-2 Layer II components should be available in that output.</li> <li>4. In receiver menu, select AC-3 audio.</li> <li>5. If the receiver supports a digital audio output, the audio from the AC-3 components should be available in that output.</li> </ol> <p>Support for advanced codecs (HE AAC and AC3+) are tested in test cases: <b>Task 5:39 - Task 5:47.</b></p> <p><b>Expected result:</b> The selected audio format is outputted in the digital audio output.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

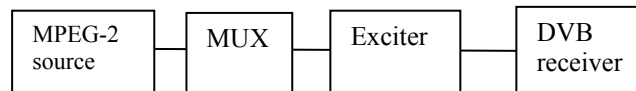
<b>Test Case</b>	<b>Task 5:25 Audio language support</b>
<b>Section</b>	NorDig Unified 6.1.3
<b>Requirement</b>	<p>The NorDig IRD shall be able to read and use the ISO 639 language descriptors associated with the audio-streams in the ISO/IEC 13818-1 [37] MPEG2 transport stream.</p> <p>The user shall be able to select storable preferences for primary and secondary audio language. If an audio-stream according to the primary audio language preference is not associated with the chosen service the NorDig IRD shall automatically chose the audio stream according to the secondary audio language preference, if present. In addition the user shall be able to manually select between all audio-streams that are associated with the active service.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the support for primary and secondary audio language.</p> <p><b>Equipment:</b></p> <div style="text-align: center;">  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]             </pre> </div> <p>Transport stream containing at least one service with two audio languages.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Verify a service with two different audio components is broadcasted dedicated for test of Nordic languages</li> <li>2. Verify the audio components are signaled as according to languages used in Nordic countries, i.e. Swedish, Finnish, Norwegian, Danish, Icelandic, Sami.</li> </ol>

	<ol style="list-style-type: none"> <li>3. Verify it is possible to select and setup primary and secondary audio language in the receiver setup.</li> <li>4. Verify the receiver selects the correct audio for primary language.</li> <li>5. Drop the audio component selected as primary audio language in receiver.</li> <li>6. Verify the receiver selects correct audio component, i.e. secondary audio language.</li> </ol> <p><b>Expected result:</b> It shall be possible to select primary and secondary language. If the selected primary language is not broadcasted, the selected secondary audio language shall be selected automatically.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:26 Dynamic changes in audio components</b>
<b>Section</b>	NorDig Unified 6.1.3
<b>Requirement</b>	<p>The NorDig IRD shall be able to handle dynamic changes of audio component(s) (PID/PIDs) in a service. The IRD shall automatically identify if an audio component is added or removed between two programme events in the same service). The NorDig IRD should have minimum disturbance for such changes of audio format</p> <p>The NorDig IRD shall be able to handle dynamic changes without user interaction and start decoding within one second after reception of a change (like PMT update, elementary stream header signalling);</p> <ul style="list-style-type: none"> <li>- change of audio PID value (typical examples are during regional news insertions) (case SVT regional news insertion)</li> <li>- change from dual channel audio (with different language) into stereo or mono channel audio (case Finland, with two official languages)</li> <li>- change from stereo or mono channel audio into dual channel audio (with different languages and the IRD's user preferences) (case Finland)</li> <li>- removal of one audio component/PID, the NorDig IRD shall use next preferred audio component/PID (for example; a service broadcasts two or more audio components/PIDs and then removes one of them, like removal of AC3 during regional news broadcast). (case SVT regional news insertion)</li> <li>- addition of one audio component with higher preferred user settings (for example; a service adds an audio component/PID, like add AC3 audio component, after a regional news broadcast). (case SVT regional news insertion)</li> </ul> <p>The NorDig IRD shall handle the dynamic changes after change of selected service ("zapping") (i.e. shall not require to re-install services) and should be able to handle the following dynamic changes without user interaction and start decoding within one second after reception of change;</p> <ul style="list-style-type: none"> <li>- change of number of audio codec, (for example change from MPEG1 Level II into HE AAC, AC3 or E-AC3)</li> <li>- change of ISO 639 language for an audio component .</li> </ul>
<b>Test procedure</b>	<b>Purpose of test:</b> To verify the IRD is able to handle dynamic changes of audio components in transmission.

- change of audio PID value is tested in test case: **Task 9:44**
- change from dual channel audio into stereo or mono channel audio
- change from stereo or mono channel audio into dual channel audio
- removal of one audio component/PID, the NorDig IRD shall use next preferred audio component/PID is tested in test case: **Task 9:45**
- addition of one audio component with higher preferred user settings

**Equipment:**



MPEG-2 source must have capability to change format of the MPEG-1 Layer II audio component according to below:

- dual channel audio into stereo channel audio
- dual channel audio into mono channel audio

MPEG-2 source must have capability to simultaneously with MPEG-1 Layer II audio component broadcast:

- MPEG-4 HE AAC
- AC3
- E-AC3

**Test procedure:**

First part of this test is to change the MPEG-1 Layer II formats.

1. Tune to service with MPEG-1 Layer II audio component
2. Change the format of the MPEG-1 Layer II audio from dual channel into stereo channel audio and verify that it works correctly
3. Change the format of the MPEG-1 Layer II audio from dual channel into mono channel audio and verify that it works correctly

The second part of this test is to verify that receiver selects higher preferred user setting.

1. Tune to service with MPEG-1 Layer II audio component
2. Verify that in user settings AC3 is selected
3. Add AC3 audio component and verify receiver selects that audio
4. Remove AC3 audio component and verify receiver selects MPEG-1 Layer II audio component
5. Verify that in user settings MPEG-4 HE AAC is selected
6. Add the audio component to MPEG-4 HE AAC and verify receiver selects that audio
7. Remove MPEG-4 HE AAC audio component and verify receiver selects MPEG-1 Layer II audio component
8. Verify user that in user settings E-AC3 is selected
9. Add E-AC3 audio component and verify receiver selects that audio
10. Remove E-AC3 audio component and verify receiver selects MPEG-1 Layer II audio component

**Expected result:**

IRD is able to dynamically adapt and decode different MPEG-1 Layer II audio formats.

IRD is able to dynamically change the decoded audio component according to user settings if user setting is “higher” than MPEG-1 Layer II audio format.



<b>Test result(s)</b>		<b>NOK or OK</b>
	Dynamic change MPEG-1 Layer II dual channel audio to stereo channel audio	
	Dynamic change MPEG-1 Layer II dual channel audio to mono channel audio	
	Dynamic selection of AC3 works if accepted in user settings	
	Dynamic selection of E-AC3 works if accepted in user settings	
	Dynamic selection of MPEG-4 HE AAC works if accepted in user settings	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<b>Date</b>		

Sign

<b>Test Case</b>	<b>Task 5:27 Audio descriptors</b>	
<b>Section</b>	NorDig Unified 6.1.3	
<b>Requirement</b>	The NorDig IRD shall be able to read the audio information contained in the DVB_SI stream_content and component_type of the component descriptor as defined in EN 300 468 [5], see chapter 12. The NorDig IRD should be able to present the audio information, including the descriptors for audio description for the visually impaired and audio for the hard of hearing, contained in the component descriptor to the user for information and selection purposes.	
<b>Test procedure</b>	The IRD manufacturer shall describe the used test procedure and the used test setup.	
<b>Test result(s)</b>	The IRD manufacturer shall describe the used test procedure and the used test setup.	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 5:28 HDTV – General</b>	
<b>Section</b>	NorDig Unified 5.2.1	
<b>Requirement</b>	<p>The NorDig HDTV IRD video decoder shall, in addition to the MPEG-2 MP@ML video decoding, comply with AVC HDTV and SDTV video decoding – i.e. HP@L4.</p> <p>The following clauses of ETSI TS 101 154 [23] specification are relevant to this specification:</p> <ul style="list-style-type: none"> <li>• video sub clause 5.5; Specifications Common to all H.264/AVC IRDs and Bitstreams</li> <li>• sub clause 5.6; H.264/AVC SDTV IRDs and Bitstreams</li> <li>• sub clause 5.7; H.264/AVC HDTV IRDs and Bitstreams</li> </ul>	



**NorDig**

<b>Test procedure</b>	This is a general requirement. It will be verified in the following tests		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 5:29 HDTV - Video Decoder – Resolutions and Frame rates</b>																																																																														
<b>Section</b>	NorDig Unified 5.2.2.2																																																																														
<b>Requirement</b>	The Video Decoder shall (1) be able to receive and decode the video formats specified in Table 5.1 in Nordig Unified 1.0.4.																																																																														
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that all video luminance resolutions and frame rates in table below are displayed correctly.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     Source[Source] --- MUX[MUX]     MUX --- Exciter[Exciter]     Exciter --- DVB[DVB receiver]     DVB --- Monitor[Monitor]             </pre> </div> <p>Source must have TS containing all the video formats listed in test results.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Play streams that contain all video formats in table below</li> <li>2. Tune to services</li> <li>3. Verify that the services are displayed correctly</li> <li>4. Fill in test results</li> </ol> <p><b>Expected result:</b> Verify that the video is decoded and displayed correctly.</p>																																																																														
<b>Test result(s)</b>	<table border="1"> <thead> <tr> <th>Video Luminance Resolutions Horizontal x Vertical,</th> <th>Frame rate [Hz]</th> <th>Frame Aspect Ratio (Horizontal : Vertical)</th> <th>Bit Stream (Profile@ Level)</th> <th>OK/NOK</th> </tr> </thead> <tbody> <tr><td>720x576i</td><td>25</td><td>4:3</td><td>MPEG-2 MP@ML</td><td></td></tr> <tr><td>720x576i</td><td>25</td><td>16:9</td><td>MPEG-2 MP@ML</td><td></td></tr> <tr><td>720x576i</td><td>25</td><td>4:3</td><td>AVC HP@L3</td><td></td></tr> <tr><td>720x576i</td><td>25</td><td>16:9</td><td>AVC HP@L3</td><td></td></tr> <tr><td>720x576p</td><td>25</td><td>16:9</td><td>AVC HP@L3</td><td></td></tr> <tr><td>720x576p</td><td>50</td><td>16:9</td><td>AVC HP@L3.1</td><td></td></tr> <tr><td>1280x720p</td><td>50</td><td>16:9</td><td>AVC HP@L4</td><td></td></tr> <tr><td>1280x720p</td><td>59.94 (60/1.001)</td><td>16:9</td><td>AVC HP@L4</td><td></td></tr> <tr><td>1280x720p</td><td>25</td><td>16:9</td><td>AVC HP@L4</td><td></td></tr> <tr><td>1280x720p</td><td>23.98 (24/1.001)</td><td>16:9</td><td>AVC HP@L4</td><td></td></tr> <tr><td>1920x1080i</td><td>25</td><td>16:9</td><td>AVC HP@L4</td><td></td></tr> <tr><td>1920x1080i</td><td>29.97 (30/1.001)</td><td>16:9</td><td>AVC HP@L4</td><td></td></tr> <tr><td>1920x1080p</td><td>23.98 (24/1.001)</td><td>16:9</td><td>AVC HP@L4</td><td></td></tr> <tr><td>1920x1080p</td><td>25</td><td>16:9</td><td>AVC HP@L4</td><td></td></tr> </tbody> </table>				Video Luminance Resolutions Horizontal x Vertical,	Frame rate [Hz]	Frame Aspect Ratio (Horizontal : Vertical)	Bit Stream (Profile@ Level)	OK/NOK	720x576i	25	4:3	MPEG-2 MP@ML		720x576i	25	16:9	MPEG-2 MP@ML		720x576i	25	4:3	AVC HP@L3		720x576i	25	16:9	AVC HP@L3		720x576p	25	16:9	AVC HP@L3		720x576p	50	16:9	AVC HP@L3.1		1280x720p	50	16:9	AVC HP@L4		1280x720p	59.94 (60/1.001)	16:9	AVC HP@L4		1280x720p	25	16:9	AVC HP@L4		1280x720p	23.98 (24/1.001)	16:9	AVC HP@L4		1920x1080i	25	16:9	AVC HP@L4		1920x1080i	29.97 (30/1.001)	16:9	AVC HP@L4		1920x1080p	23.98 (24/1.001)	16:9	AVC HP@L4		1920x1080p	25	16:9	AVC HP@L4	
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<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 5:30 HDTV - Upconversion</b>
<b>Section</b>	NorDig Unified 5.2.2.3
<b>Requirement</b>	The NorDig IRD shall support luminance resolutions including all sub-sampled luminance resolutions as specified in ETSI TS 101 154 [55], section 5.6.2.3 for SDTV resolutions and section 5.7.1.5 for HDTV resolutions. Up-sampling of sub-sampled resolutions shall also be made in accordance with ETSI TS 101 154 [55], i.e. sub-sampled luminance resolutions shall be up-converted by the Decoder Format Converter into the full video raster of the Decoder Composition Output, see Reference Model Figure 5.1
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>To verify that the HDTV Level IRD is supporting all sub-sampled luminance resolution.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     Source[Source] --- MUX[MUX]     MUX --- Exciter[Exciter]     Exciter --- DVB[DVB receiver]     DVB --- Monitor[Monitor]             </pre> </div> <p>Source must have TS containing MPEG-4 AVC 25Hz video resolutions listed in test results.</p> <p>Note 1: ETSI TS 101 154 section 5.6.2.3 SDTV resolutions for 4:3 and 16:9 display are 720x576, 544x576, 480x576, 352x576 and 352x288</p> <p>Note 2: ETSI TS 101 154 section 5.7.1.5 HDTV resolutions for 16:9 display are 1920x1080, 1440x1080, 1280x1080, 960x1080, 1280x720, 960x720 and 640x720.</p> <p>Note 3: All required sub-sampled resolutions are not tested.</p> <p><b>Test Procedure:</b></p> <ol style="list-style-type: none"> <li>1. Play streams that contain all video formats in table in test results</li> <li>2. Tune to services</li> <li>3. Verify that STB selects automatically the native resolution of the monitor device (or screen, if the IRD is an iDTV).</li> <li>4. Verify that the up-sampling is done in the specified manner.</li> <li>5. Fill in test results</li> </ol> <p><b>Expected result:</b></p> <p>The IRD selects automatically right resolution and performs up-sampling correctly.</p>



**NorDig**

<b>Test result(s)</b>	<table border="1"> <thead> <tr> <th>Video Luminance Resolutions Horizontal x Vertical</th> <th>Frame rate [Hz]</th> <th>Frame Aspect Ratio (Horizontal : Vertical)</th> <th>Bit Stream (Profile@ Level)</th> <th>OK/NOK</th> </tr> </thead> <tbody> <tr> <td>544x576i</td> <td>25</td> <td>4:3</td> <td>AVC HP@L3</td> <td></td> </tr> <tr> <td>544x576i</td> <td>25</td> <td>16:9</td> <td>AVC HP@L3</td> <td></td> </tr> <tr> <td>640x720p</td> <td>50</td> <td>16:9</td> <td>AVC HP@L4</td> <td></td> </tr> <tr> <td>960x720p</td> <td>50</td> <td>16:9</td> <td>AVC HP@L4</td> <td></td> </tr> <tr> <td>1440x1080i</td> <td>25</td> <td>16:9</td> <td>AVC HP@L4</td> <td></td> </tr> </tbody> </table>	Video Luminance Resolutions Horizontal x Vertical	Frame rate [Hz]	Frame Aspect Ratio (Horizontal : Vertical)	Bit Stream (Profile@ Level)	OK/NOK	544x576i	25	4:3	AVC HP@L3		544x576i	25	16:9	AVC HP@L3		640x720p	50	16:9	AVC HP@L4		960x720p	50	16:9	AVC HP@L4		1440x1080i	25	16:9	AVC HP@L4	
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<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																														
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information																														
<b>Date</b>		<b>Sign</b>																													

<b>Test Case</b>	<b>Task 5:32 HDTV - Dynamic changes in video stream</b>
<b>Section</b>	NorDig Unified 5.2.2.5
<b>Requirement</b>	The NorDig HDTV IRD shall be able to handle dynamic changes in transmission between different video modes (like from 720p to 1080i/1080p) or different frame rates within one seconds after receiving Random Access Point.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver is able to handle dynamic changes in transmission between different video modes.</p> <p><b>Equipment:</b></p> <pre> graph LR     Source[Source] --- MUX[MUX]     MUX --- Exciter[Exciter]     Exciter --- DVB[DVB receiver]     DVB --- Monitor[Monitor]           </pre> <p>Transport stream containing services with following video content and transitions between them:</p> <ul style="list-style-type: none"> <li>• MPEG-4 AVC HP@L3 576i 25Hz</li> <li>• MPEG-4 AVC HP@L4 720p 50Hz</li> <li>• MPEG-4 AVC HP@L4 1080i 25Hz</li> <li>• MPEG-2 MP@ML 576i 25Hz</li> </ul> <p><b>Test procedure:</b> Tune to the service and verify that changes between modes is happening correctly. Fill in result to test results table below.</p> <p><b>Expected result:</b> The IRD is able to handle mode changes.</p>



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<b>Test result(s)</b>	<b>From</b>	<b>To</b>	<b>OK/NOK</b>
	MPEG-4 AVC HP@L3 576i 25Hz	MPEG-4 AVC HP@L4 720p 50Hz	
	MPEG-4 AVC HP@L4 720p 50Hz	MPEG-4 AVC HP@L3 576i 25Hz	
	MPEG-4 AVC HP@L4 720p 50Hz	MPEG-4 AVC HP@L4 1080i 25Hz	
	MPEG-4 AVC HP@L4 1080i 25Hz	MPEG-4 AVC HP@L4 720p 50Hz	
	MPEG-4 AVC HP@L4 1080i 25Hz	MPEG-4 AVC HP@L3 576i 25Hz	
	MPEG-4 AVC HP@L3 576i 25Hz	MPEG-4 AVC HP@L4 1080i 25Hz	
	MPEG-2 MP@ML 576i 25Hz	MPEG-4 AVC HP@L4 720p 50Hz	
	MPEG-4 AVC HP@L4 720p 50Hz	MPEG-2 MP@ML 576i 25Hz	
	<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 5:33 HDTV - AVC still picture</b>
<b>Section</b>	NorDig Unified 5.2.2.6
<b>Requirement</b>	<p>The NorDig HDTV IRD shall support still picture for all AVC profiles.</p> <p>For the signalling of the AVC still picture the AVC descriptor will be used (in PMT) as specified in MPEG-2 Systems (ISO/IEC 13818/ITU-T H.222.0 – Amendment 3), (the flag AVC_still_present will be set).</p> <p>By still picture means broadcast of only intra coded frames at very low frame rate (typical 1 frame per second). The NorDig HDTV IRD shall decode this still picture frame and repeat displaying this until next (still picture) frame is available to display.</p>



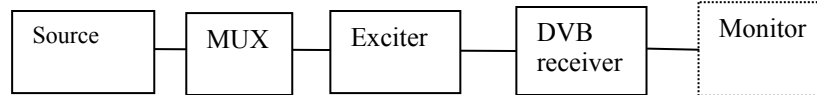
**NorDig**

<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver is able to decode AVC still pictures.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     Source[Source] --- MUX[MUX]     MUX --- Exciter[Exciter]     Exciter --- DVB[DVB receiver]     DVB --- Monitor[Monitor]             </pre> </div> <p>Transport stream with AVC still pictures and an IRD. The bitrate of AVC still picture stream is 100 kbits/s.</p> <p>Use following resolutions and frame rates in the test stream(s):</p> <ul style="list-style-type: none"> <li>• 720x576i25</li> <li>• 1280x720p50</li> <li>• 1920x1080i25</li> </ul> <p><b>Test procedure:</b> Tune to the service(s) and verify that the IRD decodes AVC still pictures correctly.</p> <p><b>Expected result:</b> The IRD is able to decode AVC still pictures at the bitrate of 100 kbit/s.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>
<b>Test Case</b>	<b>Task 5:34 HDTV - AVC video minimum bandwidth</b>
<b>Section</b>	NorDig Unified 5.2.2.7
<b>Requirement</b>	The NorDig HDTV IRD shall provide support for very low bandwidth video. The NorDig HDTV IRD shall be able to decode AVC video down to 250 kbps. For AVC still picture the NorDig HDTV IRD shall be able to decode down to 100 kbps.



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<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver is able to decode AVC video streams at minimum 250 kbps stream.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     Source[Source] --- MUX[MUX]     MUX --- Exciter[Exciter]     Exciter --- DVB[DVB receiver]     DVB --- Monitor[Monitor]             </pre> </div> <p>A transport stream with following video content at 250 kbps:</p> <ul style="list-style-type: none"> <li>• MPEG-4 AVC HP@L3 720x576i 25Hz</li> <li>• MPEG-4 AVC HP@L4 1280x720p 50Hz</li> <li>• MPEG-4 AVC HP@L4 1920x1080i 25Hz</li> </ul> <p><b>Test procedure:</b></p> <p>Tune IRD to a service having 250kbps AVC video.</p> <p>Use following resolutions and frame rates in the test stream(s):</p> <ul style="list-style-type: none"> <li>• 720x576i25</li> <li>• 1280x720p50</li> <li>• 1920x1080i25</li> </ul> <p>Verify that video is displayed correctly.</p> <p><b>Expected result:</b></p> <p>The IRD support AVC video streams down to 250 kbps.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>
<b>Test Case</b>	<b>Task 5:35 HDTV - Frame cropping</b>
<b>Section</b>	NorDig Unified 5.2.2.9
<b>Requirement</b>	The NorDig HDTV IRD shall support frame cropping. Frame cropping signalling is used to indicate which area of the encoded video that should be displayed. For 1080 line formats, the video is encoded with 1088 lines. To indicate which area of the encoded video that should be displayed, frame cropping signalling may be used. If frame cropping information is included in the encoded video, this shall be used to decide which 8 lines should be hidden in the Decoder Composition Output. If no frame cropping signalling is available, the IRD shall crop the bottom 8 lines.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver support frame cropping.</p> <p><b>Equipment:</b></p>



TS containing a service with frame cropping signalling for 8 lines (1080i) and a service without frame cropping (1080i).

**Test procedure:**

1. Play out the transport stream containing a service with frame cropping information and another service without frame cropping information.
2. Verify that the desired lines are cropped.
3. Change to service without frame cropping information.
4. Verify that the bottom 8 lines are cropped.
5. Fill in test results

**Expected result:**

The IRD supports frame cropping correctly

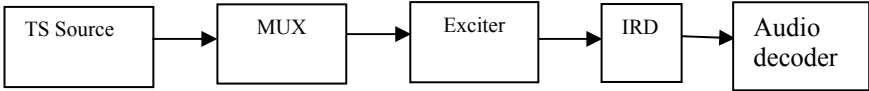
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:36 HDTV - High Definition Video Output and Display</b>
<b>Section</b>	NorDig Unified 5.2.2.11
<b>Requirement</b>	The NorDig HDTV Level STBs shall be able to use the EDID information provided by the display to determine automatically the STB output and to accept a manual setting of the STB output, as specified in section 9.11.2.  For NorDig HDTV iDTVs the output video shall always be converted to the display's native resolution.
<b>Test procedure</b>	<b>Purpose of test:</b> To verify that all video luminance resolutions and frame rates in Table 5.1 are displayed correctly.  <b>Expected result:</b> The IRD selects automatically right resolution and performs up-sampling correctly.  <b>This requirement is tested in test case Task 8:9.</b>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

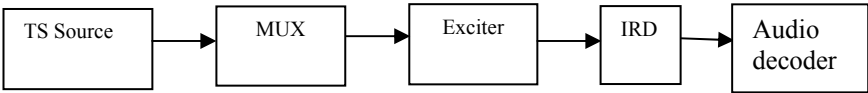
<b>Test Case</b>	<b>Task 5:37 HDTV - Down-conversion of High Definition Video for Standard Definition output</b>	
<b>Section</b>	NorDig Unified 5.2.2.12	
<b>Requirement</b>	<p>If SCART, or any other analogue video output (Y, P<sub>b</sub>, P<sub>r</sub>, RF-PAL or CVBS) is available, the decoded High Definition video shall be down-converted by the SD Format Converter to Standard Definition resolution for output via these interfaces.</p> <p>Down-conversion of pictures shall be implemented, from any of the incoming encoded HD full screen luminance resolution values (1920x1080, 1440x1080, 1280x1080, 960x1080, 1280x720, 960x720 and 640x720) to SD resolution (720x576).</p> <p>When down-converting any 1:1 pixel aspect ratio format (i.e. 1280x720 or 1920x1080) in the Decoder Composition Output to 720x576 resolution, the target shall be 702x576 pixels to be centred in the 720x576 grid with nine black pixels inserted as the start of the 720 pixel active line and nine pixels inserted as the end of the 720 pixel active line.</p> <p>Down-converted HD video shall be displayed as 16:9 letterbox on 4:3 displays. (Allowing centre cut would limit the safe area to 4:3 for HD production, hence <i>not</i> an allowed display option).</p> <p>The SD Format Converter should apply appropriate re-interlacing (field mode integration re-interlacing). It shall process and output 720x576i25 in 4:3 frame aspect ratio or 16:9 frame aspect ratio video with colours according to.</p> <p>Conversion of received video with other frame rates than 25 or 50 Hz is not required for the SCART or any other analogue Standard Definition output, implying that received 23.98, 29.97 and 59.94 Hz video content will not be available on the SCART output.</p>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver downconverts the HD video signal to analog video connectors</p> <p><b>Expected result:</b> The analog output connection is only delivering SDTV level signals</p> <p><b>This requirement is tested in test task Task 8:13</b></p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information</p>	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 5:38 HDTV - Audio Decoder (General)</b>	
<b>Section</b>	NorDig Unified 6.2.1	
<b>Requirement</b>	<p>The HDTV level IRD shall support reception of multi-channel (up to 5.1) audio in addition to the mandatory audio requirements for SDTV level IRDs. The HDTV level IRD shall provide audio outputs for stereo/mono and should provide outputs for multi-channel audio. There may also be additional audio channels and audio components for additional languages and/or for impaired people; these channels/components shall be treated as specified below.</p> <p>The multi-channel audio may be carried by “System A” and/or via “System B”, as determined for the relevant network; i.e. both “System A” and “System B” shall be</p>	

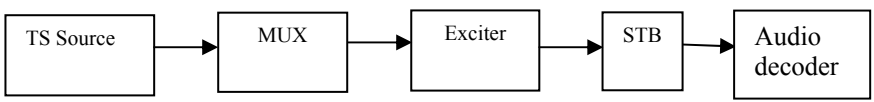
	supported for networks where there is no mandatory operator acceptance of IRDs, while either “System A” or “System B” may be required for networks where an operator is in charge of specifying the functionality of the IRDs and ensuring that the minimum requirements are met.
<b>Test procedure</b>	This requirement is tested in test cases: <b>Task 5:39- Task 5:51</b>

<b>Test Case</b>	<b>Task 5:39 HDTV - Audio format support – E-AC3 with HDMI output interface</b>
<b>Section</b>	NorDig Unified 6.2.2.1
<b>Requirement</b>	<p>The IRD shall be capable of providing the following formats on the HDMI connector:</p> <ul style="list-style-type: none"> <li>•Pass-through of native bitstream (AC3, E-AC3 and HE AAC) (1).</li> <li>•E-AC3 bitstream transcoded to AC3, if E-AC3 is implemented in the IRD</li> <li>•PCM stereo from the decoded or down-mixed bitstream</li> <li>•PCM multi-channel from the decoded bitstream is optional.</li> <li>•Multichannel HE AAC bitstream transcoded to AC3 or DTS, if HE AAC is implemented in the IRD</li> <li>•Pass-through of DTS bitstream is optional.</li> </ul>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD supports E-AC3 in HDMI interfaces.</p> <p>This test is only relevant for IRD with HDMI output.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]     IRD --&gt; Decoder[Audio decoder]   </pre> <p>The TS shall contain services with E-AC3 audio component</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Setup the system</li> <li>2. Verify the HDMI output has correct bitstream format and audio is hearable correctly.</li> <li>3. Select stereo mode for the audio in the menu system</li> <li>4. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analog audio outputs.</li> <li>5. Select multichannel mode for the audio in the menu system</li> <li>6. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analog audio outputs.</li> </ol> <p><b>Expected result:</b></p> <p>When in IRD menu stereo is selected, decoding of E-AC3 shall be available at HDMI output as PCM stereo.</p> <p>When in IRD menu multichannel is selected, decoding of E-AC3 shall be supported in</p>

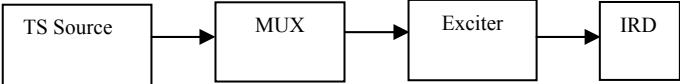
	<p>all formats according to below:</p> <ul style="list-style-type: none"> <li>• E-AC3 pass through *)</li> <li>• Transcoded to AC3</li> <li>• PCM stereo downmix</li> </ul> <p>*) Receiving device shall support E-AC3.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:40 HDTV - Audio format support – E-AC3 with S/PDIF output interface</b>
<b>Section</b>	NorDig Unified 6.2.2.1
<b>Requirement</b>	<p>The IRD shall be capable of providing the following formats on the HDMI connector:</p> <ul style="list-style-type: none"> <li>•Pass-through of native bitstream (AC3, E-AC3 and HE AAC).</li> <li>•E-AC3 bitstream transcoded to AC3, if E-AC3 is implemented in the IRD</li> <li>•PCM stereo from the decoded or down-mixed bitstream</li> <li>•PCM multi-channel from the decoded bitstream is optional.</li> <li>•Multichannel HE AAC bitstream transcoded to AC3 or DTS, if HE AAC is implemented in the IRD</li> <li>•Pass-through of DTS bitstream is optional.</li> </ul>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD supports E-AC3 in S/PDIF interfaces.</p> <p>This test is only relevant for IRD with S/PDIF output.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]     IRD --&gt; Decoder[Audio decoder]   </pre> <p>The TS shall contain services with E-AC3 audio component.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Setup the system</li> <li>2. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly.</li> <li>3. Select stereo mode for the audio in the menu system</li> <li>4. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analog audio outputs.</li> <li>5. Select multichannel mode for the audio in the menu system</li> <li>6. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analog audio outputs.</li> </ol> <p><b>Expected result:</b></p> <p>When in IRD menu stereo is selected, decoding of E-AC3 shall be available at HDMI</p>

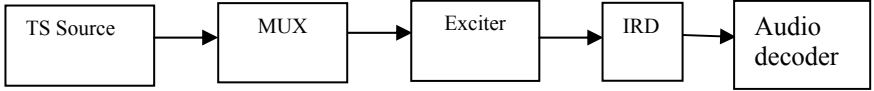
	<p>output as PCM stereo.</p> <p>When in IRD menu multichannel is selected, decoding of E-AC3 shall be supported in all formats according to below:</p> <ul style="list-style-type: none"> <li>• E-AC3 pass through *)</li> <li>• Transcoded to AC3</li> <li>• PCM stereo downmix</li> </ul> <p>*) Receiving device shall support E-AC3.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:41 HDTV - Audio format support –E-AC3 requirements</b>
<b>Section</b>	NorDig Unified 6.2.2.1
<b>Requirement</b>	<p>•The NorDig HDTV Level IRD compatible with E-AC3 shall decode AC3 streams at all bit rates and sample rates listed in ETSI TS 102 366 [66] (not including Annex E).</p> <p>•The NorDig HDTV Level IRD compatible with E-AC3 shall additionally decode E-AC3 streams with data rates from 32 kbps to 3 024 kbps and support all sample rates listed in TS 102 366 [66] Annex E.</p> <p>The NorDig HDTV Level IRD shall be capable of transcoding E-AC3 bitstreams to AC3 bitstreams according to TS 102 366 [66]. Transcoding to AC3 audio streams shall be at a fixed bit rate of 640 kbps.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD supports E-AC3.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; STB[STB]     STB --&gt; Decoder[Audio decoder]   </pre> <p>The TS shall contain services, which has</p> <ul style="list-style-type: none"> <li>• a E-AC3 (mono, stereo) audio component with relevant signaling at bit rates and sampling rates:       <ul style="list-style-type: none"> <li>○ TBD</li> </ul> </li> <li>• a E-AC3 (multichannel) audio component with relevant signaling at bit rates and sampling rates:       <ul style="list-style-type: none"> <li>○ TBD</li> </ul> </li> </ul> <p><b>Test procedure:</b> TBD</p>

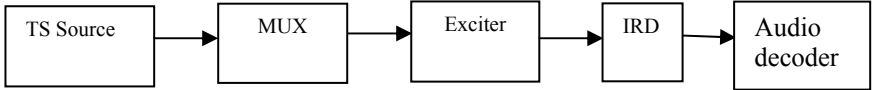
<b>Expected result:</b>	IRD supports for E-AC3 input audio signal and down-mix to stereo.																						
<b>Test result(s)</b>	<table border="1"> <thead> <tr> <th></th> <th>Bit rate</th> <th>Sampling rate</th> <th>NOK or OK</th> </tr> </thead> <tbody> <tr> <td>mono</td> <td></td> <td></td> <td></td> </tr> <tr> <td>stereo</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Multichannel 5.1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Down-mix to stereo</td> <td>N/A</td> <td>N/A</td> <td></td> </tr> </tbody> </table>				Bit rate	Sampling rate	NOK or OK	mono				stereo				Multichannel 5.1				Down-mix to stereo	N/A	N/A	
	Bit rate	Sampling rate	NOK or OK																				
mono																							
stereo																							
Multichannel 5.1																							
Down-mix to stereo	N/A	N/A																					
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																						
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information																						
<b>Date</b>		<b>Sign</b>																					

