14MM-DD4HD-R DVB-T Encoder Modulator

User's Manual

SW Version: 5.02

HW version: 2.9

Web NMS version: 1.12

About This Manual

Intended Audience

This user manual has been written to help people who have to use, to 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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Chapter 1 Introduction

1.1 Product Overview

DD4HD series products are all-in-one devices which integrate encoding (MPEG-2 HD/SD, MPEG-4/AVC H.264 HD/SD) and modulating to convert V/A signals into Digital RF output. It has equipped with 4 HDMI channels input and 1 ASI input and output with 2 ASI ports and 1 UDP, RTP/RTSP IP (4*SPTS) port.

The latency problem has been greatly reduced to achieve an extremely low value from the encoding progress to the decoding terminals.

It adopts inner drawer-type structural design which greatly facilitates the change of encoding modules (HDMI/SDI /…) as needed.

The signals source could be from satellite receivers, closed-circuit television cameras, Blue-ray players, and antenna etc. Its output signals are to be received by DVB-T TVs or STBs and etc

1.2 Key features

- **MPEG2 & MPEG4 AVC/H.264 HD/SD video encoding**
- **MPEG1 Layer II, MPEG2-AAC, MPEG4-AAC, AC3 2.0 audio encoding**
- **Support resolution downscale converting setting**
- **Support Dialog Normalization**
- **Up to 1920*1080@50P/60P supported (MPEG4 AVC/H.264)**
- **Up to 1920*1080@50I/60I supported (MPEG2 HD)**
- **4* HDMI input**
- **1*ASI input for re-mux; 1*RF input for mix**
- **Simultaneously encoding each channel more than 10Mbps**
- **Independent ASI output channel config, Support 4 * SPTS output, 2*DVB-T RF out**
- **Extremely low latency**
- **LCN support (Logical Channel Number)**
- **Excellent modulation quality MER≥42dB**

■ **Web NMS management; Updates via web**

1.3 Specification

Encoding section

Video	
Encoding	MPEG2, MPEG4 AVC/H.264
Input	HDMI*4
Resolution	1920*1080_60P, 1920*1080_50P, (-for MPEG4 AVC/H.264 only) 1920*1080_60i, 1920*1080_50i, 1280*720_60p, 1280*720_50P 720*480_60i, 720*576_50i
Low delay	Normal, mode 1 mode 2, Manual
Audio	
encoding	MPEG1 Layer II, MPEG2-AAC, MPEG4-AAC, AC3 2.0
Sample rate	48KHz
Bit rate	64kbps, 96kbps,128kbps, 192kbps, 256kbps, 320kbps

Modulator Section

DVB-T	
Standard	EN300744
Bandwidth	6M, 7M, 8M
Constellation	QPSK, 16QAM, 64QAM,
Code rate	1/2, 2/3, 3/4, 5/6, 7/8.
Guard Interval	1/32, 1/16, 1/8, ¼
Transmission Mode:	2K, 8K
MER	≥42dB
RF frequency	30~960MHz, 1KHz step
RF Out	COFDM DVB-T out
RF output level	-30~ -10dbm (77~97 dbμV), 0.1db step

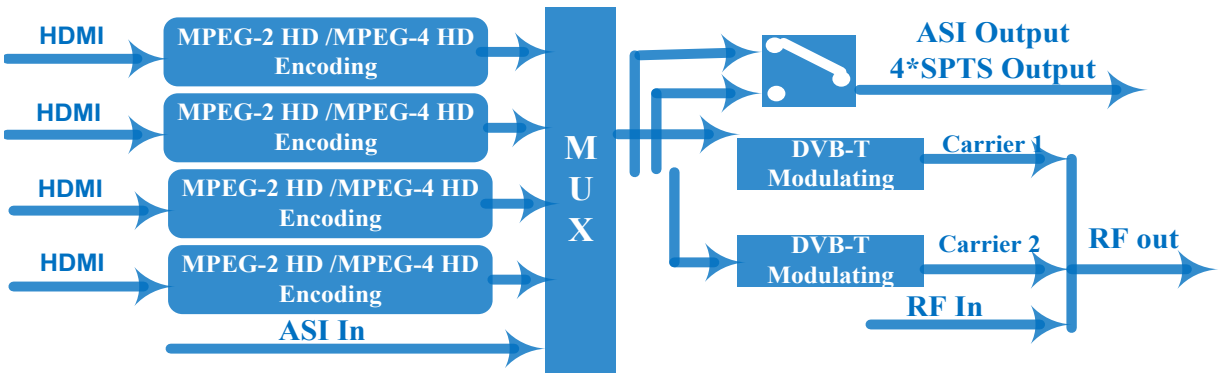
System

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

General

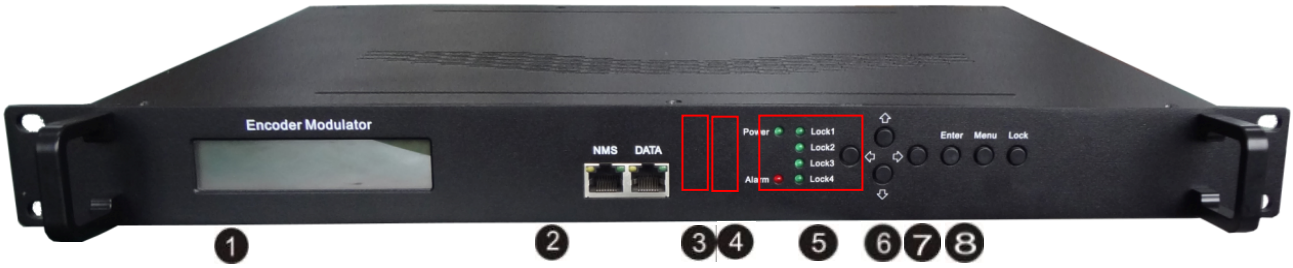
Power supply	AC 100V~240V
Dimensions	420*400*44mm
Weight	4.5 kgs
Operation temperature	0~45℃

1.4 Principle Chart



1.5 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

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

Chapter 2 Installation Guide

This section is to explain the cautions the users must know in some case that possible injure may bring to users when it's used or installed. For this reason, please read all details here and make in mind before installing or using the product.

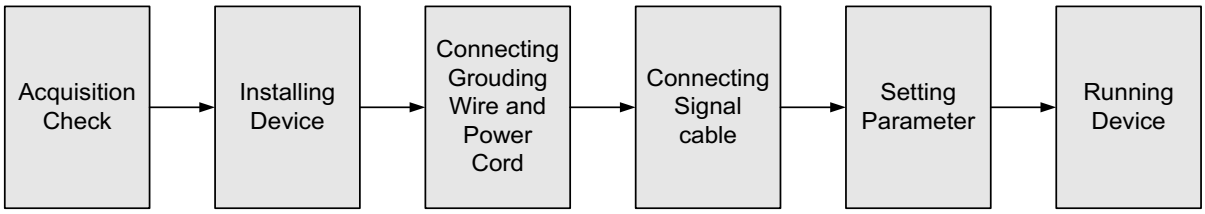
2.1 General Precautions

- ✓ Must be operated and maintained free of dust or dirty.
- ✓ The cover should be securely fastened, do not open the cover of the products when the power is on.
- ✓ After use, securely stow away all loose cables, external antenna, and others.

2.2 Power precautions

- ✓ When you connect the power source, make sure if it may cause overload.
- ✓ Avoid operating on a wet floor in the open. 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



2.4 Environment Requirement

Item	Requirement
Machine Hall Space	When user installs machine frame array in one machine hall, 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.
Machine Hall Floor	Electric Isolation, Dust Free Volume resistivity of ground anti-static material: $1X10^7$~$1X10^{10}\Omega$, Grounding current limiting resistance: 1MΩ (Floor bearing should be greater than 450Kg/㎡)
Environment Temperature	5~40℃(sustainable), 0~45℃(short time), installing air-conditioning 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
Wall	It can be covered with wallpaper, or brightness less paint.
Fire Protection	Fire alarm system and extinguisher
Power	Requiring device power, air-conditioning power and lighting power are 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

- ✓ All function modules' good grounding is the basis of reliability and stability of devices. Also, they are the most important guarantee of lightning arresting and interference rejection. Therefore, the system must follow this rule.
- ✓ Grounding conductor must adopt copper conductor in order to reduce high frequency impedance, and the grounding wire must be as thick and short as possible.
- ✓ Users should make sure the 2 ends of grounding wire well electric conducted and be antirust.
- ✓ It is prohibited to use any other device as part of grounding electric circuit
- ✓ The area of the conduction between grounding wire and device's frame should be no less than 25 ㎡.

Chapter 3 Operation

The front panel of the Encoder Modulator is the user-operating interface and the equipment can be conveniently operated and managed by user according to the procedures displayed on the LCD:

Keyboard Function Description:

MENU: Cancel current entered value, resume previous setting; Return to previous menu.

