

# THOR

BROADCAST

## User Manual



### 1-4 SDI to QAM Modulators and IPTV Streaming Encoders

### H-1/2/4SDI-QAM-IPLL

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# Chapter 1 Product Introduction

## 1.1 Outline

H-1/2/4SDI-QAM-IPLL series products are Thors'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 Digital RF output. It is equipped with 4 HDMI (4 SDI optional) channels input and 1 ASI input(optional) and output via 2 ASI ports(optional) and 1 DATA (4\*SPTS or 2 or 4 MPTS--as per carrier numbers) output over UDP, RTP/RTSP. The latency has been greatly reduced to achieve an extremely low value from the encoding progress to the decoding terminals.

It adopts an 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.

## 1.2 Main Features

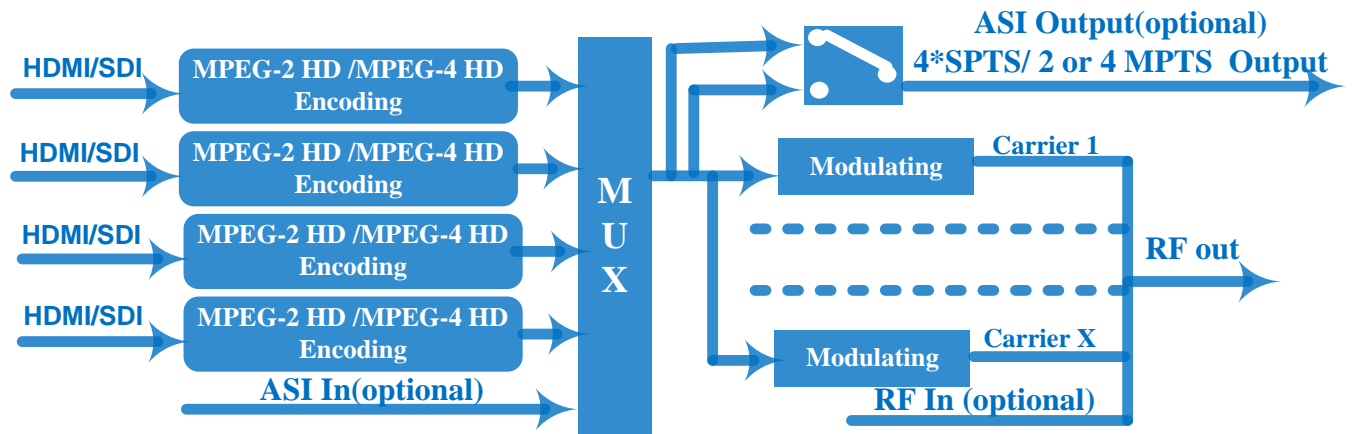
- **4\* HDMI/SDI inputs**
- **MPEG2 & MPEG4 AVC/H.264 HD/SD video encoding**
- **Up to 1920\*1080@50P/60P (MPEG4 AVC/H.264)**  
Up to 1920\*1080@50I/60I (MPEG2 HD)
- **Huge video buffer (for SDI interface)**
- **MPEG1 Layer II, MPEG2-AAC, MPEG4-AAC, AC3 2.0 (Optional) audio encoding**
- **1\*ASI input for re-mux and ASI out—(Optional);**
- **1\*RF input for mix—(Optional)**
- **Support CC (closed caption ) for SDI interface**
- **DVB-C/DVB-T/ATSC/ISDB-T RF out for option**
- **Support IP (4\*SPTS or 4\*MPTS) output over UDP, RTP/RTSP protocol---DVB-C/DVB-T/ATSC**
- **Support IP (4\*SPTS or 2\*MPTS) output over UDP, RTP/RTSP protocol---ISDB-T**
- **Extremely low latency**
- **LCN support (Logical Channel Number)**
- **Excellent modulation quality MER≥40dB**
- **RF Frequency range 50Mhz~960Mhz**
- **LCD display, Remote control and firmware**
- **Web NMS management; Updates via web**

### 1.3 Technical Specifications

<b>HDMI Encoder Board</b>	<b>Video</b>	Input	HDMI*2
		Encoding	MPEG2; MPEG4 AVC/H.264
		Bitrate	1-19.5Mbps
		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
		Support object resolution (for downscale conversion)	1920*1080_60i, 1920*1080_50i, 1440*1080_60i, 1440*1080_50i, 1280*720_60p, 1280*720_50P 720*480_60i, 720*576_50i
		Low Delay	Normal, Mode 1, Mode 2, Manual
		Chroma	4:2:0
		Aspect Ratio	16:9,4:3
	<b>Audio</b>	Encoding	MPEG1 Layer II;MPEG 2-AAC; MPEG 4-AAC and Dolby Digital AC3 2.0(optional)
		Dialog Normalization Applicable for DD AC3 encoding only)	-31 ~ -1 dB
		Sample rate	48KHz
Bitrate		64/96/128/ 192/256/320kbps	
<b>SDI Encoder Board</b>	<b>Video</b>	Encoding	MPEG2; MPEG4 AVC/H.264
		Input	SDI*2
		Bitrate	1-19.5Mbps
		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
		Support object resolution (for downscale conversion)	1920*1080_60i, 1920*1080_50i, 1440*1080_60i, 1440*1080_50i, 1280*720_60p, 1280*720_50P 720*480_60i, 720*576_50i
		Low Delay	Normal, Mode 1, Mode 2, Manual
		Chroma	4:2:0
		Aspect Ratio	16:9,4:3
	<b>Audio</b>	Encoding	MPEG1 Layer II ,MPEG2-AAC, MPEG4-AAC and Dolby Digital AC3 2.0(optional)
		Dialog Normalization Applicable for DD AC3 encoding only)	-31 ~ -1 dB
		Sample rate	48KHz
		Bitrate	64/96/128/ 192/256/320kbps

<b>Modulator Section</b>	<b>DVB-T</b>	Standard	DVB-T			
		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, 1/4			
		Transmission Mode	2K, 4K, 8K			
		MER	≥40dB			
		RF frequency	50~960MHz, 1KHz step			
		RF Out	4*DVB-T carriers(40MHz bandwidth)			
	RF output level	-20~ -3dbm, 0.1db step				
	<b>DVB-C (Optional)</b>	Standard	J.83A (DVB-C), J.83B, J.83C			
		MER	≥40dB			
		RF frequency	50~960MHz, 1KHz step			
		RF output level	-20~ +3dbm, 0.1db step			
		Symbol rate	3.000~9.000MSPS adjustable			
		RF Out	4*DVB-C carriers(40MHz bandwidth)			
			<b>J.83A</b>	<b>J.83B</b>	<b>J.83C</b>	
		Constellation	16/32/64/128/ 256QAM	64/ 256 QAM	64/ 256 QAM	
		Bandwidth	8M	6M	6M	
	<b>ATSC (Optional) (under developing)</b>	Standard	ATSC A/53			
		MER	≥40dB			
		RF frequency	50~960MHz, 1KHz step.			
		RF Out	4*ATSC carriers			
		RF output level	-20~ +3dbm, 0.1db step			
		Constellation	8VSB			
	<b>ISDB-T (Optional)</b>	Standard	ARIB STD-B31			
		Bandwidth	6M			
Constellation		QPSK, 16QAM, 64QAM				
Guard Interval		1/32, 1/16, 1/8, 1/4				
Transmission Mode		2K, 4K, 8K				
MER		≥40dB				
RF frequency		50~960MHz, 1KHz step				
RF Out		2*ISDBT carriers(30MHz bandwidth)				
RF output level		-20~ -3dbm, 0.1db step				
<b>General</b>	<b>System</b>	Local interface	LCD + control buttons			
		Remote management	Web NMS			
		Stream Out	2 ASI out (BNC type, same one mirror out ts as one of 4/2 MPTS outputs and 4 SPTS outputs) DVB-C/DVB-T/ATSC: IP (4 MPTS & 4 SPTS) out over UDP, RTP/RTSP ISDBT: IP (2 MPTS & 4 SPTS) out over UDP, RTP/RTSP			
		DATA Port	1000M			
		NMS interface	RJ45, 100M			
		Language	English			
		<b>Physical Specification</b>	Power supply	100~240VAC, 50/60Hz		
			Dimensions	482*400*44mm		
			Operation temperature	0~45°C		

