QUESTTEL

Broadcast Systems

DVB C CABLE

DVB S SATELLITE

DVB T TERRESTRIAL

B-QAM-SDI-IP-2CH-LL

User Manual

Directory

Chapter 1 Introduction

1.1 Product Overview

B-QAM-SDI-IP-2CH-LL series products are QuestTel's new breakthrough 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 DVB-C RF output. It has equipped with 2 SDI channels input and 1 ASI input and output with 2 ASI ports and 1 UDP IP port.

Now, 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-C TVs or STBs and etc.

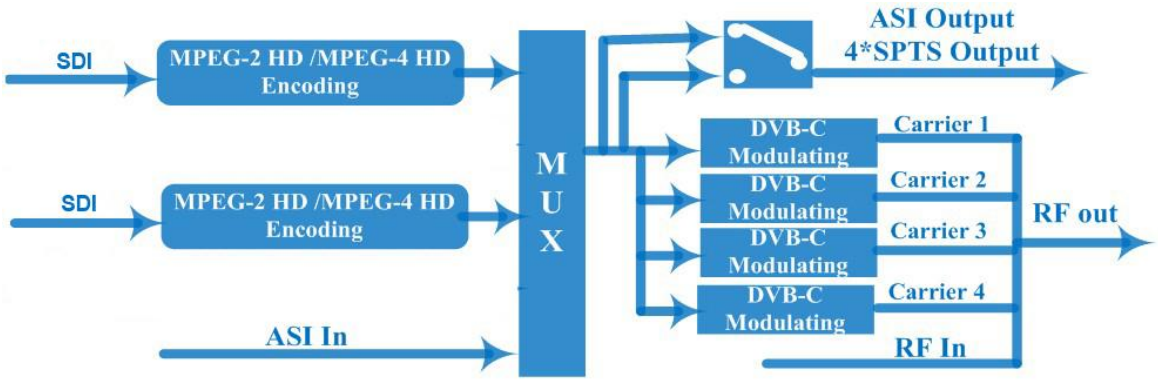
1.2 Key Features

- **MPEG2 & MPEG4 AVC/H.264 HD/SD encoding**
- **Up to 1920*1080@50P/60P supported (MPEG4 AVC/H.264 HD)**
- **Up to 1920*1080@50I/60I supported (MPEG2 HD)**
- **2* SDI input; 1*ASI input for re-mux; 1*RF input for mix**
- **2* DVB-C RF out (2 carriers combined output)**
- **Support 2 * SPTS output**
- **Extremely low latency reachable**
- **LCN support (Logical Channel Number)**
- **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**

1.3 Specifications

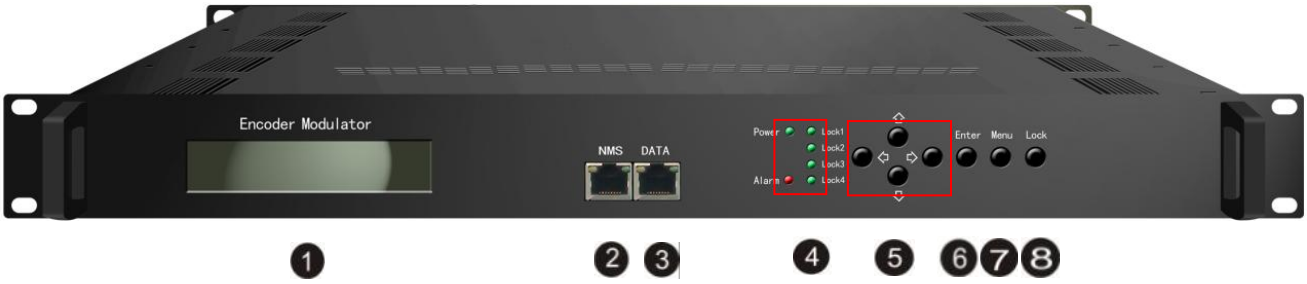
Encoding Section			
Video			
Encoding	MPEG2; MPEG4 AVC/H.264		
Input	SDI*2		
Resolution	1920*1080_60P, 1920*1080_50P, (-for MPEG4 AVC/H.264) 1920*1080_60i, 1920*1080_50i, 1280*720_60p, 1280*720_50P 720*480_60i, 720*576_50i		
Low Latency Mode	Normal, Mode 1, Mode 2		
Audio			
encoding	MPEG1 Layer II, MPEG2-AAC, MPEG4-AAC		
Sample rate	48KHz		
Bit rate	64kbps, 96kbps,128kbps, 192kbps, 256kbps, 320kbps		
DVB-C Modulator Section			
Standard	J.83A , J.83B, J.83C		
MER	≥42dB		
RF frequency	30~960MHz, 1KHz step		
Symbol rate	5.000~9.000Msps adjustable		
RF output level	-30~ -10dbm (81~97 dbμV), 0.1db step		
	J.83A	**J.83B**	**J.83C**
Constellation	16/32/64/128/256QAM	64QAM/ 256QAM	64QAM/ 256QAM
bandwidth	8M	6M	6M
System			
Local interface	LCD + control buttons		
Remote management	Web NMS		
output	2*ASI out (BNC type); 2*SPTS IP out over UDP (RJ45, 100M)		
NMS interface	RJ45, 100M		
Language	English		
General			
Power supply	AC 100V~240V		
Consumption	25 W		
Dimensions	482*300*44mm		
Weight	3.5 kgs		
Operation temperature	0~45℃		

1.4 Principle Chart



1.5 Appearance and Description

Front Panel Illustration



① **LCD window: LCD display**
② **NMS port for web management**
③ **DATA port for IP signal output**
④ **Indicators**
⑤ **Navigation buttons**
⑥ **Enter button: for confirm**
⑦ **Menu button: for back step**
⑧ **Lock button: press to lock set**

Rear Panel Illustration

① SDI input port 1
② SDI input port 2
③ RF in port (for RF mix)
④ RF out port
⑤ ASI input port
⑥ ASI output ports
⑦ Power 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.

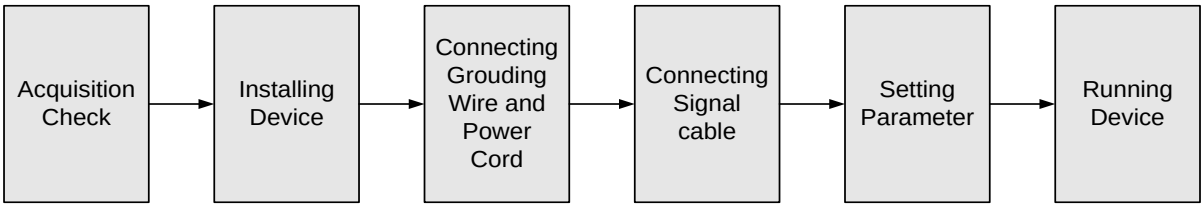
2.1 General Precautions

- ✓ 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	When user installs machine frame array in one machine hall,

Space	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.