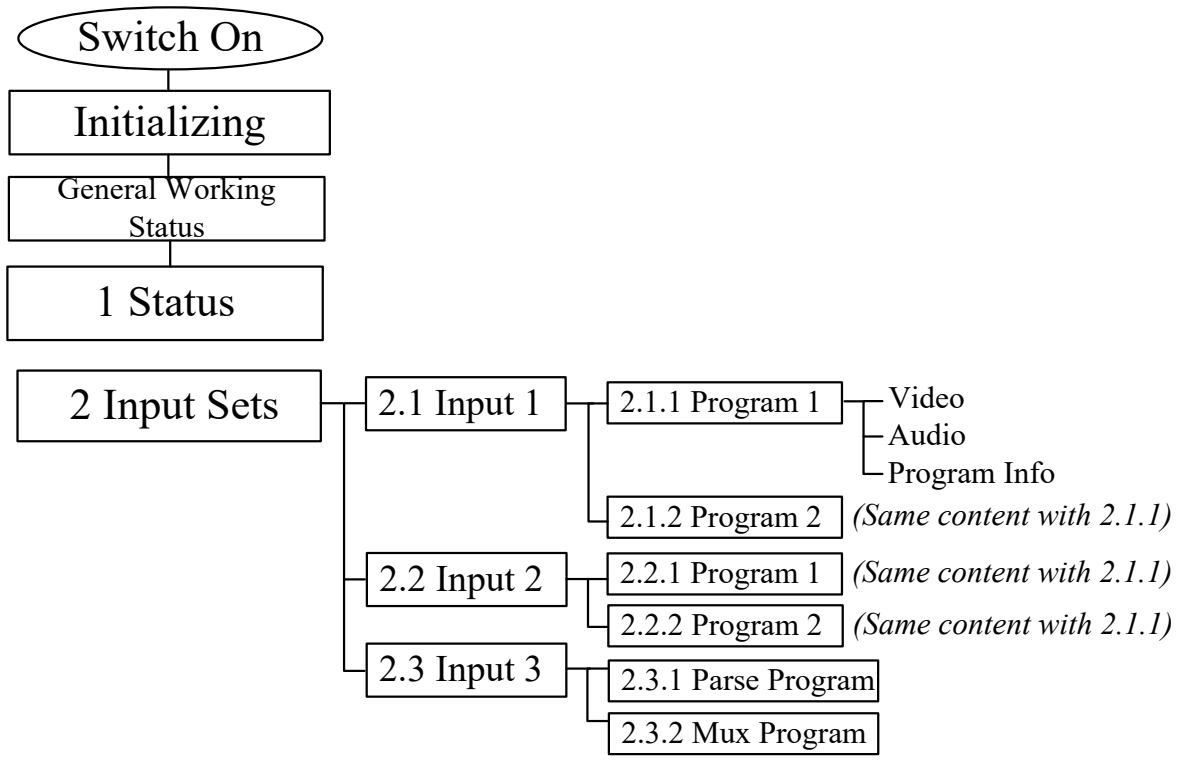
ENTER: Activate the parameters which need modifications, or confirm the change after modification.

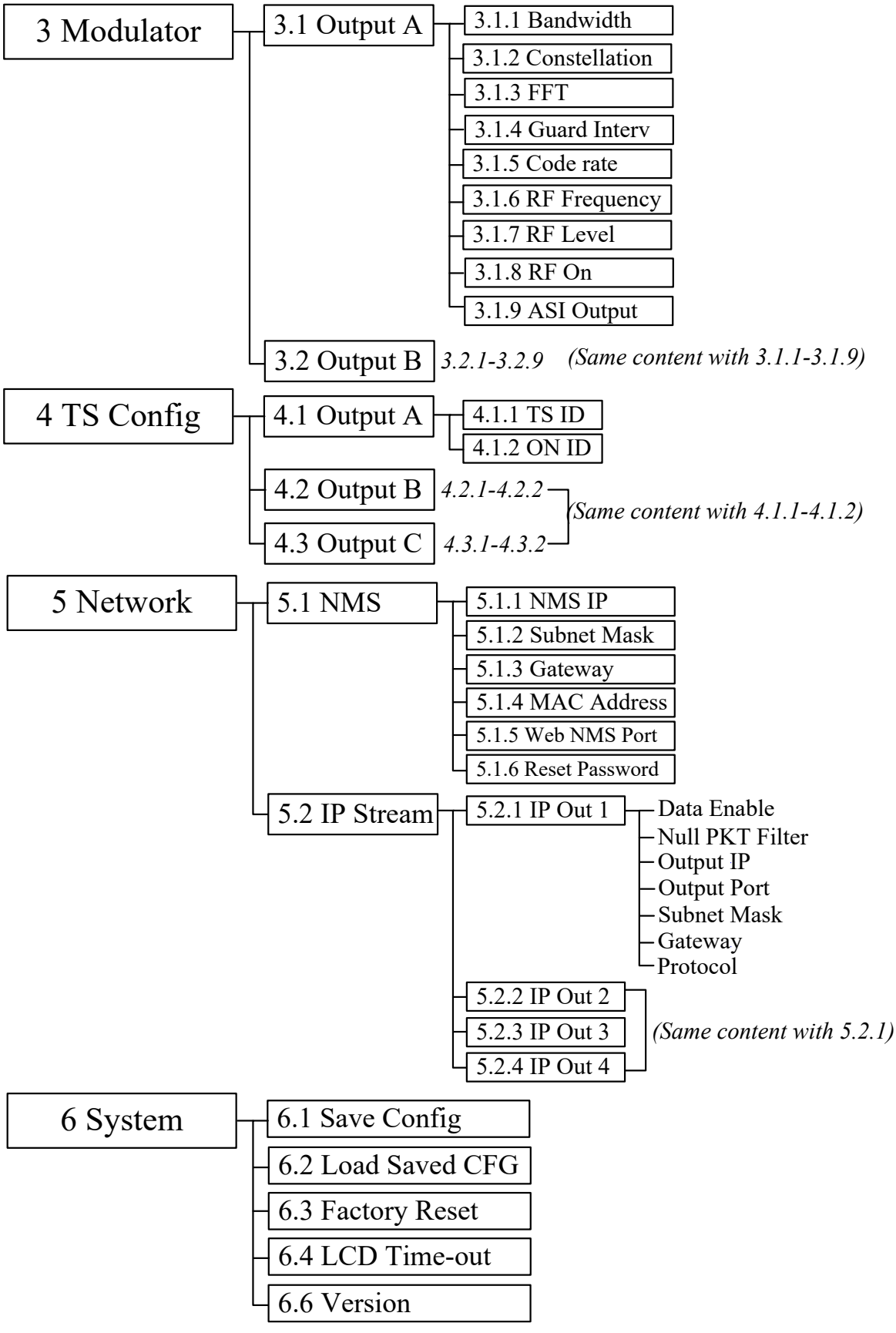
LEFT/RIGHT: Choose and set the parameters.

UP/DOWN: Modify activated parameter or paging up/down when parameter is inactivated.

LOCK: Lock the screen/cancel the lock state. After pressing the lock key, the LCD will display the current configuring state.

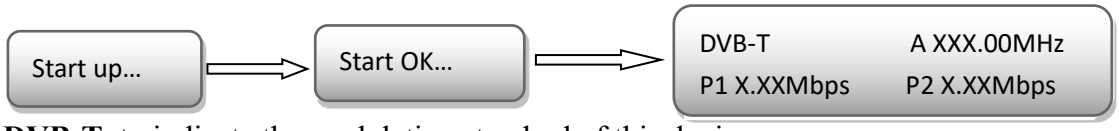
3.1 3.1 LCD Menu Structure




3 Modulator
3.1 Output A
3.1.1 Bandwidth
3.1.2 Constellation
3.1.3 FFT
3.1.4 Guard Interv
3.1.5 Code rate
3.1.6 RF Frequency
3.1.7 RF Level
3.1.8 RF On
3.1.9 ASI Output
3.2 Output B
3.2.1-3.2.9
(Same content with 3.1.1-3.1.9)
4 TS Config
4.1 Output A
4.1.1 TS ID
4.1.2 ON ID
4.2 Output B
4.2.1-4.2.2
4.3 Output C
4.3.1-4.3.2
(Same content with 4.1.1-4.1.2)
5 Network
5.1 NMS
5.1.1 NMS IP
5.1.2 Subnet Mask
5.1.3 Gateway
5.1.4 MAC Address
5.1.5 Web NMS Port
5.1.6 Reset Password
5.2 IP Stream
5.2.1 IP Out 1
Data Enable
Null PKT Filter
Output IP
Output Port
Subnet Mask
Gateway
Protocol
5.2.2 IP Out 2
5.2.3 IP Out 3
5.2.4 IP Out 4
(Same content with 5.2.1)
6 System
6.1 Save Config
6.2 Load Saved CFG
6.3 Factory Reset
6.4 LCD Time-out
6.6 Version

3.1 Initial Status

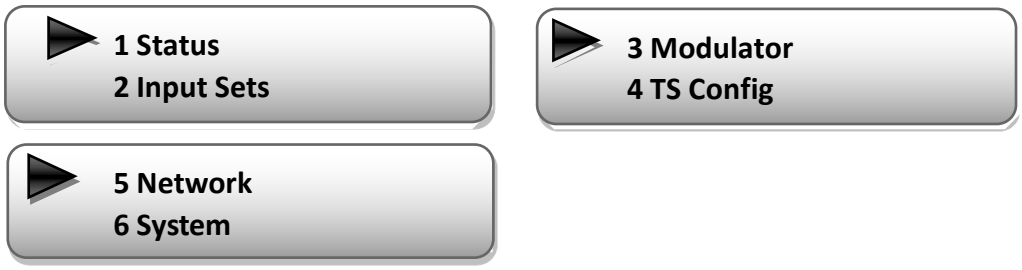
After powering on the device，it will take a few seconds to initialize the system It shows as below:



- **DVB-T**: to indicate the modulation standard of this device.
- **A/B**: to indicate the 2 carrier outputs
- **XXX.XX MHz:** to indicate the current output frequency (Range: 30~999MHz) of the 2 carriers output, which shows in turn.
- **X.XX Mbps**: to indicate the encoding bit rate of each encoding board respectively.

