

All-In-One STB Project

WSTH-136GN Software Specification

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Table of Contents

Purpose of This Document	4
Acronyms and Abbreviations	4
Service List of All-In-One STB	5
Function Requirement Specification	6
Broadcast TV SD	6
Broadcast TV HD.....	7
Catch-up TV	8
Transaction Video On Demand	9
Rapid ZAP Time(FCC)	10
TSTV	10
Trick-play	11
Pause Live TV	11
Start-over TV.....	12
Multiple Subtitle track.....	13
Multiple Audio track.....	13
Bookmarking.....	14
Personal Favorites	15
Parental control.....	15
Pin Code Entry	16
Multi-user profile	17
Search Engine	19
Self-Care & Self-Service	20
SVOD.....	20
Language	21
PIP	21
Local PVR (cPVR).....	22
Network PVR (nPVR).....	24
Walled Garden (RSS).....	26
News.....	26
Help Page.....	27
Network Connectivity Diagnose	28

All-In-One STB Function.....	28
STB Start-up.....	28
Media Center.....	29
Application Management.....	30
Satellite TV(DVB-S)	31
Internet Router.....	32
Internet Browser	34
STB Setting.....	35
Revision Record	35

Acronyms and Abbreviations

- STB –Set-Top Box
- DRM – Digital Right Management, more specifically the Verimatrix VCAS platform, version 3.1.
- TS – Transport Stream.
- BMS – Business Management System.
- CMS – Content Management System.
- VOD – Video-On-Demand, meaning all types of videos that can be purchased on a transactional, subscription, or free ('ad supported') basis.
- TVOD – Transactional Video-On-Demand.
- SVOD – Subscription Video-On-Demand.
- P/CVOD – Points/Credit Video-On-Demand.
- AVOD – Audio Video-On-Demand.
- SD--Standard Definition.
- HD—High Definition.
- PIP---Picture in Picture.
- DLNA—Digital Living Network Alliance.
- EMS—Elemental management System.
- BOSS—Business and Operation Support System which is CBCM system.
- CDR-- Call Detail Record.

Service List of All-In-One STB

All-In-One STB (WSTH-136GN) support current all features in IPTV platform. The features are as below:

SN	Service	Description
1	Broadcast TV SD	Feature of IPTV platform
2	Broadcast TV HD	
3	Catch-up TV	
4	Transaction VOD	
5	Rapid ZAP Time(FCC)	
6	TSTV	
7	Trick-play	
8	Pause Live TV	
9	Start – over TV	
10	Multiple subtitling track	
11	Multiple audio track	
12	Bookmarking	
13	Personal Favorites	
14	Parental Control	
15	Pin Code Entry	
16	Multi-user Profile	
17	Search Engine	
18	Self-Care & Self-Service	
19	SVOD	
20	Language	
21	PIP	
22	Local PVR	
23	Network PVR(nPVR)	
24	Walled Garden(RSS)	
25	Help Page	
26	Network Diagnosis	

Independent features of All-In-One STB (WSTH-136GN) as below:

1	STB Start-up	Features of STB
2	Media Center	
3	My Application	
4	Satellite TV(DVB-S)	
5	Internet Router	
6	Internet Browser	
7	STB Setting	

Function Requirement Specification

Broadcast TV SD

❖ Definition

The Broadcast TV is similar to the traditional cable TV or satellite TV. In terms of user experience, users watch BTV programs in the same way as they watch traditional TV programs. In terms of signal transmission, the IPTV system transmits audio and video signals to terminals through the IP network after encoding and transcoding the signals.

- The subscriber can select the live-TV through EPG via the remote control.
- The subscriber can switch the channel via the up or down key in the remote control. The zapping time is around 1 second.
- It will display the channel information including the channel number, current running program information, and next program to be played.
- The subscriber can add the channel to his/her list of favorite channels.
- The subscriber can switch the subtitle and audio track through EPG via remote control, which depends on whether the source includes subtitles and audio tracks.
- Features of Catch-up TV, Local pause TV, PIP and Parent control. Please refer to the related description.

The broadcast TV SD service is that the subscribers can watch the live channel via IPTV STB after ordering the service.

❖ Scenario Description

❖ User Experience

❖ Impact

None.

❖ Limitation

- STB should support decryption and decoding H.264 SD format.
- Video streams in H.264 MPEG4 AC-10 @2.5Mbps.
- End to end network should support multicast and the bandwidth and QoS should be guaranteed.
- Verimatrix DRM must be deployed for integration with IPTV system.
- The broadcast TV SD channel is delivered from Etisalat or the head-end and encrypted by the VMX DRM (AES). The output streaming of the DRM is multicast (TS over UDP).
- FCC solution required otherwise the zapping time 1.5-2s.
- A maximum of 8 audio tracks and 8 types of subtitles can be supported, and the source should include the subtitle or audio track
- The output streaming of P1 MPEG4 must be ready.
- Video standard in NTSC or PAL.
- Audio streams in MPEG2 AAC or MPEG4 AAC LC (sampled at 32KHz/48KHz, with a bit-rate of 32/48/ 64kbps/96Kbps) or MPEG1 layer 2 (sampled at 32KHz/48KHz at 96/128Kbps).

Broadcast TV HD

❖ Definition

The Broadcast TV is similar to the traditional cable TV or satellite TV. In terms of user experience, users watch BTV programs in the same way as they watch traditional TV programs. In terms of signal transmission, the IPTV system transmits audio and video signals to terminals through the IP network after encoding and trans-coding the signals.