<b>Test Case</b>	<b>Task 5:42 HDTV - Audio format support –E-AC3 metadata support requirements</b>
<b>Section</b>	NorDig Unified 6.2.2.1
<b>Requirement</b>	The IRD shall support the use of a complete set of Dolby metadata embedded in the audio stream when decoding AC3 or E-AC3 bitstreams, transcoding E-AC3 bitstreams to AC3, or creating a PCM stereo downmix from a decoded E-AC3 or AC3 bitstream
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD supports Dolby metadata.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]   </pre> <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"> <li>• Dolby Dynamic Range Control</li> <li>• Dolby Dialogue Normalization according to ISO/IEC 14496-3 : 2005 (Audio 3rd edition)</li> <li>• Down Mix parameters</li> </ul> <p><b>Test procedure:</b></p> <p>This test can be done parallel with Task 5:50.</p> <ol style="list-style-type: none"> <li>1. Setup the system</li> <li>2. Connect audio decoder to HDMI output.</li> <li>3. Verify that the IRD supports metadata correctly for decoding of the E-AC3 stereo</li> <li>4. Verify that the IRD supports metadata correctly for transcoding E-AC3 multichannel to AC3.</li> <li>5. Verify that the IRD supports metadata correctly for creating PCM stereo</li> </ol>

	downmix.
	<b>Expected result:</b> IRD shall support E-AC3 metadata according to requirement.
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:43 HDTV - Audio format support – HE AAC with HDMI output interface</b>
<b>Section</b>	NorDig Unified 6.2.2.2
<b>Requirement</b>	The IRD shall be capable of providing the following formats on the HDMI connector: <ul style="list-style-type: none"> <li>•Pass-through of native bitstream (AC3, E-AC3 and HE AAC) (1).</li> <li>•E-AC3 bitstream transcoded to AC3, if E-AC3 is implemented in the IRD</li> <li>•PCM stereo from the decoded or down-mixed bitstream</li> <li>•PCM multi-channel from the decoded bitstream is optional.</li> <li>•Multichannel HE AAC bitstream transcoded to AC3 or DTS, if HE AAC is implemented in the IRD</li> <li>•Pass-through of DTS bitstream is optional.</li> </ul>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD supports HE AAC in HDMI interfaces.</p> <p>This test is only relevant for IRD with HDMI output.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]     IRD --&gt; Decoder[Audio decoder]   </pre> <p>The TS shall contain services, which has</p> <ul style="list-style-type: none"> <li>• a HE AAC Level2 @48kHz (mono, stereo) audio component with relevant signaling.</li> <li>• a HE AAC Level 4 @48kHz (multichannel) audio component with relevant signaling.</li> </ul> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Setup the system</li> <li>2. Verify the HDMI output has correct bitstream format and audio is hearable correctly.</li> <li>3. Select stereo mode for the audio in the menu system</li> <li>4. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analog audio outputs.</li> <li>5. Select multichannel mode for the audio in the menu system</li> <li>6. Verify the HDMI output has correct bitstream format and audio is hearable correctly in digital and analog audio outputs.</li> </ol>

	<p><b>Expected result:</b></p> <p>When in IRD menu stereo is selected, decoding of HE AAC Level 2 (stereo) shall be available at HDMI output as PCM stereo.</p> <p>When in IRD 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"> <li>• HE AAC pass through *)</li> <li>• Transcoded to AC3</li> <li>• Transcoded to DTS</li> <li>• PCM stereo downmix</li> </ul> <p>*) Receiving device shall support HE AAC.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:44 HDTV - Audio format support – HE AAC with S/PDIF output interface</b>
<b>Section</b>	NorDig Unified 6.2.2.2
<b>Requirement</b>	<p>The IRD shall be capable of providing the following formats on the HDMI connector:</p> <ul style="list-style-type: none"> <li>• Pass-through of native bitstream (AC3, E-AC3 and HE AAC).</li> <li>• E-AC3 bitstream transcoded to AC3, if E-AC3 is implemented in the IRD</li> <li>• PCM stereo from the decoded or down-mixed bitstream</li> <li>• PCM multi-channel from the decoded bitstream is optional.</li> <li>• Multichannel HE AAC bitstream transcoded to AC3 or DTS, if HE AAC is implemented in the IRD</li> <li>• Pass-through of DTS bitstream is optional.</li> </ul>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD supports HE AAC in S/PDIF interfaces.</p> <p>This test is only relevant for IRD with S/PDIF output.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]     IRD --&gt; Decoder[Audio decoder]   </pre> <p>The TS shall contain services, which has</p> <ul style="list-style-type: none"> <li>• a HE AAC Level2 @48kHz (mono, stereo) audio component with relevant signaling.</li> <li>• a HE AAC Level 4 @48kHz (multichannel) audio component with relevant signaling.</li> </ul> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Setup the system</li> </ol>

	<ol style="list-style-type: none"> <li>2. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly.</li> <li>3. Select stereo mode for the audio in the menu system</li> <li>4. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analog audio outputs.</li> <li>5. Select multichannel mode for the audio in the menu system</li> <li>6. Verify the S/PDIF output has correct bitstream format and audio is hearable correctly in digital and analog audio outputs.</li> </ol> <p><b>Expected result:</b></p> <p>When in IRD menu stereo is selected, decoding of HE AAC Level 2 (stereo) shall be available at HDMI output as PCM stereo.</p> <p>When in IRD 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"> <li>• HE AAC pass thorough *)</li> <li>• Transcoded to AC3</li> <li>• Transcoded to DTS</li> <li>• PCM stereo downmix</li> </ul> <p>*) Receiving device shall support HE AAC.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:45 HDTV - Audio format support –HE AAC requirements</b>
<b>Section</b>	NorDig Unified 6.2.2.2
<b>Requirement</b>	<p>The NorDig HDTV Level IRD compatible to HE AAC shall be capable of decoding HE AAC Level 2 (mono, stereo) at sampling rates of 48 kHz according to ETSI TS 101 154 [23], Annex H.</p> <p>The NorDig HDTV Level IRD compatible to HE AAC shall 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 [23], Annex H (downmix).</p> <p>The NorDig HDTV Level IRD compatible to HE AAC shall be capable of transcoding HE AAC Level 4 (multi-channel, up to 5.1) at sampling rates of 48 kHz according to TS 101 154 [23], Annex H to AC3 or DTS.</p> <p>If featured, transcoding to AC3 audio streams shall be according to TS 102 366 [66] at a fixed bit rate of 640 kbps.</p> <p>If featured, transcoding to DTS audio streams shall be according to TS 102 114 [64] at a fixed bit rate of 1,536 Mbps.</p> <p>The HE AAC multi-channel decoding shall, when present, be decoded to a stereo down-mix of the format indicated by the HE AAC metadata and shall be fed to the (stereo) analogue output connectors (SCART and RCA).</p>



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<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD supports HE AAC requirements.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exc[Exciter]     Exc --&gt; IRD[IRD]     IRD --&gt; Dec[Audio decoder]             </pre> </div> <p>The TS shall contain services, which has</p> <ul style="list-style-type: none"> <li>• a HE AAC Level2 @48kHz (mono, stereo) audio component with relevant signaling.</li> <li>• a HE AAC Level 4 @ 48kHz (multichannel) audio component with relevant signaling.</li> </ul> <p><b>Test procedure:</b> TBD</p> <p><b>Expected result:</b> IRD supports decoding of HE AAC Level2 and 4 @48 kHz and transcoding of it to AC3 or DTS and supports down-mixing.</p>												
<b>Test result(s)</b>	<table border="1"> <thead> <tr> <th>Feature</th> <th>NOK or OK</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>	Feature	NOK or OK	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	
Feature	NOK or OK												
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Down-mixing of HE AAC L4 @48kHz													
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments												
<b>Comments</b>	<p>If possible describe if fault 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>												
<b>Date</b>	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"></td> <td style="width: 20%; text-align: center;"><b>Sign</b></td> <td style="width: 30%;"></td> </tr> </table>		<b>Sign</b>										
	<b>Sign</b>												

<b>Test Case</b>	<b>Task 5:46 HDTV - Audio format support –HE AAC metadata support requirements</b>
<b>Section</b>	NorDig Unified 6.2.2.2
<b>Requirement</b>	<p>The NorDig HDTV Level IRD shall support the use of the following aacPlus (HE AAC) metadata embedded in the audio stream when decoding HE AAC and transcoding HE AAC multichannel to AC3 or DTS:</p> <ul style="list-style-type: none"> <li>•Dynamic Range Control according to ISO/IEC 14496-3 [65]</li> <li>•Program Reference Level according to ISO/IEC 14496-3 [65].</li> <li>•Mix Down Parameters according to "Transmission of MPEG4 Ancillary Data" part of DVB specification ETSI TS 101 154 [23]</li> </ul>



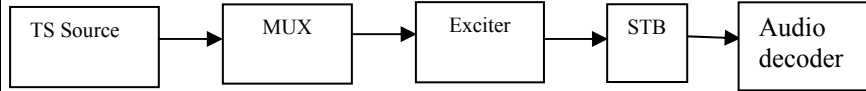
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<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD supports HE AAC metadata.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exc[Exciter]     Exc --&gt; IRD[IRD]             </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"> <li>• [aacPlus] Dynamic Range Control (equivalent to [Dolby] Dynamic Range Control)</li> <li>• [aacPlus] Program Reference Level (equivalent to [Dolby] Dialogue Normalization) according to ISO/IEC 14496-3 : 2005 (Audio 3rd edition)</li> <li>• Mix Down Parameters</li> </ul> <p><b>Test procedure:</b></p> <p>This test can be done parallel with Task 5:48.</p> <ol style="list-style-type: none"> <li>1. Setup the system</li> <li>2. Connect audio decoder to HDMI output.</li> <li>3. Verify that the IRD supports metadata correctly for decoding of the HE AAC stereo or transcoding HE AAC multichannel to AC3 or DTS.</li> <li>4. Verify that the IRD supports down-mixing to stereo output</li> </ol> <p><b>Expected result:</b> IRD shall support AAC metadata according to requirement.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:47 HDTV - Audio Prioritising</b>
<b>Section</b>	NorDig Unified 6.2.3
<b>Requirement</b>	<p>The default settings of the NorDig HDTV Level IRD for digital audio output shall be PCM Stereo according to IEC 60958. The NorDig HDTV Level IRD shall provide output formats in accordance with Table 6.1 (NorDig Unified v1.0.4). The user shall be able to select multi-channel audio for the digital outputs, when the outputs are equipped for multi-channel audio.</p> <p>The NorDig HDTV Level IRD shall use the stereo audio source to provide PCM stereo if both multichannel and stereo sources are available for the selected language. If multiple stereo or multichannel sources are available, selection shall be based on the language descriptor. If the audio source is not matching with the language settings, the NorDig HDTV Level IRD shall always select one of the stereo audio sources.</p>
<b>Test procedure</b>	<b>Purpose of test:</b>

To verify the audio priority selection.

**Test Equipment:**



Transport stream containing services with audio components listed in table below in test results.

**Test procedure:**

1. Setup the system
2. Verify that the audio selection is done correctly according the input formats in table below in test results
3. Repeat test with all input format in table below
4. Fill in test results

**Expected result:**

The IRD shall select the audio format correctly.

*Test result(s)*

Available inputs formats	Output on S/PDIF		OK/NOK
	When Stereo is selected (default)	When Multichannel is selected	
MPEG1 layer II & AC3	PCM	AC3	
MPEG1 layer II & E-AC3	PCM	Transcoded to AC3	
HE AAC stereo & HE AAC multichannel	PCM	Transcoded to AC3, or DTS	

Available inputs formats	Output on HDMI		OK/NOK
	When Stereo is selected (default)	When Multichannel is selected	
MPEG1 layer II & AC3	PCM	AC3	
MPEG1 layer II & E-AC3	PCM	AC3 <sup>1)</sup>	
MPEG1 layer II & E-AC3	PCM	E-AC3	
HE AAC stereo & HE AAC multichannel	PCM	HE AAC multichannel	
HE AAC stereo & HE AAC multichannel	PCM	Transcoded <sup>2)</sup> to AC3, or DTS	

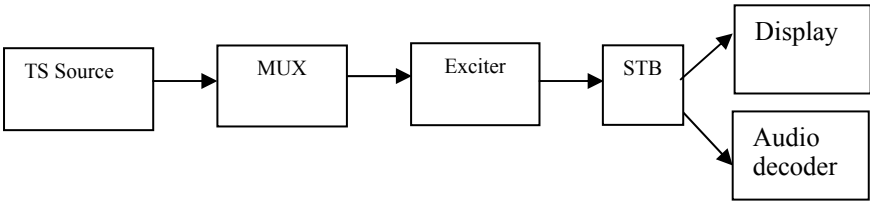


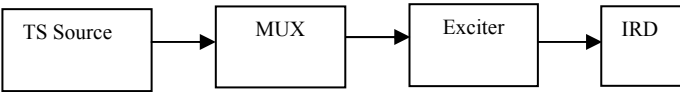
	1) transcoded to AC3 if E-AC3 is not supported by receiving device 2) transcoded to AC3 or DTS if HE AAC not supported by receiving device	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 5:48 HDTV - Support for "Clean audio" concept</b>	
<b>Section</b>	NorDig Unified 6.2.4	
<b>Requirement</b>	The NorDig HDTV Level IRD should support the "Clean Audio" concept by implementing an easy way to adjust the balance between the centre channel and other channels in the audio stream before making a stereo down-mix.	
<b>Test procedure</b>	<b>To be defined</b>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 5:49 HDTV - Audio stream mixing</b>	
<b>Section</b>	NorDig Unified 6.2.5	
<b>Requirement</b>	The audio decoder should be capable of simultaneously decoding two elementary streams containing different programme elements, and then combining the programme elements into a complete programme.  Most of the programme elements are found in the main audio service. Another programme element (such as a spoken subtitle for the visually impaired or additional audio services such as a spoken director's commentary or alternative languages) may be found in an associated audio service.	
<b>Test procedure</b>	<b>To be defined.</b>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 5:50 HDTV - Video/audio delay settings</b>	
<b>Section</b>	NorDig Unified 6.2.7	
<b>Requirement</b>	The NorDig HDTV Level IRD shall support the possibility to adjust the audio-delay on	

	the S/PDIF output (if available) up to 250 ms and it should be adjustable in 10 ms steps, as the IRD may have several different user set-ups, resulting in different a/v delays; e.g. the IRD may be connected to several types of external audio-amplifiers and the STB may be connected to several types of external screens.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD has settings for video/audio delay.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; STB[STB]     STB --&gt; Display[Display]     STB --&gt; Audio[Audio decoder]     </pre> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Verify the IRD has a setting to setup video/audio delay up to 250ms.</li> <li>2. Verify the setting has effect in delay between video and audio.</li> </ol> <p><b>Expected result:</b> It is possible to change static delay between video and audio decoding and it has effect.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 5:51 HDTV - Audio handling when changing service or audio format</b>
<b>Section</b>	NorDig Unified 6.2.8
<b>Requirement</b>	The NorDig HDTV Level IRD shall gracefully handle change of service or audio format at the audio outputs without significant disturbances to the end user.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD handles audio format changes in zapping and audio format change.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]     </pre> <p>The TS shall several services, but at least following services with following components</p> <ul style="list-style-type: none"> <li>• a HE AAC Level2 @48kHz and/or E-AC3 (stereo)audio component with relevant signaling.</li> <li>• a HE AAC Level 4 @48kHz and/or E-AC3 (multichannel)audio component with relevant signaling.</li> </ul>

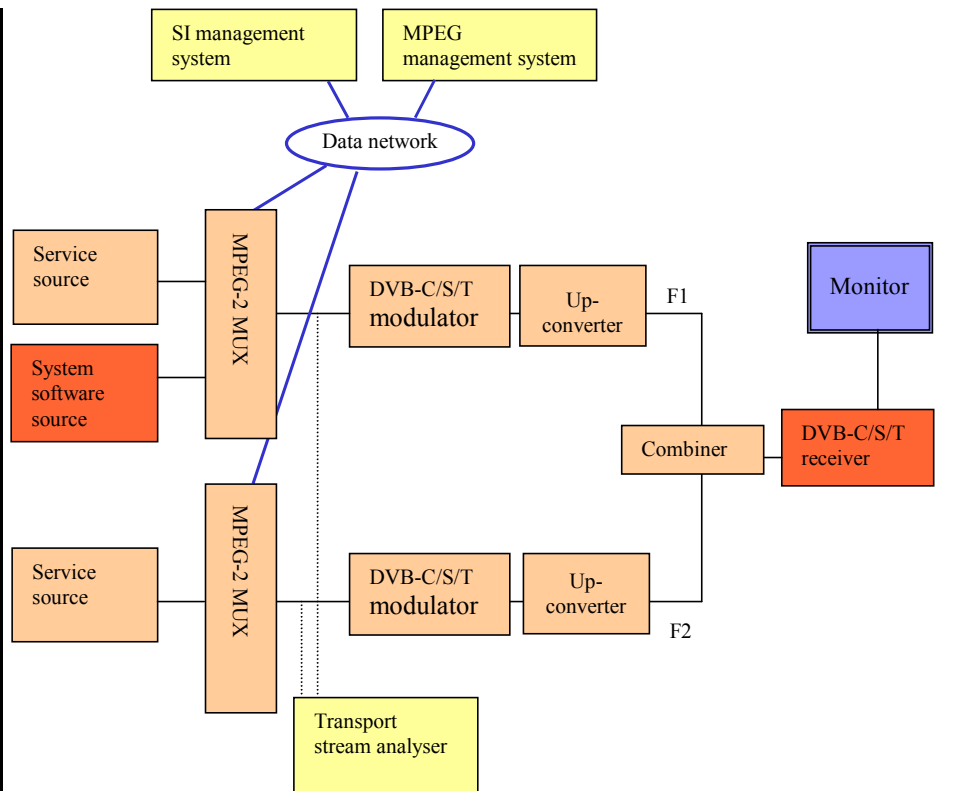


NorDig

	<ul style="list-style-type: none"><li>• a MPEG-1 Layer II (stereo) with relevant signaling.</li></ul> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"><li>1. Zap to different services</li><li>2. Verify the IRD is able to settle to different audio formats</li><li>3. Decide if the format settling could disturb end-user.</li></ol> <p><b>Expected result:</b></p> <p>Audio format change is handled gracefully.</p> <p>Handling doesn't disturb end-user.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

## 2.6 Task 6: The Bootloader (System Software Update)

<b>Test Case</b>	<b>Task 6:1 The Bootloader – Supported software download mechanism</b>
<b>Section</b>	NorDig Unified 11.2.2
<b>Requirement</b>	<p>The NorDig IRD shall provide a system software download mechanism accessing software files output cyclically broadcast in one PID within a MPEG-2 transport stream. The data transport protocol should be based on MPEG data structures. One of the following formats shall be used:</p> <ol style="list-style-type: none"> <li>1. NorDig Bootload streams</li> <li>2. DVB Data Download streams</li> </ol> <p>In case of (1) it is the responsibility of the receiver manufacturers potentially sharing the download service to identify their organisations' stream.</p> <p>In case of (2) the PSI and SI signalling of the system software download shall be as specified in chapter 12.</p> <p>In case of (3) the PSI and SI signalling shall be as specified in ref [25]</p> <p>The security aspects shall be the responsibility of the NorDig IRD manufacturer. An authentication scheme using private/public key cryptographic algorithm is recommended. <b>(not tested)</b></p> <p>The software download mechanism (as defined in section 7.2.1) shall check availability of new system software either when the box enters (recommended) or leaves stand-by mode. If new software version is available the actual upgrade shall be initiated by the user, as specified in section 7.2.1. It is recommended that the user preferences and service lists stored in the IRD will not be affected (i.e. not deleted) by an update of system software.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>To check which system software upgrade mechanism the manufacturer uses and to verify that it's compatible with the requirements in specification.</p> <p>To verify that the information provided by the manufacturer is sufficient and that it is possible to configure the testbed correctly.</p> <p><b>Equipment:</b></p>



The PSI/SI signaling for the three different formats are described below.

1 DVB Download streams

The NIT must contain:

- Linkage\_descriptor 0x4A to DVB bootloader service using linkage\_type 0x09.

Example for linkage\_descriptor for IRD system download located at Tsid/Onid 0x0456/0x22F1.

Descriptor_tag	0x4A
Transport_stream_id	0x0456
Original_network_id	0x22F1
Service_id	0x1194
Linkage_type	0x09
Private_data_bytes *)	
OUI	
selector_bytes	
private_data_byte	

\*) The Private\_data\_bytes shall be used as specified in the DVB Data Download Specification; Part 1: Simple Profile . (ETSI TS 102 006 v1.3.1 )

The PMT must contain:

(The descriptor shall be placed in the component loop of the PSI PMT table.)

- Data\_broadcast\_id\_descriptor

Descriptor_tag	0x66
Data_broadcast_id	0x000A
Id_sector_bytes *)	

OUI **)	
update_type ***)	
update_versioning_flag	
update_version	
selector_bytes	
private_data_bytes	

\*) The id\_sector\_bytes shall be used as specified in the DVB Data Download Specification; Part 1: Simple Profile . (ETSI TS 102 006-1V1.3.1)

\*\*) The OUI value in the PMT shall match the OUI value in the NIT linkage to bootloader descriptor.

\*\*\*) Update\_type 0x0 (proprietary update solution) shall not be used.

## 2 Nordig Bootload streams

The NIT must contain:

- Logical\_channel\_descriptor in 2<sup>nd</sup> loop = “in each TS loop”.

Example of the logical\_channel\_descriptor for NorDig bootloader. Service is not visible and not available on the service list.

Descriptor tag	0x83
Descriptor length	
Service id	0x1194
Visible service flag	0 (bin)
Reserved	1 (bin)
Logical channel number	00 00 00 00 00 00 00 (bin)

- Linkage 0x4A to NorDig bootloader using linkage\_type 0x81.

Example for linkage\_descriptor for Nokia 9820T system download located at Tsid/Onid 0x0456/0x22F1. Start date is 06/02/2001 at 17:00:00 o'clock.

Descriptor tag	0x4A
Transport stream id	0x0456
Original network id	0x22F1
Service id	0x1194
Linkage type	0x81
Manufacture ID	0x0001
HW model	0x0001
HW version	0x0202
SW model	0x265C
SW version	0x0014
Transaction id	0x81230001
Start date (julian)	0xCAEA
Start time	17:00:00

The SDT must contain:

- The service\_type (under the service\_descriptor) value 0x81 is reserved for the bootloader use.

### Test procedure:

Make sure the software can be updated by one of the two methods listed above.

Fill in which method the IRD uses in the comment section.



	<b>Expected result:</b> The software download mechanism is compatible with the requirements in NorDig specification.	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<i>Date</i>		<i>Sign</i>

<i>Test Case</i>	<b>Task 6:2 The Bootloader: Initiation</b>
<i>Section</i>	NorDig Unified 11.2.1 and 11.2.2
<i>Requirement</i>	<p>The actual upgrade of NorDig IRD software shall be initiated by the user. The NorDig IRD manufacturer shall provide the procedure and functions carrying out the upgrade in the receiver. The user procedure for initiating the upgrade shall be part of the Navigator function. The NorDig IRD manufacturer should also provide a mechanism for indicating when new system software is available for download.</p> <p>The user procedure shall in an unambiguous way indicate which network the user is connected to (from NIT, SI, see Chapter 12), and then ask the user if upgrade is wanted, with a possibility to abort the system software upgrade. The progress of the download shall be displayed by the NorDig IRD.</p> <p>The manufacturer should, with reasonable confidence, ensure that download of non-certified systemsoftware is prevented. NorDig recommend the use of a public-key/private-key mechanism, with the public-keys present in the NorDig IRD. <b>(not tested)</b></p> <p>...</p> <p>The software download mechanism (as defined in section 7.2.1) shall check availability of new system software either when the box enters (recommended) or leaves stand-by mode. If new software version is available the actual upgrade shall be initiated by the user, as specified in section 7.2.1. It is recommended that the user preferences and service lists stored in the IRD will not be affected (i.e. not deleted) by an update of system software.</p>
<i>Test procedure</i>	<p><b>Purpose of test:</b> To test the software upgrade initiation is compatible with the NorDig specification.</p> <p><b>Equipment:</b> Same as in previous test case.</p> <p><b>Test procedure:</b></p> <p>Start condition: No system software is broadcasted. The IRD is using the current version of the software.</p> <ol style="list-style-type: none"> <li>1. Connect and start up the instruments.</li> <li>2. Configure SI with suitable parameters for over-the-air download on the frequency f1.</li> <li>3. Configure SI for frequency f2.</li> <li>4. Turn on IRD.</li> <li>5. Do a channel search and check that all the services are possible to receive.</li> <li>6. Tune the IRD to a service located on the frequency f1.</li> </ol>

7. Check that the IRD can show an unambiguous way which network it is receiving.
8. Fill in the test protocol.
9. Turn off the IRD.
10. Turn on the IRD.
11. The new software should now be displayed to the user automatically.
12. Check that the IRD indicates to the user that there is a new software available.
13. Check that the IRD doesn't start to download the new software without user confirmation.
14. Abort the download process. Note that the IRD should not start to upgrade the system software and it should still have the old system software.
15. Fill in the test protocol
16. The test is done with one fail parameter at once. After test the fail parameter is changed back to its correct value and the next parameter is changed to its fail value.

The parameters depends on which format the IRD uses (DVB download, Nordig bootload or proprietary). The parameters in testpoints 16.1-16.6 is applicable for the Nordig bootload. If the test concerns DVB download or proprietary, please fill in extra information in the test protocol about which fail parameters has been tested. (for example OUI for DVB Download etc.)

- 16.1 The Manufacture ID is different than the specified
- 16.2 The HW model is different than the specified.
- 16.3 The HW version is different than the specified.
- 16.4 The SW model is different than the specified.
- 16.5 The SW version is different than the specified.

Initiate the download after change of the parameter. The receiver shall not recognize the system software. Notice that the software shall not be updated in any case.

- 16.6 The Transaction ID is different than the specified.

Initiate the download after change of parameter. The receiver might recognize the system software but it shall not be updated.

17. Fill in the test protocol.

**Expected result:**

All test results are OK.

**Test result(s)**

**Test protocol**

Test points 1-8. Received network as it is displayed by the receiver

Network name, as configured in the NIT.	Expected result
OK or not OK	
	The network name shall be displayed as configured in the NIT.

Test points 9-15. Initiating of download procedure and aborting it

Test result OK or not OK	Expected result
	The navigator shall display that new software is available.
	Aborting of the system software upgrade is possible

Test points 16-17. Fail signaling.

Test	OK or NOK	Parameter name	Expected result
16.1			The receiver doesn't recognize the system software
16.2			The receiver doesn't recognize the system software
16.3			The receiver doesn't recognize the system software
16.4			The receiver doesn't recognize the system software
16.5			The receiver doesn't recognize the system software
16.6			The receiver doesn't recognize the system software

<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 6:3 The Bootloader: Over-the-air via Broadcast Download</b>
<b>Section</b>	NorDig Unified 11.2.1
<b>Requirement</b>	<p>...</p> <p>If the NorDig System software is corrupt, the NorDig manufacturer shall provide a backup mechanism, either on local storage or via download, which can make the NorDig operational again.</p> <p>NorDig shall provide a download mode based on broadcast over-the-air/via in-network channel, and should provide a mode for download over the local data interface when such local interface is implemented.</p> <p>...</p> <p>The software download mechanism (as defined in section 7.2.1) shall check availability of new system software either when the box enters (recommended) or leaves stand-by mode. If new software version is available the actual upgrade shall be initiated by the user, as specified in section 7.2.1. It is recommended that the user preferences and service lists stored in the IRD will not be affected (i.e. not deleted) by an update of system software.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To test the IRD system software download and its robustness for the disturbances.</p>

	<p><b>Equipment:</b> Same as in previous test case.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Connect and start up the instruments.</li> <li>2. Configure three outgoing download streams from the system software source. The system software PID, PMT PID and SID may not conflict with each other.</li> <li>3. Configure the multiplexer to transmit three outgoing system software download streams within TS on the frequency f1. The system software PID, PMT PID and SID may not conflict with each other. (Simulates three system software streams.)</li> <li>4. If the linkage_descriptor is used: Configure linkage_descriptor for the two system software download streams not to be suitable for the receiver under test. The linkage_descriptor parameters for the third download stream shall be suitable for the receiver under test. The third system software download stream shall be the last in order.</li> <li>5. If the linkage_descriptor is used: For the frequency f2 configure linkage_descriptor to refer to the frequency f1 with suitable parameters for the over-the-air download. (Simulates frequency change).</li> <li>6. Do a channel search and check that all the services are possible to receive.</li> <li>7. Tune the receiver to a service on the frequency f1.</li> <li>8. Initiate the download.</li> <li>9. Notify that the software is being updated.</li> <li>10. Check that the progress of the download is displayed.</li> <li>11. Fill in the test protocol.</li> <li>12. Download older software to the receiver in use or use other receiver.</li> <li>13. Tune the receiver to a service on the frequency f2.</li> <li>14. Initiate the download again.</li> <li>15. Notify that the software is being updated.</li> <li>16. Check that the progress of the download is displayed.</li> <li>17. Fill in the test protocol.</li> <li>18. Download older software to the receiver in use or use other receiver.</li> <li>19. Initiate the download again.</li> <li>20. Plug out the electric cable to corrupt the downloading of the system software.</li> <li>21. Plug in the electric cable.</li> <li>22. Notify that the receiver starts.</li> <li>23. Fill in the test protocol. Fill in extended information in the comments section if the receiver ends up in an error state. Error messages etc.</li> <li>24. Initiate the download again.</li> <li>25. Plug out the antenna cable. (Simulates RF disturbances).</li> <li>26. Plug in the antenna cable.</li> <li>27. Fill in the test protocol. Fill in extended information in the comments section if the receiver ends up in an error state. Error messages etc.</li> </ol> <p><b>Expected result:</b> All test results are OK.</p>										
<p><i>Test result(s)</i></p>	<p>Test points 1-11. System software download.</p> <table border="1"> <thead> <tr> <th>Test result</th> <th>Expected result</th> </tr> </thead> <tbody> <tr> <td>OK or not OK</td> <td></td> </tr> <tr> <td></td> <td>The navigator shall display that new software is available.</td> </tr> <tr> <td></td> <td>The correct system software on the frequency f1 is chosen.</td> </tr> <tr> <td></td> <td>The progress of the system software download process is displayed.</td> </tr> </tbody> </table> <p>Test points 12-17. System software download.</p>	Test result	Expected result	OK or not OK			The navigator shall display that new software is available.		The correct system software on the frequency f1 is chosen.		The progress of the system software download process is displayed.
Test result	Expected result										
OK or not OK											
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	<table border="1"> <thead> <tr> <th>Test result OK or not OK</th> <th>Expected result</th> </tr> </thead> <tbody> <tr> <td></td> <td>The navigator shall display that new software is available.</td> </tr> <tr> <td></td> <td>The correct system software on the frequency f1 is chosen. (i.e. download is started)</td> </tr> <tr> <td></td> <td>The progress of the system software download process is displayed.</td> </tr> </tbody> </table>	Test result OK or not OK	Expected result		The navigator shall display that new software is available.		The correct system software on the frequency f1 is chosen. (i.e. download is started)		The progress of the system software download process is displayed.
	Test result OK or not OK	Expected result							
		The navigator shall display that new software is available.							
		The correct system software on the frequency f1 is chosen. (i.e. download is started)							
		The progress of the system software download process is displayed.							
	Test points 18–28. Corrupt download stream.								
	<table border="1"> <thead> <tr> <th>Test result OK or not OK</th> <th>Expected result</th> </tr> </thead> <tbody> <tr> <td></td> <td>Receiver starts after electric break using old (working) software.</td> </tr> </tbody> </table>	Test result OK or not OK	Expected result		Receiver starts after electric break using old (working) software.				
	Test result OK or not OK	Expected result							
		Receiver starts after electric break using old (working) software.							
	If NOK on the test point above								
<table border="1"> <thead> <tr> <th>Test result OK or not OK</th> <th>Expected result</th> </tr> </thead> <tbody> <tr> <td></td> <td>The download failure shall be indicated to the user with an error message</td> </tr> </tbody> </table>	Test result OK or not OK	Expected result		The download failure shall be indicated to the user with an error message					
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	The download failure shall be indicated to the user with an error message								
Test points 24–27. Corrupt download stream.									
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Test result OK or not OK	Expected result								
	The download failure shall be indicated to the user with an error message								
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments								
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information								
<b>Date</b>	<b>Sign</b>								

