

## PRODUCT MODEL NUMBER: TL-9994C 16-in-1 MUX-SCRAMBLING QAM MODULATOR



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# CHAPTER 1

## INTRODUCTION

### 1.1 PRODUCT OVERVIEW

TL-9994C is a high performance and cost-effective QAM modulator designed by TRANSLITE. It supports 16 DVB-C (DVB-T/-T2/-S/-S2/S2X, ATSC, ISDB-T Optional) FTA tuner input, maximum 512 IP input through GE1 and TS input for re-mux through 2 ASI ports. After multiplexing, scrambling and QAM modulating, it gives 16 non-adjacent carriers output and 1 IP (MPTS) output through GE1.

TL-9994C is also characterized with high integrated level, high performance and low cost. It supports dual power supply (optional). This is very adaptable to new generation CATV broadcasting system.

### 1.2 KEY FEATURES

- 16 DVB-C (DVB-T/-T2/-S/-S2/-S2X, ATSC, ISDB-T Optional) FTA Tuner + 2 ASI input+512 IP input thru GE1 over UDP and RTP protocol
- 16\*DVB-C RF output
- 1 IP (MPTS) output over UDP and RTP/RTSP, as mirror of one carrier
- Support 16 groups multiplexing+16 groups scrambling +16 groups QAM modulating
- Excellent RF output performance index, MER≥40db
- Support accurate PCR adjusting
- Support PSI/SI editing and inserting
- Support Web management, Updates via web
- Redundancy Power Supply (optional)

## 1.3 SPECIFICATIONS

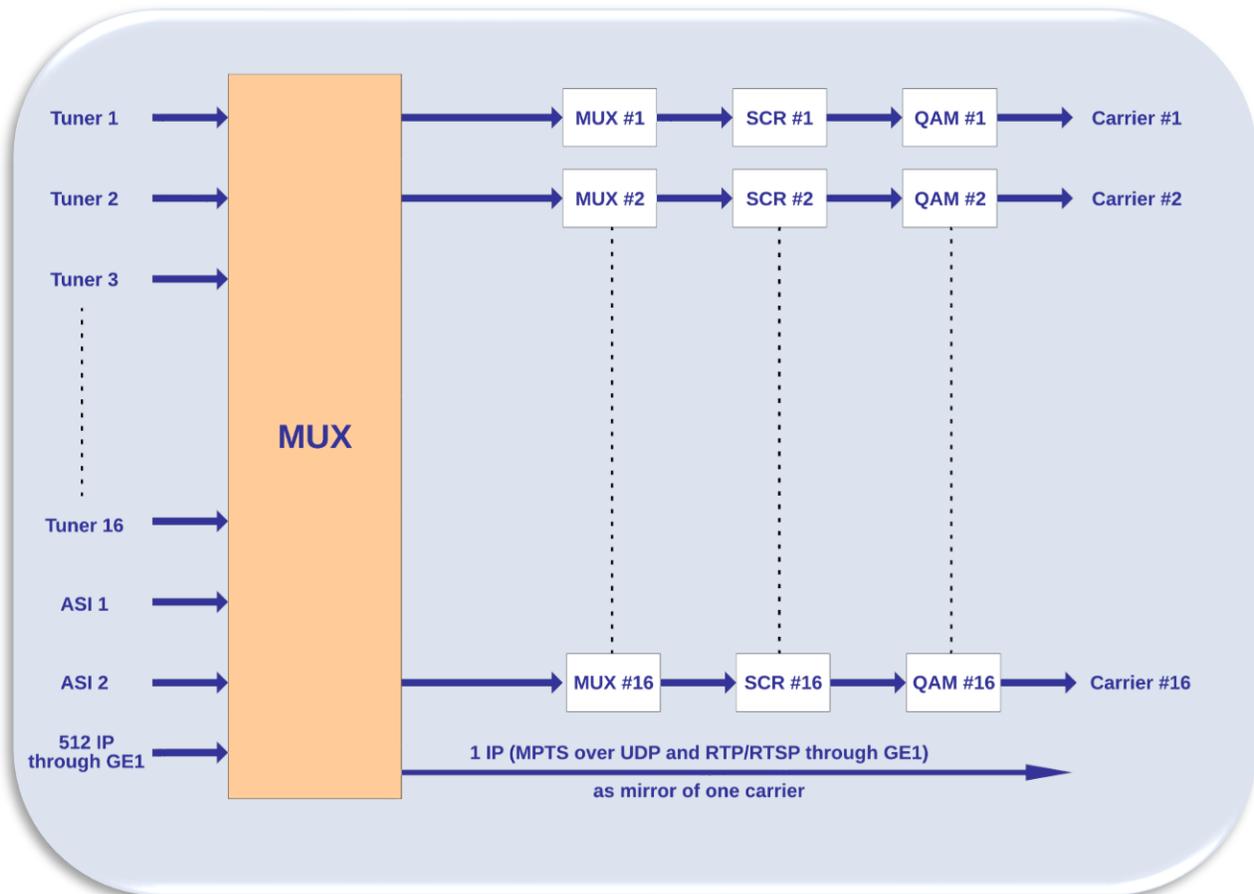
Input			
16 DVB-C (DVB-T/-T2/-S/-S2/-S2X, ATSC, ISDB-T Optional) FTA Tuner			
512 IP input through GE1 over UDP and RTP protocol			
2 ASI input, BNC interface			
Tuner Section			
<b>Multi-mode tuners switchable</b>	DVB-C	Standard	J.83A(DVB-C), J.83B, J.83C
		Frequency In	60~890MHz
		Constellation	16/32/64/128/256 QAM
	DVB-T/T2	Frequency In	60~890MHz
		Bandwidth	6/7/8 M bandwidth
	ISDB-T	Frequency In	60~890MHz
<b>Version 1</b>	DVB-S/S2	Frequency In	950~2150MHz
		Symbol rate	QPSK 1~45Mbauds 8PSK 1~45Mbauds
		Code rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
		Constellation	QPSK, 8PSK
<b>Version 2 (New)</b>	DVB-S	Frequency In	950~2150MHz
		Symbol rate	0.5~45Msps
		Signal Strength	- 65~-25dBm
		FEC	1/2, 2/3, 3/4, 5/6, 7/8
		Constellation	QPSK
	Max input bitrate	≤129 Mbps	
	DVB-S2	Frequency In	950~2150MHz
	Symbol rate	QPSK/8PSK /16APSK: 0.5~45 Msps 32APSK: 0.5~40Msps;	



