THOR

FIBER

H-2/4 HDMI/SDI-ATSC-IP

Encoder Modulator

A Note From Thor About This Manual

Intended Audience

This user manual has been written to help people who have to use, integrate and to install the product. Some chapters require some prerequisite knowledge in electronics and especially in broadcast technologies and standards.

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Directory

Chapter 1 Introduction

1.1 Product Overview

The Thor H-4HDMI-ATSC-IP encoder is a powerful new all-in-one device which integrates encoding (MPEG-2 HD, MPEG-4/AVC H.264) and modulating ATSC to convert V/A signals into RF output. It comes equipped with 4 HDMI channels input and 1 ASI input and output with 2 ASI ports and 1 UDP IP port.

The signal source could be injected from satellite receivers, closed-circuit television cameras, Blu-ray players, and antennas. Its output signals are to be received by TVs, STB with corresponding standard of ATSC.

With its various inputs available, our encoder modulator are wildly used in public places such as the mall, market hall, theatre, hotels, resorts, and etc for advertising, monitoring, training and educating in company's, schools, campuses, hospital.

1.2 Key Features

- **MPEG2 HD/MPEG4 HD video encoding**
- **Up to 1920*1080@50P/60P supported (MPEG4 HD)**
  Up to 1920*1080@50I/60I supported (MPEG2 HD)
- **4* HDMI in, 1*ASI in**
- **Simultaneously encoding each channel at more than 10Mbps**
- **4* ATSC RF out (4 carriers combined output)**
- **Supports IP (MPTS) output**
- **Excellent modulation quality MER≥42dB**
- **RF Frequency range 30Mhz~960Mhz**
- **LCD display, Remote control and firmware**
- **Web NMS management; Updates via web**
- **Lowest cost per channel --- breakthrough price**

1.3 Specifications

Encoding Section

Video

Encoding	MPEG2 HD/MPEG4 HD
Input	HDMI*4
Resolution	1920*1080_60P, 1920*1080_50P, (-for MPEG4/H.264)
	1920*1080_60i, 1920*1080_50i,
	1280*720_60p, 1280*720_50P
	720*480_60i, 720*576_50i

Audio

encoding	MPEG1 Layer II, (MPEG2-AAC, MPEG4-AAC available)
Sample rate	48KHz
Bit rate	64kbps, 96kbps,128kbps, 192kbps, 256kbps, 320kbps

ATSC Modulator Section

Standard	ATSC A/53
Constellation	8 VSB
RF Output Level	26~-10dbm (81~97dbμV), 0.1db step
MER	≥42dB
RF frequency	30~960MHz, 1KHz step

System

Local interface	LCD + control buttons
Remote management	Web NMS
output	2 ASI out (BNC type);
	1 IP out (RJ45, 100M)
NMS interface	RJ45, 100M
Language	English

General

|	
Power supply	AC 100V~240V
Dimensions	482*400*44mm
Weight	5 kgs
Operation temperature	0~45℃

1.4 Schematic Overview
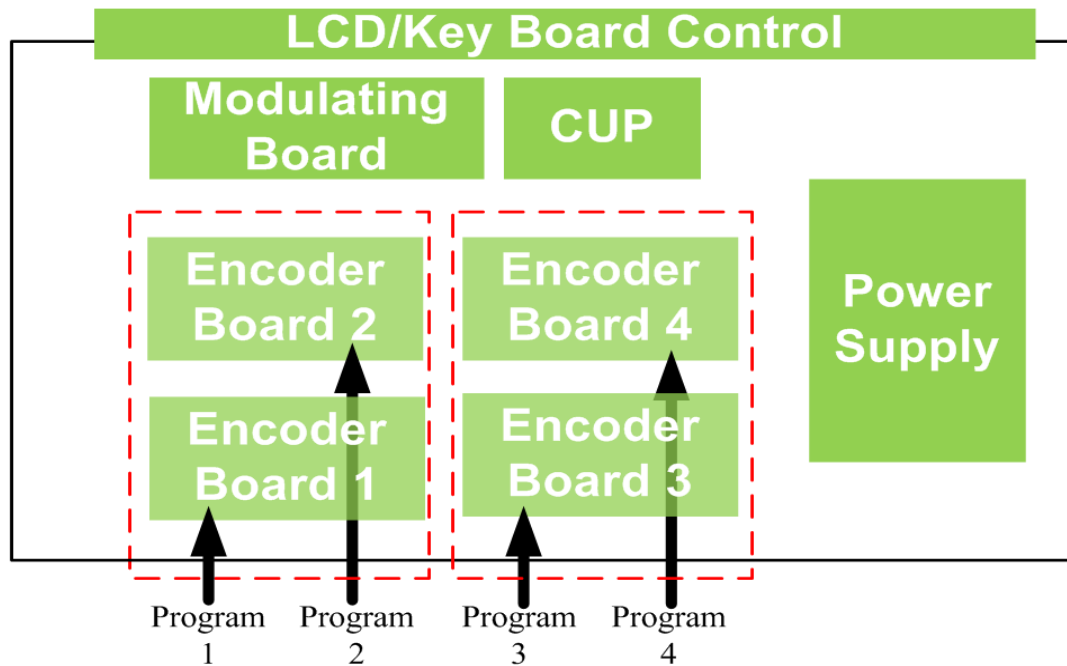
1.5 Principle Chart
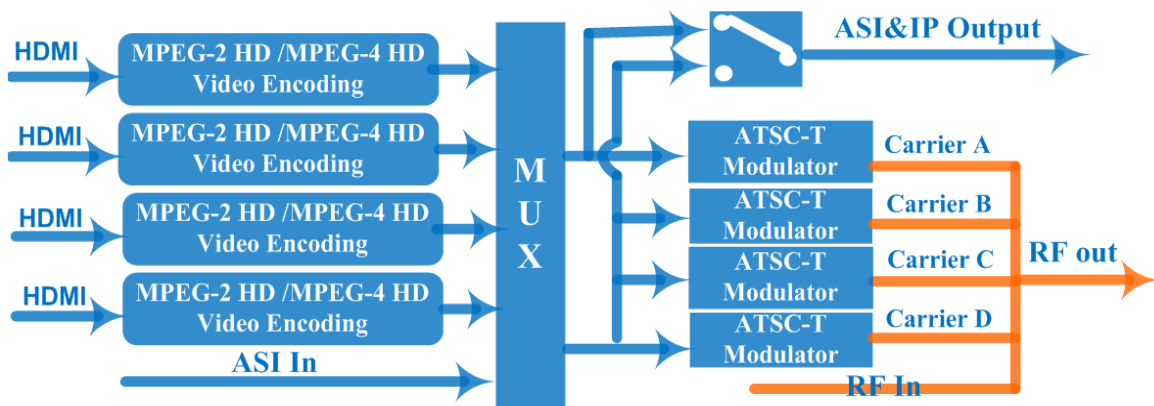
1.6 Typical Application of 4 * ATSC Carrier Outputs

To maximize the potential of our encoder for ATSC we have been able to boost the maximum possible bit-rate bandwidth up to 76Mbps (19*4), which makes it reliably carry 4 channel HD programs output simultaneously. This power has helped stem the source encoding and modulation to any amount of TV's at 1080i quality in MPEG2,
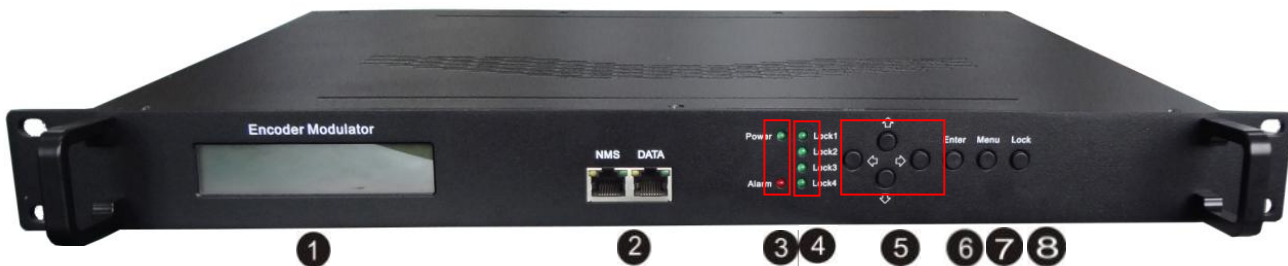
and 1080p quality resolution on MPEG4. Previously the maximum bitrate was only 11Mbps, this powerful unit will now help drive any digital programming at the highest resolution rate allowed on the market.

Below brief chart will help to more clearly illustrate the working principle.
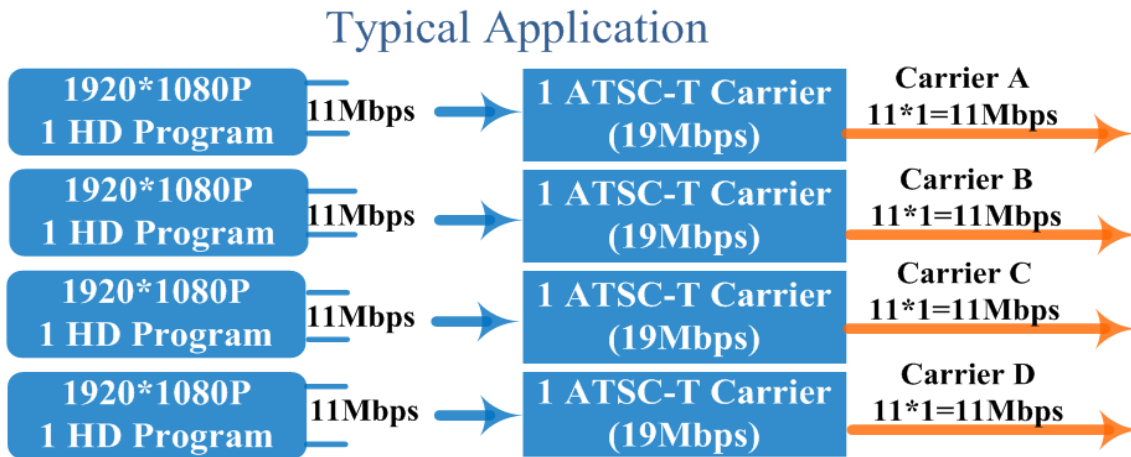
1.7 Appearance and Description

Front Panel Illustration

① **LCD window: LCD display**
② **NMS & DATA ports**
③ **Power and Alarm Indicators**
④ **Lock Indicators**
⑤ **Up and down, left and right button**
⑥ **Enter button: for confirm**
⑦ **Menu button: for back step**
⑧ **Lock button: press to lock set**

Rear Panel Illustration

①HDMI Module 1: HDMI input port 1&2
②HDMI Module 2: HDMI input port 3&4
③RF in port (for combiner use)
④RF out port
⑤ASI input port
⑥ASI output ports
⑦Switch
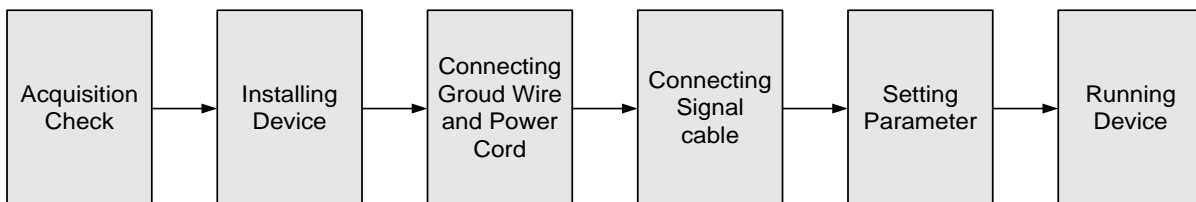⑧Power supply slot
⑨Grounding

Chapter 2 Installation Guide

2.1 General Precautions

✓ Must be operated and maintained in an area free of dust and debris.