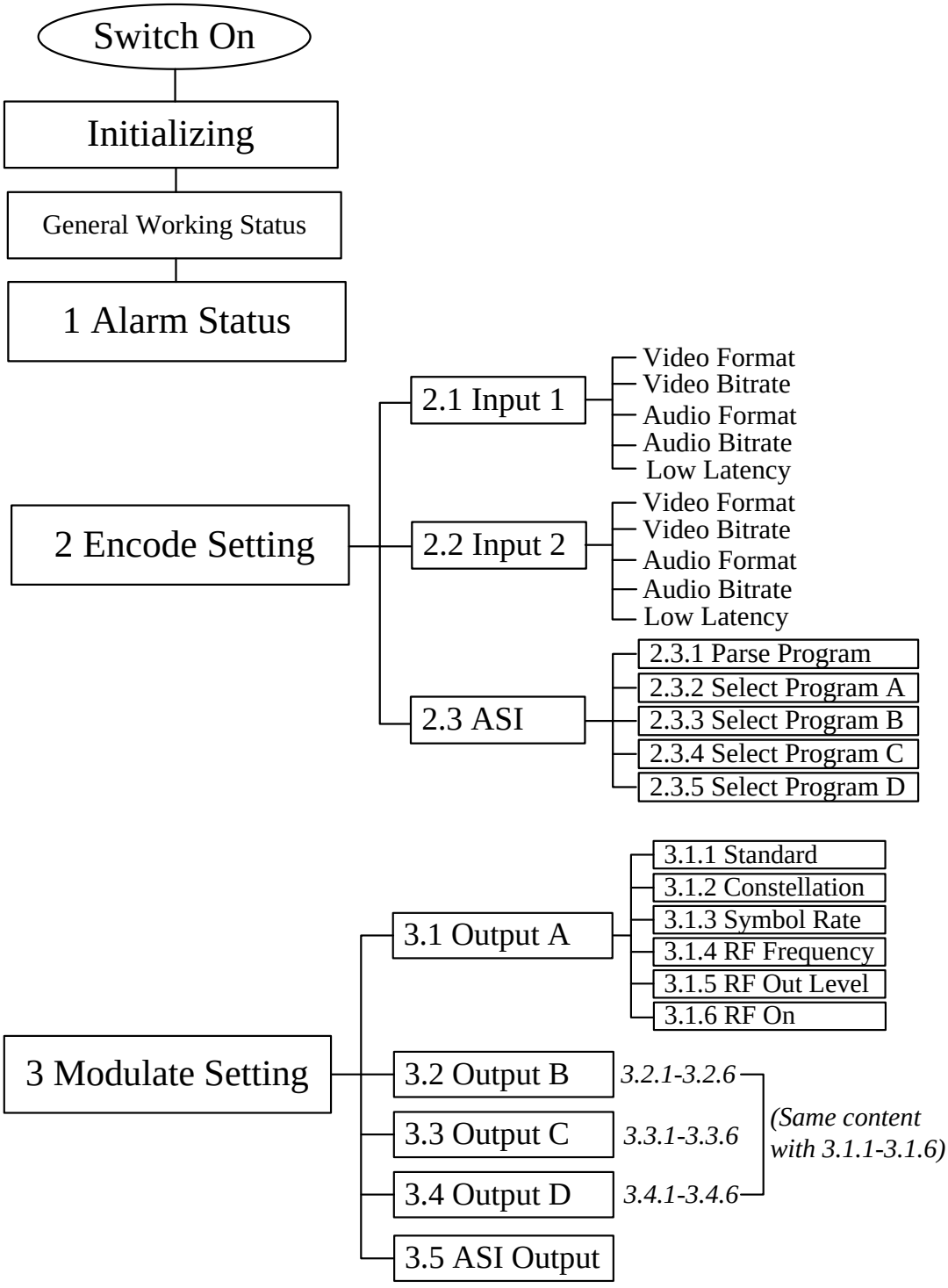
2.5 Grounding Requirement

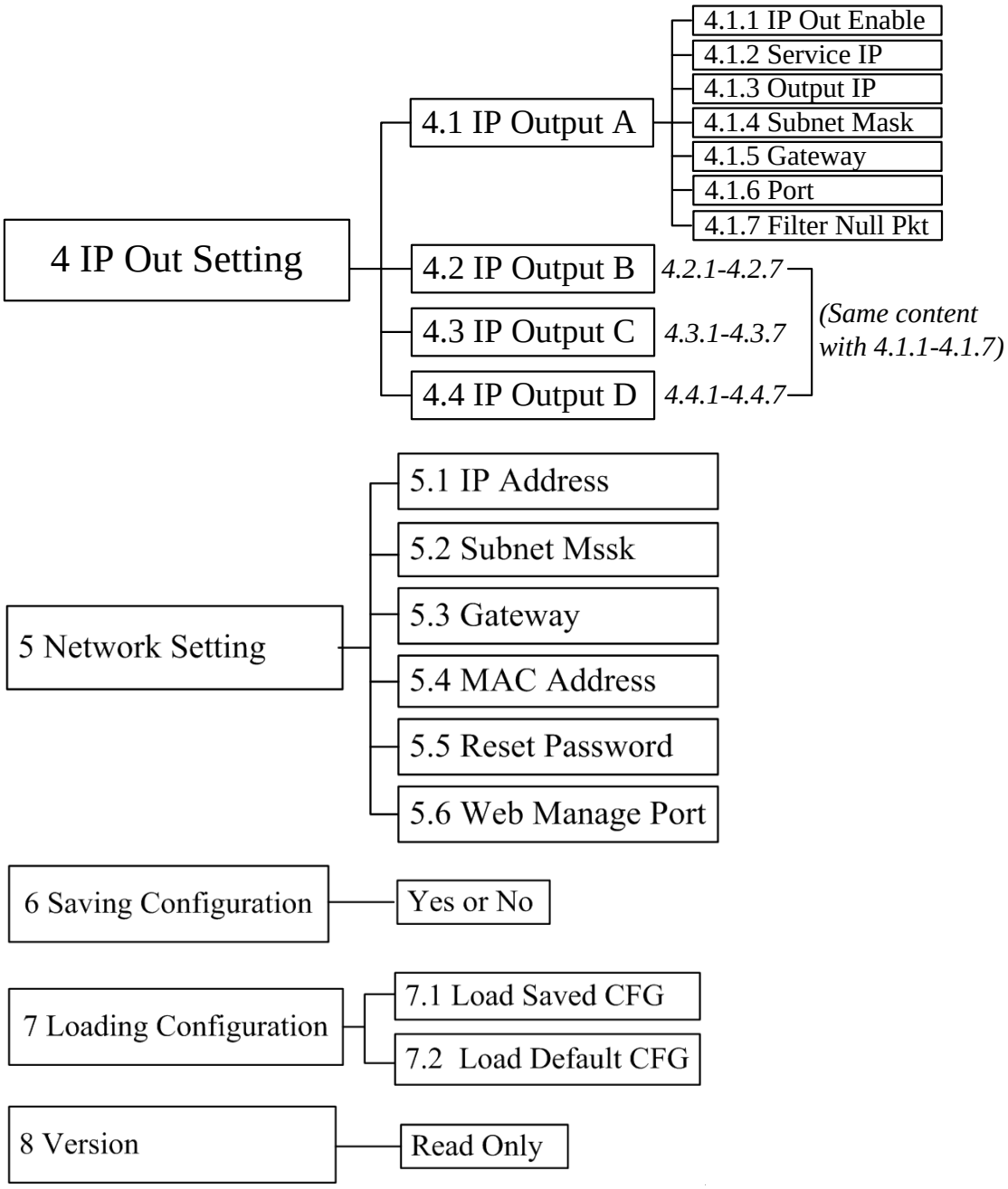
- ✓ All function modules' good grounding is the basis of reliability and stability of devices. Also, they are the most important guarantee of lightning arresting and interference rejection. Therefore, the system must follow this rule.
- ✓ Grounding conductor must adopt copper conductor in order to reduce 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 mm^2.

Chapter 3 Operation

3.1 LCD Menus

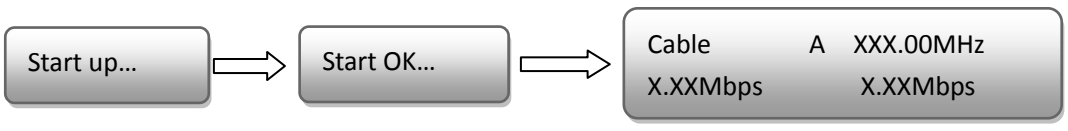
An overview of the LCD menus:





3.2 Initial Status

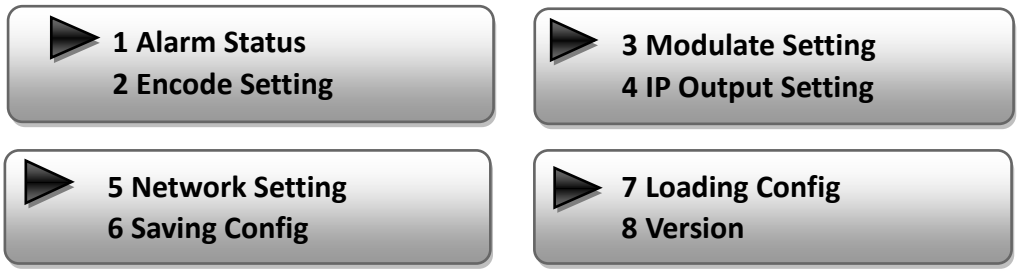
Switch on the device and after a few seconds' initialization, it presents start-up pictures as below:



- **Cable**: indicate the modulation standard of this device is DVB-C.
- **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.
- **X.XX Mbps**: indicate the encoding bit rate of the 2 SDI programs respectively.

3.3 General Settings for Main Menu

Press "Lock" key on the front panel to enter the main menu. The LCD will display the following pages where user can configure the parameters for the device:



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

1) Alarm Status

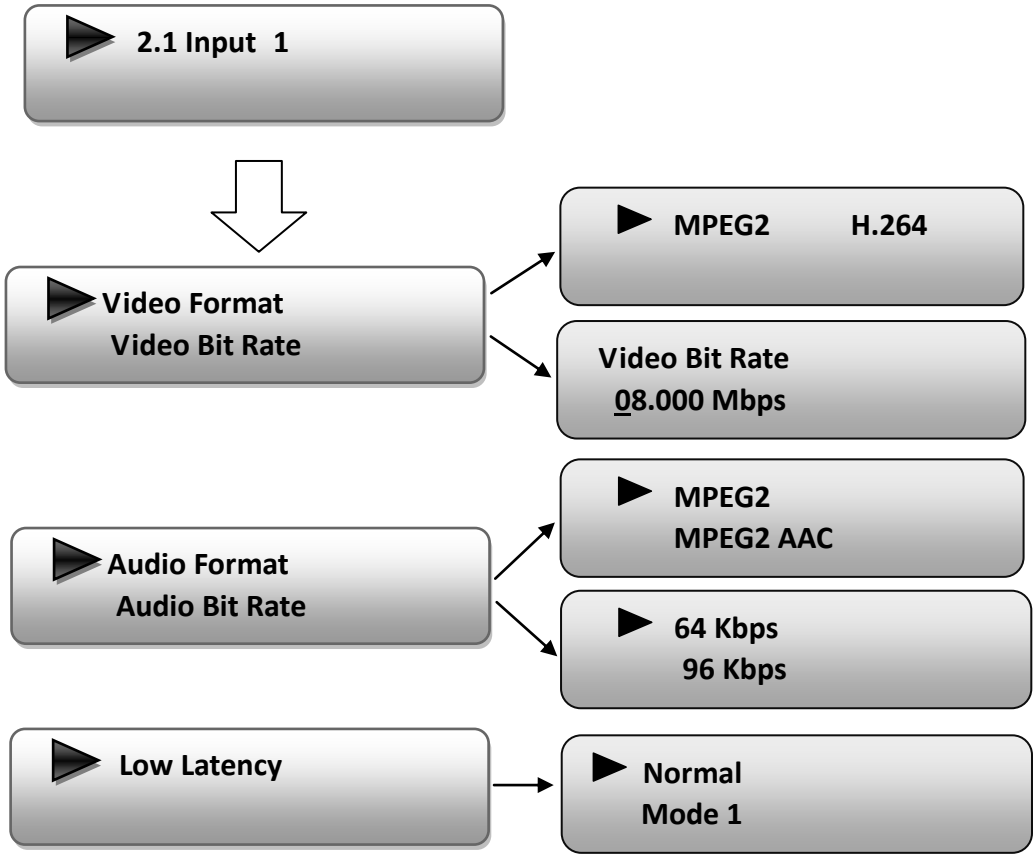
The alarm indicator will turn on if there is no A/V signals inputting or outputting bit rate overflows. User then can enter this menu to check the error type.

2) Encode Setting

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



“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 with UP/DOWN keys, and press ENTER key to save the settings.

“Audio Format”: the encoding module supports MPEG2, MPEG2-AAC and MPEG4-AAC audio formats. Move the triangle mark with UP/DOWN keys to specify the intended format and press ENTER to confirm.

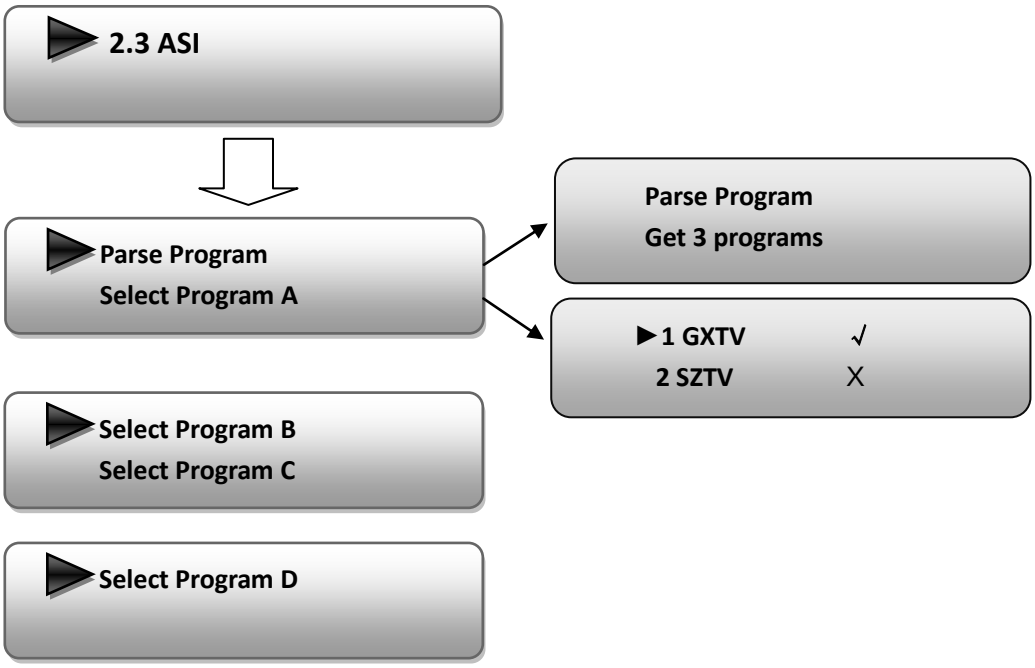
“Audio Bit Rate” is to select audio encoding bit rate from the options provided.