Multiplexing		
<b>Maximum PID Remapping</b>	360 output per channel	
<b>Function</b>	PID remapping (automatically or manually)	
	Accurate PCR adjusting	
	Generate PSI/ SI table automatically	
Scrambling Parameters		
<b>Max simulcrypt CA</b>	4	
<b>Scramble Standard</b>	ETR289, ETSI 101 197, ETSI 103 197	
<b>Connection</b>	Local/remote connection	
Modulation		
<b>QAM Channel</b>	16 non-adjacent carriers output	
<b>Standard</b>	EN300 429/ITU-T J.83A/B	
<b>MER</b>	≥40db	
<b>RF frequency</b>	50~960MHz, 1KHz step	
<b>RF output level</b>	-20~+10dbm(87~107 dbμV),0.1db step	
<b>Symbol Rate</b>	5.0Msps~7.0Msps, 1ksps stepping	
	J.83A	J.83B
<b>Constellation</b>	16/32/64/128/256QAM	64/256 QAM
<b>Bandwidth</b>	8M	6M
Stream Output		
	16 RF output (F type interface)	
	1 IP (MPTS) output over UDP and RTP/RTSP (GE1 only), as mirror of one carrier	
System Function		
	Network management (WEB)	
	English language	
	Ethernet software upgrade	

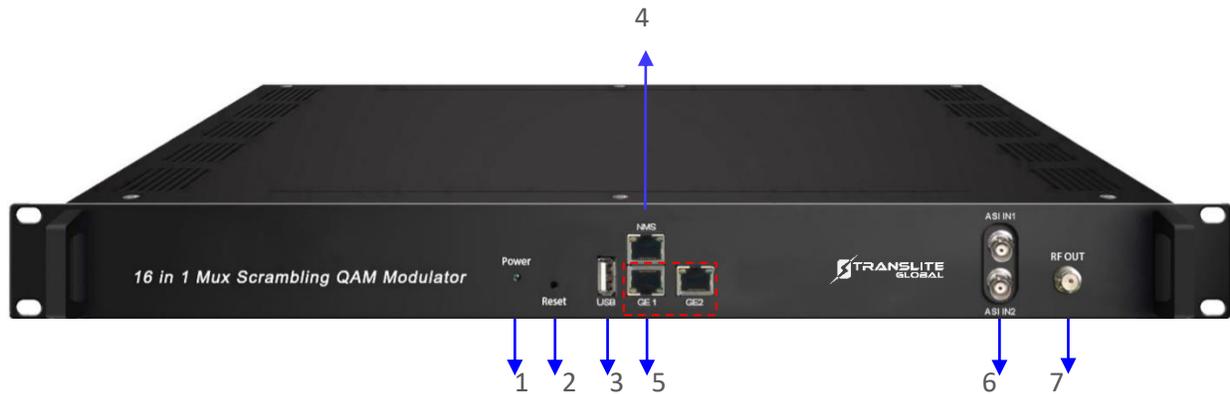
General	
<b>Dimension(W*D*H)</b>	482mm×300mm×44.5mm
<b>Temperature</b>	0~45°C(Operation); -20~80°C(Storage)
<b>Power</b>	AC 100V±1050/60Hz; AC 220V±10%, 50/60HZ

## 1.4 PRINCIPLE CHART



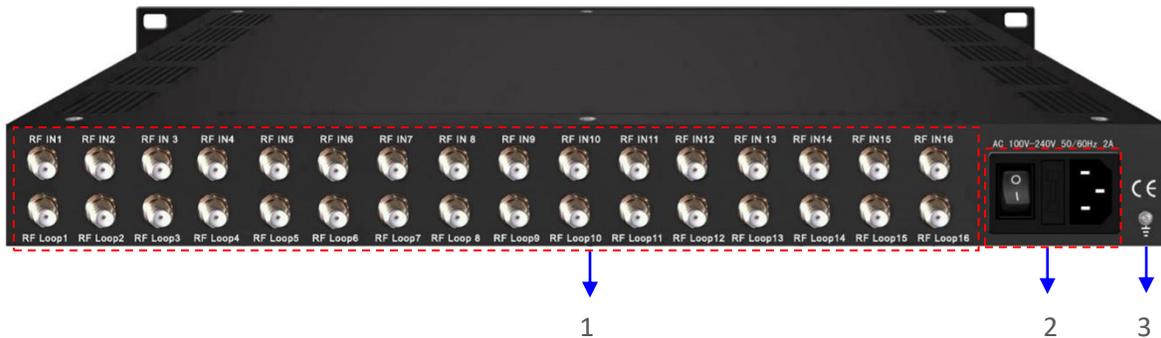
## 1.5 APPEARANCE AND DESCRIPTION

### Front Panel Illustration



1	Power indicator
2	Reset: Reset webmaster IP address, recover it to default IP address
3	USB port for upgrade
4	NMS port: Network management interface
5	Data port: GE1: IP input and output port GE2: reserved for future
6	ASI input port
7	RF out port

## Rear Panel Illustration



1	16 channels RF IN Interface
2	Integrated power switch and socket
3	Grounding Wire

## CHAPTER 2

### INSTALLATION GUIDE

This section is to explain the cautions the users must know in some case that possibly 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 ACQUISITION CHECK

