

**DIGITAL TELEVISION RECEIVERS:
USABILITY ACTION PLAN FOR SWITCHOVER**

INTERIM REPORT ON TASKS

by

The Digital Television Group

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Introduction

The Usability Action Plan has identified a number of tasks intended to encourage the introduction of digital receivers having “best practice” features. At the Usability Action Plan meeting on 18th July, 2006, the Digital Television Group adopted the following tasks:

1 **CORE REQUIREMENTS**

1.3 AUTOMATIC RESCANNING

1.3.1 Draft requirements

1.3.2 Prove operation

1.4 PROGRESS REVIEWS

1.4.3 High performance receiver profile

1.4.4 Constraints to current system (e.g. SI cross-carriage) and potential solutions

1.4.5 Standardisation of terminology and labelling

1.4.6 Engineering diagnostics/signal quality display

2 **INTEROPERABILITY/IMPLEMENTATION ISSUES**

2.1 TEST SUITES

2.1.1 Propose suite of standardised tests for horizontal market receivers (e.g. MHEG-5v1.06)

2.2 INTEROPERABILITY

2.2.1 Identify shortfalls in interoperability performance which need addressing

This report addresses each of the adopted tasks, and gives the status of DTG’s work in each case.

Usability Action Plan Task 1.3: Automatic rescanning

Introduction

At switchover, most multiplexes will be changing frequency. To avoid losing services when these moves happen, consumer receivers must re-scan all UHF channels to find the relevant transmissions. At present, re-scanning must be triggered manually by the user. In some areas, this re-scanning process will be required up to three times within a period of a few weeks. It therefore would appear to be helpful for the re-scanning process to be triggered automatically by signalling transmitted over air.

The Usability Action Plan identifies two sub-tasks to automatic rescanning: 1.3.1, draft requirements, and 1.3.2, prove operation.

The current position

This subject was first addressed about two years ago. The requirements were gathered, and the DTG's SI group drafted a specification. The specification still requires verification: a test stream needs to be generated together with a receiver implementation, to demonstrate that the required functionality can be achieved.

The specification requires the use of Transmission Parameter Signalling bits to carry Cell Id. Most modulators in the field at present are not capable of programming these bits, but newer generator modulators are. The transmission companies have indicated that they will be able to overcome this problem by temporary use of new modulators, which can be shipped from region to region as switchover progresses.

The way forward

Progress appears to be blocked due to the lack of a strong business case to proceed. Clearly, a large number of receivers will not be upgraded, as they are no longer supported products. As time progresses, the number of such receivers will increase. Some form of support for their owners will have to be provided, and this will probably involve web sites and call centres (e.g. Digital UK's, or manufacturer's).

The DTG proposes to investigate the business case for automatic re-scanning, by examining the likely call-centre costs that will fall particularly on manufacturers, taking account of the numbers of receivers that will and will not be able to be updated.

The DTG is also convening a meeting of a small group of people from relevant organisations (BBC, CE manufacturer, TDN, Digital UK) to review the existing

requirements (as they are about two years old), and to develop a plan to enable the specification to be tested in a trial implementation.

Both TDN and Digital UK have indicated that they will support the introduction of an automatic re-scan mechanism.

Usability Action Plan Task I.4.3: High performance receiver profile

Introduction

Building on knowledge gained from the DTG's Reception Group and RF Group, a proposal had been made that a specification should be developed for receivers capable of operating in difficult reception areas. Such areas might include edge of coverage, and in the presence of impulsive interference and large signals on neighbouring frequencies.

As work on the specification progressed, it became clear that the manufacturers had little appetite for two specifications and to produce equipment aimed at a relatively small portion of the market. Such equipment would cost more than a standard receiver, and therefore would not be competitive in the mainstream market. Furthermore, as much of the service area is interference limited, gains in sensitivity would not increase coverage as much as would otherwise be expected. It was felt that in most fringe area cases, bigger gains were to be found in improving domestic aerial installations.

