

XL-ITB-101 IP Set-top Box



User Manual

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1. Overview

With an Ethernet input and flexible video and audio output, XL-ITB-101 introduces high performance solution by advanced video decoder H.264/AVC engines. This provides our customers, ISPs or Telecoms, a cost effective way to deliver sophisticated interactive digital television service including multicast streaming, video on demand, Internet access, etc.

1.1 Features

- HD (High Definition)
- MPEG2 MP@HL
- H.264/AVC main and high profile to level 4.1
- VC-1 advanced profile @ level 3 (Option)
- VC-1 simple and main profile (Option)
- Audio decode: AAC LC, AAC LC+SBR Level 2, AAC+ Level 2, AAC+ Level 4
- Audio decode: MPEG1 Layer 1, 2, MPEG 1 Layer 3 (MP3)
- Audio decode: Windows Media Audio (WMA) (Option)
- HDMI 1.2/DVI 1.0 with HDCP 1.1
- Supports different Middleware and Conditional Access vendors
- Audio outputs:
 - Stereo Audio
 - Digital Audio surround via S/P-DIF (coaxial and optical)
- Video outputs
 - SD: Composite, S-Video
 - HD: Component, HDMI/HDCP
 - SD: PAL, NTSC and SECAM
 - HD: 720p, 1080i, 1080p30
 - Full screen ,4:3 and 16:9 format
 - Independent simultaneous dual output HD/SD
- IR remote controller
- IPv6 support
- 10/100 BaseT Ethernet
- UDP multicast streaming
- Video on demand
- No air-cooling fan

- Conditional Access smartcard-less - OTP for storage of secure information and special customer configurations.
- Macrovision 7.1 (Option)

1.2 Accessories

- Infra Remote Controller
- Universal DC Adapter
- User Manual

1.3 Environment

1.3.1 Temperature

- High (40° C) / 72 hours; Low (0° C) / 72 hours; Cycle (Normal: 4 hours / High: 4 hours / Low: 4 hours): 10 times (Interval time : 2 hours)

1.3.2 Humidity

- Operating: 0~85% (non-condensing)
- Non-Operating: 10% ~ 90% (non-condensing)

1.3.3 Vibration

- Amplitude: 1.5mm
- Frequency: 10 ~ 55Hz
- Cycle: 5 min
- Direction: X / Y / Z (1 hour)

1.3.4 Drop

- 90 cm with package (1 angle / 6 faces / 8 corner); 60 cm without package (1 angle / 6 faces / 8 corner)

1.3.5 Noise

- 50dB (max.) at 1 meter

1.3.6 ESD

- Condition 1: Contact 4KV / Air 8K; Condition 2: Contact 8KV / Air 12KV; Condition 3: Contact / Air 20KV (Shut-Down mode)

1.3.7 Surge

- Normal mode: 1KV; Common mode: 2KV

1.3.8 Pulse

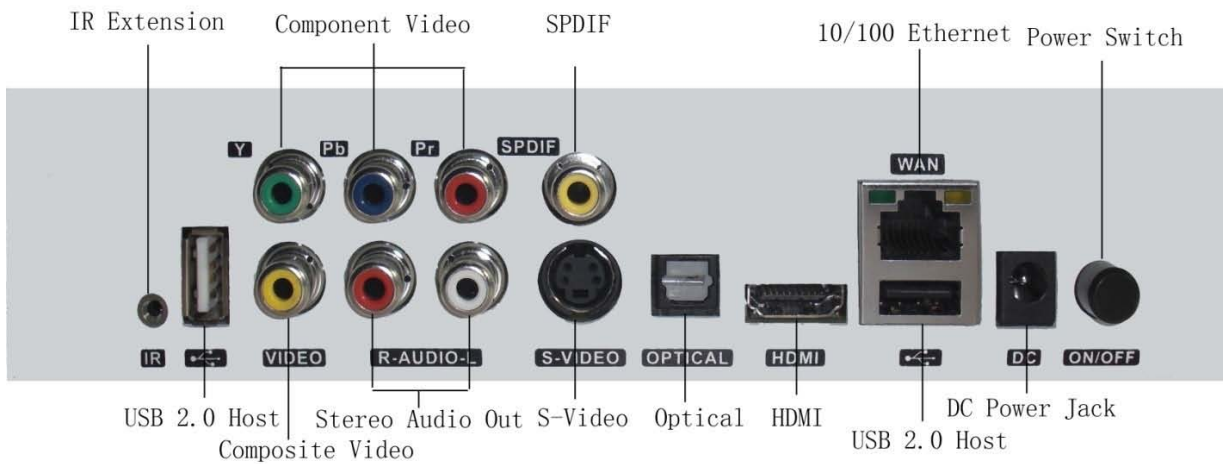
- +/- 2KV (2.5KHz~5KHz / 1 min)