✓ The cover should be securely fastened, do not open the cover of the chassis when the power is on. This will also void Thor's manufacturer's warranty.

✓ After installation, securely stow away all loose cables, external antenna, and others.

2.2 Power Precautions

✓   Be careful when connecting a power source to the device.

✓   Do not operate in wet or damp areas. Make sure the extension cable is in good condition

✓   Make sure the power switch is off before you start to install the device

2.3 Device's Installation Flow Chart Illustrated as following

Acquisition Check	→	Installing Device	→	Connecting Groud Wire and Power Cord	→	Connecting Signal cable	→	Setting Parameter	→	Running Device

2.4 Environment Requirement

Item	Requirement
Rack Mount	When user installs machine on rack, the distance between 2 rows of machine frames should be 1.2~1.5m and the distance against wall should be no less than 0.8m.
Floor/ Table	Electric Isolation, Dust Free Volume resistivity of ground anti-static material: $1X10^{7} \sim 1X10^{10}\Omega$, Grounding current limiting resistance: $1M\Omega$ (Floor bearing should be greater than 450Kg/㎡)

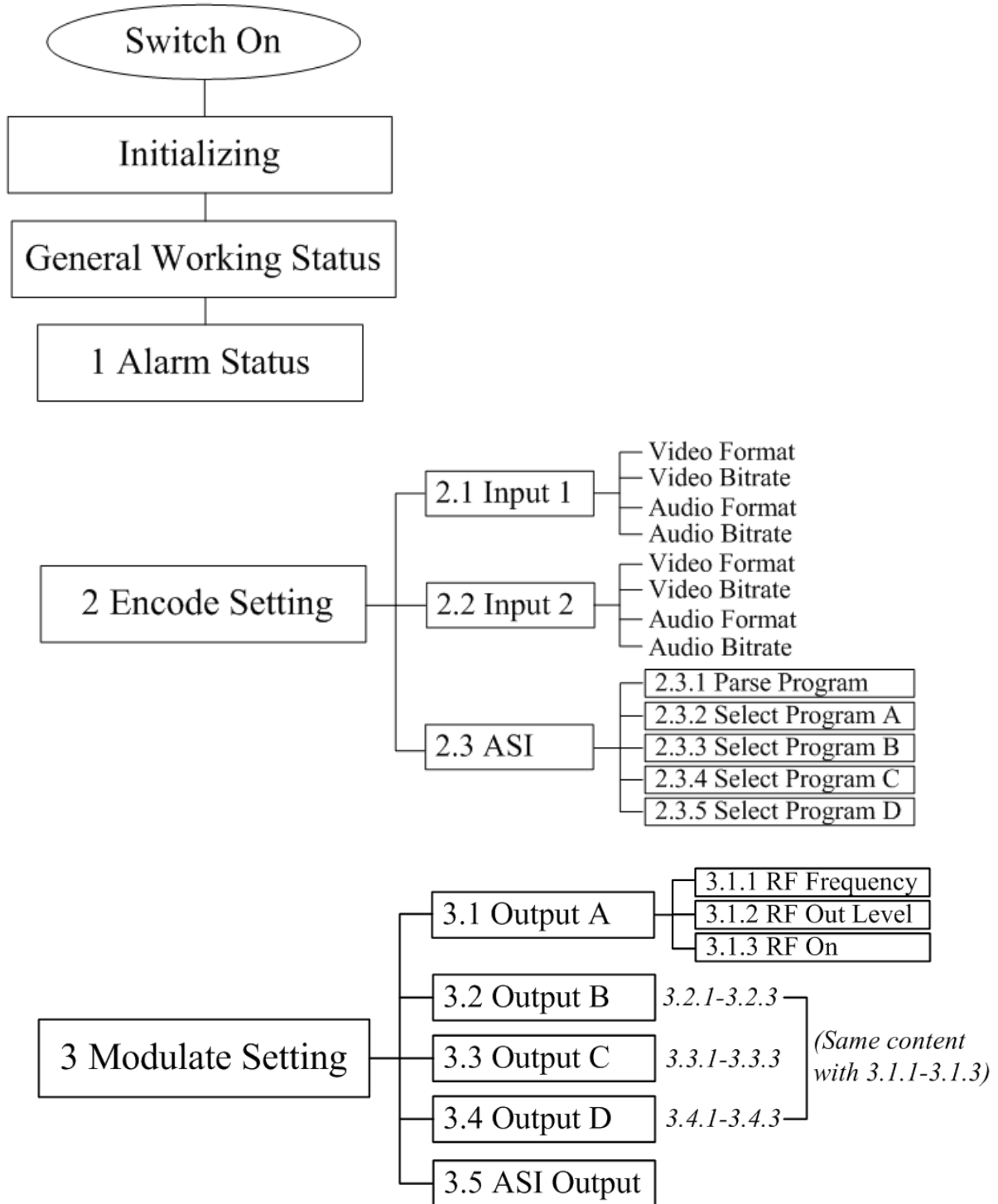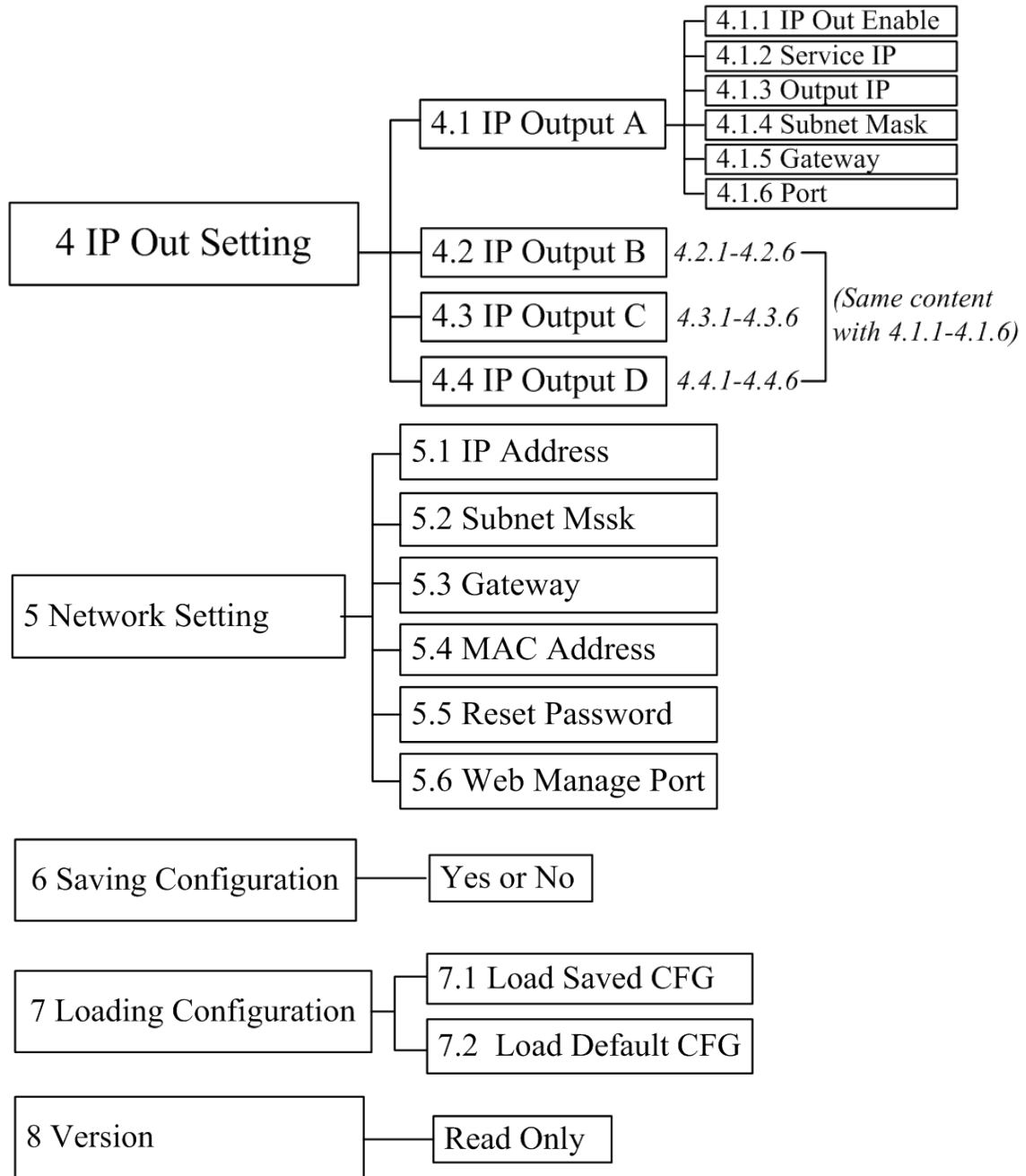| Environment Temperature	5~40°C(sustainable), 0~45°C(short time), installing HVAC is recommended
Relative Humidity	20%~80% sustainable 10%~90% short time
Pressure	86~105KPa
Door & Window	Installing rubber strip for sealing door-gaps and dual level glasses for window
Fire Protection	Fire alarm system and extinguisher
Power	Device power, HVAC and lighting should be independent to each other. Device power requires AC 110V±10%, 50/60Hz or AC 220V±10%, 50/60Hz. Please carefully check before running.

2.5 Grounding Requirement

✓ It is important to keep this device grounded to ensure all of the modules function correctly. Correctly grounding the device will also help prevent any electrical interference, lightening. Etc. Also it helps reject minor interference that may disrupt the devices ability to function smoothly. General rule of them, make sure the device is grounded when installing anywhere.

✓ Always use copper wire. When applied correctly the ground must be wrapped well to ensure maximum conduction so it can reduce any high frequencies. The copper ground wire should also be as short and thick as possible

✓ Installer must make sure that the two ends of the ground are well conducted and have appropriate anti-rust properties.

✓ It is prohibited to use any other device as part of the grounding electric circuit.

✓ The area of the conduction between the ground wire and device's frame should be no less than 25 ㎡.

