



DTH Gapfiller User Interface Specification (non-Subsidised STBs)

Minimum Specification

Document Description: The STB User Interface specification issued by e.tv Pty (Ltd) (“e.tv”) and the South African Broadcasting Corporation Pty Ltd (“SABC”) on behalf of the South African free-to-air broadcasters as per the requirements of SANS 1719. This specification sets out the minimum functionality only. The specification does not prescribe the full user behaviour for DTH, which may be determined by the manufacturer. In compliance with SANS 1719, the minimum specification does not require the use of MHEG-5.

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- VI. In relation to CAS this specification takes into account the requirements of Nagravision. In the event that another CAS in future the screen and displayed information shall be updated accordingly.

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Document Control

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References

Title	Description
Draft D-Book 6.2.1 SI Chapters-xx.pdf	DTG Dbook 6.2.1
SA specific documents	
SANS862:2015 Ed2.1	Set-top box decoder for free-to-air digital terrestrial television (“DTH STB specification”)
SANS 1719:2015	Specification for Direct To Home satellite set top box (“DTH STB specification”)
Nagravision Conditional Access Kernel API V6.1.3	Conditional Access API

Definitions

AD -	Audio Descriptor
BER –	Bit Error Rate
C/N –	Carrier-to- Noise ratio
CRT-	Cathode Ray Tube
DTH-	Direct To Home
FSA-	File System Acceleration
FTA –	Free To Air
LCN –	Logical Channel Number, which is the number that will be displayed and associated with a particular service or programme
LO-	Local Oscillator
LNB-	Low Noise Block amplifier
MHEG –	MHEG-5 interactive middleware whose applications are available OTA
NIT-	Network Information Table
OTA -	Over the Air
PLP -	Physical Layer Pipe
RCU –	Remote Control Unit
RF –	Radio Frequency
SQI –	Signal Quality Indicator: A relative value within a range of 0 to 100%, with a resolution of 1% and updated once a second. This value should be referred to a PLP in the received signal at the RF signal input and its combination of C/N and BER before error correction where the signal quality is weighted by the receiver C/N
SSI –	Signal Strength Indicator: A relative value within a range of 0 to 100%, with a resolution of 1% and updated once a second. The absolute accuracy shall be ± 5 dB at RF input levels -20dBm to -65dBm.
STB –	Set Top Box
UI –	User Interface

1. Introduction

The non-subsidised STB's that operate on the South African Digital satellite gap filler network shall contain one type of software that provides the software functionality of the STB and EPG derived from the native code at the manufacturers discretion and best practice. The software shall be embedded native code, implemented by STB manufacturers, that supports the STB functionality as well as provides some of the user interface screens. This specification outlines the basic functional requirements for the native user interface ("Native UI") screens that are embedded in the STB.

Areas of native code functionality that pertain to key support services (such as call centre) have been prescribed as mandatory. Menu and submenu structures, menu item numbers and dedicated keys as defined in this document are all mandatory requirements. STB manufacturers are able to exercise their own options in terms of the following items:

- Screen colours
- Graphics design
- Support additional STB features
- Include menu options in addition to those prescribed in this document.

The User Interface shall include the following key functions and screens which shall be developed by the manufacturer:

1. Electronic Programme Guide ("EPG") – which is a full seven day programme guide using EIT based data
2. Now/Next banner – (also known as the channel change banner, or small/large information screens) which provides programme information on the Now channel selected as well as the Next event on that channel
3. Channel List – which provides a list of available channels (Radio and TV) with LCN channel number displayed in the EPG or accessed by any other means, e.g. pressing a P+/P- button or digits buttons on the RCU.

2. On-screen display requirements

Requirement 2.1 The native UI screens must be designed for use on 4:3 CRT Televisions taking into account best practice with regards to safe areas. Downscaling may be used, but not at the expense of screen clarity. If a native 720x576 resolution screen looks better then it shall be used. If a 16:9 screen is configured or detected (e.g. an HDMI display is connected) then a higher resolution screen that covers the entire video plane may be used.

Requirement 2.2 Items that are mandatory in the menus shall be numbered and directly selectable using numeric keys. This aids any call centre trying to provide telephonic assistance.

Requirement 2.3 The display of signal strength indicator (SSI) and signal quality indicator (SQI) as defined, shall include an on screen display or bar that is colour coded to indicate signal conditions that are within tolerance and out of tolerance. The display shall be

- green if signal level is acceptable
- red if signal level is unacceptable

NB: this is not mandatory as the same information shall be displayed in the diagnostics screen.