2. Physical Interface

2.1 Front Panel



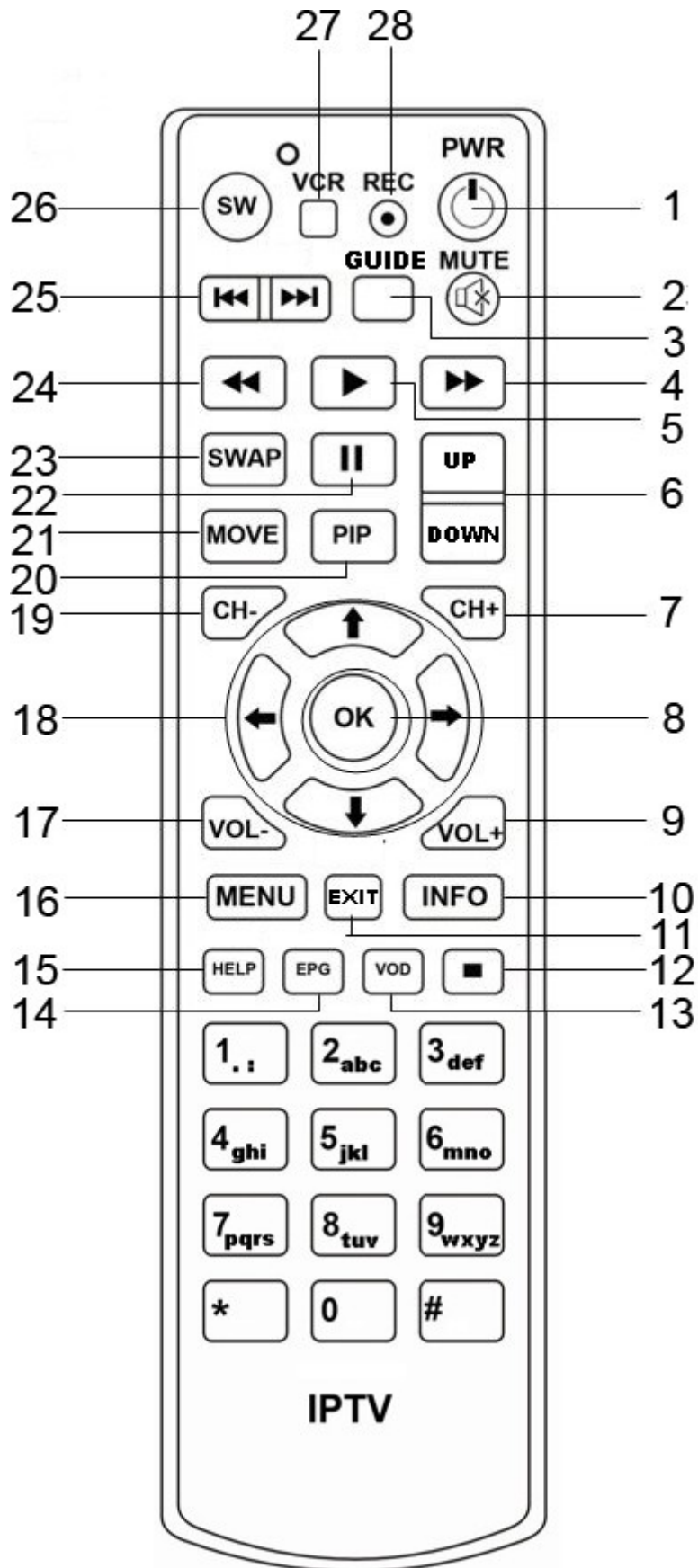
2.2 Rear Panel












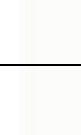











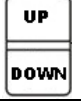




2.3 LED Status

Name	Description	Color	Mode	Status
POWER	Power	Green	ON	O.K.
			OFF	Power failure or disconnected
		Red	ON	Standby mode
LINK	ETH link	Green	ON	WAN port is connected
			OFF	WAN port is disconnected
IR	IR receiver indication	Green	Blinking	Received a correct signal from remote controller

2.4 Remote Controller

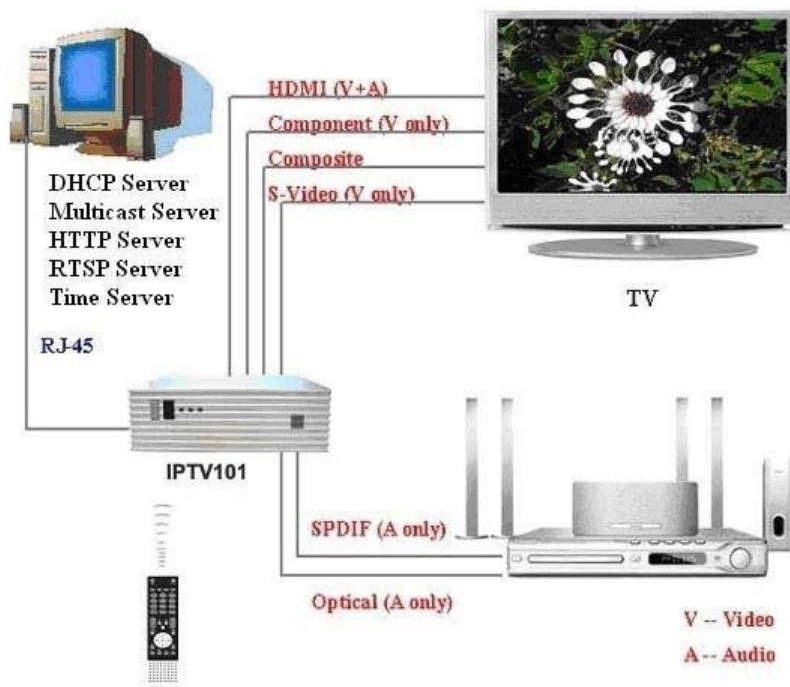


No.	Item	Description
1	PWR 	Normal/Standby
2	MUTE 	Cancel the voice
3	GUIDE 	Toggle to Video Playlist
4		Fast forward(VOD mode)
5		Play(VOD mode)
6		
7		Increase one channel(multicasting mode)
8		Enter
9		Increase volume
10		Toggle the info panel on the full-screen TV screen
11		Exit the current screen to full-screen TV screen
12		Quit play(VOD mode)
13		Video on demand
14		
15		
16		Toggle the main menu
17		Decrease volume
18	Navigation	control the focus movement
19		Decrease one channel or clear text one by one
20		Picture-in-Picture mode
21		Toggle pip control
22		Pause when playing Stepping when paused(VOD mode) Pause PVR. Only works on full-screen TV.
23		Toggle video between main and pip
24		Fast rewind(VOD mode)
25		Previous page(WEB mode) Next page(WEB mode)
26		
27	VCR <input type="checkbox"/>	
28	REC 	Press once to bring up record screen, press again to start recording.

3. Minimum Configuration

This part describes a brief instruction about how to make XL-ITB-101 work. It uses a minimum requirement to simulate real environment.

3.1 System Diagram



3.2 Software Environment

Using Microsoft Window 98/2000/XP operation system

Step 1: First go to My Network Places in your OS. Step

2: Select Properties of Local Area Connection. Step 3:

Select Properties of Internet Protocol (TCP/IP).

Step 4: Input the IP address, subnet mask, default gateway and DNS server address manually.

3.3 Use Set-top Box Accessories

Using the DC adaptor

Many countries have different power cord configurations. Your set-top box should be supplied with the correct one for your area.

Step 1: Plug the DC adaptor into the power connector on the rear side of the set-top box.

Step 2: Connect the power cord to the DC adaptor and then to a power outlet.

Loading batteries in the remote control

In the accessory box, you can find an AAA battery set and one remote control.

Step 1: Take off the plastic bag of remote control.

Step 2: Remove the lid of battery container.

Step 3: Put the battery into the battery container, and please follow the instruction described in the container and make sure the batteries are set in the right direction.

Step 4: Put on the lid of battery container.

Turning on the Set-top Box

Step 1: Plug the DC adaptor.

Step 2: See if the power LED light is on.