“Low Latency”: to select a latency mode for the content. Move the triangle mark to specify a mode and press ENTER to confirm.

NOTE

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

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



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

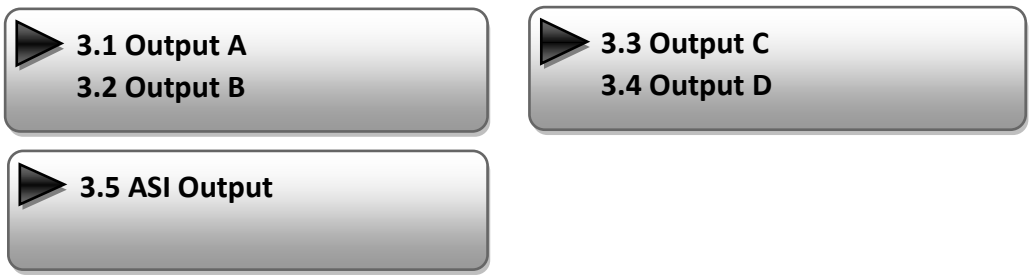
"Select Program A" is for selecting programs from the ASI IN to output through Carrier A. Move the triangle mark to specify the program and press RIGHT/LEFT keys to shift the mark between "√" and "X". ("√": to output the corresponding program; "X": not to output the corresponding program)

REMARK:

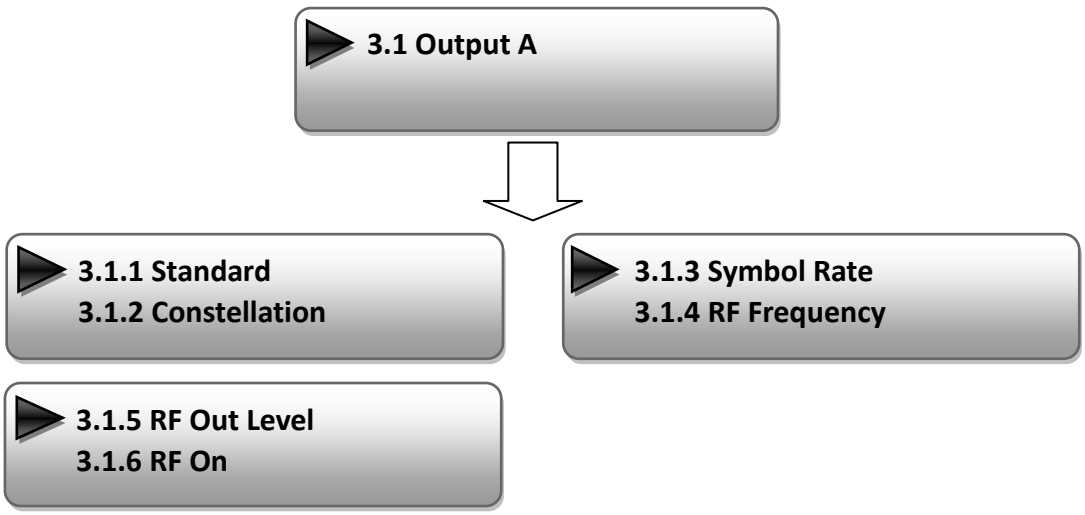
"Select Program B/C/D" shares the same principle with "Select Program A". One program can be output through multi-carriers.

3) Modulator Setting

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



As the B-QAM-SDI-IP-2CH-LL (DVB-C Modulating) is with 4 carrier outputs, "3.1"-"3.4" represent the "Carrier A", "Carrier B", "Carrier B", and "Carrier D" respectively. User can enter "3.1"/"3.2"/"3.4"/"3.4" to set the corresponding modulating parameters. Submenus (taking "3.1" as an example) are as below:



- **Standard**

  There are three possible options provided for selecting **Standard**: J.83A (DVB-C), J.83B, J.83C when the display shows them, user just need swift LEFT and RIGHT key to choose.

- **Constellation**

  Three different constellations: J.83A (DVB-C), J.83B, J.83C will show on the LCD window when Constellation been entered.

  J.83A (DVB-C) contains 16QAM, 32QAM, 64QAM, 128QAM, and 256QAM;

  J.83B contains 64QAM, 256QAM;

  J.83C contains 64QAM, 256QAM.

16QAM: Quadrature Amplitude Modulation is 16

32 QAM: Quadrature Amplitude Modulation is 32

64QAM: Quadrature Amplitude Modulation is 64

128QAM: Quadrature Amplitude Modulation is 128

256QAM: Quadrature Amplitude Modulation is 256

Setting method is just the same. When the display shows them, user just need swift LEFT and RIGHT key to choose and repressing "ENTER" for confirm.

- **Symbol Rate**

The symbol rate range of both J.83A (DVB-C) & J.83C is 5Msps to 9Msps and J.83B is fixed and cannot be changed.

- **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 (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 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.

NOTE: The setting principle of "3.2", "3.3", and "3.4" are the same with "3.1" explained above.

ASI Output:

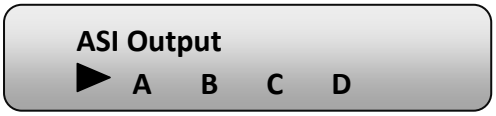
B-QAM-SDI-IP-2CH-LL encoder & modulator (DVB-C Modulating) is with quad-carrier outputs: Output A, B, C, and D.

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

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

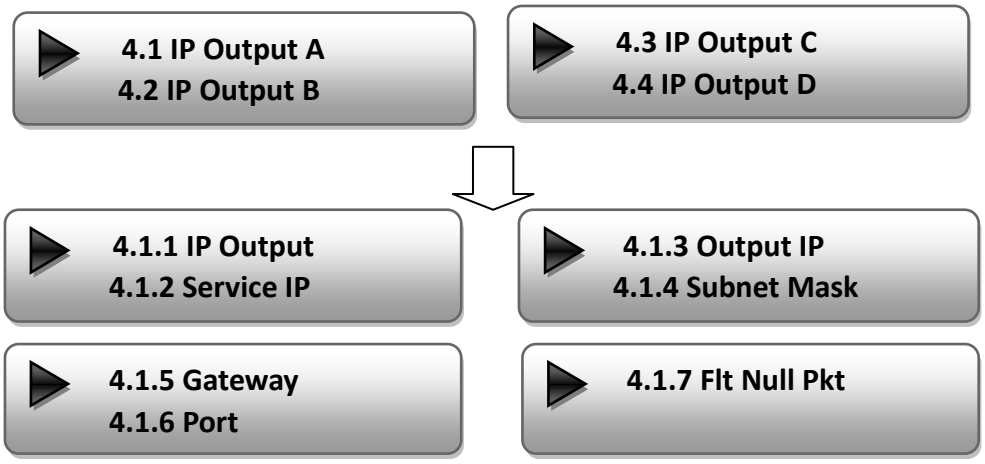
Output C: the ASI output programs are same as carrier output C.

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

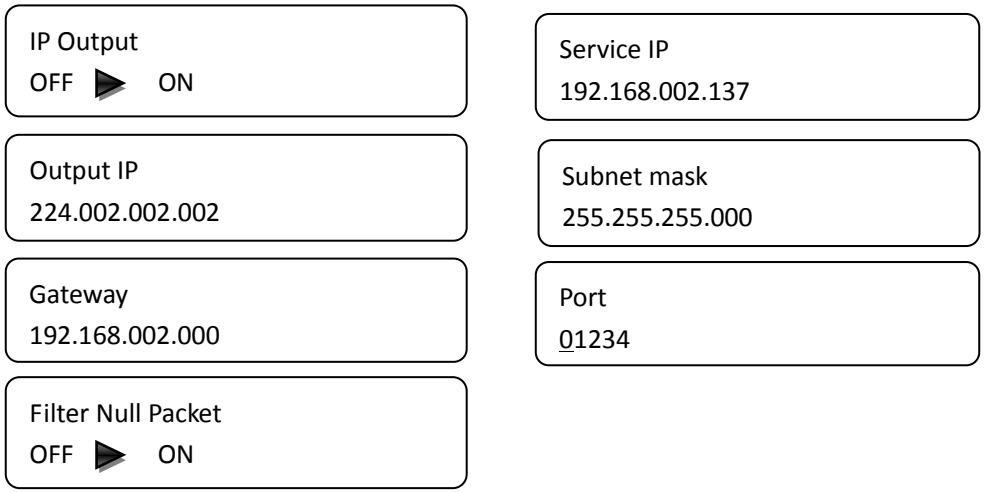


4) IP Output Setting

B-QAM-SDI-IP-2CH-LL encoder & modulator (DVB-C Modulating) is with quad-carrier output (Output A, B, C, and D), "4.1" to "4.4" are for the settings of the 4 carrier outputs respectively. Submenus go as 4.1.1-4.1.7

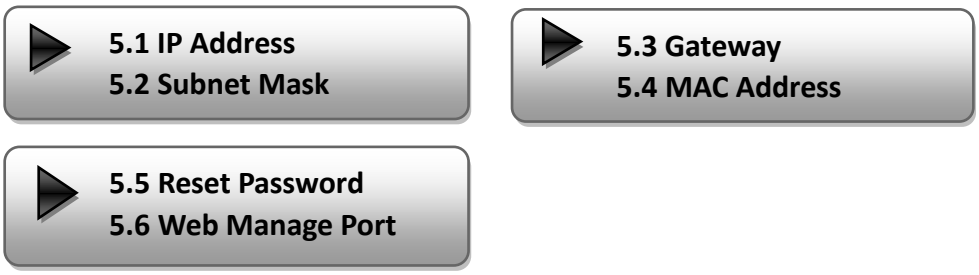


User can enter 4.1.1 to decide whether to turn the IP port on or off, and enter to the rest menu items to set the corresponding parameters.