Chapter 3 Operation

3.1 LCD Menus

An overview of the LCD menu tree:

```
4 IP Out Setting ──┬── 4.1 IP Output A ──┬── 4.1.1 IP Out Enable
                   │                     ├── 4.1.2 Service IP
                   │                     ├── 4.1.3 Output IP
                   │                     ├── 4.1.4 Subnet Mask
                   │                     ├── 4.1.5 Gateway
                   │                     └── 4.1.6 Port
                   ├── 4.2 IP Output B  4.2.1-4.2.6 ──┐
                   ├── 4.3 IP Output C  4.3.1-4.3.6   │ (Same content
                   └── 4.4 IP Output D  4.4.1-4.4.6 ──┘ with 4.1.1-4.1.6)
```

```
5 Network Setting ──┬── 5.1 IP Address
                    ├── 5.2 Subnet Mssk
                    ├── 5.3 Gateway
                    ├── 5.4 MAC Address
                    ├── 5.5 Reset Password
                    └── 5.6 Web Manage Port
```

```
6 Saving Configuration ──── Yes or No
```

```
7 Loading Configuration ──┬── 7.1 Load Saved CFG
                          └── 7.2  Load Default CFG
```

```
8 Version ──── Read Only
```

3.2 Initial Status

After powering on the device，it will take a few seconds to initialize the system

```
Start up...  ⟹  Start OK...  ⟹   ATSC        A    XXX.00MHz
                                  P1:X.XXMbps    P2: X.XXMbps
```
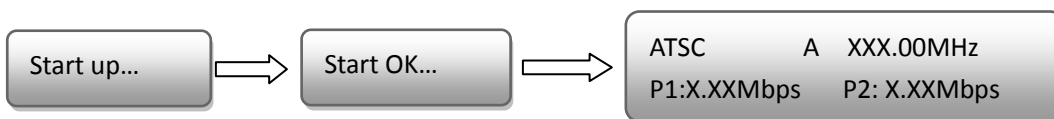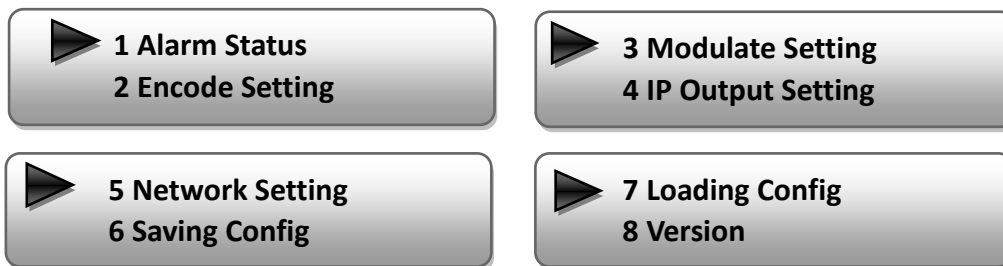
● **ATSC**: indicates the modulation standard of this device: ATSC.

- **A**: the symbol of different carrier output. "*A*", "*B*", "*C*", and "*D*" alternate constantly with the following output frequency.

- **XXX.XX MHz** indicates the current output frequency (range: 30~960MHz) of its corresponding carrier output.

- **P1**: Program 1; **P2**: Program 2; **P3**: Program 3; **P4**: Program 4

- **X.XX Mbps**: indicates the encoding bit rate of each channel respectively.

3.3 General Settings for Main Menu

By pressing "Lock" key on the front panel, enter the main menu. The LCD will display the following pages:

> ▶ **1 Alarm Status**
> **2 Encode Setting**

> ▶ **3 Modulate Setting**
> **4 IP Output Setting**

> ▶ **5 Network Setting**
> **6 Saving Config**

> ▶ **7 Loading Config**
> **8 Version**

1) Press UP/DOWN buttons to specify menu items, and then press ENTER to enter the submenus as below:

2) **Alarm Status**

   The alarm indicator will turn on if there is no A/V signals inputting or outputting bit rate overflows. User then can enter this menu to check the error type.

3) **Encode Setting**

   Under this submenu, the LCD will show "2.1 Input 1", "2.2 Input 2" and "2.3 ASI".

> ▶ **2.1 Input 1**
> **2.2 Input 2**

> ▶ **2.3 ASI**

Under submenus 2.1 or 2.2, user could set the video encoding format and bit rate, and set audio encoding bit rate and also read the audio encoding format of the program from the HDMI input.
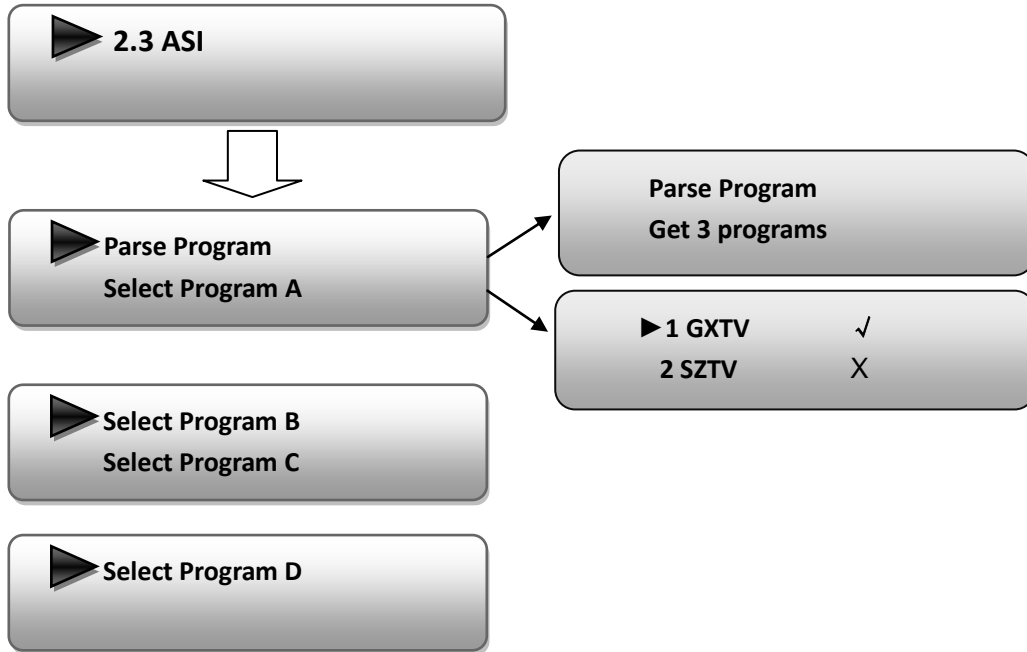
```
   ▶  2.1 Input  1

            │
            ▼

   ▶  2.1.1 Program 1

            │
            ▼

   ▶ Video Format          ──▶   ▶  MPEG2      H.264
     Video Bit Rate
                           ──▶    Video Bit Rate
                                  08.000 Mbps


   ▶ Audio Format          ──▶    MPEG2
     Audio Bit Rate
                           ──▶   ▶ 64 Kbps
                                   96 Kbps
```
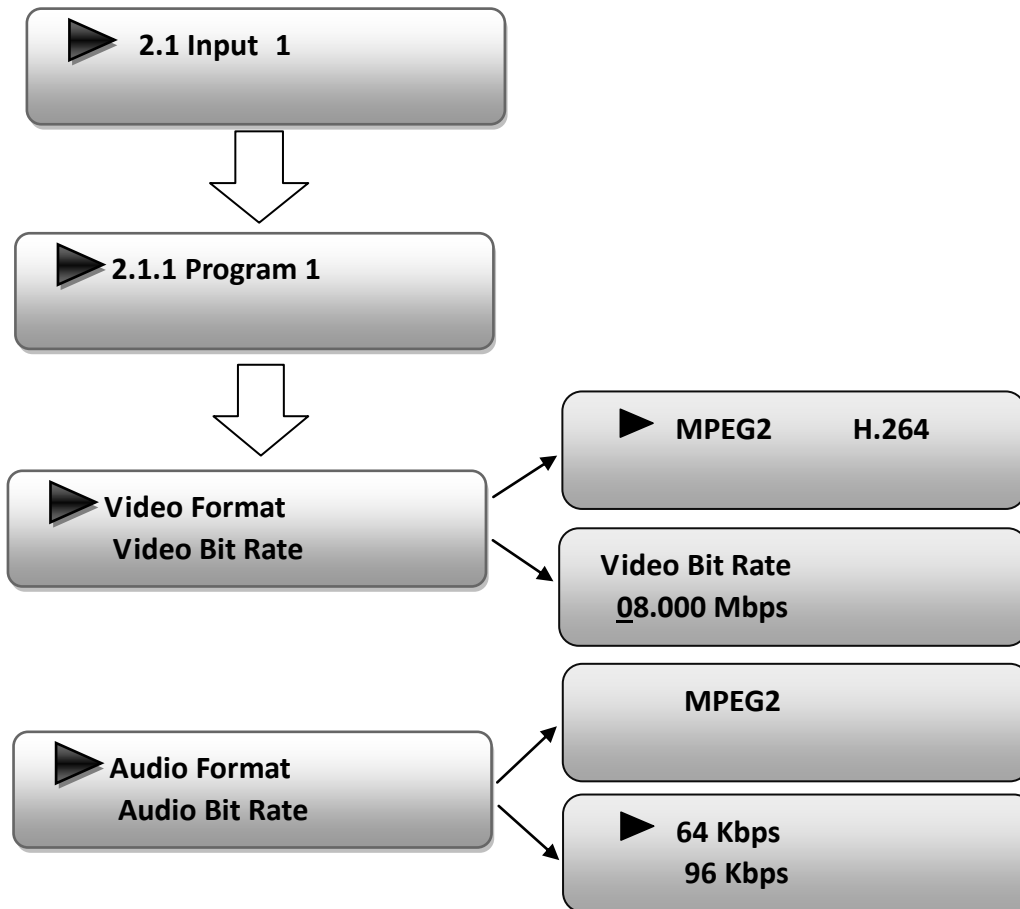
"Video Format": the encoding module supports both MPEG2 and MPEG4 AVC/H.264 formats. Move the triangle mark with LEFT/RIGHT keys to specify the intended format and press ENTER to confirm.

"Video Bit Rate": Move the underline with LEFT/RIGHT keys and modify the value of frequency (1-19Mbps) with UP/DOWN keys, and press ENTER key to save the settings.

"Low Delay": Normal: disable the low delay mode. "Audio Format": the encoding module supports MPEG2 audio format. This is a read-only interface for checking.

"Audio Bit rate" is for selecting bit rate for the audio. Move the triangle mark to specify the target bit rate and press ENTER to confirm.

Under submenu 2.3, you could parse the inputting programs and select the programs to output.

```
   ▶ 2.3 ASI
```

```
   ▶ Parse Program
     Select Program A
```
→
```
   Parse Program
   Get 3 programs
```
→
```
   ▶1 GXTV      √
    2 SZTV      X
```

```
   ▶ Select Program B
     Select Program C
```

```
   ▶ Select Program D
```

"Parse Program" is for checking the quantity of input programs from the ASI IN port.

"Select Program A" is for selecting programs from the ASI IN to output through Carrier A. Move the triangle mark to specify the program and press RIGHT/LEFT keys to shift the mark between "√" and "X". ("√": to output the corresponding program; "X": not to output the corresponding program)

◆ **REMARK**: "Select Program B/C/D" shares the same explanation with "Select Program A".

