



12 Channel HDMI or SDI CATV RF Modulator IP Encoder QAM/ATSC/DVB-T/ISDB-T

H-12HDMI-QAM-IPLL



H-12HDMI-QAM-IPLL
H-12HDMI-ATSC-IPLL
H-12HDMI-DVB-T-IPLL
H-12HDMI-ISDB-T-IPLL

H-12SDI-QAM-IPLL



H-12SDI-QAM-IPLL
H-12SDI-ATSC-IPLL
H-12SDI-DVB-T-IPLL
H-12SDI-ISDB-T-IPLL

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

Product Overview

The Thor Broadcast H-12HDMI-QAM-IPLL Encoder-RF Modulator is a professional high capacity solution for any headend that requires integration of encoding, multiplexing, scrambling and modulating. It supports 12 HDMI and 12 CC inputs, one DVB-C tuner input and 512 IP input through Data1 (GE) port. It also supports DVB-C RF out with 16 non-adjacent carriers and supports 16 MPTS which mirror the 16 carriers through the Data2 (GE) output port. To meet customers' various requirements, it is also equipped with 1 ASI output as mirror of one of RF output carriers. Managed through any modern web browser, each encoder can be independently adjusted for bitrate, codecs, and video image qualities. Encoding support for the MPEG-2, or H.264, codec along with Dolby AC/3 audio ensure that the programs generated by this encoder can be used around the world on a global scale.

Key Features

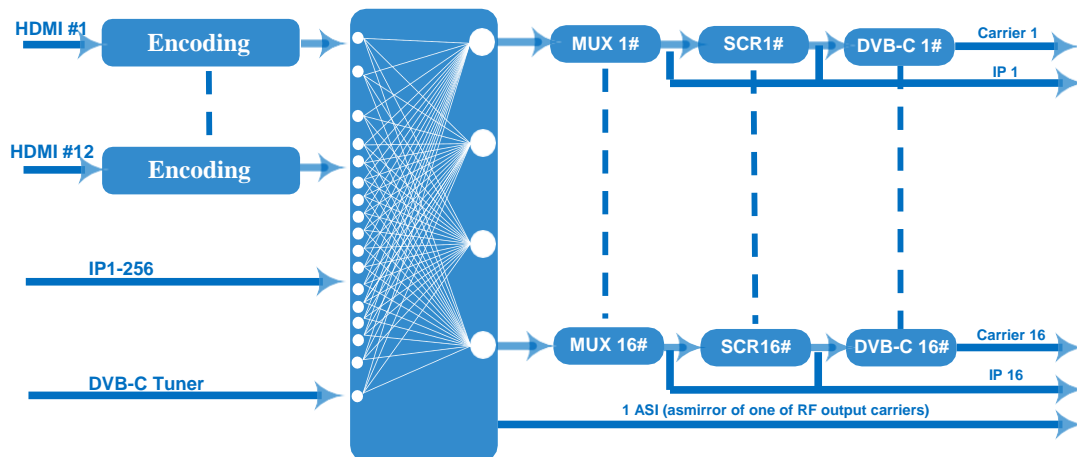
- **12 HDMI inputs with MPEG2 & MPEG4 AVC/H.264 Encoding**
- **12 CC (Closed Caption) inputs**
- **1DVB-C (ATSC optional) tuner input for re-mux**
- **512 IP(DATA1 port only) input over UDP and RTP protocols**
- **MPEG1 Layer II, MPEG2-AAC, MPEG4-AAC, Dolby Digital AC3 (2.0) encoding (Optional), AC3 (2.0/5.1) passthrough**
- **16 groups multiplexing/Scrambling/DVB-C modulating**
- **1 ASI out as mirror of one of RF output carriers**
- **16 MPTS IP (DATA2 port only) output over UDP, RTP/RTSP**
- **PID remapping/ accurate PCR adjusting/PSI/SI editing and inserting**
- **Control via web management, and easy updates via web**

Specifications

Input	12 HDMI inputs 12 CC(closed caption) input, BNC interface 1 DVB-C(ATSC optional) Tuner for re-mux, F type interface 512 IP input over UDP and RTP, DATA1, RJ45	
Video	Input	1920*1080_60p, 1920*1080_50p, 1920*1080_60i, 1920*1080_50i, 1280*720_60p, 1280*720_50P, 720*480_60i, 720*576_50i
	Output	1920*1080_60p, 1920*1080_50p, 1920*1080_60i, 1920*1080_50i, 1440*1080_60i, 1440*1080_50i, 1280*720_60p, 1280*720_50P, 720*576_50p, 720*576_50i, 720*576_30p, 720*576_25p, 720*480_60p, 720*480_60i, 720*480_30p, 720*480_25p, 320*240_60p, 320*240_50p, 320*240_30p, 320*240_25p, 320*180_60p, 320*180_50p, 320*180_30p, 320*180_25p, 960*540_50i, 704*576_50i, 704*480_60i, 640*576_50i, 640*480_60i, 544*576_50i, 544*480_60i,
	Resolution	
	Encoding	MPEG2 & MPEG4 AVC/H.264
	Bit-rate	0.8~19Mbps for H.264 encoding 1~19Mbps for MPEG-2 encoding
	Rate Control	CBR/VBR
	GOP Structure	GOP B Frame: 0-3, GOP P Frame: 0-6
	Advanced Pretreatment	De-interlacing, noise reduction
Audio	Encoding	MPEG1 Layer II, MPEG2-AAC, MPEG4-AAC, Dolby Digital AC3 (2.0) encoding (Optional), AC3 (2.0/5.1) passthrough
	Sampling rate	48KHz
	Bit-rate	64Kbps-320kbps each channel
Multiplexing	Maximum PID Remapping	180 input per channel
	Function	PID remapping (automatically or manually)
		Accurate PCR adjusting Generate PSI/ SI table automatically
Scrambling	Maximum simulcrypt CA	4
	Standard	ETR289, ETSI 101197, ETSI 103197
	Connection	Local/remote connection
Modulation		QAM Channel: 16 non-adjacent carriers output (maximum bandwidth 192MHz)

	DVB-C	Standard: EN300 429/ITU-T J.83A/B	
		MER: ≥ 40 db	
		RF frequency: 50~960MHz, 1KHz step	
		RF output level: -20~+10dbm, 0.1db step	
		J.83A	J.83B
	Constellation	16/32/64/128/256QAM	64/256 QAM
	Bandwidth	8M	6M
Stream output	RF output (F type interface)		
	1 ASI output as mirror of one of RF output carriers		
	16 MPTS output over UDP and RTP/RTSP as mirror of 16 DVB-C carriers, 1*1000M Base-T Ethernet interface		
System function	Network management (WEB)		
	English		
	Ethernet software upgrade		
Miscellaneous	Dimension (W×L×H)	482mm×440mm×44mm	
	Environment	0~45°C(work); -20~80°C (Storage)	
	Power requirements	AC 110V± 10%, 50/60Hz, AC 220 ± 10%, 50/60Hz	

Flow Chart



Appearance and Description

Front and Rear Panel Illustration



1	RF test and RF out port
2	Power supply and Grounding Pole
3	12 HDMI and 12 CC input port
4	Reset Key
5	LED Indicators
6	ASI output port
7	DATA Port (DATA1 and DATA2 for IP stream input/output, DATA 3 for upgrading modules)
8	NMS port for web-based management
9	RF in and Loop out port

Chapter 2 Installation Guide

Please use caution when operating this device in order to abstain from any possible injuries during installation. For this reason, please read all details listed below and make sure you use caution before proceeding to operate and use this device.

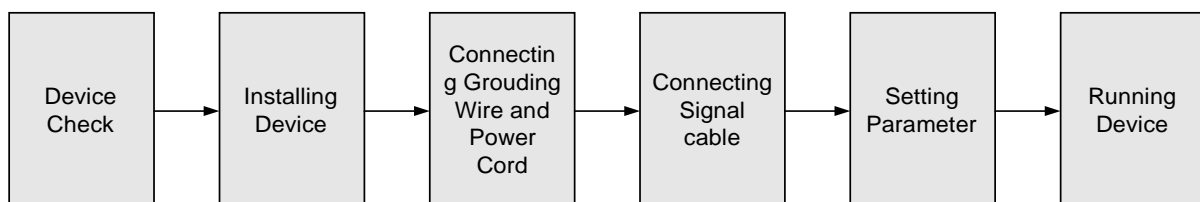
General Precautions

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

Power precautions

- When you connect the power source, make sure it is grounded correctly so it doesn't cause an 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.

Device's Installation Flow Chart Illustrated as following



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: $1 M\Omega$ (Floor bearing should be greater than 450Kg/m^2)
Environment Temperature	$5 \sim 40^\circ\text{C}$ (sustainable) , $0 \sim 45^\circ\text{C}$ (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 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 $110\text{V} \pm 10\%$, 50/60Hz or AC $220\text{V} \pm 10\%$, 50/60Hz. Please carefully check before running.

Grounding Requirement

- ✓ It is important to keep this device grounded to ensure all of the modules function correctly. Correctly grounding the device will also help prevent any electrical interference, lightning. Etc. Also it helps reject minor interference that may disrupt the devices ability to function smoothly. General rule of them, make sure the device is grounded when installing anywhere.
- ✓ Always use copper wire. When applied correctly the ground must be wrapped

well to ensure maximum conduction so it can reduce any high frequencies. The copper ground wire should also be as short and thick as possible

- ✓ Installer must make sure that the two ends of the ground are well conducted and have appropriate anti-rust properties.
- ✓ It is prohibited to use any other device as part of the grounding electric circuit.
- ✓ The area of the conduction between the ground wire and device's frame should be no less than 25 m².

Chapter 3 WEB NMS Operation

You must connect the Encoder Modulator to a PC in order to setup the configuration, to control and set configure the settings you must plug the device into web NMS Port. Users should ensure that the computer's IP address is different from this device's IP address; otherwise, it would cause IP conflict.

Login

The default IP address of this device is 192.168.0.136.

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 1 to 254 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.