## 2.7 Task 7: Graphics processing

<b>Test Case</b>	<b>Task 7:1 NorDig Basic</b>	
<b>Section</b>	NorDig Unified 8.1	
<b>Requirement</b>	<ul style="list-style-type: none"> <li>i. Support resolutions of 720 by 576 pixels and lower.</li> <li>ii. Support at least one colour look-up table (CLUT) with a minimum of 16 entries including transparency. It should be possible to choose any 24-bit RGB colour into the 16 entries.</li> <li>iii. Support 2 logical display planes: <ul style="list-style-type: none"> <li>o Video plane for full screen MPEG video.</li> <li>o Graphic plane for graphics (used for menus, teletext, DVB sutitling ,etc.)</li> </ul> </li> <li>iv. Support blending of the graphics with video or stills backgrounds. At least 5 levels of transparency shall be provided (0%, 30%, 50%, 70%, 100%).</li> </ul> <p>Support aspect ratios as set in the installation setting (at the SCART 1 interface, or equivalent for iDTV), see NorDig Unified chapter 17.</p>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify graphics processing capabilities.</p> <p><b>Equipment:</b> IRD under test</p> <p><b>Test procedure:</b> The IRD is tested using IRD's OSD user interface images that contain colours that have been chosen from any 24-bit RGB colour using least one colour look-up table (CLUT) with a minimum of 16 entries including transparency with into the 16 entries. Images are displayed on top of video plane with selectable transparency (0%, 30%, 50%, 70%, 100%).</p> <p><b>Expected result:</b> The images are displayed correctly</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b></p> <p>Describe more specific faults and/or other information</p>	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 7:2 NorDig Enhanced and Interactive</b>	
<b>Section</b>	NorDig Unified 8.2	
<b>Requirement</b>	<ul style="list-style-type: none"> <li>i. Support resolutions of 720 by 576 pixels and lower.</li> <li>ii. Support at least one colour look-up table (CLUT) with a minimum of 256 entries including transparency. It shall be possible to choose any 24-bit RGB colour into the 256 entries. The actual presentation shall be specified as defined in the DVB-MHP specification.</li> <li>iii. Support 4 logical display planes: <ul style="list-style-type: none"> <li>o Video plane for full screen MPEG video.</li> <li>o Graphic plane I for MPEG I-still frames, JPEGs, GIFs, PNGs and / or decimated live MPEG video.</li> <li>o Graphic plane II for graphics (full screen).</li> <li>o Cursor plane: 32 x 32 pixel, RGB format.</li> <li>o Simultaneous overlapping displays of all planes.</li> </ul> </li> </ul>	

	<p>iv. Support blending of the graphics with video or stills backgrounds. At least 5 levels of transparency shall be provided (0%, 30%, 50%, 70%, 100%). Support aspect ratios as set in the installation setting (at the SCART 1 interface, or equivalent for iDTV), (see NorDig unified chapter 17).</p>			
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify graphics processing capabilities.</p> <p><b>Equipment:</b> IRD under test</p> <p><b>Test procedure:</b> The IRD is tested using a MHP application that uses images and graphic containers (on graphics plane II) that contain MHP colour palette and full screen high resolution MPEG I-still frame. Images are displayed on top of video plane. Transparency selected in following values; 0%, 30%, 50%, 70%, 100%.</p> <p><b>Expected result:</b> The images are displayed correctly</p>			
<b>Test result(s)</b>				
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments			
<b>Comments</b>	<p>If possible describe if fault 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>			
<b>Date</b>	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"></td> <td style="width: 10%; text-align: center;"><i>Sign</i></td> <td style="width: 40%;"></td> </tr> </table>		<i>Sign</i>	
	<i>Sign</i>			

<b>Test Case</b>	<b>Task 7:3 HDTV - NorDig HDTV Level – Enhanced and Interactive</b>
<b>Section</b>	NorDig Unified 8.2
<b>Requirement</b>	<p>i. Support resolutions of 1920 by 1080 pixels and lower.</p> <p>ii. Support at least 16 bit graphics (RGBa 4:4:4:4 and/or RGB 5:6:5) as defined in DVB MHP v1.1.2 (BlueBook) [27]</p> <p>iii. Support 4 logical display planes:</p> <ul style="list-style-type: none"> <li>o Video plane for full screen MPEG video.</li> <li>o Graphic plane I for MPEG I-still frames, JPEGs, GIFs, PNGs and / or decimated live MPEG video.</li> <li>o Graphic plane II for graphics (full screen).</li> <li>o Cursor plane: 32 x 32 pixel, RGB format.</li> <li>o Simultaneous overlapping displays of all planes.</li> </ul> <p>iv. Support blending of the graphics with video or stills backgrounds. At least 5 levels of transparency shall be provided (0%, 30%, 50%, 70%, 100%). Support aspect ratios for SDTV signals as set in the installation setting (at the SCART 1 interface, or equivalent for iDTV), (see NorDig unified chapter 17).</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify graphics processing capabilities.</p> <p><b>Equipment:</b> IRD under test</p> <p><b>Test procedure:</b> The IRD is tested using a MHP application that uses images and graphic containers (on graphics plane II) that contain MHP colour palette and full screen high resolution MPEG I-still frame. Images are displayed on top of video plane. Transparency selected in following values; 0%, 30%, 50%, 70%, 100%.</p> <p><b>Expected result:</b> The images are displayed correctly</p>

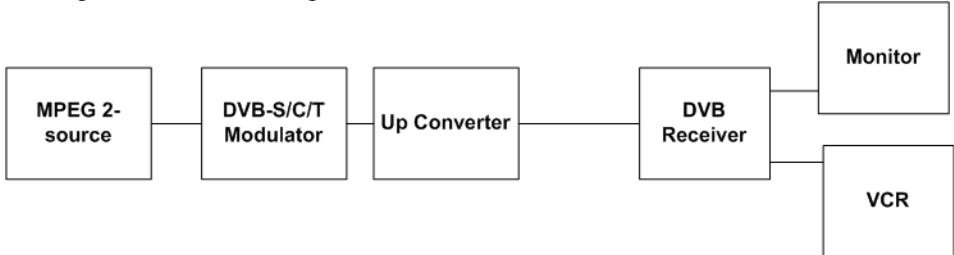


**NorDig**

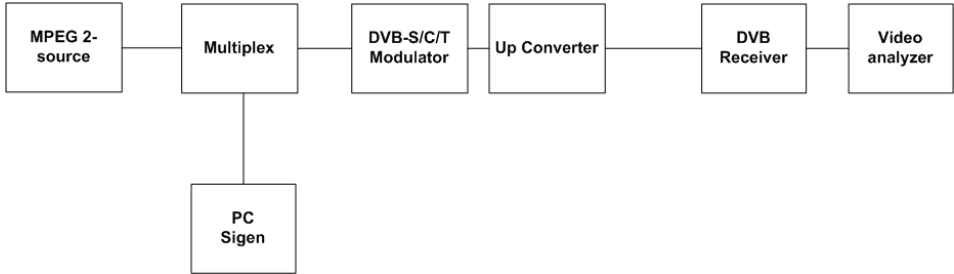
<i>Test result(s)</i>			
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<i>Date</i>		<i>Sign</i>	

## 2.8 Task 8: Interfaces, signal levels and performance

<b>Test Case</b>	<b>Task 8:1 Interaction Channel Interface</b>	
<b>Section</b>	NorDig Unified 9.3	
<b>Requirement</b>	<p>The NorDig IRD shall (optional for NorDig I) support at least one of the following interaction channel interfaces:</p> <ol style="list-style-type: none"> <li>1. Standard modem interface: ITU-T: V 32bis (14400 bit/s)</li> <li>2. V.90 modem (56 kbit/s) in accordance with ITU-T V.90.</li> <li>3. Ethernet (IEEE 802.3 or faster).</li> <li>4. EURO-ISDN adapter, according to ETS 300 012 - 11.</li> <li>5. Wireless GSM modem/GPRS (see relevant ETSI specifications).</li> <li>6. EuroDocsis return channel modem in accordance with ES 201 488.</li> <li>7. IEEE 1394.</li> </ol> <p>See details in NorDig Unified chapter 9.3</p> <p>Note: The Interaction Channel Interface is not relevant for the NorDig Basic and NorDig Enhanced profiles, except as a front-end for IP-based networks</p>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> Verify functionality of interaction channel interface.</p> <p><b>Equipment:</b> Manufacturer describes used test setup and test procedures.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	<p>If possible describe if fault 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>	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 8:2 SCART Interface</b>	
<b>Section</b>	NorDig Unified 9.4	
<b>Requirement</b>	The NorDig IRD should have one SCART Interface in accordance with EN 50049-1 and EN 50157-2-1.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> Verify that the IRD SCART interface comply with the NorDig Unified requirements.</p> <p><b>Equipment:</b> Test signals are created using the test bed shown below:</p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]     D --&gt; F[VCR]           </pre> <p>The multiplex should contain a number of services with 4:3 picture aspect ratio, and one service with 16:9 aspect ratio. All services in the multiplex are descrambled before recording. And one of them contains DVB or Teletext subtitles.</p>	

	<p>If the IRD is IDTV, this test is not relevant.</p> <p><b>Test procedure:</b> Verify that IRD has at least one analog video and audio interface with SCART connector.</p> <p>The SCART interface provides analog audio and analog video in CVBS or RGB format.</p> <p>Monitor voltage on pin 8 and pin 16 on SCART when services with 4:3 and 16:9 aspect ratio video is selected.</p> <p><b>Expected results:</b> IRD has at least one analog video and audio output interface with SCART connector.</p> <p>The SCART interface provides analog audio and analog video in CVBS or RGB video format.</p> <p>Signalling in SCART is correct and shows corresponding display formats and subtitles are shown in all SCART connectors.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 8:3 Video performance</b>
<b>Section</b>	NorDig Unified 12.2
<b>Requirement</b>	Measurement results which comply with NorDig Unified requirements (Table 10.1)
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify video performance for RGB and PAL output signals.</p> <p><b>Test Equipment:</b> Test signals are created using the test bed shown below:</p> <div style="text-align: center;">  <pre> graph LR     A[MPEG 2-source] --&gt; B[Multiplex]     B --&gt; C[DVB-S/C/T Modulator]     C --&gt; D[Up Converter]     D --&gt; E[DVB Receiver]     E --&gt; F[Video analyzer]     G[PC Sigen] --- B             </pre> </div> <p><b>Test signal configuration:</b> A transport stream containing a video signal with a number of Insertion Test Signals (ITS) is used. The signals employed for this test is a TV-line with black luminance, a TV-line containing the CCIR 17 test signal and a TV-line containing (sin x)/x pulses. Another transport stream containing CCIR 331 test signal is used to check chroma/luma intermodulation. LO Phase noise not measured.</p> <p><b>Test procedure:</b> Measurements of test signal response at RGB and PAL output</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments



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<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 8:4 Audio performance</b>
<b>Section</b>	NorDig Unified 12.3
<b>Requirement</b>	<p>Verify test protocol from manufacturer for compliance with NorDig Unified. The manufacturer shall also guarantee that data are typical for the IRD version in regular sale.</p> <p>The measured audio test items shall comply with NorDig Unified requirements (Table 10.3)</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> Verify performance of audio output signals by checking test protocol from manufacturer. A limited number of measurements to verify basic audio performance.</p> <p><b>Test Equipment:</b> Test signals are created using the test beds shown below:</p> <pre> graph LR     A[MPEG 2-source] --- B[Multiplex]     C[PC Sigen] --- B     B --- D[DVB-S/C/T Modulator]     D --- E[Up Converter]     E --- F[DVB Receiver]     F --- G[Spectrum analyzer]     F --- H[Oscilloscope]     </pre> <p><b>Test signal configuration:</b> Several transport streams containing various audio test signals is used. The audio signals used for this test includes:          - Audio multiburst (L+R), 40 Hz to 15 kHz, - 6.0 dB<sub>r</sub> . Each burst with 1 s duration.          - 40 sec audio burst (L+R), 1.0 kHz, 0.0 dB<sub>r</sub>, followed by 40 sec silence.          - 1 sec audio bursts (R), 15 kHz, + 10.0 dB<sub>r</sub>. (L): silence.</p> <p><b>Test procedure:</b> Check test protocol from manufacturer. Audio signal measurements</p> <p><b>Expected results:</b> Audio performance of the decoded digital audio signal in analog audio output comply with required NorDig Unified performance.</p> <p><b>Note:</b> 0 dB<sub>r</sub> refers to a level equal to full scale – 12 dB. (Full scale is the level where clipping starts to occur). 0 dB<sub>u</sub> refers to a voltage equal to 0.7446 V<sub>rms</sub>.</p>



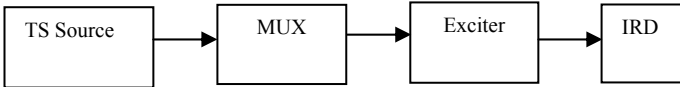
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

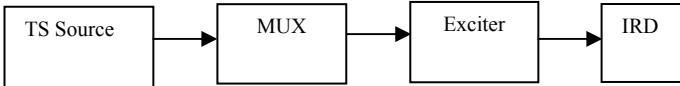
<b>Test Case</b>	<b>Task 8:5 Zapping time</b>																								
<b>Section</b>	NorDig Unified 12.4																								
<b>Requirement</b>	Sample test results in line with the NorDig Unified requirements. (Table 10.3)																								
<b>Test procedure</b>	<p><b>Purpose of test:</b> Verify zapping times</p> <p><b>Test Equipment:</b> Test bed with a transport stream with different TV services, scrambled and non scrambled IRD under test</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. A limited number of sample tests are done to check zapping times.</li> <li>2. Fill in test results</li> </ol> <p><b>Expected results:</b> Note: The figures in table shall be met for a GOP length of 12, a repetition rate of ECM of 2 per second and a repetition rate of PAT and PMT of 10 times per second. The picture on the display during the zapping time shall be either frozen or black and the sound shall be muted until the new session has been stabilised. The figures in the table are valid for any reception conditions.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Coming from ↓</th> <th style="width: 20%;">Going to ⇒</th> <th style="width: 20%;">Digital Scrambled Services</th> <th style="width: 20%;">Digital Services</th> <th style="width: 20%;">Analogue* Services</th> </tr> </thead> <tbody> <tr> <td>Digital Scrambled Services</td> <td></td> <td>2.5 second</td> <td>1.5 second</td> <td>1 second</td> </tr> <tr> <td>Digital Services</td> <td></td> <td>2.5 second</td> <td>1.5 second</td> <td>1 second</td> </tr> <tr> <td>Analogue Services</td> <td></td> <td>2.5 second</td> <td>1.5 second</td> <td>1 second</td> </tr> </tbody> </table> <p>* When demodulation of analogue RF programmes is available</p>					Coming from ↓	Going to ⇒	Digital Scrambled Services	Digital Services	Analogue* Services	Digital Scrambled Services		2.5 second	1.5 second	1 second	Digital Services		2.5 second	1.5 second	1 second	Analogue Services		2.5 second	1.5 second	1 second
Coming from ↓	Going to ⇒	Digital Scrambled Services	Digital Services	Analogue* Services																					
Digital Scrambled Services		2.5 second	1.5 second	1 second																					
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Analogue Services		2.5 second	1.5 second	1 second																					
<b>Test result(s)</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Coming from ↓</th> <th style="width: 20%;">Going to ⇒</th> <th style="width: 20%;">Digital Scrambled Services</th> <th style="width: 20%;">Digital Services</th> <th style="width: 20%;">Analogue* Services</th> </tr> </thead> <tbody> <tr> <td>Digital Scrambled Services</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Coming from ↓	Going to ⇒	Digital Scrambled Services	Digital Services	Analogue* Services	Digital Scrambled Services														
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Digital Scrambled Services																									

	Digital Services			
	Analogue Services			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments			
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information			
<b>Date</b>		<b>Sign</b>		

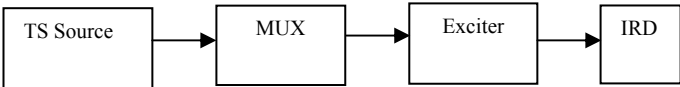
<b>Test Case</b>	<b>Task 8:6 HDTV - HDMI interface – HD Ready</b>			
<b>Section</b>	NorDig Unified 9.9.1			
<b>Requirement</b>	The NorDig HDTV level IRDs with display (iDTV-sets) shall support the requirements that are specified for high definition video interfaces by EICTA for compliant HD Ready iDTV-sets [58].  The NorDig HDTV level IRDs without display (STBs) shall have at least one High-Definition Multimedia Interface (HDMI) with type A connector [60], supporting displays that comply with the EICTA HD-Ready requirements [58].			
<b>Test procedure</b>	<b>The Manufactires shall verify the HD Ready certificate.</b>			
<b>Test result(s)</b>				
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments			
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information			
<b>Date</b>		<b>Sign</b>		

<b>Test Case</b>	<b>Task 8:7 HDTV - HDMI interface – EDID information</b>			
<b>Section</b>	NorDig Unified 9.9.2			
<b>Requirement</b>	The NorDig HDTV Level STB shall be able to use the EDID information provided by the display to automatically determine the STB output.			
<b>Test procedure</b>	<p><b>Purpose of test:</b> 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 IRDs having HDMI output interface this test is optional.</p>			

	<p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exc[Exciter]     Exc --&gt; IRD[IRD]             </pre> <p><b>Test procedure:</b></p> <p>Power On the IRD Verify that the IRD selects the display parameters according the EDID information.</p> <p><b>Expected result:</b></p> <p>The IRD uses the EDID information for the display parameters.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 8:8 HDTV - HDMI interface – Original format</b>
<b>Section</b>	NorDig Unified 9.9.2
<b>Requirement</b>	The NorDig 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 should select the display mode providing the best possible video quality. This is to avoid the STB output to go black, if there is a mismatch between received format and display capabilities.
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>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 IRDs having HDMI output interface this test is optional.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exc[Exciter]     Exc --&gt; IRD[IRD]             </pre> <p>Use following resolutions and frame rates in the test stream(s):</p> <ul style="list-style-type: none"> <li>• 720x576i25</li> <li>• 1280x720p50</li> <li>• 1920x1080i25</li> </ul> <p><b>Test procedure:</b></p> <p>Play a test stream Power On the IRD</p>

	<p>Tune to the service in test stream</p> <p>Verify that video is displayed in original format if possible for the display.</p> <p><b>Expected result:</b></p> <p>The IRD shall negotiate the display parameters according the input signal.</p>
<i>Test result(s)</i>	
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<i>Date</i>	<i>Sign</i>

<i>Test Case</i>	<b>Task 8:9 HDTV - HDMI – Manual setting for resolution</b>
<i>Section</i>	NorDig Unified 9.9.2
<i>Requirement</i>	It shall also be possible to manually set the default output format from the HDTV level STB to a fixed format. The fixed format shall include at least one of the following formats: 1280x720p@50Hz, 1920x1080i@25Hz/1920x1080p@25Hz and 1920x1080p@50Hz.
<i>Test procedure</i>	<p><b>Purpose of test:</b> To verify that the receiver is able to use the EDID information.</p> <p><b>Equipment:</b></p> <div style="text-align: center;">  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]             </pre> </div> <p><b>Test procedure:</b></p> <p>Set the manually the display format to 1280*720p50. Verify that format is set. Repeat the test with 1920*1080i25, 1920*1080p25 and 1920*1080p50 formats Fill in the test results.</p> <p><b>Expected result:</b></p> <p>It shall be possible to test output format manually.</p>
<i>Test result(s)</i>	
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<i>Date</i>	<i>Sign</i>

<i>Test Case</i>	<b>Task 8:10 HDTV - HDMI – Signal protection</b>
<i>Section</i>	NorDig Unified 9.9.4



<p><b>Requirement</b></p>	<p>The HDMI interface shall support the High-bandwidth Digital Content Protection (HDCP) [61]. It shall be possible to switch the HDCP on and off, as signalled via the SI-system, see section 12.7 and via the IRD's CA-system, as specified by the relevant network/CA operator.</p>																																																	
<p><b>Test procedure</b></p>	<p><b>Purpose of test:</b> To verify that the receiver is able set the status HDCP according the signal protection scheme.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exc[Exciter]     Exc --&gt; IRD[IRD]             </pre> </div> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Setup the equipment</li> <li>2. Set the content protection mode to one by one each mode in table below</li> <li>3. Fill in test results</li> </ol> <p><b>Expected result:</b></p> <p>It shall be possible to set the content protection mode.</p>																																																	
<p><b>Test result(s)</b></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">Mode</th> <th style="width: 45%;">IRD actions</th> <th style="width: 15%;">CA-system</th> <th style="width: 15%;">PMT-table</th> <th style="width: 20%;">NOK or OK</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>HDCP shall be disabled for this service regardless of HDCP user setting (Return to HDCP-user setting when leaving this service)</td> <td>HDCP Not wanted</td> <td>0x00 (HDCP Not wanted)</td> <td></td> </tr> <tr> <td>2</td> <td>HDCP shall be enabled for viewing this service (Return to HDCP-user setting when leaving this service)</td> <td>HDCP Wanted</td> <td>0x00 (HDCP Not wanted)</td> <td></td> </tr> <tr> <td>3</td> <td>Content protection is not required. HDCP may be enabled or disabled</td> <td>CP Not needed</td> <td>0x01* (Not needed)</td> <td></td> </tr> <tr> <td>4</td> <td>Content protection is required. HDCP shall be enabled for viewing this service</td> <td>CP Required</td> <td>0x01 (Not needed)</td> <td></td> </tr> <tr> <td>5</td> <td>SD service: HDCP may be enabled or disabled HD service: HDCP shall be enabled this service</td> <td>CP Not needed</td> <td>0x02 (cond'al requirement)</td> <td></td> </tr> <tr> <td>6</td> <td>Content protection is required. HDCP shall be enabled for viewing this service</td> <td>CP Required</td> <td>0x02 (cond'al requirement)</td> <td></td> </tr> <tr> <td>7</td> <td>Content protection is required. HDCP shall be enabled for viewing this service</td> <td>CP Not needed</td> <td>0x03 (CP required)</td> <td></td> </tr> <tr> <td>8</td> <td>Content protection is required. HDCP shall be enabled for viewing this service</td> <td>CP Required</td> <td>0x03 (CP required)</td> <td></td> </tr> </tbody> </table>					Mode	IRD actions	CA-system	PMT-table	NOK or OK	1	HDCP shall be disabled for this service regardless of HDCP user setting (Return to HDCP-user setting when leaving this service)	HDCP Not wanted	0x00 (HDCP Not wanted)		2	HDCP shall be enabled for viewing this service (Return to HDCP-user setting when leaving this service)	HDCP Wanted	0x00 (HDCP Not wanted)		3	Content protection is not required. HDCP may be enabled or disabled	CP Not needed	0x01* (Not needed)		4	Content protection is required. HDCP shall be enabled for viewing this service	CP Required	0x01 (Not needed)		5	SD service: HDCP may be enabled or disabled HD service: HDCP shall be enabled this service	CP Not needed	0x02 (cond'al requirement)		6	Content protection is required. HDCP shall be enabled for viewing this service	CP Required	0x02 (cond'al requirement)		7	Content protection is required. HDCP shall be enabled for viewing this service	CP Not needed	0x03 (CP required)		8	Content protection is required. HDCP shall be enabled for viewing this service	CP Required	0x03 (CP required)	
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<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 8:11 HDTV - Analogue video interface (option)</b>		
<b>Section</b>	NorDig Unified 9.9.1		
<b>Requirement</b>	The NorDig HDTV level IRD may provide down-converted versions of the received HDTV signals via analogue interfaces, where the output signal is down-converted to SDTV format		
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the IRD always outputs SD (576i) on the SCART or any other analogue video output (Y, P<sub>b</sub>, P<sub>r</sub>, RF-PAL or CVBS) connector.</p> <p>This test is relevant only for IRD with analogue video output interface.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exc[Exciter]     Exc --&gt; IRD[IRD]             </pre> </div> <p>The TS shall contain a service which has a video component that</p> <ul style="list-style-type: none"> <li>Change between 1280 x 720p@50Hz and 1920 x 1080i@25Hz video resolution</li> </ul> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>Set up the test environment according to above.</li> <li>Play out the transport stream with alternating video resolutions 1280 x 720p@50Hz and 1920 x 1080i@25Hz</li> <li>Make a channel search on the IRD</li> <li>Verify that the SCART or any other analogue video output has always SD (576i) regardless of HDMI setting and resolution.</li> </ol> <p><b>Expected result:</b> That the IRD only outputs SD (576i) on SCART any other analogue video output (i.e. not higher than 576i).</p>		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 8:12 Smart Card Interface</b>		
<b>Section</b>	NorDig Unified 10.3		



**NorDig**

<b>Requirement</b>	The NorDig IRD shall include at least one embedded smart card reader for use with conditional access and/or other applications. The smart card interface shall comply with ISO/IEC 7816 Part 1-3 [38]. The NorDig IRD does not need to support synchronous cards.			
<b>Test procedure</b>	<b>Purpose of test:</b> Verify functionality of smart card interface.  <b>Equipment:</b> Test bed providing transport streams with CA-scrambled services. IRD under test.  <b>Test procedure:</b> Select a CA-scrambled service and observe decoded picture/sound.			
<b>Test result(s)</b>				
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments			
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information			
<b>Date</b>	<table border="1" style="width: 100%;"><tr><td style="width: 50%;"></td><td style="width: 10%; text-align: center;">Sign</td><td style="width: 40%;"></td></tr></table>		Sign	
	Sign			

<b>Test Case</b>	<b>Task 8:13 Transport Stream Input/Output (Common Interface)</b>
<b>Section</b>	NorDig Unified 10.2
<b>Requirement</b>	The NorDig IRD should support the Common Interface, EN 50221. The Common Interface shall be prepared for modules of type 2. Support for type 3 is optional. See NorDig Unified 15.1.
<b>Test procedure</b>	<b>This requirement is tested in test: Task 13:1</b>

## 2.9 Task 9: SI and Navigator

### 2.9.1 General

These test tasks differ from the normal NorDig division of the test tasks. These test tasks are not listed in that order as the requirements appear in NorDig specification. Instead the order of the test tasks are divided in to a order how the different information data shall be able to be retrieved, handled and updated by the receiver. This division in this context is defined as following:

- Static PSI/SI data is defined as a data that must be updated by the receiver in the channel search or first time initialization.
- Quasi static PSI/SI data is defined as a data that must be updated by the receiver when it is toggled between stand-by mode and active mode or vice versa.
- Dynamic PSI/SI data is defined as a data that must be updated by the receiver whenever a change in the data occurs.

In order to maintain the reference to requirements, in every test task, the requirement from the specification is referenced.

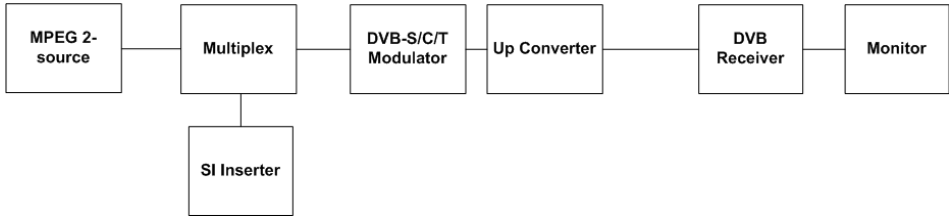
<b>Test Case</b>	<b>Task 9:1 SI: General</b>	
<b>Section</b>	NorDig Unified 13.1	
<b>Requirement</b>	All descriptors that are mandatory to receive according to NorDig Rules of Operation shall be transmitted. IRD must notice changes in SI tables within 1 second.	
<b>Test procedure</b>	This is general requirement that will be test in following tests.	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

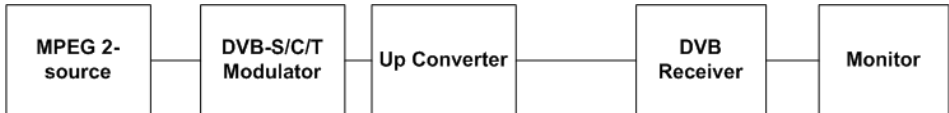
<b>Test Case</b>	<b>Task 9:2 SI: General – Undefined data structures</b>	
<b>Section</b>	NorDig Unified 13.1	
<b>Requirement</b>	If the receiver encounters a descriptor with an unrecognised tag or contex, the receiver should skip over that descriptor (using the length field) and proceed with decoding the following SI data.	
<b>Test procedure</b>	<p><b>Purpose of test:</b> Confirm the proper function</p> <p><b>Test procedure:</b> It is a general requirement, which is tested, in the following tests.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 9:3 SI: General – ‘Actual’ and ‘Other’ tables</b>	
<b>Section</b>	NorDig Unified 13.1	
<b>Requirement</b>	The IRD shall be able to process the PSI/SI tables, both for the ‘Actual’ and for ‘Other’ transport streams.	
<b>Test procedure</b>	<b>This is a general requirement, which is tested, in the following tests.</b>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 9:4 SI: SI data available through an API</b>	
<b>Section</b>	NorDig Unified 13.1	
<b>Requirement</b>	<p><b>In case of NorDig Basic:</b> The NorDig IRD shall be able to process, i.e. sort out, store and make available through the Man-Machine Interface (NorDig Basic) or an API (NorDig I), the incoming SI data (descriptors) as tabulated in NorDig Unified sections 12.2.2- 12.7, i.e. these are (minimum) mandatory descriptors for the receiver to decode and interpret, (see also Table 12.1 for an overview over minimum broadcast and receiver requirements). The processing shall be compliant with EN 300 468 and ETR 211.</p> <p><b>In case of NorDig Enhanced:</b> The NorDig IRD shall be able to process, i.e. sort out, store and make available through the DVB MHP API, the incoming SI data (descriptors) as tabulated in sections 12.2.2- 12.7, i.e. these are (minimum) mandatory descriptors for the receiver to decode and interpret, (see also Table 12.1 for an overview over minimum broadcast and receiver requirements). The processing shall be compliant with EN 300 468 and ETR 211. The NorDig IRD shall support all the DVB SI additions as defined in the DVB-MHP specification version 1.1.</p>	
<b>Test procedure</b>	<p><b>In case of NorDig Basic without MHP API:</b> Not tested.</p> <p><b>In case of NorDig Enhanced:</b> This test is part of the MHP Test Suite. Not tested here</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

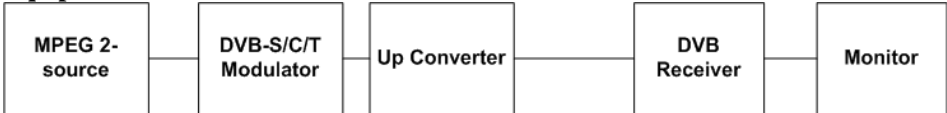
<b>Test Case</b>	<b>Task 9:5 SI: Text strings and field size of the SI descriptor</b>	
<b>Section</b>	NorDig Rules of operation 2.1.1	
<b>Requirement</b>	In NorDig transmission, text strings shall be coded using the ‘Latin Alphabet number 5’ as specified in ISO 8859-9 [i.e. our Nordic characters] (and then signalled with a first	

	byte '0x05' in the text field) or optional using the 'Latin Alphabet' as specified in ISO/IEC 6937 (see EN 300 468 [6] Appendix A).	
<b>Test procedure</b>	<p><b>Purpose of test:</b> Check the alphabet tables.</p> <p><b>Equipment:</b></p>  <p><b>Test procedure:</b> 1. Play-out test stream containing SI tables with text strings that is coded "Latin Alphabet number 5" 2. Verify that text strings are displayed as coded in "Latin Alphabet number 5"</p> <p><b>Expected result:</b> All text strings are displayed as defined.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>


<b>Test Case</b>	<b>Task 9:6 Navigator: General</b>	
<b>Section</b>	NorDig Unified 13.1	
<b>Requirement</b>	<p>The NorDig IRD shall implement a basic Navigator, which provides user access to system information, and allows the user to control the operation of the IRD. The Navigator is by definition part of the system software.</p> <p>The Navigator shall include a service list function and a basic Event Schedule Guide (ESG), see EN 300 468 [5].</p> <p>The Navigator shall also initiate bootloading</p>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To test the existent of the Navigator functions.</p> <p><b>Equipment:</b></p>  <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Start the Navigator.</li> <li>2. Check that it displays the valid services and allow control of the IRD.</li> <li>3. Check that a service list is presented and that EIT p/f is displayed.</li> <li>4. Check that the initiation of the bootloading is possible.</li> </ol>	

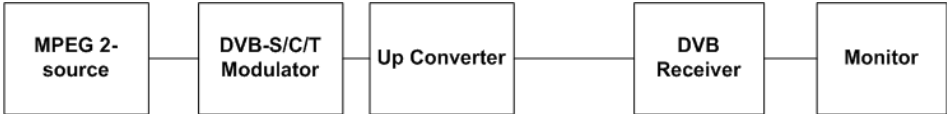
	<b>Expected result:</b>	
	The Navigator is present and complies with the requirement defined above.	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<i>Date</i>		<i>Sign</i>

### 2.9.2 Static PSI/SI data

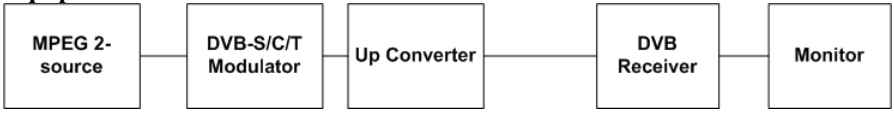
<i>Test Case</i>	<b>Task 9:7 Service list - Automatic channel search</b>	
<i>Section</i>	NorDig Unified 13.2.1	
<i>Requirement</i>	The service list shall be displayed to the user.  The user shall be able to select a service from the displayed service list.  The selected service shall appear immediately.	
<i>Test procedure</i>	<p><b>Purpose of test:</b> To verify that the service list has services on it and they are able to choose.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG 2-source] --- B[DVB-S/C/T Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor]   </pre> <p><b>Test procedure:</b> Start the Navigator and go through and select all services in the list in a random pattern.</p> <p><b>Expected result:</b> Verify that all services are selectable.</p>	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information	
<i>Date</i>		<i>Sign</i>