4) **Modulator Setting**

When entering "Modulator Setting" submenu, below different parameters can be set and the LCD window would show these:

```
   ▶ 3.1 Output A
     3.2 Output B
```
```
   ▶ 3.3 Output C
     3.4 Output D
```

```
   ▶ 3.5 ASI Output
```
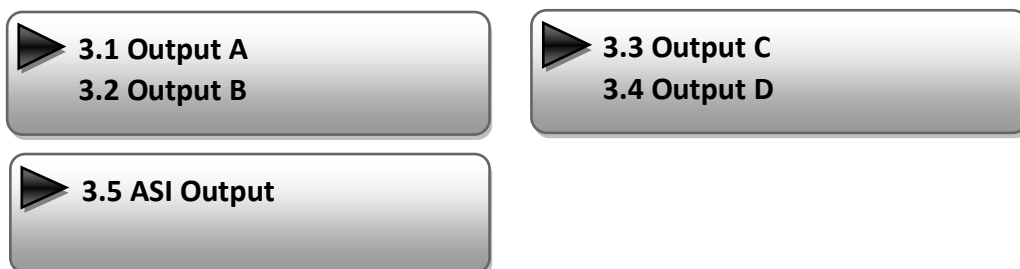
As the 4HDMI-ATSC unit comes with 4 carrier outputs, "3.1"-"3.4" represents the

"Carrier A", "Carrier B", "Carrier C", and "Carrier D" respectively. Eenter "3.1"/"3.2"/"3.4"/"3.4" to set the corresponding modulating parameters. Submenus (taking "3.1" as an example) are here:

```
▶ 3.1 Output A
```

```
▶ 3.1.1 RF Frequency          ▶ 3.1.3 RF On
  3.1.2 RF Out Level
```
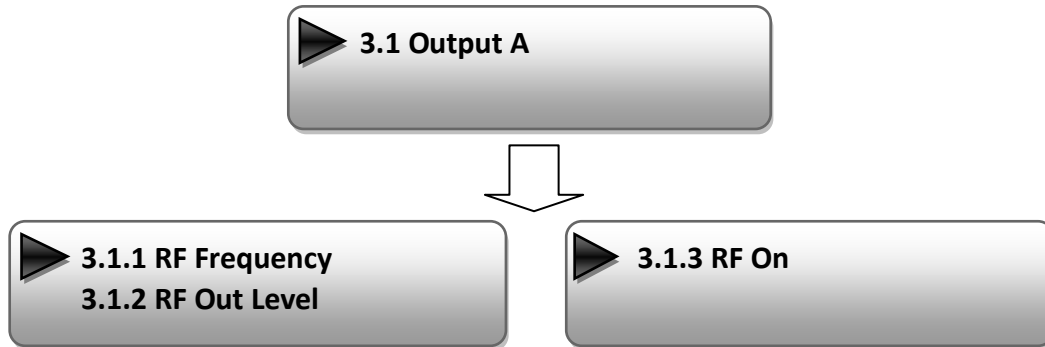
> **RF Frequency**

The RF output frequency range is from 30 to 960MHz with 1K stepping. After entering the RF frequency setting submenu, users the can press LEFT, RIGHT, UP, and DOWN buttons to adjust the frequency and confirm by press ENTER button.

```
RF Frequency
  750.000 MHz
```

> **RF out level**

The RF attenuation range is from -30~-10dbm (81~97dbμV) with 0.1db step. After entering this setting submenu, user can shift UP/DOWN/LEFT/RIGHT key to set the output level and press ENTER to confirm.

```
RF Out Level
  -10.0 dbm
```

> **RF On**

This interface allows you to enable the RF (carrier A) output or not.

OFF: to disable programs to output through carrier A.

ON: to enable programs to output through carrier A.

```
RF On
  ▶ Off          On
```
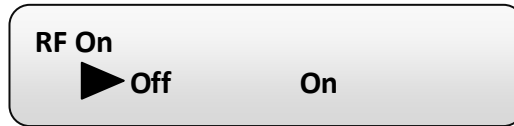
NOTE: The setting for "3.2", "3.3", and "3.4" are the same as "3.1" explained/shown above.

ASI Output:

The Thor 4-HDMI-ATSC-IP encoder & modulator has a quad-carrier output: Output A, B, C, and D.

Output A: the ASI output programs are same as carrier output A.

Output B: the ASI output programs are same as carrier output B.

**Output C:** the ASI output programs are same as carrier output C.

Output D: the ASI output programs are same as carrier output D.

```
ASI Output
  ▶  A    B    C    D
```
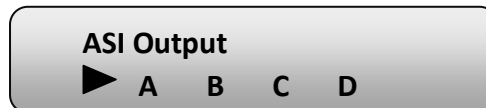
5) IP Output Setting

The Thor Encoder also has 4 MPTS IP output (Output A, B, C, and D), "4.1" to "4.4" are

for the settings of the 4 MPTS IP outputs respectively. Submenus go as 4.1.1-4.1.6

```
▶  4.1 IP Output A          ▶  4.3 IP Output C
   4.2 IP Output B             4.4 IP Output D
```

```
▶  4.1.1 IP Output          ▶  4.1.3 Output IP
   4.1.2 Service IP            4.1.4 Subnet Mask
```

```
▶  4.1.5 Gateway
   4.1.6 Port
```
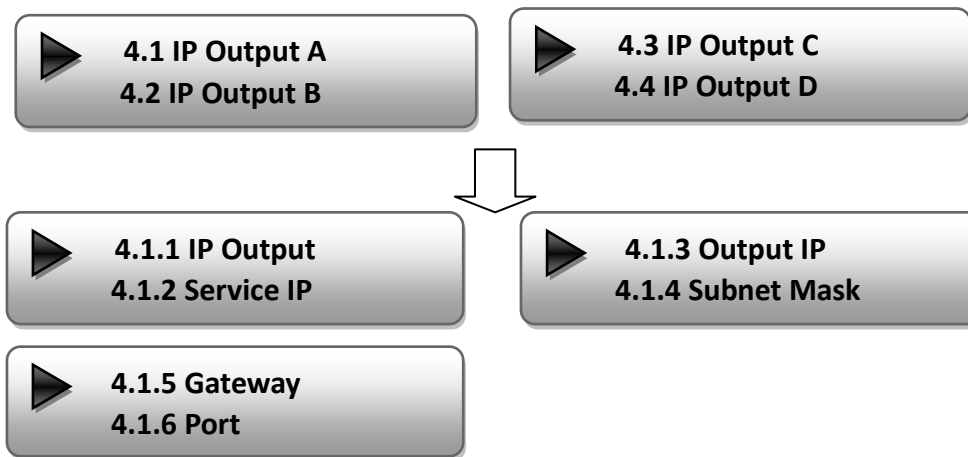
Enter 4.1.1 to decide whether to turn the IP port on or off, and enter to the rest menu

items to set the corresponding parameters.

```
IP Output
OFF  ▶  ON
```

```
Service IP
192.168.002.137
```
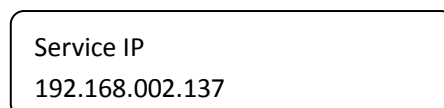
Output IP 224.002.002.002	Subnet mask 255.255.255.000
Gateway 192.168.002.000	Port 01234

NOTE: The sub-menus under "4.2"-"4.4" are the same as "4.1" explained above.

6) **Network setting**

After you enter Network Setting, there are three submenus shows as the following LCD displays.

▶ 5.1 IP Address 5.2 Subnet Mask	▶ 5.3 Gateway 5.4 MAC Address
▶ 5.5 Reset Password 5.6 Web Manage Port	

Press "UP/DOWN" to choose this item and "ENTER" & "LEFT/RIGHT" to set the parameters.

IP Address 192.168.000.136	Subnet Mask 255.255.255.000
Gateway 192.168.000.001	MAC Address ffffffffffffffffffff
Reset Password? Yes ▷ NO	Web Manage Port 00080

NOTE: The MAC address is according to the factory setting, and it is unique.

7) **Saving Configuration**

Enter Saving Configuration submenu for saving your current chosen settings. Choose yes and press ENTER to confirm.

Save Configuration? Yes ▶ No	⟹	Saving Config…
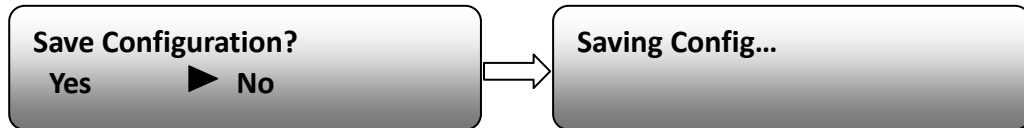
8) Loading Configuration

At this menu, user can press UP/DWON key to select and repress ENTER to confirm. User can restore the device into the last saved configuration by choosing "7.1" and restore the device into factory configuration by choosing "7.2" the display will show as below:

▶ 7.1 Load Saved CFG 7.2 Load Default

⟱

Load Saved CFG? Yes ▶No	⟹	Loading Config…
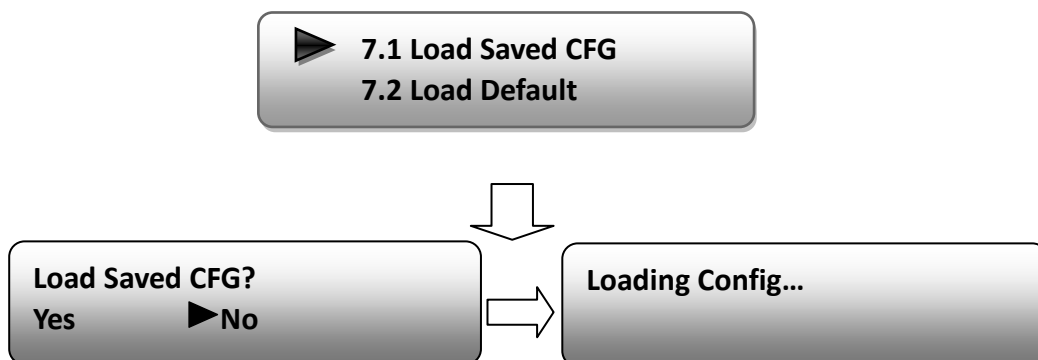
9) Version

User can check the software version and hardware version of this equipment under this submenu.

Encoder Modulator SW 1.00 HW 7.f

Chapter 4 WEB NMS Operation

For setting configurations you can use the front panel; also you are able to control and set the configurations on any computer by connecting the device to the web NMS Port. You should ensure that the computer's IP address is different from the THOR 4-ADHD's IP address; otherwise, it would cause IP conflict.

4.1 login

The default IP of this device is 192.168.0.136. We can modify the IP through the front panel.

Connect the pc and the device with net cable, and use ping command to confirm they are on the same network segment.

E.G. the PC IP address is 192.168.99.252, we then change the device IP to 192.168.99.xxx (xxx can be 0 to 255 except 252 to avoid IP conflict).

Use any web browser to connect the device with the PC by inputting the Encoder & Modulator's IP address in the browser's address bar and press Enter.