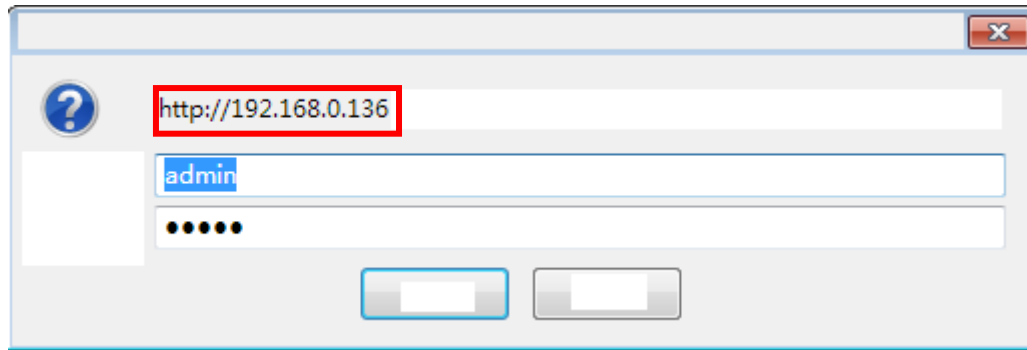


Figure-1

Operation

Summary→Status

When we login into encoder module, it displays the status interface as Figure-2.

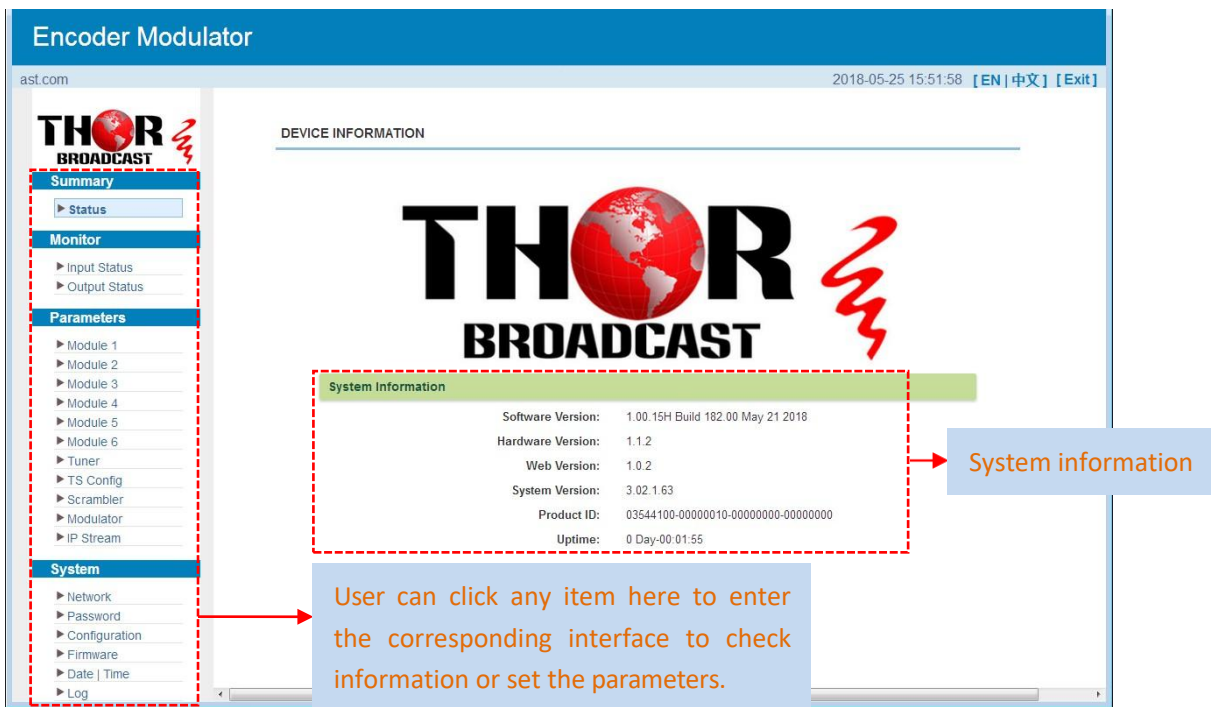


Figure-2

Monitor→Input Status

➤ Module

Clicking “Input Status→Module”, it displays the interface where users can check the encoding status of each module as Figure-3.

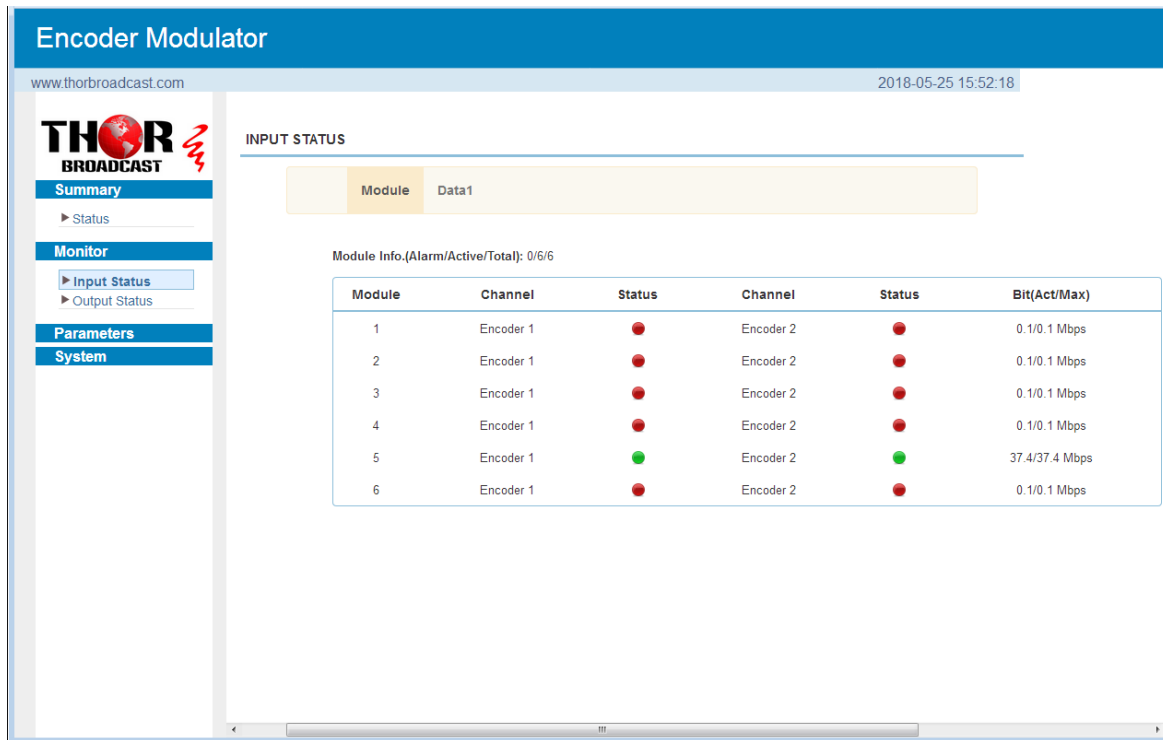


Figure-3

➤ Data1

Clicking “Input Status→Data1”, it displays the interface where users can check the Data1 input status after adding IP input from data1 port in the “TS Config”, and the interface displays the following as shown in Figure-4.

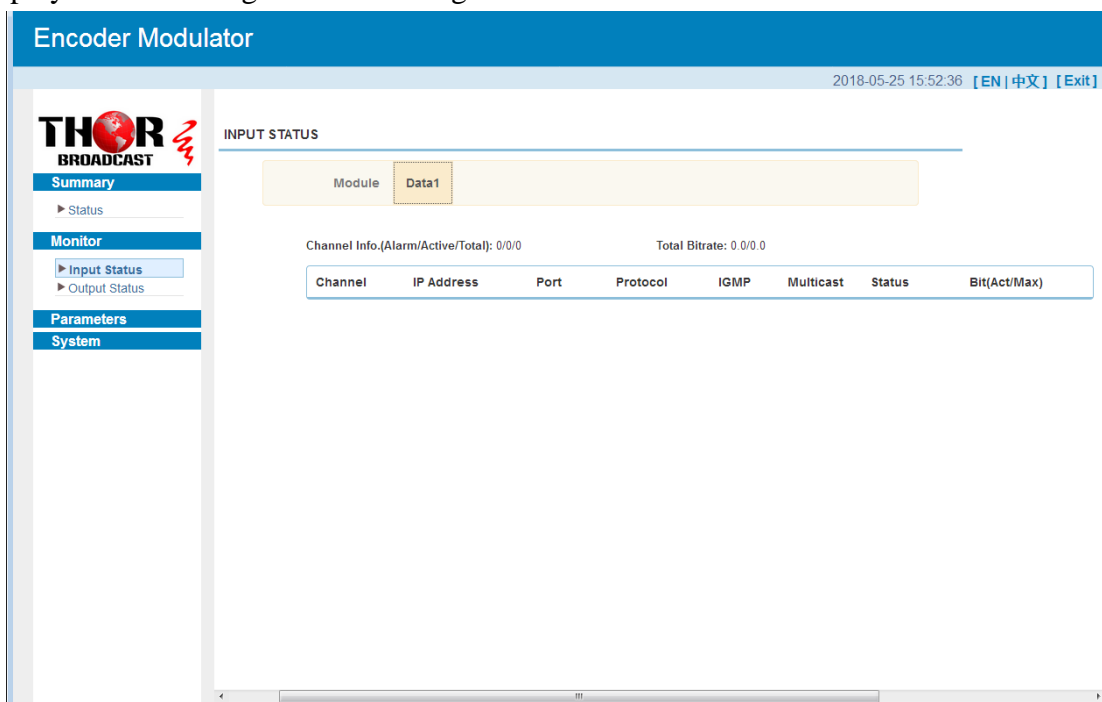


Figure-4

Monitor→Output Status

➤ **QAM**

Clicking “Output Status→QAM”, it displays the interface where users can check the QAM output status of each carrier as Figure-5.