3.2 General setting for Main Menu

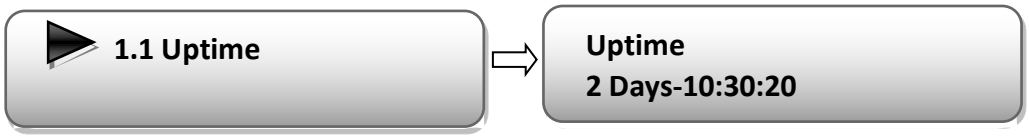
By pressing “Lock” key on the front panel, user can enter the main menu. The LCD will display the following pages:



User can press UP/DOWN buttons to specify menu item, and then press ENTER to enter the submenus as below:

1) Status

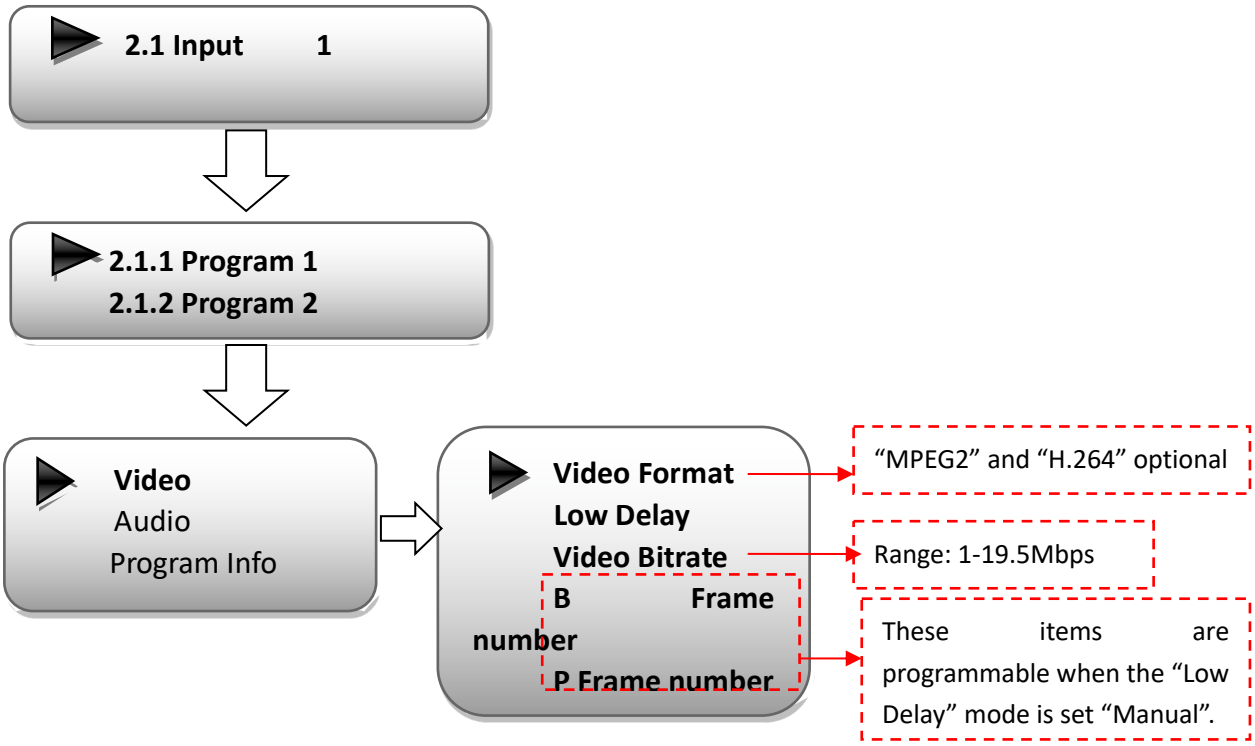
Press Enter to enter “Status” and it displays the working time duration of the device. It times upon power on.



2) Input Sets

Under this submenu, the LCD will show “2.1 Input 1”, “2.2 Input 2” and “2.3 Input 3”.

"2.1 Input 1" and "2.2 Input 2" respectively represent the two encoding boards and there are two programs under each input. User could enter each program to set the interface as per the signal source and set the related video & audio parameters.



"Low Delay": Normal, Mode 1, Mode 2, and Manual optional.

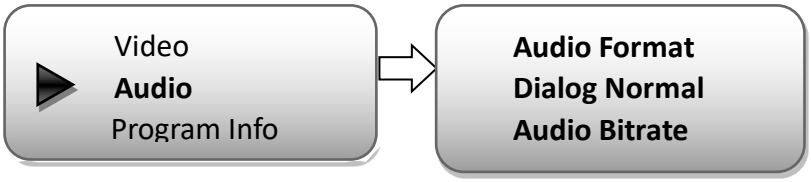
Normal: not to enable the low delay mode.

Mode 1: B frame=0, P frame=14, DTS=1

Mode 2: B frame=2, P frame=4, DTS=1

Manual: Under this mode, B frame (≤3), P frame (≤6) and DTS (1-500) can be customized manually.

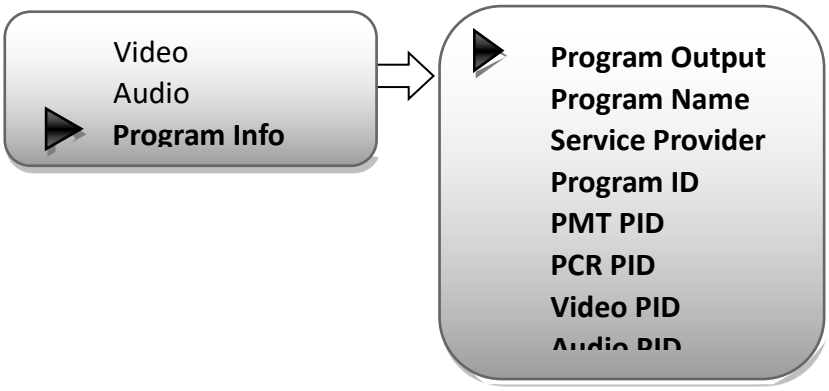
NOTE: The different combination of **Video Format**, **Video Bit-rate**, **Low Delay Mode** and **the Resolution** of signal source will have an impact on the time latency on receiving side. Please refer to the **Appendix** attached for detailed information.



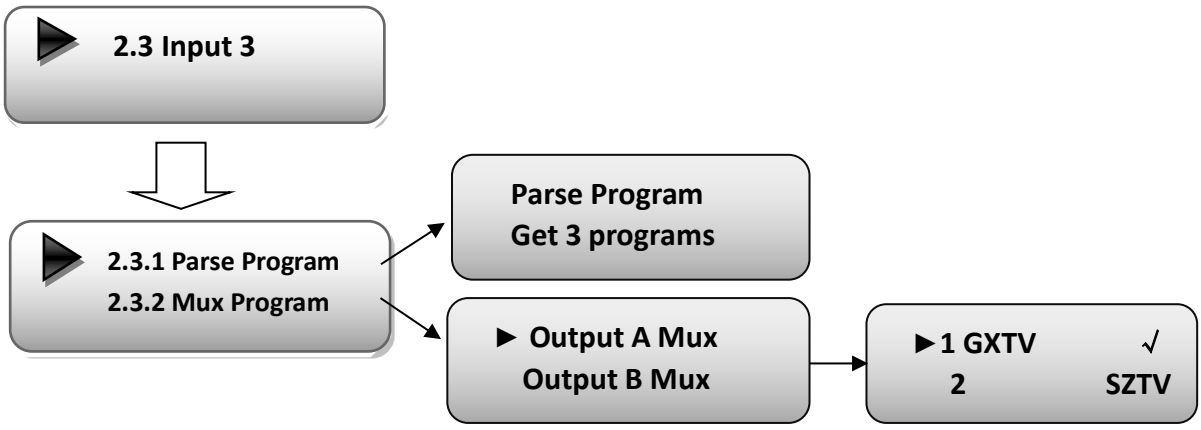
“Audio Format”: MPEG-1 Layer 2, MPEG-2 AAC, MPEG-4 AAC, AC3 optional.

“Dialog Normal”: “Dialog Normal”: It refers to dialog normalization based on Dolby Digital AC3 audio coding. It can be customized when the audio format above is set “AC3”. (Range: -31~-1 dB)

“Audio Bitrate”:64-320Kbps optional.



“2.3 Input 3” represents the ASI input. User could parse and select program(s) to mux out.

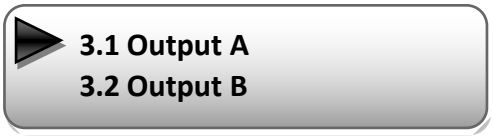


“Parse Program” is for checking the quantity of input programs from the corresponding Tuner input.

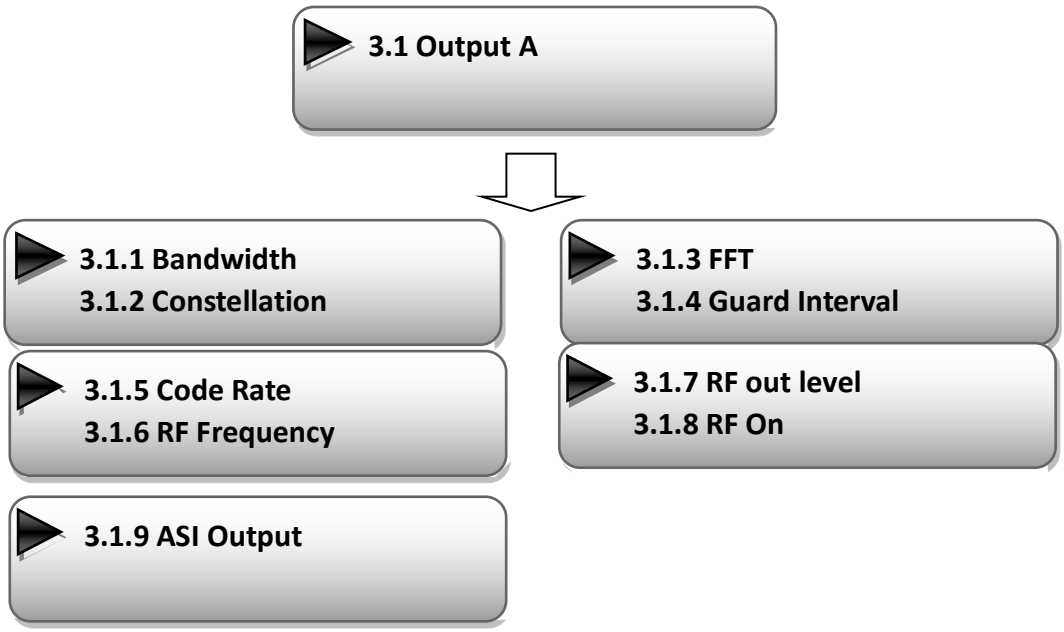
“Mux Program” is for selecting programs from the ASI IN to output via corresponding carrier output or ASI output (A, B, C optional). Move the triangle mark to specify the program and press RIGHT/LEFT keys to shift the mark between “√” and “X”. (“√”: to output the corresponding program; “X”: not to output the corresponding program)

3) Modulator Setting

When entering “Modulator” submenu, user can configure the modulating parameters for the 2 carrier output separately:



As the DD4HD-R (DVB-T Modulating) is with 2 carrier outputs, “3.1”-“3.2” represent the “Carrier A” and “Carrier B” respectively. User can enter “3.1”/“3.2” to set the corresponding modulating parameters. Submenus (taking “3.1” as an example) are as below:



- **Bandwidth**

There are three possible options provided for selecting bandwidth: 6M, 7M, and 8M. When the display shows them, user just need swift LEFT and RIGHT key to choose and repressing ENTER to confirm.