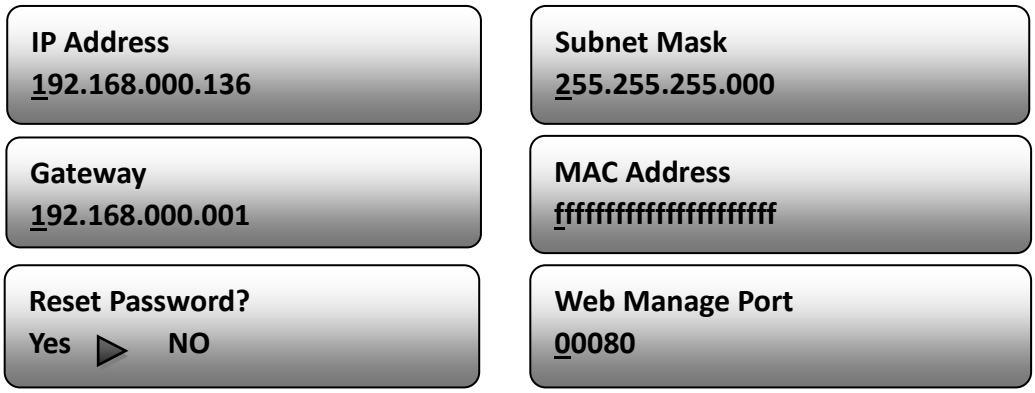


5) Network setting

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



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

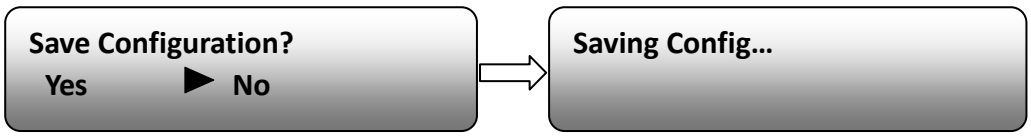


NOTE: The MAC address is according to the factory setting, and it is unique.

6) Saving Configuration

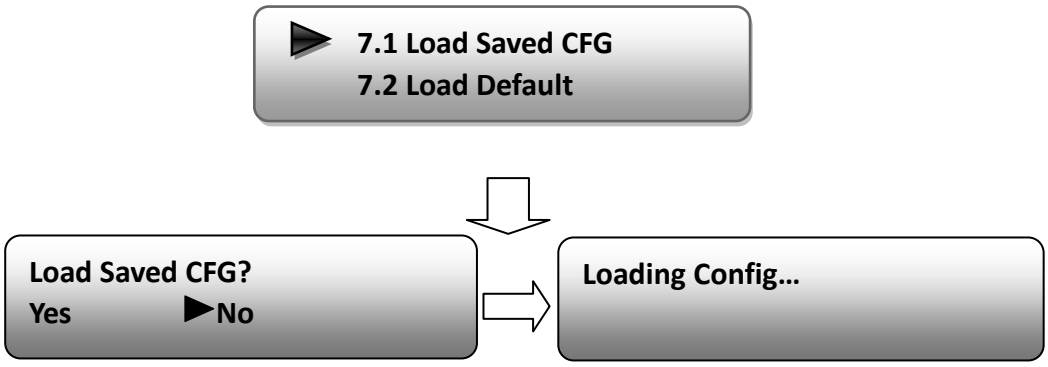
Users can enter Saving Configuration submenu for saving settings. Choose yes and

press ENTER to confirm.



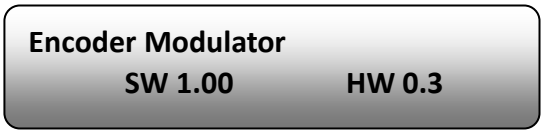
7) Loading Configuration

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:



8) Version

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



Chapter 4 WEB NMS Operation

User not only can use front buttons to set 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 B-QAM-SDI-IP-2CH-LL's IP address; otherwise, it would cause IP conflict.

4.1 login

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

Connect the PC (Personal Computer) 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.

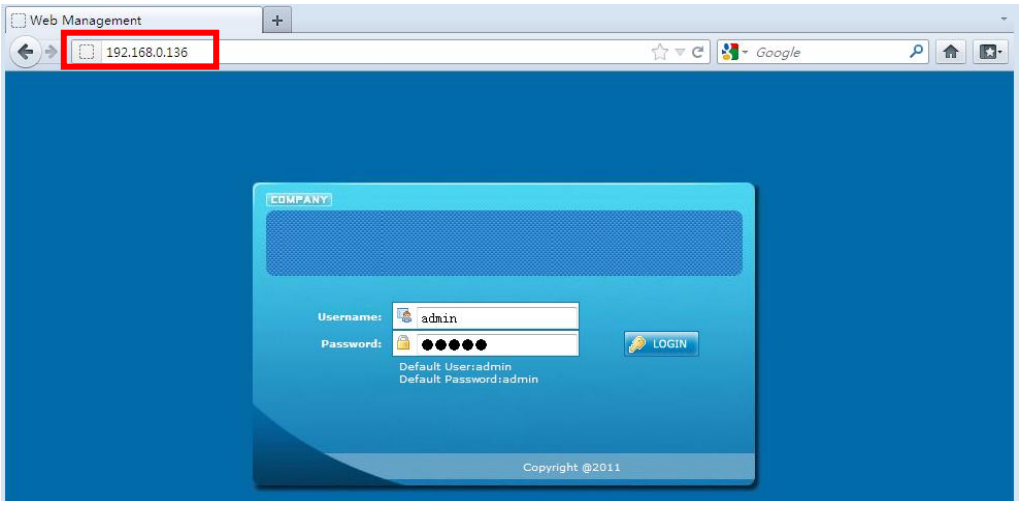
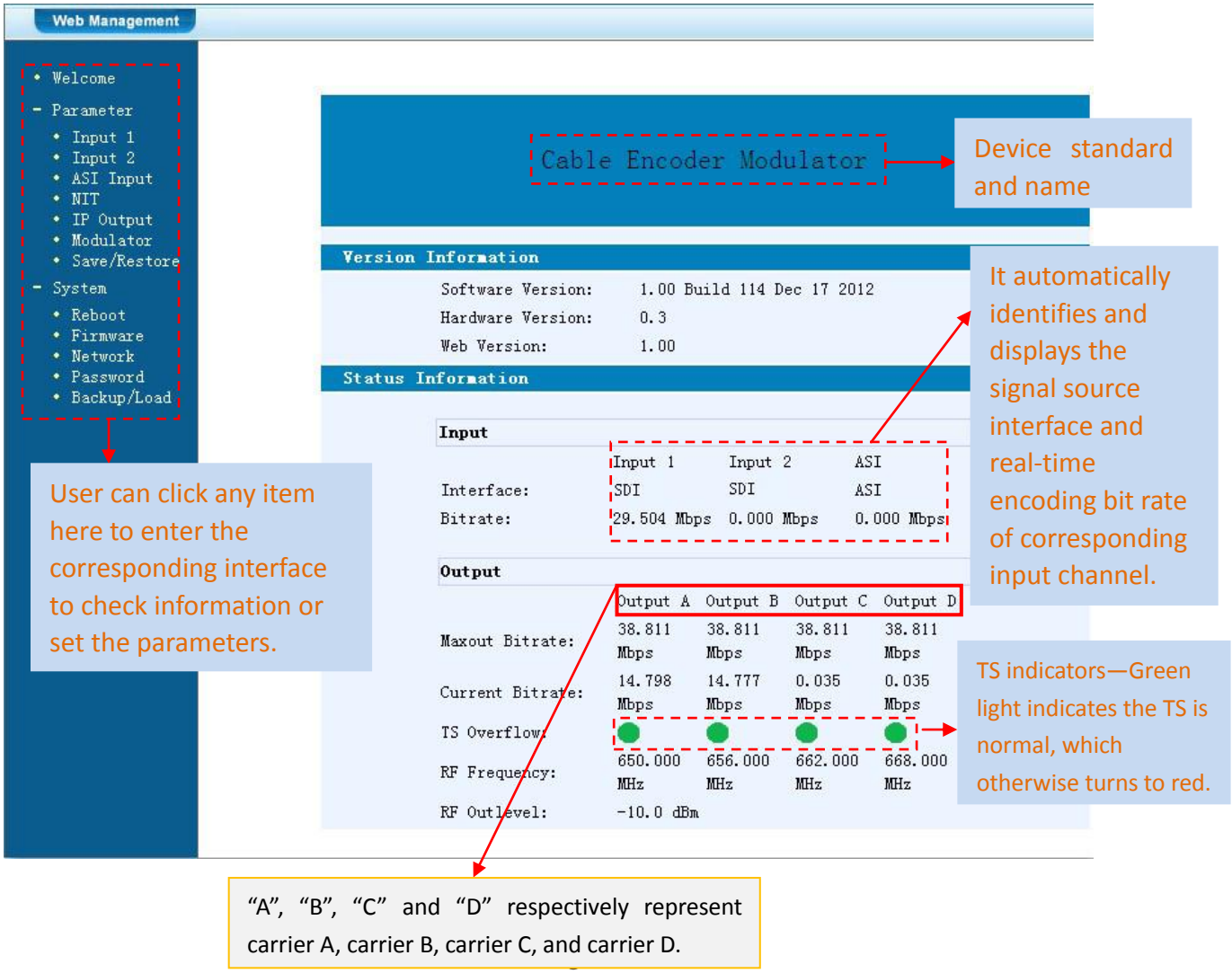


Figure-1

4.2 Operation

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



Input 1

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

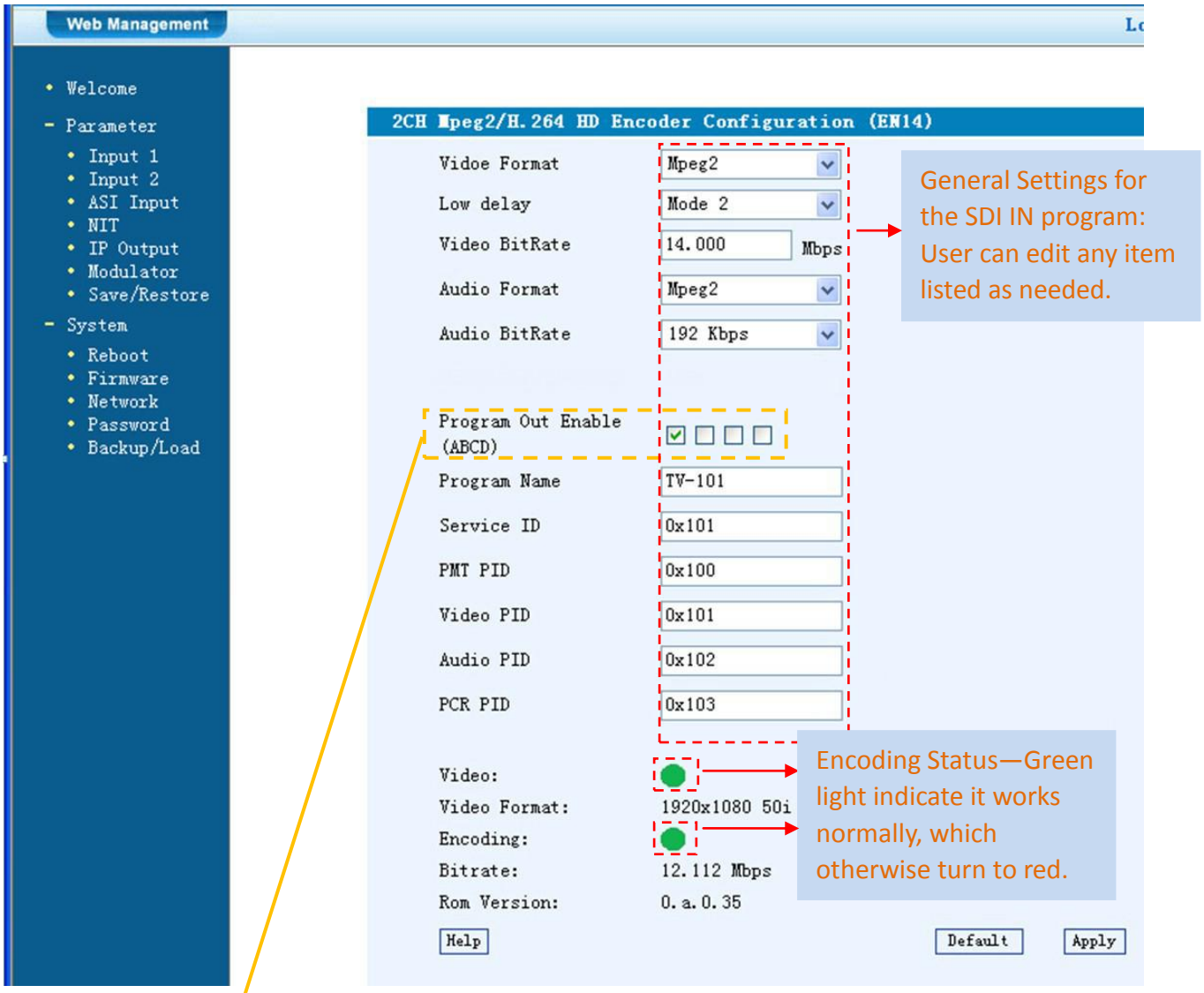
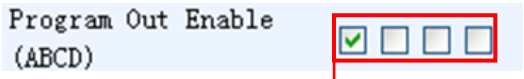


