MINIMUM RECEIVER REQUIREMENTS FOR DTT

IN IRELAND

V1.0

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1. Introduction

This document has been developed by the DTT Specification Working Group. It sets out the minimum requirements, recommended features and optional features for a Digital Terrestrial Television receiver in Ireland.

For a Digital Terrestrial Television Receiver ("the Receiver") to be deemed compliant with this document, it must satisfy all the requirements where the word "shall" is used (Sections 2 & 3). All other features (Section 4 & Appendix C) are recommended and/or optional. The Other Optional Features contained in Appendix C should conform to the provisions of the relevant ETSI standard or associated guideline should receiver manufacturers choose to implement them.

The numbers in square brackets refer to the standards listed in Appendix B. Where references are given and unless otherwise indicated, the latest version of each standard applies.

2. General Requirements

2.1 The Receiver shall receive and output all Irish free-to-air video and audio channels ("the Channels") broadcast on the DTT Service[1]. This shall include the capability to:

- Receive and output SD and HD Channels
- Receive and output DVB subtitles (when broadcast) if required by the viewer
- Receive and output 16x9 and 4x3 video correctly formatted for the connected display device

2.2 On installation, the Receiver shall receive and output all Channels available at the installed location.

2.3 The Receiver shall provide the user with a means of selecting a primary network (e.g. country selection). The Receiver shall allocate Service Numbers directly corresponding to the LCN of Channels from the designated primary network. The Receiver shall make Channels received from the non-primary network available to the user through assignment of alternative unassigned Service Numbers.

2.4 The Channels being broadcast will change over time. To ensure that the viewer is always able to access all the Channels being broadcast, it is recommended that the Receiver automatically detect and reflect to the viewer any such changes.

2.5 All Channels shall be transmitted with an associated Logical Channel Number (LCN). LCNs shall be useable directly as Service Numbers on the Receiver. The Receiver shall assign a Service Number to all Channels received based on the LCN allocated to that Channel.

2.6 If duplicate Channels are received from different transmitters on the same network (i.e. same LCN and same network_id), the Receiver shall allocate a Service Number directly corresponding to the LCN of the Channel with the highest received signal quality.

2.7 The Receiver shall provide a complete list of Channels and an EPG containing event information for all DTT services.

[1] Note that the Irish DTT service has an original_network_id of 0x2174. Services shall use a network_id in the range 0x3201-0x3300 [9].

3. Basic Requirements

All Receivers shall satisfy all of the requirements contained in Section 3 except where the requirement applies only to a set-top box. Requirements which have a related recommended feature in section 4 are indicated and hyperlinked with an asterix (*).

3.1 Tuner & Demodulator	
Input Connector	IEC 169-2[2], Female
Input signal level	-10 to -70 dBm
Frequency Range	470-862 MHz
Demodulation	16 QAM and 64 QAM in accordance with EN 300 744[1].
Carrier Mode	8k
FEC Mode Rate	1/2, 2/3, 3/4, 5/6, 7/8
Guard Interval	1/4, 1/8, 1/16, 1/32
The Receiver shall be able to scan the entire frequency range indicated above, and use the information from the PSI/SI tables to automatically display all available Channels to the viewer.	

3.2 RF Modulator (Set-top box only)	
Loop through/modulator output (set-top box only)	IEC 169-2[2], Male
RF channel	User adjustable to any UHF channel between 21 and 69. Modulator to be preset on UHF channel 69.
Channel bandwidth	8 MHz
Colour system	PAL I

3.3 MPEG-2 Decoder (Standard Definition)	
Transport Stream	ISO/IEC 13818-1[3]
Video Profile / Level	ISO/IEC 13818-2[4]: Main Profile @ Main level
Video Resolution	Standard Definition: 720x576
Audio Decoding	ISO/IEC 13818-3[5] (MPEG-1 Layer 2)
Audio Mode	Mono Stereo

3.4 MPEG-4 Decoder (Standard Definition)	
Transport Stream	ISO/IEC 13818-1[3]
Video Profile / Level	ISO/IEC 14496-10[6]: Main Profile @ L3.0
Video Resolution	Standard Definition: 720x576
Audio Decoding	ISO/IEC 14496-3[7] (HE-AACv1)
Audio Decoding (Sound Broadcasting Services)	ISO/IEC 13818-3[5] (MPEG-1 Layer 2)
Audio Mode	Mono Stereo