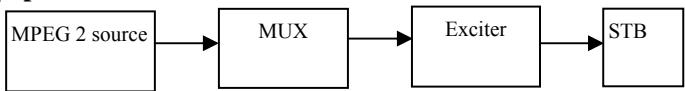
<i>Test Case</i>	<b>Task 9:8 Service list – NIT_actual service types</b>	
<i>Section</i>	NorDig Unified 13.1.4 and 13.1.5	
<i>Requirement</i>	The NorDig IRD shall minimum handle the service types listed in Table12.1. Service types that are not supported by the NorDig IRD should be ignored. (If the (SDTV) IRD do not	

	<p>support MPEG-4 AVC video decoder, it should not list/install within the TV service list service types for advanced codec; 0x16 and 0x19).</p> <p>The IRD shall build up different sections inside one service list or build up several service lists, one for each different service_type as the default IRD service_list(s).</p> <p>Minimum three different sections/lists shall be supported for three different categories of service_types and they are 'TV', 'Radio', and 'Data/Other' services.</p> <p>The NorDig IRD (1) shall during installation of services create a common service list for each category (i.e. all 0x01, 0x16 and 0x19 within same TV category list and so on for the Radio and Other/data categories).</p>																																																						
<p><b>Test procedure</b></p>	<p><b>Purpose of test:</b> To test that the different type of services are located on different lists.</p> <p><b>Equipment:</b></p> <div style="text-align: center;">  </div> <table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th>Service3</th> <th>Service 4</th> <th>Service 5</th> </tr> </thead> <tbody> <tr> <td>MUX</td> <td>SID 1100</td> <td>SID 1200</td> <td>SID 1300</td> <td>SID 1400</td> <td>SID 1500</td> </tr> <tr> <td>TS_id 1</td> <td>Service type 0x01</td> <td>Service type 0x02</td> <td>Service type 0x0C</td> <td>Service type 0x16</td> <td>Service type 0x16</td> </tr> <tr> <td>Network_id 1</td> <td>S_name Test11</td> <td>S_name Test12</td> <td>S_name Test13</td> <td>S_name Test14</td> <td>S_name Test15</td> </tr> <tr> <td>ON_id <sup>1)</sup></td> <td>PMT PID 1100</td> <td>PMT PID 1200</td> <td>PMT PID 1300</td> <td>PMT PID 1400</td> <td>PMT PID 1500</td> </tr> <tr> <td></td> <td>V PID 1109</td> <td>V PID 1209</td> <td>V PID 1309</td> <td>V PID 1409</td> <td>V PID 1509</td> </tr> <tr> <td></td> <td>A PID 1108</td> <td>A PID 1208</td> <td>A PID 1308</td> <td>A PID 1408</td> <td>A PID 1508</td> </tr> <tr> <td></td> <td>Logical_chan_desc 1 visible</td> <td>Logical_chan_desc 2 visible</td> <td>Logical_chan_desc 3 visible</td> <td>Logical_chan_desc 4 visible</td> <td>Logical_chan_desc 5 visible</td> </tr> <tr> <td></td> <td>Encrypted</td> <td>Clear</td> <td>Clear</td> <td>Clear</td> <td>Clear</td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>Control that the services on MUX has service types digital television services, digital radio service and data broadcast service signalled.</li> <li>Perform re-initialisation if needed.</li> <li>Check the service lists.</li> </ol> <p><b>Expected result:</b> Different types of services are available on different category lists or they are separated in one list to different categories. Categories are 'TV', 'Radio', and 'Data/Other' services.</p>		Service1	Service2	Service3	Service 4	Service 5	MUX	SID 1100	SID 1200	SID 1300	SID 1400	SID 1500	TS_id 1	Service type 0x01	Service type 0x02	Service type 0x0C	Service type 0x16	Service type 0x16	Network_id 1	S_name Test11	S_name Test12	S_name Test13	S_name Test14	S_name Test15	ON_id <sup>1)</sup>	PMT PID 1100	PMT PID 1200	PMT PID 1300	PMT PID 1400	PMT PID 1500		V PID 1109	V PID 1209	V PID 1309	V PID 1409	V PID 1509		A PID 1108	A PID 1208	A PID 1308	A PID 1408	A PID 1508		Logical_chan_desc 1 visible	Logical_chan_desc 2 visible	Logical_chan_desc 3 visible	Logical_chan_desc 4 visible	Logical_chan_desc 5 visible		Encrypted	Clear	Clear	Clear	Clear
	Service1	Service2	Service3	Service 4	Service 5																																																		
MUX	SID 1100	SID 1200	SID 1300	SID 1400	SID 1500																																																		
TS_id 1	Service type 0x01	Service type 0x02	Service type 0x0C	Service type 0x16	Service type 0x16																																																		
Network_id 1	S_name Test11	S_name Test12	S_name Test13	S_name Test14	S_name Test15																																																		
ON_id <sup>1)</sup>	PMT PID 1100	PMT PID 1200	PMT PID 1300	PMT PID 1400	PMT PID 1500																																																		
	V PID 1109	V PID 1209	V PID 1309	V PID 1409	V PID 1509																																																		
	A PID 1108	A PID 1208	A PID 1308	A PID 1408	A PID 1508																																																		
	Logical_chan_desc 1 visible	Logical_chan_desc 2 visible	Logical_chan_desc 3 visible	Logical_chan_desc 4 visible	Logical_chan_desc 5 visible																																																		
	Encrypted	Clear	Clear	Clear	Clear																																																		
<p><b>Test result(s)</b></p>																																																							
<p><b>Conformity</b></p>	<p><input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments</p>																																																						
<p><b>Comments</b></p>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information</p>																																																						
<p><b>Date</b></p>	<p style="text-align: right;"><b>Sign</b></p>																																																						

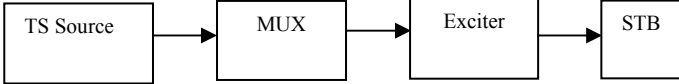
<b>Test Case</b>	<b>Task 9:9 Service list - Inconsistent of SDT_actual and NIT_actual information</b>
<b>Section</b>	NorDig Rules Of Operation 2.6.2
<b>Requirement</b>	Optional descriptors: Service_list_descriptor
<b>Test procedure</b>	<p><b>Purpose of the test:</b> To verify if the IRD updates service list quasi-static from SDT_actual instead of NIT_actual service_list_descriptor.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]   </pre> <p><b>Test procedure:</b></p> <p>Service_list in NIT is optional to broadcast. Therefore, it is important to verify how the receiver extract information from the SDT_actual and NIT_actual service_list in case the information is inconsistent.</p> <p>Transport stream shall have at least one service configured. The SDT_actual signalize the service, but the service_list_descriptor in NIT_actual shall not have the service listed.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Make first time installation of the IRD</li> <li>2. Verify the service_list_descriptor doesn't list at least one of the services carried within transport stream. With other words, there is inconsistent between SDT_actual and service_list_descriptor in NIT_actual</li> <li>3. Verify that all the carried services within transport stream are in the service list.</li> </ol> <p><b>Expected result:</b> Services, carried within transport stream and listed in SDT_actual, are listed in service list independently if the services are listed in service_list_descriptor in NIT_actual.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:10 Service list – NIT_actual interpretation</b>
<b>Section</b>	NorDig Unified 13.2.1
<b>Requirement</b>	<p>The information in the descriptors specified in table 13.1 and 13.2 (NorDig Unified) shall be displayed. The original network operator name may be omitted in case only one network is available.</p> <p>Note: Tables 13.1 and 13.2 descriptors</p> <p>Network_name_descriptor Terrestrial_delivery_system_descriptor Service_list_descriptor Nordig Logic_channel_descriptor</p>

	Service_list_descriptor CA_identifier_descriptor																								
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the information in descriptors are displayed.</p> <p><b>Equipment:</b></p>  <table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>MUX</td> <td>SID 1100</td> <td>SID 1200</td> <td rowspan="5">Can be chosen depending of the distribution media</td> </tr> <tr> <td>TS_id 1</td> <td>S_name Test11</td> <td>S_name Test12</td> </tr> <tr> <td>Network_id 1</td> <td>PMT PID 1100</td> <td>PMT PID 1200</td> </tr> <tr> <td>ON_id <sup>1)</sup></td> <td>V PID 1109</td> <td>V PID 1209</td> </tr> <tr> <td></td> <td>A PID 1108</td> <td>A PID 1208</td> </tr> <tr> <td></td> <td>Logical_chan_desc 1 visible</td> <td>Logical_chan_desc 2 visible</td> <td></td> </tr> </tbody> </table> <p><sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xFE00 (operational network). Network_name NorDigTest</p> <p><b>Test procedure:</b> Start the Navigator. Check that the following information is available for all services:</p> <ul style="list-style-type: none"> <li>• network name, i.e. NorDigTest</li> <li>• transmission parameters for respective distribution media</li> <li>• service name, i.e. Test11 and Test12 on stored on channel positions 1 and 2.</li> <li>• service type, i.e. Digital television service</li> </ul> <p><b>Expected result:</b> Verify that all the information specified above is available.</p>		Service1	Service2	Frequency	MUX	SID 1100	SID 1200	Can be chosen depending of the distribution media	TS_id 1	S_name Test11	S_name Test12	Network_id 1	PMT PID 1100	PMT PID 1200	ON_id <sup>1)</sup>	V PID 1109	V PID 1209		A PID 1108	A PID 1208		Logical_chan_desc 1 visible	Logical_chan_desc 2 visible	
	Service1	Service2	Frequency																						
MUX	SID 1100	SID 1200	Can be chosen depending of the distribution media																						
TS_id 1	S_name Test11	S_name Test12																							
Network_id 1	PMT PID 1100	PMT PID 1200																							
ON_id <sup>1)</sup>	V PID 1109	V PID 1209																							
	A PID 1108	A PID 1208																							
	Logical_chan_desc 1 visible	Logical_chan_desc 2 visible																							
<b>Test result(s)</b>																									
<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																								
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information																								
<b>Date</b>	<b>Sign</b>																								

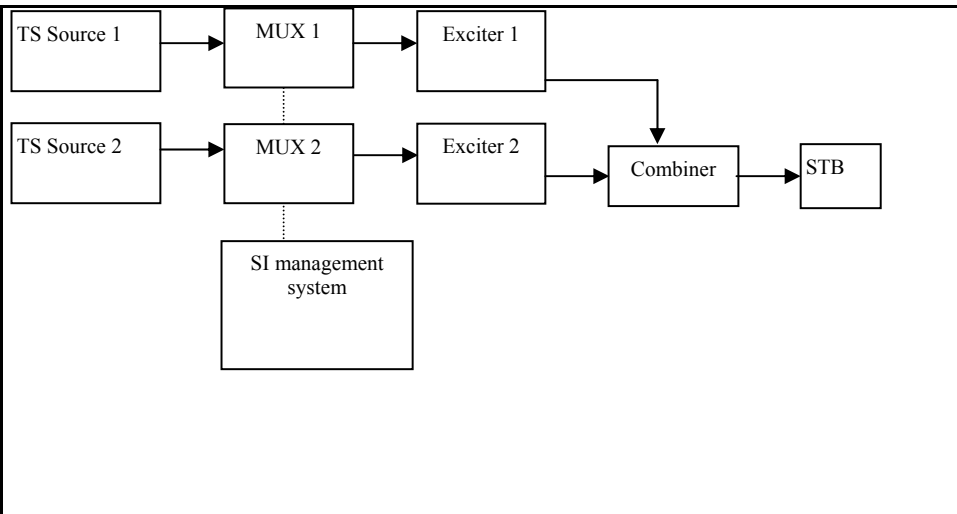
<b>Test Case</b>	<b>Task 9:11 Service list – NIT_actual original_network_ID</b>
<b>Section</b>	Nordig Unified 13.2.2
<b>Requirement</b>	Original_network_ID within 0xFF00-0xFFFF (temporary_private_use), shall only be used for test and (shorter) demonstration transmission. Receiver will not install or display services within these original_network_ids.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To test the reception in the test network.</p> <p><b>Equipment:</b></p> 

	Service1	Service2	Frequency
MUX TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media
<sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xFE00 (operational network).			
<b>Test procedure:</b> <ol style="list-style-type: none"> <li>1. Turn on receiver.</li> <li>2. Do re-initialization or make sure there are no services in channel list or in ESG.</li> <li>3. Make sure that the ON_id is on the range of the operational network.</li> <li>4. Do channel search.</li> <li>5. Check in channel list or ESG that the services are available.</li> <li>6. Change ON_id to 0xFF00.</li> <li>7. Do re-initialization or make sure there are no services in channel list or in ESG.</li> <li>8. Do channel search.</li> <li>9. Check in channel list or ESG that there are no services available.</li> <li>10. Change ON_id to 0xFFFF.</li> <li>11. Repeat from test point 7.</li> </ol>			
<b>Expected result:</b> Services are not available for ON-id range 0xFF00 – 0xFFFF.			
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 9:12 Service list – NIT_actual network_ID</b>										
<b>Section</b>	Nordig Unified 13.2.2										
<b>Requirement</b>	Network_ID within 0xFF01-0xFFFF (temporary_private_use), shall only be used for test and (shorter) demonstration transmission. Receiver will not install or display services within these network_ids.										
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>To test the reception in the test network.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exc[Exciter]     Exc --&gt; STB[STB]           </pre> <table border="1"> <thead> <tr> <th></th> <th>Service2</th> <th>Service2</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>MUX TS_id 1 Network_id <sup>1)</sup> ON_id <sup>2)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td>Can be chosen depending of the distribution media.</td> </tr> </tbody> </table> <p><sup>1)</sup> Network_id on the range 0x0001 – 0xFDFF (operational network).  <sup>2)</sup>ON_id (Original_network_id) can be chosen on range 0x0001-0xFE00 (operational network)</p> <p><b>Test procedure:</b></p>				Service2	Service2	Frequency	MUX TS_id 1 Network_id <sup>1)</sup> ON_id <sup>2)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media.
	Service2	Service2	Frequency								
MUX TS_id 1 Network_id <sup>1)</sup> ON_id <sup>2)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media.								

	<ol style="list-style-type: none"> <li>1. Turn on receiver.</li> <li>2. Do re-initialization or make sure there are no services in channel list or in ESG.</li> <li>3. Make sure that the network_id is on the range of the operational network.</li> <li>4. Do channel search.</li> <li>5. Check in channel list or ESG that there are no services available.</li> <li>6. Change the network_id to 0xFF01.</li> <li>7. Do re-initialization or make sure there are no services in channel list or in ESG.</li> <li>8. Do channel search.</li> <li>9. Check in channel list or ESG that there are no services available.</li> <li>10. Change the network_id to 0xFFFF.</li> <li>11. Repeat from test point 7.</li> </ol> <p><b>Expected result:</b></p> <p>Services are not available for network_id range 0xFF01 – 0xFFFF.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:13 Service list – NIT_other and SDT_other</b>
<b>Section</b>	NorDig Unified 13.2.2 and 14.2.3
<b>Requirement</b>	<p>The NorDig IRD shall make use of the descriptors listed in below in all NIT_actual (the transport stream the NorDig IRD is tuned to) and NIT_other (other transport stream) tables available in order to update the service list (system delivery data, number of transport streams, logic channel number etc).</p> <p>NIT descriptors:</p> <p>Network_name_descriptor  Satellite_delivery_system_descriptor  Cable_delivery_system_descriptor  Terrestrial_delivery_system_descriptor  Service_list_descriptor</p> <p>A Navigator shall never display services that the IRD is not able to receive or decode except for descrambling.</p> <p>The IRD shall use the descriptors listed in table 13.2 from both SDT_actual and SDT_other tables to update the service list (service names etc.).</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>To verify that the services, which are not able to receive, but signaled in SDT_other and/or NIT_other, are not visible in service list.</p> <p><b>Equipment:</b></p>



	Service1	Service2	Frequency
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media.
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Can be chosen depending of the distribution media. Not same as for Exciter 1

<sup>1)</sup>ON\_id (Original\_network\_id) can be chosen in range 0x0001-0xfe00 (operational network)

Following tables are signaled in both MUX:

- SDT\_actual and
- SDT\_other
- NIT\_acutal inclusive service\_list
- NIT\_other inclusive service\_list

With following information content:

- In MUX1, the SDT\_actual corresponds the SDT\_other in MUX2.
- In MUX2, the SDT\_actual corresponds the SDT\_other in MUX1
- In MUX1, the NIT\_actual corresponds the NIT\_other in MUX2
- In MUX2, the NIT\_acutal corresponds the NIT\_other in MUX1

With other words, the SDT and NIT information is cross-distributed between multiplexes.

**Test procedure:**

The idea of the test is that for stationary reception, the services from the SDT\_other and NIT\_other service\_list\_description shall not be installed in the service list if the services are not able to be received. If the services are able to receive, the SDT\_other and NIT\_other information can be used to update the service list information.

1. Attenuate the output level of the exciter 1 to very low level or disconnect the output cable.
2. Clear all channels on service list (channel list in receiver).
3. Make new channel search.
4. Verify that no services are installed carried within the transport stream through

	<p>MUX1.</p> <ol style="list-style-type: none"> <li>5. Fill in the measurement record in test results.</li> <li>6. Increase the output level of the exciter1 to a output level that is able to be received by the receiver.</li> <li>7. Clear all channels on service list (channel list in receiver).</li> <li>8. Make new channel search.</li> <li>9. Verify that all the services carried within transport stream from both MUX1 and MUX2 are installed in the service list (channel list in receiver).</li> <li>10. Zap to service1 in MUX1.</li> <li>11. Change the information content of the SDT_actual and NIT_actual in MUX2 and verify the information content of the SDT_other and NIT_other in MUX1 is changed as well. Following information content shall be changed:             <ol style="list-style-type: none"> <li>a. Network name in network_name_descriptor</li> <li>b. Service name of the service1 in MUX2 in service_descriptor</li> </ol> </li> <li>12. Toggle receiver from active mode to standby mode and vice versa.</li> <li>13. Verify if the content of the information is updated in the receiver service list (channel list).</li> </ol> <p><b>Expected result:</b>            Services that are not able to be received are not available in the service list (channel list).            Information of the services are updated in case of change of information content in SDT_other and NIT_other tables.</p>							
<i>Test result(s)</i>	<table border="1"> <thead> <tr> <th style="text-align: left;">Requirement</th> <th style="text-align: left;">NOK or OK</th> </tr> </thead> <tbody> <tr> <td>Services are not listed in service list (channel list) when the services are not able to be received</td> <td></td> </tr> <tr> <td>Information in the service list is updated</td> <td></td> </tr> </tbody> </table>		Requirement	NOK or OK	Services are not listed in service list (channel list) when the services are not able to be received		Information in the service list is updated	
Requirement	NOK or OK							
Services are not listed in service list (channel list) when the services are not able to be received								
Information in the service list is updated								
<i>Conformity</i>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments							
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information							
<i>Date</i>		<i>Sign</i>						

<i>Test Case</i>	<b>Task 9:14 Service list – Simultaneous transmission of LCD v1 and v2</b>
<i>Section</i>	NorDig Unified 13.2.7.3
<i>Requirement</i>	<p>Within one and the same network (i.e. within one Original Network ID), the NorDig IRD should be able to sort service/channel into the service list when transmitting both NorDig logical channel descriptor (LCD) version 1 and version 2.</p> <p>When broadcasting both LCD version 1 and version 2 within one Original Network ID, the NorDig IRD supporting both descriptors shall only sort according to the version 2 (i.e. NorDig LCD version 2 has higher priority).</p>



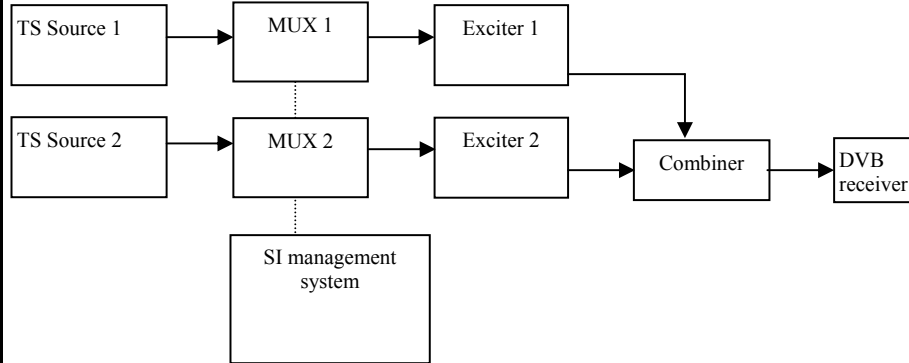
**NorDig**

**Test procedure**

**Purpose of test:**

To verify the support for simultaneous transmission of LCD ver.1 and Ver2.

**Equipment:**



	Service1	Service2	Service3	Frequency
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 LCN Ver.1: 1 visible LCN Ver.2: 2 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 LCN Ver.1: 2 visible LCN Ver.2: 1 visible	SID 1300 S_name Test13 PMT PID 1300 V PID 1309 A PID 1308 LCN Ver.1: 3 visible LCN Ver.2: 3 visible	Can be chosen depending of the distribution media
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 LCN Ver.1: 4 visible LCN Ver.2: 5 visible	SID 2200 S_name Test22 PMT PID 2200 V PID 2209 A PID 2208 LCN Ver.1: - LCN Ver.2: -		Can be chosen depending of the distribution media, but cannot be same as in MUX1

<sup>1)</sup>ON\_id (Original\_network\_id) can be chosen in range 0x0001-0xfe00 (operational network)

Note: It is not obvious that network operators will broadcast different LCN in different version of LCD. However, for testing purposes, different LCNs are broadcasted.

**Test procedure:**

1. Perform factory reset to the receiver
2. Perform automatic channel search
3. Verify that the all services are found
4. Verify that the services are stored according the LCD version 2 signaling.

**Expected result:**

The channel numbers are correct.

Service in service list should be stored as listed below:

Service name	IRD supports version 2
Test12	1
Test11	2
Test13	3
Test21	5
Test22	Last in the list

**Test result(s)**

**Conformity**  OK  Fault  Major  Minor, define fail reason in comments



<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 9:15 Service list – Simultaneous reception of multiple networks and NorDig LCD</b>
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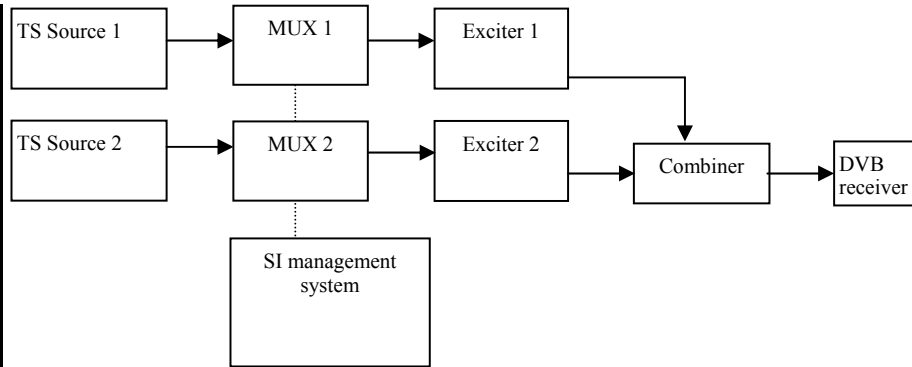
<b>Section</b>	NorDig Unified 13.2.7.4
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<b>Requirement</b>	<p>The NorDig IRD with terrestrial front-end shall be able to install several (DTT) original networks (with different original network ids). For multiple original networks (original network ids) the NorDig IRD shall first sort/list all services from one original network (original network id) according to that LCD, before sorting/listing the next original network. The first original network is the primary network and any additional received original networks are referred to as secondary network(s).</p> <p>The user shall be able to set which original network that shall be the primary, either via the user preferences, e.g. matching country setting (preferred) or via user selectable list of available original networks or similar mechanism. In order to simplify this, the NorDig IRD should map/translate the original network id into the country name. This means that for IRD where the user has set the country setting, the primary network should automatic be the country matching the original network id (and its services shall be listed first in the NorDig IRD’s service list).</p>
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<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the support for the reception of multiple networks and NorDig LCN.</p> <p><b>Equipment:</b></p> <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.-&gt; SI[SI management system]     MUX2 -.-&gt; SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; DVB[DVB receiver]     </pre> <table border="1"> <thead> <tr> <th></th> <th><b>Service1</b></th> <th><b>Service2</b></th> <th></th> <th><b>Frequency</b></th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id X<sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td></td> <td>Can be chosen depending of the distribution media</td> </tr> <tr> <td><b>MUX2</b> TS_id 2 Network_id 2 ON_id Y<sup>1)</sup></td> <td>SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 1 visible</td> <td>SID 2200 S_name Test22 PMT PID 2200 V PID 2209 A PID 2208 Logical_chan_desc 2 visible</td> <td></td> <td>Can be chosen depending of the distribution media, but cannot be same as in MUX1</td> </tr> </tbody> </table> <p><sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network). Values for X and Y shall be selected different.</p>		<b>Service1</b>	<b>Service2</b>		<b>Frequency</b>	<b>MUX1</b> TS_id 1 Network_id 1 ON_id X <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media	<b>MUX2</b> TS_id 2 Network_id 2 ON_id Y <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 1 visible	SID 2200 S_name Test22 PMT PID 2200 V PID 2209 A PID 2208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media, but cannot be same as in MUX1
	<b>Service1</b>	<b>Service2</b>		<b>Frequency</b>												
<b>MUX1</b> TS_id 1 Network_id 1 ON_id X <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media												
<b>MUX2</b> TS_id 2 Network_id 2 ON_id Y <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 1 visible	SID 2200 S_name Test22 PMT PID 2200 V PID 2209 A PID 2208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media, but cannot be same as in MUX1												

	<p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Perform factory reset to the receiver</li> <li>2. The primary network is either user selectable or automatically based on the country settings in the receiver.</li> <li>3. Perform channel search</li> <li>4. Verify that the all services are found</li> <li>5. Verify that the services are ordered firstly by the ON_id and secondly by the LCD.</li> </ol> <p><b>Expected result:</b></p> <p>User is able to select which network is the primary network.</p> <p>The channel numbers are correct.</p> <p>Service in service list should be stored as listed below:</p> <table border="1"> <thead> <tr> <th>Service name</th> <th>ON_id X as primary</th> <th>ON_id Y as primary</th> </tr> </thead> <tbody> <tr> <td>Test11</td> <td>1</td> <td>3</td> </tr> <tr> <td>Test12</td> <td>2</td> <td>4</td> </tr> <tr> <td>Test21</td> <td>3</td> <td>1</td> </tr> <tr> <td>Test22</td> <td>4</td> <td>2</td> </tr> </tbody> </table>	Service name	ON_id X as primary	ON_id Y as primary	Test11	1	3	Test12	2	4	Test21	3	1	Test22	4	2
Service name	ON_id X as primary	ON_id Y as primary														
Test11	1	3														
Test12	2	4														
Test21	3	1														
Test22	4	2														
<b>Test result(s)</b>																
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments															
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information															
<b>Date</b>	<b>Sign</b>															

<b>Test Case</b>	<b>Task 9:16 Service list - Priority of LCN between SD and HDTV services</b>
<b>Section</b>	NorDig Unified 13.2
<b>Requirement</b>	Whenever two or more services within same category are allocated to the same logical_channel_number, the NorDig HDTV IRD shall first priorities the advanced codec services as stated in Table12.1 above (see chapter 12.1.4 for priority between different services within same service category).
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the support for priority of LCN between SD and HD services.</p> <p><b>Equipment:</b></p>



	Service1	Service2	Service3	Frequency
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 S_type 0x01 PMT PID 1100 V PID 1109 A PID 1108 LCN Ver.1: 1 visible LCN Ver.2: 1 visible	SID 1200 S_name Test12 S_type 0x19 PMT PID 1200 V PID 1209 A PID 1208 LCN Ver.1: 2 visible LCN Ver.2: 2 visible	SID 1300 S_name Test13 S_type 0x19 PMT PID 1300 V PID 1309 A PID 1308 LCN Ver.1: 3 visible LCN Ver.2: 3 visible	Can be chosen depending of the distribution media
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 S_type 0x01 PMT PID 2100 V PID 2109 A PID 2108 LCN Ver.1: 3 visible LCN Ver.2: 3 visible	SID 2200 S_name Test22 S_type 0x01 PMT PID 2200 V PID 2209 A PID 2208 LCN Ver.1: 4 visible LCN Ver.2: 4 visible		Can be chosen depending of the distribution media, but cannot be same as in MUX1

<sup>1)</sup>ON\_id (Original\_network\_id) can be chosen in range 0x0001-0xfe00 (operational network)

Note 1: Receiver can use the service\_type when sorting the HD and SD services.

Note 2: Test13 (HD) has higher priority than Test21 (SD) in HDTV receiver.

**Test procedure:**

1. Perform factory reset to the receiver
2. Perform channel search
3. Verify that the all services are found
4. Verify that the services are ordered according the priority

**Expected result:**

The channel numbers are correct.

The NorDig HDTV IRD shall first priorities the advanced codec services.