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

- TL-9994C 16 in 1 Mux-Scrambling QAM Modulator
- User's Manual
- Power Cord

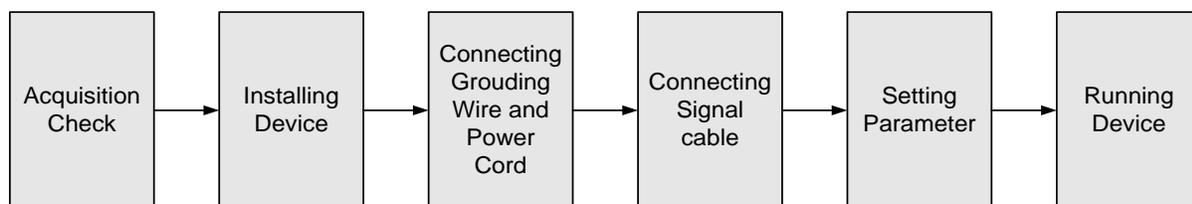
## 2.2 INSTALLATION PREPARATION

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 modulator
- Connecting signal cables
- Connecting communication port (if it is necessary)

## 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: $1 \times 10^7 \sim 1 \times 10^{10} \Omega$ , Grounding current limiting resistance: $1 \text{M}\Omega$ (Floor bearing should be greater than $450 \text{Kg}/\text{m}^2$ )
Environment Temperature	5~40°C (sustainable), 0~45°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 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 $110\text{V} \pm 10\%$ , 50/60Hz or AC $220\text{V} \pm 10\%$ , 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.
- Coaxial cables 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 25mm<sup>2</sup>.

## 2.5.1 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>.

## 2.5.2 DEVICE GROUNDING

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

## 2.6 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  $1\Omega$ .

⚠ **Caution:**

**Before connecting power cord to TL-9994C 16 in 1 Mux-Scrambling QAM Modulator, user should set the power switch to “OFF”.**

## 2.7 SIGNAL CABLE CONNECTION

The signal connections include the connection of input signal cable and the connection of output signal cable. The details are as follows:

TL-9994C 16 in 1 Mux-Scrambling QAM Modulator Cable Illustration:

➤ **NMS Cable illustration (CAT5):**



➤ **RF Input/Loop Cable Illustration:**



➤ **ASI input cable illustration:**



## CHAPTER 3

# WEB BASED NMS MANAGEMENT

Users cannot use front buttons to set configuration, can only control and set the configuration in computer by connecting the device to web NMS Port. Users should ensure that the computer's IP address is different from the TL-9994C's IP address; otherwise, it would cause IP conflict.

## 3.1 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 Modulator's IP address in the browser's address bar and press Enter.

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

## 3.2 OPERATION

When we confirm the login, it displays the WELCOME interface as Figure-2 where users can have an overview of the device's system information and working status.

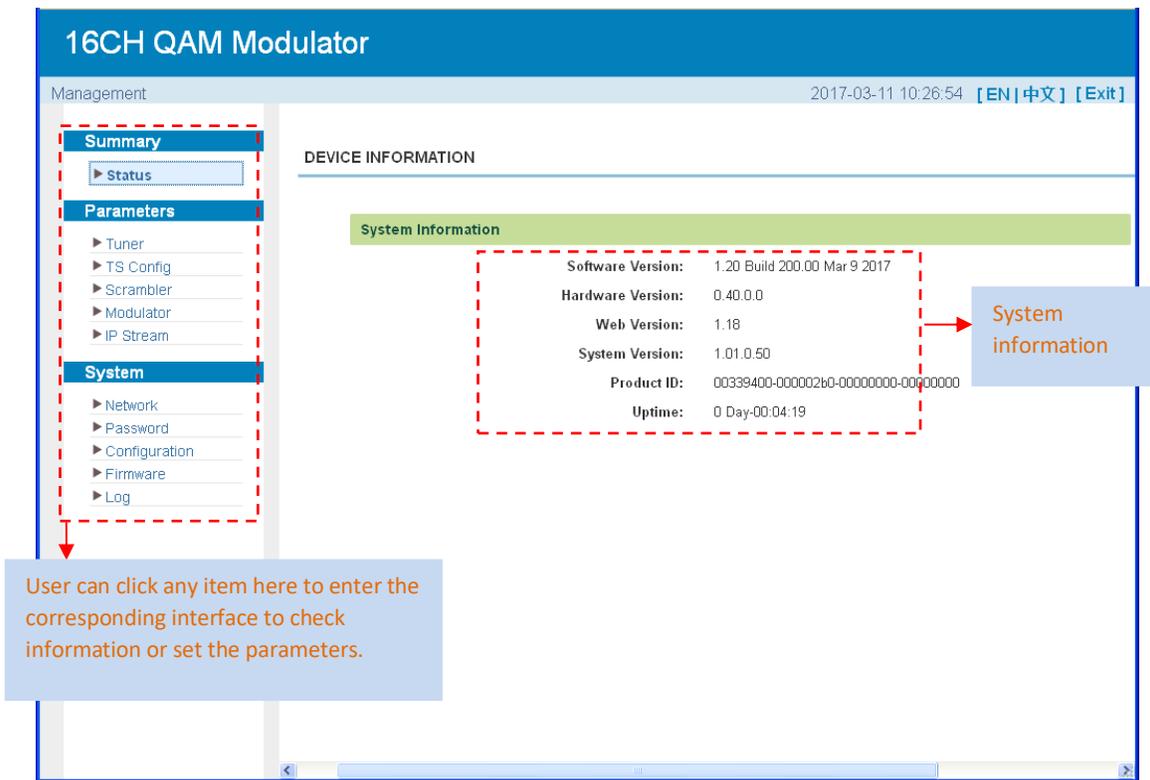


Figure-2

### Parameters → Tuner 1-16

TL-9994C support 16 DVB-S/S2 (DVB-T/T2/C, ATSC, ISDB-T optional) Tuner input. From the menu on left side of the webpage, clicking "Tuner1-16", it displays the information of each encoding channel as Figure-3.

The screenshot displays the '16CH QAM Modulator' web management interface. On the left, a navigation menu includes 'Summary', 'Parameters' (with 'Tuner' selected), and 'System'. The main area shows a 'TUNER CONFIGURATION' table with 16 rows. Each row represents a channel with columns for '#', 'Tuner', 'TS Lock', 'Signal' (Quality and Strength), 'Param' (Satellite Freq, LNB Freq, Symbolrate), and 'Action' (Edit). A modal dialog 'CH 1 Config' is open, showing configuration fields for the first channel. A red arrow points to the 'Satellite Freq' field in the dialog, which is highlighted in red in the background table row.