3.5 MPEG-4 Decoder (High Definition)	
Transport Stream	ISO/IEC 13818-1[3]
Video Profile / Level	ISO/IEC 14496-10[6]: High Profile @ L4.0
Video Resolution	High Definition (HD): • 1920x1080 (1080i) • 1440x1080 • 1280x720 (720p) Set-top boxes shall be capable of downscaling HD Services for output via SCART.
Audio Decoding	ISO/IEC 14496-3[7] (HE-AACv1)
Audio Decoding (Sound Broadcasting Services)	ISO/IEC 13818-3[5] (MPEG-1 Layer 2)
Audio Mode	Mono Stereo

3.6 Video, Audio & Data Connectors for Set-top Boxes*	
Video connectors	• Primary output: 21-pin Euro SCART with both Composite and RGB for output to display. • Secondary output: 21-pin Euro SCART with Composite and optionally RGB or S-Video. • RCA/CINCH composite output SCART inputs and outputs should be fully wired for pass-through. Pin 8 should facilitate programme recording. • HDMI for output to display
Audio connectors	Two RCA/CINCH audio outputs (Left and Right)
Software upgrade	The Receiver shall support local software upgrades via a suitable connector.

3.7 Aspect Ratio Switching

The Receiver shall offer the user the following display options:

- 16:9
- 4:3

To allow 16:9 content to be viewed on a 4:3 display, the Receiver shall offer the user two modes:

- Centre cut-out mode
- Letterbox mode

The Receiver shall support 14:9 and 16:9 letterbox modes

The Receiver shall support both SCART Pin8 and Line 23 signalling. Line 23 signalling shall be derived from the received MPEG header and reinserted by the Receiver. Where both are present, Line 23 signalling shall take priority.

Detailed information on the recommended receiver response to aspect ratio switching can be found in "*Recommended Receiver Reaction to Aspect Ratio Switching in Digital Video Broadcasting*" [8].

3.8 Logical Channel Numbers

The Receiver shall allocate Service Numbers based on Logical Channel Numbers.

3.9 Electronic Programme Guide*

Based on the ETSI EN 300 468[10] standard relating to DVB Service Information (SI) and MPEG Programme Specific Information (PSI), the Receiver shall provide an Electronic Programme Guide (EPG) using data provided in the Event Information Table (EIT). The EPG shall present the programme title, start time, duration, a description and parental rating for the currently running programme and future programmes over the following seven days. The EPG shall present programme or event information for all Channels on all available multiplexes.

3.10 Subtitles

The Receiver shall receive and output DVB subtitles compliant with EN 300 743[11] (where broadcast) if required by the viewer.

3.11 Software Upgrade

DVB-SSU	Receivers shall accept software upgrades in accordance with TS 102 006[12]

3.12 Language Support*

The Receiver shall support both English and Irish (Gaeilge) languages.

Electronic Programme Guide (EPG)	Data contained within the EPG shall be displayed in the language in which it is broadcast.
Data Broadcast Services	Data Broadcast Services shall support English and Irish

3.13 Power

Input Voltage	AC 200 to 250V, 50 Hz
Plug	The plug shall be appropriately fused and meet BS1363[13] or IS401[14] for UK/Republic of Ireland (3-pin plug)
The Receiver shall have energy consumption characteristics for normal operation and in standby that are in line with good industry practise. The EU has produced the Code of Conduct [15] recommendation to which manufacturers are encouraged to sign up and conform.	

3.14 Additional Items

Set-top boxes shall be supplied with the following items:
Remote Control meeting the requirements set out below.
Suitable batteries
1 x Fully-wired 21-pin Euro SCART lead
1 x Mains lead, with integrated correctly fused, 3-pin plug
Clear and easy to understand user instruction booklet including a quick setup/installation guide

3.15 Remote Control

The following keys shall be included on the remote:

On/Standby	To toggle between active and standby mode
Numbers 0-9	For numeric entry
Up, Down Left, Right	Navigation keys
OK/Enter/Select	Confirmation of a screen choice or action
Back/Return	Move back one step in an EPG, interactive application or other user action
Info/i	Display a now/next banner or the current program event information
Text	Launch an interactive application
Guide/List	Display program event information for all services
Red, Green, Yellow, Blue	Launch interactive services or other functions
Program Up/Program Down	Change channel
The following keys are recommended:	
Alpha entry	“abc” “def” “ghi” “jkl” “mno” “pqrs” “tuv” “wxyz” Alpha entry should follow the format used by mobile telephones (ETSI standard ETS 300 640)
TV	Return directly to sound and vision from any user service currently selected

Sound Mute	Mute the audio input
Menu	Access the receiver set-up screens
Subtitles	Toggles visibility of Subtitles

4. Recommended Features

The features in Section 4 are recommended for enhanced receivers. Features are listed in order of priority.