Services in service list should be stored as listed below:

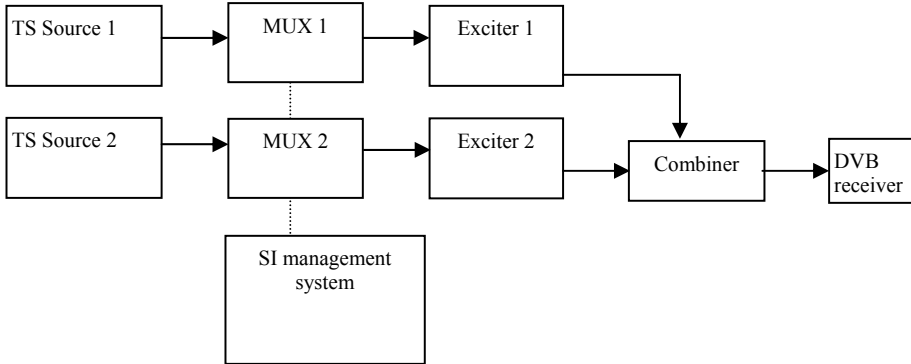
Service name	SDTV receiver	HDTV receiver
Test11	1	1
Test12	-	2
Test13	-	3
Test21	3	Last in the list
Test 22	4	4

**Test result(s)**

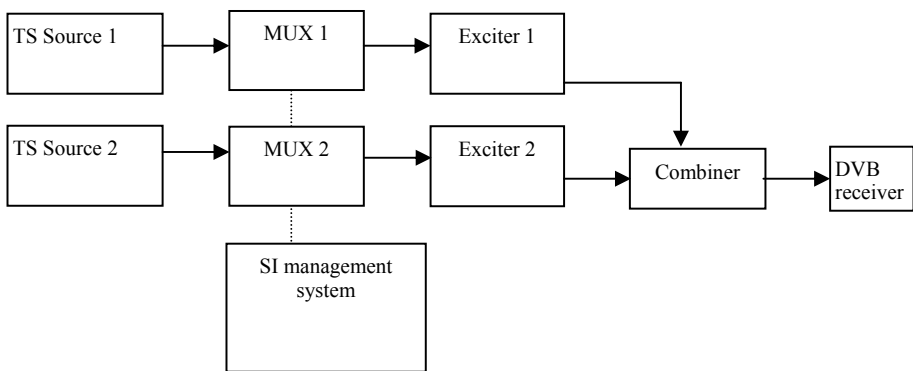
**Conformity**  OK  Fault  Major  Minor, define fail reason in comments

**Comments** If possible describe if fault can be fixed with software update:  YES  NO


	Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 9:17 NIT_actual – frequency_list_descriptor</b>																	
<b>Section</b>	NorDig Unified 13.2.3;																	
<b>Requirement</b>	<p>NIT descriptors mandatory to receive and interpret if broadcasted:</p> <p>Network_name_descriptor  Service_list_descriptor  Terrestrial_delivery_system_descriptor  Linkage_descriptor  Private_data_specifier_descriptor  Frequency_list_descriptor  Nordig Logic_channel_descriptor</p>																	
<b>Test procedure</b>	<p><b>Purpose of test:</b>  To check that when there is not correct center_frequency signalled in terrestrial_system_delivery_desc, but the alternative frequencies are available in Frequency_list_desc.</p> <p>Note: This test is only for terrestrial IRDs.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.- SI[SI management system]     MUX2 -.- SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; DVB[DVB receiver]     </pre> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th></th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td>NIT: Center frequency: 474 MHz</td> <td>666 MHz</td> </tr> <tr> <td><b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup></td> <td>SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible</td> <td></td> <td></td> <td>730 MHz</td> </tr> </tbody> </table> <p><sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Change the terrestrial_system_delivery_parameters on MUX1 that they are not correct compared to DVB-T mode in Exciter 1.</li> </ol>				Service1	Service2		Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	NIT: Center frequency: 474 MHz	666 MHz	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible			730 MHz
	Service1	Service2		Frequency														
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	NIT: Center frequency: 474 MHz	666 MHz														
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible			730 MHz														

	<ol style="list-style-type: none"> <li>2. Configure the frequency_list descriptor to have the transmission frequency.</li> <li>3. Zap between a service on MUX1 and MUX2.</li> <li>4. Confirm that the reception is possible.</li> <li>5. Change the center_frequency terrestrial_system_delivery_parameter on MUX1 so that it has the same center_frequency as Exciter 2.</li> <li>6. Zap between a service on MUX1 and MUX2.</li> <li>7. Confirm that the reception is possible.</li> </ol> <p><b>Expected result:</b> The services are able to receive with incorrect centre_frequency in terrestrial_system_delivery_descriptor.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:18 NIT_actual – Missing terrestrial_system_delivery_descriptor</b>			
<b>Section</b>	NorDig Unified 13.2.2;			
<b>Requirement</b>	NIT descriptors mandatory to receive and interpret if broadcasted:  Network_name_descriptor Service_list_descriptor Terrestrial_delivery_system_descriptor Linkage_descriptor Private_data_specifier_descriptor Frequency_list_descriptor Nordig Logic_channel_descriptor			
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the functionality of the receiver when there is no terrestrial_system_delivery_desc signaled.</p> <p>Note: This test is only for terrestrial IRDs.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.- SI[SI management system]     MUX2 -.- SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; DVB[DVB receiver]       </pre>			
	<b>MUX1</b>	<b>Service1</b>	<b>Service2</b>	<b>Frequency</b>
	TS_id 1	SID 1100 S_name Test11 PMT PID 1100	SID 1200 S_name Test12 PMT PID 1200	NIT: Missing terrestrial  666 MHz

	Network_id 1 ON_id <sup>1)</sup>	V PID 1109 A PID 1108 Logical_chan_desc 1 visible	V PID 1209 A PID 1208 Logical_chan_desc 2 visible	system_ delivery_ descriptor	
	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible			730 MHz
<sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)					
<b>Test procedure:</b> <ol style="list-style-type: none"> <li>1. Remove the terrestrial_system_delivery_descriptor in MUX1</li> <li>2. Do channel search.</li> <li>3. Zap between a service on MUX1 and MUX2.</li> <li>4. Confirm that the reception of services in MUX1 and MUX2 is possible.</li> </ol>					
<b>Expected result:</b> The services are able to receive even when terrestrial_delivery_descriptor is missing.					
<b>Test result(s)</b>					
<b>Conformity</b> <input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments					
<b>Comments</b> If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information					
<b>Date</b>			<b>Sign</b>		

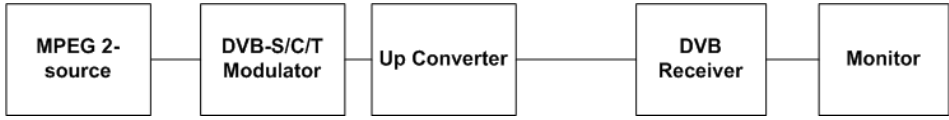
<b>Test Case</b>	<b>Task 9:19 SDT_actual service_descriptor and CA_identifier_descriptor</b>
<b>Section</b>	NorDig Unified 13.3.2 and 13.3.3
<b>Requirement</b>	<p>SDT descriptors mandatory to receive and interpret if broadcasted:</p> <p>Service_descriptor CA_identifier_descriptor Linkage_descriptor</p> <p>This descriptor may be present in the SDT when at least one service component is scrambled. The CA_system_id is allocated by ETSI and is given by ETR 162 [16]. The descriptor may be used statically (recommended). It will in that case be set according to the services regular/normal scrambling status. Alternatively it may be used dynamically, in accordance with the current services scrambling status.</p> <p>This static use enables IRDs to “grey mark” services that cannot be descrambled due to lack of the required CA-system for the relevant service(s). It allows the IRD to display services that are only temporary (event based) scrambled.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check the support for the Service descriptor and CA identifier descriptor.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[Multiplex]     B --&gt; C[DVB-S/C/T Modulator]     C --&gt; D[Up Converter]     D --&gt; E[DVB Receiver]           </pre>

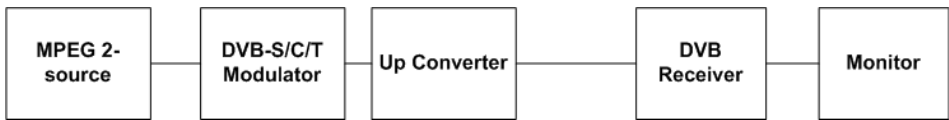
	Service1	Service2	Service3	Frequency
MUX TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 Service type 0x01 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible Encrypted	SID 1200 Service type 0x02 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible Clear	SID 1300 Service type 0x0C S_name Test13 PMT PID 1300 V PID 1309 A PID 1308 Logical_chan_desc 3 visible Clear	Can be chosen depending of the distribution media
<sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)				
<b>Test procedure:</b>				
<ol style="list-style-type: none"> <li>1. Verify that CA_identifier_descriptor is signaled in SDT_actual for another CA_system_id than supported by the receiver. If the receiver doesn't support any CA system, the used CA system in EIT_actual p/f can have any valid CA_system_id.</li> <li>2. Do the first time initialization or a channel search</li> <li>3. Verify that the service1 is displayed as non-available, e.g. "grey marked".</li> </ol>				
<b>Expected result:</b>				
The service1 is displayed as non-available by the receiver.				
<b>Test result(s)</b>				
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments			
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information			
<b>Date</b>		<b>Sign</b>		

<b>Test Case</b>	<b>Task 9:20 SDT_actual and service_identifier_descriptorr</b>		
<b>Section</b>	NorDig Unified 13.1		
<b>Requirement</b>	The NorDig IRD shall be able to to process, i.e. sort out, store and make available through an API, the incoming SI data (descriptors) as tabulated in table 12.1.		
<b>Test procedure</b>	<b>This requirement is tested with API.</b>		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

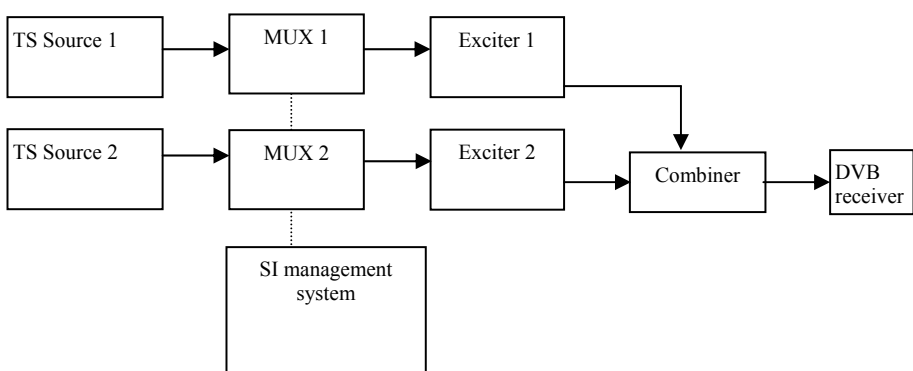
### 2.9.3 Quasi static PSI/SI data

<b>Test Case</b>	<b>Task 9:21 Quasi static update of SDT_actual</b>		
<b>Section</b>	NorDig Unified 13.1		
<b>Requirement</b>	The IRD shall at least start updating for any changes in the received "quasi-static" SI data, (NIT and SDT i.e. SI that is normally stored in the flash memory for service		

	navigations such as service_name, service_ID, number of services), after it return to active from stand-by mode.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the quasi-static use of the SDT_actual information.</p> <p><b>Equipment:</b></p>  <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>Change the information in SDT;             <ol style="list-style-type: none"> <li>service_name</li> <li>service_ID</li> </ol> </li> <li>Check that the changes are triggered by toggling the receiver from active mode to stand-by mode and vice versa</li> </ol> <p>Additionally changed tables / descriptors write down in comments which information is changed.</p> <p><b>Expected result:</b> Changes are triggered and made..</p>
<b>Test result(s)</b>	<p>Update is made:</p> <p><input type="checkbox"/> From active mode to stand-by mode</p> <p><input type="checkbox"/> From stand-by mode to active mode</p> <p><input type="checkbox"/> In stand-by mode</p>
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	<p>If possible describe if fault 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>
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:22 Quasi static update of SDT_actual</b>
<b>Section</b>	NorDig Unified 13.3.4
<b>Requirement</b>	<p>SDT descriptors mandatory to receive and interpret if broadcasted:</p> <p>Linkage_descriptor</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check the support for the Linkage to a CA replacement service in SDT.</p> <p><b>Equipment:</b></p>  <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>Select a service from test stream. IRD is not able to descramble the service.</li> <li>Add linkage to a CA replacement service</li> <li>Verify reaction in IRD by toggling the receiver from active mode to stand-by</li> </ol>

	mode and vice versa. <b>Expected result:</b> If IRD is not able to descramble the service and a service CA replacement service linkage descriptor is present then the receiver shall present this replacement service.
<b>Test result(s)</b>	Update is made: <input type="checkbox"/> From active mode to stand-by mode <input type="checkbox"/> From stand-by mode to active mode <input type="checkbox"/> In stand-by mode
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:23 Quasi-static update of SDT_actual – linkage to NorDig simulcast replacement service</b>																																	
<b>Section</b>	NorDig Unified 13.3.4																																	
<b>Requirement</b>	0x82, NorDig Simulcast replacement service, linkage from an (MPEG2 ) SDTV based service to an (MPEG4 AVC) HDTV replacement service with the same content. It may be used during simulcasting of a service in both an SDTV and an HDTV version on separate service ids with same content within the same original network id. This linkage may be included in the (MPEG2) SDTV service (service_type 0x01) within the SDT pointing to the HDTV version (service_type 0x19) of the service. Whenever it is used, it will be used quasi-static.																																	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the support for the linkage to simulcast replacement service in SDT_actual.</p> <p>This test is relevant for HDTV receiver only.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.- SI[SI management system]     MUX2 -.- SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; DVB[DVB receiver]     </pre> <table border="1"> <thead> <tr> <th></th> <th><b>Service1</b></th> <th><b>Service2</b></th> <th><b>Frequency</b></th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b></td> <td>SID 1100</td> <td>SID 1200</td> <td rowspan="6">Can be chosen depending of the distribution media</td> </tr> <tr> <td>TS_id 1</td> <td>S_name Test11</td> <td>S_name Test12</td> </tr> <tr> <td>Network_id 1</td> <td>S_type 0x01</td> <td>S_type 0x19</td> </tr> <tr> <td>ON_id<sup>1)</sup></td> <td>PMT PID 1100</td> <td>PMT PID 1200</td> </tr> <tr> <td></td> <td>V PID 1109</td> <td>V PID 1209</td> </tr> <tr> <td></td> <td>A PID 1108</td> <td>A PID 1208</td> </tr> <tr> <td></td> <td>LCN Ver.1: 1 visible</td> <td>LCN Ver.1: 2 visible</td> <td></td> </tr> <tr> <td></td> <td>LCN Ver.2: 1 visible</td> <td>LCN Ver.2: 2 visible</td> <td></td> </tr> </tbody> </table>				<b>Service1</b>	<b>Service2</b>	<b>Frequency</b>	<b>MUX1</b>	SID 1100	SID 1200	Can be chosen depending of the distribution media	TS_id 1	S_name Test11	S_name Test12	Network_id 1	S_type 0x01	S_type 0x19	ON_id <sup>1)</sup>	PMT PID 1100	PMT PID 1200		V PID 1109	V PID 1209		A PID 1108	A PID 1208		LCN Ver.1: 1 visible	LCN Ver.1: 2 visible			LCN Ver.2: 1 visible	LCN Ver.2: 2 visible	
	<b>Service1</b>	<b>Service2</b>	<b>Frequency</b>																															
<b>MUX1</b>	SID 1100	SID 1200	Can be chosen depending of the distribution media																															
TS_id 1	S_name Test11	S_name Test12																																
Network_id 1	S_type 0x01	S_type 0x19																																
ON_id <sup>1)</sup>	PMT PID 1100	PMT PID 1200																																
	V PID 1109	V PID 1209																																
	A PID 1108	A PID 1208																																
	LCN Ver.1: 1 visible	LCN Ver.1: 2 visible																																
	LCN Ver.2: 1 visible	LCN Ver.2: 2 visible																																

	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 S_type 0x01 PMT PID 2100 V PID 2109 A PID 2108 LCN Ver.1: 3 visible LCN Ver.2: 3 visible  SDT_actual: linkage_descriptor 0x82 pointing to service2 on MUX1	Can be chosen depending of the distribution media, but cannot be same as in MUX1
<sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)			
<b>Test procedure:</b> <ol style="list-style-type: none"> <li>1. Verify that all services are available in SDT_actual</li> <li>2. Verify that the linkage to a simulcast replacement service in MUX2 points to service2 in MUX1.</li> <li>3. Verify that all services are able to be received and decoded</li> <li>4. Choose the service1 on MUX2</li> <li>5. If IRD is a HDTV receiver and capable to decode the corresponding HDTV service2 in MUX1, verify that receiver receives and decodes service2 on MUX1</li> </ol>			
<b>Expected result:</b>  Verify that receiver selects HDTV service (service2 in MUX1) instead of SDTV service (service in MUX1) after updating its service information quasi-statically.			
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

<b>Test Case</b>	<b>Task 9:24 Quasi static update of service list – service addition</b>
<b>Section</b>	NorDig Unified 13.1 and 14.2.4
<b>Requirement</b>	The IRD shall at least start updating for any changes in the received “quasi-static” SI data, (NIT and SDT i.e. SI that is normally stored in the flash memory for service navigations such as service_name, service_ID, number of services), after it return to active from stand-by mode.  ... Initiation of update in the Service List that the IRD is not able to perform in the ‘background’ without disturbances or user action/confirmation, shall (only) be made after manual power up or after user selection to an affected service/transport stream (e.g. when re-scanning is needed).



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<b>Test procedure</b>	<p><b>Purpose of the test:</b> To check that the IRD updates service list quasi-static when a service is added within transport stream.</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --- B[DVB-S/C/T Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor]             </pre> </div> <p>NOTE: For the terrestrial networks where several transmitters can be received simultaneously, it is important to verify the parameters original_network_id, transport_stream_id and service_id to make a service unique. In cases where original_network_id and transport_stream_id are the same, but the services carried within transport stream differs, network_id can be interpreted to verify if the transport stream belongs to an other region.</p> <p><b>Test procedure:</b></p> <p>In initial phase transport stream carries at least one service. In second phase at least one new service is added inclusive the required PSI/SI signalization parameters.</p> <ol style="list-style-type: none"> <li>1. Make first time installation of the IRD or verify that the receiver doesn't have the service which will be added in the service list already installed in the service list..</li> <li>2. Check that the original service is accessed.</li> <li>3. Add a new service within transport stream             <ol style="list-style-type: none"> <li>a. Verify the service is added in SDT_actual, PAT and PMT.</li> <li>b. Verify the service is added in service in service_list_descriptor in NIT_actual</li> </ol> </li> <li>4. Toggle receiver from active mode to standby mode and from standby mode to active mode</li> <li>5. Verify the added service is added to service list.</li> </ol> <p><b>Expected result:</b> IRD automatically adds and updates the new service in the service list The service it is accessible.</p>
<b>Test result(s)</b>	<p>If possible, mark when the service addition is done:</p> <p style="margin-left: 40px;"><input type="checkbox"/> From active mode to stand-by mode</p> <p style="margin-left: 40px;"><input type="checkbox"/> From stand-by mode to active mode</p> <p style="margin-left: 20px;"><input type="checkbox"/> In stand-by mode</p>
<b>Conformity</b>	<p><input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments</p>
<b>Comments</b>	<p>If possible describe if fault 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>
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:25 Quasi static update of service list – service remove</b>
<b>Section</b>	NorDig Unified 13.1 and 14.2.4
<b>Requirement</b>	<p>The IRD shall at least start updating for any changes in the received “quasi-static” SI data, (NIT and SDT i.e. SI that is normally stored in the flash memory for service navigations such as service_name, service_ID, number of services), after it return to active from stand-by mode.</p> <p>... Initiation of update in the Service List that the IRD is not able to perform in the ‘background’ without disturbances or user action/confirmation, shall (only) be made after manual power up or after user selection to an affected service/transport stream (e.g.</p>

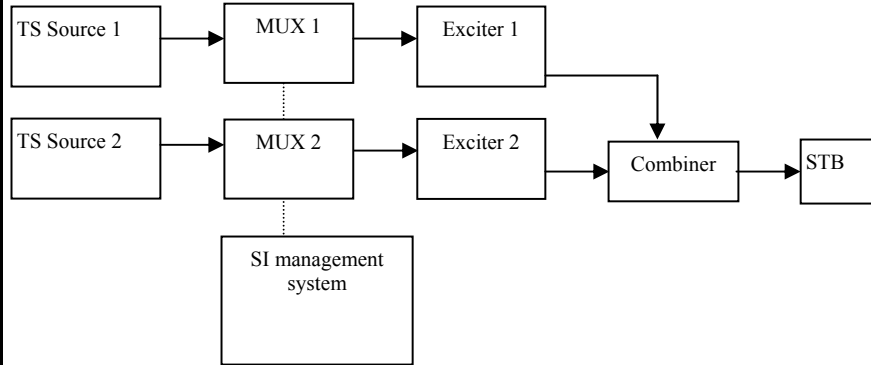
when re-scanning is needed).

**Test procedure**

**Purpose of the test:**

To check that the IRD updates service list quasi-static when a service is removed within transport stream.

**Equipment:**



	<b>Service1</b>	<b>Service2</b>		<b>Frequency</b>
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media.
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Bouquet SI All information in EIT.	Can be chosen depending of the distribution media. Not same as for Exciter 1

<sup>1)</sup>ON\_id (Original\_network\_id) can be chosen in range 0x0001-0xfe00 (operational network)

NOTE: For the terrestrial networks where several transmitters can be received simultaneously, it is important to verify the parameters original\_network\_id, transport\_stream\_id and service\_id to make a service unique. In cases where original\_network\_id and transport\_stream\_id are the same, but the services carried within transport stream differs, network\_id can be interpreted to verify if the transport stream belongs to an other region.

**Test procedure:**

In initial phase transport stream carries at least two services. In second phase one service is removed inclusive the required PSI/SI signalization parameters.

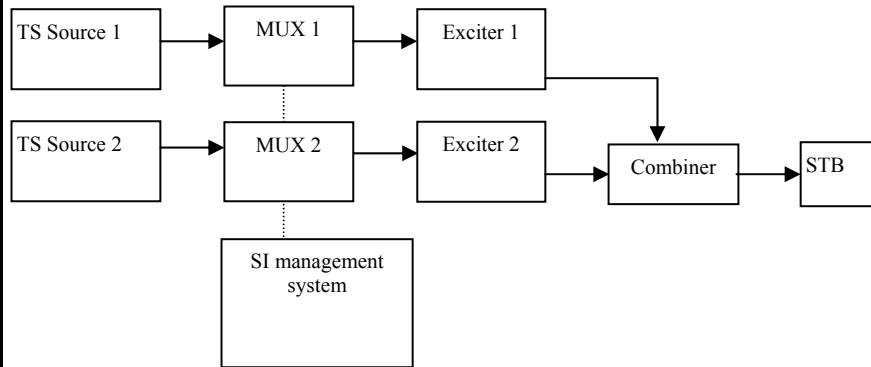
**Test procedure:**

1. Make first time installation of the IRD or verify that all the carried services within transport stream are in the service list.
2. Remove a service2 carried within transport stream through MUX1
  - a. Verify the service2 is removed from SDT\_actual, PAT and PMT in MUX1.
  - b. Verify the service2 is removed from service\_list\_descriptor in NIT\_actual in MUX1.
  - c. Verify the service2 is removed from SDT\_other in MUX2 in case the SDT\_other is signaled.
3. Toggle receiver from active mode to standby mode and from standby mode to

	<p>active mode</p> <p>4. Verify the service removed from the service list.</p> <p><b>Expected result:</b> IRD automatically removes the service from the service list.</p> <p>NOTE 1: If the removed service is reserved for any reason, e.g. for timer use, the receiver will have a conflict in that time when the removed service is requested. It is receiver manufacture responsibility to handle such a conflict.</p> <p>NOTE 2: In that time when the service is removed from the transport stream and user is watching an other service, displaying of any OSD is not allowed, due to the possibility that the viewer may be disturbed of that, e.g. in case of recording another service</p> <p>NOTE 3: If a user requests a removed service by zapping to that service, an OSD request to remove the service is allowed.</p>
<b>Test result(s)</b>	<p>If possible, mark when the service remove is done:</p> <p><input type="checkbox"/> From active mode to stand-by mode <input type="checkbox"/> From stand-by mode to active mode</p> <p>Does the receiver remove the service from the service list if the user is zapping to a removed service:</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	<p>If possible describe if fault 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>
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:26 Quasi static update of NorDig LCN v1</b>
<b>Section</b>	NorDig Unified 13.2.1 and 14.2.2
<b>Requirement</b>	<p>NIT descriptors mandatory to receive and interpret if broadcasted:</p> <p>Private_data_specifier_descriptor NorDig channel descriptor</p> <p>Services that are not listed in NorDig Logic_channel_descriptor, shall be displayed in the service list(s) and shall be located last in the list (for that service_type).</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b></p> <p>To check the support for the private data specifier and NorDig logic channel version 1 descriptors.</p> <p>To verify that the services, which are not listed in NorDig logic_channel_descriptor are displayed last in service list for that service type.</p>

**Equipment:**



	Service1	Service2	Service3	Frequency
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 S type 1 PMT PID 1100 V PID 1109 A PID 1108 Logic number 1 visible	SID 1200 S_name Test12 S type 12 PMT PID 1200 V PID 1209 A PID 1208 Logic number 0 non-visible	SID 1300 S_name Test13 S type 2 PMT PID 1300 V PID 1309 A PID 1308 Logic number 3 visible	Can be chosen depending of the distribution media.
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 S type 1 PMT PID 2100 V PID 2109 A PID 2108 Logic number 3 visible	SID 2200 S_name Test22 S type 1 PMT PID 2200 V PID 2209 A PID 2208 Logic number missing	SID 2300 S_name Test23 S type 1 PMT PID 2300 V PID 2309 A PID 2308 Logic number 98 visible	Can be chosen depending of the distribution media. Not same as for Exciter 1

<sup>1)</sup>ON\_id (Original\_network\_id) can be chosen in range 0x0001-0xfe00 (operational network)

**Test procedure:**

1. Verify that the private\_data\_specifier\_descriptor and NorDig\_channel\_descriptor are signaled in NIT\_actual.
2. If needed perform a re-initialisation and a channel search.
3. Verify that the services from MUX 1 and MUX2 are located in service list as they are signaled.
4. Fill in the measurement record 1
5. Verify the service2 in MUX2 is listed last in the TV service list.
6. Change the content of the following logical\_channel\_descriptors
  - a. service1 in MUX2: from 3 to 99 (remains visible)
  - b. service2 in MUX1: from 0 to 1 (visible)
7. Toggle between active mode and standby mode.
8. Verify the services are stored at their logical numbers in the service list.
9. Fill in the measurement record 2.

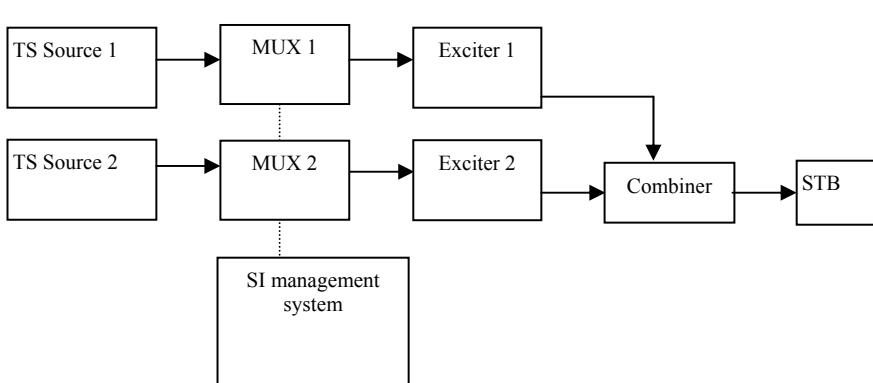
**Expected result:**

Services are stored in correct type of service lists and in their signaled logical channel positions.  
Service2 in MUX2 is listed last in the TV service list.

**Test result(s)**

Measurement record 1

	<table border="1"> <tr> <th>TV list</th> <th>Radio list</th> <th>Data list</th> <th>NOK or OK</th> </tr> <tr> <td>1 Test11 3 Test21 98 Test23 99 Test22</td> <td>3 Test13</td> <td></td> <td></td> </tr> </table>	TV list	Radio list	Data list	NOK or OK	1 Test11 3 Test21 98 Test23 99 Test22	3 Test13		
	TV list	Radio list	Data list	NOK or OK					
1 Test11 3 Test21 98 Test23 99 Test22	3 Test13								
Measurement record 2	<table border="1"> <tr> <th>TV list</th> <th>Radio list</th> <th>Data list</th> <th>NOK or OK</th> </tr> <tr> <td>1 Test11 98 Test23 99 Test21 100 Test22</td> <td>3 Test13</td> <td>1 Test12</td> <td></td> </tr> </table>	TV list	Radio list	Data list	NOK or OK	1 Test11 98 Test23 99 Test21 100 Test22	3 Test13	1 Test12	
TV list	Radio list	Data list	NOK or OK						
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<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments								
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information								
<b>Date</b>	<b>Sign</b>								

<b>Test Case</b>	<b>Task 9:27 Quasi static update of NorDig LCN v2</b>				
<b>Section</b>	NorDig Unified 13.2.7				
<b>Requirement</b>	NIT descriptors mandatory to receive and interpret if broadcasted:  Private_data_specifier_descriptor NorDig_logical_channel_descriptor v2				
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check the support for the private data specifier and NorDig logic channel version 2 descriptors.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.- SI[SI management system]     MUX2 -.- SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; STB[STB]     </pre>				
		<b>Service1</b>	<b>Service2</b>	<b>Service3</b>	<b>Frequency</b>
<b>MUX1</b>	SID 1100	SID 1200	SID 1300	Can be chosen depending of the distribution	
TS_id 1	S_name Test11	S_name Test12	S_name Test13		
Network_id 1	S type 1	S type 12	S type 2		

	ON_id <sup>1)</sup>	PMT PID 1100 V PID 1109 A PID 1108 Logic number 1 visible	PMT PID 1200 V PID 1209 A PID 1208 Logic number 0 non-visible	PMT PID 1300 V PID 1309 A PID 1308 Logic number 3 visible	media.																			
	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 S type 1 PMT PID 2100 V PID 2109 A PID 2108 Logic number 3 visible	SID 2200 S_name Test22 S type 1 PMT PID 2200 V PID 2209 A PID 2208 Logic number missing	SID 2300 S_name Test23 S type 1 PMT PID 2300 V PID 2309 A PID 2308 Logic number 98 visible	Can be chosen depending of the distribution media. Not same as for Exciter 1																			
	<sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)																							
	Five logical_channel_descriptors are defined in both MUX1 and MUX2 as follows:																							
	MUX1:																							
	<table border="1"> <thead> <tr> <th>Channel list ID</th> <th>Channel list name</th> <th>Country code</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>ListSWE</td> <td>SWE</td> </tr> <tr> <td>2</td> <td>ListFIN</td> <td>FIN</td> </tr> <tr> <td>3</td> <td>ListNOR</td> <td>NOR</td> </tr> <tr> <td>4</td> <td>ListDNK</td> <td>DNK</td> </tr> <tr> <td>5</td> <td>ListICE</td> <td>ICE</td> </tr> </tbody> </table>						Channel list ID	Channel list name	Country code	1	ListSWE	SWE	2	ListFIN	FIN	3	ListNOR	NOR	4	ListDNK	DNK	5	ListICE	ICE
Channel list ID	Channel list name	Country code																						
1	ListSWE	SWE																						
2	ListFIN	FIN																						
3	ListNOR	NOR																						
4	ListDNK	DNK																						
5	ListICE	ICE																						
	MUX2:																							
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1	ListSWE	SWE																						
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3	ListNOR	NOR																						
4	ListDNK	DNK																						
5	ListICE	ICE																						
	<b>Test procedure:</b>																							
	<ol style="list-style-type: none"> <li>Verify that the private_data_specifier_descriptor and NorDig_channel_descriptor are signaled in NIT_actual.</li> <li>If needed perform a re-initialisation and a channel search.</li> <li>Verify that the services from MUX 1 and MUX2 are located in service list as they are signaled.</li> <li>Fill in the measurement record 1</li> <li>Verify the service2 in MUX2 is listed last in the TV service list.</li> <li>Change the content of the following logical_channel_descriptors             <ol style="list-style-type: none"> <li>service1 in MUX2: from 3 to 99 (remains visible)</li> <li>service2 in MUX1: from 0 to 1 (visible)</li> </ol> </li> <li>Toggle between active mode and standby mode.</li> <li>Verify the services are stored at their logical numbers in the service list.</li> <li>Fill in the measurement record 2.</li> </ol>																							
	<b>Expected result:</b>																							
	Services are stored in correct type of service lists, with correct channel list name, and in their signaled logical channel positions. Service2 in MUX2 is listed last in the TV service list.																							
<b>Test result(s)</b>	Measurement record 1 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Selected country settings in receiver</td> <td></td> </tr> <tr> <td>Selected channel list name</td> <td></td> </tr> </table>						Selected country settings in receiver		Selected channel list name															
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Measurement record 2	<table border="1"> <tr> <td>Selected country settings in receiver</td> <td></td> </tr> <tr> <td>Selected channel list name</td> <td></td> </tr> </table> <table border="1"> <thead> <tr> <th>TV list</th> <th>Radio list</th> <th>Data list</th> <th>NOK or OK</th> </tr> </thead> <tbody> <tr> <td>1 Test11 98 Test23 99 Test21 100 Test22</td> <td>3 Test13</td> <td>1 Test12</td> <td></td> </tr> </tbody> </table>	Selected country settings in receiver		Selected channel list name		TV list	Radio list	Data list	NOK or OK	1 Test11 98 Test23 99 Test21 100 Test22	3 Test13	1 Test12	
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<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments												
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information												
<b>Date</b>	<b>Sign</b>												

<b>Test Case</b>	<b>Task 9:28 Quasi-static update of NIT_actual – Linkage to an information service about the network</b>
<b>Section</b>	NorDig Unified 13.2.2
<b>Requirement</b>	NIT Linkage descriptors mandatory to receive and interpret if broadcasted:  0x01 Linkage to an information service about the network 0x02 Linkage to EPG service 0x04 Linkage to transport stream that carries EIT Schedule information for all services 0x09 Linkage to DVB/ETSI System Software Download Service 0x81 Linkage to NorDig System Software Download Service
<b>Test procedure</b>	<b>Purpose of test:</b> To check the support for the Linkage to an information service about the network descriptor.  <b>Test procedure:</b>  From the receiver point of view the linkage to an information service about the network, is practically read dynamically when the user request that information. However, the information of the the linkage to an information service about the network content can be updated when toggling between active mode and standby mode for faster access. The NorDig specification defines the NIT_actual as quasi-static data and therefore this test is classified as quasi-static.  <b>This requirement is tested only with API.</b>
<b>Test result(s)</b>	



NorDig

<b>Conformity</b>	<input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

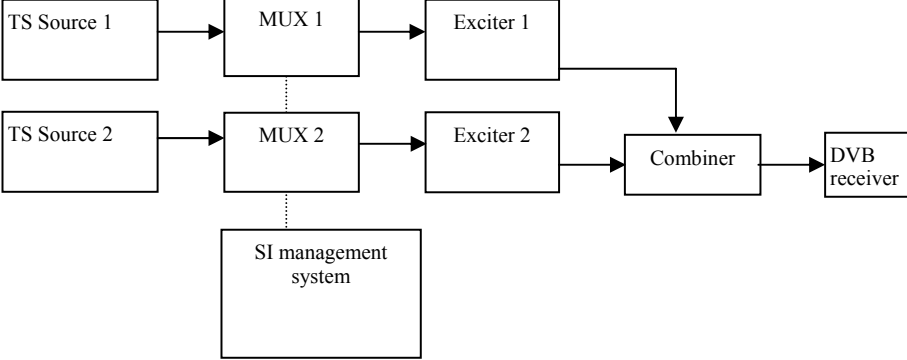
<b>Test Case</b>	<b>Task 9:29 Quasi-static update of NIT_actual – Linkage to EPG service</b>																		
<b>Section</b>	NorDig Unified 13.2.2																		
<b>Requirement</b>	NIT Linkage descriptors mandatory to receive and interpret if broadcasted:  0x01 Linkage to an information service about the network 0x02 Linkage to EPG service 0x04 Linkage to transport stream that carries EIT Schedule information for all services 0x09 Linkage to DVB/ETSI System Software Download Service 0x81 Linkage to NorDig System Software Download Service																		
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check the support for the Linkage to EPG service descriptor. To test the use of the linkage_descriptor 0x02 founded in NIT.</p> <p><b>Equipment:</b></p> <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.- SI[SI management system]     MUX2 -.- SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; STB[STB]     </pre> <table border="1"> <thead> <tr> <th></th> <th><b>Service1</b></th> <th><b>Service2</b></th> <th></th> <th><b>Frequency</b></th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td>NIT: Linkage to EPG service at SID 2200</td> <td>Can be chosen depending of the distribution media.</td> </tr> <tr> <td><b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup></td> <td>SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible</td> <td>SID 2200 S_name Test22 PMT PID 2200 V PID 2209 A PID 2208 Logical_chan_desc 0 not visible</td> <td>NIT: Linkage to EPG service at SID 2200</td> <td>Can be chosen depending of the distribution media. Not same as for Exciter 1</td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p><b>Test procedure:</b>  From the receiver point of view, the linkage to EPG service, is practically read dynamically when the user request the EPG. However, the information of the linkage to EPG content can be updated when toggling between active mode and standby mode for faster access. The NorDig specification defines the NIT_actual as quasi-static data and therefore this test is classified as quasi-static.</p>					<b>Service1</b>	<b>Service2</b>		<b>Frequency</b>	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	NIT: Linkage to EPG service at SID 2200	Can be chosen depending of the distribution media.	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible	SID 2200 S_name Test22 PMT PID 2200 V PID 2209 A PID 2208 Logical_chan_desc 0 not visible	NIT: Linkage to EPG service at SID 2200	Can be chosen depending of the distribution media. Not same as for Exciter 1
	<b>Service1</b>	<b>Service2</b>		<b>Frequency</b>															
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	NIT: Linkage to EPG service at SID 2200	Can be chosen depending of the distribution media.															
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible	SID 2200 S_name Test22 PMT PID 2200 V PID 2209 A PID 2208 Logical_chan_desc 0 not visible	NIT: Linkage to EPG service at SID 2200	Can be chosen depending of the distribution media. Not same as for Exciter 1															