Figure-3

Enable or Disable the Carrier Output Function:



The 4 boxes respectively represent Carrier A, B, C, and D. Tick the corresponding box(es) to enable the related program output through the corresponding Carrier.
One program can output through a single or multiple Carriers. However, it is suggested that a single carrier outputs only one program to adapt the fluctuant encoding bit rate.

LOW LATENCY NOTE

The different combination of **Video Format**, **Video Bit-rate**, **Low Latency Mode** and **the Resolution** of signal source will have an impact on the delay. Please refer to the **Appendix** attached for detailed information.

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 program from the 2ed SDI encoding slot.

ASI Input

Click “ASI Input”, it will display ASI input program information as Figure-4.

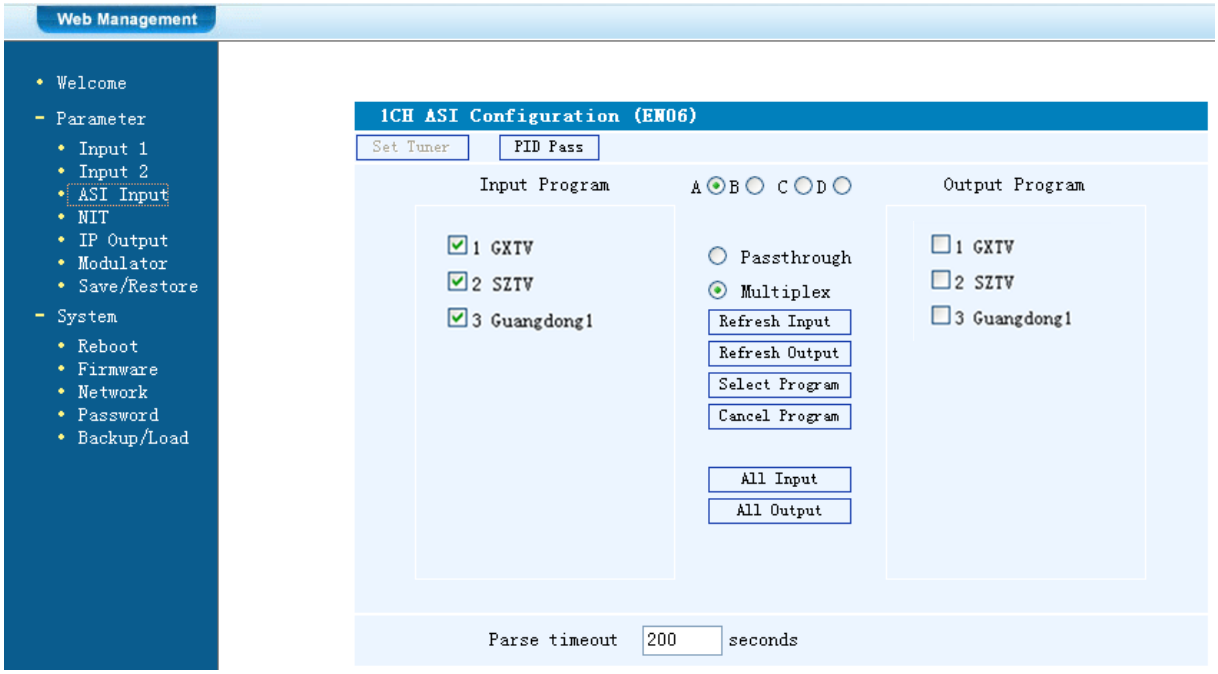


Figure-4

A B C D Select the carrier output channel for the multiplexed programs. Every carrier channel can carry different program combination to 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.

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

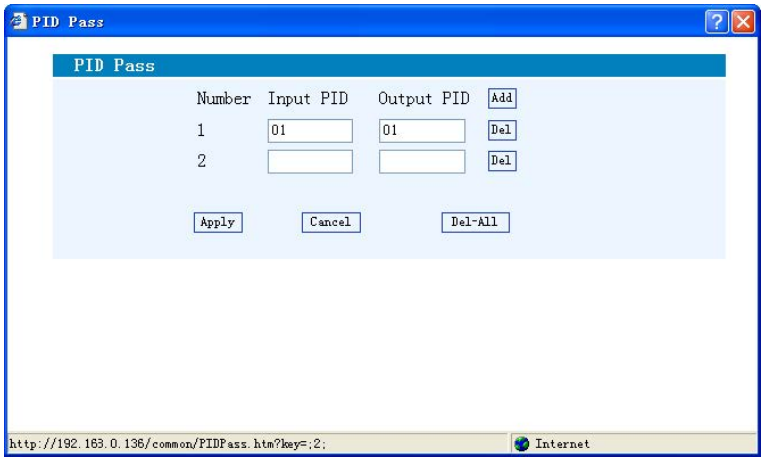
Cancel Program Similarly, user can cancel the multiplexed programs from the right box.

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 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” 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.

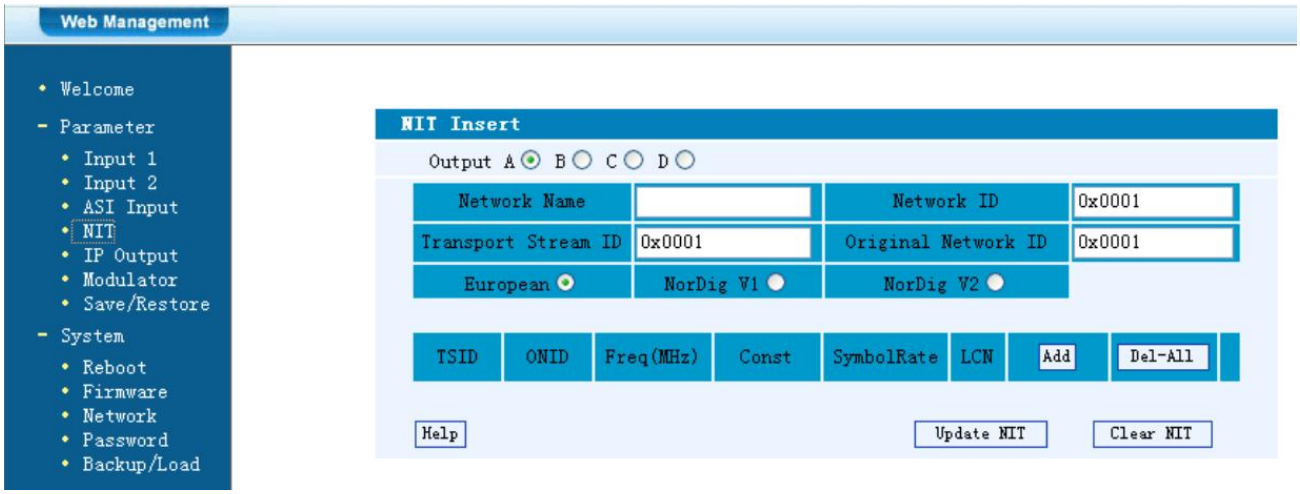
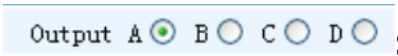


Figure-5



Select the carrier output channel for the inserted NIT.

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.

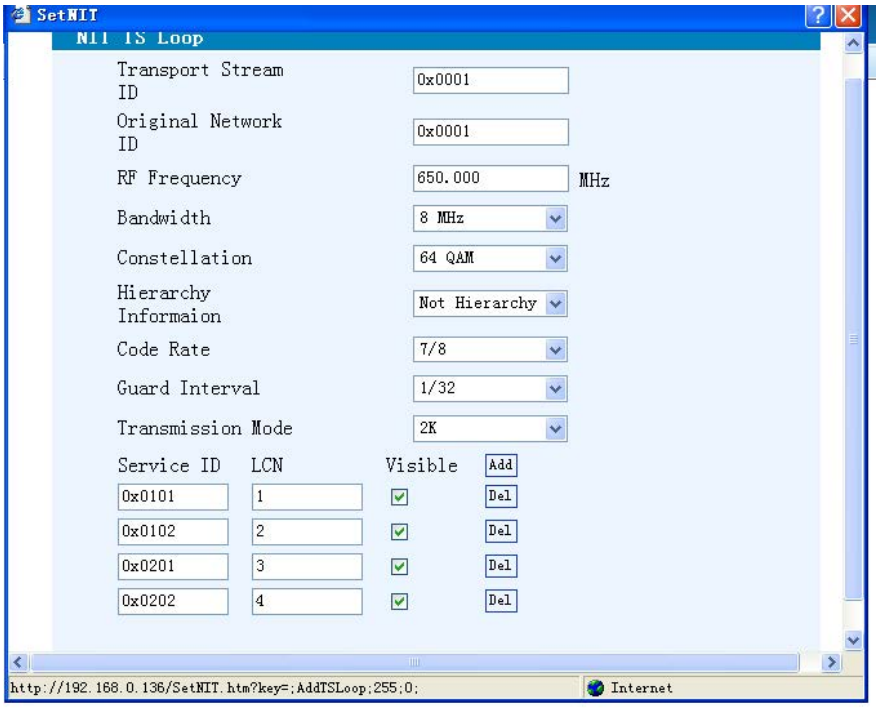
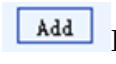


Figure-6



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" Save to save the setting. As Figure-7, click "Update NIT" Update NIT to update the NIT information.