## 1.4 Principle Chart



## 1.5 Major Technical Comparison

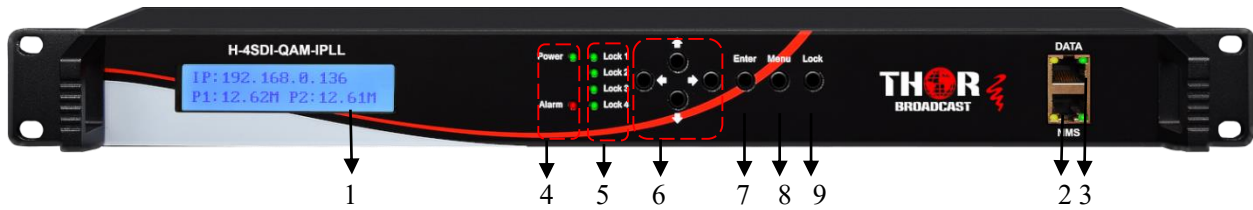
	The Former Version	The Current Version (V2)
<b>Bit rate Mode</b>	CBR/VBR option	CBR
<b>Audio Group/Pair option-SDI</b>	No	Yes
<b>Low Delay</b>	Normal/Mode 1/Mode 2	Normal/Mode 1/Mode 2/Manual
<b>Character Encoding option</b>	No	Yes
<b>DATA Port</b>	100M port	1000M port
<b>Frequency Range</b>	30-960MHz	50-960MHz
<b>Symbol Rate--DVB-C</b>	5-9Msps	3-9Msps
<b>ISDB-T carriers</b>	1 or 2 carriers for order option	2 carriers
<b>IP out--DVB-C</b>	1 MPTS and 4 SPTS	4 MPTS and 4 SPTS
<b>IP out--DVB-T</b>	4 SPTS	4 MPTS and 4 SPTS
<b>DVB-T carriers</b>	2 carriers	4 carriers

The other differences are existing in Web GUI design and chassis design etc(NMS/DATA port position), no further description here.

Updated on Dec 19<sup>th</sup>, 2022

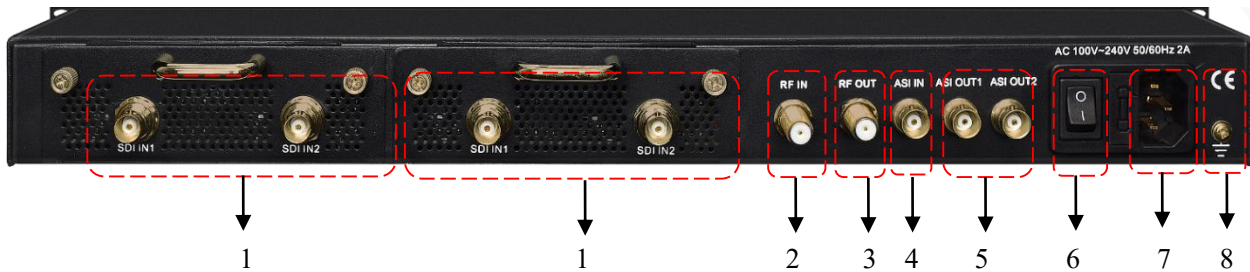
## 1.6 Appearance and Illustration

Front Panel Illustration:



1. LCD Screen
2. NMS Port
3. DATA Port
4. Power and Alarm Indicators
5. Lock 1 and Lock 2: SDI input locking status; Lock 3: ASI in locking status. Lock 4: useless
6. Up and Down, Left and Right Buttons
7. Enter Button: for confirm
8. Menu Button: for back step
9. Lock Button: To Lock the screen / cancel the lock state

Rear Panel Illustration:



1. SDI Input interface
2. RF in for mix
3. RF Output interface
4. ASI in for mux
5. ASI out
6. Power Switch
7. Power Socket
8. Grounding

## Chapter 2 Installation Guide

### 2.1 Acquisition Check

When users open the package of the device, it is necessary to check items according to packing list. Normally it should include the following items:

- Encoder Modulator
- Power Cord
- Ground lead

If any item is missing or mismatching with the list above, please contact local dealer.

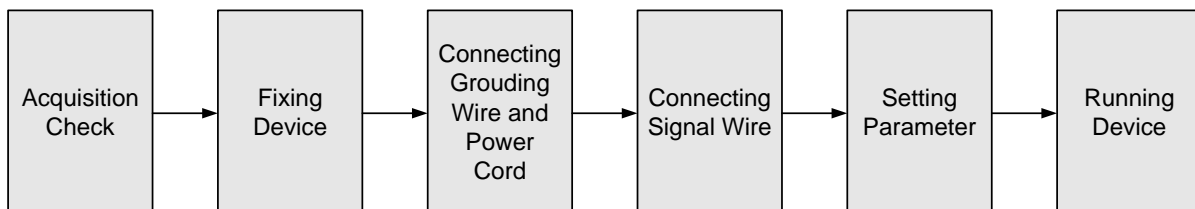
### 2.2 Installation Preparation

When users install device, please follow the below steps. The details of installation will be described at the rest part of this chapter. Users can also refer rear panel chart during the installation.

The main content of this chapter including:

- Checking the possible device missing or damage during the transportation
- Preparing relevant environment for installation
- Installing Encoder Modulator
- Connecting signal cables
- Connecting communication port (if it is necessary)

#### 2.2.1 Device's Installation Flow Chart is Illustrated as following:





## 2.2.2 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: $1 \times 10^7 \sim 1 \times 10^{10} \Omega$ , Grounding current limiting resistance: 1M (Floor bearing should be greater than $450 \text{Kg/m}^2$ )
Environment Temperature	5~40°C(sustainable ), 0~45°C(short time), installing air-conditioning is recommended
Relative Temperature	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 power 220V 50Hz. Please carefully check before running.

## 2.2.3 Grounding Requirement

- All function modules' good grounding designs are 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.
- Coaxial cable's outer conductor and isolation layer should keep proper electric conducting with the metal housing of device.
- 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  $25 \text{mm}^2$ .

## 2.2.4 Frame Grounding

All the machine frames should be connected with protective copper strip. The grounding wire should be as short as possible and avoid circling. The area of the conduction between grounding wire and grounding strip should be no less than 25mm<sup>2</sup>.

## 2.2.5 Device Grounding

Connecting the device's grounding rod to frame's grounding pole with copper wire.

## 2.3 Wire's Connection

The grounding wire conductive screw is located at the right end of rear panel, and the power switch, fuse, power supply socket is just beside ,whose order goes like this, power switch is on the left ,power supply socket is on the right and the fuse is just between them.

- Connecting Power Cord

User can insert one end into power supply socket, while insert the other end to AC power.

- Connecting Grounding Wire

When the device solely connects to protective ground, it should adopt independent way, say, share the same ground with other devices. When the device adopts united way, the grounding resistance should be smaller than 1Ω.

---

☞ **Caution:**

**Before connecting power cord to this Encoder Modulator, user should set the power switch to “OFF”.**

## Chapter 3 Keyboard Operation

This Encoder Modulator's front panel is user-operating interface. Before operating, users can decide whether directly use the default setting or customize the input and output parameters setting. The detailed operations go as follows:

### Keyboard Function Description:

**ENTER:** Activating the parameters which need modifications, or confirming the change after modification.

**MENU:** To cancel presently entered value, resume previous setting and return to previous menu.

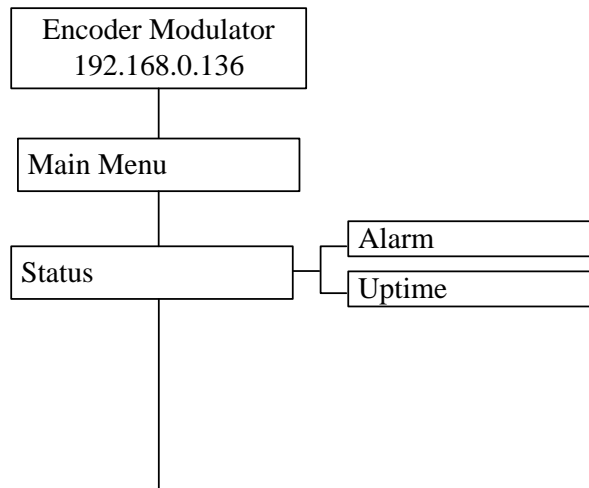
**LEFT/RIGHT:** To move the “▶” to choose or set the parameters.