The broadcast TV HD service is that the subscribers can watch the live channel via IPTV STB after ordering the service.

❖ Scenario Description

❖ User Experience

- The subscriber can select the live-TV through EPG via the remote control.
- The subscriber can switch the channel via the up or down key in the remote control.
- It will display the channel information including the channel number, current running program information, and next program to be played.
- The subscriber can add the channel to his/her list of favorite channels.
- The subscriber can switch the subtitle and audio track through EPG via remote control, which depends on whether the source includes subtitles and audio tracks.
- Features of Catch-up TV, Local pause TV, PIP and Parent control. Please refer to the related description.

❖ Impact

With the increasing of broadcast TV HD channel number, the impact on the IP bearer network load should be considered.

❖ Limitation

- STB should support decryption and decoding H.264 HD format.
- Video streams in H.264 MPEG4 AC-10 @10Mbps.
- End to end network should support multicast and the bandwidth and QoS should be guaranteed.
- Verimatrix DRM must be deployed for integration with IPTV system.
- The broadcast TV HD channel is delivered from Etisalat or the head-end and encrypted by VMX DRM (AES).
- FCC solution required otherwise the zapping time 1.5-2s.
- A maximum of 8 audio tracks and 8 types of subtitles can be supported. and the source should include the subtitle or audio track.
- The output streaming of P1 MPEG4 must be ready.
- The output streaming of the DRM is multicast (TS over UDP).
- Video standard in NTSC or PAL, and the audio format is MPEG2 AAC or MPEG4 AAC LC (sampling ratio: 32KHz or 48KHz. Bit rate: 32Kbps,

48Kbps, 64Kbps or 96Kbps) or MPEG-1 layer2 (sampling ratio: 32K Hz or 48K Hz; 96Kbps or 128K bps).

Catch-up TV

❖ Definition

Catch-up TV is a service which allows the subscriber to watch the TV channel program in the past seven days.

The catch-up TV program is recorded in the system side according to the operator's setting.

❖ Scenario Description

❖ User Experience

- The subscriber can browse the EPG page which lists all channels that support catch-up TV service.
- It will refresh the channel EPG information while the subscriber selects the date in the past seven days.
- The subscriber can show the detailed EPG of the channel to select his favorite content.
- The subscriber can pause, fast rewind, or fast forward the catch-up TV program, the fast rewind and fast forward speed is 4x 8x 16x 32x.
- The subscriber can switch the subtitle if the content includes multiple subtitles.
- The subscriber can switch the audio track if the content includes multiple audio tracks.

❖ Impact

- The operator sets the live-TV channel to support catch-up TV features.

❖ Limitation

- Catch-up TV programs are recorded according to the channel program guide. Before the catch-up TV service is enabled, the matching Live TV channel must have a valid program guide.
- The maximum catch-up TV record duration is 7 days. The record duration depends on network storage server.
- Catch-up TV should be ordered together with original live channel.
- STB should support decryption and decoding of the H.264 format.
- End to end network bandwidth and QoS shall be guaranteed.

Transaction Video On Demand

❖ Definition

Transaction VOD is VOD which allows the subscriber to select his/her favorite content on demand.

❖ Scenario Description

❖ User Experience

- The subscriber can browse the VOD content on EPG screen.
- If a subscriber selects a program, it will display the brief introduction of the content
- The subscriber can preview the VOD content.
- The subscriber can order and play the content, and playing progress will display while the subscriber presses a specific key in remote controller.
- The subscriber can pause, fast rewind, and fast forward. The available fast rewinding and forwarding speed is 4x 8x 16x 32x.
- The subscriber can save bookmarking automatically while quitting playing the content. When the subscriber accesses the content again, the subscriber can play the content since the bookmarking directly.
- The subscribers can favorite/rate the VOD content.

❖ Impact

None.

❖ Limitation

- The video content format is H.264 SD@2.5Mbps, HD 1920*1080p @10Mbps.
- End to end network should support unicast and the bandwidth and QoS should be guaranteed.
- The audio content format is MPEG2 AAC or MPEG4 AAC LC (sampling ratio: 32KHz or 48KHz. Bit rate: 32Kbps, 48Kbps, 64Kbps or 96Kbps) or MPEG-1 layer2 (sampling ratio: 32K Hz or 48K Hz; 96Kbps or 128K bps).
- A maximum of 8 audio tracks and 8 types of subtitles can be supported.

Rapid ZAP Time(FCC)

❖ Definition

Rapid ZAP Time (FCC) is a service by which the end-user can switch channels quickly.

❖ Scenario Description

❖ User Experience

- The subscriber can switch the channel via the up or down key in the remote control. The zapping time is around 1.5 second.

❖ Impact

- More bandwidth should be needed while switching channel.

❖ Limitation

- The MRF must be deployed.
- FCC capability shall be supported by system network.
- The multicast streaming must be transferred to the center site.
- End to end network should support multicast and the bandwidth and QoS should be guaranteed.(FCC bandwidth is 1.3 times of the basic bandwidth)
- The feature depends on Verimatrix DRM.

TSTV

❖ Definition

When watching a Live TV program, end users can go back to picture they have just missed. That is they can trick-play the live program. Pause and fast rewind function can be used. When the program is behind the Live TV actual content, fast forward function can be used to catch up the current Live TV stream.