- **Constellation**

Four different constellations QPSK, 16QAM and 64QAM will be shown on the LCD window. User can set constellation type with the same method mentioned above.

- **FFT**

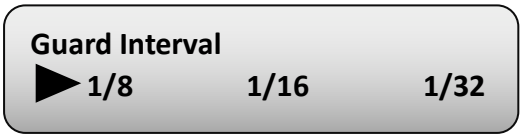
When user enters FFT (Transmission Mode), the LCD would show the current working mode. User can move LEFT/RIGHT keys to select and press ENTER key to confirm. 2K and 8K are the options:

2K: When the device works as current mode, the number of current carrier is 2048

8K: When the device works as current mode, the number of current carrier is 8192

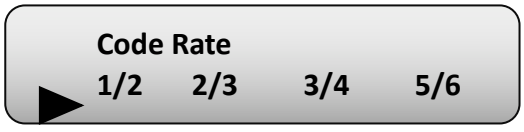
- **Guard Interval**

In communications, guard intervals are used to ensure that distant transmissions do not interfere with each other. These transmissions may belong to different users (as in TDMA) or same user (as in OFDM). The purpose of the guard interval is to introduce immunity to propagation delays, echoes and reflections, to which digital data is normally very sensitive. There are four possible options provided to be selected. They are 1/4, 1/8, 1/16, 1/32. User can shift the LEFT/RIGHT keys to select and press ENTER to confirm.



- **Code Rate**

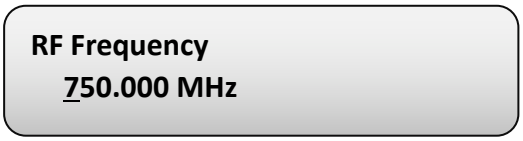
The code rate includes 1/2, 2/3, 3/4, 5/6, and 7/8. After entering this submenu, the LCD display would show them, users just need press LEFT and RIGHT buttons to choose and press ENTER button to confirm.



- **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 Out Level**

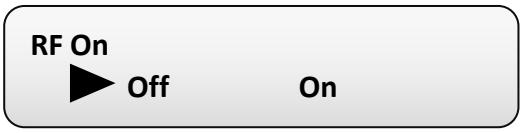
The RF attenuation range is from -30~-10dbm (77~97dbμV) with 0.1db step. After entering this setting submenu, user can shift UP/DOWN/LEFT/RIGHT key to set the output level and press ENTER to confirm.

- **RF On**

This interface is to decide whether 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.



- **ASI Output (optional)**

DD4HD-R encoder & modulator (DVB-T Modulating) is with two carrier output A, B. and 1 ASI output C, not included by default.

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 set separately.

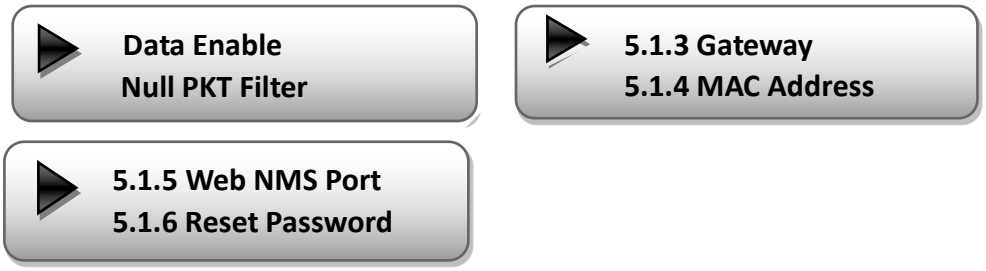
4) TS Config

Enter each menu to configure the TS ID and Original Network ID for the 2 carriers and ASI output (C).

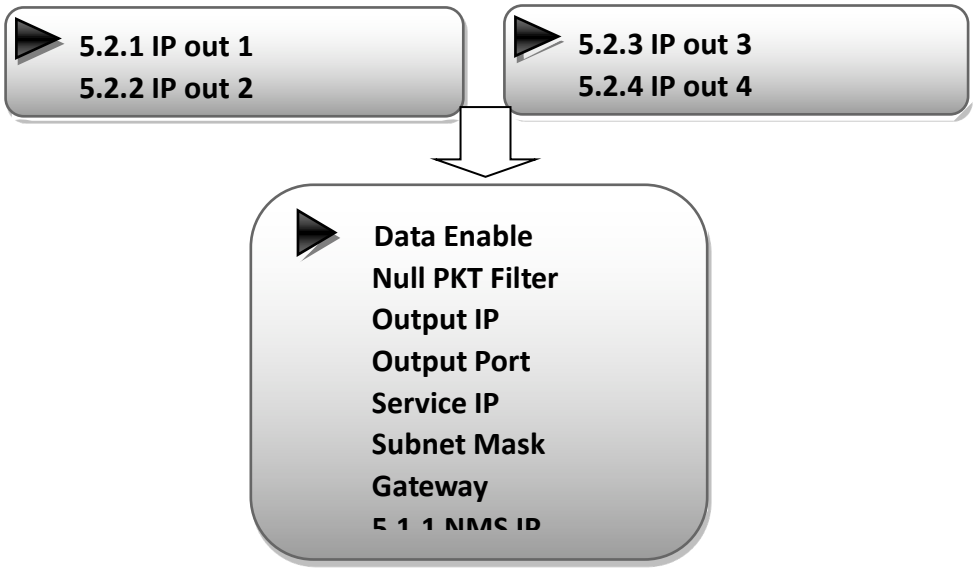
5) Network

Network contains “5.1 NMS” and “5.2 IP Stream”.

“5.1 NMS” is for setting the network parameters for the connection between the device and PC.

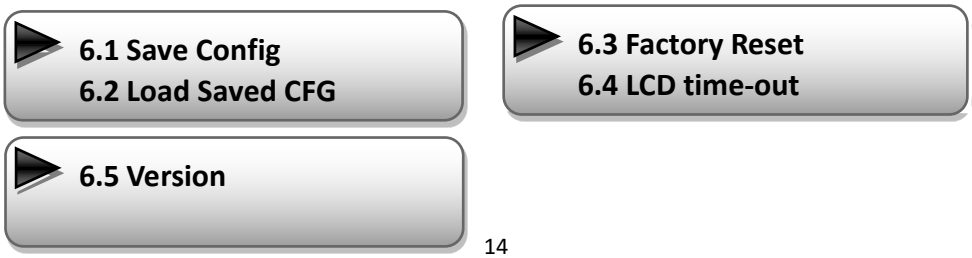


“IP Stream” is for configuring the 4 SPTS output respectively.



6) System

It contains 5 submenus where users can save/load configurations.



Chapter 4 WEB NMS operation

User not only can use front buttons for setting configuration, but also can control and set the configuration in computer by connecting the device to web NMS Port. User should ensure that the computer's IP address is different from the encoders 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.

I.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 web browser to connect the device with 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.