TSID	ONID	Freq(MHz)	Bandwidth	Const	LCN
0x0001	0x0001	750.000	8 MHz	64 QAM	yes

Figure-7

IP Output

Click "IP Output" from the left menu, it will display the screen as Figure-8 where to set the multicast IP Output address for the device if needed and set the IP output for the programs.

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

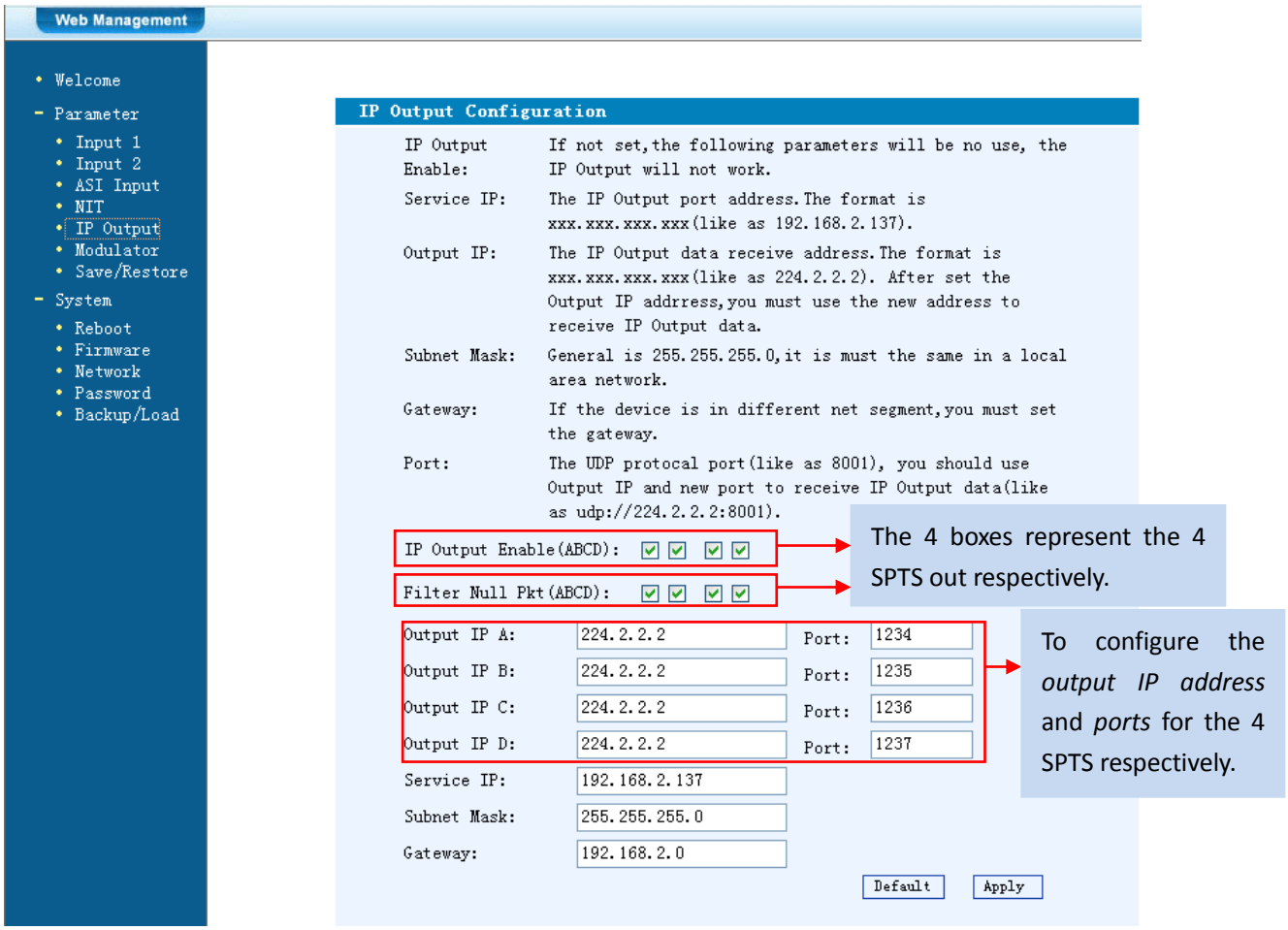


Figure-8

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/C/D) output or not.

Standard –Modulating standard selecting.

Constellation –QAM type selecting.

Symbol Rate – To set the symbol rate

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.

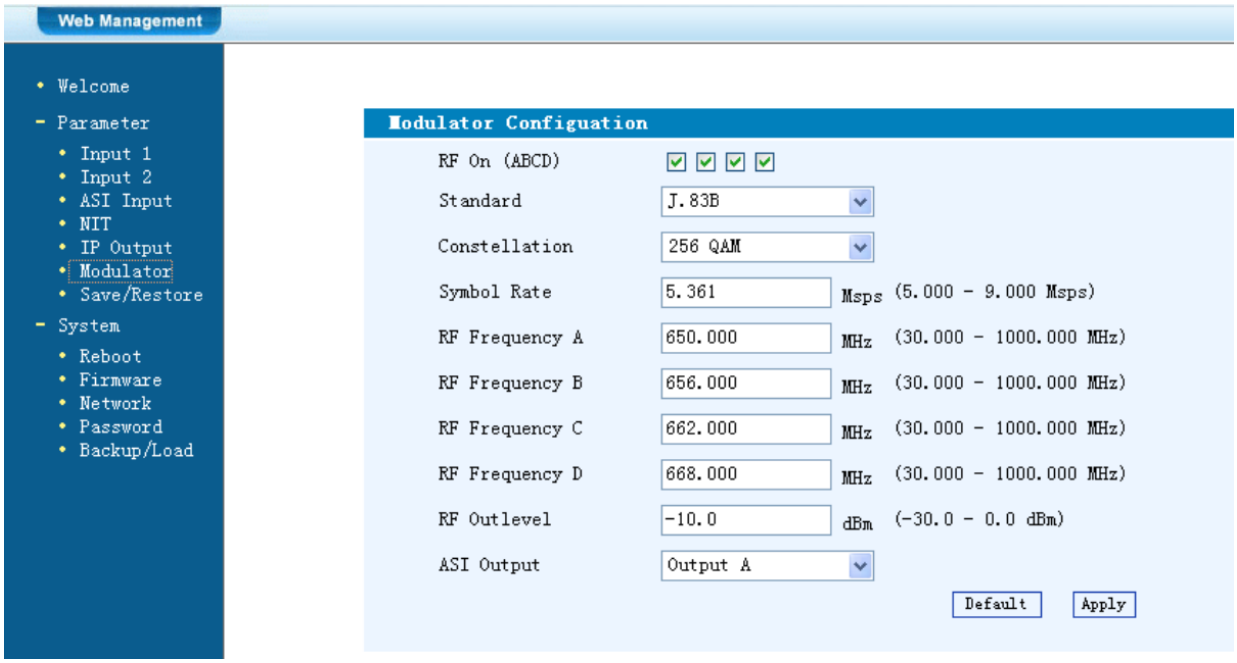


Figure-9

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.

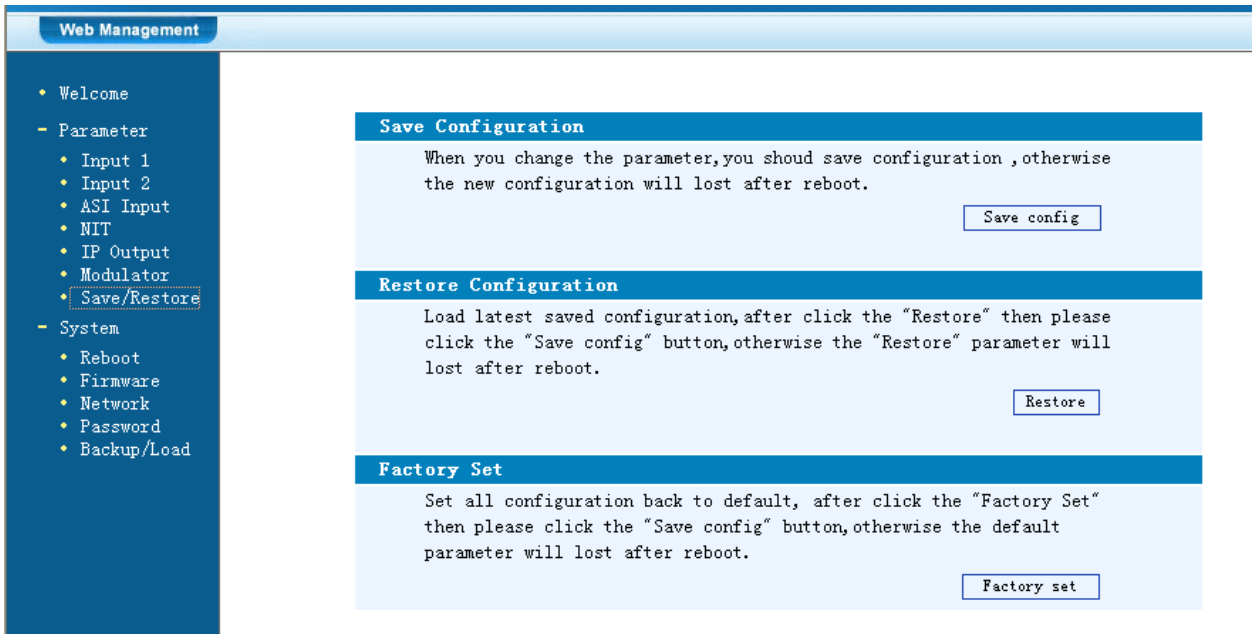


Figure-10

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.

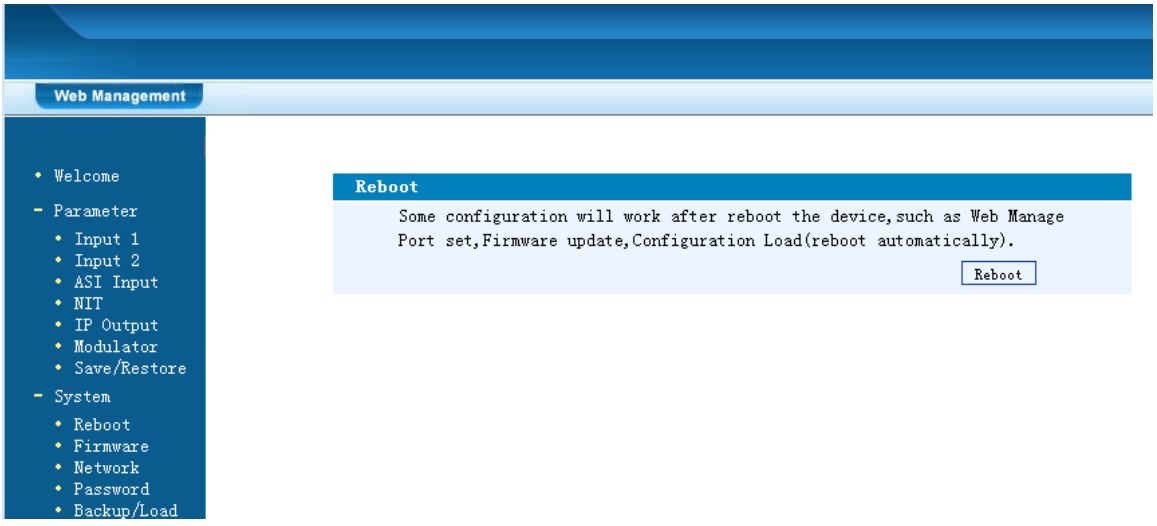


Figure-11

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.