4.1 Middleware

Support for Data Broadcast Services is a highly recommended feature of the Receiver. If the Receiver supports middleware, the ability to receive and output Data Broadcast Services presented in accordance with the "MHEG-5 UK Profile, version 1.06[17]" is a minimum requirement.

4.2 Conditional Access

In anticipation of a consensus approach by the multiplex contractors to a common conditional access (CA) system, if a set-top box is marketed as being capable of receiving encrypted signals, it should comply with the most recent common interface (CI) standard from the DVB or use an embedded CA solution.

The Universal Service Directive [16] requires that digital television sets with screen sizes greater than 30cm be fitted with at least one “open interface socket”.

4.3 Closed Signing and Audio Description

Receivers that are capable of presenting closed signing should provide at least the minimum user controls. Design of controls should take into account that many users of closed signing are hearing impaired.

Receivers that are capable of presenting audio description should provide at least the minimum user controls. Design of controls should take into account that many users of audio description are visually impaired.

4.4 Language Support

Setup Menu	It is recommended that the set-up menu be available in both English and Irish according to the user’s preference
Main Menu	It is recommended that the main menu be available in both English and Irish according to the user’s preference

4.5 Electronic Programme Guide

It is recommended that Receiver be capable of outputting an alternative EPG if transmitted as a Data Broadcast Service application.

Appendix A

Terms and Definitions

Receiver

A device used for the reception of DVB-T signals.

Channel

A free-to-air video and/or audio channel broadcast on the DTT platform, which has a unique Logical Channel Number associated with it.

Service Number

A number assigned by a Receiver to a particular Channel based on that Channel's LCN.

Duplicate Channels

Channels that have the same LCN and the same original_network_id.

Set-top Box (STB)

A stand-alone receiver used to enable a television to display a DVB-T service.

Logical Channel Number

A Logical Channel Number is a pre-assigned default channel number.

Data Broadcast Services

Data services which are intended for free-to-air reception e.g. information pages, enhanced broadcasts and interactive services.

Appendix B

References

1. ETSI EN 300 744, "Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television"

2. IEC 60169-2, "Radio-frequency connectors. Part 2: Coaxial unmatched connector"

3. ISO/IEC 13818-1, "Information Technology - Generic Coding of Moving Pictures and Associated Audio; Part 1: Systems"

4. ISO/IEC 13818-2, "Information Technology - Generic Coding of Moving Pictures and Associated Audio; Part 2: Video"

5. ISO/IEC 13818-3, "Information Technology - Generic Coding of Moving Pictures and Associated Audio; Part 3: Audio"

6. ISO/IEC 14496-10, "Information technology - Coding of audio-visual objects - Part 10: Advanced Video Coding"

7. ISO/IEC 14496-3, "Information technology - Coding of audio-visual objects - Part 3: Audio"

8. *"Recommended Receiver Reaction to Aspect Ratio Switching in Digital Video Broadcasting",* http://www.dtg.org.uk/publications/books.html

9. DVB SI Identifiers, "http://www.dvb.org/products_registration/dvb_identifiers/index.xml"

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

11. ETSI EN 300 743, "Digital Video Broadcasting (DVB); Subtitling systems"

12. ETSI TS 102 006, "Digital Video Broadcasting (DVB); Specification for System Software Update in DVB Systems"

13. BS 1363-1, "13 A plugs, socket-outlets and adaptors. Specification for rewireable and non-rewireable 13 A fused plugs"

14. IS 401, "Safety requirements for rewireable and non-rewireable 13 A fused plugs for normal and rough use having insulating sleeves on live and neutral pins"

15. European Commission Directorate-General Joint Research Centre, Institute for Environment and Sustainability Renewable Energies Unit, "Code of Conduct on Energy Efficiency of Digital TV Service Systems", Version 4

16. “Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive)”

17. “MHEG-5 UK Profile, version 1.06”, http://www.dtg.org.uk/publications/books_mheg.html

Appendix C

Other Optional Features

C1 Introduction

This Appendix contains features which are not minimum requirements for the Receiver but are intended as a guide should manufacturers wish to implement them.

Multichannel Audio

Where Dolby Digital Enhanced AC3 is implemented, it is recommended that receivers be capable of providing a 2 channel stereo down-mix of AC3 encoded content for output via analogue SCART and/or RCA/CINCH connectors.

S/PDIF

Where the S/PDIF digital audio output is implemented, it is recommended that an optical connection be provided.

Broadband

Where a broadband connection is implemented, it is recommended that an RJ-45 ethernet connector compatible with a home broadband router be used.

USB

Where a USB connection is implemented, it is recommended that a USB 2.0 Type A receptacle be used.