#	Tuner	TS Lock	Signal	Param	Action
1	DVBS/S2	21.653 Mbps	Quality: 39% Strength: 82%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
6	DVBS/S2	23.432 Mbps	Quality: 41% Strength: 78%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
7	DVBS/S2	23.432 Mbps	Quality: 42% Strength: 86%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
8	DVBS/S2	23.625 Mbps	Quality: 42% Strength: 80%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
9	DVBS/S2	23.625 Mbps	Quality: 42% Strength: 68%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
10	DVBS/S2	23.625 Mbps	Quality: 42% Strength: 74%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
11	DVBS/S2	0.000 Mbps	Quality: 0% Strength: 0%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
12	DVBS/S2	0.000 Mbps	Quality: 0% Strength: 0%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
13	DVBS/S2	0.000 Mbps	Quality: 0% Strength: 0%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
14	DVBS/S2	0.000 Mbps	Quality: 0% Strength: 0%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
15	DVBS/S2	0.000 Mbps	Quality: 0% Strength: 0%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit
16	DVBS/S2	0.000 Mbps	Quality: 0% Strength: 0%	Satellite Freq: 3840.000 MHz LNB Freq: 5150.000 MHz symbolrate: 27500 Ksps	Edit

Figure-3

**Parameters → TS Config:**

From the menu on left side of the webpage, clicking “TS Config”, it displays the interface where users can configure the TS output parameters.

➤ **TS Config→Output TS:**

From the menu on top side of the webpage, clicking “Output TS X”, it displays the interface where users can select output TS channel. (Figure-4)

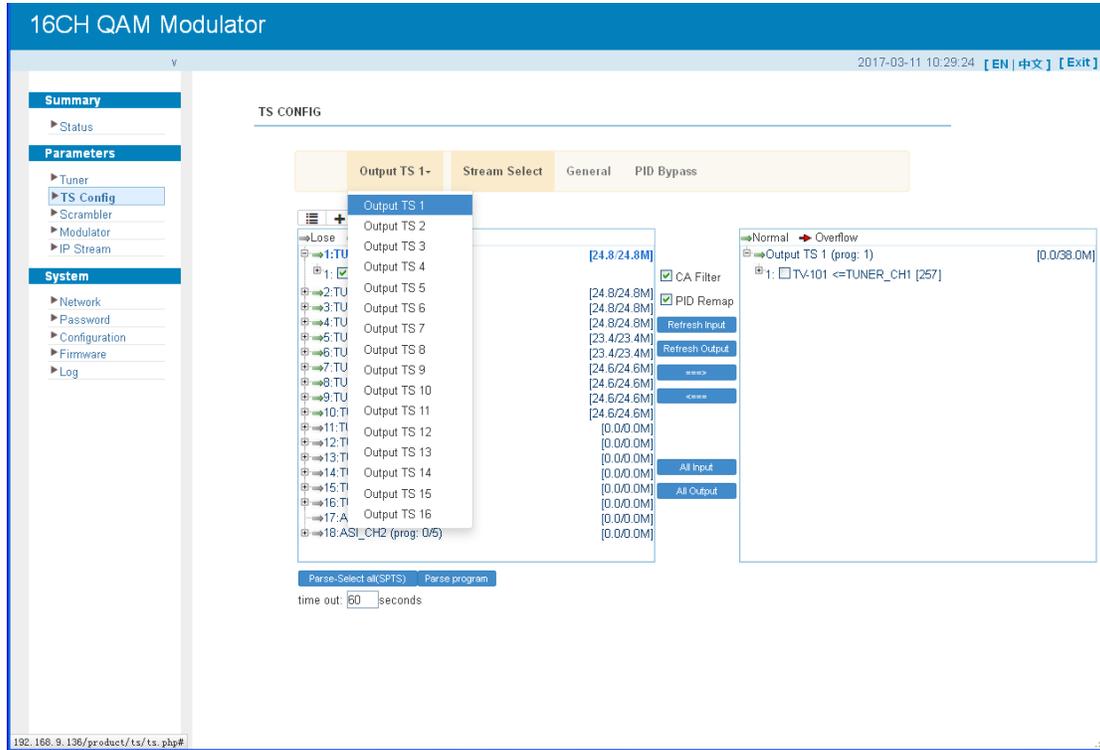


Figure-4

➤ **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-5)