3. General interaction

STB manufacturer may follow best practice.

4. Receiver response

The UI shall provide direct and clear feedback for any action initiated by a user (e.g. selecting a highlighted option or moving through options in a menu etc.)

If any user initiated action results in a noticeable delay then the receiver shall provide suitable feedback to assure the user that the action has been accepted and indications of progress should be provided for longer delays.

Requirement 4.1 If there is a delay longer than 100ms but less than 3sec the receiver must indicate that the key press has been processed (this is to avoid double key presses).

Requirement 4.2 If it is a short delay (longer than 3s but less than 10s) then a simple message such as “Please Wait” or something more appropriate to the action should be displayed.

Requirement 4.3 If it is a long delay (more than 10s) then more detail is required; such as by providing a progress bar or other visual indication to indicate when the STB may finish the requested action.

5. Remote Control

Requirement 5.1 On Screen displays shall be provided for Vol+/Vol- and Mute

Requirement 5.2 TV/Radio shall switch the box between TV and Radio Mode. The previously listened to or watched Radio or TV service shall be “Now/Next” banner.

Requirement 5.3 Only TV or Radio services in each mode can be cycled through using “CH+/CH-“. In addition, only the selected mode services are viewable in the “Now/Next Banner” and “Channel List”.

Requirement 5.4 Data or interactive services which are configured as channels are to be visible in TV mode;

The basic remote control keys shall remain the same except those which are MHEG-5 specific. MHEG-5 keys are not included in this specification.

Requirement 5.5 Remote Control Key Usage

Power	Places STB into Standby
Mute	STB Audio Mute
Vol+	STB Audio Volume Up
Vol-	STB Audio Volume Down
EPG	Change menu to the native based “EPG”
Info	Change menu to the native based “Now/Next”
CH+	Change Service Up
CH-	Change Service Down
Menu	Change menu to “Main Menu”
Exit	Exits the screen
OK	Validates the highlighted item
Left	Selects the left item
Right	Selects the right item
Up	Selects the above item
Down	Selects the below item
0-9	Digit Entry
Back	Go back to the previous menu unless not on a menu
Subtitles	Subtitle Selection for current programme
Audio	Audio Language Selection for current programme
TV/Radio	Switch between TV and Radio modes
AD	Audio Descriptor for current programme

6. Installation

6.1 Installation/TV Format

Requirement 6.1.1 If no services have been stored after coming out of standby or after a factory reset, installation screens are invoked. First, select the format (aspect ratio) of the TV set.

6.2 Installation/Service Search

Requirement 6.2.1 The STB shall perform a Network Scan using the first or primary satellite transponder tuning parameters. The default tuning parameters for this transponder shall be for the DTH gap filler home transponder. The user shall first have the option of changing the LNB settings (LO frequencies, LNB power etc.) or to use the default settings. The default LNB settings are as follows:

- LNB power on
- LNB LO low frequency: 9.75 GHz
- LNB High frequency: 10.6 GHz
- SATCR LNB Support

Requirement 6.2.2 All the scan options shall be on one screen. The text “Ensure your Satellite Dish is connected” must be included. The scan shall be invoked by one button press, that is, the “OK” button

6.3 Installation/Scan

Requirement 6.3.1 A full scan of the DTH gap filler network shall be performed.

Requirement 6.3.2 Whilst scanning, an indication of the current transponder being scanned (tuning parameters), the total services found so far, the current network ID and the current network name shall be displayed.

In all cases an FTA compliant device shall only display FTA channels that are found in the LCN in the BAT, these channels shall be displayed according to the order in which they are described in the service list descriptor. The BAT shall be processed when it is found in either;

- a) On a homing transponder as a result of a manual scan
- b) On a transponder that has been manually selected and on which PSI data describes an FTA homing transponder.

Indications of the current signal strength (SSI) and quality (SQI) as well as the progress (by means of a progress bar or equivalent graphical indicator) through the scan shall be displayed.

It shall be possible to manually set a transponder as a temporary homing transponder. In case this transponder is successfully found and the transponder includes the necessary PSI to identify it as an FTA homing transponder it should be automatically set as the first transponder to be scanned in all future scans. If on any scan this transponder is not found it should be deleted from the list of

available homing transponders and the scan should start with the factory default homing transponders.

6.4 Installation/Services Found

Requirement 6.4.1 For a successful scan, display the results of the scan and the signal strength indicator (SSI) for the home transponder.

A summary of the type of services (TV, Radio, Data) found shall be displayed.