It will display the Login interface as Figure-1. Input the Username and Password (Both the default Username and Password are "admin".) and then click "LOGIN" to start the device setting.
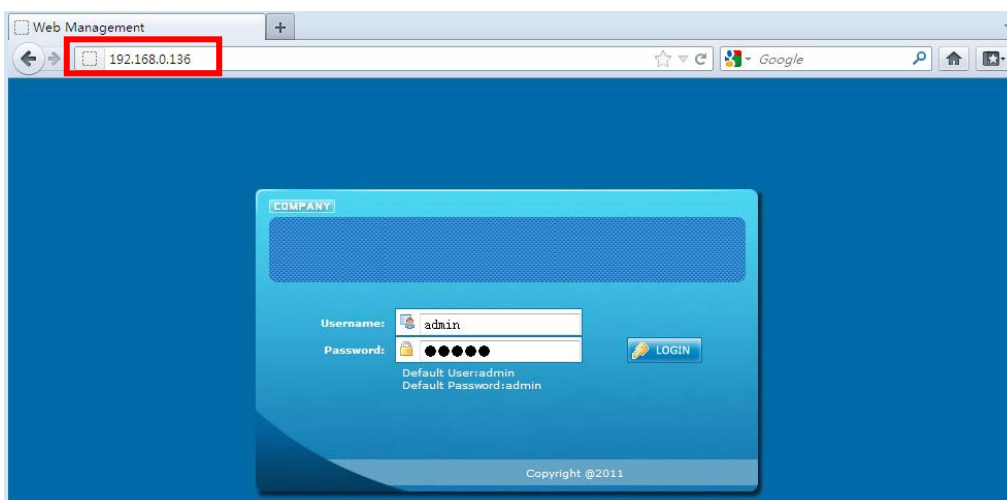
Figure-1

4.2 Operation

When we confirm the login, it displays the WELCOME interface as Figure-2.
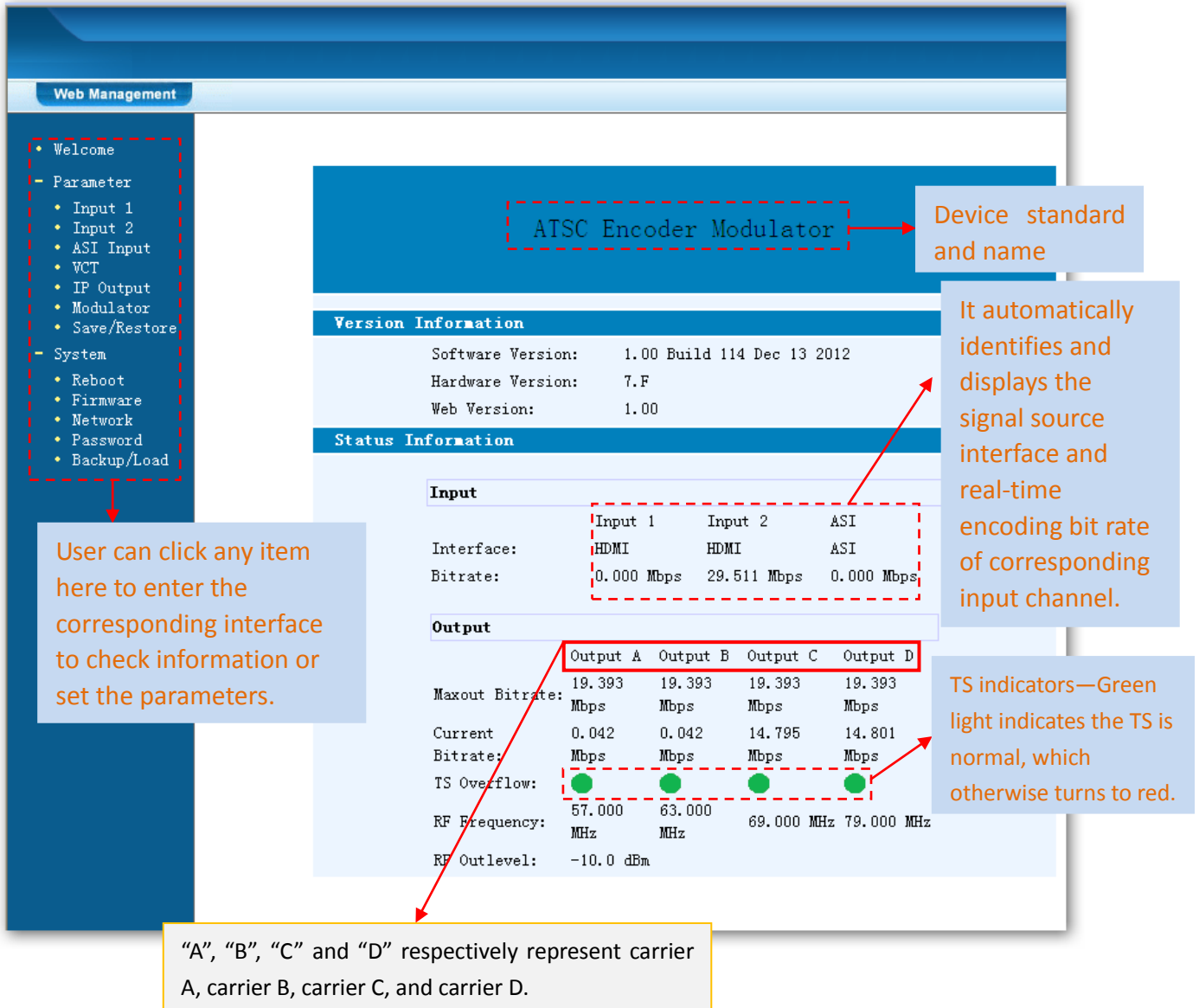
Figure-2

Input

From the menu on left side of the webpage, clicking "Input 1", it displays the information of the 2 programs from the 1st HDMI encoding slot as Figure-3.

This column is for setting the **1**st HDMI IN program.

This column is for setting the **2**ed HDMI IN program.

General Settings for the HDMI IN programs: User can edit any item listed as needed.

Encoding Status—Green light indicate it works normally, which otherwise turn to red.

Figure-3

Enable or Disable the Carrier Output Function:

The 4 boxes respectively represent IP Channel A, B, C, and D. The related programs can output through the selected IP Channel(s). (It shows that the 1st program outputs through IP Channel C and the 2ed through IP Channel D). One program can also output through more than one IP Channels. (e.g.: ☐☑☑☐)

Refer to "**1.4 Schematic Overview**" for the relationship between the input interfaces and encoder boards.

Click the box to enable or disable the program output through channel A/B/C/D.

Help Further assistance if necessary

Default Click this button to apply the default setting of Input 1

Apply Click this button to apply the modified parameters.

Input 2

Similarly, from the menu on left side of the webpage, click "Input 2" and it displays the information of the 2 programs from the 2^{ed} HDMI encoding slot. (Figure-4)
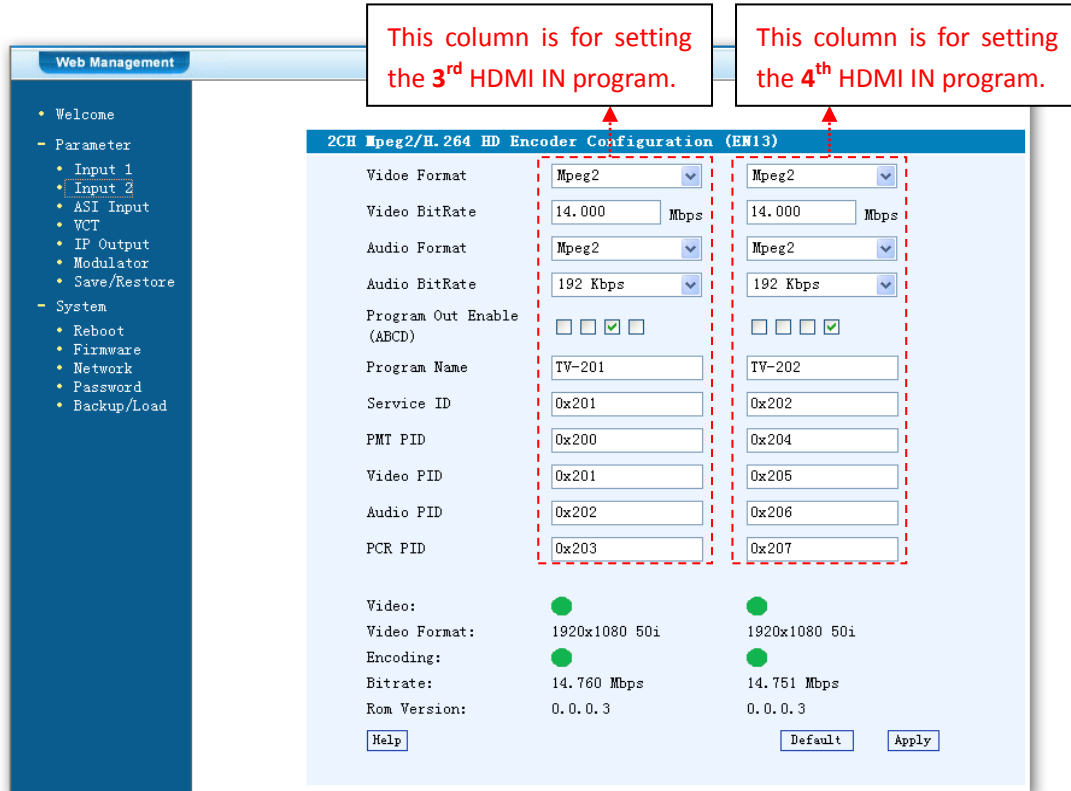
Figure-4

ASI Input

Click "ASI Input", it will display ASI input program information as Figure-5.
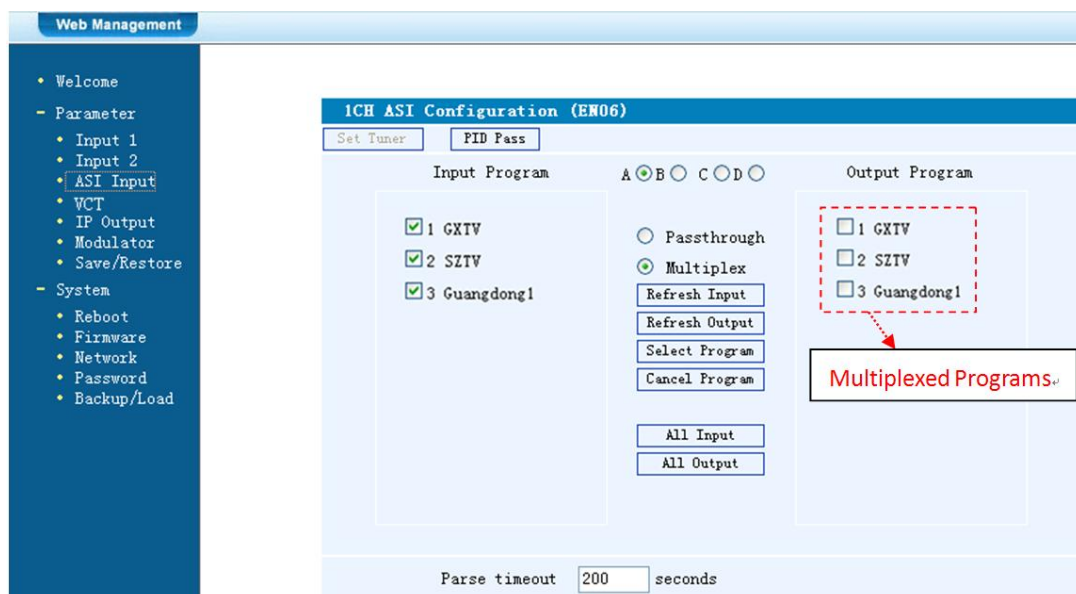
Figure-5

A ⊙ B ○ C ○ D ○   The letters A to D represent the 4 carrier outputs. E represents the ASI output. Configure different program groups for each carrier output.