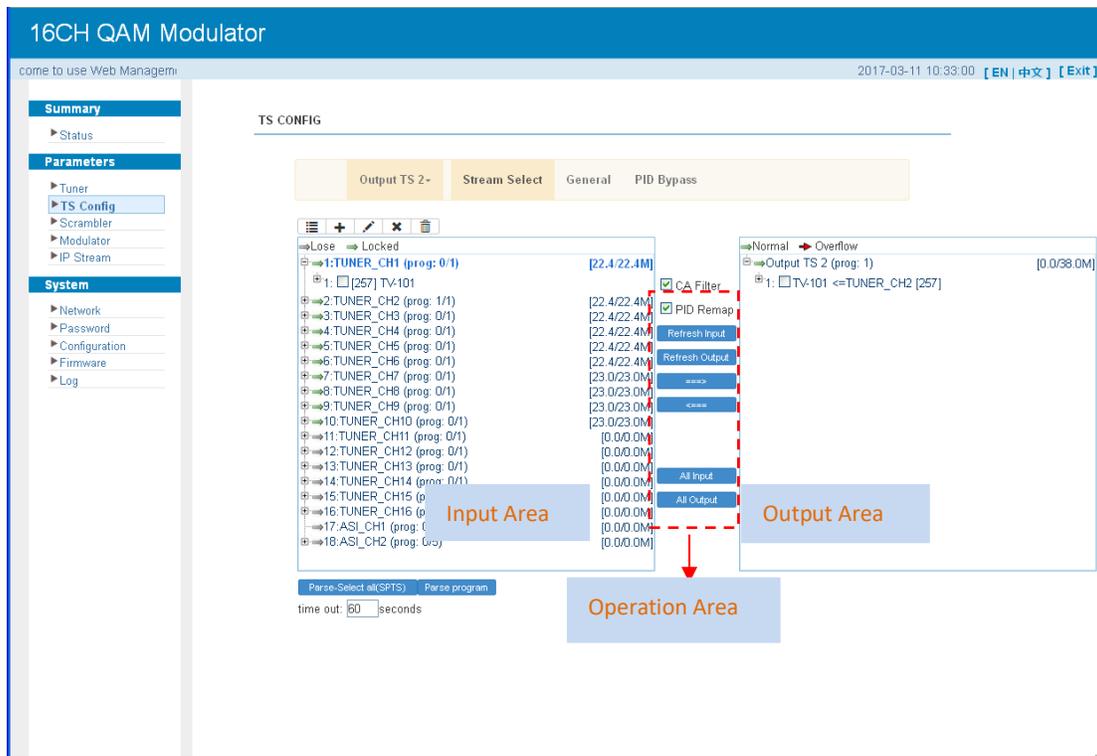


Figure-5

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

- +** : To add input channel which come from GE1
- : To edit the input channel
- x** : 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 <sup>Ⓓ</sup>1.  TV-101 <=TUNER\_CH2 [257] , it triggers a dialog box (Figure 6) where users can input new information.



Figure-6

➤ **TS Config→General:**

From the TS Config menu on up side of the webpage, clicking “General”, it displays the interface where users can set output mode, enable PSI/SI table out, NIT insert/VCT insert, PCR correction. (Figure-7)

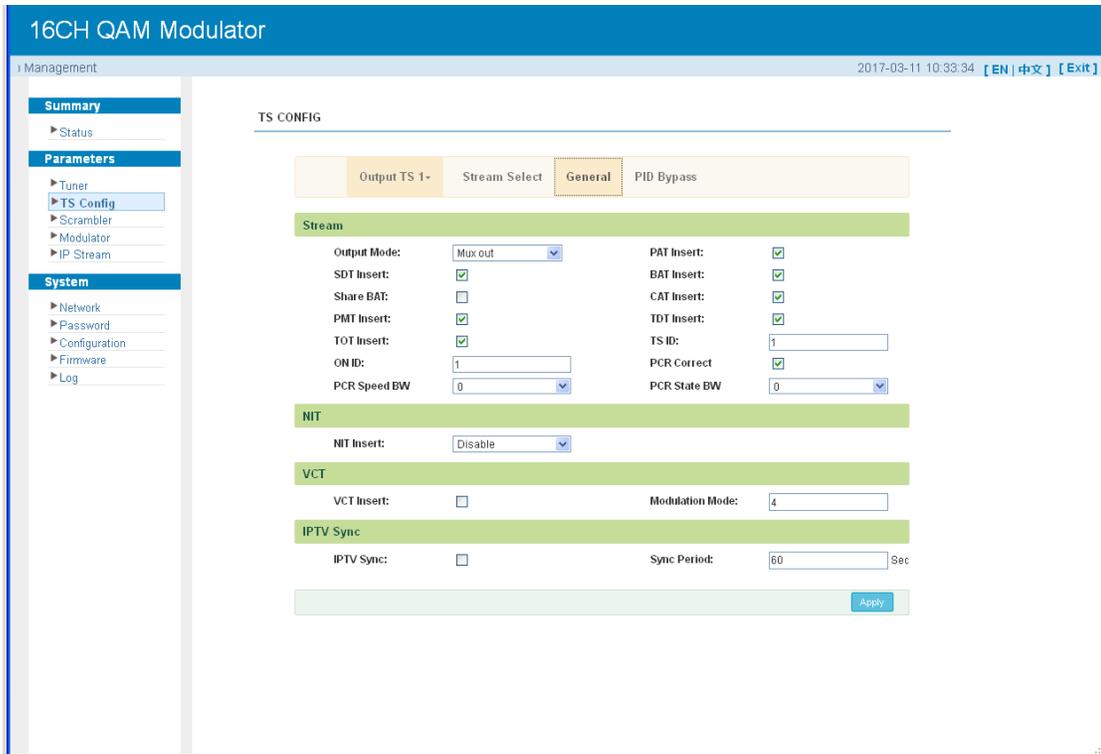


Figure-7

➤ **TS Config→PID Bypass:**

Clicking “PID Bypass”, it displays the interface as Figure-8 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” to apply the parameters.

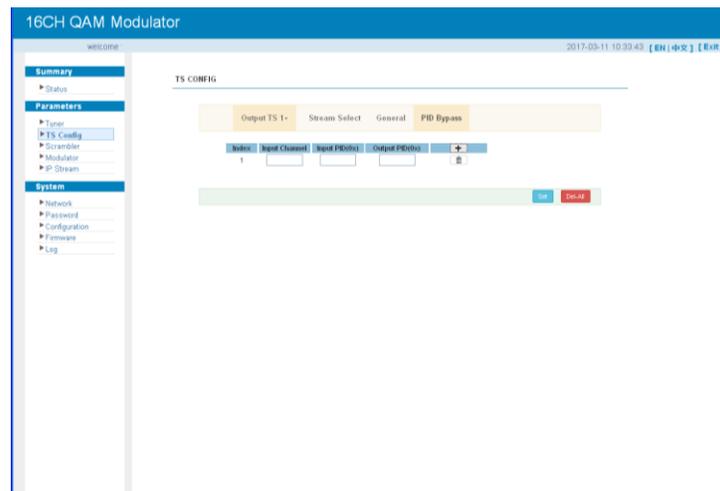


Figure-8

**Parameters → Scrambler:**

From the menu on left side of the webpage, clicking “Scrambler”, it displays the interface where users can choose the programs to scramble (Figure-9).