3.4 Set Static IP

The following steps are about how to change the IP address of STB.

Step1: After change, input **telnet (STB IP address)**, for example, telnet 192.168.10.41 in your computer's command line. The login password is **root**.

Step2: Input **vi rc.user** to edit **rc.user** file, change the IP address of STB into the IP address you want, for example, 192.168.10.88. Just remember to change the Gateway IP address so that it belongs to the same subnet.

```

c:\ Telnet 192.168.10.41
ifconfig eth0 192.168.10.88 _
route add default gw 192.168.10.1
modprobe sd_mod
modprobe usb-storage
#modprobe fat
modprobe vfat
#dhcpcd -Hd ra0 &
#mount /dev/hda4 /mnt/hd
cd /home/ks6310 && settop brutus -skin blue &
~
~
~
~
~
~
~
~
~
~
I rc.user [modified] 1/8 12%
```

Step3: Save and Exit(Press Esc, input **:wq**).

3.5 Required Server Software

It can use Windows or Linux to structure; Linux is our preferred and suggested.

OS	Fedora Core	Windows Server 2003
DHCP Server	Dhcp	Windows Built-in
Multicast Server	VLC Media Player	VLC Media Player
HTTP Server	Httpd	Windows IIS
RTSP Server	LIVE555 Media Server	LIVE555 Media Server
Time Server	Ntp	Windows Built-in

VLC media player can get from this link <http://www.videolan.org/> and it acts as UDP and HTTP multicast server or UDP unicast server.

There are some important points of using VLC

Run many VLC at un-powerful PC may cause performance issue and Windows OS is serious than Linux.

VLC version 0.8.6b, 0.8.6c & 0.8.6d has problem when multicast 2 channels above, no matter Linux or Windows. Version 0.8.6a is recommended. VLC has some issue when multicast AAC audio and it transfers audio and video PID to different value with original.

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LIVE555 media server can get form <http://www.live555.com/mediaServer/>. It is a complete RTSP server application. At our configuration, it plays for RTSP VOD Server.

Channel Table

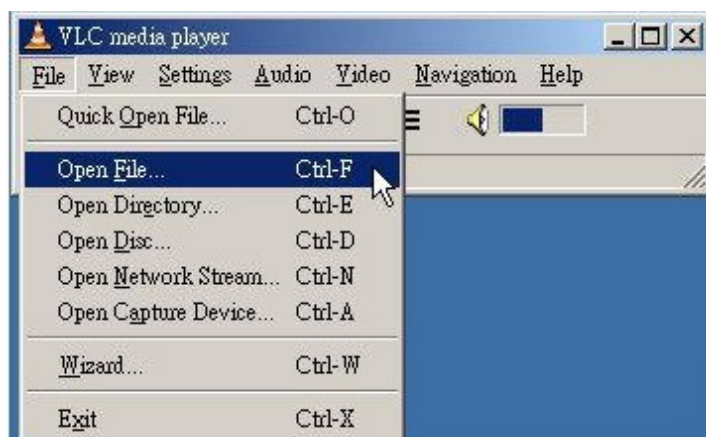
The default TV channel table of XL-ITB-101 is as below. It is pre-stored at XL-ITB-101 and it's read-only. It want change to different channel, please refer chapter VII.

Channel	Protocol	Address	Port
	UDP	224.1.1.10	1234
	UDP	224.1.1.11	1234
	UDP	224.1.1.12	1234
	RTSP	RTSP://192.168.10.108/1080_rueo2008_dome_dvd.ts	

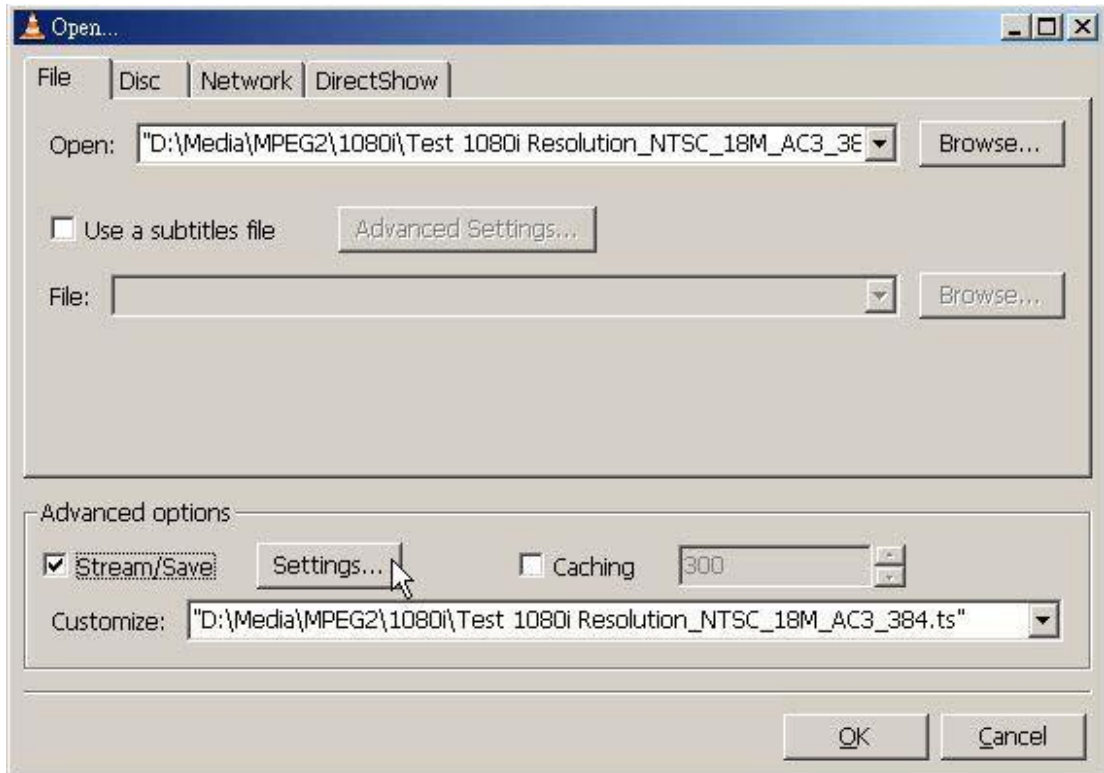
Step By Step

VLC Media Server

1. Install and set up DHCP server, install VLC Media Player.
2. After install, execute VLC by click desktop icon. Select "File", "Open File..."