End Users can also be able to re-start a TV program which is already running/ started for some duration.

The length of time shift is 2 hours for every TSTV channel.

❖ Description

❖ User Experience

- The subscriber can pause, fast rewind, and fast forward at different speed while watching TSTV.
- End Users can also be able to re-start a TV program which is already running/ started for some duration.

❖ **Impact**

None.

❖ **Limitation**

1. Max Time-shift period depends on network storage or STB hard disk.
2. The UI design considers the trick play model.

Trick-play

❖ **Definition**

The subscriber can pause, fast rewind, and fast forward at different speed while watching VOD content, catch-up TV.

❖ **Scenario Description**

❖ **User Experience**

The subscriber can pause, fast rewind, and fast forward at 4x/8x/16x/32x while watching VOD content, catch-up TV.

❖ **Impact**

None.

❖ **Limitation**

None.

Pause Live TV

❖ **Definition**

When watching a live TV, the end-user can pause watching the live TV channel and make STB start to record the live content. The end-user can start viewing the live content from where he/she paused. During watching, the end-user can fast-rewind, fast-forward, pause and play the recorded live content on the STB. He/she can also switch to watch the live program by pressing one key on the remote control, which will make STB to stop recording.

❖ **Description**

▪ **Service Management**

Content providers manage metadata of live TV channels, and enable/disable live TV channels to support local Pause TV.

▪ **User Experience**

Recording live TV channel.

- When watching a live TV, the end-user can pause watching the live TV channel by pressing the "Pause" button. After a while, he/she can continue to view the live content from where he/she paused.

- During watching the recorded live content, the end-user can fast-rewind, fast-forward, pause and play the content by pressing the corresponding keys. He/she can also switch to watch the live program by pressing the specific key on the remote control.

❖ **Impact**

None.

❖ **Limitation**

1. The service is one feature of the local PVR function and only available for the STBs with an embedded hard disk.
2. A dedicated key is needed on the remote controller.

Start-over TV

❖ **Definition**

Start Over allows end-users to jump to the beginning of a program in live-TV channel if the program is recorded or being recorded by the system.

❖ **Scenario description**

❖ **User experience**

When an end-user is watching a live TV program which supports Start Over, he/she can restart the current program via some method, such as specific button in RCU or EPG/UI, which shall be defined later.

- If the current program just starts to play (less than 5 seconds), the previous program will be played when the end-user press the Chapter Back button.
- If the current program plays for a while (more than 5 seconds), the current program will be replayed from its beginning when the end-user press the Chapter Next button.

❖ **Impact**

- The start-over concurrent streaming for time-shift TV is included in the unicast concurrent streaming.
- The high concurrent Start-Over request will increase the load of network, but this service was contemplated in the POPs design that was provided , up to 5000 concurrent connections. may upgrade the POPs to support more concurrent connections at a cost.

❖ **Limitation**

- The content provider manages metadata of live TV channels, and enables/disables live TV channel that supports Start-Over, and fills-in how long (in hours, maximum 2 hrs) the Start-Over channel is to be recorded.

- The channel is recorded at the system side according to the operator's setting. The programs recorded will be removed when they are out of the channel's recording range.
- The start-over feature depends on time-shift service. To provide start-over experience, the live TV channel must have a precise EPG.
- Start-Over TV range is dependent on the time-shift period. End-user can't start-over beyond the total length of the program which has been recorded on the network.
- The channels support Start-Over TV are the same as channels support Catch-Up TV.

Multiple Subtitle track

❖ Definition

Multiple Subtitle track, means that the subscriber switches the subtitle language via remote controller while watching the live-TV, catch-up TV or VOD content.

❖ Scenario Description

❖ User Experience

When content is played, the subscriber can switch subtitle through EPG/UI by the remote control.

❖ Impact

None.

❖ Limitation

- The content should comprise several subtitles languages. A maximum of 8 audio tracks and 8 types of subtitles can be supported
- Only English and Arabic subtitle will be supported by customized version.

Multiple Audio track

❖ Definition

Multiple audio tracks, means that the subscriber switches the audio language via remote controller while watching the live-TV, catch-up TV or VOD content.

❖ Scenario Description

❖ User Experience

When content is played, the subscriber can switch audio track through EPG/UI by the remote control.

❖ **Impact**

None.

❖ **Limitation**

- The content should comprise several audio languages. A maximum of 8 audio tracks and 8 types of subtitles can be supported.
- The remoter controller should have a dedicated key for audio toggle.
- Only English and Arabic audio track will be supported by customized version.

Bookmarking

❖ **Definition**

The bookmarking feature allows the subscriber keep a tag to record the stop point while he/she quits playing content. The subscriber can resume playing the content from the tag.

❖ **Scenario Description**

❖ **Order approach**

The bookmarking feature is a basic feature that allows any IPTV subscriber to use without any order.

❖ **User Experience**

- When the subscriber accesses the content again, the subscriber can play the content since the bookmarking directly.
- Different user profiles have personal bookmarking.

❖ **Impact**

The system will save a bookmark automatically while the subscriber quits playing content.

❖ **Limitation**

- Oldest bookmarking would be covered if the maximum number of bookmarks is exceeded.
- Bookmarks cannot be shared among STBs.
- Bookmarks cannot be stored if STB is crash or any others abnormality.

Personal Favorites

❖ Definition

Channel Personal Favorites functionality allows the subscriber to put his/her favorite channel into a personal favorite catalog.