⊙ Passthrough If this item is selected, all the input programs will pass through without any elimination.

⊙ Multiplex   Selecting this item to allow user select programs as required to output.

Refresh Input   Click "Refresh Input" to refresh the input program list.

Refresh Output   Click "Refresh Output" to refresh the output program list.

Select Program   When user checks one input program with "√", one can transfer the checked program to the right box to output.

Select the programs which we want to output or we can output all the programs.

Cancel Program   Similarly, cancel the multiplexed programs from the right box.

All Input & All Output to select all the input/output programs with one-time clicking.

Parse timeout   200   seconds Time limitation to parse the input programs

PID Pass   Click this button to trigger a dialog box as shown below, where to add the PIDs which need pass through.

In some occasions, there are some PIDs which won't belong to any program, such as EPG, NIT tables and so on which user just wants to pass them through the multiplexing module without changing anything. This is the main purpose of this function.

Click "Add" to add more boxes for filling the Input & Output PIDs, then click "Apply" to confirm.

VCT (Virtual Channel Table) Setting

Click "NIT" from the menu to trigger the screen as Figure-6. Then click "Add" from this screen to add the program descriptor in VCT.
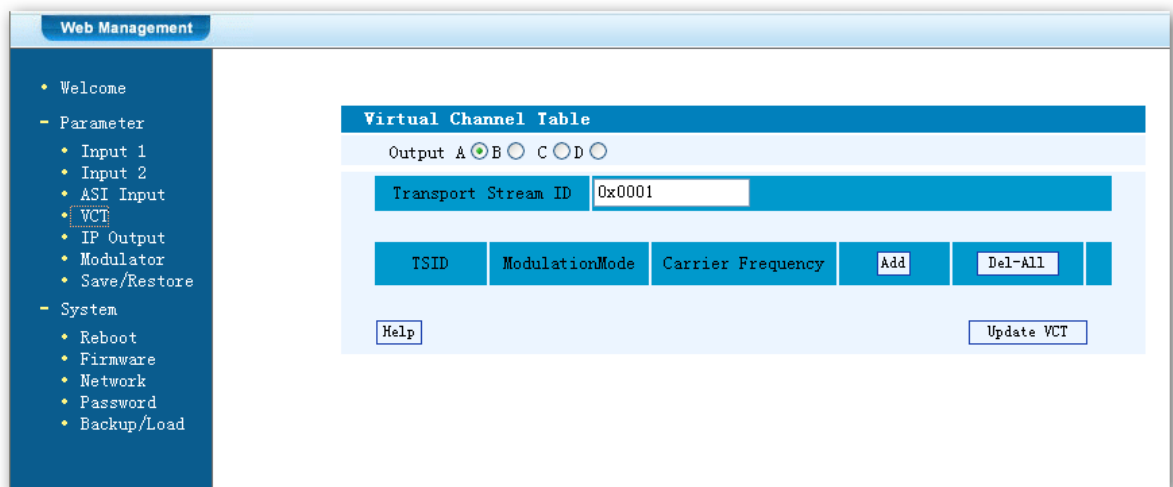
Figure-6

 Select the carrier output channel for the inserted VCT.

 Click "Add" from this page, it will display the screen as Figure-7 where it requires to add Channel TSID and configure other parameters for the programs.
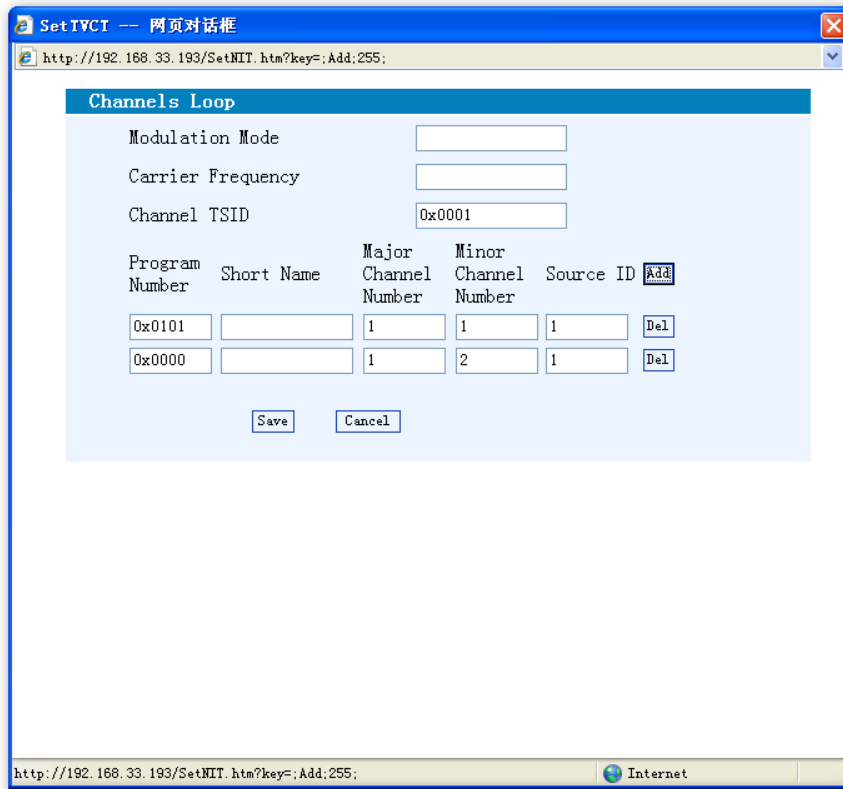
Figure-7

Add : Click "Add" to add boxes where to configure parameters in its respective fields. After setting all the data, users need to click "Save" **Save** to save the setting.

IP Output

Click "IP Output" from the left menu, it will display the screen as Figure-8 where to configure the 4 IP SPTS Output.

After setting the parameters, click "Apply" to save the setting.

The following text appears as callout boxes within the figure:

This device is has MPTS IP outputs. The 4 boxes represent respectively IP Channels 1/2/3/4. Click the related box(es) to enable the corresponding channel(s) to output programs.

To configure the *output IP address* and *ports* for the 4 IP Channels respectively.

Figure-8

Modulator Setting

Enter in "Modulator" and it will display the Modulator Configuration screen as Figure-9 where can set modulation parameters.

RF On –To enable the RF (carrier A/B/C/D) output or not.

RF Frequency A/B/C/D– to set the RF frequency for the 4 carriers

RF Out level –to set the RF output level

ASI Output– To select carrier output channel for ASI output (**Output A:** The ASI output programs are same as carrier A; **Output B:** The ASI output programs are same as carrier B; and the like.)

After setting all the parameters, click "Apply" [Apply] to save the Modulator Configuration.
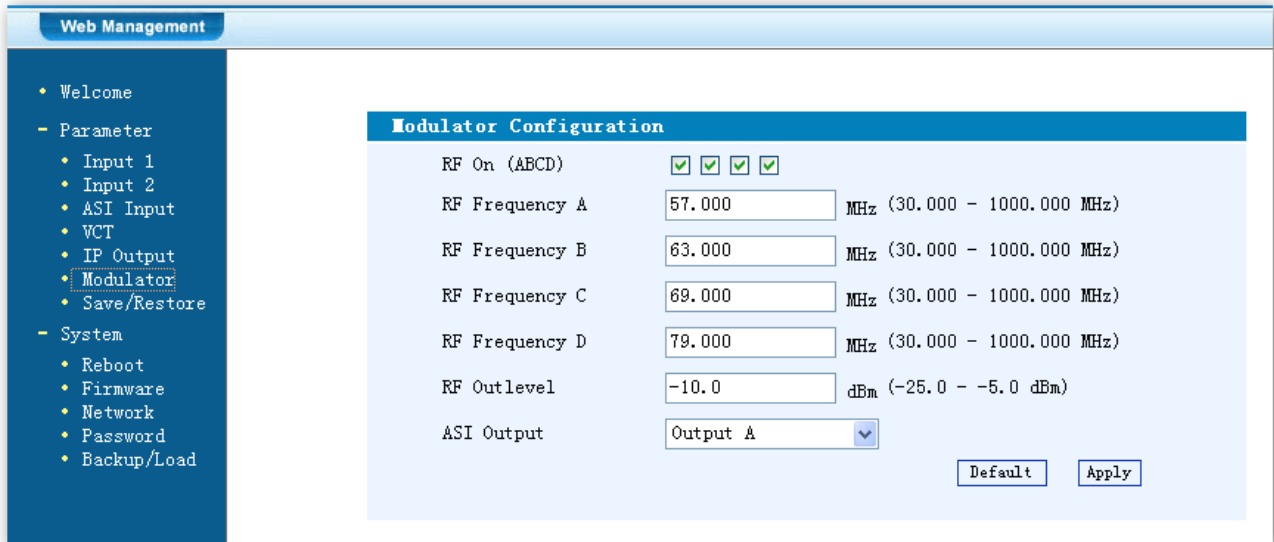
Figure-9

Save/Restore

Clicking "Save/Restore" from the menu, it will display the screen as Figure-10 where can save the configuration permanently to the device. Click "Save Configuration", for store the data permanently to the device.

By using "Restore Configuration" user can restore the latest saved configuration to the device.

By using "Factory Set" user can import the default factory configuration.
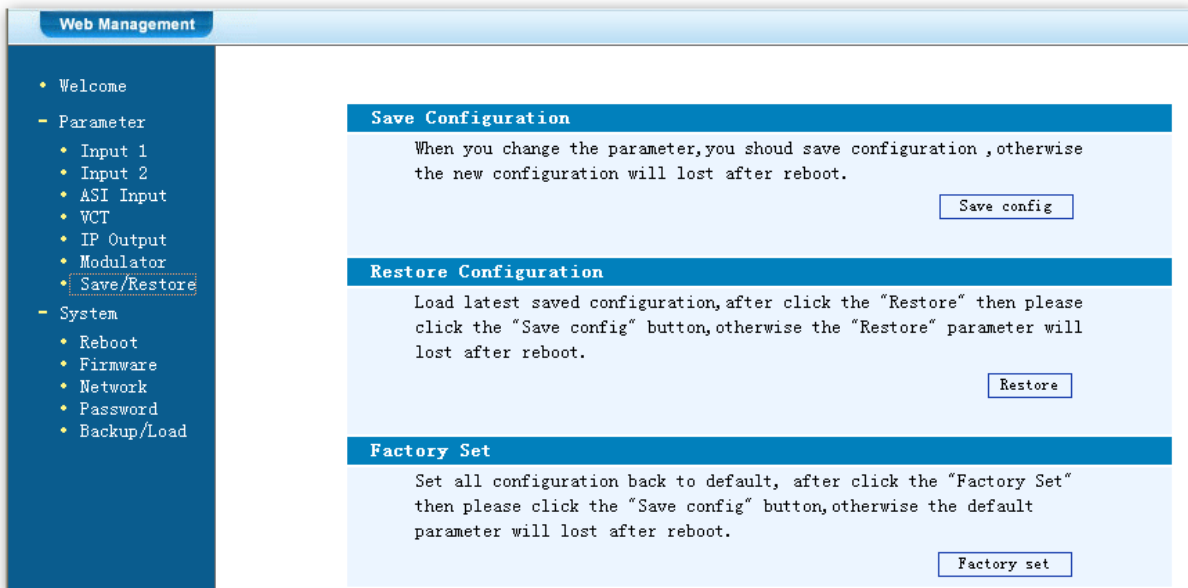