3. Click "Browse" button. Select media source that you want to multicast, click "Open". Enable "Stream/Save", and then click "Settings..."



4. There are two kinds of output protocol that XL-ITB-101 can support, UDP and HTTP.

And two stream type: Multicast and Unicast.

UDP Multicast and Unicast

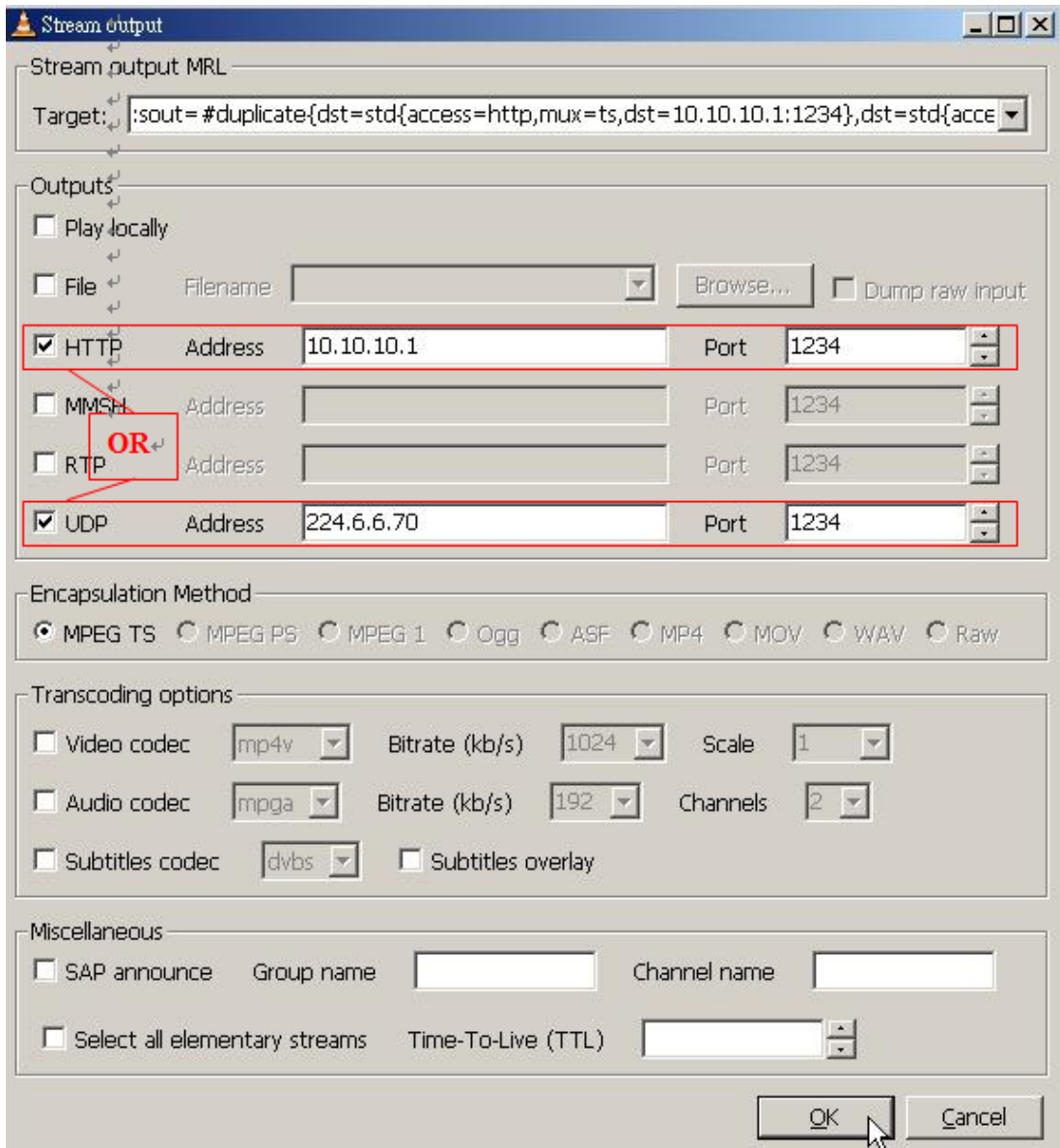
Enable "UDP" and input value of multicast channel IP and port such as channel 1:

Address: 224.1.1.10, Port:1234

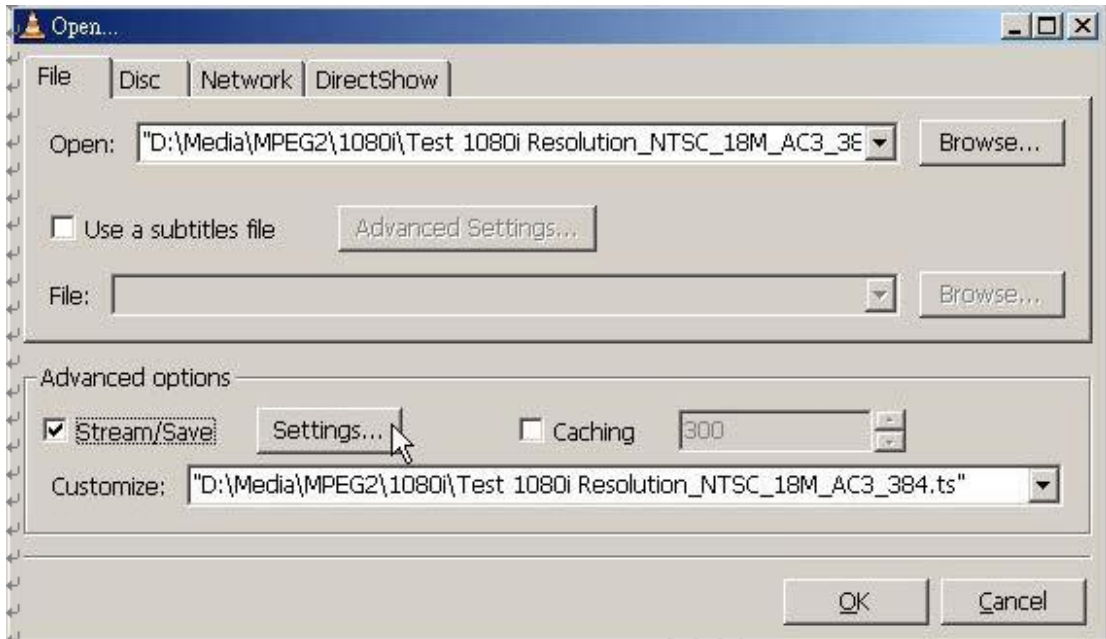
Click "OK" to save and close this window.