However, it was recognised that the D-book RF specifications could be revised in a number of areas, to reflect the improved performance from the latest generation of tuners and demodulator chips. These revisions will benefit the market as a whole, and improve ruggedness of the DTT system in the presence of other possible services (e.g. DVB-H) in released spectrum post switchover. The revisions include:

- sensitivity, which has been improved by about 2.5dB through noise figure and implementation margin changes,
- linearity, which affects the receiver's ability to operate in the presence of large signals,
- resilience to impulsive interference.

The current position

New specifications covering the characteristics described above are in an advanced state of development. Draft text for the D-book exists, and is expected to be integrated into the D-book within a few months.

Usability Action Plan Task I.4.4: Constraints to current system

Introduction

We have searched for known issues in the current system, and have identified the following:

- Inconsistent version number of SI tables In principle, any SI table (NIT, EIT, SDT, etc.) can acquire an inconsistent version number (i.e. out of sequence) when certain events such as a transmitter drive changeover occurs. This arises because the SIPSI caches the tables and plays them out, rather than acting as a straight pass-through. However, as this has been the case since the start of service and no receiver misbehaviour has been attributed to this type of event, no action is proposed.
- Two-section NIT As the number of services increased, the NIT has grown, and reached the point where it could no longer fit into one MPEG section. This caused several models of receiver to fail, and as some of these receivers were old models that were no longer supported, the only remedy was to decrease the size of the NIT. This was achieved by removing the frequency list from the NIT. The absence of the frequency list did cause a problem for a small number of receivers, so it has been re-instated whilst those receivers are upgraded by over-air download. This list will be removed at the beginning of 2007.

The multiplex operators are confident that the NIT can be kept within 1 section over the long term.

- Inconsistent Actual/Other content in the EIT It has been the practice until recently to allow Actual and Other information to come from different sources, causing occasional inconsistencies, for example when one source is updated and the other is not. However, a recent code of conduct produced by TDN has secured agreement that in future all SI will come from a single master source, the CSI. This problem is therefore considered resolved.

Conclusion

There appear to be no known issues in urgent need of fixing.

Usability Action Plan Task I.4.5: Standardisation of terminology and labelling

Chapter 25 of the D-book, Remote Control Key Labelling, already deals with some aspects of terminology and labelling. However, the level of functions covered is fairly basic, based on the so-called zapper box. Many of the functions of a PDR are not covered.

Another aspect of labelling is the symbols that might be used for description of the equipment in for example retail environments.

At a recent meeting of the DTG's Domestic Systems Group, it was agreed to set up a specialist sub-group to look at issues of terminology and labelling in more detail. This will include an audit of practices elsewhere, an investigation of portability of handsets through standardised signalling protocols, and co-ordination with related work carried out by Ofcom.

Usability Action Plan Task I.4.6: Engineering diagnostics/signal quality display

Introduction

iDTVs and STBs generally have a diagnostics page used by installers and viewers to assist with certain types of reception problem. A number of shortcomings of the information on these pages have been identified:

- No single measure has been found that is diagnostic of all reception impairments. For example, impulsive interference can have a dramatic impact on pictures and sound, but barely noticeably affects BER (bit error ratio) and other signal quality indications.
- Most receivers that show BER measure it post-Viterbi error correction. It would be more effective to show the channel BER before error correction, as this is a much less abrupt indication, having a wider range of operation.
- Another useful measure is carrier confidence, or channel state information (CSI). This quality of the signal is able to indicate the presence or absence of a range of impairments, and operates over a wider range of values than BER. However, not all receiver front end chips are able to provide information about CSI, and those that do provide differing answers. There is no agreed definition of CSI.
- Signal strength indications are particularly useful for finding the best location for an indoor aerial. With analogue television, there is an instant response to movements of the aerial, and the picture can still be seen well below the

threshold of comfortable viewing. With many digital receivers, there is a significant lag between movement of the aerial and movement of the signal quality indication (~1-2 seconds), and in some cases the indication is very coarsely quantised, further hampering aerial positioning. It is practically impossible to use picture quality as a measure of signal quality, since the nature of television is to have a very abrupt failure characteristic; in broad terms, below threshold there is no picture, and above it there are no visible reception impairments.