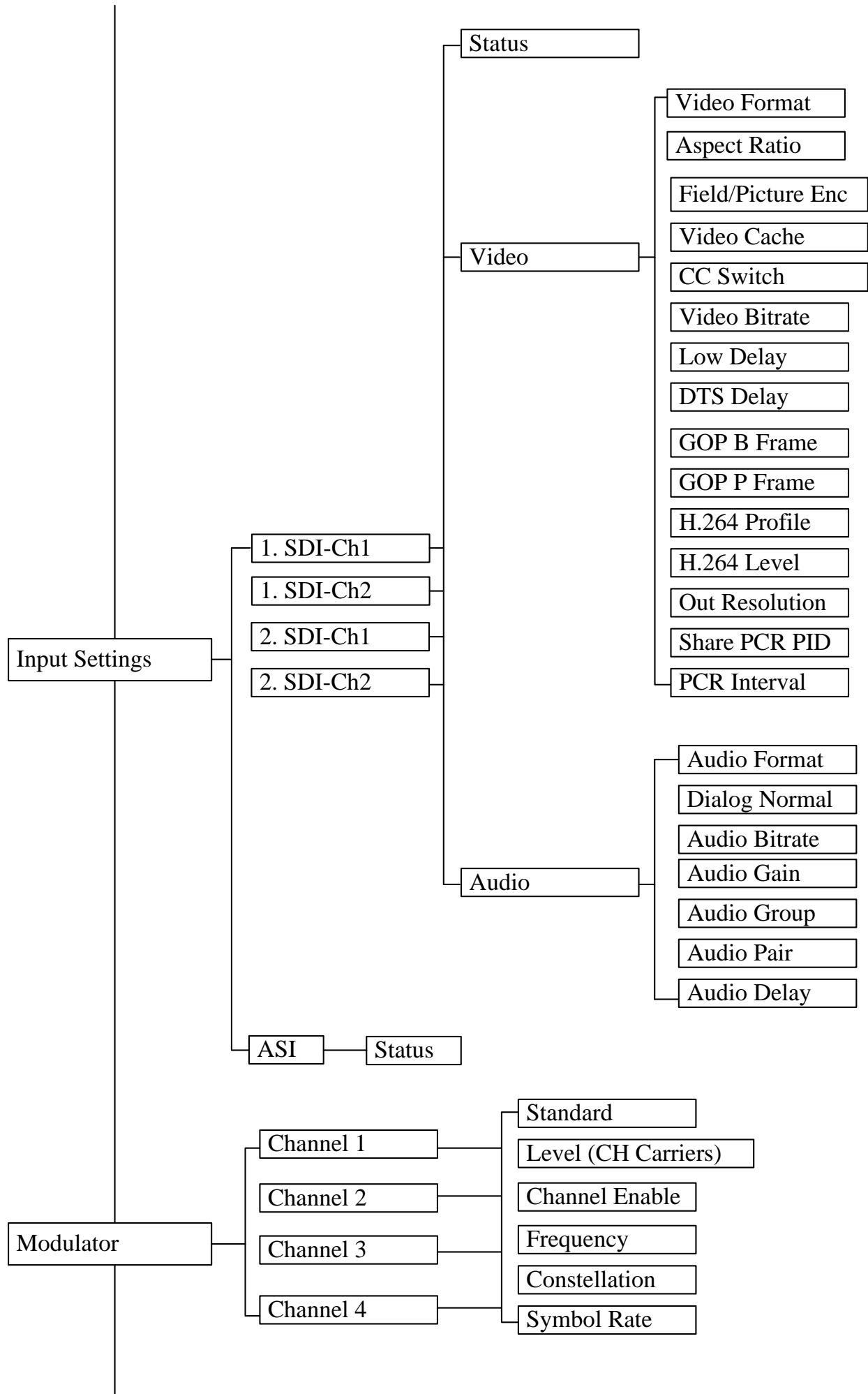
**UP/DOWN:** To modify activated parameter or page up/down when parameter is inactivated.

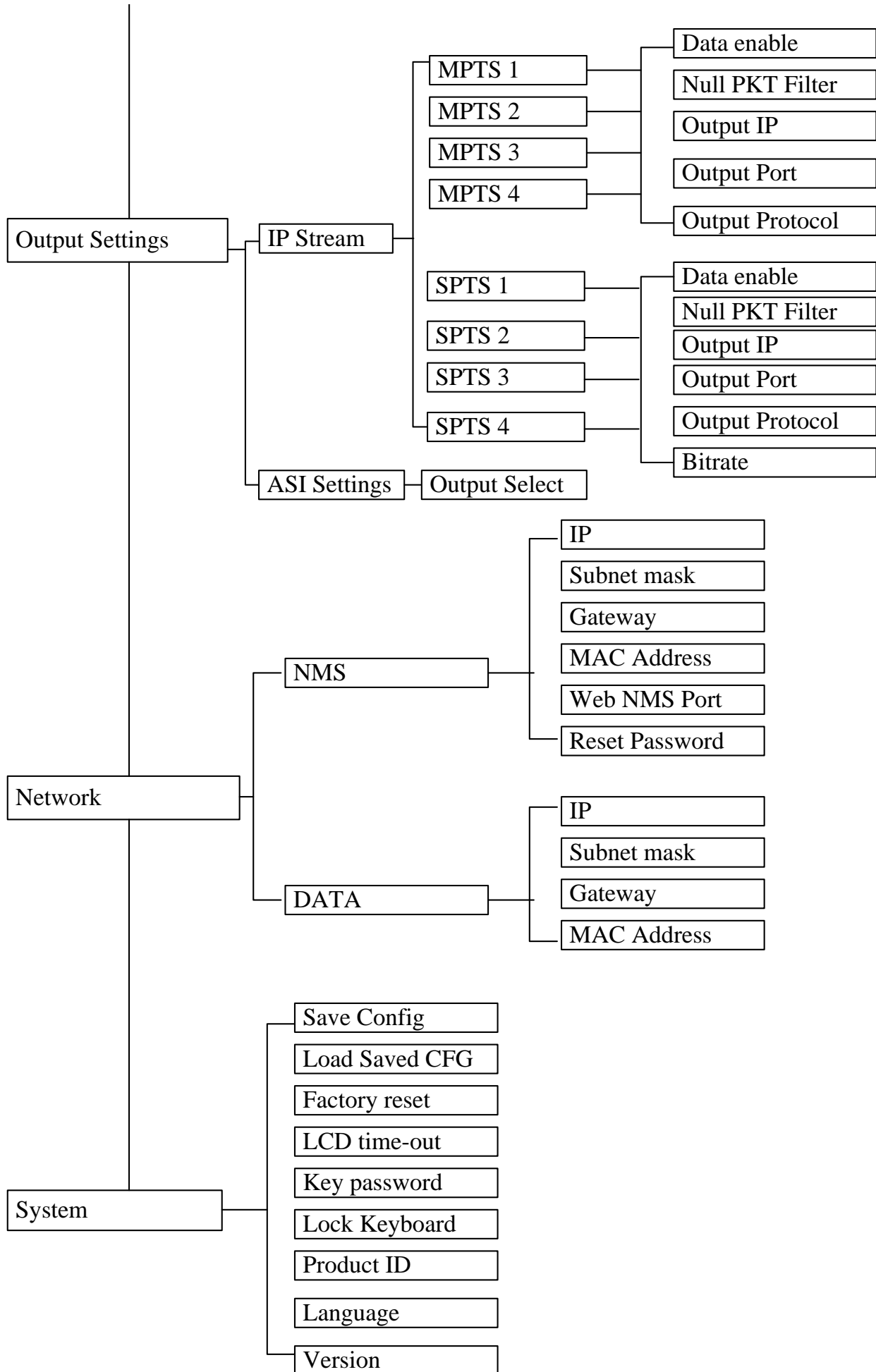
**LOCK:** To Lock the screen / cancel the lock state. After pressing lock key, the system will question the users to save present setting or not. If not, the LCD will display the current configuration state.

At the “Factory Configuration” page, user can press “ENTER” key to restore the factory default configuration.

### 3.1 LCD Menu Tree







## Chapter 4 WEB NMS operation

Users can not only use front buttons for setting configuration, but also 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 this device 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.