If unicast, just set Address to device IP. For example:

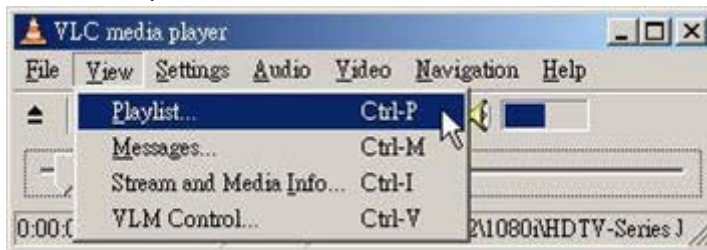
Address: 10.10.10.190, Port: 1234



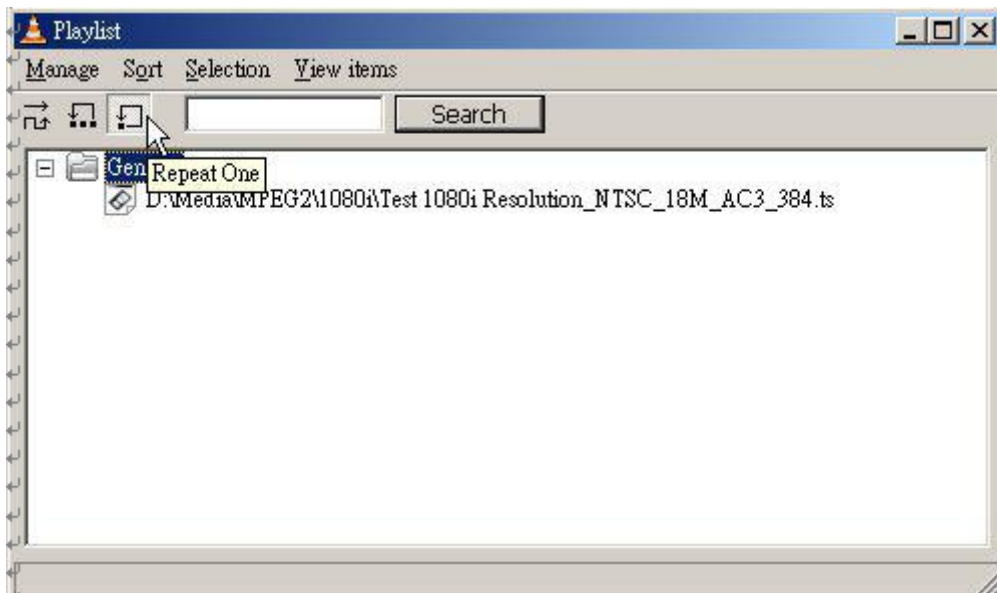
5. Click "OK" to close window and start multicasting.



6. It can set repeat mode when multicast. Select "View", "Playlist..."



7. Click "Repeat one" to enable repeat mode. It has three kinds of repeat mode that you can select: Shuffle, Repeat All and Repeat One.



By our experience, the performance of VLC multicast at Windows OS maybe decrease each time when repeat. This situation is much better at Linux OS. There is some jitter when repeat at both OS, that caused by VLC. It is normal.

8. Now can connect Ethernet, output interface cable and power on XL-ITB-101.

After loading procedure, you can watch TV. The background of menu page is multicast stream from 224.1.1.10.

9. Execute other VLC by click desktop icon and repeat above steps to set other UDP

LIVE555 Media Server

1. The server is a console application (there is currently no GUI version). To run the server, simply type "live555MediaServer".
2. Put media file that for VOD at the same directory
3. Play streams from VOD client using the URL
rtsp://<Server IP Address>/<Filename>
4. Please do not put blank at filename.

4 EPG Page

4.1 Booting

Key For All

There are some keys of remote are work for all pages:

POWER – This system can support 3 different types of power mode. You can try on by pressing the button to make sure which type you are using.

Type 1: Click to stand-by and will be wake up by one more click.

Type 2: Click to reboot.

Type 3: Click to stand-by and will be reboot by one more click.

The default type of XL-ITB-101 is type 1.

4.2 Menu

This is default portal page of XL-ITB-101. When press “**MENU**” key at remote, it jump to this page. Please use cursor key left and right to select function and press “**OK**” for connection.

4.3 TV

This is the live TV page. The left-top corner shows channel number, file name , file format and volume number at start or channel changed.

Use the channel +/- keys to change channels.

Press the "Info" button and you can see status. When viewing these status panels, you can also use the Right and Left arrow buttons to see additional status. Press the "Info" button again to toggle the panel off.

Press the "Menu" button and you'll go to the XL-ITB-101 home page. Press the arrow buttons to move to the TV window and press the "OK" button to go back to full-screen TV.

Available Key:

0-9 -- Select channel by digital, only works at the channel already defined at channel table. It can automatically change when only input one digital. For example, press 7, the channel number means "CH 7-" and change to channel 7 after waiting timeout.

CH+/- -- Switch channel.

STOP – Stop live TV and return to portal page.

PAUSE – Stop live TV temporarily.

PLAY- Play live TV.