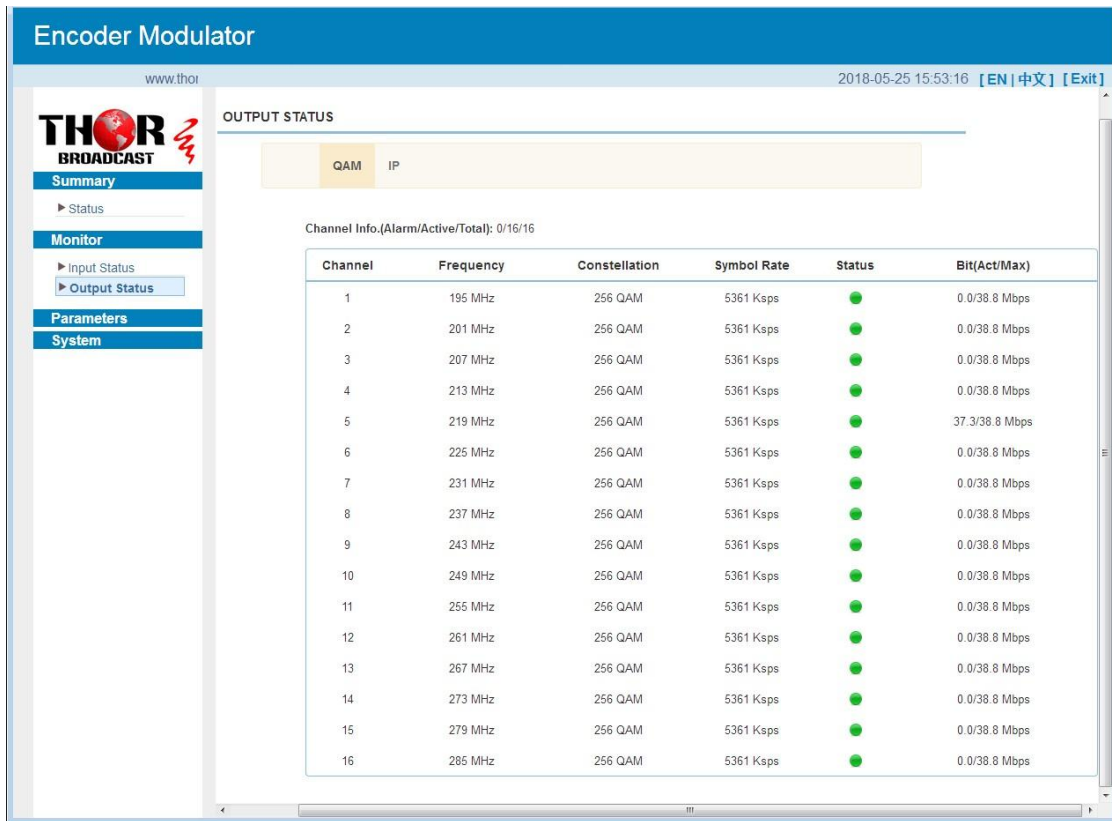


Figure-5

➤ **IP**

Clicking “Output Status→IP”, it displays the interface where users can check the IP output status after adding IP output in the “IP stream” interface, and it displays as Figure-6.

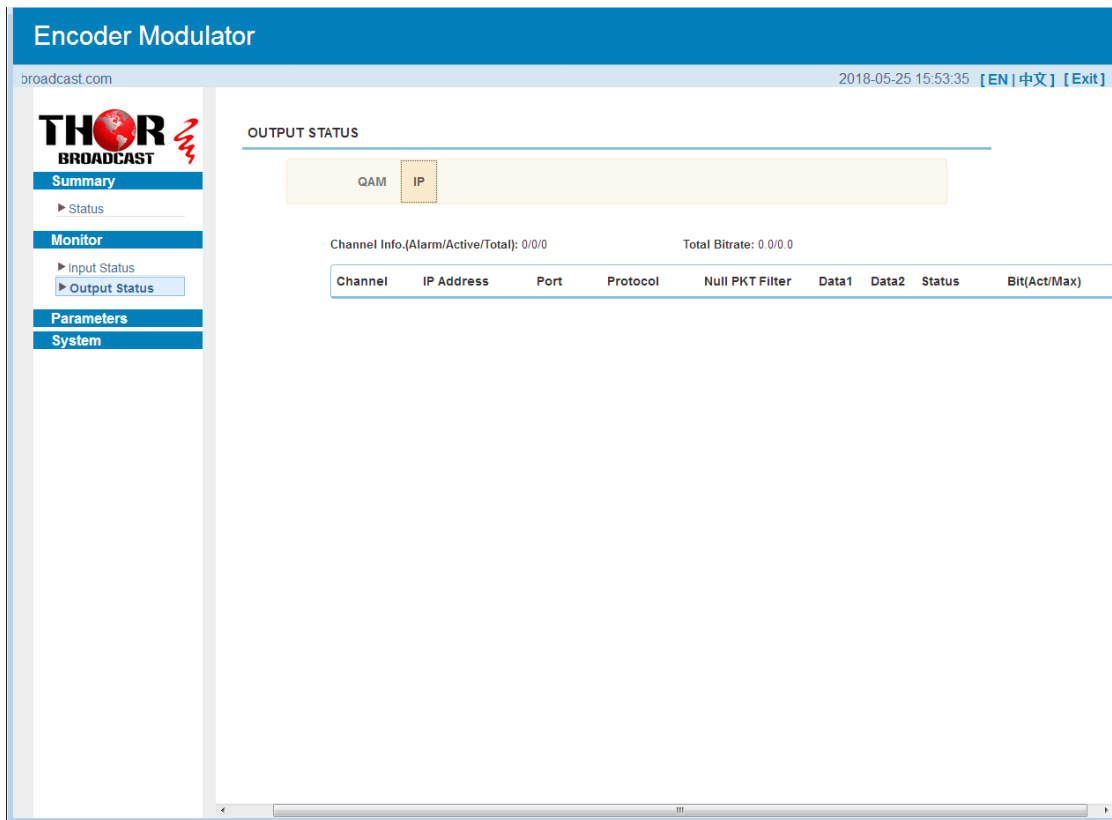


Figure-6

Parameters → Module 1-6

➤ **Encoder 1**

This encoder modulator supports up to 6 modules, and each module has 2 HDMI inputs. From the menu on left side of the webpage, clicking “Module1-6→Encoder 1”, it displays the information of 1st encoding channel (Figure-7) where users can configure the video and audio encoding parameters.

Encoder Modulator
www.thorbroadcast.com 2018-05-25 15:58:39 [EN | 中文] [Exit]

THOR BROADCAST

Summary
Monitor
Parameters

Module 1
Module 2
Module 3
Module 4
Module 5
Module 6
Tuner
TS Config
Scrambler
Modulator
IP Stream

System
Network
Password
Configuration
Firmware
Date | Time
Log

HDMI

Encoder 1 Encoder 2 System

Video

Video Format:	H.264	Bitrate:	12.00 Mbps (0.8 ~ 19)
GOP B Frame:	2 (<=3)	GOP P Frame:	4 (<=6)
Low Delay:	Normal	Aspect Ratio:	Auto
DTS Delay:	200 (0 ~ 255)	Manual Resolution:	<input type="checkbox"/>
H.264 Profile:	High Profile	Out Resolution:	720*576_50I
H.264 Level:	Level 4	CC Switch:	Off

Audio

Format:	Mpeg2	Bitrate:	128 Kbps
Gain:	100 (0-400%)	Dialog Normalization:	-31 (-31 ~ -1)dB

Program

Program Output:	<input checked="" type="checkbox"/>	Service Name:	TV-1101
Service Provider:	TV-Provider	Service Number:	1101
PMT PID:	0x00c9	PCR PID:	0x00cc
Video PID:	0x00cb	Audio PID:	0x00ca

Status

Video Lock:	●	Video Resolution:	unknown
Bitrate:	00Mbps	Rom Ver:	3.206

The light will turn green if there is source inputting from module.

General settings for the Encoding program: User can edit any item listed as needed.

Program information read area

Figure-7

Similarly, clicking “Encoder 2”, it displays the information of the 2nd encoding channel

➤ System

Clicking “System”, it displays the interface where users can check module and TS out information, and save or restore the module configuration as Figure-8.

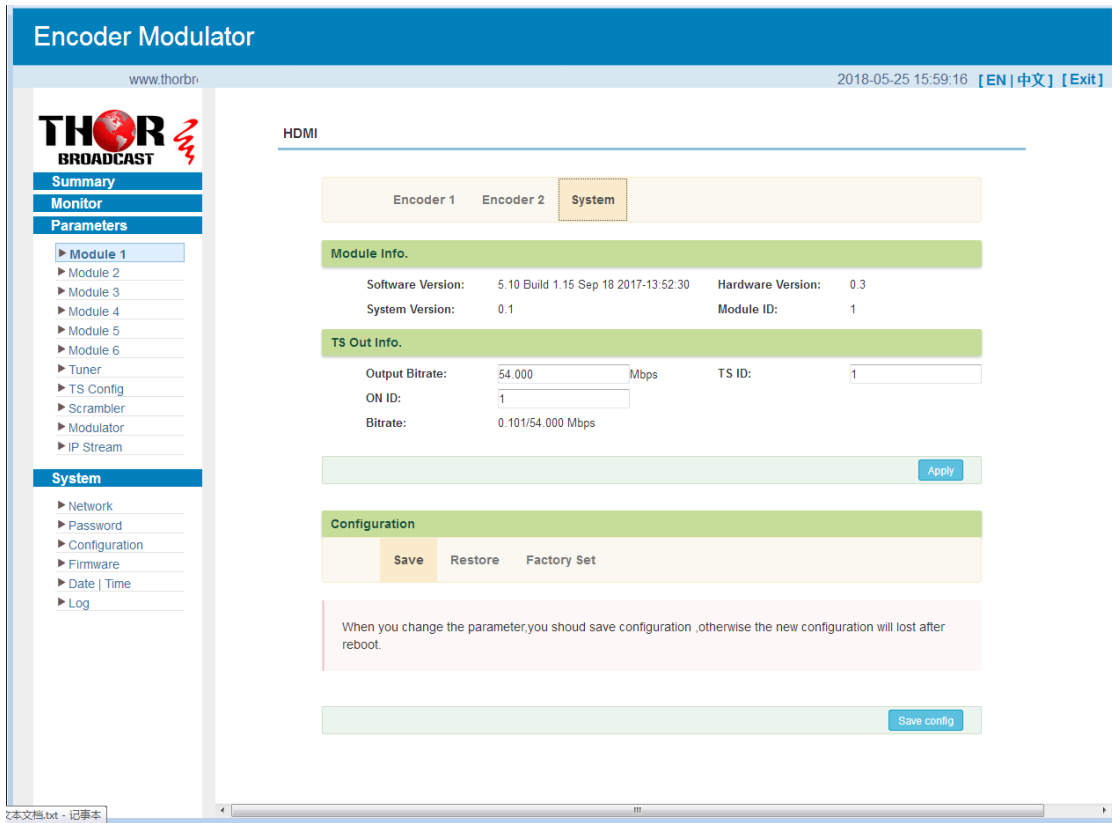


Figure-8

Parameters → Tuner:

Clicking “Tuner”, it displays the interface where users can configure the Tuner input parameters as Figure-9.