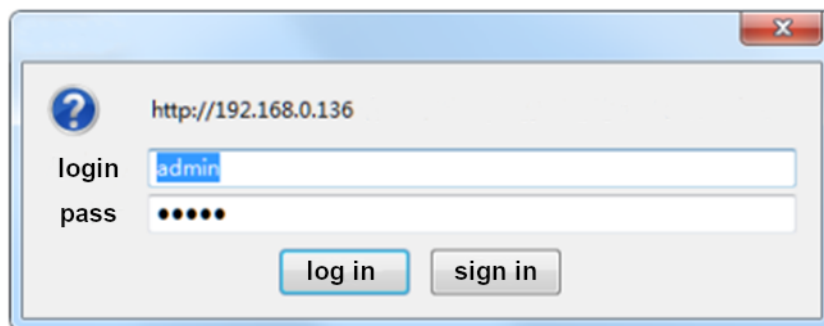


Figure-1

### 4.2 Operation

#### Status

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

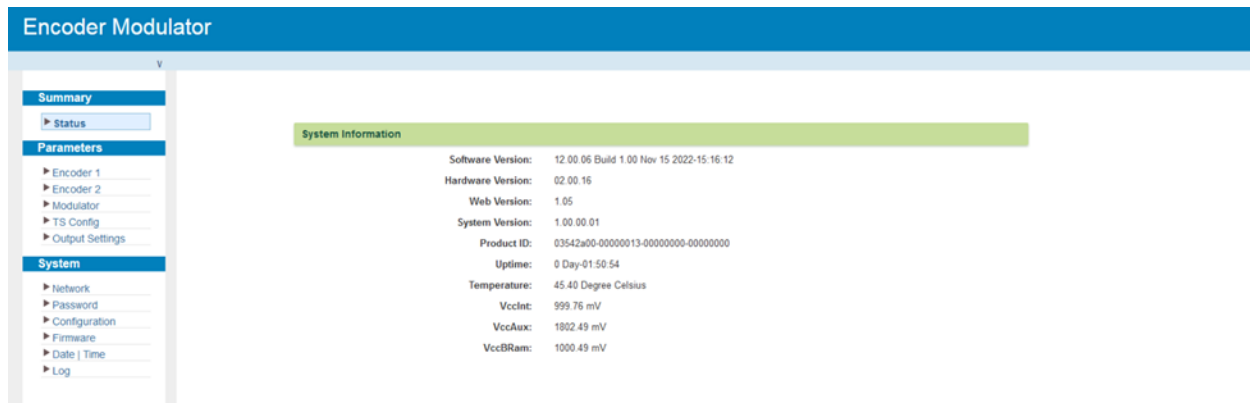


Figure-2

## Encoder 1 & 2

From the menu on left side of the webpage, clicking “Encoder 1 or Encoder 2”, it displays the information of the programs from the encoding boards as Figure-3.

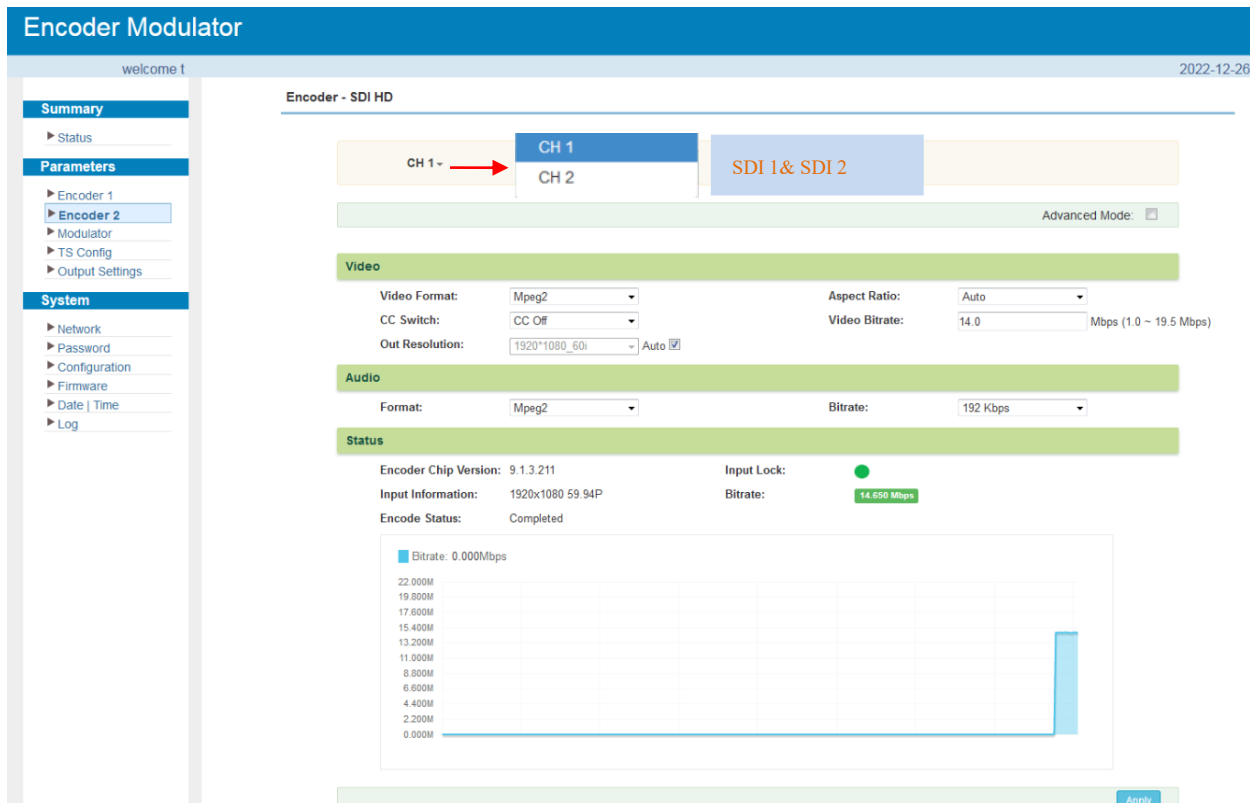


Figure-3

And check the box of Advanced Mode to get a more detailed parameter-setting menu as Figure-4.

**Encoder Modulator**

welcome to use Web IV 2022-12-26

**Encoder - SDI HD**

CH 1

**Parameters**

Encoder 1: 1920\*1080\_60i  
Encoder 2: 1920\*1080\_50i  
Modulator: 1440\*1080\_50i  
TS Config: 1280\*720\_60p  
Output Settings: 720\*480\_50i, 720\*576\_50i

**System**

Main Profile: Main Profile  
Configuration: Main Profile  
Firmware: High Profile  
Date | Time

**Video**

Video Format: Mpeg2  
CC Switch: CC Off  
Out Resolution: 1920\*1080\_60i  Auto  
Video Cache: Off  
H.264 Profile: Main Profile  
Low Delay: Manual  
GOP Bframe: 2 (<= 3)  
PCR Interval: 20 (1 ~ 500ms)

Aspect Ratio: Auto  
Video Bitrate: 14.0  
Field/Picture Encoding: Picture  
H.264 Level: Level 4  
DTS Delay: 200 (1 ~ 500)  
GOP Pframe: 4 (<= 6)  
Share PCR PID:

**Audio**

Format: Mpeg2  
Dialog Normalization: -31 (-31 ~ -1 dB)  
Audio Pair: Pair 1  
Audio Delay: 0 (-1000 ~ 1000ms)

Bitrate: 192 Kbps  
Audio Group: Group 1  
Audio Gain: 100 (0 ~ 400%)

**Status**

Encoder Chip Version: 9.1.3.211  
Input Information: 1920x1080 59.94P  
Encode Status: Completed  
Input Lock:   
Bitrate: 14.728 Mbps

Not ticking "Auto", users can set an output resolution not higher than the input resolution.

General Settings for the input programs: Users can edit any item listed as needed. Ticking Share PCR PID means Video PID and PCR PID are the same one.

Encoding status monitoring: Signal locking, input resolution, encoding bitrate etc

After parameters setting, clicking "Apply" to make the setting take effect.