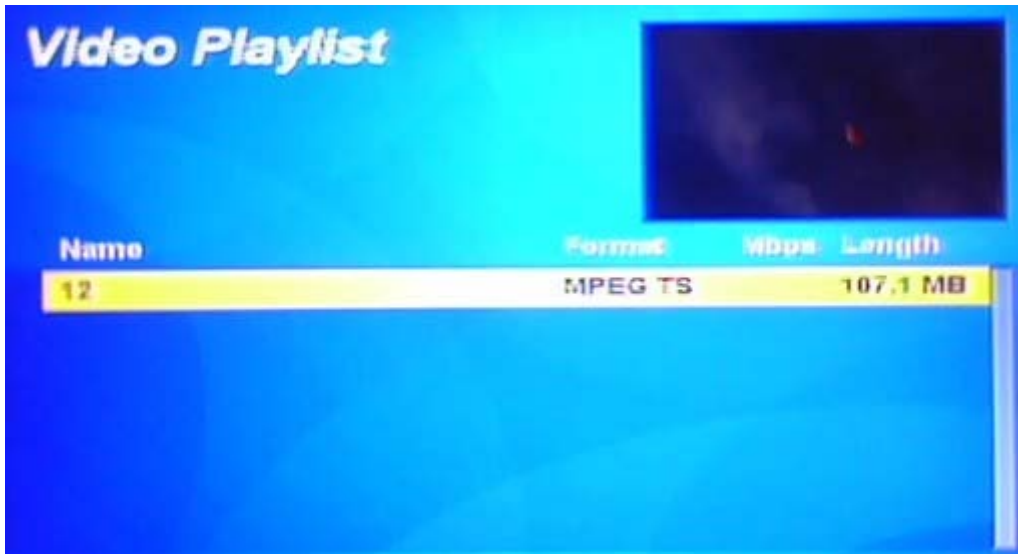
MUTE- Cancel the voice

4.4 Video

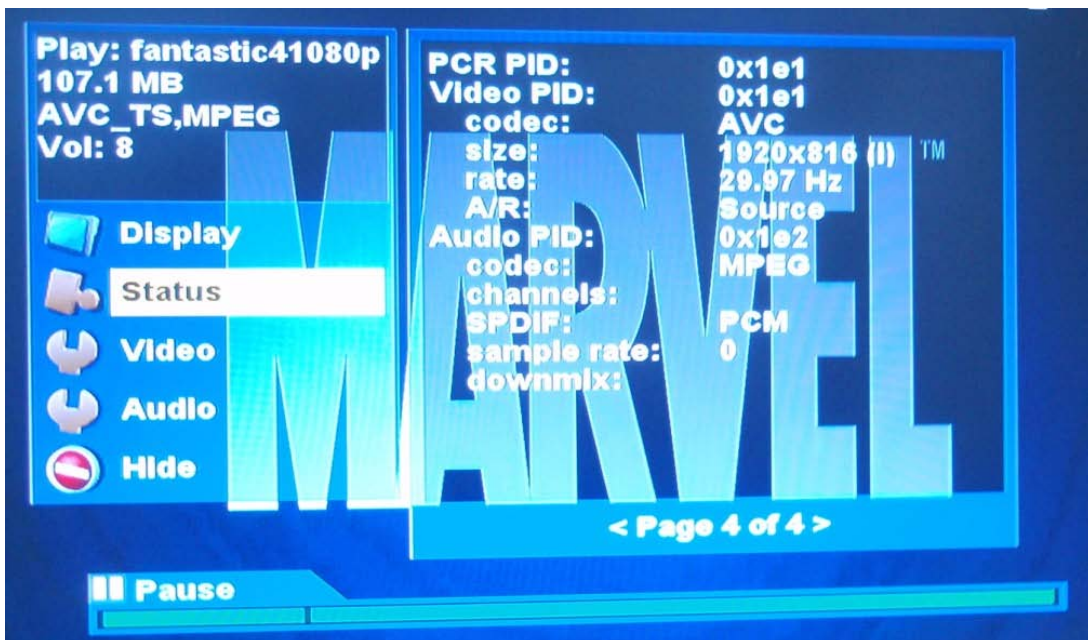
This is Video menu page, it plays video from USB storage.



This Video page is used for play local disk file. It can read media file from USB device.(such as flash disk, hard drive, flash memory card...). It can support transport stream format by extension ts. Connect USB device before enter this page, it shows disk partition when page loaded. If connect after enter, please click "admin" button to refresh streams, or else you won't see its content.



Select program and click “OK” to start play.



Below key is only available at Video playing screen.

Available Key:

STOP -- Stop VOD and return to VOD menu page.

PLAY/PAUSE -- Control VOD play and pause. When trick playing, stop playing and resume to normal speed.

F.R. & F.F. -- Control VOD play. Forward and rewind both have 42segments. Press again at trick playing increase speed. **This F.R. feature has not implement at Normal RTSP Server by current software.**

4.5 Audio

This Music page is used for play local disk mp3 files. Connect USB disk before enter this page, it shows disk partition when page loaded. If connect after enter, please click "Refresh MP3's " button from Admin page for check again.



The part below is file browser, it can be used for find the audio file that want to play. It shows 9 items per load, if the item at current path is more the 9 items. It provide navigation key to switch songs.

Available Key:

STOP – Stop playing. **PLAY** –

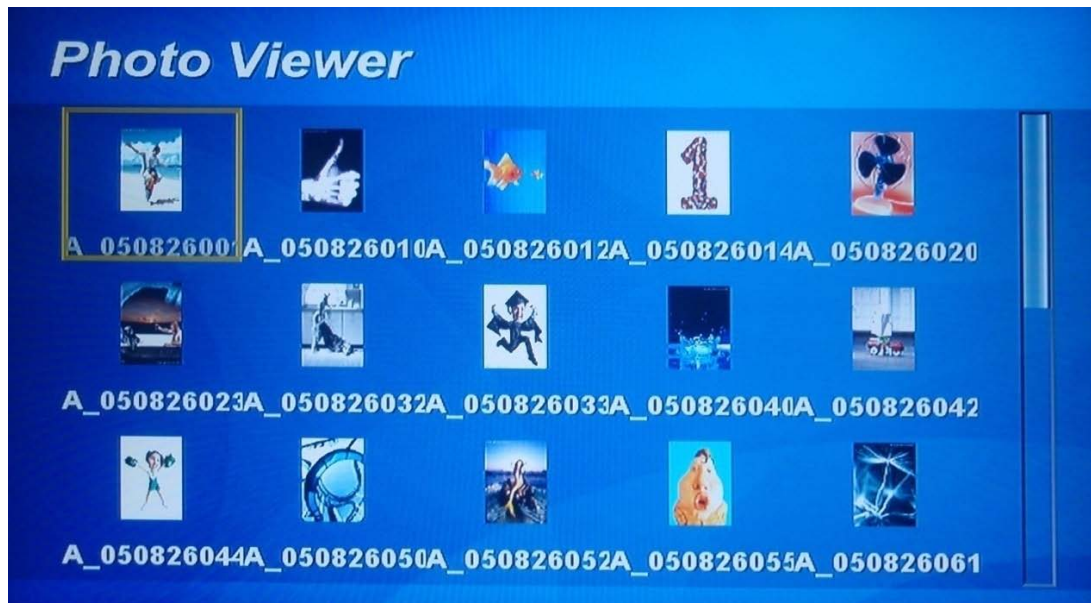
Start playing. **Navigation**

key – Switch songs.

4.6 Picture

Select photo from photo viewer page and click "OK" for view.