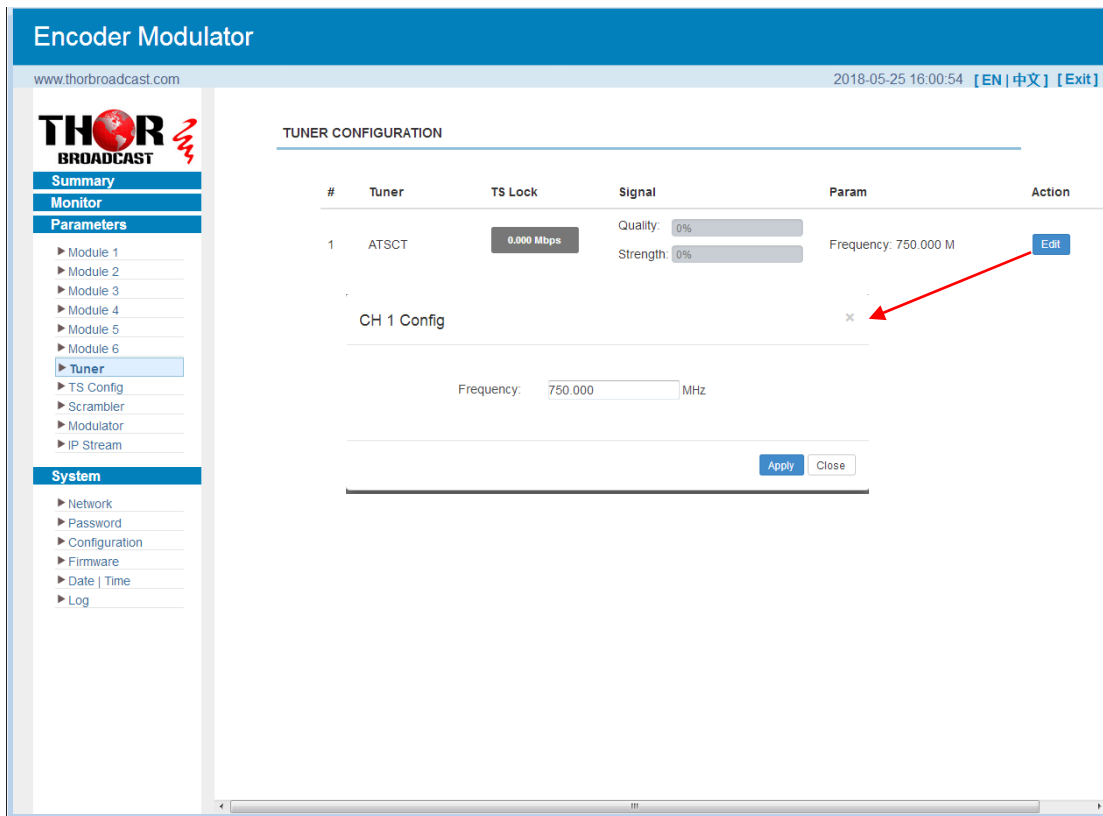


Figure-9

Parameters → TS Config:

Clicking “TS Config”, it displays the interface where users can configure the TS output parameters.

➤ **TS Config→Output TS X:**

Clicking “Output TS X”, it displays the interface where users can select the TS output carrier (Figure-10)

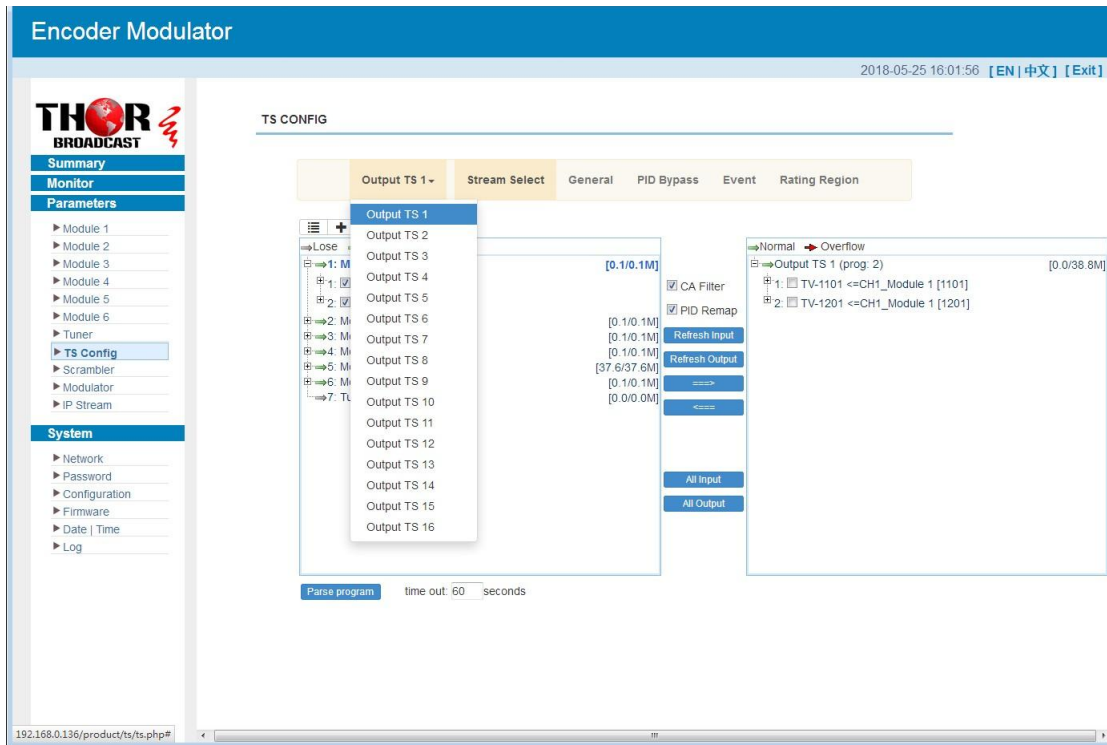


Figure-10

➤ **TS Config→Stream select:**

Clicking “Stream select”, it displays the interface where users can select program(s) to multiplex out and modify program info. (Figure-11)

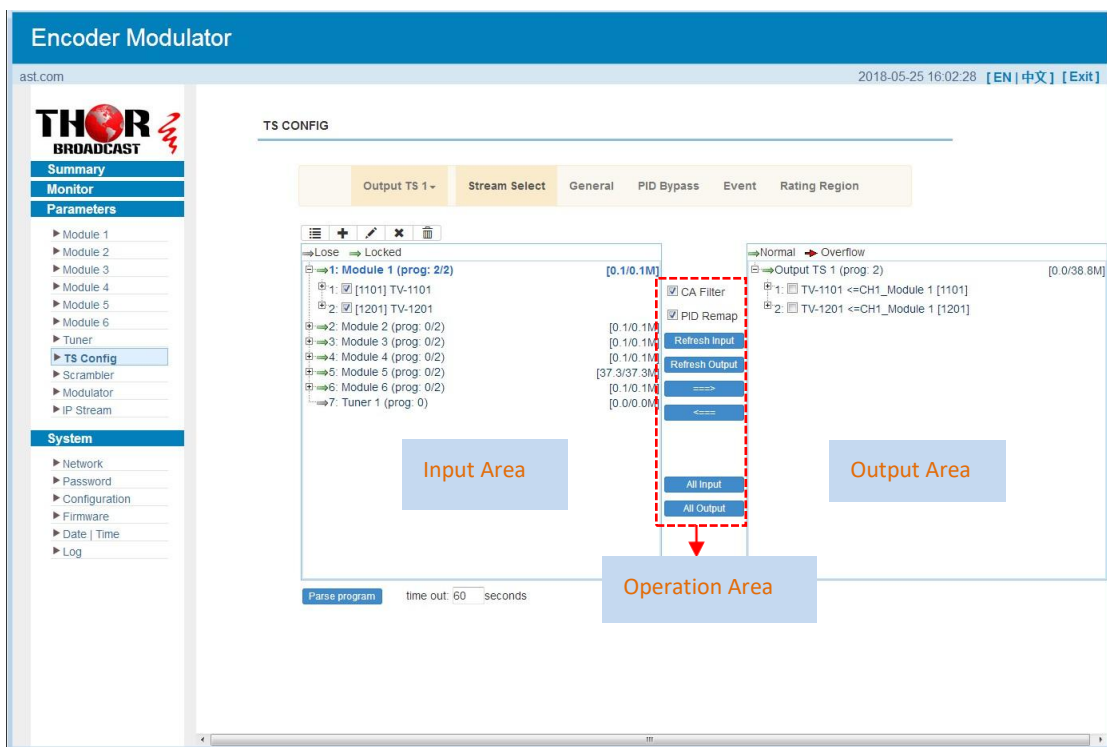





Figure-11

Configure 'Input Area' and 'Output Area' with buttons in 'Operation Area'. Instructions are as below:



 : To add input channel which come from Data 1

 : To edit the input channel

 : To delete the input channel

 : To delete all inputs channel


 Lose  Locked : To check input IP lock or not, green means current IP locked


 Normal  Overflow : To check current TS overflow or not, red color means current TS


overflow, need to reduce program


CA Filter : To filter/not filter the source CA information


PID Remap : To enable/disable the PID remapping

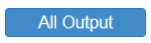
 Refresh Input To refresh the input program information

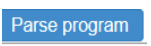
 Refresh Output To refresh the output program information

 Select one input program first and click this button to transfer the selected program to the right box to output.