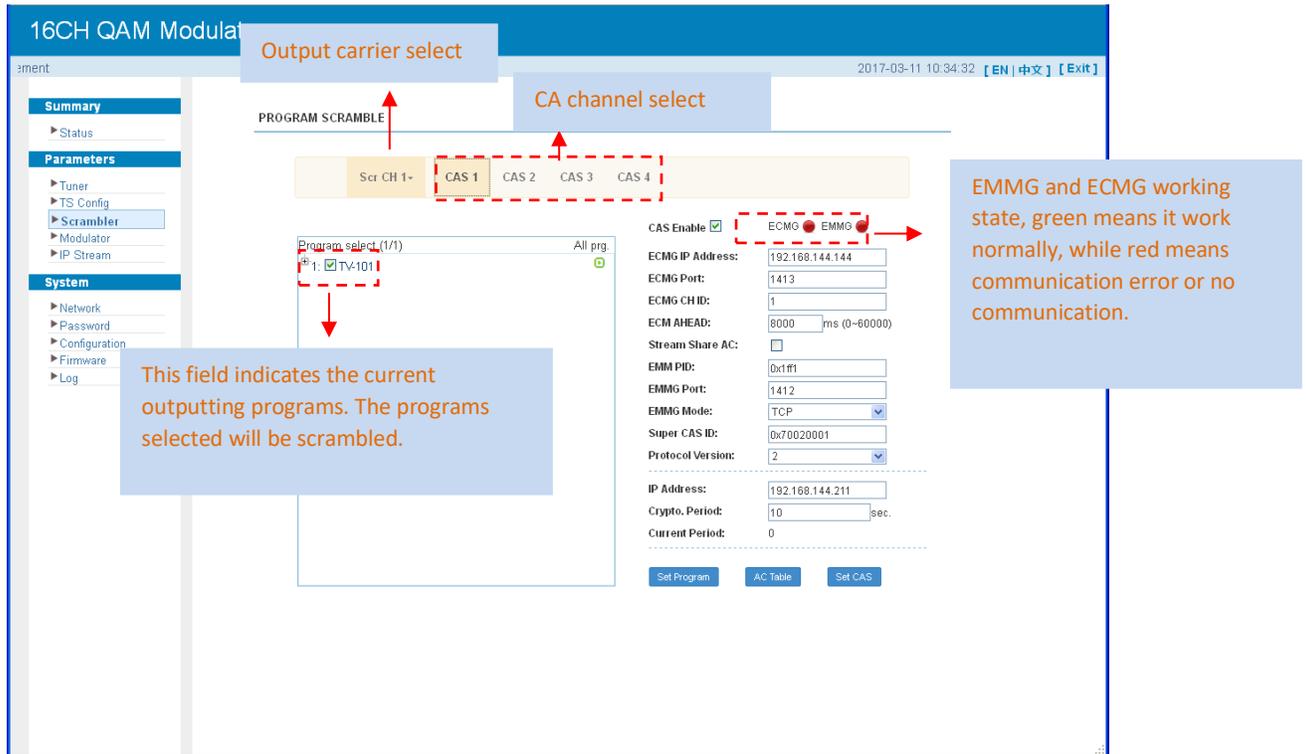


Figure-9

**Parameters → Modulator:**

From the menu on left side of the webpage, clicking “Modulator”, it displays the Modulator Configuration screen as Figure-10. Here user can set modulation parameters.

The screenshot shows the '16CH QAM Modulator' interface. On the left is a navigation menu with sections: Summary (Status), Parameters (Tuner, TS Config, Scrambler, Modulator, IP Stream), and System (Network, Password, Configuration, Firmware, Log). The main area is titled 'MODULATOR' and displays the following information:

- Center Frequency: 534.000 MHz
- Standard: J.83A(DVB-C)
- Level(All Carriers): 0.0 dBm
- Channel Info.(Alarm/Active/Total): 0/16/16

Channel	Frequency	Constellation	Symbol Rate	Gain offset	Status	Bit(Act/Max)	
1	474.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
2	482.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
3	490.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
4	498.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
5	506.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
6	514.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
7	522.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
8	530.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
9	538.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
10	546.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
11	554.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
12	562.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
13	570.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
14	578.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M	✍
15	586.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.1/38.0 M	✍
16	594.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.1/38.0 M	✍

Two callout boxes on the right point to the edit icons in the table: 'Quickly Config' points to the top-right icon, and 'Channel Config' points to the bottom-right icon.

Figure-11

When users click “quickly config” button, it triggers a dialog box as follow where users can set all channels configuration.

The 'Quickly Config.' dialog box contains the following configuration options:

- Standard: J.83A(DVB-C)
- Level(All Carriers): 0.0 (-20 ~ +10 dBm)
- Channel Enable:
- Start Frequency: 650.000 (50 ~ 960 MHz)
- Bandwidth: 8.000 MHz
- Constellation: 64 QAM
- Symbol Rate: 6875 (5000 ~ 7000 Ksps)
- Gain offset: 0.0 (-10 ~ 0 dB)

Buttons: Apply, Close

When users click “Channel config” button, it triggers a dialog box as follow where users can set the corresponding channel configuration.

Channel 1 Config.
[ close ]

**Standard:** J.83A(DVB-C) ▾

**Level(All Carriers):** 0.0 (-20 ~ +10 dBm)

---

**Channel Enable:**

**Frequency:** 650.000 (50 ~ 960 MHz)

**Constellation:** 64 QAM ▾

**Symbol Rate:** 6875 (5000 ~ 7000 Ksps)

**Gain offset:** 0.0 (-10 ~ 0 dB)

Apply
Close

**Parameters → IP Stream:**

TL-9994C supports TS to output in IP (1\*MPTS) format as copy of one carrier through the DATA port.

Clicking “IP Stream”, it displays the interface where to set IP out parameters (Figure-12).