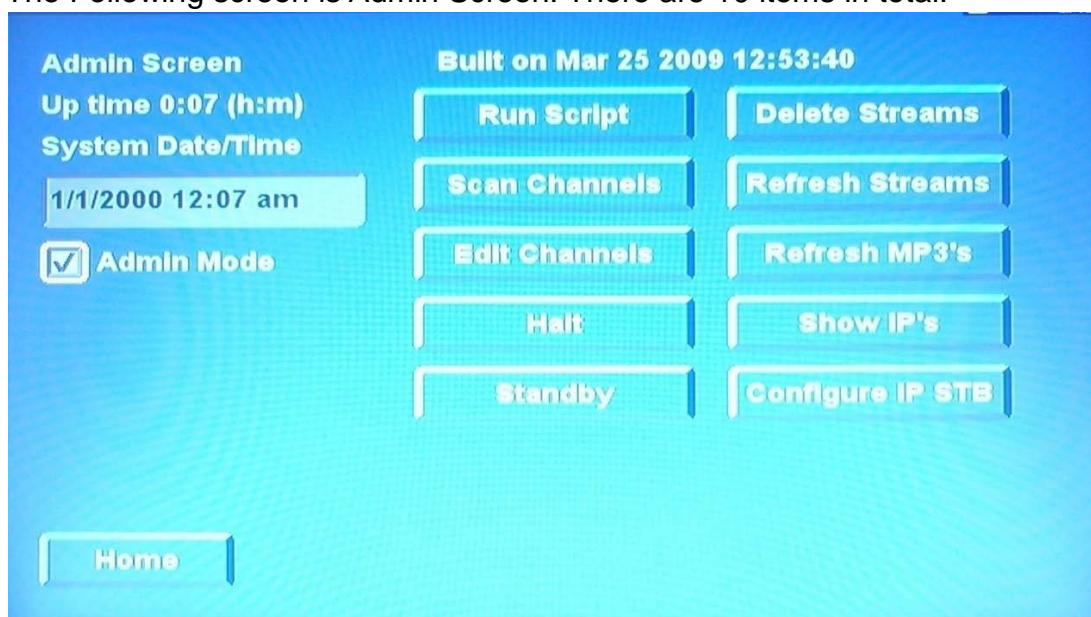
Press the "Picture" button, and you'll see a list of JPEG's, PNG's that can be viewed. If the view is empty, you'll need to copy some images into your USB storage device. Of course you need to refresh streams and refresh mp3's from the admin page.



The view page of photo just like above, it can switch to previous or next photo using navigation keys. You can also use F.F and F.R key to switch to previous or next photo. Use OK key again to quit full screen mode. You can also use play key to play slide show. Use STOP or OK key to quit full screen mode.

4.7 Admin

The Following screen is Admin Screen. There are 10 items in total.



1. Run Script

You can control all Brutus functions using a simple scripting language. The easiest way to learn about it is you use start Brutus with the --exec command

line option, type help to see your choices, then enter script commands interactively. Please see Brutus Scripting for more details.

2. Refresh Streams

The function of this item is refreshing streams in your USB storage. If you don't, XL-ITB-101 may not find the content of your USB storage device.

3. Refresh MP3's

The function of this item is refreshing MP3 files in your storage. If you don't, XL-ITB-101 may not find the content of your USB storage device.

4. Configure IP STB

5. Scan Channels

The function of this item is discovering channel changes and refreshing channel list.

6. Edit Channels

The function of this item is editing channels.

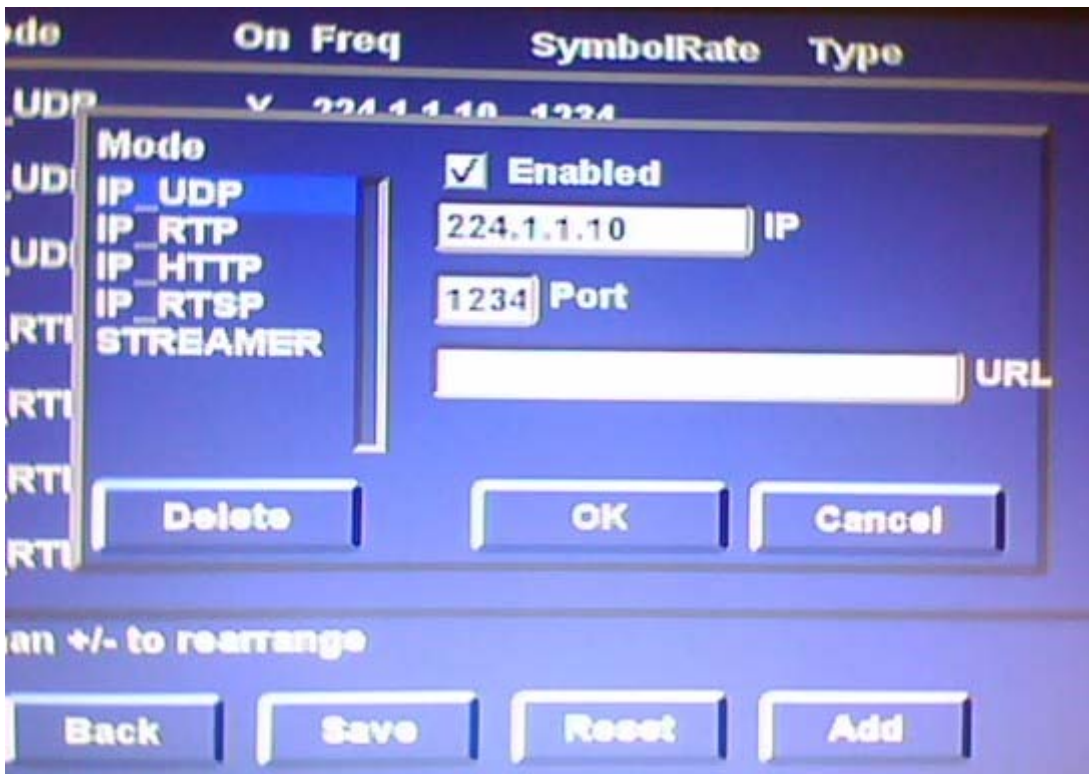
The default channel map comes from channels.txt. You may find it easier to edit using a text editor. You can also edit the channel map on screen using a remote and then overwrite that channel map.