It is of course important to provide information that is helpful to the people using it. For the average viewer, assuming they have managed to navigate to the diagnostics page, a simple bar that say extends to the right with increasing signal strength, and changes colour with BER, may be most effective. However, there are two other potential users of diagnostic information who should be considered:

- A call centre operative may have procedures to follow that allow a more accurate diagnosis of a problem than the viewer can make. It may therefore be appropriate to make additional information available.
- An aerial installer may be able to understand the shortcomings of the aerial installation better by interpreting the indications that the receiver can show.

A further aspect of diagnostics is the suggestion that a common navigation route to the diagnostics page should be established. This is seen as potentially helpful to call centres that have to deal with a wide range of receiver models. However one large manufacturer has reported that they have established a common menu structure for their entire DTT product range world-wide, and that consequently it would be difficult for them to implement a change without a strong, clear reason to do so.

The way forward

The DTG has undertaken to set up a working group reporting to its Technical Council. The working group will report on technical, viewer, installer and call-centre aspects.

Usability Action Plan Task 2.1.1: Proposed test suites

DTG Testing Ltd has created a range of test suites designed to allow manufacturers of DTT receivers for the UK market to confirm their conformance with the requirements of the DTG's D-book. The range includes:

- DVB-SI Test Suite
- MHEG-5 Test Suite
- Audio Formats Test Suite
- DVB Subtitles Test Suite

There are a number of additional test streams for testing:

- AFD behaviour,
- EPG behaviour at times straddling changes between BST and GMT,
- Time Exclusive Services

A further range of streams for testing PDRs is currently in an advanced state of development, including:

- EPG accuracy
- Accurate recording using EIT_{PF}
- Tracking programme time changes
- TOT (Time Offset Table) behaviour across changes between BST and GMT
- Series linkage (including linked programmes not being at the same time each day/week)
- Detection of recording conflicts, both at booking time and other times
- Recommendations (if you liked this programme, then you may also like...)

The target date for completion of these streams and their documentation is 27th October.

Usability Action Plan Task 2.2.1: Shortfalls in interoperability performance

From the point of view of the broadcaster, all receivers should respond identically to over air signals. However, in reality, there are differences and deficiencies in some areas. The following list identifies some areas where improvement would be desirable.

- Automatically finding new services Receivers should be able to identify that a new service has been introduced into an existing multiplex, and offer it

appropriately. Few receivers implement this.

- Consistent subtitle behaviour Informal tests on a number of DTT receivers have indicated some inconsistency in the subtitle performance of these products. In addition there are small variations in the behaviour of different subtitle generation equipment. The new subtitle test suite should help to regularise receiver behaviour. Hearing Concern is known to be pressing for improvements in this area.
- Recognition of original network identifier Some receivers react to the original network identifier, and, as part of their software licence, allocate services found with the wrong original network identifier high channel numbers. However, many receivers ignore the original network identifier, and this has contributed to the cross-border channel conflict arising between the Republic of Ireland and Northern Ireland.
- Inappropriate response to data services Some receivers find data services such as over-air downloads, and allocate them to the programme list.
- Preferred name list descriptor The preferred name list descriptor provides a list of alternative names, and name identifiers, for a service. Even though test suites and streams address it, very few receivers respond to this descriptor. One broadcaster (at least) has said that they require it.
- Over-Air-Download without the need for user intervention Although there may be a possibility of a legal impediment (related to the right to modify a purchased product without permission), it is seen as beneficial to both users and manufacturers that OAD should happen without user intervention. Ensuring that the actual upgrade does not inconvenience users, for example by happening at standby (as for PC upgrades), would be helpful.
- Inability of some receivers to select preferred languages for audio or subtitles, e.g. Gaelic, Welsh.
- Inability to handle event information other than in English About 20% of receiver models tested by DTG Testing Ltd cannot show now/next information in languages other than English, e.g. Gaelic, Welsh.
- Inability to display the full character set Some receivers only implement part of the character set. This particularly affects non-English languages.

There appears to be no mechanism to enforce the resolution of these shortcomings other than the inclusion in the requirements of a trade mark licence.