16CH QAM Modulator

welcome to use Web Manag
2017-03-11 10:36:24 [ EN | 中文 ] [ Exit ]

- Summary
- ▶ Status
- Parameters
- ▶ Tuner
- ▶ TS Config
- ▶ Scrambler
- ▶ Modulator
- ▶ IP Stream
- System
- ▶ Network
- ▶ Password
- ▶ Configuration
- ▶ Firmware
- ▶ Log

IP STREAM

IP Address	Port	Protocol	Pkt Length	Null PKT Filter	Status	Bit(Act/Max)	ModulatorChannel	
225.3.3.3	2999	RTP/RTSP	5	<input type="checkbox"/>	<span style="color: green;">●</span>	0.1/38.0 M	15	✎ →

Click here to  
Config IP output

Figure-12

**System → Network:**

Clicking “Network”, it displays the interface as Figure-13 where to set network parameters.

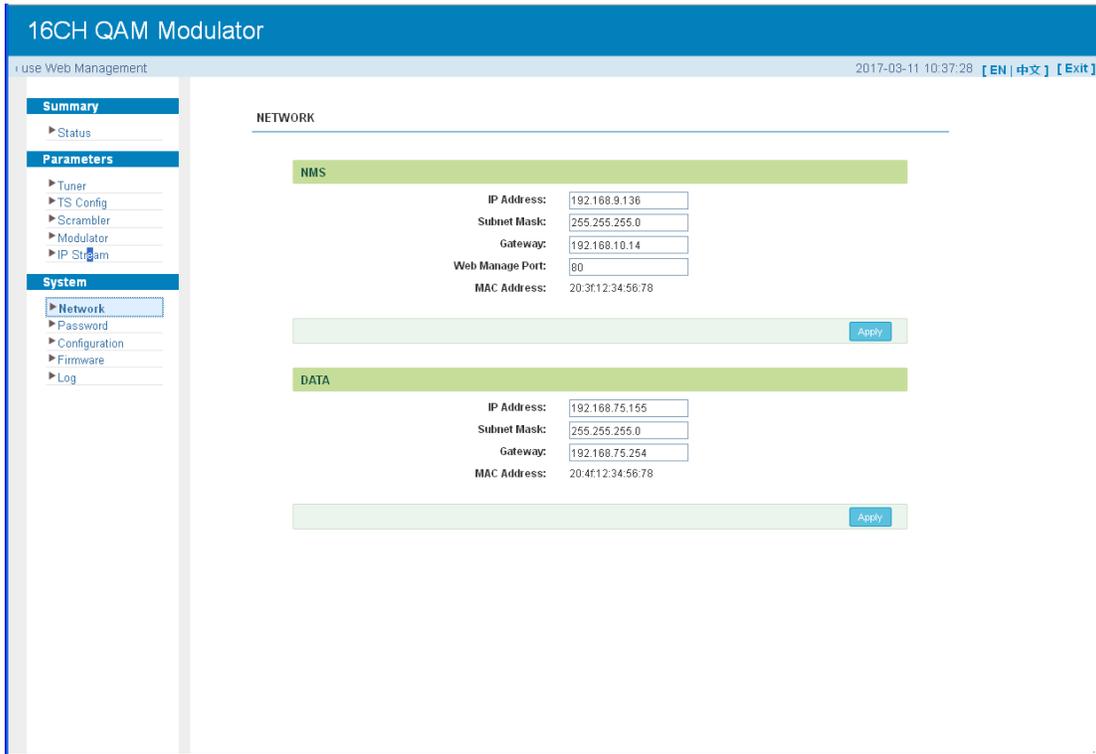


Figure-13

**System → password**

From the menu on left side of the webpage, clicking “Password”, it displays the screen as Figure-14 where to set the login account and password for the web NMS.

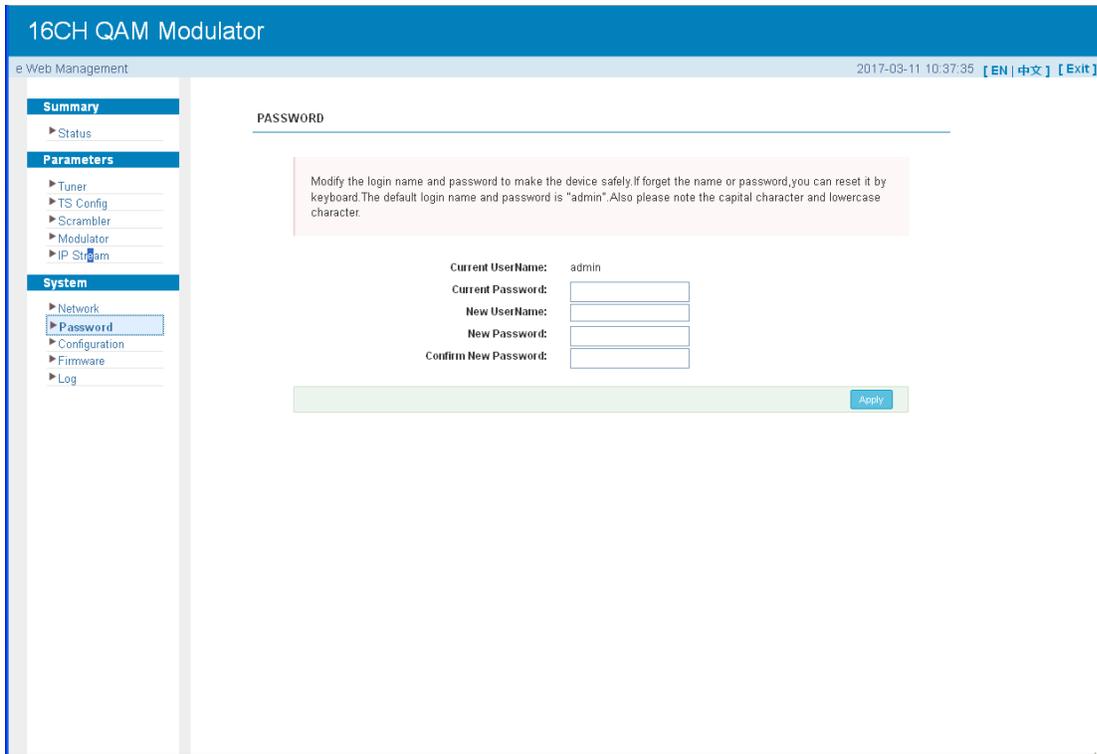


Figure-14

**System → Configuration:**

From the menu on left side of the webpage, clicking “Configuration”, it will display the screen as Figure-15 where to save/restore/factory setting/backup/load your configurations.