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

 All Input To select all the input programs

 All Output To select all the output programs

 Parse program To parse programs time limitation of parsing input programs

➤ Program Modification:

The multiplexed program information can be modified by clicking the program in the 'output' area. For example, when clicking  1:  TV-1101 <=CH1_Module 1 [1101] , it triggers a dialog box (Figure 12) where users can input new information.

[close]

Program From Input: CH1_Module 1 [1101]

Service Name:

Major Channel Number:

Minor Channel Number:

Source Id:

Short Name:

Program Number:

Logic Channel Number:

Service Type:

Service Provider:

PMT Descriptor Tag:

PMT Descriptor Data: (Hex)

PMT PID:

PCR PID:

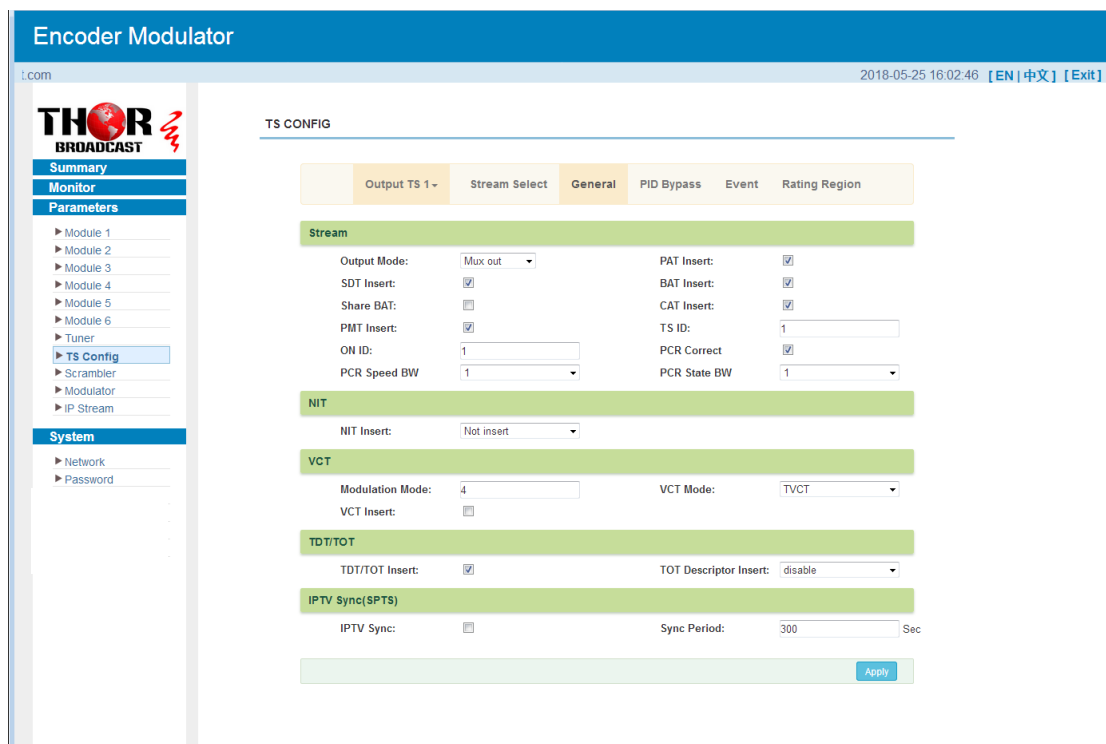
MPEG-4 Video PID:

MPEG-1 Audio PID:

Figure-12

➤ **TS Config→General:**

Clicking “General”, it displays the interface where users can set stream output information, NIT insert/VCT insert and other information. (Figure-13)



The screenshot shows the 'Encoder Modulator' web interface. The main content area is titled 'TS CONFIG' and has several tabs: 'Output TS 1', 'Stream Select', 'General', 'PID Bypass', 'Event', and 'Rating Region'. The 'General' tab is active, showing various configuration options:

- Stream:**
 - Output Mode:
 - SDT Insert:
 - Share BAT:
 - PMT Insert:
 - OH ID:
 - PCR Speed BW:
 - PAT Insert:
 - BAT Insert:
 - CAT Insert:
 - TS ID:
 - PCR Correct:
 - PCR State BW:
- NIT:**
 - NIT Insert:
- VCT:**
 - Modulation Mode:
 - VCT Insert:
 - VCT Mode:
- TDT/TOT:**
 - TDT/TOT Insert:
 - TOT Descriptor Insert:
- IPTV Sync(SPTS):**
 - IPTV Sync:
 - Sync Period: Sec

An 'Apply' button is located at the bottom right of the configuration area.

Figure-13

➤ **TS Config→PID Bypass:**

Clicking “PID Bypass”, it displays the interface as Figure-14 where user can add PIDs to be passed, click the “+” symbol, input current IP channel number, then input current IP source Pid and output Pid which is customer needed , then click “set”

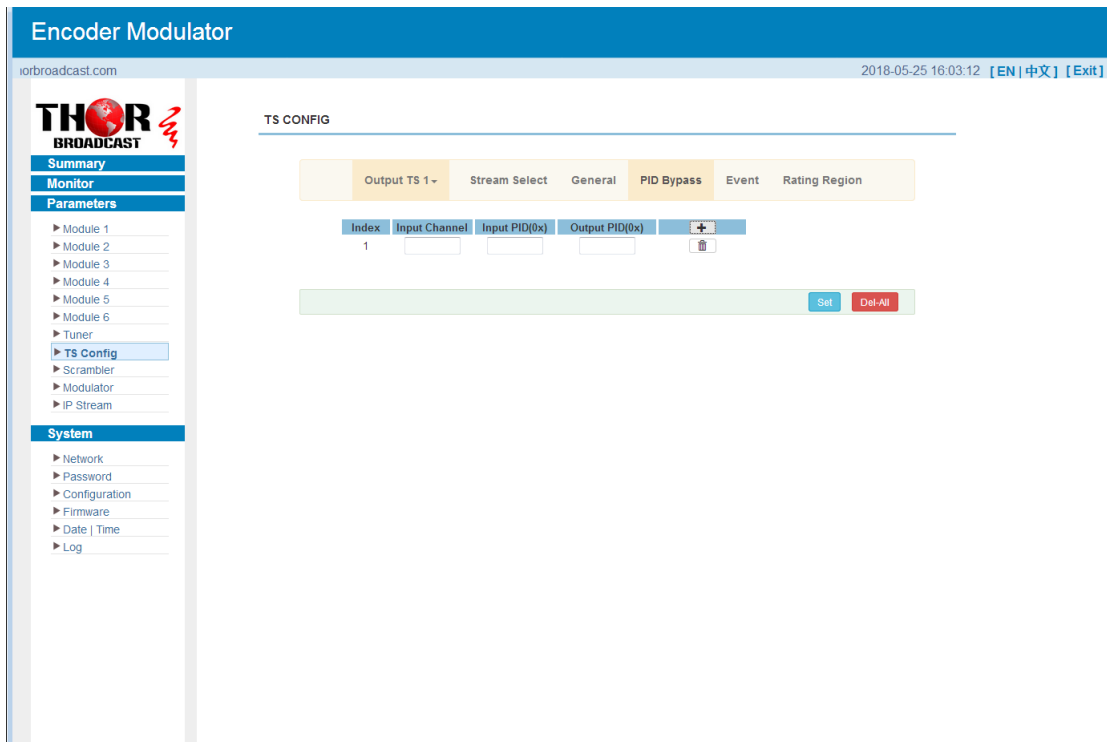


Figure-14

➤ **Event:**

Clicking “Event”, it displays the interface as Figure-15 where users can set the upcoming events (programs). This function is only supported in ATSC RF output.

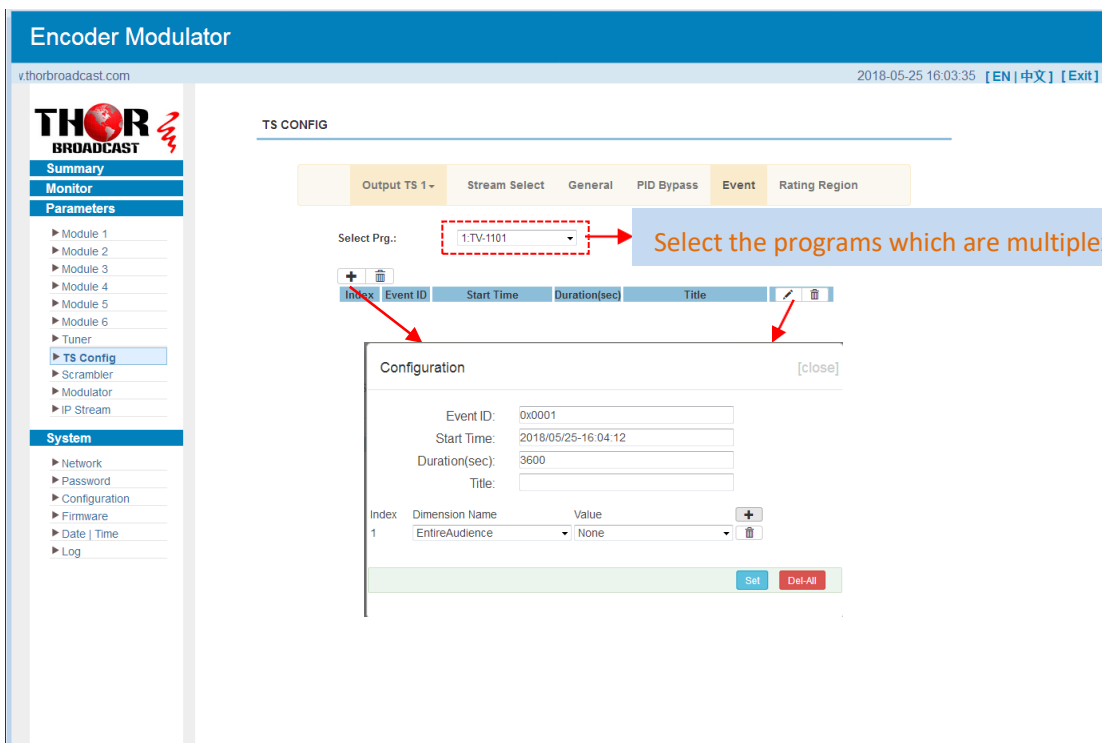


Figure-15

➤ **Rating Region:**

Clicking “Rating Region”, it displays the interface as figure-16 where user can classify the input programs. This function is only supported in ATSC RF output.