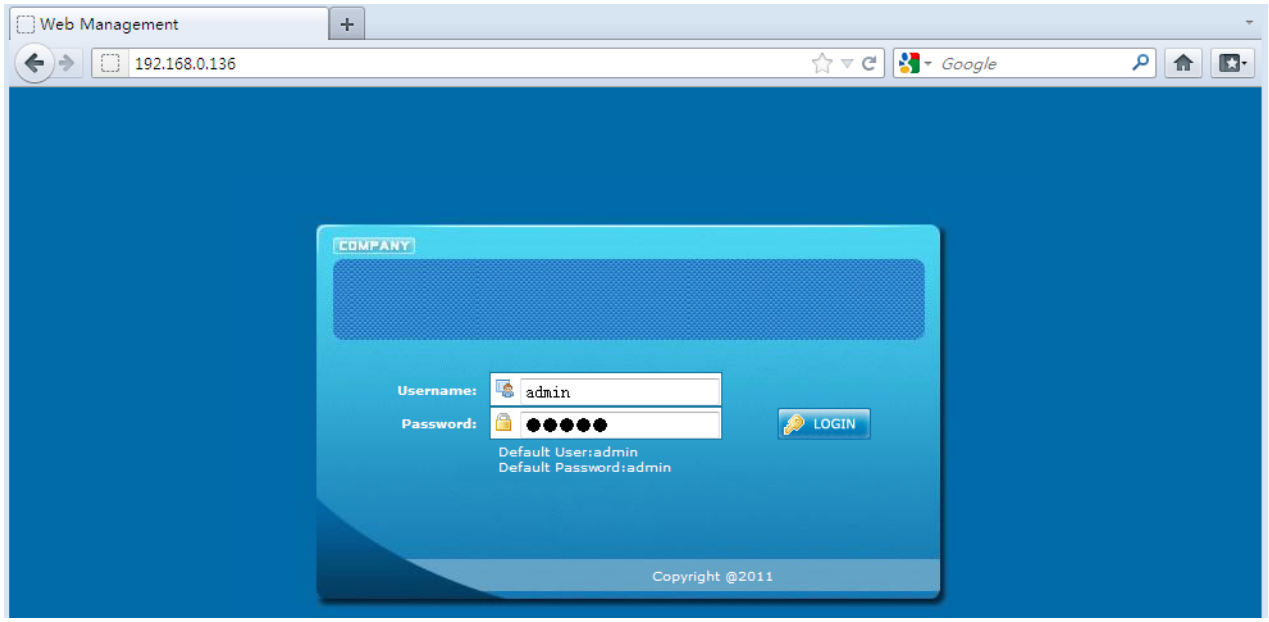


Figure-1

4.2 Operation

Welcome

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

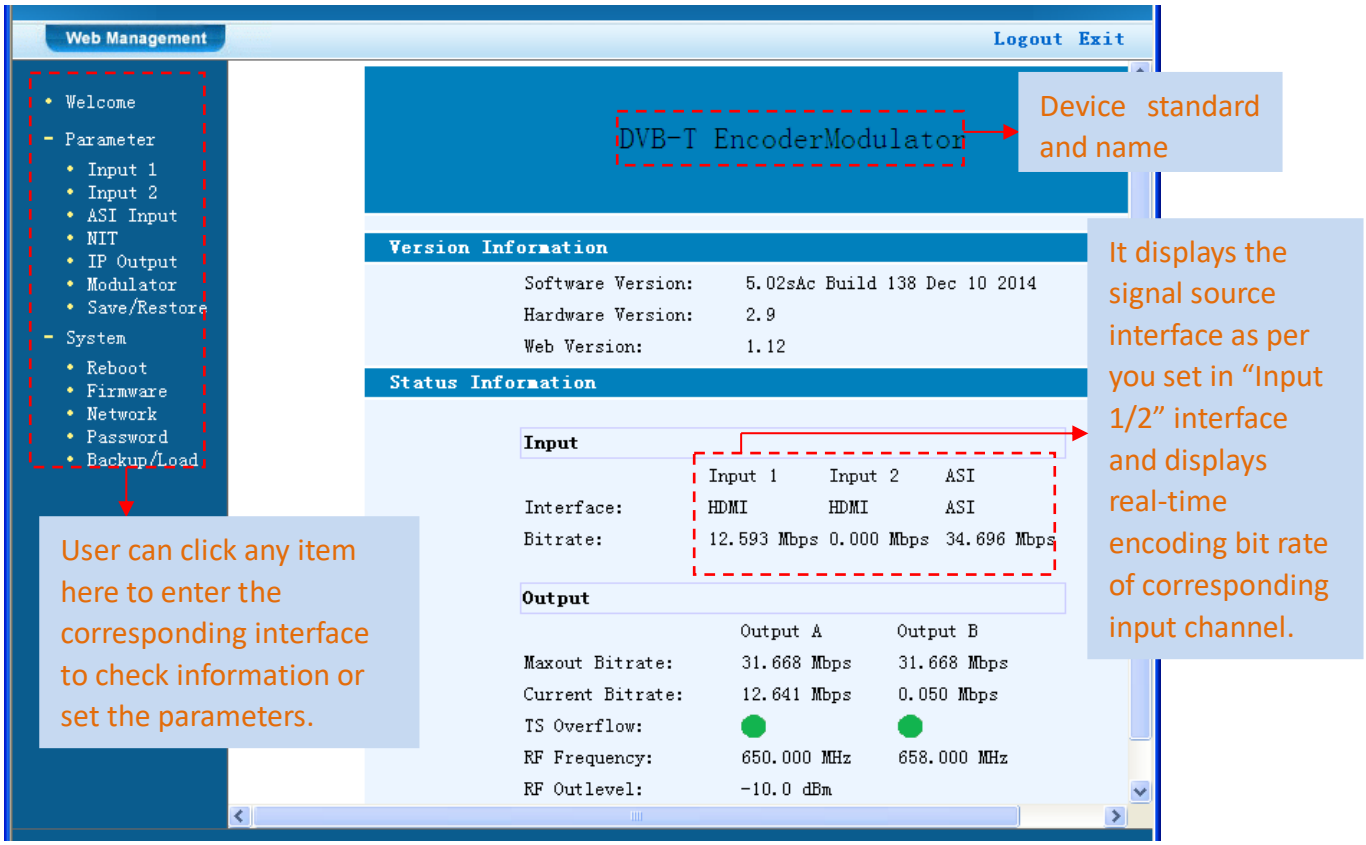


Figure-2

Input 1

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

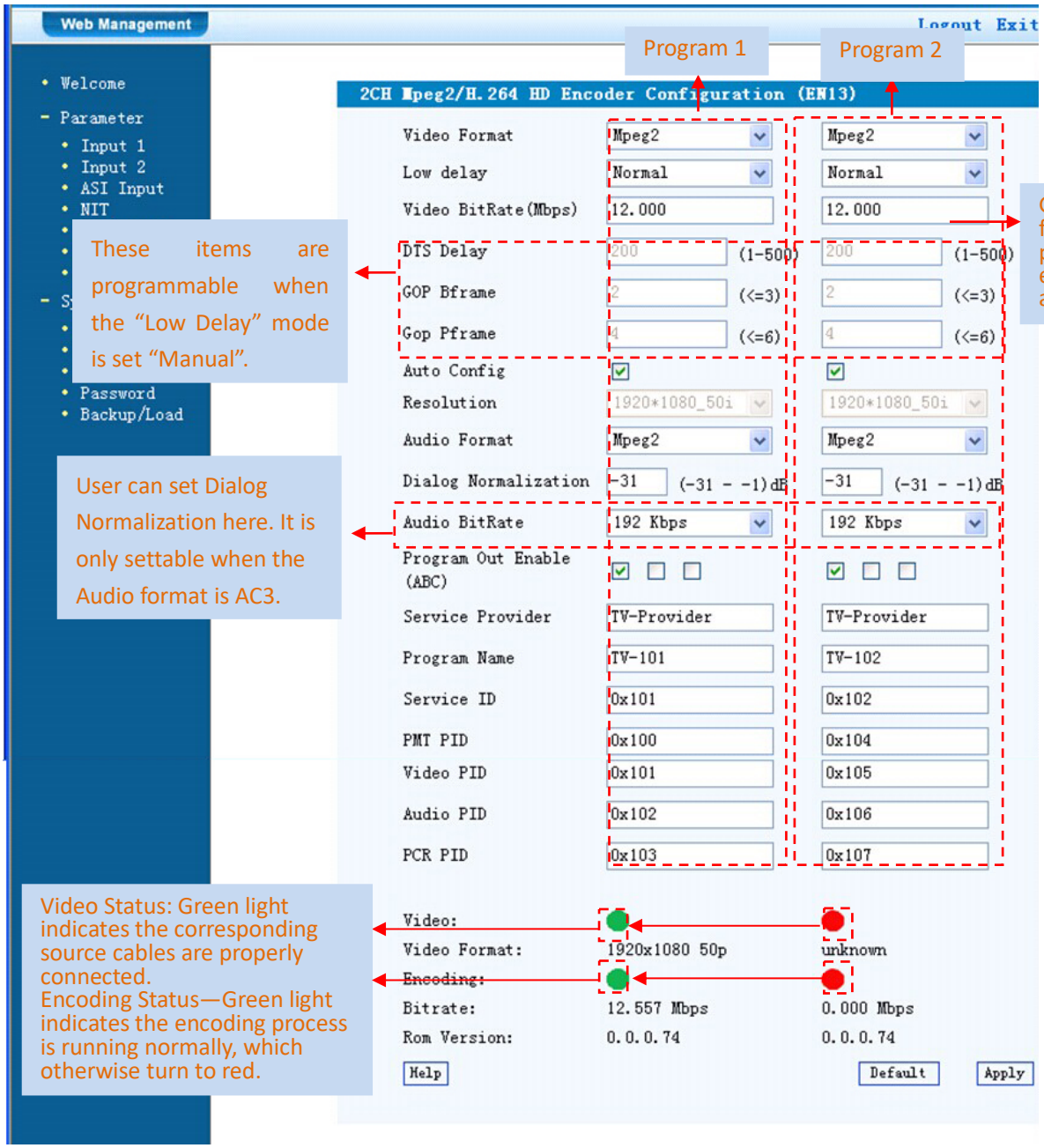


Figure-3

"Low Delay": Normal, Mode 1, Mode 2, and Manual optional.

Normal: not to enable the low delay mode.

Mode 1: B frame=0, P frame=14, DTS=1

Mode 2: B frame=2, P frame=4, DTS=1

Manual: Under this mode, B frame (≤3), P frame (≤6) and DTS (1-500) can be customized manually.

NOTE: The different combination of **Video Format**, **Video Bit-rate**, **Low Delay Mode** and **the Resolution** of signal source will have an impact on the time latency on receiving side. Please refer to the **Appendix** attached for detailed information.

Program Out Enable (ABC) User can choose to output the encoded program from 2 carriers(A, B) or ASI(C).

Help For user to turn to refer detailed explanation of terms on this interface

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, clicking “Input 2”, it displays the information of the programs from the 2ed encoding board.

ASI Input

Click “ASI Input”, it will display ASI input program information as Figure-4. User can parse and multiplex ASI IN programs in this interface.