**Apply**

Figure-4

### Low Delay setting

This encoder modulator can achieve the low delay from encoding side to STB decoding side. User can configure the low delay option accordingly in the Web GUI as Figure-5:

**Video**

Video Format: Mpeg2  
CC Switch: CC Off  
Out Resolution: 1920\*1080\_60i  Auto  
Video Cache: Off  
H.264 Profile: Main Profile  
Low Delay: Normal  
GOP Bframe: 2 (<= 3)  
PCR Interval: 20 (1 ~ 500ms)

Aspect Ratio: Auto  
Video Bitrate: 14.0 Mbps (1.0 ~ 19.5 Mbps)  
Field/Picture Encoding: Picture  
H.264 Level: Level 4  
DTS Delay: 200 (1 ~ 500)  
GOP Pframe: 4 (<= 6)  
Share PCR PID:

Normal  
Normal  
Mode 1  
Mode 2  
Manual

Figure-5

There are 4 low delay options:

1. **Normal:** to disable the low delay function.
2. **Mode 1:** to activate the low delay function in the default Mode 1 configuration.



3. **Mode 2:** to activate the low delay function in the default Mode 2 configuration.
4. **Manual:** to configure DTS Delay, GOP B frame and GOP P frame to get a low delay result accordingly.

The delay is mainly affected by the different combination of **Video Format, Video Bit-rate, Low delay Mode and the Resolution** of signal source etc.

**NOTE:** The delay duration will also be impacted as the decoding performance of the STB side change. Users need to apply a well-performed STB or other decoding terminals to achieve a low delay.

### TS Config

Click “TS Config”, it will display the encoded program information as Figure-6. Users can parse and multiplex encoded programs in this interface.

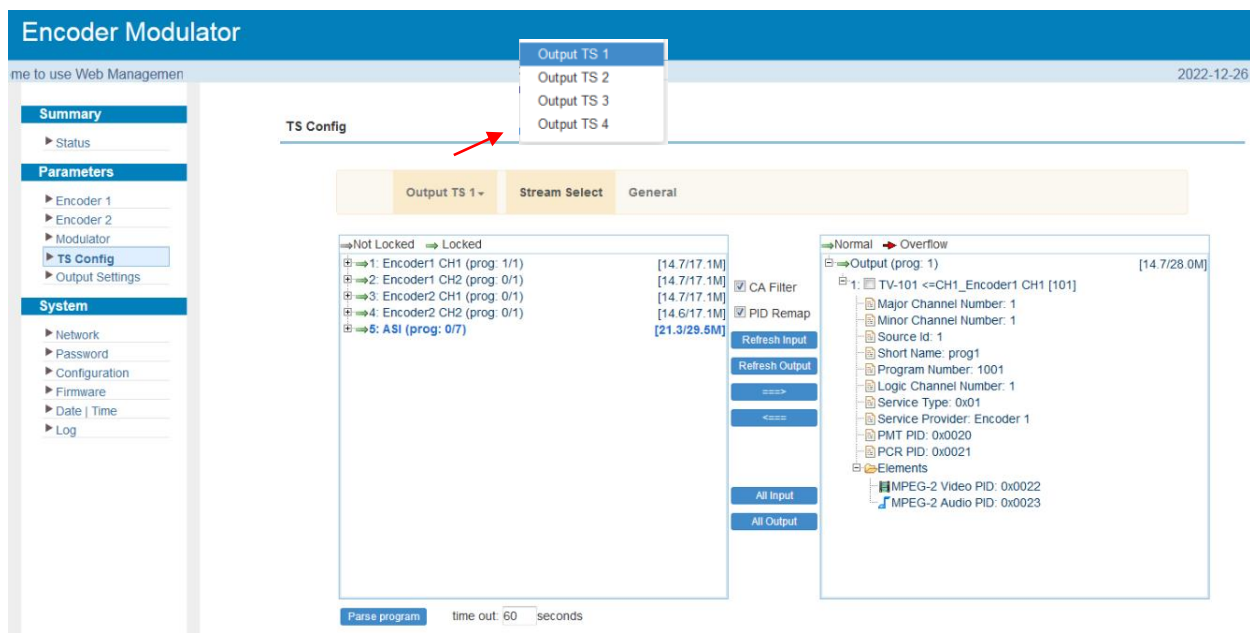


Figure-6

Output TS 1/2/3/4 represents the 4 carrier outputs and 4 MPTS out. Users can configure different program group for each carrier output as needed.

- CA Filter** : To enable/disable the CA filter
- PID Remap**: To enable/disable the PID remapping
- Refresh Input** To refresh the input program information
- Refresh Output** To refresh the output program information

Select the wanted input program(s) firstly and click this button to transfer the selected program(s) to output.

Cancel the multiplexed programs from the output area after your program selection.

To select all the input programs

To select all the output programs

To parse programs  seconds time limitation of parsing input programs

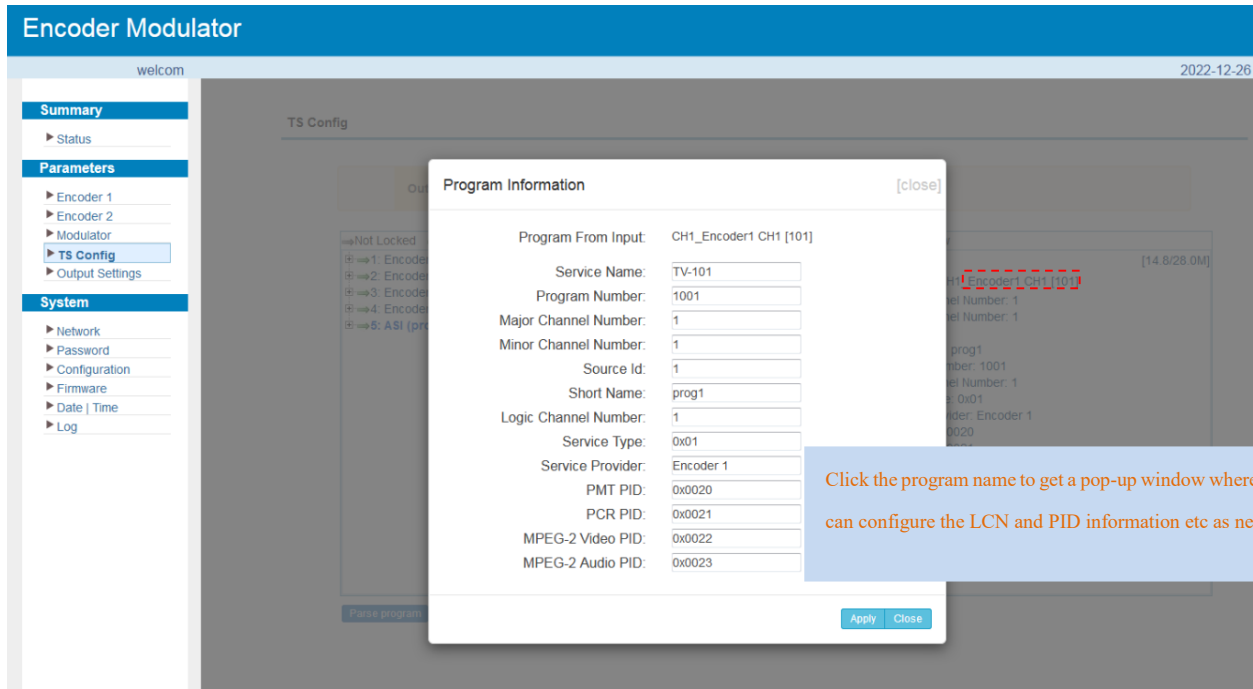


Figure-7

## General

Click “General” from the menu to set Character Encoding option according to the program name language, VCT and NIT etc as Figure-8.