VOD Personal Favorites functionality allows the subscriber to put his/her favorite VOD into a personal favorite catalog.

The personal favorite feature is a basic feature that allows any IPTV subscriber to use without any order.

❖ Scenario Description

❖ User experience

- The subscriber can manage (add, delete) the favorite program (channel or VOD).
- Different user profile has his/her own personal favorite list.
- A popup message reminds the subscriber that channel favorite (or VOD favorite) fails this time if the maximum number of channel favorites (or VOD favorites) is exceeded.

❖ Impact

None.

❖ Limitation

The system provides two favorite catalogs (Tag): VOD, Channel.

Parental control

❖ Definition

The parental control is used to allow the subscriber to set the content access level. Different levels of parental control associated with different content ratings according to the content attributes such as kinds, violence and others.

❖ Scenario Description

❖ User Experience

- The end-user opens the account and gets the administrator password for parent control. The master user profile gets the highest access level.
- Watching Live TV / Catch-up TV / VOD.
- Before the end-user watches content, authorization must be executed, including checking parent control. If the end user's level is lower than the level of Live TV / Catch-up TV / VOD, the end user must input the correct administrator password.
- Self-manage Parent control.

- The end-user can browser his/her level of parent control.
- The admin profile can set the access level of the sub-profile for the parental control.

❖ **Impact**

None.

❖ **Limitation**

Live TV channels or VODs' metadata shall be managed by content providers, and be filled in the content's level for parent control.

Pin Code Entry

❖ **Definition**

PIN code is a Personal Identification Number which is used for enhancing system security. The PIN code is also named user password. Each IPTV account has the unique PIN code.

There are three type of PIN:

Login password:

Used for subscriber to login to EPG. Each user profile has his/her own login password. Each user profile can maintain his/her own login password.

Purchase password:

Used for online subscription. There is no such password in IPTV service. When the user profile requires to subscribe to a product, his/her consumption cap will be checked. If the consumption cap exceed, the subscriber shall enter admin password. And if consumption cap of admin profile exceeded too, the system will reject the user's purchase by the system.

When a user profile logs into EPG, the previously login of this user profile can be set expired or not expired, it depends on the configuration of system platform.

Parental control password

Used for parental control. It's the same with the login password of the admin user profile and maintained by the admin user profile.

❖ **Scenario Description**

❖ **User Experience**

- The subscriber can login to EPG with the login password.
- The subscriber shall fill in the PIN code in the parent control setting.
- The subscriber can purchase content with purchase PIN code.

- The subscriber can change the PIN code.
- The subscriber can apply for resetting the PIN code in a business center.

❖ **Impact**

None.

❖ **Limitation**

The BOSS system should support generating a unique PIN code for each IPTV account.

Multi-user profile

❖ **Definition**

Multi-user profile indicates that an IPTV subscriber has multiple user profiles. Each user profile can watch only specified Live TV channels and VOD categories and has his/her personal parental control settings, consumption cap, and favorites. That is, each user profile experiences IPTV services like an independent IPTV service user.

Different profile users of a same IPTV service user use a unified charging account. They are created by the main profile user.

❖ **Scenario Description**

❖ **User Experience**

In multi-profile scenario, end user should select one profile before he/she login, user could select default profile to auto login next boot up

- **Multi profile management**
- When login with the admin user profile ID, the end-user can manage his/her user profiles, including:
 - Create a user profile
 - Delete a user profile
 - Modify a user profile
 - Query and view user profile information

Note: There can be only one admin user profile for each subscriber which is the default user profile created when the subscriber account is opened.

- The admin user profile can set all the parameters for other user profiles, including: login password, parent control setting, consumption cap and the contents which are not allowed to watch.
- Login with user profile ID and password
- The end-user can logon based on user profile and switch user profile.
 - The end-user can browse the page of Switching profiles, and switch to the user profile that he/she wants. When the password

is checked right, all the information of user profile would be changed.

- Watching Live TV / VOD content.
 - Before the end-user watches content, authorization must be executed, including checking parent control. If the end user's level is lower than the level of the content, the end user must input the correct password.
- Self-manage Multi-profile
 - Admin user profile can create the sub user profile, and set the profiles' parent control level, consumption limit password, and the contents which are not allowed to watch.
 - Sub user profiles can owe their own profiles.
- Browsing EPG
 - When user profile browses EPG, all information must be limited by user profile. He/she only watch those contents that be allowed.
 - User profile can favorite the contents what he/she likes.
- **Subscription**
- The subscriber logs into EPG with a user profile, he/she can The user profile can manage his/her own basic information, including:
 - subscribe to one or more products.
 - If the product can be shared, the subscription is related to the subscriber and can be shared to all the terminal devices of the customer.
 - If the product can't be shared, the subscription is related to the terminal device and won't be shared to other terminal devices.
 - Then this user profile can access the subscribed contents.
- Personalized user experience
 - Modify his/her own basic information (icon, nick name, Phone number, Email address)
 - Change his/her own icon
 - Change his/her login password
 - Manage his/her favorites
- When the user profile requires accessing a content, parental control will be taken according to the currently set user profile set by the admin for the parental control setting.
- When the user profile requires to subscribe to a product, his/her consumption cap will be checked. If exceed the consumption cap, the subscriber shall enter admin password. And if consumption cap of admin profile it exceeded too, the system will reject the user's purchase by the system.
- When a user profile logs into EPG, the previously login of this user profile will be set expired or not expired, it depends on the configuration of system platform.