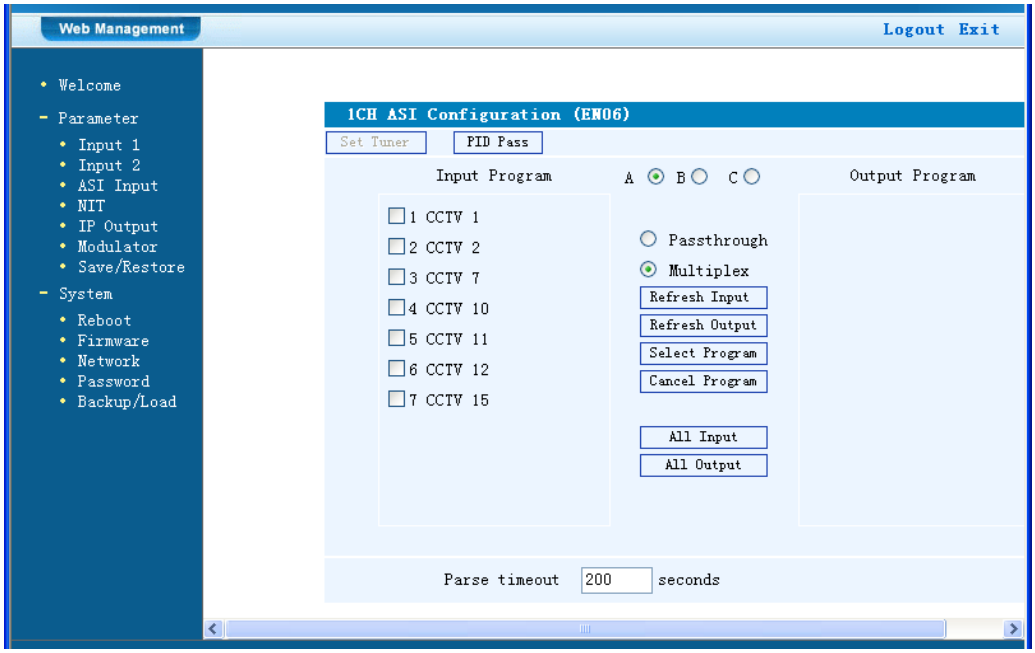
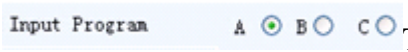
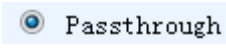


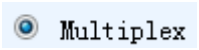
Figure-4



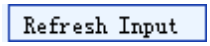
The letters A、B represent the 2 carrier outputs. C represent the ASI output. User can configure different program group for each channel.



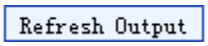
If this item is selected, all the input programs will pass through without any elimination.



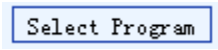
Selecting this item to allow user select programs as required to output.



Click “Refresh Input” to refresh the input program list.

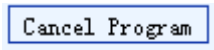


Click “Refresh Output” to refresh the output program list.

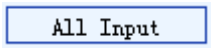


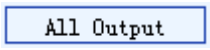
When user checks one input program with “√”, one can transfer the checked program to the right box to output.

Here user can select the programs which we want to output or we can output all the programs.



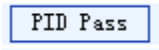
Similarly, user can cancel the multiplexed programs from the right box.



&


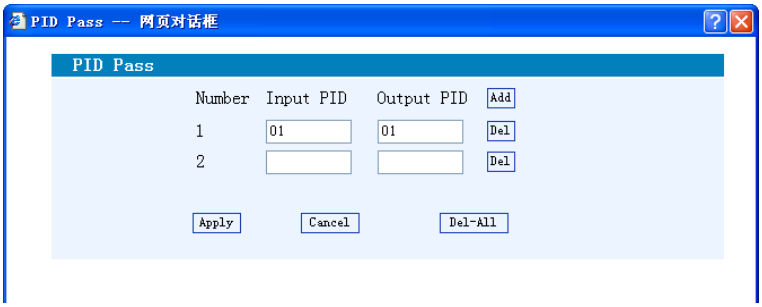
to select all the input/output programs with one-time clicking.

Time limitation to parse the input programs



Click this button to trigger a dialog box as 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.

NIT Table setting

Click “NIT” from the menu to trigger the screen as Figure-5. Then click “Add” from this screen to add the program descriptor in NIT Table.

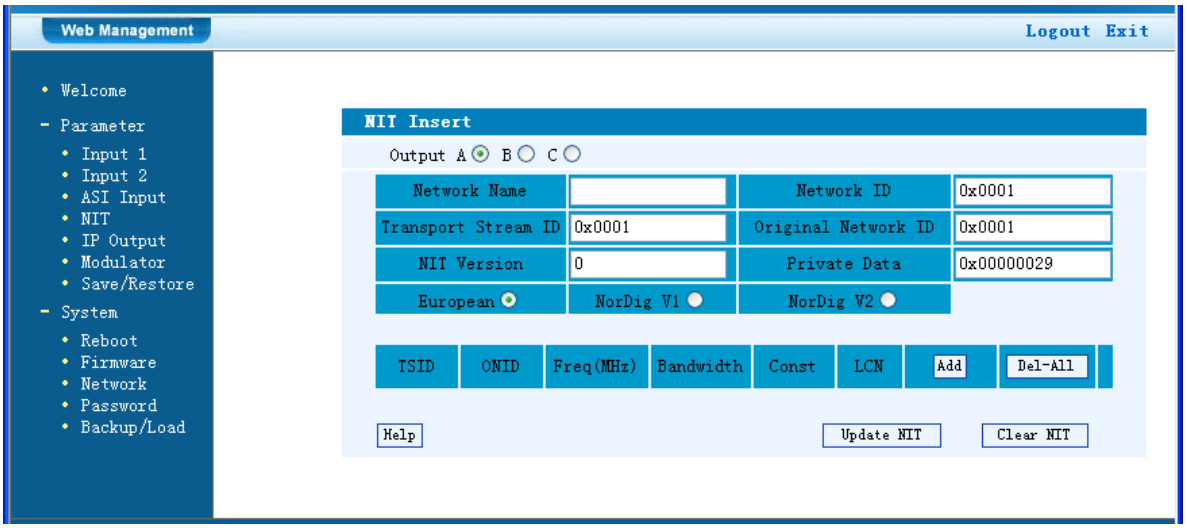


Figure-5

Click “Add” from this page, it will display the screen as Figure-6 where it requires to add Service ID and configure other parameters for the programs.

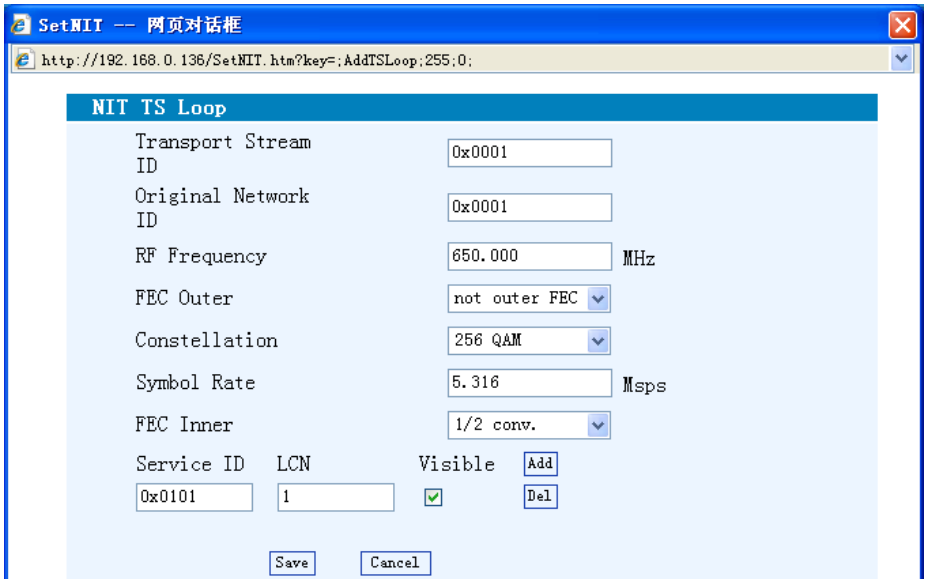
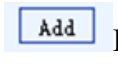


Figure-6



Here by clicking “Add”, users can set the program LCN in its respective field. After setting all the data, users need to click on “Save”

to save the setting. As Figure-7, click “Update NIT”

to update the NIT information.

Figure-7

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.

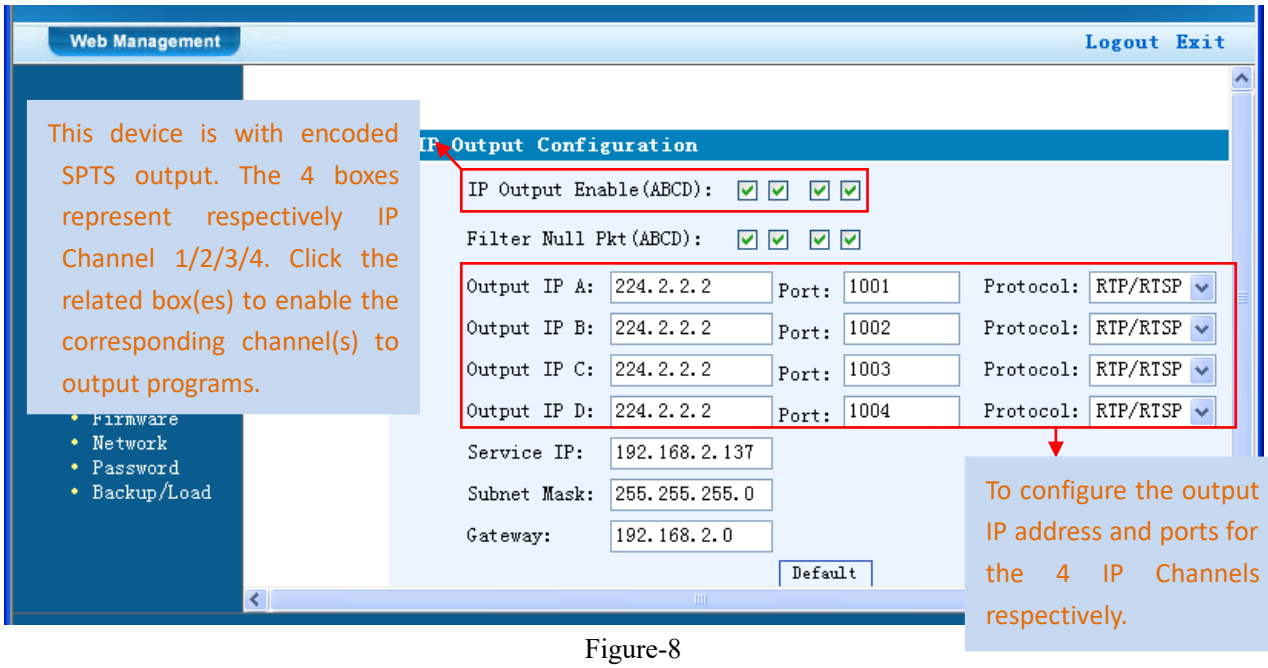


Figure-8

Modulator Setting

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

RF On –To decide whether to enable the RF (carrier A/B) output or not.