Figure-10

Restart the Device

Click "Reboot" from the menu, the screen will display as Figure-11. Here when clicking "Reboot" box, it will restart the device automatically.
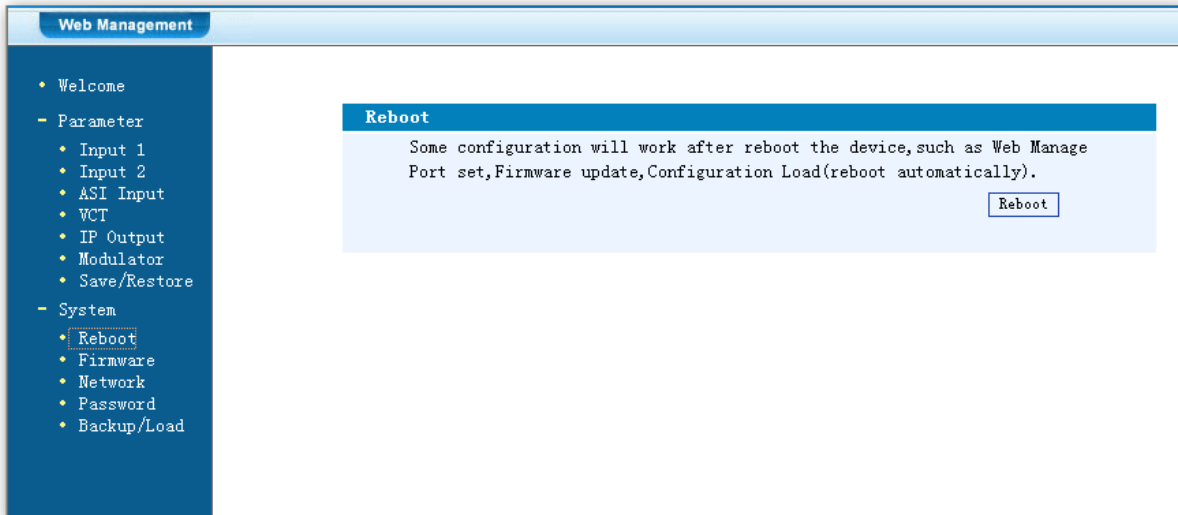
Figure-11

Update the Device

Click "Firmware" from the menu it will display the screen as Figure-12. Here user can update the device by using the update file.

Click "Browse" to find the path of the device update file for this device then click "Update" to update the device.

After updating the device, user needs to restart the device by using Reboot option.
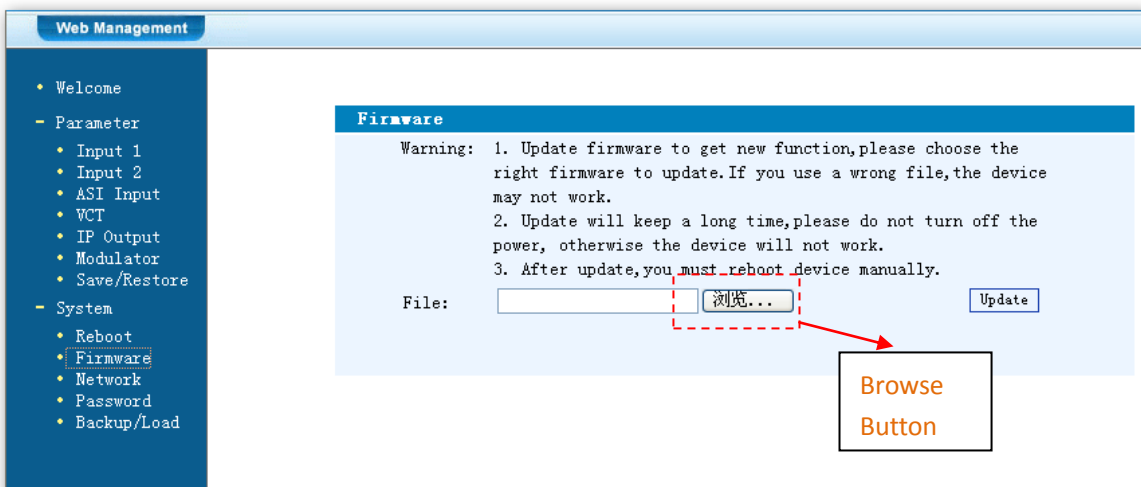
Figure-12

Network

When you click "Network", it will display the screen as Figure-13. It displays the network information of the device. Here change the device network configuration as needed.
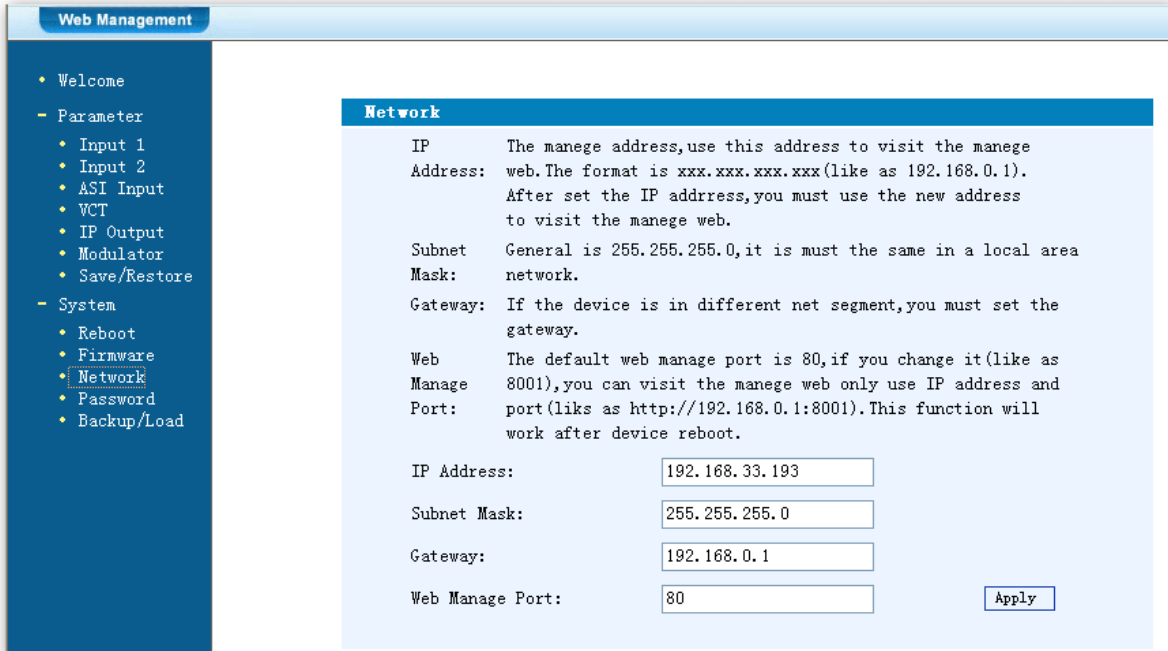
Figure-13

Password

When user clicks "Password", it will display the password screen as Figure-14. Here change the Username and Password for login to the device.

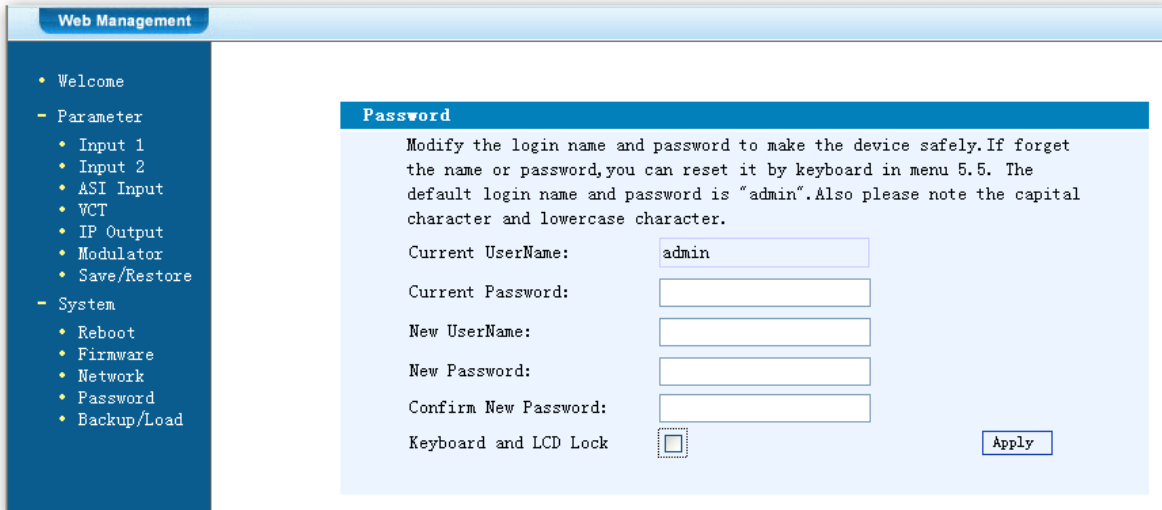After putting the current and new Username and Password, click Apply" to save the configuration.

Figure-14

➢ Keyboard and LCD Lock: If it is marked with "√", the LCD and keyboard will be locked to avoid unrelated users' modifying or view the device information and configurations. User can't operate the keyboard & LCD while only the device IP address can be noted in the LCD window.

```
IP Address
192.168.000.136
```

Backup/Load

Click "Backup/Load" from the menu, it will display the screen as Figure-15.