	<ol style="list-style-type: none"> <li>1. Check that there is an EPG service available in the stream at SID 2200.</li> <li>2. Press the guide button and check that EPG is started.</li> <li>3. Change a parameter in the linkage to EPG content</li> <li>4. Toggle between active mode and standby mode.</li> <li>5. If it is relevant, note if the data content in the linkage is updated.</li> </ol> <p><b>Expected result:</b> The EPG is started. (Not relevant for NorDig Basic)</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

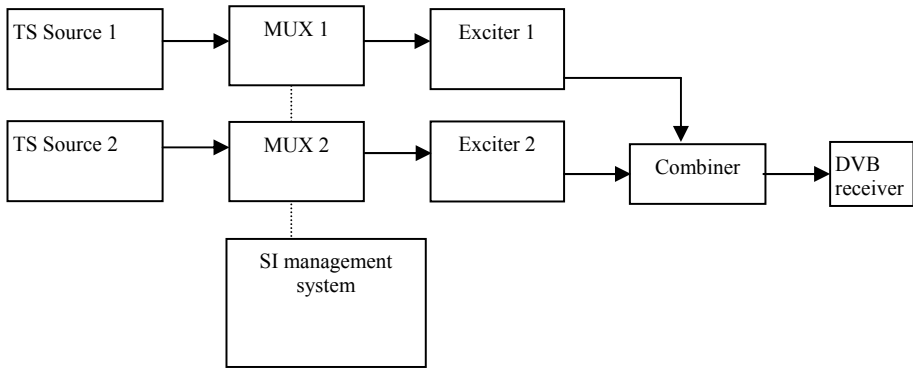
<b>Test Case</b>	<b>Task 9:30 Quasi-static update of NIT_actual – Linkage to TS that carriers EIT sch information for all services</b>
<b>Section</b>	NorDig Unified 13.2.2
<b>Requirement</b>	Linkage_type 0x04 (“Transport stream containing complete network/bouquet SI”) is used for this purpose.
<b>Test procedure</b>	<p>From the receiver point of view, the linkage to TS that carriers EIT sch information for all services, is practically read dynamically when the user request that information. However, the information of the the linkage to TS that carriers EIT sch information for all services content can be updated when toggling between active mode and standby mode for faster access. The NorDig specification defines the NIT_actual as quasi-static data and therefore this test is classified as quasi-static.</p> <p><b>This requirement is tested in Task 9:39.</b></p>

<b>Test Case</b>	<b>Task 9:31 Quasi-static update of NIT_actual – Linkage to System Software Download service</b>
<b>Section</b>	NorDig Unified 13.2.2
<b>Requirement</b>	<p>NIT Linkage descriptors mandatory to receive and interpret if broadcasted:</p> <p>0x09 Linkage to DVB/ETSI System Software Download Service 0x81 Linkage to NorDig System Software Download Service</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check the support for the Linkage to DVB/ETSI System Software Download Service And Linkage to NorDig System Software Download Service descriptors.</p> <p><b>Test procedure:</b></p> <p><b>This requirement is tested in Task 6:5</b></p>



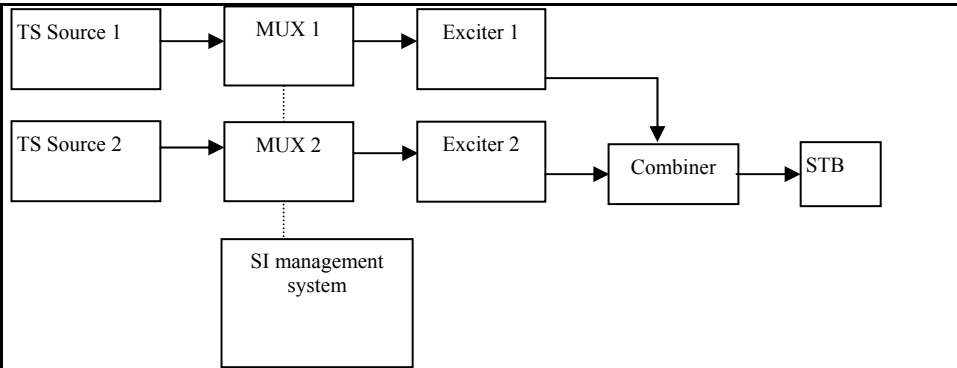
<b>Test Case</b>	<b>Task 9:32 Dynamic update of SDT_actual free_CA_mode and linkage_to a CA replacement service</b>												
<b>Section</b>	NorDig Unified 13.1 and 13.3.4												
<b>Requirement</b>	<p>SDT descriptors mandatory to receive and interpret if broadcasted:</p> <p>Linkage_descriptor</p> <p>0x05, linkage to a service replacement service. When present, the receiver shall automatically switch to the replacement service if the 'running_status' is set to "1" (not running) and if the receiver are able to receive the SDT containing the original service during the replacement, also switch back when 'running_status' is set to "4" (running).</p>												
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the support for the linkage to CA replacement service and free_CA_mode in SDT_actual.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.- SI[SI management system]     MUX2 -.- SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; DVB[DVB receiver]     </pre> <table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id<sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  SDT: linkage_descriptor 0x03 pointing to service1 on MUX2</td> <td>Can be chosen depending of the distribution media</td> </tr> <tr> <td><b>MUX2</b> TS_id 2 Network_id 2 ON_id<sup>1)</sup></td> <td>SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible</td> <td></td> <td>Can be chosen depending of the distribution media, but cannot be same as in MUX1</td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Verify that all services have free_CA_mode 0 in SDT_actual (not scrambled)</li> <li>2. Verify that the linkage to a CA replacement points to service1 in MUX2.</li> <li>3. Verify that all services are able to be received and decoded</li> <li>4. Choose the service2 on MUX1</li> <li>5. Change the free_CA_mode to 1 (scrambled) in SDT_actual of service2 in MUX1.</li> <li>6. Verify that receiver receives and decodes service1 on MUX2</li> </ol>		Service1	Service2	Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  SDT: linkage_descriptor 0x03 pointing to service1 on MUX2	Can be chosen depending of the distribution media	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Can be chosen depending of the distribution media, but cannot be same as in MUX1
	Service1	Service2	Frequency										
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  SDT: linkage_descriptor 0x03 pointing to service1 on MUX2	Can be chosen depending of the distribution media										
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Can be chosen depending of the distribution media, but cannot be same as in MUX1										

	<b>Expected result:</b> Verify that receiver receives and decodes service1 on MUX2 after change of free_CA_mode in SDT_actual for service2 in MUX1. The service change shall be done automatically by the receiver.	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 9:33 Dynamic update of SDT_actual running status and linkage to a service replacement service</b>													
<b>Section</b>	NorDig Unified 13.1 and 13.3.4													
<b>Requirement</b>	SDT descriptors mandatory to receive and interpret if broadcasted:  Linkage_descriptor  0x03, linkage to a CA replacement service. When present, the receiver shall automatically switch to the replacement service if the receiver are not able descramble the (original) service and if the receiver are able to receive the SDT containing the original service during the replacement, also switch back when 'free_CA_mode' is set to "0".													
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check the support for the Linkage to service replacement service in SDT.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.- SI[SI management system]     MUX2 -.- SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; DVB[DVB receiver]     </pre> <table border="1"> <thead> <tr> <th></th> <th><b>Service1</b></th> <th><b>Service2</b></th> <th></th> <th><b>Frequency</b></th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id 1<sup>b)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  SDT: linkage_descriptor 0x05 pointing to service1 on MUX2</td> <td></td> <td>Can be chosen depending of the distribution media</td> </tr> </tbody> </table>					<b>Service1</b>	<b>Service2</b>		<b>Frequency</b>	<b>MUX1</b> TS_id 1 Network_id 1 ON_id 1 <sup>b)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  SDT: linkage_descriptor 0x05 pointing to service1 on MUX2		Can be chosen depending of the distribution media
	<b>Service1</b>	<b>Service2</b>		<b>Frequency</b>										
<b>MUX1</b> TS_id 1 Network_id 1 ON_id 1 <sup>b)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  SDT: linkage_descriptor 0x05 pointing to service1 on MUX2		Can be chosen depending of the distribution media										

	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Can be chosen depending of the distribution media, but cannot be same as in MUX1
<sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)				
<b>Test procedure:</b> <ol style="list-style-type: none"> <li>1. Verify that all service have running_status 4 (running)</li> <li>2. Verify that all services are able to be received and decoded</li> <li>3. Choose the service2 on MUX1</li> <li>4. Change running_status of service2 on MUX1 to 1 (not running)</li> <li>5. Verify that receiver receives and decodes service1 on MUX2</li> </ol>				
<b>Expected result:</b> Verify that receiver receives and decodes service1 on MUX2.				
<b>Test result(s)</b>				
<b>Conformity</b> <input type="checkbox"/> OK <input type="checkbox"/> Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments				
<b>Comments</b> If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information				
<b>Date</b>			<b>Sign</b>	

<b>Test Case</b>	<b>Task 9:34 Dynamic update of EIT actual/other p/f</b>
<b>Section</b>	NorDig Unified 13.3.2
<b>Requirement</b>	NorDig IRD shall make use of the EIT p/f tables from both EIT_actual and EIT_other tables.  The NorDig IRD manufacturer shall provide a procedure that allows the user to configure blanking of video and muting of sound for certain parental rating values.  If information is missing (i.e. not included in the transmission) the ESG shall <u>not</u> display an error message, instead the text information field shall stay empty (i.e. no information like “no information available”).
<b>Test procedure</b>	<b>Purpose of test:</b> To check that relevant contents of the EIT actual/other p/f are decoded and displayed correctly.  <b>Equipment:</b>



	Service1	Service2		Frequency
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical chan desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical chan desc 2 visible	EIT actual/other p/f	Can be chosen depending of the distribution media.
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		EIT actual/other p/f	Can be chosen depending of the distribution media. Not same as for Exciter 1

<sup>1)</sup> ON\_id (Original\_network\_id) can be chosen in range 0x0001-0xfe00 (operational network)

**Test procedure:**

1. Verify that there is one visible service with EIT information signalled on MUX1, one visible service without EIT signalled on MUX1 and one service with EIT signalled on MUX2.
2. Launch navigator.
3. Check that service with and without EIT signalled is displayed correctly.

**Expected result:**

The IRD shall display the information signalled in EIT from MUX1 and MUX2 correctly in navigator inclusive all the descriptor defined above.

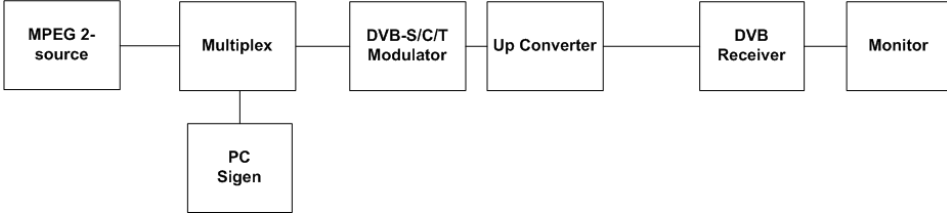
The IRD shall not display error message for the service, which don't have EIT signalled, on MUX1.

The ESG has equal layout for all services in one service type.

<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

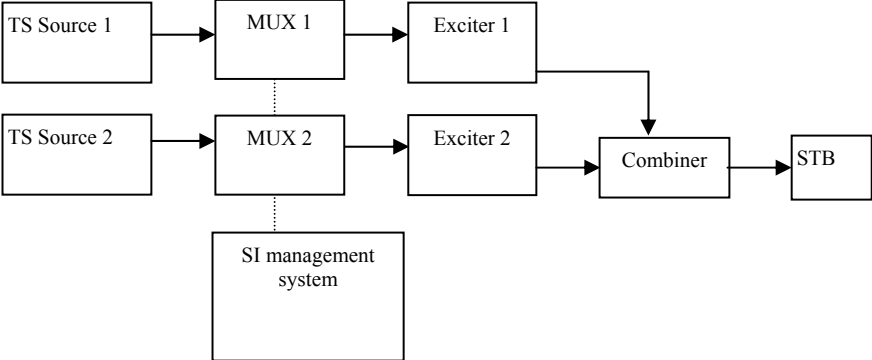


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<b>Test Case</b>	<b>Task 9:35 Dynamic update of EIT_actual p/f CA_identifier_descriptor</b>										
<b>Section</b>	NorDig Unified 13.1 and 13.4.2										
<b>Requirement</b>	<p>EIT_actual p/f descriptors mandatory to receive and interpret if broadcasted:</p> <p>CA_identifier_descriptor</p> <p>This descriptor is optional, however, it may be present in the EIT whenever at least one service component is scrambled. The CA_system_id is allocated by ETSI and is given by ETR 162 [16]. When used, it will be used dynamically, i.e. following the services scrambling status, mainly targeting the ESG/EPG applications.</p>										
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify the support for the dynamic interpretation of the CA_identifier_descriptor in EIT_actual p/f.</p> <p><b>Equipment:</b></p>  <table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  EIT: CA_identifier_descriptor signaled for a CA_system_id</td> <td>Can be chosen depending of the distribution media</td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>Verify that CA_identifier_descriptor is signaled for a service2 next event_id in EIT_actual p/f for a CA_system_id supported by the receiver. If the receiver doesn't support any CA system, the used CA system in EIT_actual p/f can have any valid CA_system_id.</li> <li>Verify by accessing the ESG or EPG that the event is marked as scrambled.</li> </ol> <p><b>Expected result:</b> The event is marked as scrambled in the ESG or EPG.</p>				Service1	Service2	Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  EIT: CA_identifier_descriptor signaled for a CA_system_id	Can be chosen depending of the distribution media
	Service1	Service2	Frequency								
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible  EIT: CA_identifier_descriptor signaled for a CA_system_id	Can be chosen depending of the distribution media								
<b>Test result(s)</b>											
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments										
<b>Comments</b>	<p>If possible describe if fault 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>										
<b>Date</b>		<b>Sign</b>									

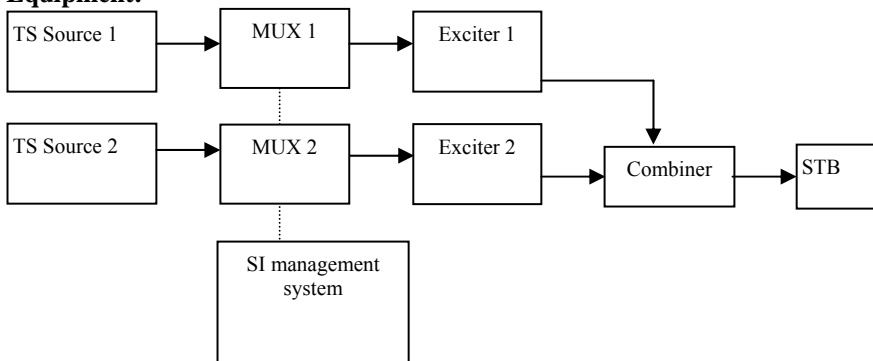


NorDig

<b>Test Case</b>	<b>Task 9:36 Dynamic update of EIT actual/other p/f short_event_descriptor, extended_event_descriptor and content_descriptor</b>															
<b>Section</b>	NorDig Unified 13.4															
<b>Requirement</b>	<p>EIT descriptors mandatory to receive and interpret if broadcasted:</p> <p>Short_event_descriptor          Extended_event_descriptor          Component_descriptor          Content_descriptor          Parental_rating_descriptor          Private_data_specifier_descriptor</p>															
<b>Test procedure</b>	<p><b>Purpose of test:</b>          To check the support for the following descriptors in EIT actual/other p/f:          Short_event_descriptor          Extended_event_descriptor          Content_descriptor          Parental_rating_descriptor</p> <p><b>Equipment:</b></p>  <table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th></th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td></td> <td>Can be chosen depending of the distribution media.</td> </tr> <tr> <td><b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup></td> <td>SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible</td> <td></td> <td>Bouquet SI All information in EIT.</td> <td>Can be chosen depending of the distribution media. Not same as for Exciter 1</td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Check that the descriptors above are signalled for the two tables EIT actual and other p/f</li> <li>2. Choose a service which have descriptors signalled and access the info banner.</li> <li>3. Check that the information on info banner is correct (EIT actual p/f).</li> <li>4. Keep the same channel, but zap using the info banner to an other service.</li> <li>5. Check that the information on info banner is correct (EIT other p/f).</li> </ol>		Service1	Service2		Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media.	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Bouquet SI All information in EIT.	Can be chosen depending of the distribution media. Not same as for Exciter 1
	Service1	Service2		Frequency												
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media.												
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	<ol style="list-style-type: none"> <li>6. Change the information in content_descriptor to Movie/Drama, News/Current affairs, Show/Game show, Sports, Children's/Youth programmes, Music/Ballet/Dance, Arts/Culture (without music), Social/Political issues/Economics, Education/ Science/Factual topics and Leisure hobbies, in hexadecimal values 0x1 – 0xA respectively.</li> <li>7. Check that the changes are updated in info banner.</li> <li>8. Change the parental_rating_descriptor to Children, Youth and Adult, in hexadecimal 0x01-0x04, 0x05-0x08, 0x09-0x0F respectively.</li> <li>9. Check that the changes are updated in info banner.</li> </ol> <p><b>Expected result:</b> The info banner shows the information signalled in descriptors above and it is changed the information is updated.</p>
<i>Test result(s)</i>	
<i>Conformity</i>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<i>Date</i>	<i>Sign</i>

<i>Test Case</i>	<b>Task 9:37 Dynamic update of EIT actual/other p/f content descriptor and component_descriptor</b>															
<i>Section</i>	NorDig Unified 13.4															
<i>Requirement</i>	EIT descriptors mandatory to receive and interpret if broadcasted:  Short_event_descriptor Extended_event_descriptor Component_descriptor Content_descriptor Parental_rating_descriptor Private_data_specifier_descriptor CA_identifier_descriptor (optional)															
<i>Test procedure</i>	<p><b>Purpose of test:</b> To check the support for the following descriptors in EIT p/f: Content_descriptor (because it is needed in component descriptor) Component_descriptor</p> <p>This test is a subset of the all combinations of values defined for content_descriptor / component_descriptor. The following combinations are tested:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Content_desc</th> <th style="text-align: center;">Component_desc</th> <th style="text-align: center;">Language</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0x01</td> <td style="text-align: center;">0x01 video, 4:3 aspect ratio</td> <td style="text-align: center;">swe/fin/nor/dan/ice/sami</td> </tr> <tr> <td style="text-align: center;">0x01</td> <td style="text-align: center;">0x03 video, 16:9 aspect ratio without pan vectors</td> <td style="text-align: center;">swe/fin/nor/dan/ice/sami</td> </tr> <tr> <td style="text-align: center;">0x02</td> <td style="text-align: center;">0x03 Audio stereo (2 channel)</td> <td style="text-align: center;">swe/fin/nor/dan/ice/sami</td> </tr> <tr> <td style="text-align: center;">0x03</td> <td style="text-align: center;">0x01 EBU teletext</td> <td style="text-align: center;">swe/fin/nor/dan/ice/sami</td> </tr> </tbody> </table>	Content_desc	Component_desc	Language	0x01	0x01 video, 4:3 aspect ratio	swe/fin/nor/dan/ice/sami	0x01	0x03 video, 16:9 aspect ratio without pan vectors	swe/fin/nor/dan/ice/sami	0x02	0x03 Audio stereo (2 channel)	swe/fin/nor/dan/ice/sami	0x03	0x01 EBU teletext	swe/fin/nor/dan/ice/sami
Content_desc	Component_desc	Language														
0x01	0x01 video, 4:3 aspect ratio	swe/fin/nor/dan/ice/sami														
0x01	0x03 video, 16:9 aspect ratio without pan vectors	swe/fin/nor/dan/ice/sami														
0x02	0x03 Audio stereo (2 channel)	swe/fin/nor/dan/ice/sami														
0x03	0x01 EBU teletext	swe/fin/nor/dan/ice/sami														

	<p><b>Equipment:</b></p> 																	
	<table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th></th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td> <b>MUX1</b>  TS_id 1  Network_id 1  ON_id <sup>1)</sup> </td> <td> SID 1100  S_name Test11  PMT PID 1100  V PID 1109  A PID 1108  Logical_chan_desc 1 visible </td> <td> SID 1200  S_name Test12  PMT PID 1200  V PID 1209  A PID 1208  Logical_chan_desc 2 visible </td> <td></td> <td> Can be chosen depending of the distribution media. </td> </tr> <tr> <td> <b>MUX2</b>  TS_id 2  Network_id 2  ON_id <sup>1)</sup> </td> <td> SID 2100  S_name Test21  PMT PID 2100  V PID 2109  A PID 2108  Logical_chan_desc 3 visible </td> <td></td> <td> Bouquet SI  All information in EIT. </td> <td> Can be chosen depending of the distribution media. Not same as for Exciter 1 </td> </tr> </tbody> </table>		Service1	Service2		Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media.	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Bouquet SI All information in EIT.	Can be chosen depending of the distribution media. Not same as for Exciter 1		
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	<sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)																	
	<p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>Check that these descriptors doesn't cause any harm for the receiver.</li> </ol>																	
	<p><b>Expected result:</b>  Content_descriptor and component_descriptor don't cause any harm if they are not visible.  Content_descriptor and component_descriptor are decoded correctly if they are visible in info banner or/and ESG.</p>																	
<b>Test result(s)</b>																		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																	
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<b>Date</b>		<b>Sign</b>																

<b>Test Case</b>	<b>Task 9:38 Dynamic update of EIT actual/other p/f parental_rating_descriptor</b>
<b>Section</b>	NorDig Unified 13.3.2
<b>Requirement</b>	The IRD manufacturer shall provide a procedure that allows the user to configure blanking of video and muting of sound for certain parental rating values (in parental_rating_descriptor in the EIT p/f).



<b>Test procedure</b>	<p><b>Purpose of test:</b> To check that muting of audio and blanking of video works.</p> <p><b>Equipment:</b></p>																	
	<table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th></th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td></td> <td>Can be chosen depending of the distribution media.</td> </tr> <tr> <td><b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup></td> <td>SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible</td> <td></td> <td>Bouquet SI All information in EIT.</td> <td>Can be chosen depending of the distribution media. Not same as for Exciter 1</td> </tr> </tbody> </table> <p><sup>1)</sup> ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>Control that there is a service with EIT information signalled for higher parental_rating as allowed in preferences of the IRD on MUX1</li> <li>Zap to this service</li> <li>Control that the video is blanked and the audio is muted.</li> </ol> <p><b>Expected result:</b></p> <p>The IRD shall blank the video and mute the audio for ages that are not allowed to decode.</p>					Service1	Service2		Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media.	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Bouquet SI All information in EIT.
	Service1	Service2		Frequency														
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media.														
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Bouquet SI All information in EIT.	Can be chosen depending of the distribution media. Not same as for Exciter 1														
<b>Test result(s)</b>																		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information																	
<b>Date</b>		<b>Sign</b>																

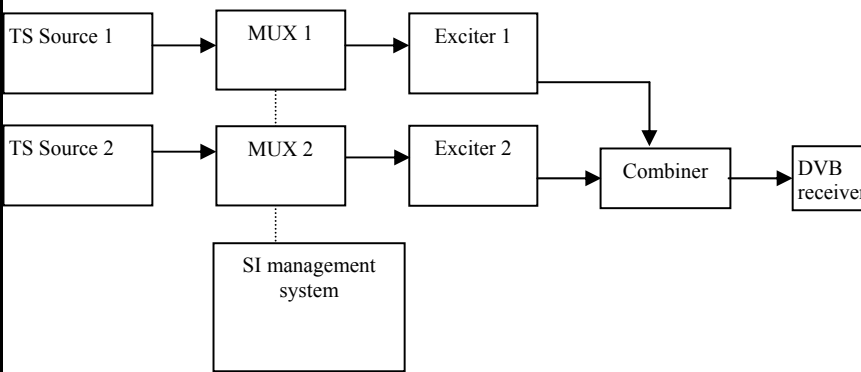


NorDig

<b>Test Case</b>	<b>Task 9:39 Dynamic update of EIT actual/other p/f and schedule in ESG using linkage</b>															
<b>Section</b>	NorDig Unified 13.5 and 13.3.1															
<b>Requirement</b>	<p>Upon user request for EIT schedule information, the IRD shall look for the reference using linkage descriptor mechanism in the NIT and perform a frequency re-tuning if necessary. Linkage_type 0x04 (“Transport Stream containing complete network/bouquet SI”) shall be used to refer to EIT schedule information.</p> <p>The ESG shall include the EIT present/following table.</p> <p>The NorDig IRD shall be able to handle situations when the EIT is not present.</p> <p>The ESG shall be non-discriminatory and display all services on equal basis.</p> <p>The ESG shall process and display the relevant content of the following tables (including start time, end time/duration, and content of all descriptors specified below)</p> <p>Short_event_desc          Extended_event_desc          Component_desc          Content_desc          Parental_rating_desc          CA_identifier_descriptor (optional)</p>															
<b>Test procedure</b>	<p><b>Purpose of test:</b>          To verify the dynamic update of EIT actual/other p/f and schedule information in ESG using the linkage_descriptor 0x04 (“Transport Stream containing complete network/bouquet SI”) in NIT.</p> <p>The verify the handling of the EIT schedule descriptors in NorDig Basic receiver:          Short_event_descriptor          Component_descriptor          Extend_event_descriptor          Parental_rating_descriptor</p> <p>Note: Other profiles using MHP are not tested.</p> <p><b>Equipment:</b></p> <pre>         graph LR             TS1[TS Source 1] --&gt; MUX1[MUX 1]             TS2[TS Source 2] --&gt; MUX2[MUX 2]             MUX1 -.- SI[SI management system]             MUX2 -.- SI             MUX1 --&gt; Exc1[Exciter 1]             MUX2 --&gt; Exc2[Exciter 2]             Exc1 --&gt; Comb[Combiner]             Exc2 --&gt; Comb             Comb --&gt; DVB[DVB receiver]             </pre> <table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th></th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id 1<sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td></td> <td>Can be chosen depending of the distribution media.</td> </tr> <tr> <td><b>MUX2</b> TS_id 2</td> <td>SID 2100 S_name Test21 PMT PID 2100</td> <td></td> <td>Bouquet SI All information</td> <td>Can be chosen depending of</td> </tr> </tbody> </table>		Service1	Service2		Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id 1 <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media.	<b>MUX2</b> TS_id 2	SID 2100 S_name Test21 PMT PID 2100		Bouquet SI All information	Can be chosen depending of
	Service1	Service2		Frequency												
<b>MUX1</b> TS_id 1 Network_id 1 ON_id 1 <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible		Can be chosen depending of the distribution media.												
<b>MUX2</b> TS_id 2	SID 2100 S_name Test21 PMT PID 2100		Bouquet SI All information	Can be chosen depending of												

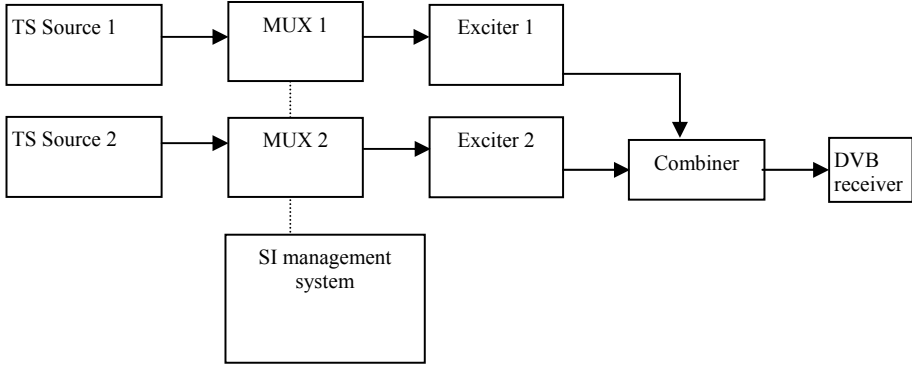
	<table border="1"> <tr> <td>Network_id 2 ON_id<sup>1)</sup></td> <td>V PID 2109 A PID 2108 Logical_chan_desc 3 visible</td> <td></td> <td>in EIT.</td> <td>the distribution media. Not same as for Exciter 1</td> </tr> </table>	Network_id 2 ON_id <sup>1)</sup>	V PID 2109 A PID 2108 Logical_chan_desc 3 visible		in EIT.	the distribution media. Not same as for Exciter 1	
Network_id 2 ON_id <sup>1)</sup>	V PID 2109 A PID 2108 Logical_chan_desc 3 visible		in EIT.	the distribution media. Not same as for Exciter 1			
	<p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p>On MUX1 in NIT_actual first loop configure linkage_type 0x04 to point to MUX2. On MUX2 configure complete transport stream/bouquet SI. In linkage_descriptor the service_id shall be 0x0000.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Turn on receiver.</li> <li>2. Do re-initialization or make sure there are no services in channel list or in ESG.</li> <li>3. Do channel search.</li> <li>4. Check in channel list or ESG that there are services available.</li> <li>5. Press the Guide button.</li> <li>6. Check that the transport stream/bouquet information is displayed correctly as signalled for amount days in EIT p/f and schedule.</li> </ol> <p><b>Expected result:</b> Linkage to transport stream/bouquet information is displayed correctly as signalled in EIT schedule for following descriptors: Short_event_descriptor Component_descriptor Extend_event_descriptor Parental_rating_descriptor</p>						
<b>Test result(s)</b>	<table border="1"> <tr> <td></td> <td><b>NOK OR OK</b></td> </tr> <tr> <td>The services and events can be presented to viewer.</td> <td></td> </tr> <tr> <td>EIT information is available for all services and event and it is visible to viewer.</td> <td></td> </tr> </table>		<b>NOK OR OK</b>	The services and events can be presented to viewer.		EIT information is available for all services and event and it is visible to viewer.	
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EIT information is available for all services and event and it is visible to viewer.							
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	<b>Sign</b>						

<b>Test Case</b>	<b>Task 9:40 Dynamic update of EIT actual/other p/f and schedule in ESG</b>
<b>Section</b>	NorDig Unified 13.5 and 13.3.1
<b>Requirement</b>	<p>Upon user request for EIT schedule information, the IRD shall look for the reference using linkage descriptor mechanism in the NIT and perform a frequency re-tuning if necessary. Linkage_type 0x04 (“Transport Stream containing complete network/bouquet SI”) shall be used to refer to EIT schedule information.</p> <p>The ESG shall include the EIT present/following table.</p> <p>The NorDig IRD shall be able to handle situations when the EIT is not present.</p> <p>The ESG shall be non-discriminatory and display all services on equal basis.</p> <p>The ESG shall process and display the relevant content of the following tables (including start time, end time/duration, and content of all descriptors specified below</p>

	<p>Short_event_desc          Extended_event_desc          Component_desc          Content_desc          Parental_rating_desc          CA_identifier_descriptor (optional)</p>												
<p><b>Test procedure</b></p>	<p><b>Purpose of test:</b>          To verify the dynamic update of EIT actual/other p/f and schedule information in ESG when EIT information is signaled complete per multiplex, with other words, without using the linkage_descriptor 0x04 (“Transport Stream containing complete network/bouquet SI”) in NIT.</p> <p>The verify the handling of the EIT schedule descriptors in NorDig Basic receiver:          Short_event_descriptor          Component_descriptor          Extend_event_descriptor          Parental_rating_descriptor</p> <p>Note: Other profiles using MHP are not tested.</p> <p><b>Equipment:</b></p>  <table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td>Can be chosen depending of the distribution media.</td> </tr> <tr> <td><b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup></td> <td>SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible</td> <td></td> <td>Can be chosen depending of the distribution media. Not same as for Exciter 1</td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p>MUX1 event information (EIT actual p/f and schedule) is cross-distributed to MUX2 as event information (EIT other p/f and schedule).</p> <p>MUX2 event information (EIT actual p/f and schedule) is cross-distributed to MUX1 as event information (EIT other p/f and schedule).</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Turn on receiver.</li> <li>2. Do re-initialization or make sure there are no services in channel list or in ESG.</li> <li>3. Do channel search.</li> <li>4. Check in channel list or ESG that there are services available.</li> </ol>		Service1	Service2	Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media.	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Can be chosen depending of the distribution media. Not same as for Exciter 1
	Service1	Service2	Frequency										
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media.										
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Can be chosen depending of the distribution media. Not same as for Exciter 1										