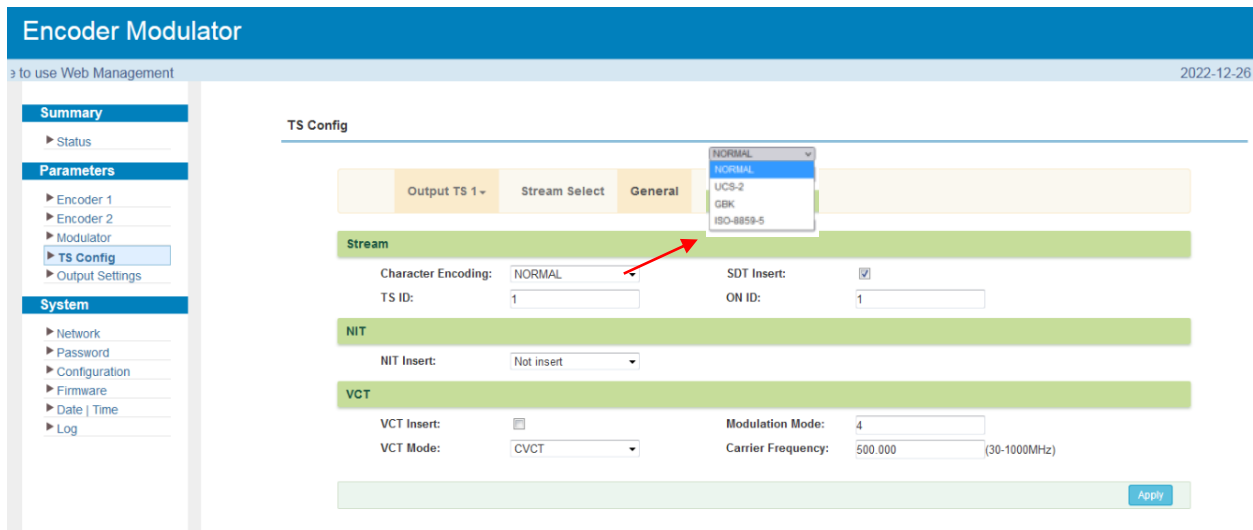


Figure-8

Set Web Insert for NIT Insert and Click “+” from this page, it will display the screen as Figure-9 where it requires to add NIT descriptor. Please follow your configuration in Modulator page to edit the NIT descriptor.

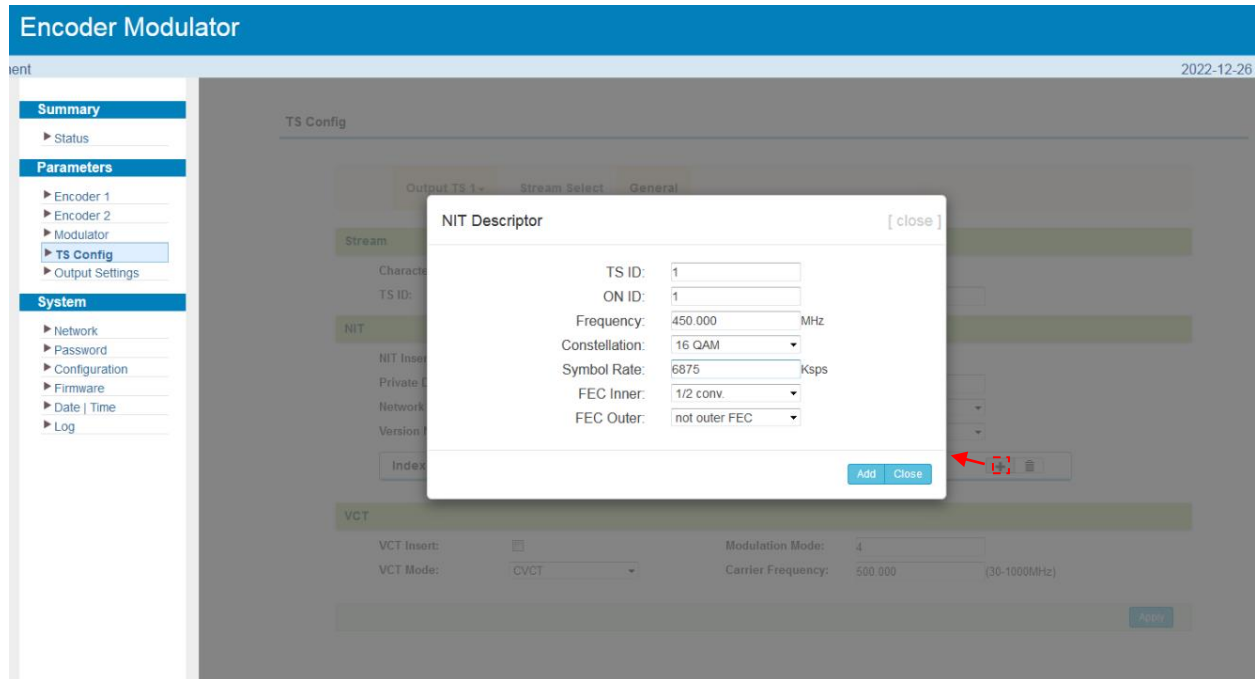


Figure-9

## Modulator

This unit is equipped with 4 DVB-C frequencies output. User can configure the modulation parameters of the 4 carrier outputs by clicking the .

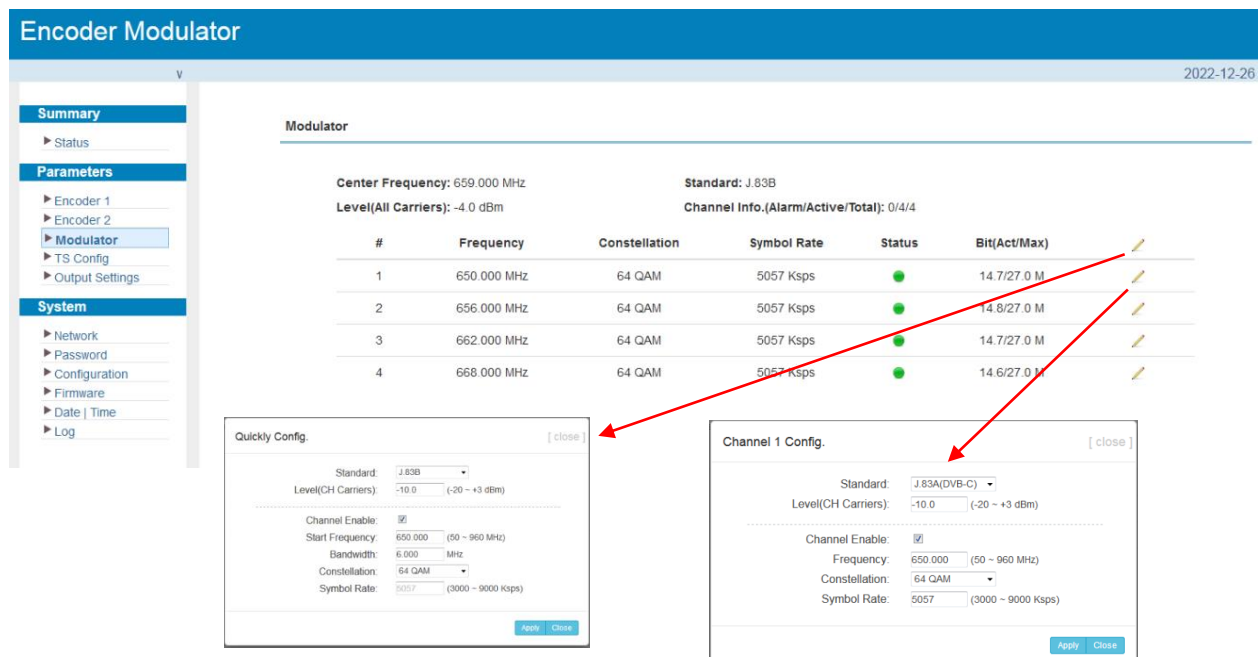


Figure-10

## Output Settings

Click “Output Settings” from the left menu, it will display the page as Figure-11 where to configure the 4 MPTS output and 4 SPTS Output by clicking the .

The screenshot shows the 'Encoder Modulator' web interface. The left sidebar contains a menu with 'Output Settings' selected. The main area displays 'Output Settings' for 'IP Stream(GE\_DATA)'. A table lists 8 outputs (MPTS 1-4 and SPTS 1-4) with columns for #, IP Address, Port, Protocol, Pkt Length, Null PKT Filter, Program, Status, and Bit(Act/Max). Three configuration pop-ups are overlaid: 'Quickly Config.' at the top, 'MPTS 1 Config.' at the bottom left, and 'SPTS 1 Config.' at the bottom right. Red arrows point from the pencil icons in the table to these pop-ups. The 'SPTS 1 Config.' pop-up also shows a 'Program' dropdown menu with options like 'TV-101(MPTS1)', 'TV-101(MPTS1)', 'TV-102(MPTS2)', 'TV-201(MPTS3)', 'TV-202(MPTS4)', and 'CGTN(MPTS4)'.

Figure-11

## Network

When user clicks “Network”, it will display the page as Figure-12. It displays the network information of the device. Here users can change the device network configuration as needed.