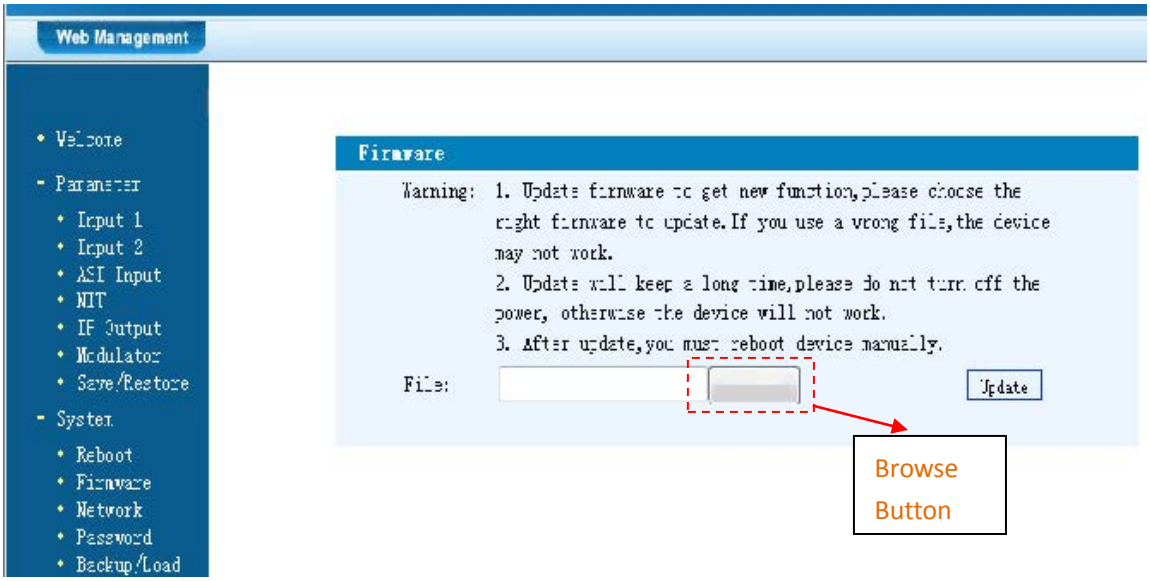


Figure-12

Network

When 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.

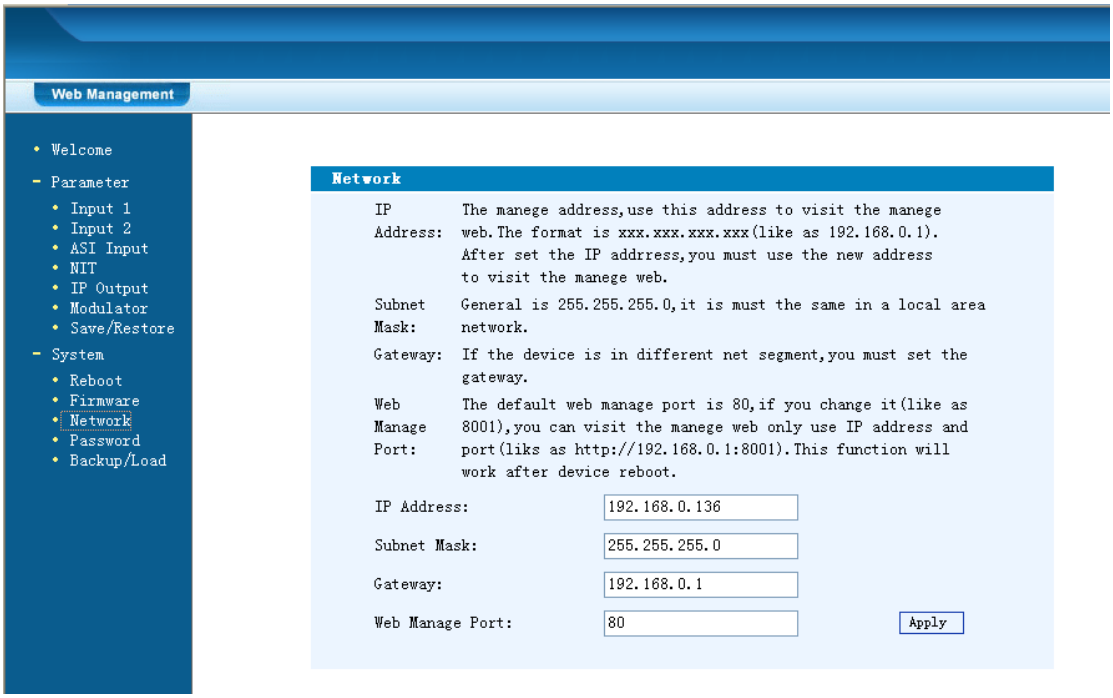


Figure-13

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.

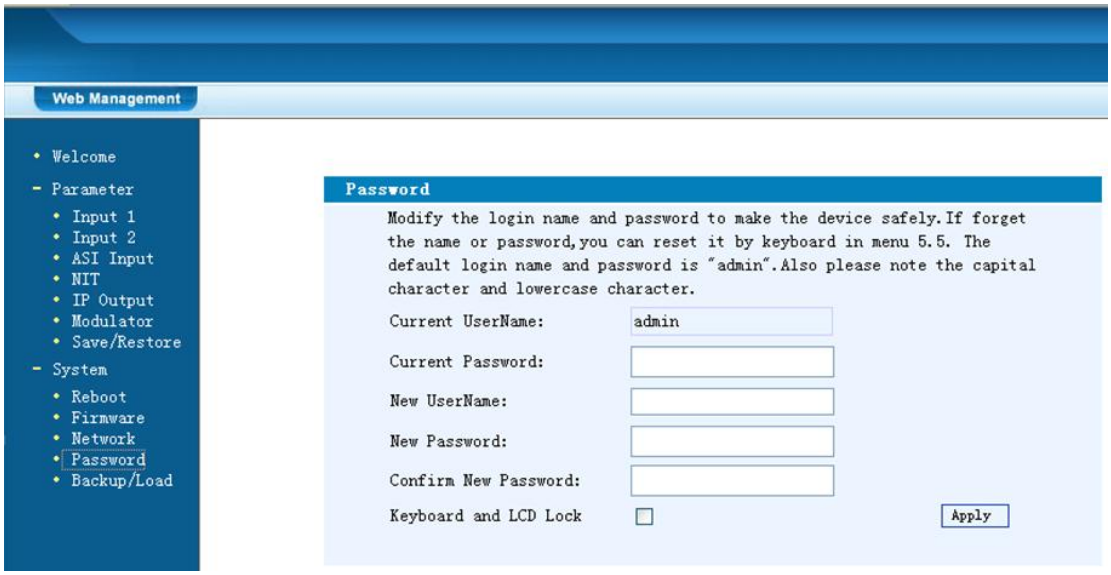
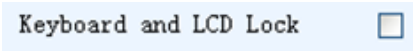
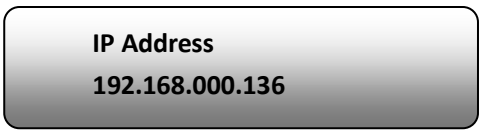


Figure-14



➢ Keyboard and LCD Lock: If it is marked with "√", the LCD and keyboard will be locked to avoid 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.



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.

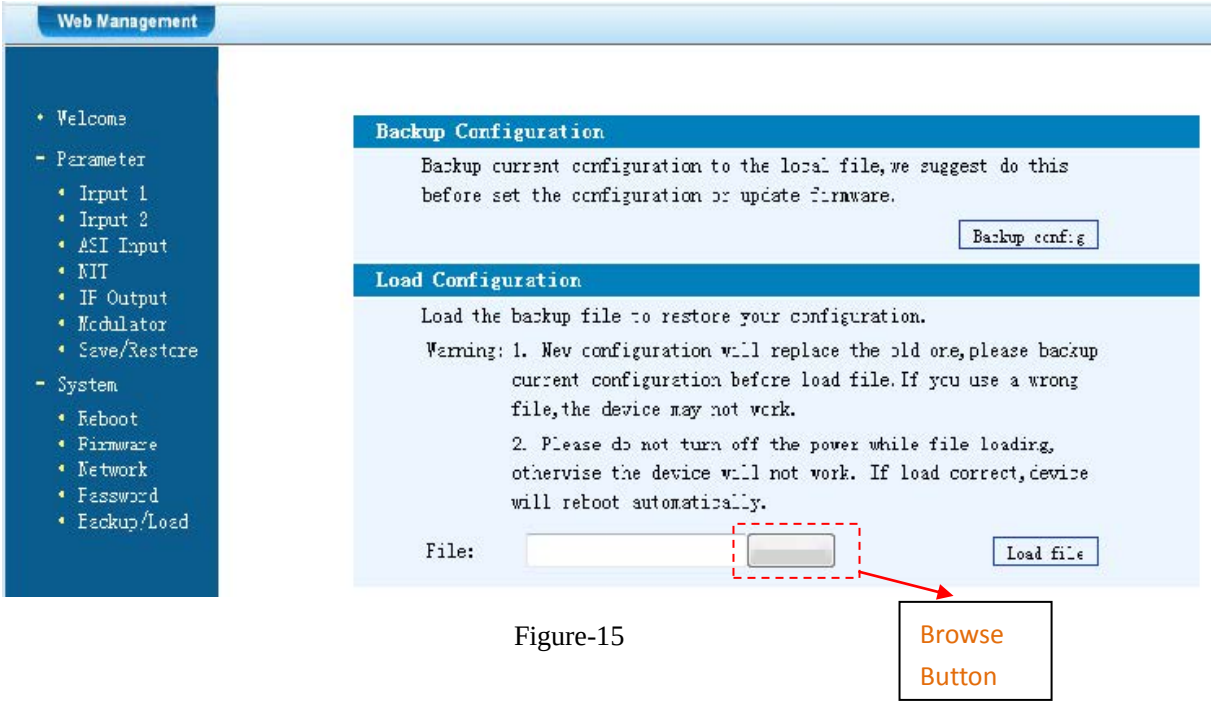


Figure-15

Chapter 5 Troubleshooting

Prevention Measure

- Installing the device at the place in which environment temperature between 0 to 45 ℃
- 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.