❖ **Impact**

None.

❖ **Limitation**

- There is only one kit of EPG UI in Android STB.
- There can be only one admin user profile for each subscriber which is the default user profile created when the subscriber account is opened.
- The default user profile user cannot be deleted until the customer account is deleted.
- billing system shall provide interfaces for querying detailed or summary consumption of the each user profile of a customer.

Search Engine

❖ **Definition**

The search feature is a basic feature that allows the subscriber to search content offered to subscriber via the IPTV platform without any order.

❖ **Scenario Description**

❖ **User Experience**

- The subscriber can use remote controller or the on-screen soft keyboard to fill in the topic which she/he wants to search. The soft keyboard only supports English.
- The subscriber can search the program in Live TV, the result includes Catch-up TV and Live-TV program, the Live-TV program with “Live” to indicate user.
- The subscriber can search VOD content by actor, movie name, director, and genre.
- The searching result will dynamically display while the subscriber fills in the topic.
- The subscriber can get the search result after press the search button on UI/EPG.

❖ **Impact**

None.

❖ **Limitation**

- The operator defines the key words for searching.

Self-Care & Self-Service

❖ Definition

The self-service page provides the functionality to allow the subscriber to inquire the below information:

- Inquire purchased VOD list (My Active, Rental History).
- Inquire last viewed VOD content(last viewed)

❖ Scenario Description

❖ User Experience

- The user goes to the self-service page via top menu of EPG UI.
- The user (any user profile) can inquiry the consumption detail, it will list content name, original price as well.

❖ Impact

Integration with existing BOSS system which provide the billing inquiring interface is needed

❖ Limitation

The bill is the family account information and it is not correlative to the user profile.

SVOD

❖ Definition

SVOD (Subscription VOD) which allow the subscriber purchase the VOD package where multiple VOD contents included per monthly.

❖ Scenario Description

❖ User Experience

- Operator can publish a new SVOD package via bonding the package to a new category, and operator can update the contents of SVOD package.
- All Subscribers can order the SVOD package via EPG.
- The subscriber can browse the SVOD content on EPG.
- Subscriber cannot change any content of any SVOD package.
- The subscriber can browse the content that is part of a subscription (which is associated to media that has been assigned to a category) and play it at any time during the subscription period.
- Only monthly package is supported.

❖ Impact

- The monthly SVOD package should be created by operator in platform.
- The pricing object for SVOD product is a category in the CMS.

❖ Limitation

- Billing/ICMS need to support VOD purchase interface.
- A-La Carte function is not supported; subscriber cannot change contents of SVOD package after it was published.

Language

❖ Definition

English and Arabic are supported for UI/EPG for STB.

The UI follows current IPTV EPG platform.

❖ Scenario Description

❖ User Experience

- When the end-user logs in, the default language UI/EPG will be displayed. All the information is based on the default language.
- The end user can change his/her default language via a specified UI/EPG entry. All the languages what is supported will be displayed in the UI/EPG page. When the end user chooses a new language as his/her default language, all the information will be changed to the new language immediately until the language setting is changed again.

❖ Impact

None

❖ Limitations

- The content metadata must support multi-languages. If there are not multiple languages in metadata, when the end user's default language is changed, only the style of UIs will be changed.

PIP

❖ Definition

A PIP channel is a special Live TV channel. When watching a PIP channel, a user can watch two channel windows. The big window shows a common Live TV channel, and the small window shows a Live TV channel at a low bit-rate.

❖ Scenario Description

❖ User Experience

- When an end-user is watching a live TV channel, he/she starts PIP through EPG/UI. At the time, a small window to display PIP stream would be opened.
- The end user can switch PIP channels.

- When the end user selects a PIP channel and confirms by the remote control, the big stream related to the PIP stream would be played in full screen.

❖ **Impact**

- Bandwidth and multicast resources would be occupied by PIP streams.
- Encoders must provide the capability of outputting PIP stream while outputting normal channel stream.

❖ **Limitation**

- SD encoder, low bit-rate output: 192 x 192 pixels, bit-rate lower than 300 kbps.
- HD encoder, low bit-rate output: 192x 192 pixels, bit-rate lower than 500 kbps.
- Bandwidth and multicast shall be guaranteed.
- NVOD channels and audio channels do not support media streams at high and low bitrates.
- Media streams at a low bitrates support FCC.
- No PIP window is displayed when an STB starts and plays a channel for the first time.
- A PIP channel cannot be recorded.
- As supported by the current chipset, PIP will support one HD stream and one SD stream.

Local PVR (cPVR)

❖ **Definition**

Local PVR enables an end-user to record live TV programs in STB and watch the recorded programs locally.

❖ **Service Management**

Content providers manage the metadata of live TV channels, and enable/disable live TV channels to support local PVR.