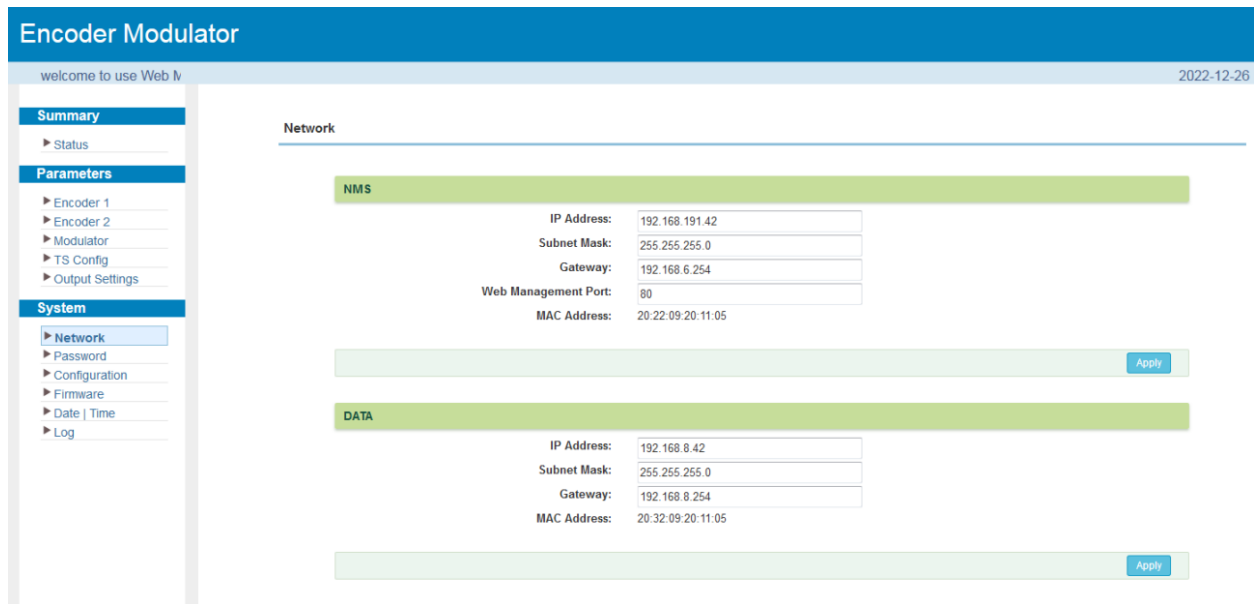


Figure-12

## Password

From the menu on left side of the webpage, clicking “Password”, it will display the screen as Figure-13 where to set the login account and password for the web NMS.

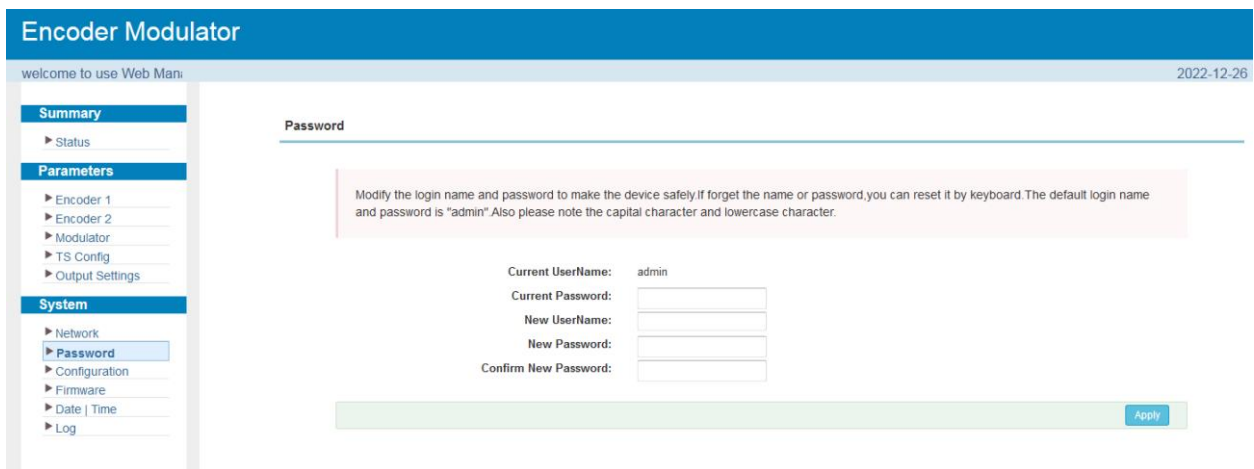


Figure-13

## Configuration

From the menu on left side of the webpage, clicking “Configuration”, it will display the page as Figure-14 where to save, restore, make factory set, backup and load your configurations.

### Encoder Modulator

Management 2022-12-26

- Summary
- ▶ Status
- Parameters
- ▶ Encoder 1
- ▶ Encoder 2
- ▶ Modulator
- ▶ TS Config
- ▶ Output Settings
- System
- ▶ Network
- ▶ Password
- ▶ Configuration
- ▶ Firmware
- ▶ Date | Time
- ▶ Log

#### Configuration

Save Restore Factory Set Backup Load

When you change the parameter,you should save configuration ,otherwise the new configuration will lost after reboot.

Save config

### Encoder Modulator

welcome to use Web Iv 2022-12-26

- Summary
- ▶ Status
- Parameters
- ▶ Encoder 1
- ▶ Encoder 2
- ▶ Modulator
- ▶ TS Config
- ▶ Output Settings
- System
- ▶ Network
- ▶ Password
- ▶ Configuration
- ▶ Firmware
- ▶ Date | Time
- ▶ Log

#### Configuration

Save Restore Factory Set Backup Load

Load latest saved configuration,after click the "Restore" then please click the "Save config" button,otherwise the "Restore" parameter will lost after reboot.

Restore

### Encoder Modulator

ment 2022-12-26

- Summary
- ▶ Status
- Parameters
- ▶ Encoder 1
- ▶ Encoder 2
- ▶ Modulator
- ▶ TS Config
- ▶ Output Settings
- System
- ▶ Network
- ▶ Password
- ▶ Configuration
- ▶ Firmware
- ▶ Date | Time
- ▶ Log

#### Configuration

Save Restore Factory Set Backup Load

Set all configuration back to default, after click the "Factory Set" then please click the "Save config" button,otherwise the default parameter will lost after reboot.

Factory set

### Encoder Modulator

ib Management 2022-12-26

- Summary
- ▶ Status
- Parameters
- ▶ Encoder 1
- ▶ Encoder 2
- ▶ Modulator
- ▶ TS Config
- ▶ Output Settings
- System
- ▶ Network
- ▶ Password
- ▶ Configuration
- ▶ Firmware
- ▶ Date | Time
- ▶ Log

#### Configuration

Save Restore Factory Set Backup Load

Backup current configuration to the local file,we suggest do this before set the configuration or update firmware.

Backup config

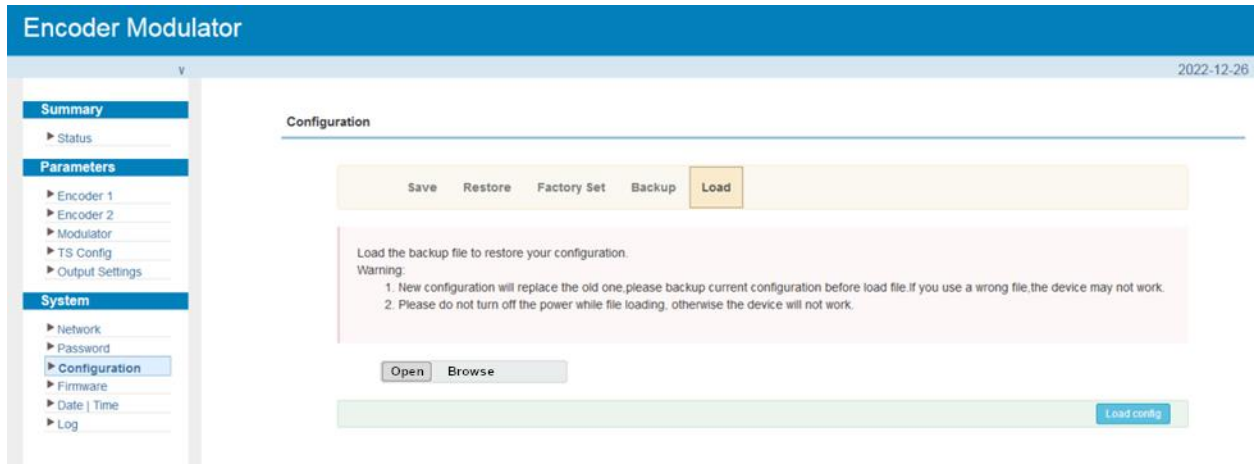


Figure-14

## Firmware

From the menu on left side of the webpage, clicking “Firmware”, it will display the screen as Figure-15 where to update firmware for the device.