	<p>5. Press the Guide or ESG button.</p> <p>6. Check that the EIT information is displayed correctly as signaled for amount days in EIT actual/other p/f and schedule.</p> <p><b>Expected result:</b>  EIT information is displayed correctly as signalled in EIT actual/other p/f and schedule for following descriptors:  Short_event_descriptor  Component_descriptor  Extend_event_descriptor  Parental_rating_descriptor</p>						
<b>Test result(s)</b>	<table border="1"> <thead> <tr> <th></th> <th>NOK OR OK</th> </tr> </thead> <tbody> <tr> <td>The services and events can be presented to viewer.</td> <td></td> </tr> <tr> <td>EIT information is cross-distributed and it is visible to viewer. (MUX1 EIT information can be seen when receiver is tuned to a service on MUX2. Also the MUX2 EIT information can be seen when receiver is tuned to a service on MUX1).</td> <td></td> </tr> </tbody> </table>		NOK OR OK	The services and events can be presented to viewer.		EIT information is cross-distributed and it is visible to viewer. (MUX1 EIT information can be seen when receiver is tuned to a service on MUX2. Also the MUX2 EIT information can be seen when receiver is tuned to a service on MUX1).	
	NOK OR OK						
The services and events can be presented to viewer.							
EIT information is cross-distributed and it is visible to viewer. (MUX1 EIT information can be seen when receiver is tuned to a service on MUX2. Also the MUX2 EIT information can be seen when receiver is tuned to a service on MUX1).							
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments						
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information						
<b>Date</b>	<table border="1"> <tr> <td style="width: 50%;"></td> <td style="width: 20%;"><b>Sign</b></td> <td style="width: 30%;"></td> </tr> </table>		<b>Sign</b>				
	<b>Sign</b>						

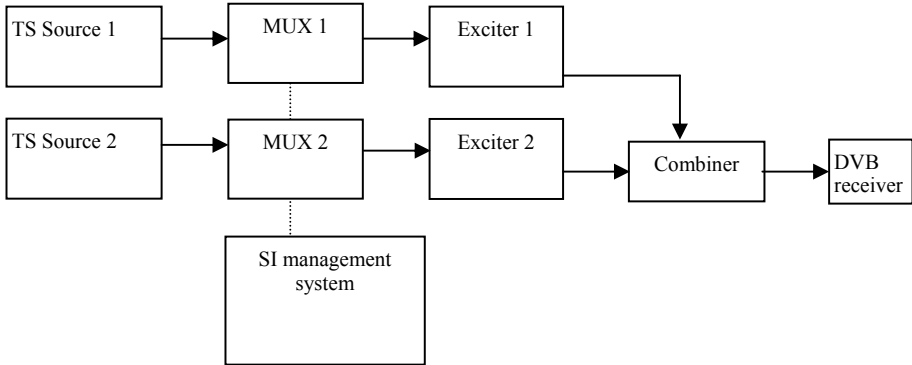
<b>Test Case</b>	<b>Task 9:41 PMT Descriptors - General</b>
<b>Section</b>	NorDig Unified 13.7
<b>Requirement</b>	<p>The following descriptors are used in PMT:</p> <p>Video_stream_descriptor  CA_descriptor  ISO_639_language_descriptor  Private_data_indicator_descriptor  Stream_identifier_descriptor  Teletext_descriptor  Subtitling_descriptor  Private_data_specifier_descriptor  Service_move_descriptor</p> <p>Audio_stream_descriptor (optional)  Target_background_descritor (optional)  Video_window_descritor (optional)</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b>  To check the support for the following descriptors:</p> <p>Video_stream_descriptor  CA_descriptor  ISO_639_language_descriptor  Private_data_indicator_descriptor  Stream_identifier_descriptor  Teletext_descriptor  Subtitling_descriptor  Private_data_specifier_descriptor</p>

	<p><b>Equipment:</b></p> 														
	<table border="1"> <thead> <tr> <th></th> <th>Service1</th> <th>Service2</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup></td> <td>SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible</td> <td>SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible</td> <td>Can be chosen depending of the distribution media</td> </tr> <tr> <td><b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup></td> <td>SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible</td> <td></td> <td>Can be chosen depending of the distribution media, but cannot be same as in MUX1</td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p>				Service1	Service2	Frequency	<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media	<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Can be chosen depending of the distribution media, but cannot be same as in MUX1
	Service1	Service2	Frequency												
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 A PID 1108 Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 A PID 1208 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media												
<b>MUX2</b> TS_id 2 Network_id 2 ON_id <sup>1)</sup>	SID 2100 S_name Test21 PMT PID 2100 V PID 2109 A PID 2108 Logical_chan_desc 3 visible		Can be chosen depending of the distribution media, but cannot be same as in MUX1												
	<p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>Control that the MUX1 has a service with descriptors signalled above</li> <li>Zap to this service and check quickly that it works.</li> </ol>														
	<p><b>Expected result:</b> All components in the service are able to decode.</p>														
<b>Test result(s)</b>															
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments														
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information														
<b>Date</b>		<b>Sign</b>													

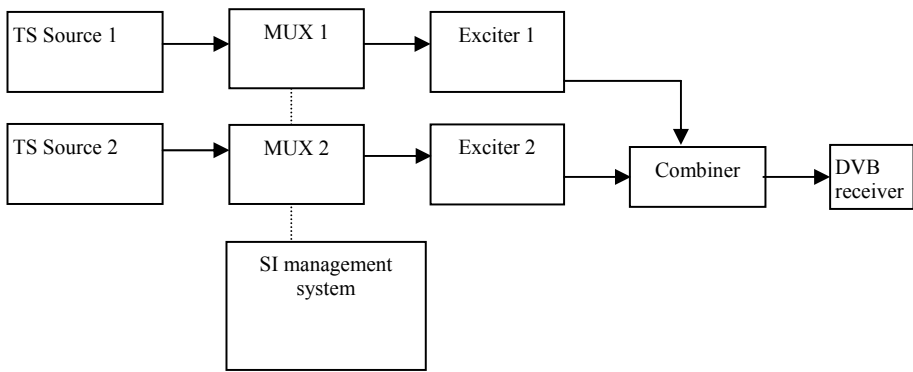
<b>Test Case</b>	<b>Task 9:42 PMT Descriptors – teletext pages, teletext subtitling and DVB subtitling</b>
<b>Section</b>	NorDig Unified 13.7
<b>Requirement</b>	The following descriptors are used in PMT: teletext_descriptor subtitling_descriptor
<b>Test procedure</b>	<b>Purpose of test:</b>

	<p>To check the dynamic support for the following descriptors: Teletext_descriptor Subtitling_descriptor</p> <p><b>Equipment:</b></p> <p><b>Test procedure:</b></p> <p><b>This requirement is tested in Task 10:3 and Task 10:4.</b></p> <p><b>Expected result:</b> Content of the teletext_descriptor and subtitling_descriptor shall be handled and used correctly by the receiver.</p>	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information</p>	
<i>Date</i>		<i>Sign</i>

<i>Test Case</i>	<b>Task 9:43 PMT Descriptors – MHP API</b>	
<i>Section</i>	NorDig Unified 13.7	
<i>Requirement</i>	<p>The following descriptors are used in PMT: Data_broadcast_descriptor Application_signalling_descriptor carousel_descriptor</p>	
<i>Test procedure</i>	<p><b>Purpose of test:</b> To check the support for the following descriptors: Data_broadcast_descriptor Application_signalling_descriptor carousel_descriptor</p> <p><b>This requirement is tested with API.</b></p> <p><b>Equipment:</b> TBD</p> <p><b>Test procedure:</b> TBD</p> <p><b>Expected result:</b> TBD</p>	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information</p>	
<i>Date</i>		<i>Sign</i>

<b>Test Case</b>	<b>Task 9:44 Dynamic update of PMT PID values</b>																																										
<b>Section</b>	NorDig Unified 13.1																																										
<b>Requirement</b>	The NorDig IRD shall at least start action for any changes in the received "dynamic" PSI and SI data, (PMT, EIT, TDT/TOT, running status and CA mode) within 1 second. (As a guideline for the implementation, the trigger for changes in received tables can be based on comparing the 'version id' in the tables)																																										
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the receiver is able to maintain reception when PID values in PMT are dropped, added or changed.</p> <p><b>Equipment:</b></p>  <table border="1"> <thead> <tr> <th></th> <th><b>Service1</b></th> <th><b>Service2</b></th> <th></th> <th><b>Frequency</b></th> </tr> </thead> <tbody> <tr> <td><b>MUX1</b></td> <td>SID 1100</td> <td>SID 1200</td> <td></td> <td rowspan="6">Can be chosen depending of the distribution media</td> </tr> <tr> <td>TS_id 1</td> <td>S_name Test11</td> <td>S_name Test12</td> <td></td> </tr> <tr> <td>Network_id 1</td> <td>PMT PID 1100</td> <td>PMT PID 1200</td> <td></td> </tr> <tr> <td>ON_id<sup>1)</sup></td> <td>V PID 1109 incl PCR</td> <td>V PID 1209 incl PCR</td> <td></td> </tr> <tr> <td></td> <td>A PID 1108</td> <td>A PID 1208</td> <td></td> </tr> <tr> <td></td> <td>Teletext PID 1107</td> <td>Teletext PID 1207</td> <td></td> </tr> <tr> <td></td> <td>DVB Subt PID 1106</td> <td>DVB Subt PID 1106</td> <td></td> </tr> <tr> <td></td> <td>Logical_chan_desc 1 visible</td> <td>Logical_chan_desc 2 visible</td> <td></td> <td></td> </tr> </tbody> </table> <p><sup>1)</sup>ON_id (Original_network_id) can be chosen in range 0x0001-0xfe00 (operational network)</p> <p>Sometimes broadcaster may drop, add or change the content of the PID. If this happens, the PMT is updated by changing the version_id.</p> <p><b>Test procedure:</b></p> <p>This test can done parallel with Task 5:23.</p> <ol style="list-style-type: none"> <li>1. Control that the MUX1 and MUX2 have services signaled as defined in table above</li> <li>2. Zap all the services and check quickly that they works.</li> <li>3. Zap to service1 in MUX1</li> <li>4. Drop PIDs in following order: <ol style="list-style-type: none"> <li>a. DVB subtitling PID 1106</li> <li>b. Teletext PID 1107</li> <li>c. Audio PID 1108</li> <li>d. Video PID 1109</li> </ol> </li> <li>5. Add PIDs in following order: <ol style="list-style-type: none"> <li>a. Video PID 1109</li> <li>b. Audio PID 1108</li> <li>c. Teletext PID1107</li> <li>d. DVB subtitling PID 1106</li> </ol> </li> <li>6. Verify that the service is decoded correctly by watching the video, listening the audio and reading the teletext, teletext subtitling and DVB subtitling</li> </ol>					<b>Service1</b>	<b>Service2</b>		<b>Frequency</b>	<b>MUX1</b>	SID 1100	SID 1200		Can be chosen depending of the distribution media	TS_id 1	S_name Test11	S_name Test12		Network_id 1	PMT PID 1100	PMT PID 1200		ON_id <sup>1)</sup>	V PID 1109 incl PCR	V PID 1209 incl PCR			A PID 1108	A PID 1208			Teletext PID 1107	Teletext PID 1207			DVB Subt PID 1106	DVB Subt PID 1106			Logical_chan_desc 1 visible	Logical_chan_desc 2 visible		
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	DVB Subt PID 1106	DVB Subt PID 1106																																									
	Logical_chan_desc 1 visible	Logical_chan_desc 2 visible																																									

	<p>7. Change the following PID values:</p> <ol style="list-style-type: none"> <li>a. Video PID 1109 to 1103</li> <li>b. Audio PID 1108 to 1102</li> </ol> <p><b>Expected result:</b> After addition of the PIDs, all the component in the service are decoded correctly.</p> <p>Change of PID values maintains the service decoding.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:45 Dynamic update of PMT - Component priority</b>
<b>Section</b>	NorDig Unified 13.7.2
<b>Requirement</b>	<p>NorDig IRD not supporting a specific advanced codec, shall not default choose that advanced codec stream. For example, an (SDTV) IRD that do not include any AC3 (down-mix) decoder, (maybe only supports pass-through of AC-3 to the digital audio output), shall not default choose the AC3 audio stream. Instead it shall default first choose the basic MPEG-1 Layer II audio stream.</p> <p>The NorDig (HDTV Level) IRD that supports more advanced codecs for video and audio decoding, shall priorities the service's components (video and/or audio) with advanced codec, default according to priority listed in table 12.7 and 12.8.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that the HDTV receiver is able select video and audio components in priority order. To verify that the SDTV receiver is not affected anyway by the stream_types not supported by the receiver.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS1[TS Source 1] --&gt; MUX1[MUX 1]     TS2[TS Source 2] --&gt; MUX2[MUX 2]     MUX1 -.- SI[SI management system]     MUX2 -.- SI     MUX1 --&gt; Exc1[Exciter 1]     MUX2 --&gt; Exc2[Exciter 2]     Exc1 --&gt; Comb[Combiner]     Exc2 --&gt; Comb     Comb --&gt; DVB[DVB receiver]     </pre>

	Service1	Service2	Frequency
<b>MUX1</b> TS_id 1 Network_id 1 ON_id <sup>1)</sup>	SID 1100 S_name Test11 PMT PID 1100 V PID 1109 (MPEG 2 SD) V PID 1119 (AVC HD) V PID 1129 (AVC SD)  A PID 1108 (MPEG1 L2) A PID 1118 (HE AAC) A PID 1128 (E-AC3) A PID 1138 (AC-3)  Logical_chan_desc 1 visible	SID 1200 S_name Test12 PMT PID 1200 V PID 1209 incl PCR A PID 1208 Teletext PID 1207 DVB Subt PID 1106 Logical_chan_desc 2 visible	Can be chosen depending of the distribution media

<sup>1)</sup>ON\_id (Original\_network\_id) can be chosen in range 0x0001-0xfe00 (operational network)

**Test procedure:**

1. Control that the MUX1 have services signaled as defined in table above
2. Zap all the services and check quickly that they works.
3. Zap to service1 in MUX1
4. Drop PIDs in following order:
  - a. Video PID 1119
  - b. Video PID 1129
  - c. Audio PID 1138
  - d. Audio PID 1128
  - e. Audio PID 1118
5. Add PIDs in following order:
  - a. Video PID 1119
  - b. Video PID 1129
  - c. Audio PID 1138
  - d. Audio PID 1128
  - e. Audio PID 1118
6. Verify that the service is decoded correctly by watching the video, listening the audio

**Expected result:**

HDTV receiver: After remove and addition of the PIDs, all the component in the service are decoded correctly.

SDTV receiver: stream\_types not supported by the receiver are not affecting the receiver operability.

**Test result(s)**

Video codecs:

Video codec	Stream_type	Priority	OK/NOK
MPEG-4 AVC HP@L4 HD video stream	0x1B	1 (highest)	
MPEG-4 AVC HP@L4 / L3 SD video stream	0x1B	2	
Basic, MPEG-2 MP@ML video stream (or MPEG1)	0x02 (0x01)	3 (lowest)	

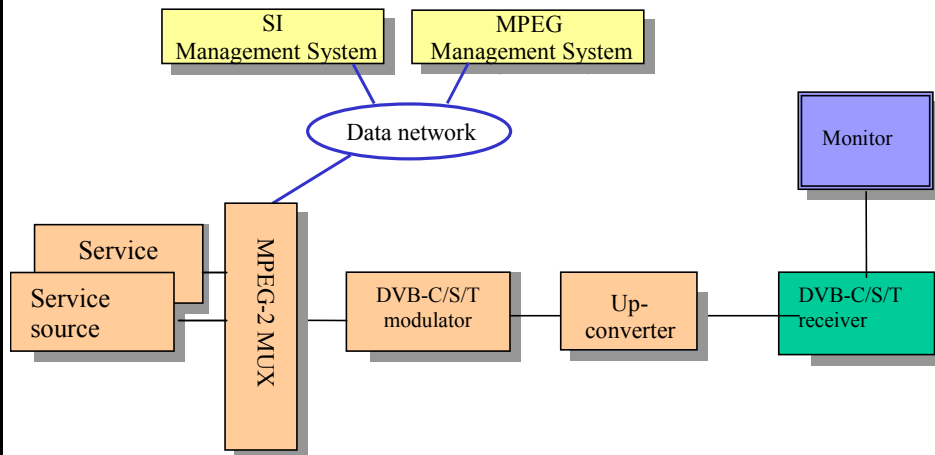
	<p>Audio codecs:</p> <table border="1"> <thead> <tr> <th>Audio codec</th> <th>Stream_type</th> <th>Priority</th> <th>OK/NOK</th> </tr> </thead> <tbody> <tr> <td>MPEG-4 HE.AAC (or LC.AAC) v2 audio stream</td> <td>0x11</td> <td>1 (highest)</td> <td></td> </tr> <tr> <td>E-AC3, AC3+ (Enhanced AC3) audio stream</td> <td>0x06</td> <td>2</td> <td></td> </tr> <tr> <td>AC3 (AC3) audio stream</td> <td>0x06</td> <td>3</td> <td></td> </tr> <tr> <td>Basic, MPEG-1 Layer II audio stream</td> <td>0x03</td> <td>4 (lowest)</td> <td></td> </tr> </tbody> </table>	Audio codec	Stream_type	Priority	OK/NOK	MPEG-4 HE.AAC (or LC.AAC) v2 audio stream	0x11	1 (highest)		E-AC3, AC3+ (Enhanced AC3) audio stream	0x06	2		AC3 (AC3) audio stream	0x06	3		Basic, MPEG-1 Layer II audio stream	0x03	4 (lowest)	
Audio codec	Stream_type	Priority	OK/NOK																		
MPEG-4 HE.AAC (or LC.AAC) v2 audio stream	0x11	1 (highest)																			
E-AC3, AC3+ (Enhanced AC3) audio stream	0x06	2																			
AC3 (AC3) audio stream	0x06	3																			
Basic, MPEG-1 Layer II audio stream	0x03	4 (lowest)																			
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																				
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information																				
<b>Date</b>	<b>Sign</b>																				

<b>Test Case</b>	<b>Task 9:46 Dynamic update of PMT - Content_Protection_descriptor</b>
<b>Section</b>	NorDig Unified 13.7.3
<b>Requirement</b>	<p>This descriptor is used to signal the content protection level for the received service.</p> <p>The IRD shall use the signalled Content Protection level together with the IRD default setting for Content Protection, to determine if HDCP shall be enabled or disabled on the HDMI output interface.</p> <p>The Content Protection descriptor shall be conveyed in the descriptor loop immediately following the program_info_length field in the Program Map Table. The descriptor only applies to the service to which the program map table is applicable. If the descriptor is missing for a service, it shall be interpreted as content protection level 0x01 (see Table 12.20).</p>
<b>Test procedure</b>	<b>This requirement is tested in Test Task 8:12</b>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 9:47 Dynamic update of TDT/TOT</b>
<b>Section</b>	NorDig Unified 13.6
<b>Requirement</b>	The NorDig IRD shall have a real time clock / calendar running continuously. The clock shall be updated by incoming TDT and TOT from SI.
<b>Test procedure</b>	<b>Purpose of test:</b>

To verify that the real time clock runs continuously.

**Equipment:**



**Test procedure for continuously running clock / calendar:**

1. Connect and start up the instruments
2. Make sure that the TDT (Time and Date Table) and TOT (Time Offset Table) are present in the transport stream.
3. Locate the time and date display.
4. Check if the time and date is updated and fill in the test protocol. (Date can be tested separately and filled later in the test protocol).

**Expected result:**

The time and date shall be displayed and updated in the navigator as time goes by.

**Purpose of test:**

To test that the real time clock is updated from TDT and TOT information.

**Equipment:**

As in previous test.

Example of the configuration of the local\_time\_offset descriptor in the TOT for Sweden and from summertime to wintertime change. Date of the change is 28/10/2001 and time 01:00:00 o'clock.

Descriptor tag		0x58
Descriptor length		
Country code	SWE	0x535745
Country region id	Only one time zone	00 00 00 (bin)
Reserved		0 (bin)
Local time offset polarity	the polarity is positive	0 (bin)
Local time offset	2 h in Sweden on summertime	0x0200
Time of change	28/10/2001 01:00:00	0xCBF2010000
Next time offset	01:00:00	0x0100

**Test procedure Updated clock by TDT and TOT:**

(Use traditional calendar to find out dates and times for the next wintertime and summertime changes.)

1. Connect and start up the instruments
2. Make sure that the TDT (Time and Date Table) and TOT (Time Offset Table) is present in the transport stream.

	<ol style="list-style-type: none"> <li>3. Configure the TOT without local_time_offset descriptor. Configure the TDT in the transport stream as it is specified in the test protocol.</li> <li>4. Turn on receiver.</li> <li>5. Wait for the change of the year.</li> <li>6. Locate the time and date display.</li> <li>7. Check the time and date in the navigator.</li> <li>8. Fill in the result and NOK or OK in the test protocol.</li> <li>9. Turn off receiver.</li> <li>10. Configure TOT local_time_offset descriptor for the next change to wintertime/summertime. Set UTC_time in the TDT few minutes before actual change. Make sure the same UTC_time is used in TOT.</li> <li>11. Turn on receiver.</li> <li>12. Check the time and date in the navigator.</li> <li>13. Fill in the test date and time, result date and time and NOK or OK in the protocol.</li> <li>14. Turn off receiver.</li> <li>15. Configure TOT local_time_offset descriptor for the next change to summertime/wintertime after the date used in test point 10. Set UTC_time in the TDT few minutes before that change. Make sure the same UTC_time is used in TOT.</li> <li>16. Turn on receiver.</li> <li>17. Check the time and date in the navigator.</li> <li>18. Fill in the test date and time, result date and time and NOK or OK in the protocol.</li> <li>19. Repeat test points 14 to 18 using country codes for ICE (Iceland), DNK (Denmark), FIN (Finland) and NOR (Norway).</li> </ol> <p><b>Expected result:</b> All test results fulfills the expected results as defined in the specification.</p>								
<p><i>Test result(s)</i></p>	<p><b>Test procedure for continuously running clock / calendar :</b></p> <table border="1"> <thead> <tr> <th>Expected result, time</th> <th>Expected result, date</th> <th>NOK or OK, time</th> <th>NOK or OK, date</th> </tr> </thead> <tbody> <tr> <td>Time is changed.</td> <td>Date is changed.</td> <td></td> <td></td> </tr> </tbody> </table> <p><b>Test procedure Updated clock by TDT and TOT:</b> Test points 1-8. (TDT test)</p>	Expected result, time	Expected result, date	NOK or OK, time	NOK or OK, date	Time is changed.	Date is changed.		
Expected result, time	Expected result, date	NOK or OK, time	NOK or OK, date						
Time is changed.	Date is changed.								

Test date and time		Date and time in MJD+UTC (BCD) format (required in the TDT)			
2001-12-31 23:57:00		0xCC32235700			

Result, time	Result, date	Expected result, time	Expected result, date	NOK or OK, time	NOK or OK, date
		The time ≈ 23:57 is presented in a comprehensive format	The date 2001-12-31 is presented in a comprehensive format		
		The time ≈ 00:01 is presented in a comprehensive format	The date 2002-01-01 is presented in a comprehensive format		

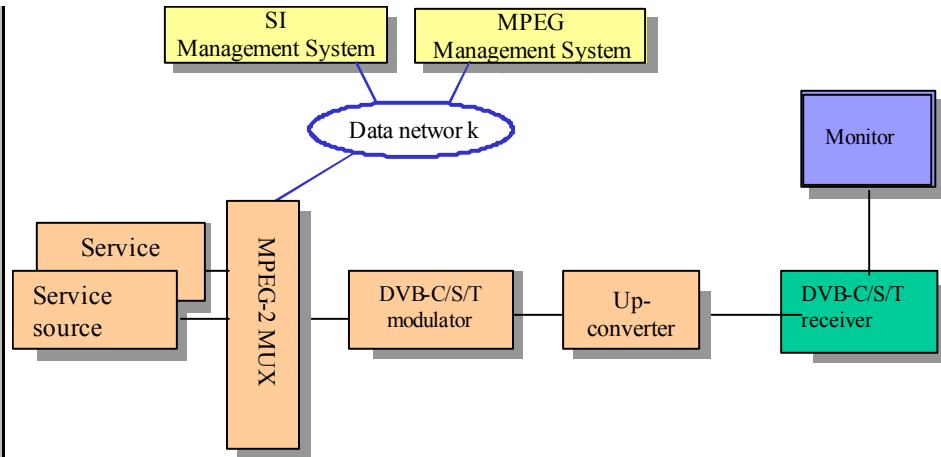
Test points 9-13. (TOT test)

Test, time	Test, date	Expected result, time	Expected result, date	NOK or OK, time	NOK or OK, date
		Time before change.	Date before change.		
		Time after change.	Time before change.		

Test points 14-19. (TOT test)

Test, time	Test, date	Expected result, time	Expected result, date	Country code	NOK or OK, time	NOK or OK, date
		Time before change.	Date before change.	SWE		
		Time after change.	Time before change.	SWE		
		Time before change.	Date before change.	ICE		
		Time after change.	Time before change.	ICE		
		Time before change.	Date before change.	DNK		
		Time after change.	Time before change.	DNK		
		Time before change.	Date before change.	FIN		
		Time after change.	Time before change.	FIN		
		Time before change.	Date before change.	NOR		
		Time after change.	Time before change.	NOR		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments					
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information					
<b>Date</b>				<b>Sign</b>		

<b>Test Case</b>	<b>Task 9:48 Internal timer</b>
<b>Section</b>	NorDig Unified 13.6
<b>Requirement</b>	The NorDig IRD should have an internal timer for the possibility to automatically switch from stand by mode to the operational mode. This timer shall be initiated locally (accepted by end user).
<b>Test procedure</b>	<b>Purpose of test:</b> To test the functionality of the timer i.e. in recording.  <b>Equipment:</b>



**Test procedure:**

1. Connect and start up the instruments
2. Make sure to connect and configure several MPEG-2 sources, so that is possible to switch services in the receiver.
3. Switch the receiver to a given service.
4. Locate the timer function in the receiver.
5. Initiate the timer to start a few minutes after the current time displayed in the receiver.
6. Switch the receiver to standby mode.
7. Repeat the test procedure above for different services.
8. Fill in the result in the test protocol.

**Expected result:**

The receiver starts up as defined in the internal timer.

*Test result(s)*

Test protocol

Start time (as configured in the timer)	Service before receiver is turned off	Time when receiver wakes up	Service to which the receiver wakes up	NOK or OK

*Conformity*

OK  Fault  Major  Minor, define fail reason in comments

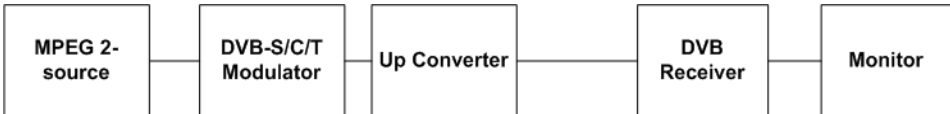
*Comments*

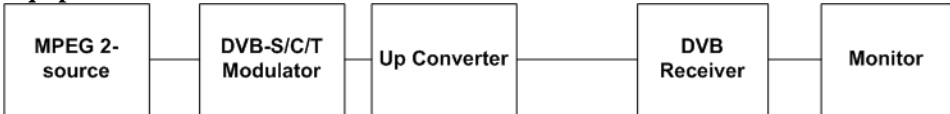
If possible describe if fault can be fixed with software update:  YES  NO  
Describe more specific faults and/or other information

*Date*

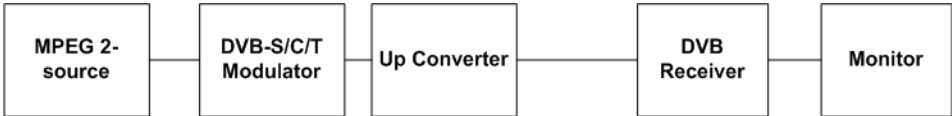
*Sign*

## 2.10 Task 10: Teletext and subtitling

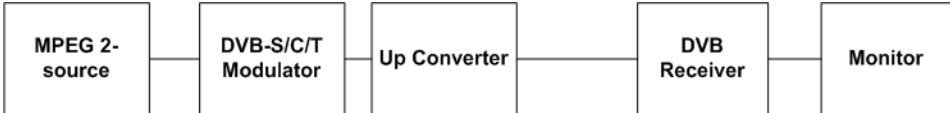
<b>Test Case</b>	<b>Task 10:1 Handling of teletext Level 1.5</b>
<b>Section</b>	NorDig Unified 7.1
<b>Requirement</b>	Level 1.5 teletext and teletext subtitling is displayed.
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check that enhanced teletext (Level 1.5) is decoded and displayed.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG 2-source] --- B[DVB-S/C/T Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor] </pre> <p><b>Test signal configuration:</b> A transport stream is used as a test signal. Within transport stream at least one service is carried with teletext component. Teletext pages and teletext subtitles shall be ITU-R System B Teletext level 1.5 compatible.</p> <p><b>Test procedure:</b> The IRD is tuned to a service that includes ITU-R System B Teletext (Level 1.5). The teletext service is selected.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 10:2 Teletext decoding method</b>
<b>Section</b>	NorDig Unified 7.1
<b>Requirement</b>	<p>The NorDig IRD shall be able to display Teletext using the OSD and/or by the insertion of the teletext data in the VBI of the analogue CVBS video output. The NorDig IRD shall be able to display Teletext subtitling, meeting the requirements for level 1.5 in ref. [ETS 300 706, "Enhanced Teletext Specification"], (even if VBI insertion is used for the teletext pages).</p> <p>The VBI insertion shall be compliant with ITU-R BT.653-3 [41]. The Teletext data shall be inserted in the lines 6 to 22 and lines 320 to 335.</p> <p>It shall be possible to use the OSD to present the decoded Teletext pages, meeting the ITU-R BT.653-2 level 1.5 requirements.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that ITU-R System B Teletext data is inserted in the VBI of the analogue CVBS video output and/or it is decoded and displayed in the OSD.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG 2-source] --- B[DVB-S/C/T Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor] </pre>

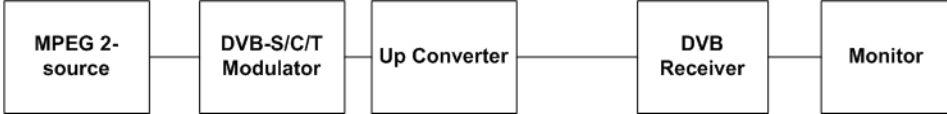
	<p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. The IRD is tuned to a TV service that includes ITU-R System B Teletext.</li> <li>2. Verify which decoding method receiver use or if it use both of below:             <ol style="list-style-type: none"> <li>a. If VBI insertion is supported, verify that teletext data is inserted onto VBI lines within the range 6-22 and 320-335.</li> <li>b. If OSD decoding method is supported, verify the teletext is correctly decoded on the OSD.</li> </ol> </li> <li>3. Fill in test protocol which method is used</li> </ol> <p>In case of a STB an external TV monitor with embedded teletext decoder is used to decode the Teletext service.            In case of an idTV an separate TV monitor with embedded teletext decoder can used to decode the Teletext service from the analog video output.            If the receiver doesn't support VBI insertion, the teletext decoding is verified in the OSD.</p> <p><b>Expected results:</b>            Teletext data is inserted onto VBI lines within the range 6-22 and 320-335.</p>										
<b>Test result(s)</b>	<p>Test protocol</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 70%;">Requirement</th> <th style="width: 30%;">NOK or OK</th> </tr> </thead> <tbody> <tr> <td>VBI of CVBS video insertion supported for teletext pages</td> <td></td> </tr> <tr> <td>VBI of CVBS video insertion supported for teletext subtitles</td> <td></td> </tr> <tr> <td>OSD decoding supported for teletext pages</td> <td></td> </tr> <tr> <td>OSD decoding supported for teletext subtitles</td> <td></td> </tr> </tbody> </table>	Requirement	NOK or OK	VBI of CVBS video insertion supported for teletext pages		VBI of CVBS video insertion supported for teletext subtitles		OSD decoding supported for teletext pages		OSD decoding supported for teletext subtitles	
Requirement	NOK or OK										
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VBI of CVBS video insertion supported for teletext subtitles											
OSD decoding supported for teletext pages											
OSD decoding supported for teletext subtitles											
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments										
<b>Comments</b>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b>            Describe more specific faults and/or other information</p>										
<b>Date</b>	<b>Sign</b>										