From the main menu, click on "Admin". Click on "Edit Channels". You can then perform the following operations:

- ❑ To add a channel, click on "Add", enter your settings, then click "OK".
- ❑ To remove a channel, click on the channel in the list, then click "Delete".
- ❑ To edit a channel, click on the channel in the list, make your changes, then click "OK".
- ❑ To save your changes, click on "Save".
- ❑ To abandon your changes, click on "Reset".



You can add UDP channels for multicast as below.



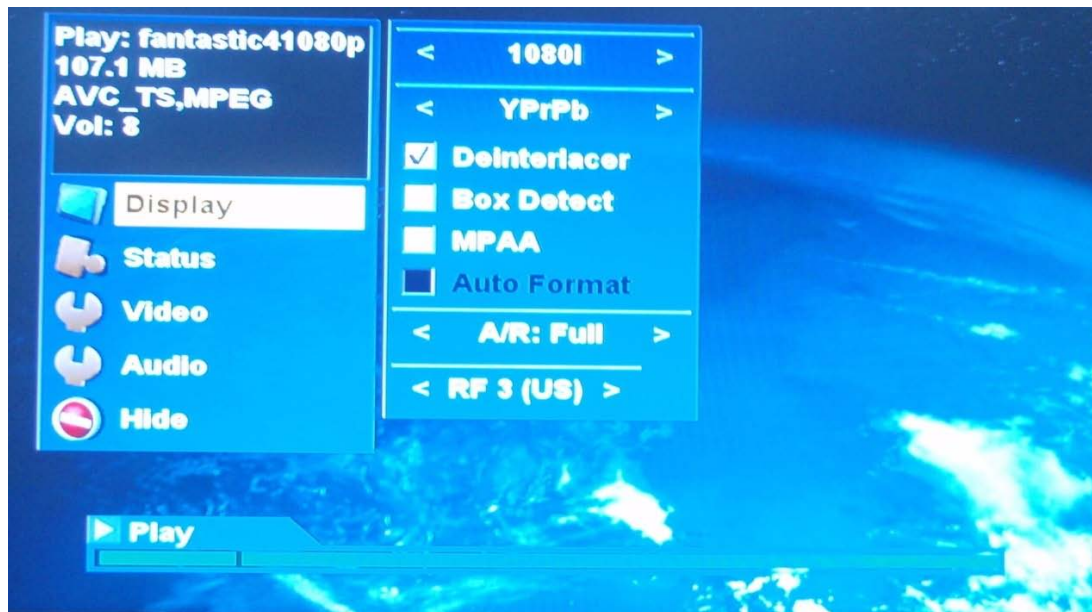
You can also add or edit RTSP channel for VOD as below. Rtp is **Real Time Streaming Protocol (RTSP)**, developed by the IETF and created in 1998 as RFC 2326, is a protocol for use in streaming media systems, which allows a client to remotely control a streaming media server, issuing VCR-like commands such as "play" and "pause", and allowing time-based access to files on a server. The format

is as follows:

Rtsp://the IP address of server/file name.



4.8 Information



You can control your display settings from the Info panel. Press the INFO button on the remote. Navigate to the “Display” button. Then arrow over to the control panel.

The controls which you see reflect the options available for the current video format. Use the right and left arrows to change the arrow bars. Press the SELECT button on the remote to enable the change. You’ll see an immediate change. You’ll also notice that the list of available controls may change as you switch video formats.

480i, NTSC	NTSC synonyms
576i, PAL	PAL synonyms
720p, 1080i, 1080p 24Hz, 1080p 30Hz	ATSC/60Hz HD modes
720p 50Hz, 1080i 50Hz, 1080p 25Hz	50Hz HD modes
1366x768p, 1024x768p, 800x600p, 640x480p, vga, 1280x768p, 1280x720p	VESA modes
NTSC J, PAL M, PAL N, PAL NC, SECAM	Other NTSC, PAL and SECAM modes

Q&A

<Q> [How to tell if the box is alive and working?](#)

<A> There are two ways to determine if STB is alive and working:

1. By pinging to the STB
2. By telnet/SSH to the STB with following password=root

<Q> [Is it playing a stream from a multicast address?](#)

<A> After connect to STB (by telnet or SSH), user can check the log file

`/var/log/messages`

The video player related logs has the prefix "local2", below is an example shows STB is playing a multicast stream in 224.6.6.70:1234

Aug 19 12:06:34 (none) local2.info syslog: [TV]Start stream -> 224.6.6.70:1234

Aug 19 12:06:35 (none) local2.info syslog: PID detected: vid=0x31, aud=0x34, pcr=0x31, vid_fmt=0x2, aud_fmt=0x81

<Q> [Which decoders are supported \(MPEG1, MPEG2, MPEG4 part 2, MPEG4 part 10 \(H.264\), WM, VC-1, etc.\)? If you decode WM, which versions \(WMV9, WMA8, etc.\)?](#)

<A> MPEG1, MPEG2, H.264, VC-1: WMV, WMV-SM, WMA standard, WMA professional

* MPEG4 part 2 is not supported in 7401

* WM is not implemented yet

- (will be implemented in 7405 chipset)

<Q> [What resolutions are supported?](#)

<A> MPEG-2: from 16x16 to 1920x1088

H.264: from 64x16 to 1920x1088

VC-1: from 64x16 to 1920x1088

<Q> [Which public standards and/or specifications for encoding and network streaming must an H.264 source conform?](#)

<A> The chip will decode any bitstream coded with any combination of tools allowed under the Main Profile as defined in the ISO standard 14496-10, (MPEG-4 Part 10). This includes any stream encoded by a baseline encoder with the appropriate compatibility flag set for Main Profile operation.

The chip decodes bitstreams conforming to the restrictions set by Level 4.1 as specified in Annex A of ISO/IEC Recommendation 14496-10 with the following restriction:

- Maximum encoded bit rate: 30-megabits per second

<Q> [How do handle content protection on HDMI interfaces?](#)

<A> By HDCP

<Q> [What operating system runs in your solutions?](#)

<A> Linux

<Q> [Which processor, graphics, and decoder chips are used in your solutions?](#)

<A> SoC: Broadcom BCM7401

<Q> [My H.264 TS stream multicast only has audio but no video?](#)

<A> The encoded video must be Level 4.1 instead of Level 5.1

<Q> [My VLC H.264 TS multicast stream Level 4.1 only has audio but no video?](#)

<A> The default VLC setting for H.264 is 5.1. Need to change VLC setting under preferences -- Input/Codecs -- Video codecs -- x264 and change H.264 level to 4.1