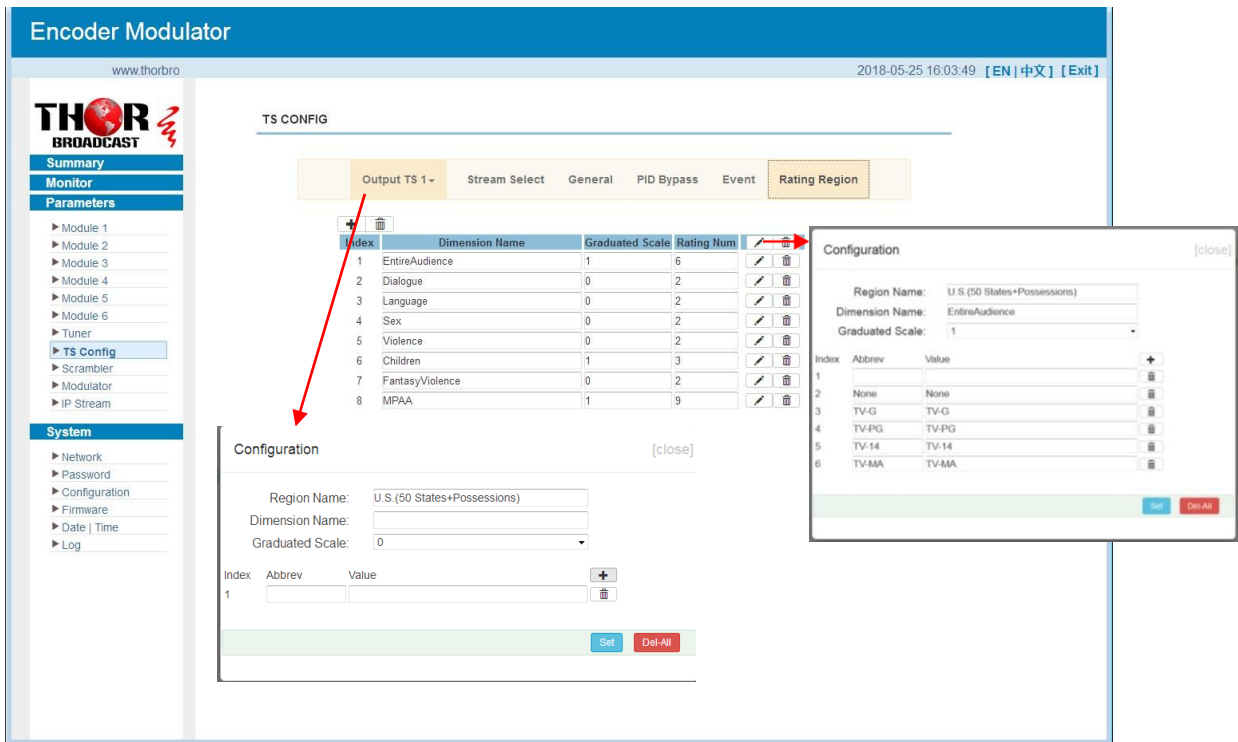


Figure-16

Parameters → Scrambler:

Clicking “Scrambler”, it displays the interface as Figure-17 where user can configure parameters to scramble the programs. Scr CH1-16 is corresponding to Output TS1-16 respectively.

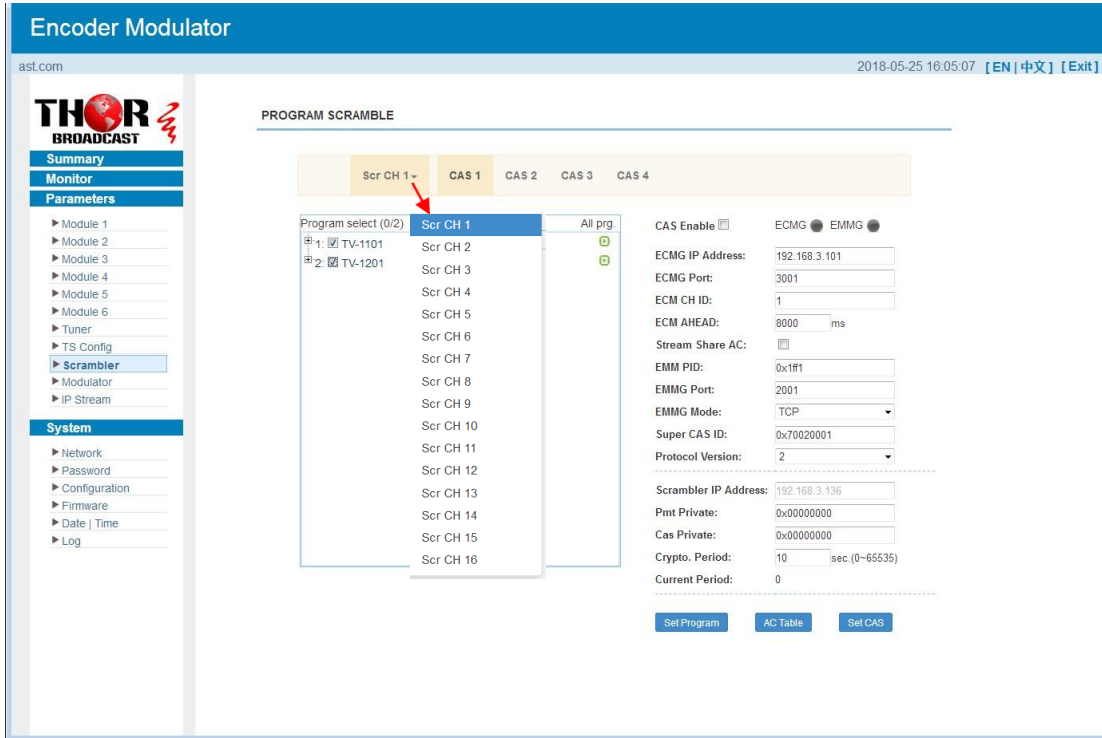


Figure-17

Parameters → Modulator:

Clicking “Modulator”, it displays the Modulator Configuration screen as Figure-18. Here user can set modulating parameters.

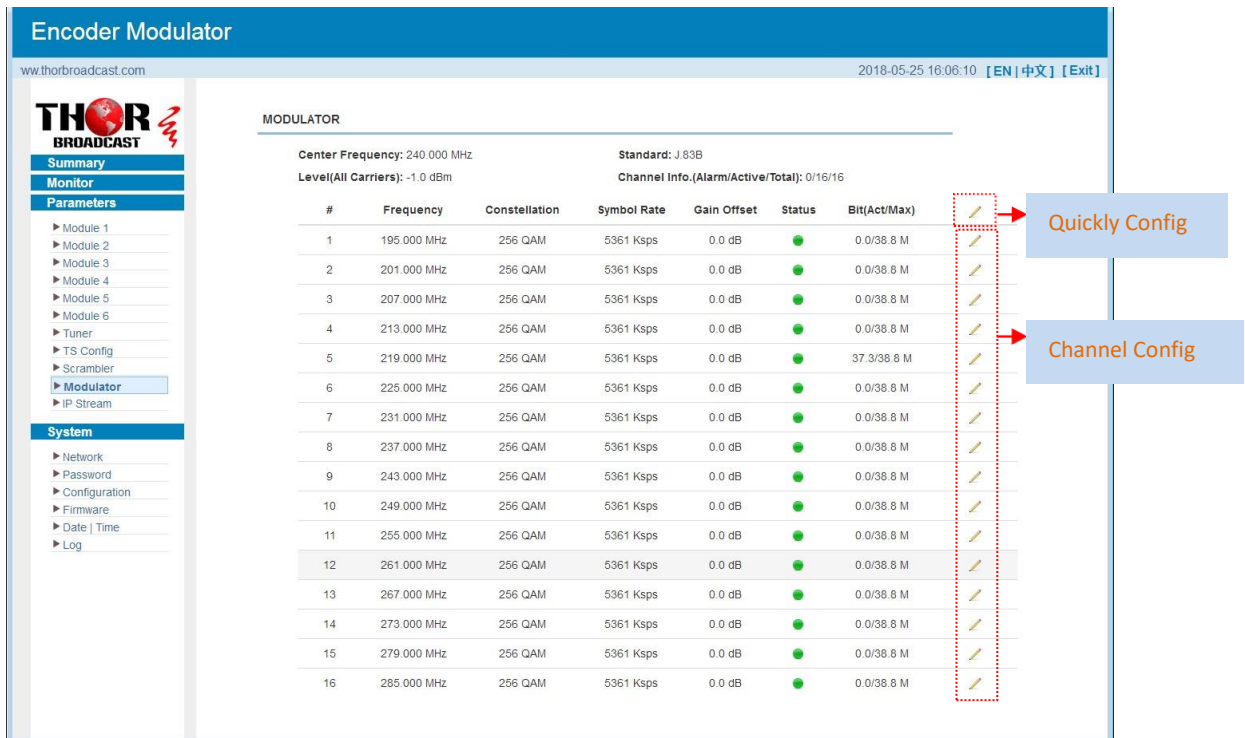


Figure-18

When users click “quickly config” button, it triggers a dialog box (Figure -19) where users can set all channels configuration.

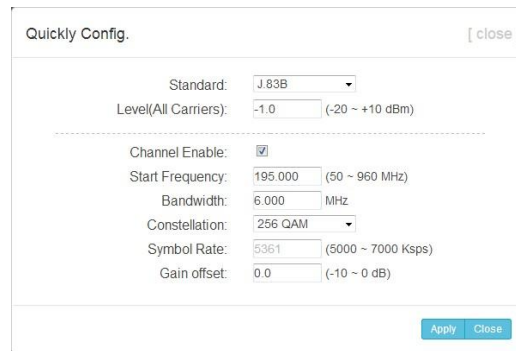


Figure-19

When users click “Channel config” button, it triggers a dialog box (Figure-20) where users can set the corresponding channel configuration.