RF Frequency A/B– to set the RF frequency for the 2 carriers

RF Out level –to set the RF output level

After setting all the parameters, click “Apply” Apply to save the Modulator Configuration.

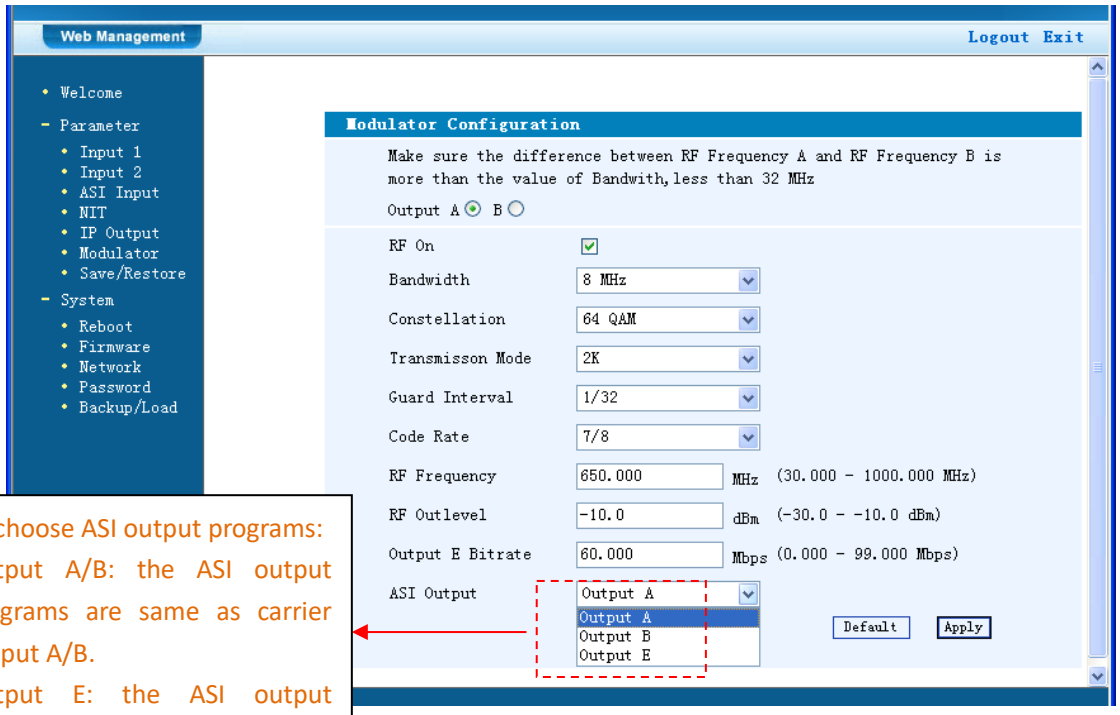


Figure-9

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.

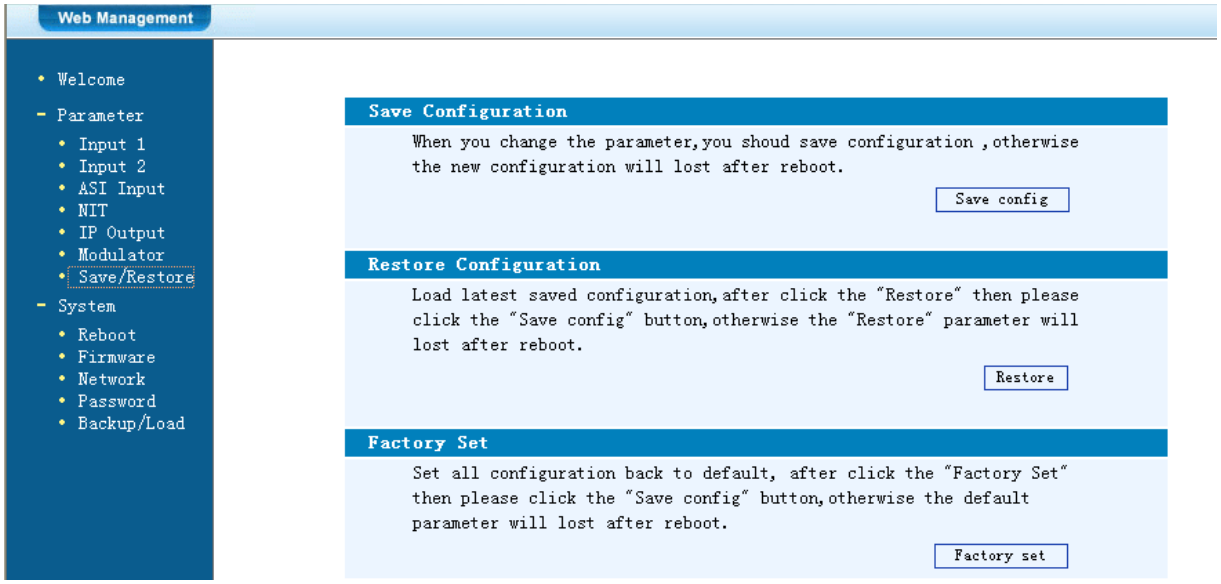


Figure-10

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.

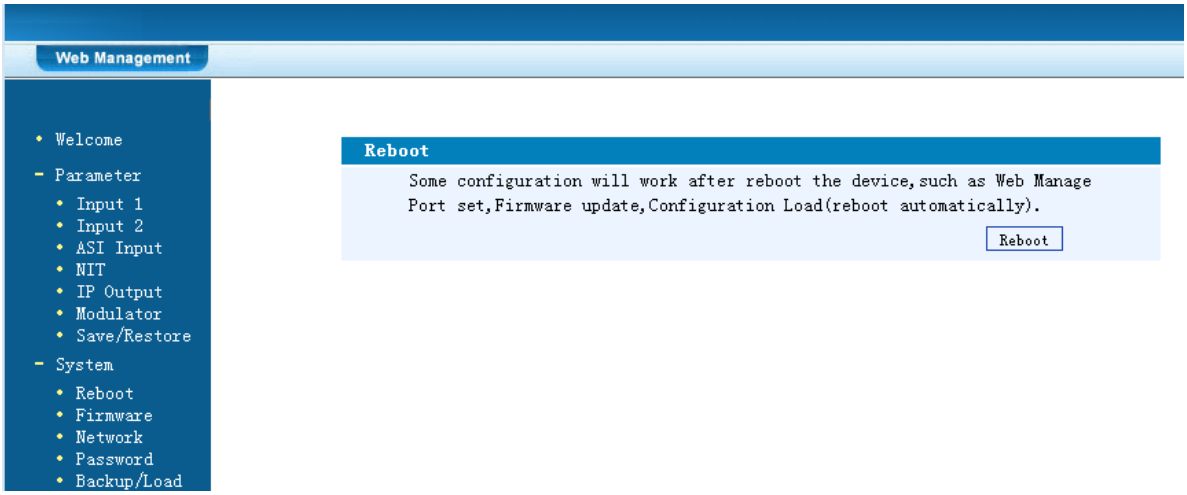


Figure-11

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.

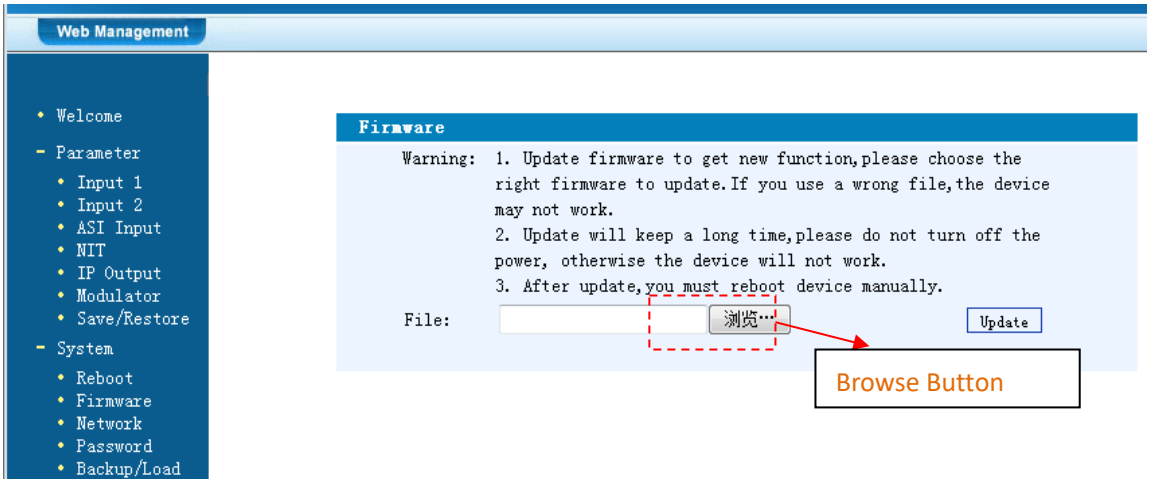


Figure-12

Network

When user clicks “Network”, it will display the screen as Figure-13. It displays the network

information of the device. Here user can change the device network configuration as needed.