6.5 Installation/No Signal Found

Requirement 6.5.1 A help screen should be displayed after no services have been found on a transponder scan.

7. Main Menu

This main menu structure is a minimum requirement and the manufacturer may follow best practice.

Requirement 7.1 The Main menu is the portal to access all of the STBs features and menus. The order and text of the following menu items is mandatory, as is the inclusion of the numbers:

1. Installation
2. System Setup
3. Channel Manager
4. System Information

7.1 Main Menu/Installation

Requirement 7.1.1 This option will allow user to perform channel search (auto/manual), to configure LNB and add a transponder.

7.2 Main Menu/System Setup

Requirement 7.2.1 The selection of this option allows the user to setup Parental Guidance, set passwords, Restore the STB to factory defaults, display System Information, Setup TV and OSD settings and lastly perform software updates.

7.3 Main Menu/Channel Manager

Requirement 7.3.1 After selecting this option the EPG (Electronic Program guide) shall be displayed. It also allows for selection of Radio/TV and to add the favourite list of channels.

7.4 Main Menu/System Information

Requirement 7.4.1 Primary System Information, to display information about the STB. This easily accessible, single page will aid a call centre when providing information about the STB. The following items are mandatory on one screen:

- STB hardware model number or name
- Software version number
- Serial number
- Smart card number
- Activation Status
- Transponder tuning parameters (minimum of polarisation and frequency)
- Tuner Lock (Locked or Not Locked)
- Signal strength (SSI) for the current transponder
- Signal Quality (SQI) for the current transponder
- Frequency of current transponder
- Polarisation of current transponder
- Transport Stream ID of current transponder
- Service ID of current service.

(Current transponder is the transponder where the current service is broadcast. Current service is the last channel tuned before going to System Information)

Requirement 7.4.2 Conditional Access information display screen, to display detailed conditional access information in addition to smart card number. The information required for display is defined in Conditional Access API. The following describes the information required to support Nagravision CAS. In case an alternative CAS is selected at any time the following information shall be updated accordingly.

Display information about the Conditional Access system. This page shall be accessed by means of right button press on the RCU whilst on the System Information display screen. This selects the "Next Page" of system information which shall contain the following mandatory information on one screen:

- Titled "Conditional Access Information"
- Nagra Conditional Access Kernel (CAK) version
- Nagra Project Number
- Nagra Unique Identifier (NUID)
- STB serial number (Manufacturer)

If a smartcard has been placed into the STB, the following items must also be displayed on the same screen:

- Smartcard UA (card-less identifier ZLK vUA)
- Smartcard Operator state (either active or suspended)
- Smartcard Renewal date (rights expiration date)

Note that these items only display if a smartcard has been inserted into the STB once.

8. On Screen Control

This section addresses functionality required whilst “on screen”, that is, viewing services.

8.1 Audio Language, Subtitle and AD Selection

Requirement 8.1.1 The menu must be provided to allow selection of languages for Audio, Subtitling and AD services being broadcast for the current programme (LCN). The relevant menu shall be invoked by using the “Audio”, “AD”, and “Subtitle” keys. Selection of a language will override the default language (as set in the Default Audio Language option) for the current programme (LCN).

Requirement 8.1.2 After changing from the current programme (LCN) to a different programme (LCN), the STB will revert to the default language setting.

Requirement 8.1.3 If the default language is not available for a selected programme (LCN), then the STB shall default to the first language available in the broadcast tables.

8.2 Reminder

Requirement 8.2.1 Reminders can be set through the resident native applications “EPG” and the “Now/Next banner”.

Requirement 8.2.2 If a reminder has been set and the programme is due to start then a warning should be displayed:

8.3 Direct Digit Entry

Requirement 8.3.1 If 0-9 are pressed without any Native menus on the screen, then the Direct Digit Entry shall be started.

This allows the user to directly go to a known LCN. A 3 digit entry is required.

Requirement 8.3.2 If an LCN is entered for a TV service whilst the STB is in Radio Mode then the STB shall ignore this instruction and present a banner indicating “Invalid channel entry”. Likewise for an LCN that is entered for a Radio service whilst the STB is in TV Mode.

8.4 Radio Services

Requirement 8.4.1 Radio services shall also use the resident native application “Now/Next banner”.

8.5 Error banners

The following error banners are mandatory:

- No signal
- Service unavailable
- Unauthorised service
- No information available
- Conditional access

Additional error banners may be provided.