<b>Test Case</b>	<b>Task 10:3 Teletext – teletext pages</b>
<b>Section</b>	NorDig Unified 7.1
<b>Requirement</b>	The Nordic characters defined in the Latin G2 supplementary set shall be supported.
<b>Test procedure</b>	<p><b>Purpose of test:</b>            To test the functionality of the teletext decoder concerning teletext pages.</p> <p><b>Equipment:</b></p> <div style="text-align: center;">  <pre> graph LR     A[MPEG 2-source] --- B[DVB-S/C/T Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor]           </pre> </div> <p><b>Test procedure:</b></p> <p>Start condition: IRD installed on the live network</p> <ol style="list-style-type: none"> <li>1. Check the teletext function on several services and make sure that it works properly.</li> <li>2. Fill in the test protocol.</li> <li>3. Zap to a service with multiple initial pages in different languages. Select an available language as primary language.</li> </ol>

	<p>4. Verify that the correct initial page is displayed when txt-button is pressed.          5. Fill in the test protocol.          6. Repeat 3-4 for another language</p> <p><b>Expected result:</b>          All test results are OK.</p>																
<b>Test result(s)</b>	<p><b>Test protocol:</b></p> <p style="text-align: center;"><i>Test point 1</i></p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="background-color: black; color: white;">Expected result</th> <th style="background-color: black; color: white;">OK or NOK</th> </tr> </thead> <tbody> <tr> <td>Teletext works without any problems.</td> <td></td> </tr> </tbody> </table> <p style="text-align: center;"><i>Test point 2-4</i></p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="background-color: black; color: white;">Primary language</th> <th style="background-color: black; color: white;">Expected result</th> <th style="background-color: black; color: white;">OK or NOK</th> </tr> </thead> <tbody> <tr> <td>swe</td> <td>The initial teletext page is displayed in swedish</td> <td></td> </tr> <tr> <td></td> <td>The initial teletext page is displayed in the selected language</td> <td></td> </tr> <tr> <td></td> <td>The initial teletext page is displayed in the selected language</td> <td></td> </tr> </tbody> </table>	Expected result	OK or NOK	Teletext works without any problems.		Primary language	Expected result	OK or NOK	swe	The initial teletext page is displayed in swedish			The initial teletext page is displayed in the selected language			The initial teletext page is displayed in the selected language	
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<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments																
<b>Comments</b>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO          Describe more specific faults and/or other information</p>																
<b>Date</b>	<b>Sign</b>																

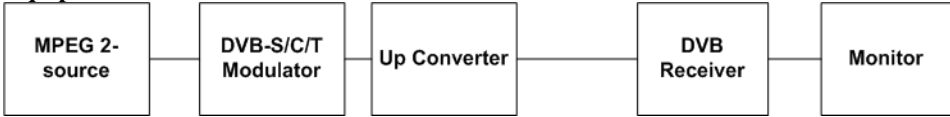
<b>Test Case</b>	<b>Task 10:4 Teletext – teletext subtitling</b>
<b>Section</b>	NorDig Unified 7.1
<b>Requirement</b>	<p>The user shall be able to select primary and secondary subtitling language.</p> <p>The Nordic characters defined in the Latin G2 supplementary set shall be supported.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b>          To test the functionality of the teletext decoder concerning subtitling.</p> <p><b>Equipment:</b></p> <div style="text-align: center;">  <pre> graph LR     A[MPEG 2-source] --- B[DVB-S/C/T Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor]           </pre> </div>

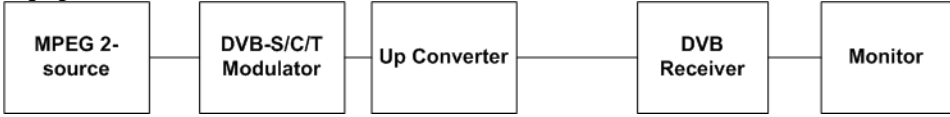
	<p><b>Test procedure:</b></p> <p>Start condition: IRD installed on the network</p> <ol style="list-style-type: none"> <li>1. Enter the menu and check that it's possible to select primary and secondary subtitling language. Fill in the test protocol.</li> <li>2. Zap to a service with multiple subtitle languages. Select an available language as primary language and check that the subtitling is displayed.</li> <li>3. Verify that the text is in sync with the video.</li> <li>4. Verify that the nordic characters are displayed correctly.</li> <li>5. Fill in the results in the protocol.</li> <li>6. Enter the language set up and select a language that is not available as primary language, and an available language as secondary.</li> <li>7. Verify that the secondary language text is displayed, and in sync with the video.</li> <li>8. Verify that the nordic characters are displayed correctly.</li> <li>9. Fill in the results in the protocol.</li> </ol> <p>Repeat 6-9 for the other subtitling languages and fill in the protocol.</p> <p><b>Expected result:</b> All test results are OK.</p>																																		
<i>Test result(s)</i>	<p><b>Test protocol:</b></p> <p>Test point 1</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: black; color: white;"> <th style="width: 80%;">Expected result</th> <th style="width: 20%;">OK or NOK</th> </tr> </thead> <tbody> <tr> <td>It's possible to select primary and secondary language.</td> <td style="text-align: center;"> </td> </tr> </tbody> </table> <p>Test point 2-10</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: black; color: white;"> <th style="width: 20%;">Primary subtitling language</th> <th style="width: 20%;">Secondary subtitling language</th> <th style="width: 40%;">Expected result</th> <th style="width: 20%;">OK or NOK</th> </tr> </thead> <tbody> <tr> <td rowspan="2">swe</td> <td rowspan="2">Set to non valid language</td> <td>Subtitling displayed in sync with video</td> <td style="text-align: center;"> </td> </tr> <tr> <td>Nordic characters displayed correctly</td> <td style="text-align: center;"> </td> </tr> <tr> <td rowspan="2">Set to non valid language</td> <td rowspan="2"> </td> <td>Subtitling displayed in sync with video</td> <td style="text-align: center;"> </td> </tr> <tr> <td>Nordic characters displayed correctly</td> <td style="text-align: center;"> </td> </tr> <tr> <td rowspan="2">Set to non valid language</td> <td rowspan="2"> </td> <td>Subtitling displayed in sync with video</td> <td style="text-align: center;"> </td> </tr> <tr> <td>Nordic characters displayed correctly</td> <td style="text-align: center;"> </td> </tr> <tr> <td rowspan="2">Set to non valid language</td> <td rowspan="2"> </td> <td>Subtitling displayed in sync with video</td> <td style="text-align: center;"> </td> </tr> <tr> <td>Nordic characters displayed correctly</td> <td style="text-align: center;"> </td> </tr> </tbody> </table>			Expected result	OK or NOK	It's possible to select primary and secondary language.		Primary subtitling language	Secondary subtitling language	Expected result	OK or NOK	swe	Set to non valid language	Subtitling displayed in sync with video		Nordic characters displayed correctly		Set to non valid language		Subtitling displayed in sync with video		Nordic characters displayed correctly		Set to non valid language		Subtitling displayed in sync with video		Nordic characters displayed correctly		Set to non valid language		Subtitling displayed in sync with video		Nordic characters displayed correctly	
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<i>Date</i>		<i>Sign</i>																																	

<b>Test Case</b>	<b>Task 10:5 DVB Subtitling</b>
<b>Section</b>	NorDig Unified 7.2
<b>Requirement</b>	<p>The Nordig IRD shall be capable of decoding, as a minimum, a subset of the DVB subtitle services as specified in section 14.2.1. and transmitted in conformance with ETS 300 743 and displayed using the OSD capabilities whilst decoding the full television service (video and audio) to which it is associated.</p> <p>The enabling and disabling of the subtitles shall be user controlled through the user interface, but with subtitles enabled as default option.</p> <p>The enabling and disabling of the subtitle composition pages and selection of “normal” or “hard of hearing” subtitling should be user controlled, with composition pages and normal subtitling enabled as default option.</p> <p>The user shall be able to select primary and secondary subtitling language.</p> <p><b>The precision of the presentation of the subtitles shall be within 2 frames</b></p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify that DVB subtitling is implemented, and that it has higher priority than Teletext subtitling.</p> <p><b>Equipment:</b></p>  <pre> graph LR     A[MPEG 2-source] --&gt; B[DVB-S/C/T Modulator]     B --&gt; C[Up Converter]     C --&gt; D[DVB Receiver]     D --&gt; E[Monitor]   </pre> <p>A transport stream containing a test service with teletext subtitling and DVB subtitling components.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Drop the DVB subtitling component in the mux. Only Teletext subtitling is broadcasted.</li> <li>2. Zap from, then to, the test service to make sure that the IRD has updated the PMT.</li> <li>3. Verify that the Teletext subtitling is displayed. Fill in the test protocol.</li> <li>4. Add the DVB Subtitling component in the mux. Both DVB and Teletext is now present.</li> <li>5. Zap from, then to, the test service.</li> <li>6. Verify that the DVB subtitling is the only component that the IRD displays. Fill in the test protocol.</li> <li>7. Verify that the DVB subtitling is in synchronisation with the video. Fill in the test protocol.</li> <li>8. Access the menu system for subtitling preferences.</li> <li>9. Verify the “normal” DVB subtitling can be enabled and disabled. Verify the functionality. (In case of teletext subtitles are still broadcasted, the decoding of the teletext subtitles should start)</li> </ol> <p>Expected result: All test results are OK.</p>
<b>Test result(s)</b>	<b>Test protocol</b>

	<b>Test point 3</b>	
	<b>Expected result</b>	<b>OK or NOK</b>
	Teletext subtitling is displayed.	
	<b>Test point 6-7</b>	
<b>Information about the used DVB Subtitling transportstream (ref, subtitle generator info etc)</b>	<b>Expected result</b>	<b>OK or NOK</b>
	DVB subtitling is the only component that is displayed.	
	DVB subtitling is in sync with the video and audio	
<b>Test point 9</b>		
<b>Expected result</b>	<b>OK or NOK</b>	
DVB subtitling can be enabled and disabled.		
DVB subtitling is enabled as default		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 10:6 DVB Subtitling –Hard of hearing</b>
<b>Section</b>	NorDig Unified 7.2
<b>Requirement</b>	<p>The enabling and disabling of the subtitle composition pages and selection of “normal” or “hard of hearing” subtitling should be user controlled, with composition pages and normal subtitling enabled as default option.</p> <p>The enabling or disabling of the subtitle ancillary pages, if available, shall be user controlled, with subtitle ancillary pages enabled as default option. The selection of subtitle ancillary pages shall be independent of the enabling of subtitle composition pages.</p> <p>In case of “hard of hearing” subtitling mode is selected and if no “hard of hearing” pages are received (signalled in subtitling descriptor), the receiver shall as a default use “normal” pages from the same selected language.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check that the IRD can handle signalisation and decoding of “hard of hearing” subtitling when they are broadcasted.or not. To check that composition pages “normal” are chosen by default instead of “hard of hearing”.</p> <p>Support for ancillary pages is not tested.</p>

	<b>Equipment:</b> 	
	<p>A transport stream containing a test service with DVB composition subtitling and “hard of hearing” components.</p> <p>Subtitling composition pages can be divided into two contents: “normal” or “hard of hearing”. Composition pages shall be enabled in mode “normal” by default. Subtitling ancillary pages can be broadcasted for more or less like a “raw data”. Ancillary pages shall be enabled by default.</p>	
	<b>Test procedure:</b> <ol style="list-style-type: none"> <li>1. Verify the “hard of hearing” subtitles are enabled as default</li> <li>2. Start to broadcast the “hard of hearing” subtitles according to correct PSI/SI signalization.</li> <li>3. Verify receiver is able to handle and decode the “hard of hearing” composition pages (DVB subtitles).</li> <li>4. Stop the “hard of hearing” subtitling pages broadcasting.</li> <li>5. Start the “normal” subtitling pages broadcast.</li> <li>6. Verify that the receiver automatically starts to decode “normal” subtitling pages.</li> </ol>	
	<b>Expected result:</b> <p>Hard of hearing content of the DVB subtitling is handled, displayed and decoded correctly.</p> <p>The automatic change from “normal” to “hard of hearing” subtitling pages and vice versa is not requirement in NorDig Unified. However, for convenient use of the subtitling composition pages content, a receiver manufacture may choose to have this support due to that all program content is not “hard of hearing” subtitled.</p>	
	<b>Test result(s)</b>	
<b>Conformity</b> <input type="checkbox"/> OK Fault <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b> If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information		
<b>Date</b>		
<b>Sign</b>		

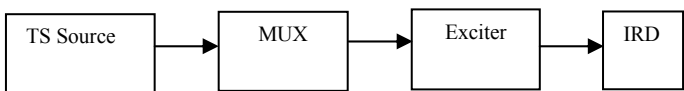
<b>Test Case</b>	<b>Task 10:7 DVB Subtitling coexistent with MHP applications</b>
<b>Section</b>	NorDig Unified 7.2
<b>Requirement</b>	The DVB subtitling shall be able to coexist with applications, and shall coexist with MHP-applications as specified in the DVB-MHP specification v1.1 [26].
<b>Test procedure</b>	<b>Purpose of test:</b> To verify that DVB subtitling can coexists with MHP applications.
	<b>Equipment:</b> 
	<p>A transport stream containing a test service with DVB composition subtitling component and at least one signaled service bound autostart MHP application at the same channel. The MHP application shall not be visible all the time and shall not use</p>

	<p>the whole graphics plane when visible.</p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. set the IRD to the autostart mode for the MHP services</li> <li>2. search channels</li> <li>3. zap to a channel that contains the MHP service and subtitles</li> <li>4. verify that when the MHP application is not using the same graphics plane or area of the plane as the subtitles, the subtitles are visible</li> </ol> <p><b>Expected result:</b></p> <p>The subtitles are visible with a MHP application, when they are not sharing the same area of the graphics plane.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<b>Date</b>	<b>Sign</b>

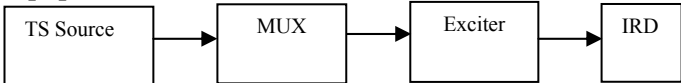
<b>Test Case</b>	<b>Task 10:8 DVB Subtitling – Subtitling subset</b>
<b>Section</b>	NorDig Unified 7.2.1
<b>Requirement</b>	<p>The NorDig IRD shall at least be capable of decoding the following DVB subtitling services:</p> <p>Object types: The handling of the object type (0x00) ‘basic object, bitmap’ shall be supported. The handling of the other object types (i.e. 0x01), ‘basic object, character’ and (0x02) ‘composite object, string of characters’) is optional.</p> <p>Regions: The number of regions shall be according to the ETS 300 743 [22] specification, however a limitation in the display area due to memory restrictions is allowed. The total number of regions to handle shall be able to cover four complete subtitle rows (per frame) where one subtitle row shall be extendable to 706 pixels * 40 pixels. The regions shall have the possibility to cover 112960 pixels per frame.</p> <p>Number of objects: The number of objects shall be at least 128.</p> <p>CLUT: The NorDig IRD receiver shall be able to handle at least one colour look-up table (CLUT) with a minimum of 16 entries per region and the possibility to have one colour scheme applied in each of the regions. It shall be possible to choose any 24-bit RGB colour into the 16 entries. The decoder shall be able to handle the mapping to the closest colour match if the decoder has some limitation in the colour presentation. The use of the non_modifying_colour flag is optional.</p> <p>Transparency: The NorDig IRD receiver shall implement at least 5 levels of transparency; 0% (opaque), 30%, 50%, 70% and 100% (completely transparent). Implementation of additional intermediate levels of transparency is optional. Where the MHP terminal cannot complement a particular value of semitransparency it</p>

	<p>shall replace it with the nearest value of transparency it can implement. However, if the encoded value of transparency is in the range 10%-90% it shall not be approximated as either 0% or 100% transparency. So, 9% may be approximated as 0% but 10% shall be represented with a value in the range 10% to 90%%, such as 30%. Similarly, 91% may be approximated as 100%.</p> <p>Number of streams: The receiver shall support at least 2 simultaneously DVB-subtitling streams.</p>		
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check that the different DVB Subtitling services are functional.</p> <p><b>Equipment:</b> IRD manufacturer describes used test equipment and procedures.</p> <p><b>Expected result:</b> Subtitling is displayed as defined in requirements.</p>		
<b>Test result(s)</b>			
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	<p>If possible describe if fault 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>		
<b>Date</b>	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"><i>Sign</i></td> </tr> </table>		<i>Sign</i>
	<i>Sign</i>		

<b>Test Case</b>	<b>Task 10:9 HDTV - DVB Subtitling – HDTV Subtitling subset</b>
<b>Section</b>	NorDig Unified 7.2.2
<b>Requirement</b>	<p>DDS Optional for SDTV-level IRDs, mandatory for HDTV-level IRDs: The Display Definition Segment for a subtitle service shall be supported for services that implement DDS, as defined in EN 300 743 [13]. Absence of a DDS implies that the display segment width shall be assumed as 720 pixels and the height as 576 lines.</p> <p>The NorDig IRD shall at least be capable of decoding the following DVB subtitling services:</p> <p>Object types: The handling of the object type (0x00) ‘basic object, bitmap’ shall be supported. The handling of the other object types (i.e. 0x01), ‘basic object, character’ and (0x02) ‘composite object, string of characters’) is optional.</p> <p>Regions: The number of regions shall be according to the ETS 300 743 [22] specification, however a limitation in the display area due to memory restrictions is allowed. The total number of regions to handle shall be able to cover four complete subtitle rows (per frame) where one subtitle row shall be extendable to 1906 pixels * 60 pixels. The regions shall have the possibility to cover 457440 pixels per frame.</p> <p>Number of objects: The number of objects shall be at least 128.</p> <p>CLUT: The NorDig IRD receiver shall be able to handle at least one colour look-up table (CLUT) with a minimum of 16 entries per region and the possibility to have one colour scheme applied in each of the regions. It shall be possible to choose any 24-bit RGB colour into the 16 entries. The decoder</p>

	<p>shall be able to handle the mapping to the closest colour match if the decoder has some limitation in the colour presentation. The use of the non_modifying_colour flag is optional.</p> <p>Transparency: The NorDig IRD receiver shall implement at least 5 levels of transparency; 0% (opaque), 30%, 50%, 70% and 100% (completely transparent). Implementation of additional intermediate levels of transparency is optional. Where the MHP terminal cannot complement a particular value of semitransparency it shall replace it with the nearest value of transparency it can implement. However, if the encoded value of transparency is in the range 10%-90% it shall not be approximated as either 0% or 100% transparency. So, 9% may be approximated as 0% but 10% shall be represented with a value in the range 10% to 90%%, such as 30%. Similarly, 91% may be approximated as 100%.</p> <p>Number of streams: The receiver shall support at least 2 simultaneously DVB-subtitling streams.</p>
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check that the different DVB Subtitling services are functional.</p> <p><b>Equipment:</b></p> <div style="text-align: center;">  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]             </pre> </div> <p><b>Expected result:</b> Subtitling is displayed as defined in requirements.</p>
<b>Test result(s)</b>	
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<b>Comments</b>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information</p>
<b>Date</b>	<b>Sign</b>

<b>Test Case</b>	<b>Task 10:10 HDTV - DVB Subtitling – HDTV Subtitling subset - DDS</b>
<b>Section</b>	NorDig Unified 7.2.2
<b>Requirement</b>	<p>DDS Optional for SDTV-level IRDs, mandatory for HDTV-level IRDs: The Display Definition Segment for a subtitle service shall be supported for services that implement DDS, as defined in EN 300 743 [13]. Absence of a DDS implies that the display segment width shall be assumed as 720 pixels and the height as 576 lines.</p> <p>The NorDig IRD shall at least be capable of decoding the following DVB subtitling services:</p> <p>Object types: The handling of the object type (0x00) ‘basic object, bitmap’ shall be supported. The handling of the other object types (i.e. 0x01), ‘basic object, character’ and (0x02) ‘composite object, string of characters’) is optional.</p> <p>Regions: The number of regions shall be according to the ETS 300 743 [22] specification,</p>

	<p>however a limitation in the display area due to memory restrictions is allowed. The total number of regions to handle shall be able to cover four complete subtitle rows (per frame) where one subtitle row shall be extendable to 1906 pixels * 60 pixels. The regions shall have the possibility to cover 457440 pixels per frame.</p> <p>Number of objects: The number of objects shall be at least 128.</p> <p>CLUT: The NorDig IRD receiver shall be able to handle at least one colour look-up table (CLUT) with a minimum of 16 entries per region and the possibility to have one colour scheme applied in each of the regions. It shall be possible to choose any 24-bit RGB colour into the 16 entries. The decoder shall be able to handle the mapping to the closest colour match if the decoder has some limitation in the colour presentation. The use of the non_modifying_colour flag is optional.</p> <p>Transparency: The NorDig IRD receiver shall implement at least 5 levels of transparency; 0% (opaque), 30%, 50%, 70% and 100% (completely transparent). Implementation of additional intermediate levels of transparency is optional. Where the MHP terminal cannot complement a particular value of semitransparency it shall replace it with the nearest value of transparency it can implement. However, if the encoded value of transparency is in the range 10%-90% it shall not be approximated as either 0% or 100% transparency. So, 9% may be approximated as 0% but 10% shall be represented with a value in the range 10% to 90%, such as 30%. Similarly, 91% may be approximated as 100%.</p> <p>Number of streams: The receiver shall support at least 2 simultaneously DVB-subtitling streams.</p>			
<b>Test procedure</b>	<p><b>Purpose of test:</b> To check that the different DVB Subtitling services are functional.</p> <p><b>Equipment:</b></p>  <pre> graph LR     TS[TS Source] --&gt; MUX[MUX]     MUX --&gt; Exciter[Exciter]     Exciter --&gt; IRD[IRD]   </pre> <p><b>Expected result:</b> Subtitling is displayed as defined in requirements.</p>			
<b>Test result(s)</b>				
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments			
<b>Comments</b>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information</p>			
<b>Date</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="width: 20%; text-align: center;"><i>Sign</i></td> <td style="width: 30%;"></td> </tr> </table>		<i>Sign</i>	
	<i>Sign</i>			

## 2.11 Task 11: The Remote Control

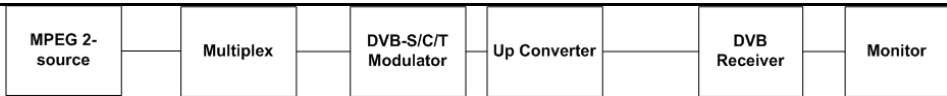
<i>Test Case</i>	<b>Task 11:1 Remote Control Function Keys</b>	
<i>Section</i>	NorDig 9.7	
<i>Requirement</i>	<p>The NorDig IRD remote control shall include 10 digit keys, labeled 0-9</p> <p>The NorDig IRD remote control shall include the following keys for digital TV functions:</p> <p>A navigation or pointing system for navigation on the OSD</p> <p>OK – a function that selects or confirms current choice or statement</p> <p>Multifunctional keys – at least four differently-coded keys for non-dedicated functions. The keys should be coloured red, green, yellow and blue.</p>	
<i>Test procedure</i>	<p><b>Test procedure:</b></p> <p>Check the manufacturer technical specification / compliance list.</p> <p><b>Expected result:</b></p> <p>The minimum hardware requirement is fulfilled.</p>	
<i>Test result(s)</i>		
<i>Conformity</i>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<i>Comments</i>	<p>If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b></p> <p>Describe more specific faults and/or other information</p>	
<i>Date</i>		<i>Sign</i>



**NorDig**  
**2.12 Task 12: User Preferences**

<b>Test Case</b>	<b>Task 12:1 Stored preferences</b>	
<b>Section</b>	NorDig Unified 16.1	
<b>Requirement</b>	<p>The user shall be able to store preferences in persistent memory. The following user preferences shall be implemented in the NorDig IRD.</p> <ul style="list-style-type: none"> <li>* Video display preferences as defined</li> <li>* Audio preferences as defined</li> <li>* Primary and secondary audio language as defined</li> <li>* Primary and secondary subtitling language as defined</li> <li>* Service list as defined</li> </ul>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify stored user preferences</p> <p><b>Equipment:</b></p> <div style="text-align: center;"> <pre> graph LR     A[MPEG 2-source] --- B[DVB-S/C/T Modulator]     B --- C[Up Converter]     C --- D[DVB Receiver]     D --- E[Monitor]           </pre> </div> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Verify following user preferences: <ul style="list-style-type: none"> <li>* Video display preferences</li> <li>* Audio preferences</li> <li>* Primary and secondary audio language</li> <li>* Primary and secondary subtitling language</li> <li>* Service list</li> </ul> </li> <li>2. For HDTV IRD: Verify following additional user preferences: <ul style="list-style-type: none"> <li>* HDMI</li> <li>* HDCP</li> </ul> </li> </ol> <p><b>Expected result:</b> User preferences are as defined.</p>	
<b>Test result(s)</b>		
<b>Conformity</b>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments	
<b>Comments</b>	<p>If possible describe if fault 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>	
<b>Date</b>		<b>Sign</b>

<b>Test Case</b>	<b>Task 12:2 Deletion of service lists</b>	
<b>Section</b>	NorDig Unified 16.2	
<b>Requirement</b>	<p>The IRD shall provide a function to remove all service lists (default and user defined) and should not affecting other parameters (e.g. user preferences).</p>	
<b>Test procedure</b>	<p><b>Purpose of test:</b> To verify deletion of the service lists</p> <p><b>Equipment:</b></p>	

	
	<p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Verify if the receiver supports a mechanism to only remove service lists.</li> <li>2. Verify that the service list(s) exists</li> <li>3. Remove service list(s)</li> <li>4. Verify remove of the service list(s)</li> </ol> <p><b>Expected result:</b> Service lists are removed.</p>
<i>Test result(s)</i>	
<i>Conformity</i>	<input type="checkbox"/> <b>OK</b> <input type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments
<i>Comments</i>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information
<i>Date</i>	<i>Sign</i>

<i>Test Case</i>	<b>Task 12:3 Reset to factory mode</b>																	
<i>Section</i>	NorDig Unified 16.3																	
<i>Requirement</i>	The IRD shall provide a function to reset all parameters to factory mode, thus removing all service lists, user preferences, etc. After reset, the IRD shall enter installation state.																	
<i>Test procedure</i>	<p><b>Purpose of test:</b> To verify the reset function.</p> <p><b>Equipment:</b></p> <p><b>Test procedure:</b></p> <ol style="list-style-type: none"> <li>1. Locate the reset to factory mode function in the IRD and initiate it.</li> <li>2. Check that the service list and user preferences have been deleted.</li> <li>3. Enter the navigator and check that the factory mode meets the requirements.</li> <li>4. Fill in the test protocol.</li> </ol> <p><b>Expected result:</b> The IRD has a reset function and the factory settings fulfil the specification.</p>																	
<i>Test result(s)</i>	<p>Test protocol</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Requirement</th> <th style="width: 20%;">Value</th> <th style="width: 30%;">NOK or OK</th> </tr> </thead> <tbody> <tr> <td>RF input DC power supply source for satellite front-end:</td> <td>on</td> <td></td> </tr> <tr> <td>RF input DC power supply source for terrestrial front-end:</td> <td>off (1)</td> <td></td> </tr> <tr> <td>RF-output preset channel:</td> <td>Channel 43 (PAL-G) (2)</td> <td></td> </tr> <tr> <td>Menu language:</td> <td>equal to country settings</td> <td></td> </tr> </tbody> </table>			Requirement	Value	NOK or OK	RF input DC power supply source for satellite front-end:	on		RF input DC power supply source for terrestrial front-end:	off (1)		RF-output preset channel:	Channel 43 (PAL-G) (2)		Menu language:	equal to country settings	
Requirement	Value	NOK or OK																
RF input DC power supply source for satellite front-end:	on																	
RF input DC power supply source for terrestrial front-end:	off (1)																	
RF-output preset channel:	Channel 43 (PAL-G) (2)																	
Menu language:	equal to country settings																	

	Primary audio language:	equal to country settings													
	Subtitling (normal):	on													
	Primary subtitling language:	as country settings													
	Subtitling; hard of hearing/hearing impaired:	off													
Additional requirements for HDTV IRD:															
<table border="1"> <thead> <tr> <th>Requirement</th> <th>Value</th> <th>NOK or OK</th> </tr> </thead> <tbody> <tr> <td>HDMI Audio output</td> <td>Stereo or a stereo down-mix from system A or B multichannel, see section 6.2</td> <td></td> </tr> <tr> <td>HDMI Video output</td> <td>Automatic using EDID information</td> <td></td> </tr> <tr> <td>HDCP</td> <td>ON or as specified by the relevant network/ CA operator see section 9.11.4 (1)</td> <td></td> </tr> </tbody> </table>				Requirement	Value	NOK or OK	HDMI Audio output	Stereo or a stereo down-mix from system A or B multichannel, see section 6.2		HDMI Video output	Automatic using EDID information		HDCP	ON or as specified by the relevant network/ CA operator see section 9.11.4 (1)	
Requirement	Value	NOK or OK													
HDMI Audio output	Stereo or a stereo down-mix from system A or B multichannel, see section 6.2														
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<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments														
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> YES <input type="checkbox"/> NO Describe more specific faults and/or other information														
<b>Date</b>		<b>Sign</b>													



## **Part III - Test Set B**



NorDig

## 1 Introduction-Test Set B

Test suites for DVB-MHP are relevant for the NorDig Enhanced, NorDig Interactive and NorDig Internet Access profiles.

The Test Suites for DVB-MHP are prepared for self-testing by industry, in order to ensure compliance with the MHP-specifications and interoperability between IRDs that are provided with different system software.

The DVB test suites and MHP logo for the Interactive profile are available for the manufacturers from ETSI. Testing in order to ensure compliance with the relevant profile of MHP-ver 1.1 will be required when they become available from DVB/ETSI.

Testing for NorDig compliance of IRDs provided with MHP compliant APIs will thus be based on the test regime established by DVB, including the MHP Test suites and the handling of MHP compliance by the ETSI Custodian.

**Test suites for proprietary APIs** are relevant for NorDig I, but not specified by NorDig.



## **Part IV - Test Set C**

## 1 Introduction-Test Set C

The NorDig test specifications Test Set C is grouped into a set of test tasks, covering related tests:

### A. Test specifications for Common Interface

Each of the main tasks defined above include a number of sub-tasks

#### 1.1 Task 13: Use of Common Interface

<b>Test Case</b>	<b>Task 13:1 Use of Common Interface</b>		
<b>Section</b>	NorDig Unified 10.2		
<b>Requirement</b>	The IRD should provide the selected transport stream via the DVB Common Interface (CI) to an external CA-module, together with relevant MMI-information and data indicating the selected service(s)(service component(s). The CA-module, together with associated smart card, shall descramble the selected service(s) and return the transport stream and MMI-data via the CI to the IRD.		
<b>Test procedure</b>	The Test procedure shall (provisionally) be based on existing interface test specifications for at least the most common CA-module. The IRD manufacturer shall describe the used test procedure.		
<b>Test result(s)</b>	The test results shall show that the IRD is fully compatible with CA-module, when the CA-module is equipped for at least one of the CA-systems used in the Nordic area.		
<b>Conformity</b>	<input type="checkbox"/> <b>OK Fault</b> <input type="checkbox"/> Major <input type="checkbox"/> Minor, define fail reason in comments		
<b>Comments</b>	If possible describe if fault can be fixed with software update: <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> Describe more specific faults and/or other information		
<b>Date</b>		<b>Sign</b>	

## Annex A: NorDig Network Custodians

The NorDig Network Custodians are represented (per June 17th, 2008) by the following companies in the Nordic countries and relevant networks:

Country/Network	Contact information
<b>Denmark</b>	
Cable Networks	To be defined
Satellite Networks	To be defined
Terrestrial Network	To be defined
<b>Finland</b>	
Cable Networks	<b>Labwise Oy</b> (test laboratory) Tel. +358 3 214 0010 Email: <a href="mailto:testing@labwise.fi">testing@labwise.fi</a> Web: <a href="http://www.kaapelitelevisio.fi">www.kaapelitelevisio.fi</a> or <a href="http://www.labwise.fi">www.labwise.fi</a>
Satellite Networks	To be defined
Terrestrial Networks	To be defined
<b>Iceland</b>	
Cable Networks	To be defined
Satellite Networks	To be defined
Terrestrial Networks	To be defined
<b>Norway</b>	
Cable Networks	To be defined
Satellite Networks	<b>Telenor Broadcast Holding AS / Canal Digital Technology &amp; IS</b> Tel. Email: Web:
Terrestrial Networks	To be defined
<b>Sweden</b>	
Cable Networks	To be defined
Satellite Networks	To be defined
Terrestrial Networks	<b>Receivers for free-to-view services:</b> <b>Teracom AB</b> (network operator) Tel: +46 8 555 420 00 (switchboard) Email: <a href="mailto:mottagartester@teracom.se">mottagartester@teracom.se</a> Web: <a href="http://www.teracom.se">www.teracom.se</a>  <b>Receivers for pay TV services:</b> <b>Boxer TV Access AB</b> (operator) Tel: +46 8 587 899 00 (switchboard) Email: <a href="mailto:mottagartest@boxer.se">mottagartest@boxer.se</a> Web: <a href="http://www.boxer.se">www.boxer.se</a>