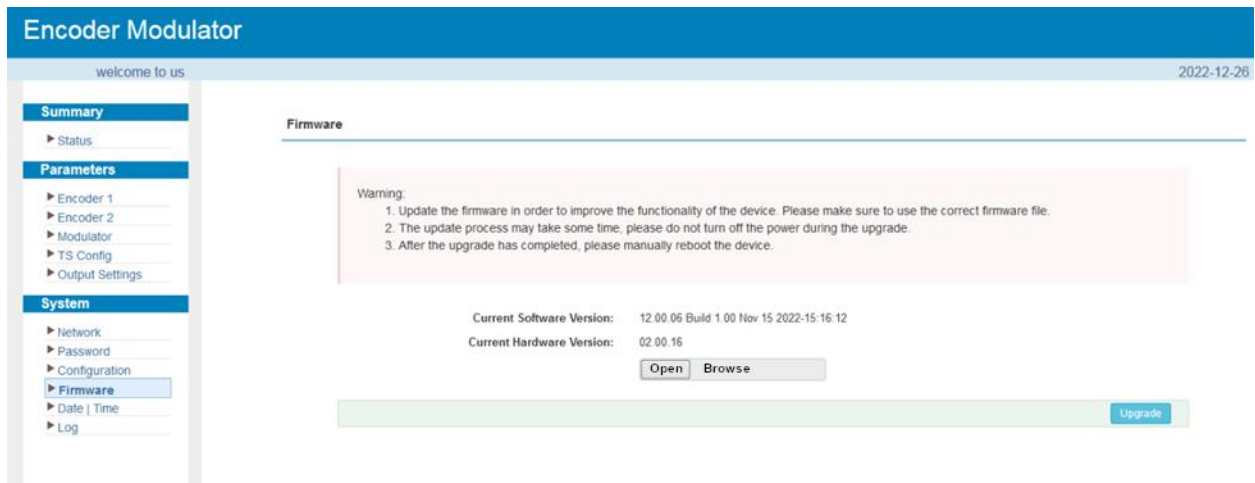


Figure-15

## Date | Time

Users can set timezone and configure NTP server to update Date and Time in the device.

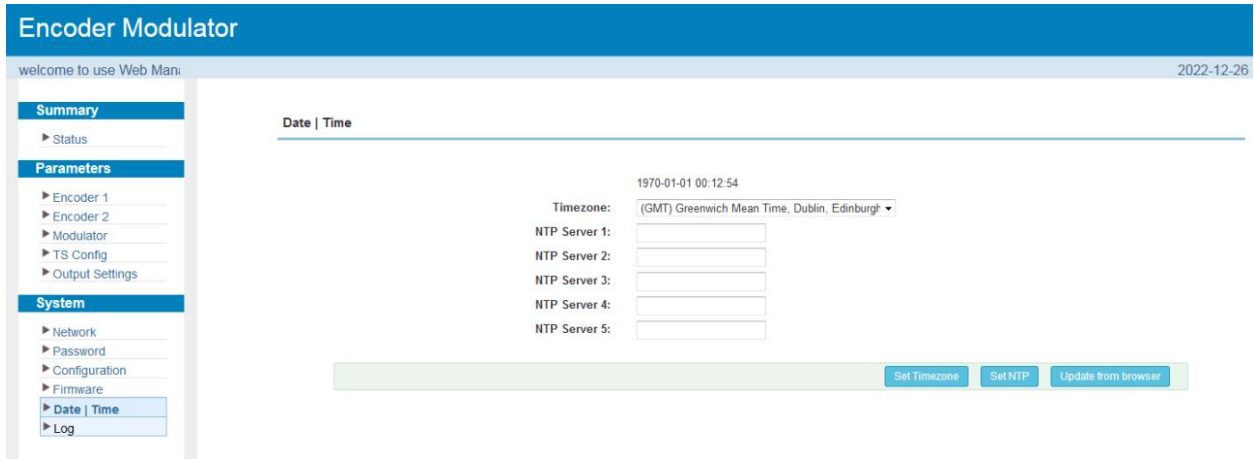


Figure-16

**Log:**

The Kernel and System log here are for the R&D debugging reference.

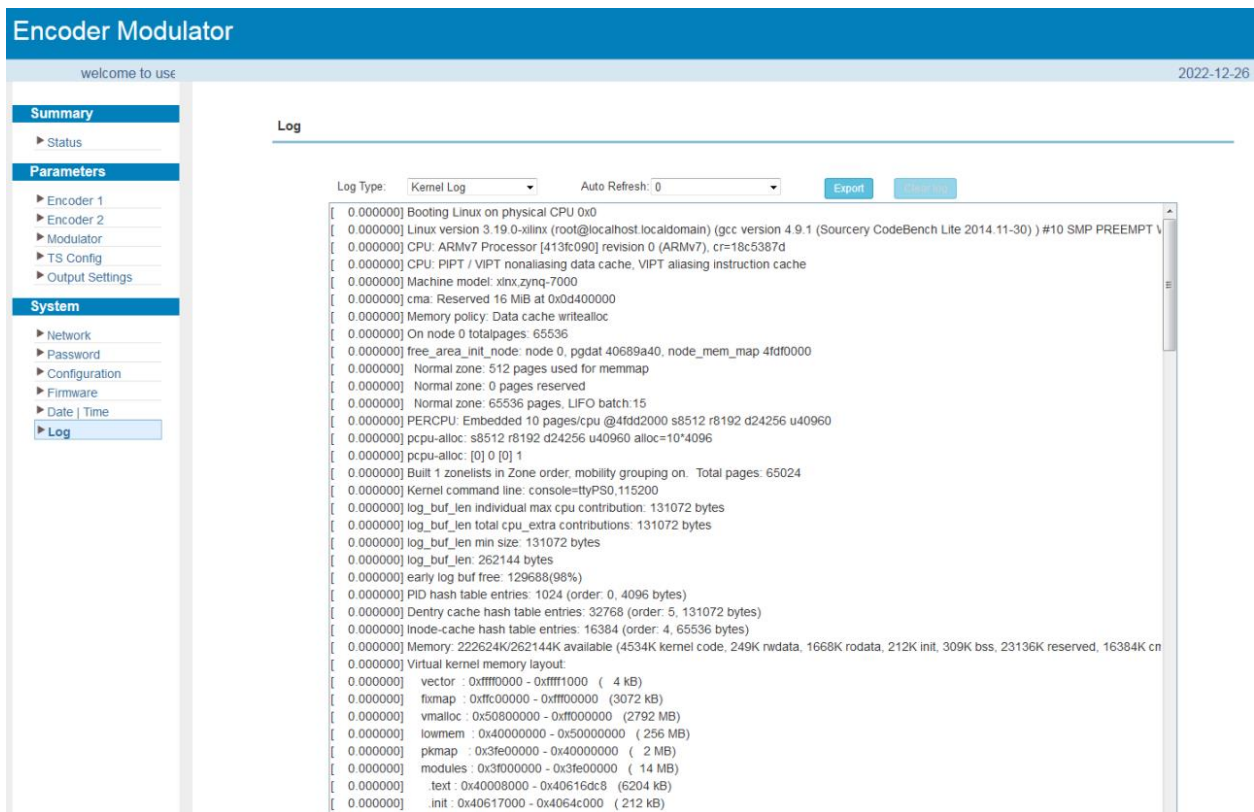


Figure-17



## Chapter 5 Troubleshooting

Our ISO9001 quality assurance system has been approved by CQC organization. For guarantee the products' quality, reliability and stability. All of our products have been passed the testing and inspection before ship out factory. The testing and inspection scheme already covers all the Optical, Electronic and Mechanical criteria which have been published by us. 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

- Encoder Modulator 1 pc
- Power cord 1 pc
- Ground Lead 1 pc