Requirement 8.5.1 No signal

If, during normal operation (that is, excluding an installation process), the level and quality of the channel that the STB is tuned to becomes unacceptable, a banner must be displayed indicating a “No Signal” condition. In addition, the banner should indicate the LCN and service name of the selected service or last service viewed.

Requirement 8.5.2 Service unavailable

If a service is selected that has a valid service ID and has been allocated an LCN but the SI data is corrupted or missing and does not allow presentation of the service, a banner with the text “Service not available” must be displayed. The banner should also indicate the LCN and name of the selected service.

Requirement 8.5.3 Unauthorised service

If a service is selected that is encrypted in a manner not decipherable by the STB (such as a pay TV service), a banner with

the text “Service Unauthorised” must be displayed. The banner should also indicate the LCN and name of the selected service.

Requirement 8.5.4 No Information available

If any service is selected, and for any reason the EIT information is not yet available to the STB, a banner with the text “No Information Available” must be displayed. The banner should also indicate the LCN and name of the selected service.

Requirement 8.5.5 Error banner latency

The error banner shall display within 3 s of the error condition arising.

Requirement 8.5.6 Conditional Access

There are several banners that are required to support conditional access error messages. The requirements for these banners are defined in the Conditional Access API document.

Requirement 8.5.6.1 Smartcard Activation

Activation is achieved through the broadcast of an activation command by the broadcast head end. If the smartcard is not in the active state, the STB shall display the message banner “Waiting for activation by network”. Optional additional information “Please contact the channel’s support centre”. This banner is only to be displayed upon first time activation only.

Requirement 8.5.6.2 Smartcard Heart beat

The smartcard requires receiving regular positive messages to maintain its status in an activated state. Should the smartcard not receive this system “heart beat” message, it will go into a service “expired” state. Therefore, the smartcard may first require a renewal message by the Conditional Access System “heart beat” before services can be displayed. Since this process may take up to 60min, a smartcard in this state shall display the following banner if the Conditional Access System renewal message (heart beat) has not been acquired within 1min of tuning (tuner lock) to the channel: “searching for heart beat...wait Xmin” where X starts at 60 and counts down at a rate of one per minute. If, after 60min, the heart beat has not been acquired (i.e. the smartcard remains in “expired” state), the banner should change to “heart beat date expired”.

Requirement 8.5.6.3 Smartcard CAS banners

Table 1: Smartcard CAS banners

Item	Error status	Banner message text	Additional information (Optional)
1	Not inserted smartcard	Please insert a valid smart card	
2	Inserted upside down	Smartcard inserted incorrectly	
3	Invalid Smartcard	Smartcard not valid	Please insert a valid smartcard.
4	Never Paired Smartcard	Smartcard never paired	Please wait 15 minutes, if the problem persists, contact support centre.
5	Not Paired Smartcard	Smartcard not paired with this decoder	Contact support centre
6	Expired Smartcard, less than 60 minute on stream	Searching for heart beat... wait X min	X: Countdown from 60 to 0 min. Please wait 60 minutes, if the problem persists, contact support centre.
7	Expired Smartcard, after 60 minute on stream	Heart beat date expired	Contact support centre.
8	Smartcard Error	Smartcard Error	Remove and re-insert the card, then unplug and plug the decoder power. If the problem persists, contact support centre.
9	Not Recognised Smartcard	Smartcard not recognized	
10	Communications error smartcard	Smartcard communications error	Remove and re-insert the card, then unplug and plug the decoder power. If the problem persists, contact support centre.
11	Smartcard no product	Not Subscribed to Channel	Contact support centre for the channel.

8.6 Messaging

The STB shall display text messages that are provided through the Conditional Access system. The IRD messaging command from the CAK indicates the text and the priority of the message. There are two message priority levels:

- Immediate display: the message must be displayed on screen as soon as possible by means of a pop up screen
- Deferred display: the STB must store the message in a message box which can then be accessed by a native application.

The message box shall be stored in non-volatile memory and the addition (via the IRD messaging command) and deletion (via user applications) of messages shall be supported.

Requirement 8.6.1 Pop-up messages

As soon as the IRD messaging command, with an “immediate display” priority, is present in the STB, the STB middleware should send this message to the Banner and EPG as well as the message box. The banner native application shall be invoked to display and a message icon will be present within the banner. Selection of this message icon shall cause the text message to be displayed. A message icon will also be present in the EPG, selection of which will cause the message text to be displayed.

Requirement 8.6.2 Message box

As soon as the IRD messaging command, with a “deferred display” priority, is present in the STB, the STB middleware shall store this message in the message box.