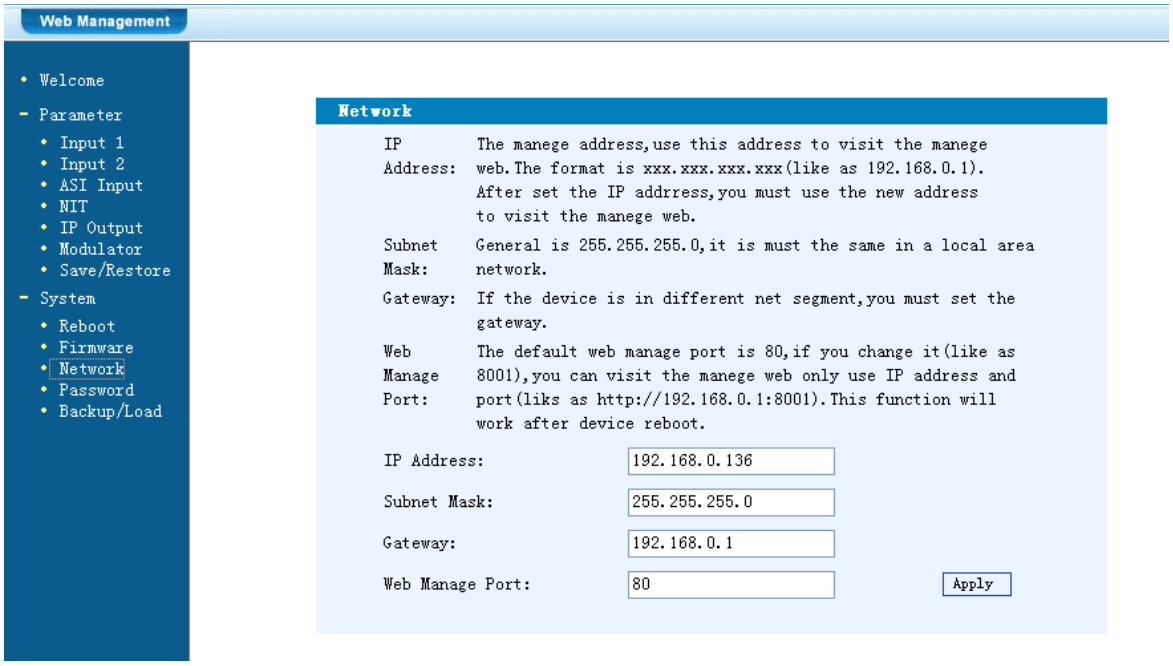


Figure-13

Change Password

When user clicks “Password”, it will display the password screen as Figure-14. Here user can 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.

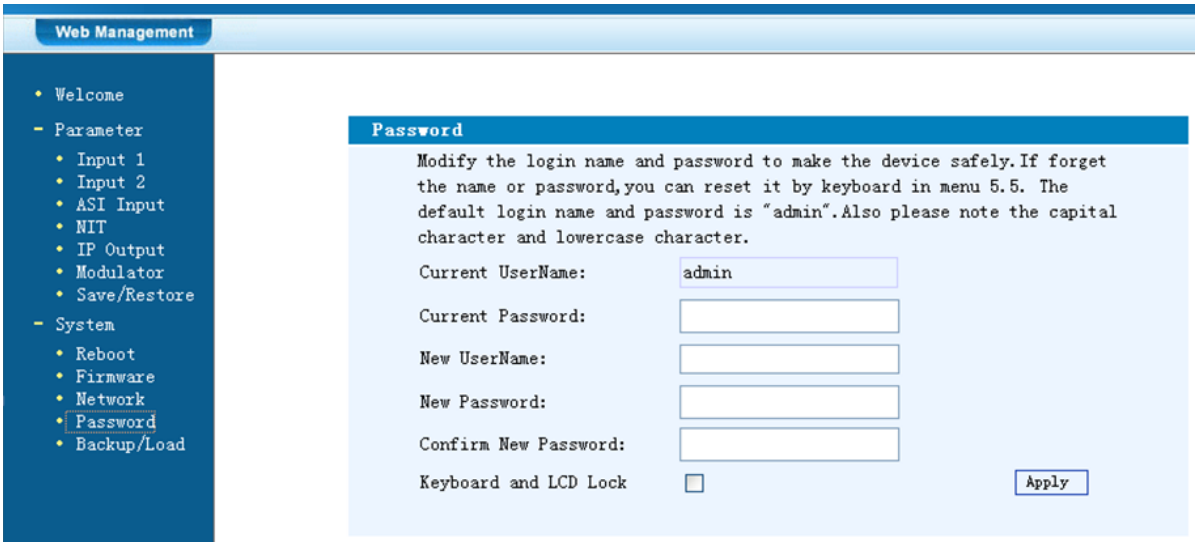
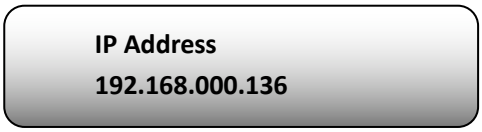


Figure-14

➢ Keyboard and LCD Lock: If it is marked with “√”， the LCD and keyboard will be locked to avoid unexpected modification or view of 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.



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.

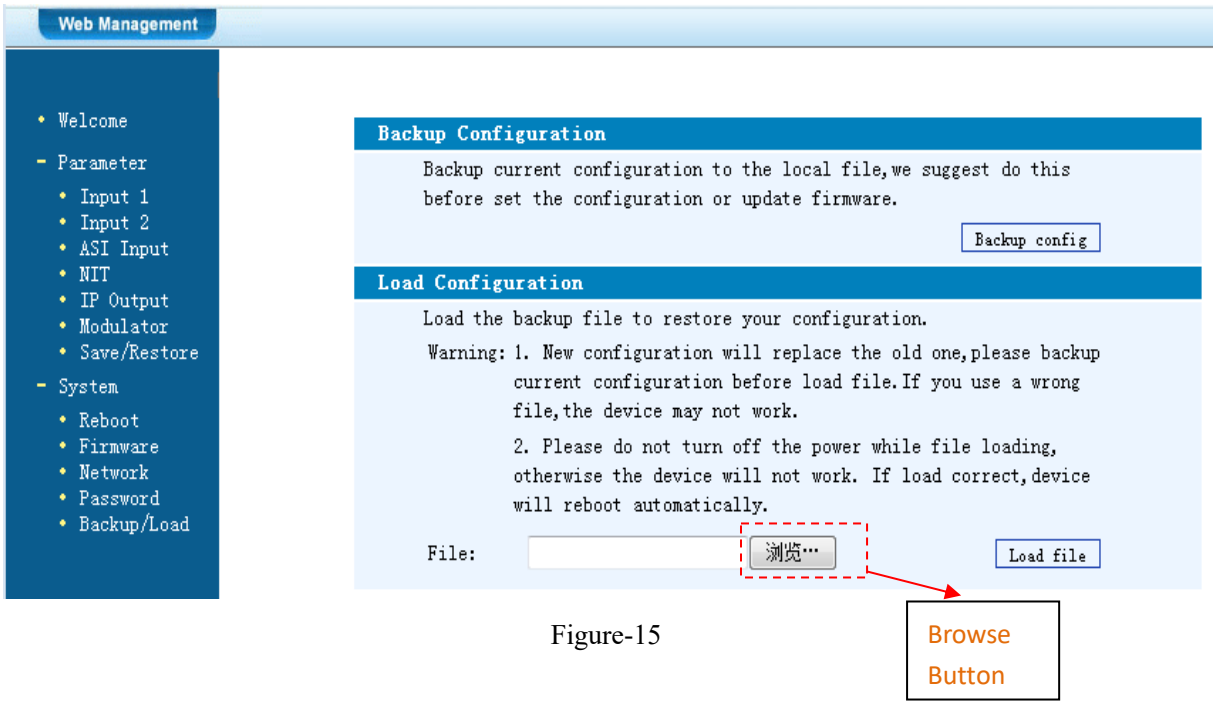


Figure-15

Appendix

Internal Test Report of Time Delay

The values cover the progress from Encoding → Decoding

Decoding Terminal	Encoding Details					Average Delay (ms)
	Single Source Interface	Bit Rate Mode	Resolution	Low Delay Mode	Encoding Type	
DVB-T HD STB	HDMI	VBR	1080i@50	Mode 1	mpeg2	300
					H.264	335
				Mode 2	mpeg2	407.5
					H.264	492.5
			720p@50	Mode 1	mpeg2	230
					H.264	285
				Mode 2	mpeg2	382.5
					H.264	395

Chapter 5 Troubleshooting

Our factory's ISO9001 quality assurance system has been approved by CQC organization. To guarantee the products' quality, reliability and stability. All factory products have been passed by testing and inspection before shipping out from factory. The testing and inspection scheme covers all the Optical, Electronic and Mechanical criteria which have been published by the factory. To prevent potential hazard, please strictly follow the operation conditions.

Prevention Measure

- Installing the device at the place in which environment temperature between 0 to 45 °C
- Making sure good ventilation for the heat-sink on the rear panel and other heat-sink bores if necessary
- Checking the input AC within the power supply working range and the connection is correct before switching on device
- Checking the RF output level varies within tolerant 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 greater than 10 seconds.

Conditions need to unplug power cord

- Power cord or socket damaged.
- Any liquid flowed into device.
- Any stuff causes circuit short
- Device in damp environment
- Device was suffered from physical damage
- Longtime idle.
- After switching on and restoring to factory setting, device still cannot work properly.
- Maintenance needed

Chapter 6 Packing List

DD4HD-R Encoder Modulator	1PC
HDMI Cables	4PCs
Power Cord	1PC