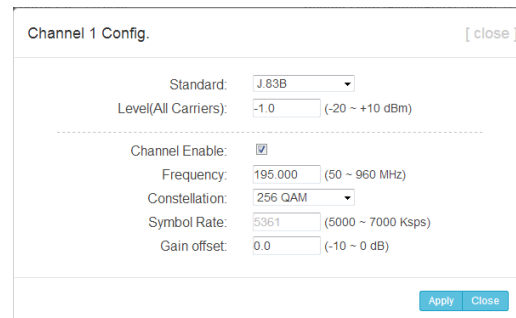


Figure-20

Parameters → IP Stream:

This encoder modulator supports TS to output in IP (16 MPTS) format through DATA 2 port and 1 ASI out as mirror of one RF output carriers.

Clicking “IP Stream”, it displays the interface where to set IP out parameters and choose the ASI out channel (Figure-21).

The screenshot shows the 'Encoder Modulator' web interface. On the left is a navigation menu with sections: Summary, Monitor, Parameters (Module 1-6, Tuner, TS Config, Scrambler, Modulator, IP Stream), and System (Network, Password, Configuration, Firmware, Date | Time, Log). The main area displays an 'IP STREAM' table with 16 rows. Each row has columns for #, IP Address, Port, Protocol, Pkt Length, Null PKT Filter, Status, and Bit(Act/Max). A red dashed box highlights the 'Quickly Config' and 'Channel Config' buttons in the right margin, which are represented by pencil icons in the table's rightmost column.

#	IP Address	Port	Protocol	Pkt Length	Null PKT Filter	Status	Bit(Act/Max)	Config
1	224.2.2.2	2001	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
2	224.2.2.2	2002	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
3	224.2.2.2	2003	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
4	224.2.2.2	2004	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
5	224.2.2.2	2005	UDP	7	<input type="checkbox"/>	●	37.3/38.8 M	Quickly Config
6	224.2.2.2	2006	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
7	224.2.2.2	2007	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Channel Config
8	224.2.2.2	2008	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
9	224.2.2.2	2009	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
10	224.2.2.2	2010	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
11	224.2.2.2	2011	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
12	224.2.2.2	2012	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
13	224.2.2.2	2013	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
14	224.2.2.2	2014	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
15	224.2.2.2	2015	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config
16	224.2.2.2	2016	UDP	7	<input type="checkbox"/>	●	0.0/38.8 M	Quickly Config

Figure-21

When users click “Quickly Config” button, it triggers a dialog box (Figure-22) where users can set all channels MPTS configuration simultaneously.

The 'Quickly Config.' dialog box contains the following fields: IP Address (224.2.2.2), Port (2001), Step (1), Protocol (UDP), Pkt Length (7), Null PKT Filter (checkbox), and TS Output (checkbox DATA2). There are 'Apply' and 'Close' buttons at the bottom right.

Figure-22

When users click “Channel Config” button, it triggers a dialog box (Figure-23) where users can set corresponding MPTS channel configuration.

The 'Channel 1 Config.' dialog box contains the following fields: IP Address (224.2.2.2), Port (2001), Protocol (UDP), Pkt Length (7), Null PKT Filter (checkbox), and TS Output (checkbox DATA2). There are 'Apply' and 'Close' buttons at the bottom right.

Figure-23

System → Network:

Clicking “Network”, it displays the interface as Figure-24 where to set network parameters.

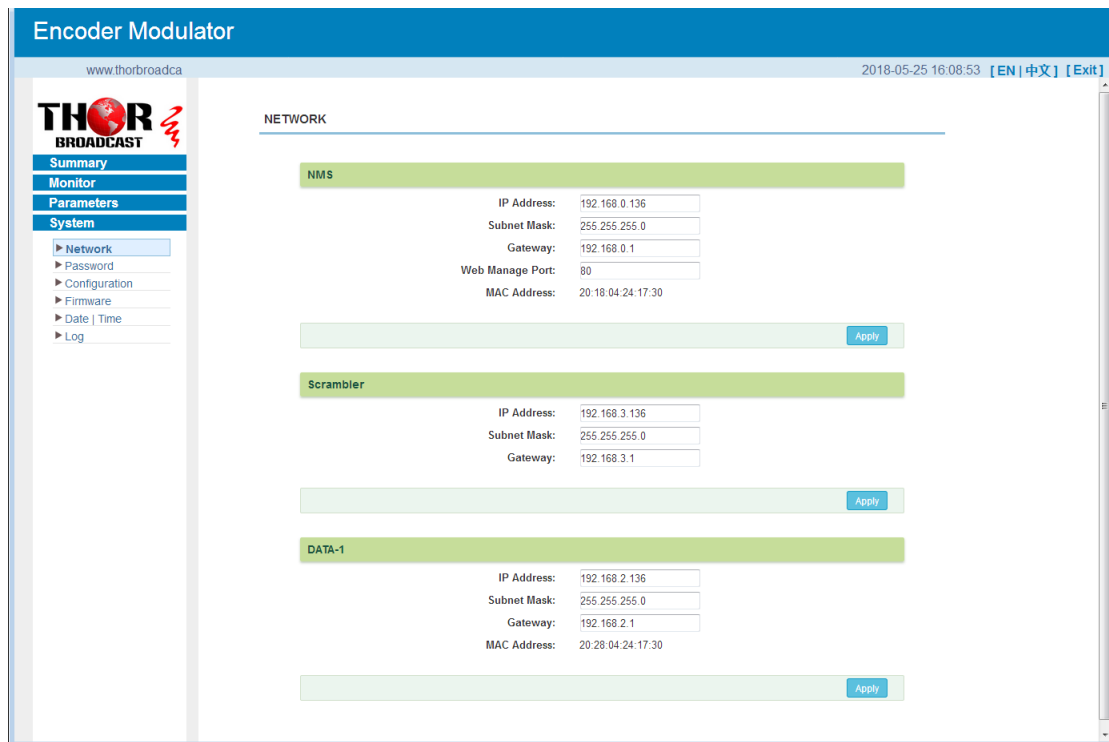


Figure-24

System → password

Clicking “Password”, it displays the screen as Figure-25 where to set the login account and password for the web NMS.

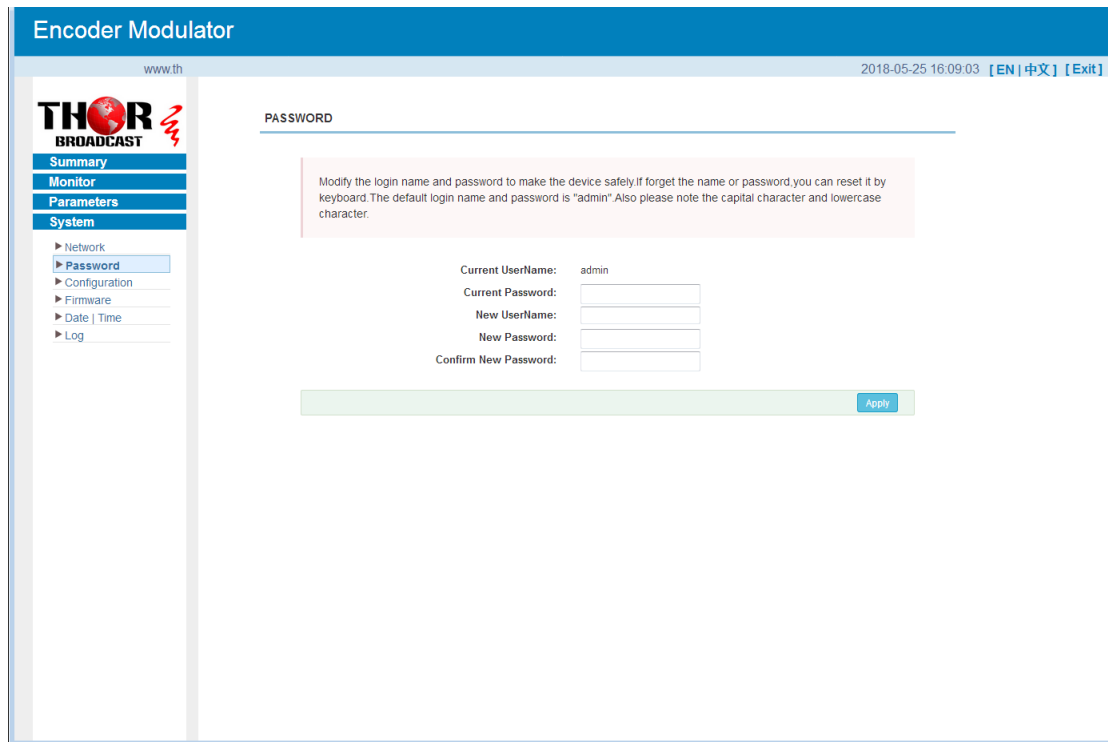


Figure-25

System → Configuration:

Clicking “Configuration”, it displays the screen as Figure-26 where to save/ restore/factory setting/ backup/ load your configurations.

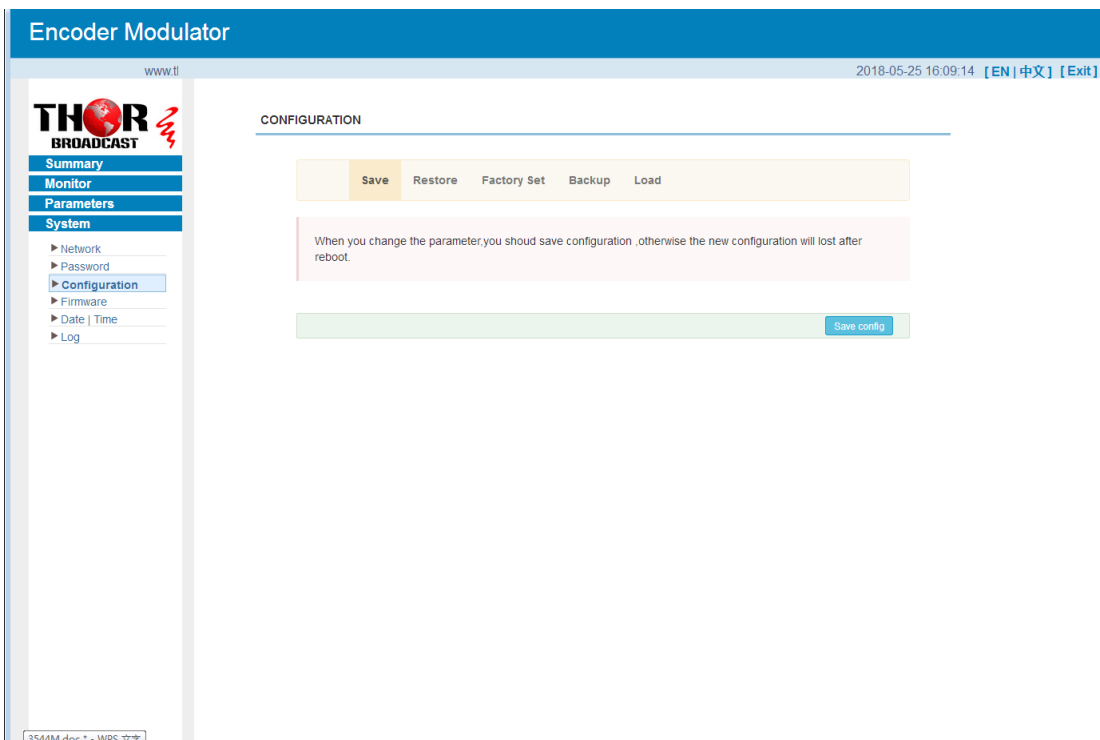


Figure-26

System → Firmware:

Clicking “Firmware”, it displays the screen as Figure-27 where to update firmware for this encoder modulator.