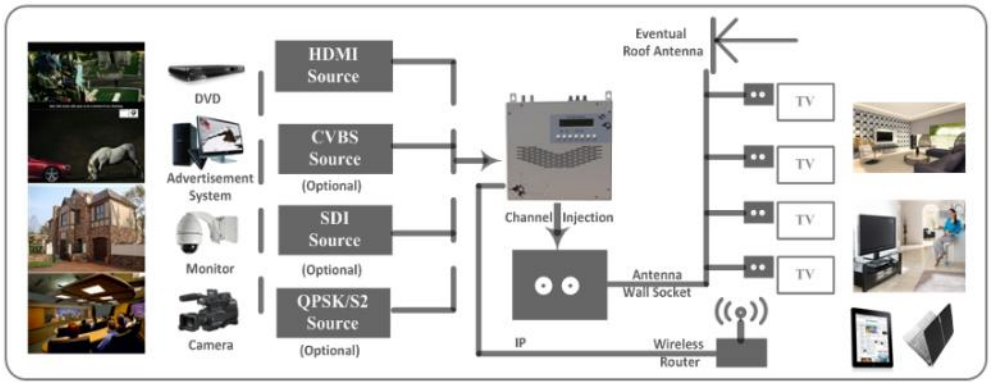
Conditions need to unplug power cord

- 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

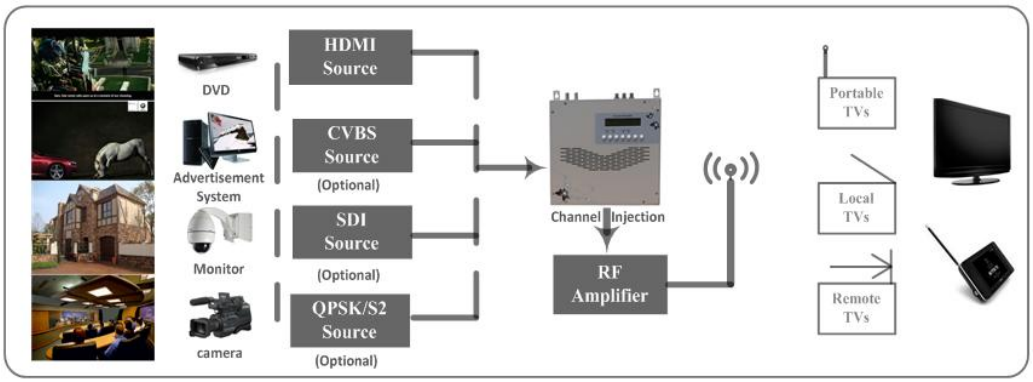
Chapter 6 Application

Application Examples

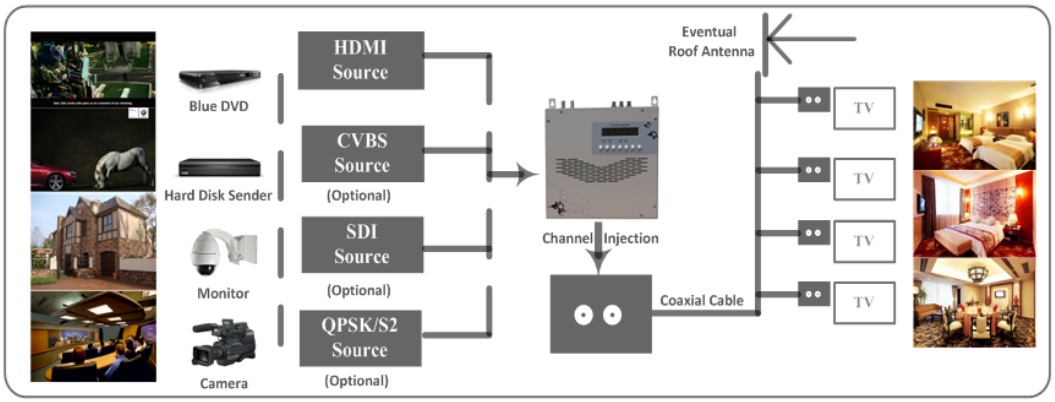
1). Residences and Private Homes Video content DVB-T/ISDB-T distribution



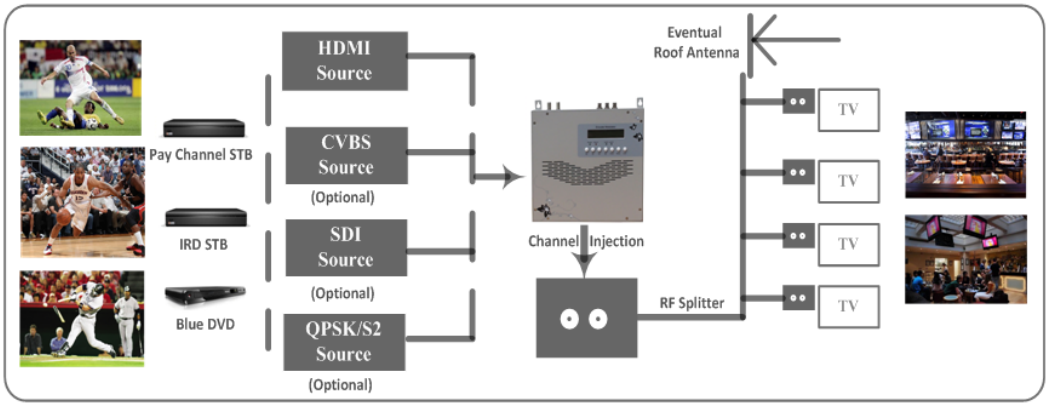
2) Outside Audio - Video contents ON - AIR DVB - T/ISDB-T distribution



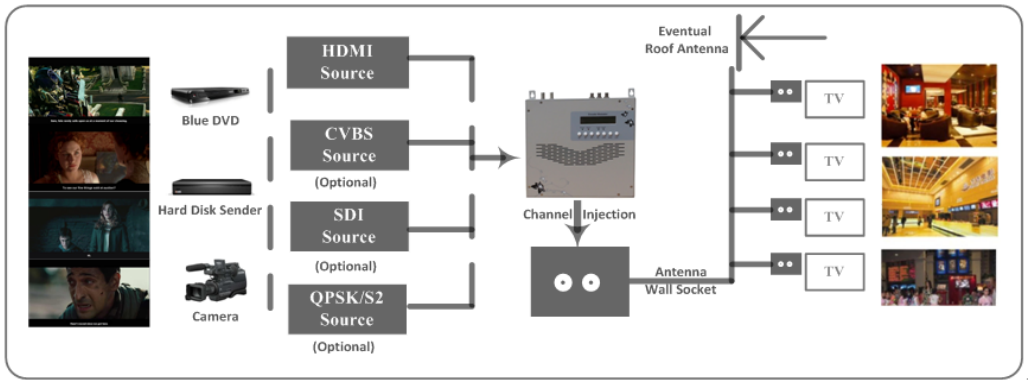
3) Hotel Audio - Video contents DVB - T/ISDB-T distribution



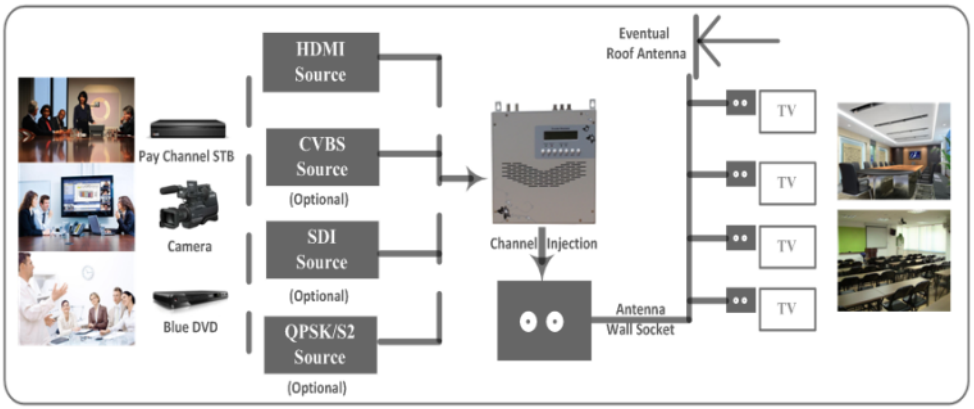
4) Bar Audio - Video contents distribution



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



6) Company Audio - Video contents distribution



Chapter 7 Packing List

B-QAM-SDI-IP-2CH-LL	1PC
Encoder Modulator User's	1PC
Manual	2PCs
SDI Cables	1PC
Power Cord	

APPENDIX

INTERNAL TEST REPORT OF LATENCY

(The values of average latency cover the progress from Encoding to Decoding.)

Decoding Terminal	Encoding Details					Average Latency (ms)
	Resolution	Encoding Bit Rate	Low Latency Mode	Single Source Interface	Video Format	
DVB-C HD STB	1080i@50	14M	Mode 1	HDMI	mpeg2	170
					H.264	347.5
				SDI	mpeg2	227.5
					H.264	367.5
			Mode 2	HDMI	mpeg2	222.5
					H.264	395
				SDI	mpeg2	240
					H.264	397.5
DVB-C HD STB	720p@50	14M	Mode 1	HDMI	mpeg2	85.75
					H.264	237.5
				SDI	mpeg2	127.5
					H.264	295
			Mode 2	HDMI	mpeg2	182.5
					H.264	277.5
				SDI	mpeg2	167.5
					H.264	325
DVB-C HD STB	576i@50	14M	Mode 1	HDMI	mpeg2	310
					H.264	600
				SDI	mpeg2	330
					H.264	620
			Mode 2	HDMI	mpeg2	270
					H.264	610
				SDI	mpeg2	280
					H.264	620

Safety Instructions

Read before operating equipment.

1. Cleaning - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
2. Power Sources - Use supplied or equivalent UL/CSA approved low voltage DC plug-in transformer.
3. Outdoor Antenna Grounding - If you connect an outside antenna or cable system to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
4. Lightning - Avoid installation or reconfiguration of wiring during lightning activity.
5. Power Lines - Do not locate an outside antenna system near overhead power lines or other electric light or power circuits or where it can fall into such power lines or circuits. When installing an outside antenna system, refrain from touching such power lines or circuits, as contact with them might be fatal.
6. Overloading - Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
7. Object and Liquid Entry - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts, resulting in a fire or electric shock. Never spill liquid of any kind on the product.
8. Servicing - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
9. Damage Requiring Service - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    - When the power supply cord or plug is damaged.
    - If liquid spills or objects fall into the product.
    - If the product is exposed to rain or water.
    - If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions. An improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
    - If the video product is dropped or the cabinet is damaged.
    - When the video product exhibits a distinct change in performance, this indicates a need for service.