Backup Configuration – To back up the device configuration file to a folder

Load Configuration – If user needs to load the old configuration to the device, click "Browse" and find the backup configuration file path. After selecting the file, click "Load File" to load the backup file to the device.
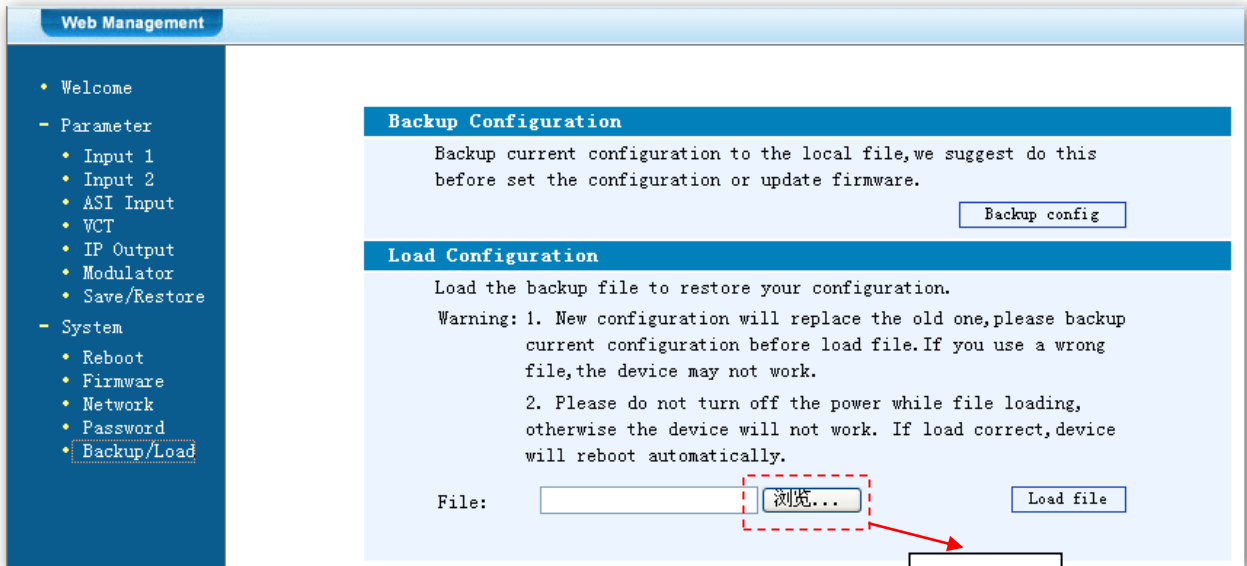
Figure-15

Chapter 5 Troubleshooting

THOR's ISO9001 quality assurance system has been approved by the CQC organization. We guarantee the products' quality, reliability and stability. All THOR products haven passed all testing and manual inspections before they are shipped out. The testing and inspection scheme already covers all the Optical, Electronic and Mechanical criteria which have been published by THOR. To prevent a potential hazard, please strictly follow the operation conditions.

Prevention Measures

- ➢ Installing the device in a place where the environmental temperature is between 0 to 45 °C
- ➢ Making sure the unit has plenty of ventilation for the heat-sink on the rear panel; and other heat-sink bores if necessary
- ➢ Checking the AC input within the power supply and ensure it is working, the connection is correctly installed before switching on device
- ➢ Checking the RF output levels to stay within a tolerable range, if it is necessary
- ➢ Checking all signal cables have been properly connected
- ➢ Frequently switching on/off device is prohibited; the interval between every switching on/off must be greater than 10 seconds.

Conditions needed to unplug power cord

- ➢ Power cord or socket damage.
- ➢ Any liquid that got into the device.
- ➢ Any stuff that could cause a circuit short
- ➢ Device in damp environment
- ➢ Device has suffered from physical damage; i.e. it fell off a rack.
- ➢ Longtime idle.
- ➢ After switching on and restoring to factory setting, device still won't work properly.
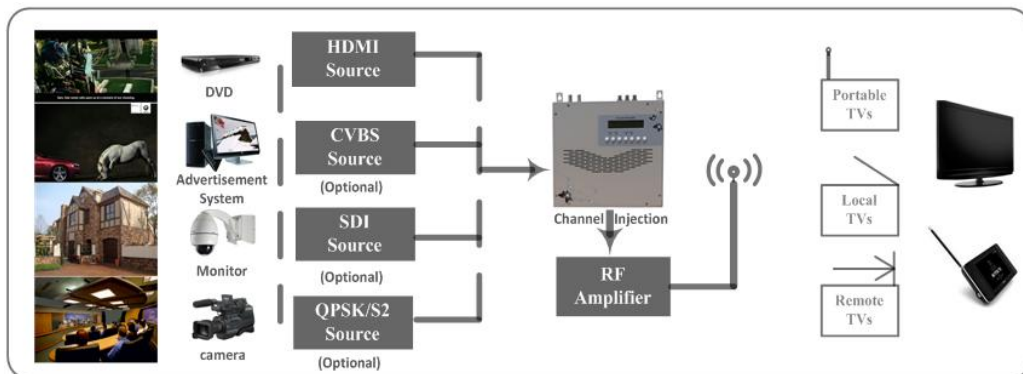- ➢ Maintenance needed on device

Chapter 6 Application
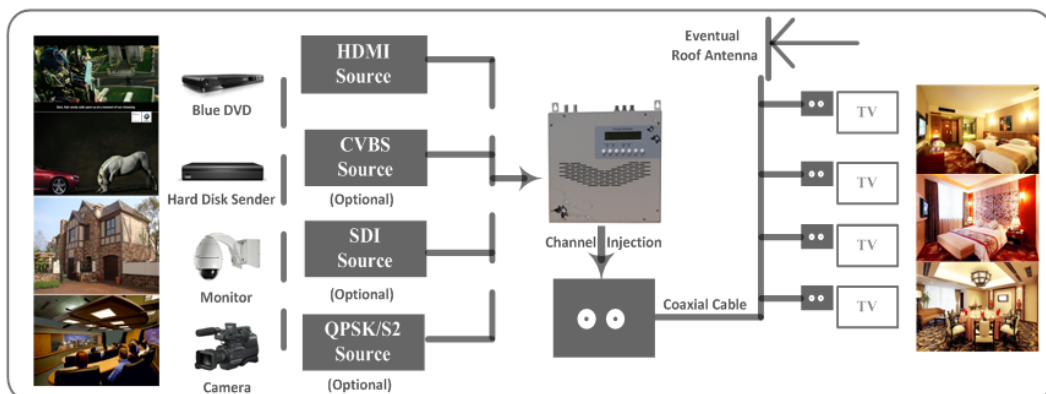
Application Examples

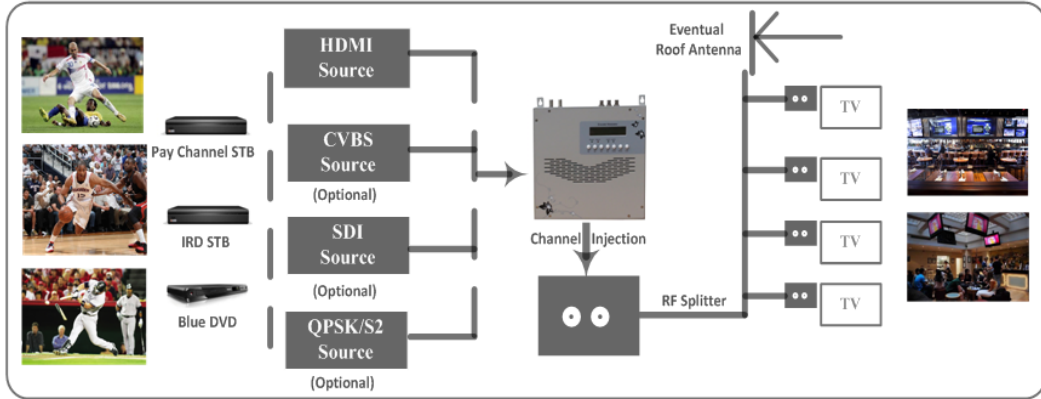**1). Residences and Private Homes Video content DVB-T/ISDB-T distribution**
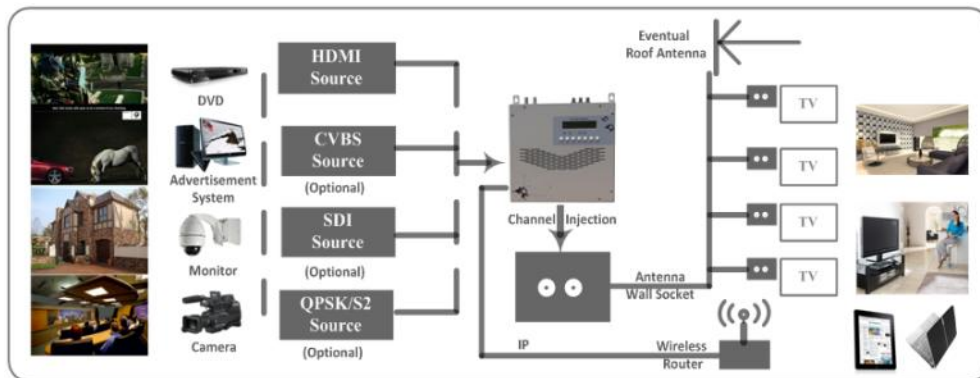
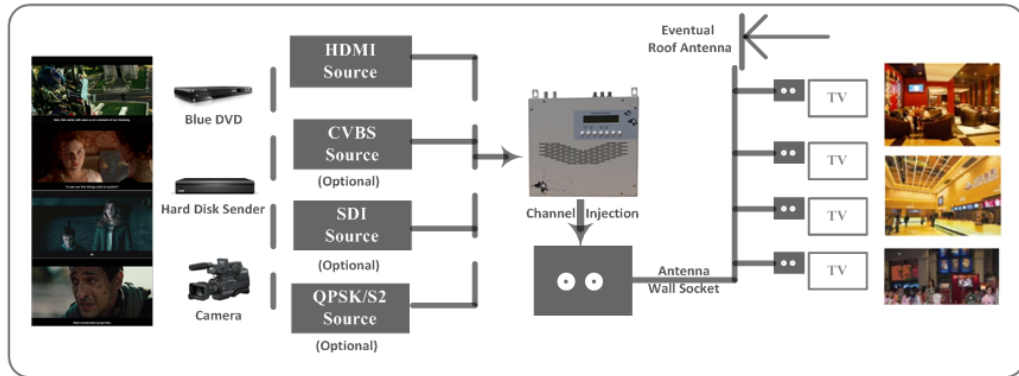**2) Outside Audio- Video contents ON- AIR DVB- T/ISDB-T distribution**

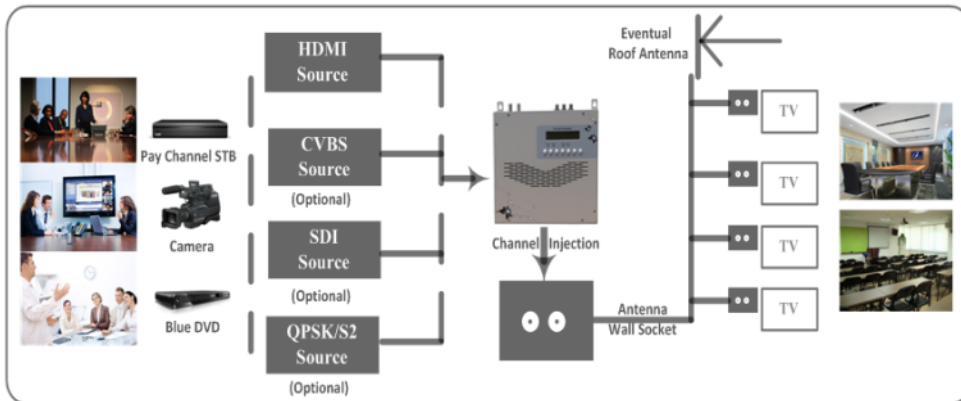**3) Hotel Audio- Video contents DVB- T/ISDB-T distribution**

4) Bar Audio- Video contents distribution

5) Cinema Audio- Video contents DVB- T/ISDB-T distribution

6) Company Audio- Video contents distribution

Chapter 7 Packing List

4-HDMI-ATSC-IP Encoder Modulator	1PC
User Manual	1PC
HDMI Cables	4PCs
Power Cord	1PC