❖ **User Experience**

- Instant Recording live TV channel
 - When an end-user is watching a live TV program, he/she starts recording by pressing the “Record” button and stop recording by pressing the button again.
- Schedule Recording live TV channel

- **Schedule recording by a program** Live TV channels are listed in EPG page, and cPVR flag of the live channels will be displayed. The already recorded/currently being recorded/ scheduled for recording events should be specifically outlined in the EPG.
 - When browsing live channel's schedule, if the live channel supports cPVR, end user can focus on the program which supports record the program/series, or delete the record task about the program/series which is in recording management list
 - Schedule recording by a specify duration end user can specify start time and end time for recording on EPG.
 - Schedule recording must also start when STB is in standby mode.
 - The recorded content can be watched immediately after record finished
 - The operation of recording will be terminated automatically when inner hard disk space is full
 - The recorded content will be encrypted by the DRM.
- Local PVR Self-management
 - An end-user can browse the EPG page to monitor the record tasks. He/she can query/stop a task, and select a task to delete to release the STB storage..
 - The end-user can schedule recording (recording of future program). In case of a failed schedule recording, the failed info shall display on the cPVR management page.
 - There are four statuses to cPVR program: Completed, Recording, Scheduled, and Failed.
 - When recording time is less than 2 minutes, the recording is failed.
 - The end-user can browse the EPG page to show the recorded programs and select one to watch, similar to watching a VOD program.
 - Before playing the recorded program, authentication will be performed to ensure that the end-user has the right to watch. During watching the PLTV, the end-user can fast-rewind (4x,8x,16x,32x), fast-forward (4x,8x,16x,32x), pause, play and seek time play the content by pressing the corresponding keys.
 - The end-user can record only one channel at the same time.
 - The end user can record one live channel and watch/operate same Live channel.
 - During playing local PVR program, end user can adjust the volume
- Query
 - The end user can check time progress and program information when STB is playing Local PVR

❖ Impact

It will need more bandwidth if the end-user watches the channel and records another channel at the same time.

Verimatrix client should support PVR.

❖ Restriction

- The service depends on live TV service and is only available for a STB.
- The maximum storage capacity is dependent on the hard disk capacity.

- There is hard disk in WSTH-136GN. WSTH-136GN doesn't support external hard disk.
- User broadband should be guaranteed more than 20Mbps (HD), 5Mbps (SD).
- When recording time is less than 2 minutes, the recording is failed.
- STB cannot support two channels recording at same time. When Telco broadband network bandwidth is enough to support two Live TV channel (SD or HD), STB supports two channel inputting (one channel is played, one channel is recorded) .
- The cPVR operation to the same program are mutually exclusive
- The recording is stop after user leave IPTV application.

❖ Reference

None.

Network PVR (nPVR)

❖ Definition

Network PVR enables an end-user to record live TV programs in the network storage and watch the recorded programs later, although his/her STB has no hard disk. The maximum NPVR record duration is 108 hours.

❖ Implementation

❖ Service Management

- Step 1: Content providers manage metadata of live TV channels, and enable/disable live TV channels to support network PVR, and fill in how long (in hours) will the NPVR channels be recorded.
- Step 2: The Operator creates network PVR products which will specify the storage size for the end user's network PVR.
- Step 3: The end user purchases one or more network PVR products to gain space to store the recorded programs.

❖ User Experience

1. Order Service

- The nPVR service is only monthly fee and shall be ordered in the business center. The end user purchases one or more network PVR products to gain space to store the recorded programs in the business center.
- The nPVR service is only available on the ordered live-TV channel

2. Instant Recording live TV channel

- When an end-user is watching a live TV program which enable nPVR, he/she starts recording by pressing the "Record" button and stop recording by pressing the button again.

3. Schedule Recording live TV channel

- **Schedule recording by a program:** Live TV channels are listed in EPG page, and nPVR flag of the live channels will be displayed. The already recorded/currently being recorded/scheduled for recording events should be specifically outlined in the EPG.
- When browsing live channel's schedule, if the live channel supports nPVR, end user can focus on the program which supports nPVR, and record the program/series which is not in nPVR list, or delete the record task about the program/series which is in nPVR list
 - **Schedule recording by a specify duration:** end user can specify start time and end time for recording on EPG.
 - The recorded content can be watched immediately after record finished
 - The recorded content will be encrypted by the DRM.

4. nPVR Self-management

- An end-user can browse the EPG page to monitor the record tasks. He/she can also select a task to delete.
- The end-user can schedule recording (recording of future program). In case of a failed schedule recording, the failed info shall display on the nPVR management page.
- There are four statuses to nPVR program: Completed, Recording, Scheduled, and Failed.
- The available space for recording will be presented (as time units)
- An end-user can browse the EPG page to show the recorded programs and select one to watch, similar to watching a VOD program. He/she can also play or delete a recorded program found via search. Before playing the recorded program, authentication will be performed to ensure that the end-user has the right to watch. The end-user can fast-rewind (4x,8x,16x,32x), fast-forward (4x,8x,16x,32x), pause, play and seek time play the content by pressing the corresponding keys.
- The end-user can record more than one channel at the same time.
- During playing PVR program, end user can adjust the volume.
- Query
- The end user can check time progress and program information when STB is playing nPVR.

❖ Impact

- The maximum NPVR record duration is 108 hours. The system should consider enough network storage capacity to record the content on server side.
- Recording Live TV type services TSTV, TVOD, and nPVR are shared the recording storage and performance on the VOD server.

❖ Limitation

- The maximum NPVR record duration is 108 hours but the capacity is depend on the server provided.

Walled Garden (RSS)

❖ Definition

Walled garden allows the subscriber to access local and news from various sources as has been aggregated news information.

❖ Scenario Description

❖ Service Management

When the system is installed, the data sources are pre-registered in mash-up server so as to provide interfaces for getting service data from third party websites and customized UI/EPG pages of the service are also pre-deployed in UI/EPG servers.

The operator manages value-added services via UMS.

The operator manages products for value-added services via IPTV system.