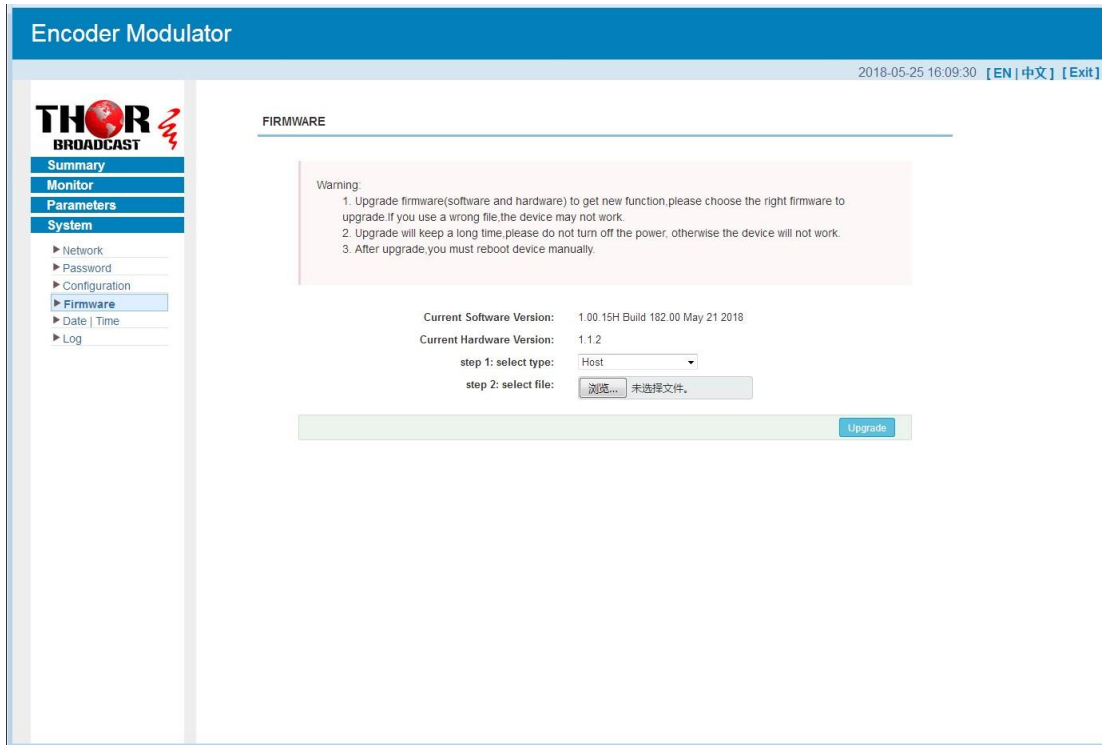


Figure-27

System → Date/Time:

Clicking “Date/Time”, it displays the screen as Figure-28 where to set date and time for the device.

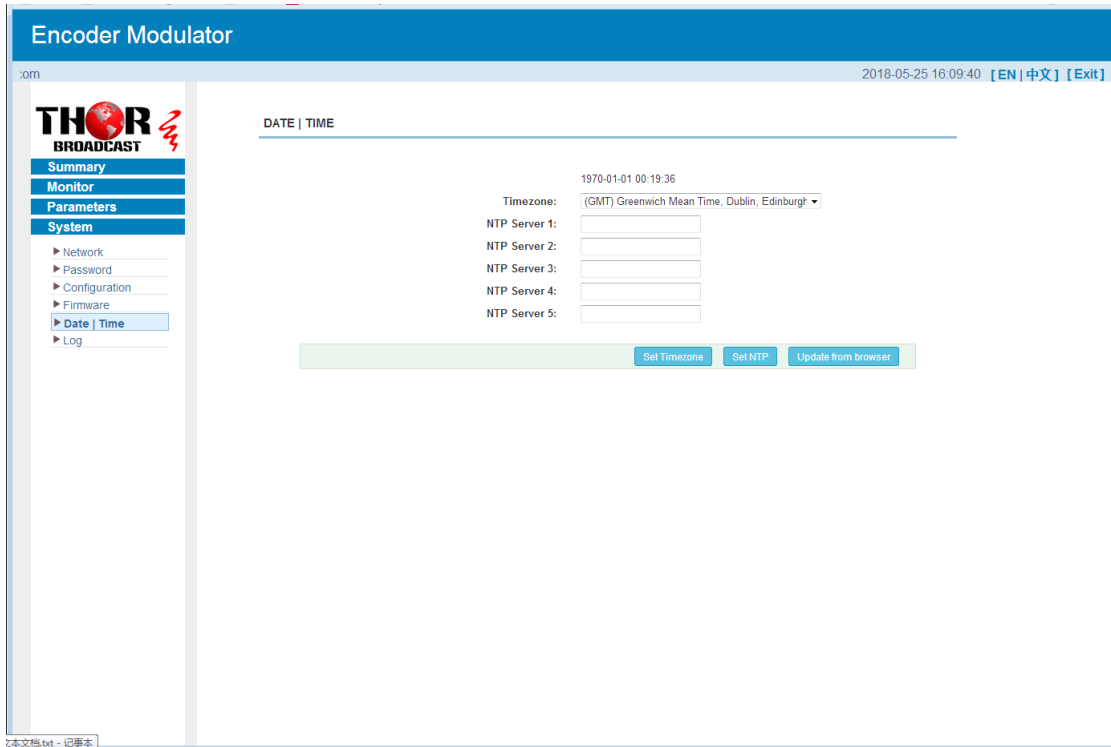


Figure-28

System → Log:

Clicking “Log”, it displays the log interface as Figure-29 where to check or export the Kernel/System log.

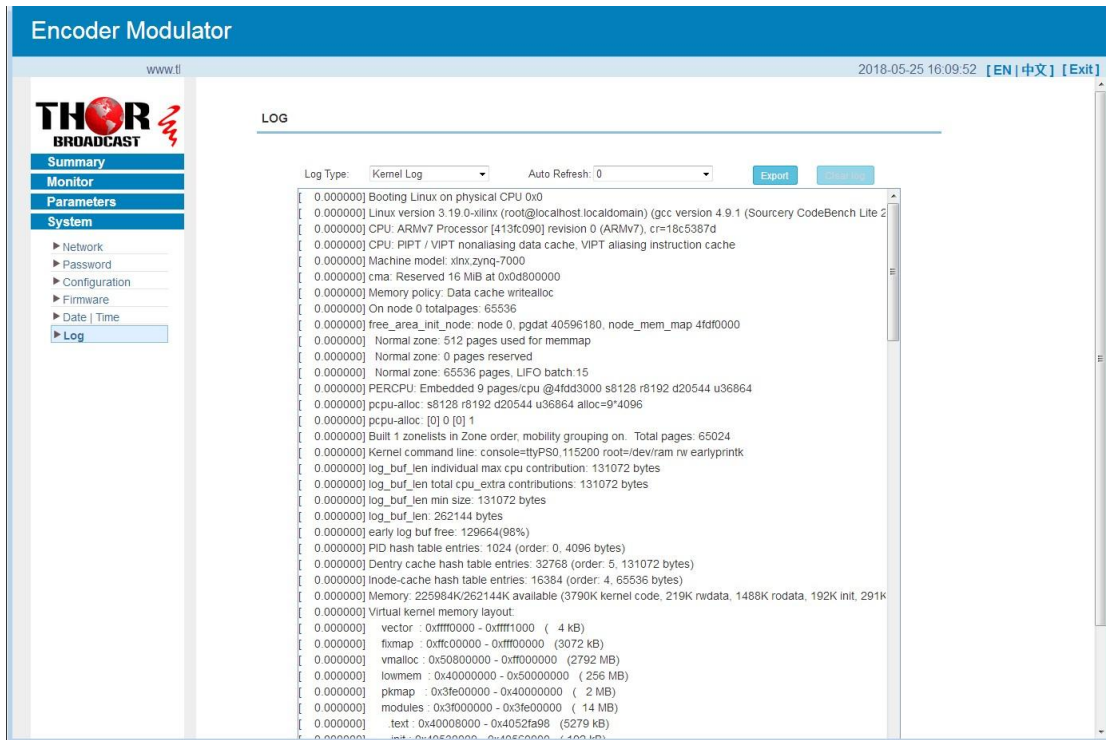


Figure-29

Chapter 4 Troubleshooting

THOR's ISO9001 quality assurance system has been approved by the CQC organization. We guarantee the products' quality, reliability and stability. All THOR products haven't passed all testing and manual inspections before they are shipped out. The testing and inspection scheme already covers all the Optical, Electronic and Mechanical criteria which have been published by THOR. To prevent a potential hazard, please strictly follow the operation conditions.

Prevention Measures

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

Conditions needed to unplug power cord

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



Chapter 5 Packing List

Thor 12 HDMI HD Encoder-RF Modulator

HDMI cable

Power Cord

For Further Tech Support

1-800-521-Thor(8467)

support@thorfiber.com