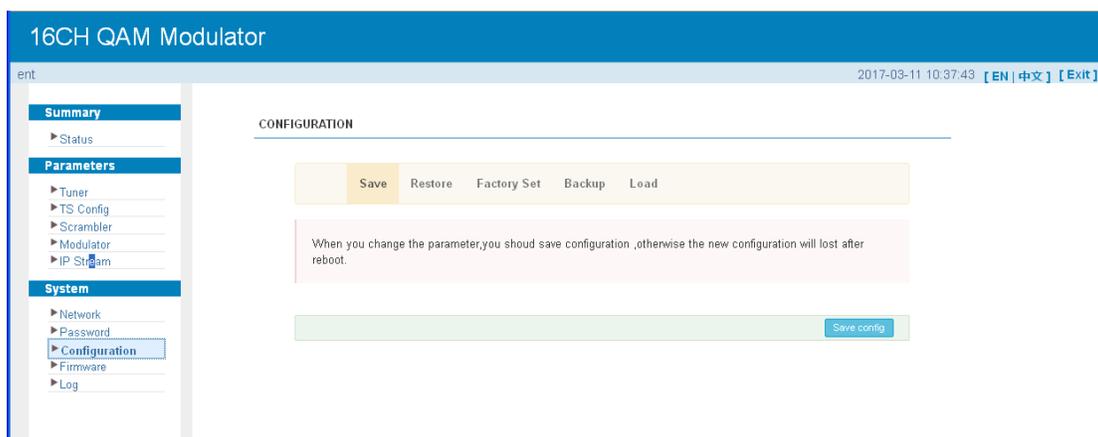


Figure-15

### System → Firmware:

From the menu on left side of the webpage, clicking “Firmware”, it will display the screen as Figure-16 where to update firmware for this modulator.

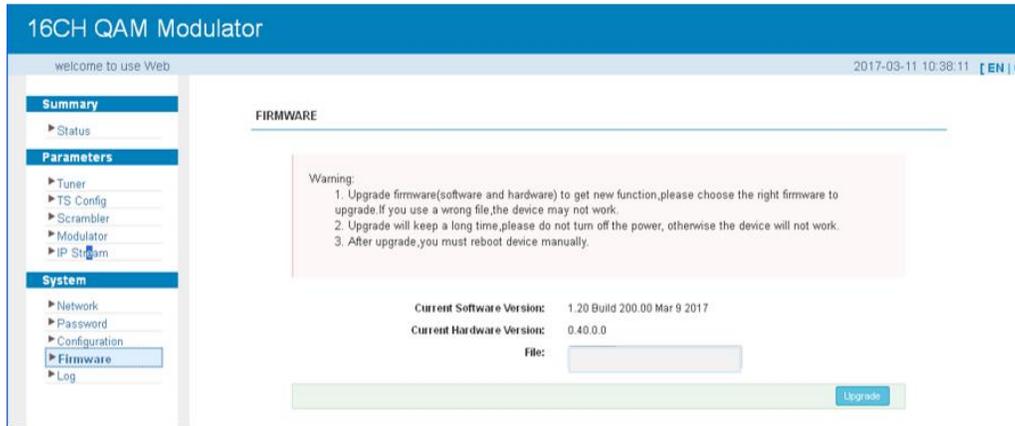


Figure-16

### System → Log:

From the menu on left side of the webpage, clicking “Log”, it will display the log interface as Figure-17 where to check or export the Kernel/System log.

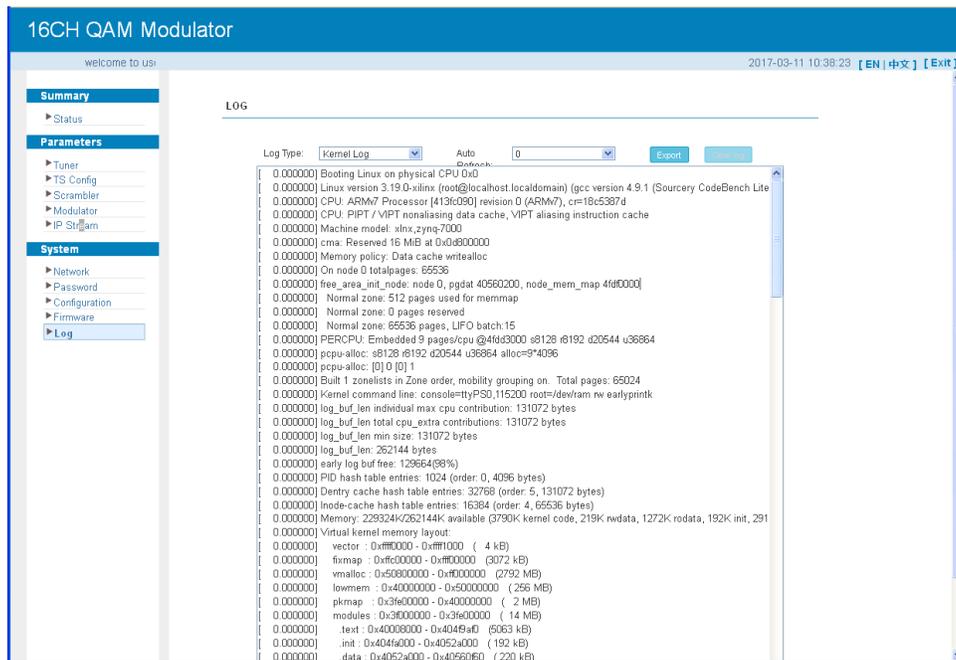


Figure-17

## CHAPTER 4

# TROUBLESHOOTING

All TRANSLITE products have been passed the testing and inspection before shipping out from factory. The testing and inspection scheme already covers all the Optical, Electronic and Mechanical criteria which have been published by TRANSLITE. 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 8

### PACKING LIST

TL-9994C 16-in-1 Mux-Scrambling Modulator	1PC
User's Manual	1PC
Power cord	2PCS

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