❖ User Experience

1. There is an entry of walled garden services area in IPTV page.
2. The subscriber can browse walled garden services in IPTV page, such as local or news from other sources as aggregated by content team.

❖ Impact

1. Because the walled gardens get some content information from outside website, maybe, the rate of the website broadband will be effect the showing result.
2. The walled garden server (Mashup) should access the international website directly.

❖ Limitation

1. Introduction of new services into the walled garden service offering needs to be customized.
2. The walled garden can support the adobe flash video, but does not support real media, windows media, and other plug-in for media-players.
3. Just support English RSS website.
4. Below CPs have been integrated, should get the approval in advance.

News

- [http://www.alriyadh.com/en/p/rss;](http://www.alriyadh.com/en/p/rss)
- [Lists available to service RSS Riyadh:](#)
- [Home](#)
- [Local News](#)
- [International News](#)
- [Economic News](#)
- [Sport News](#)
- [Misc News](#)
- [Articles](#)

- [Comics](#)
- <http://www.aljazeera.com/Services/Rss/?>
- [Lists available to service RSS Aljazeera:](#)
- [Aljazeera](#)

Help Page

❖ Definition

Help information would be provided to help the subscriber to understand IPTV services.

This information can be text, picture, using the VOD servers.

All of the help page information should be provided

❖ Scenario Description

❖ Help Page Management

- The operator prepares help information.
- The operator can publish the help picture and text.
- Help pictures will be embedded into these help pages which will be customized according to pre-definition.
- Help page display in IPTV page.

❖ User Experience

The end user can watch the help information via a specified button on remote control or an EPG entry.

❖ Impact

- Help page can only support text and pictures.
- All help information (including text and picture) should be provided
- The specified button depends on remote control provided

Network Connectivity Diagnose

❖ Definition

The subscriber can test the network connectivity on the STB and the STB should notify end users the network connection problem if it is happening. And end users can repair the network based on the notification or escalate to CSR to repair it by the phone call.

❖ Scenario Description

The following 8(eight) steps will be proceeded one by one automatically after end users started the One-key Check.

Step 1: Check cable connection.

Step 2: Check the IP Conflict

Step 3: Check Gateway

Step 4: Check NTP

Step 5: Check HTTP

Step 6: Check Multicast

❖ Impact

None.

❖ Limitation

Only shall support the function and the Mobile device is not applicable.

All-In-One STB Function

STB Start-up

❖ Definition

End user starts up STB flow.

❖ Scenario Description

❖ User Experience

- Display the STB starting page in the screen,
- Display the starting animation, the animation is consisted of several PNG file, and the resolution of the PNG file is 1280*720.

- After checking the network connection is ready for IPTV, it will display the device main page.

❖ **Impact**

None.

❖ **Limitation**

- The starting time is around 140 seconds.

Media Center

❖ **Definition**

Media Center supports media HD player, which can browse and play the Videos, Music and Pictures stored in external USB HDD or external SD.

❖ **Scenario Description**

❖ **User Experience**

- The subscriber could discover and enjoy the media contents from local storage.
- When playing the local media files, users can perform interactive operations such as playing, pausing, stopping, and using the seek slider.

❖ **Impact**

None.

❖ **Limitation**

- The format of media files can be supported as follow:
 - Video Container: AVI, WMV, TS, MP4
 - Video Codec: MPEG-2 MP@ML and MP@HL; MPEG -4 asp@L5; H264 HP@L4.1
 - Music Container: MP3
 - Audio codec: MPEG audio (MP1, MP2, MP3), MPEG 2/MPEG 4 AAC (Optional Included), Dolby (AC3) downmix 2 channel and pass through(Optional Included)
 - Picture format: JPEG, BMP, PNG.
- External USB HDD and external SD are supported.

Application Management

❖ Definition

Application Management & pre-installed Apps is in my Application.

Application Management: installation, un-installation.

❖ Scenario Description

❖ User Experience

- The subscriber can install/un-install Apps;
- The operation could be done by remote control.
- If any Application is installed and stored in flash, user can move it into SD/MMC card storage.
- Android Calculator and Android email application are pre-installed. Calculator and email application are maintained by application developer (Google).

❖ Impact

None.

❖ Limitation

- Network connection and routing is ready, and the necessary proxy server service / NAT or other service needed for internet access is ready. If the application join internet.

- Google provide the certification for Android STB.

- Abstract:

- Customer installs 3rd application in this device via external storage, company isn't responsible if the following problems take place:
 - 1, The 3rd Application doesn't adapt TV screen; Application doesn't operate via remote control.
 - 2, The 3rd Application causes the Android system to crash. Application can't run in the Android operating system.
 - 3, The 3rd Application isn't running after the Android operating system version upgrade.
 - 4, The 3rd application causes a security problem.

Satellite TV(DVB-S)

❖ Definition

The Live TV service (also known as the broadcast TV service) over DVB-S FTA path allows the subscriber to watch live channels via Android STB. Subscribers can view the information about programs through a program list.

The common application scenarios of the live TV service are channels that support multiple captions and multiple audio tracks.

❖ Implementation

❖ DVB-S Live-TV EPG information

- EPG Guide based on PSI/SI

EPG Guide which is based on PSI/SI is one function that displays Live TV channel information on one part of the TV screen. The EPG Guide is able to display Live TV program information when the Android STB receives EIT from the DVB-S FTA path. The program information is received from EIT and other tables which are included in the same MPEG2-TS through the DVB-S FTA path.

The Android STB is compliant with the ETSI EN 300468 standard; it supports parsing EPG data that includes channel lists and program metadata from EIT and other tables.

❖ User Experience

- Order Service

The Linear TV-DVB service doesn't need to be ordered through the IPTV platform.

- User Experience

The Android STB will automatically search for satellite information and channel information when the user accesses DVB-S TV for the first time.

The subscriber can select the DVB live-TV through the EPG Guide via the remote control.

The subscriber can switch the channel via the up or down key in the remote control.

The subscriber can toggle the subtitle and audio track (it depends on whether the source includes the subtitle and audio track).

The subscriber can control the volume during watching Live TV.

- Query
- None

❖ Impact

DVS-S UI refers to high-fidelity UI.

❖ Restriction

- DVB-S TV signal is free.
- Satellite signal need to include DVB-S live TV program information.
- There isn't Channel logo information in DVB-S channel.
- Android STB should connect satellite signal receiver.
- Subscriber could only watch the programs which are not encrypted.

Internet Router

❖ Definition

All-In-One STB include single family unit (SFU), which is designed for fiber to the home (FTTH) applications. It is compliant with ITU-T G.984 Gigabit Passive Optical Network (GPON) standard.

- Standard
 - ITU-T G.984.1, 984.2, 984.3, 984.4, 984.5
 - IEEE 802.1p , 802.1Q , 802.3 , 802.3u ,802.3x, 802.3z
 - Support IPv4/v6
- Router
 - PPPoE
 - NAT/NAPT
 - Static/Dynamic rout
 - DHCP server/client
- QoS
 - Strict Priority
 - Weighted Round-Robin priority
 - IGMP filtering & snooping
 - IGMP v1,v2,v3
- WIFI
 - 2.4GHz/5GHz WIFI Dual band concurrent

- IEEE 802.11a/b/g/n
- WEP, SSID, WPA, WPA2
- VoIP
 - SIP v2 (RFC3261)
 - CODECS: G.711, G.722.2, G.723, G.726, G.729
- Security
 - AES-128/192/256 encryption per Port-ID
 - DES, 3DES, SHA1, SHA2, MD5
 - IEEE 802.1x port authentication
 - Supporting to Max.256 MAC filtering
- Management
 - Remote management via OMCI channel
 - CLI management via Telnet
 - Remote firmware upgrade via FTP server or OMCI channel
 - TR-069, TR-142

❖ Scenario Description

❖ User experience

- The subscriber could modify the Internet Router parameter via Network setting in STB setting function.
- Into Internet Router GUI setting by entering configuration option.
- The subscriber can change/view the Internet Router settings/configurations, including:
 - Detail Router system status viewing.
 - Network - LAN, PON, 4G backup.
 - WIFI 2.4GHz/5GHz include basic setting, security and access.
 - 2 lines Voice.
 - Firewall.
 - Advance include DNS, ARP, Samba, QoS, and power management
 - Utilities such as configuration backup/restore, connection test, Reboot, and restore factory defaults.

❖ Impact

None

❖ Limitation

None

Internet Browser

❖ Definition

Android STB provides a Browser based on webkit. Android OS includes the browser application which complies with following standards and protocol:

- HTML: HTML 4.01, HTML 5 player plug, XHTML 1.1, XHTML Mobile Profile and 2.0
- CSS: CSS1, CSS 2.1, part of CSS3 and CSS Mobile Profile
- DOM: DOM 2.0, DOM 3.0
- JavaScript: ECMA-262 V5
- Network Protocol: HTTP1.1,SSL2.0,SSL3.0,TLS1.0,HTTP Authentication

❖ Scenario Description

❖ User experience

- There is an Internet browser icon in App pages.
- The subscriber can select one of the pre-selected website shortcut listed in the UI.
- The subscriber can select to enter a URL in the browser using the remote control, and the subscriber will be taken to the website that was requested, but the user experience is not guaranteed.

❖ Impact

- STB access both IPTV and internet via internal internet router of All-In-One STB.
- Limit: WIFI support video of Internet Browser, but it can't support video of IPTV.
- WIFI signal is more than -60db. Distance of WIFI signal is less than 10m, max rating of browser video is 1.5Mbps.

❖ Limitation

- Internet network access shall be provided by end user or operator.
- The STB transparently accesses the internet without any adaption of the display and content audit on TV screen.
- Wi-Fi and Ethernet are supported to work in parallel so that user can browse internet webpage and watch IPTV Service on one STB.
- Support for both Arabic and English in reading, but writing only in English today.
- Internet Browser application is maintained by Application developer (Google).

STB Setting

❖ Definition

STB setting is the function for the STB, and STB settings can be changed by the subscriber.

❖ Scenario Description

The subscriber can change/view the STB settings/configurations, including:

- TV resolution settings/standards.
- Appropriate remaining storage capacity can be accessed/ known.
- Date & time, including time zone, 24-hour format, date format.
- Default language.
- STB name.
- Manage application. Where the users can see the application list of those downloaded, running, all, and on USB disk.
- Network setting & network connection test.
- About. Lists of device basic information.
- User guide

❖ Impact

None.

❖ Limitation

None.

Revision Record

Date	Revision Version	Sec No.	Change Description	Author
2014-06-20	1.0		Initial draft	Tony Liu
2014-06-28	2.0		Release V.02	Mahmoud Salem