



User Manual



H-IPRF-16QAM

Revision 2017

A Note from Thor Broadcast about this Manual

Intended Audience

This user manual has been written to help people who have to use, 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 Product Overview

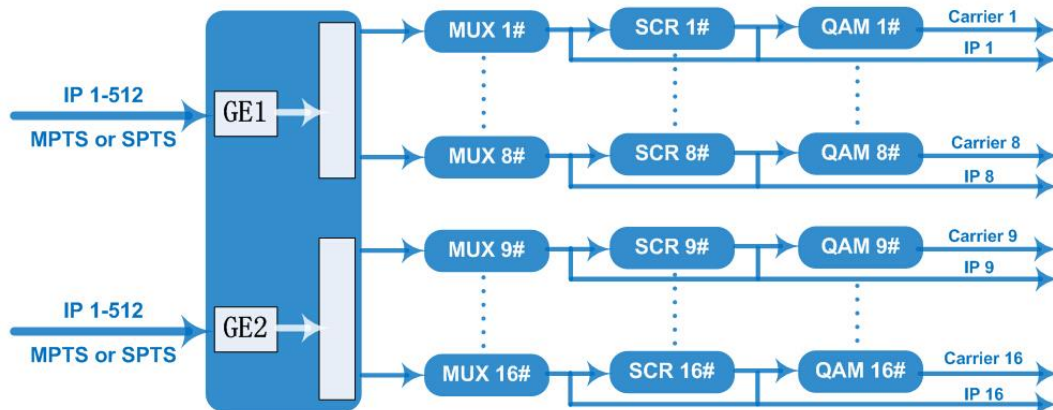
1.1 Outline

The Thor Broadcast new Edge QAM Modulator is a new 1 RU chassis headend in a box that will ingest IP feeds and convert to a QAM channel lineup of your choosing. The latest gen unit has an inclusive chassis that no longer uses blades but does all necessary functioning preloaded to successfully convert IP streams to 16 (or 32- model dependent) QAM channels to create your own efficient IPTV headend into an RF headend. This powerhouse will scramble, multiplex, and modulate up to 16 or 32 channels that supports a maximum 1024 IP TS streams through the 2 GE ports and output 16 or 32 non-adjacent carriers (50MHz~960MHz) via the single RF output interface on the rear of the unit. High performance encoding means you can now distribute countless channels into the bandwidth of 16 QAM carriers.

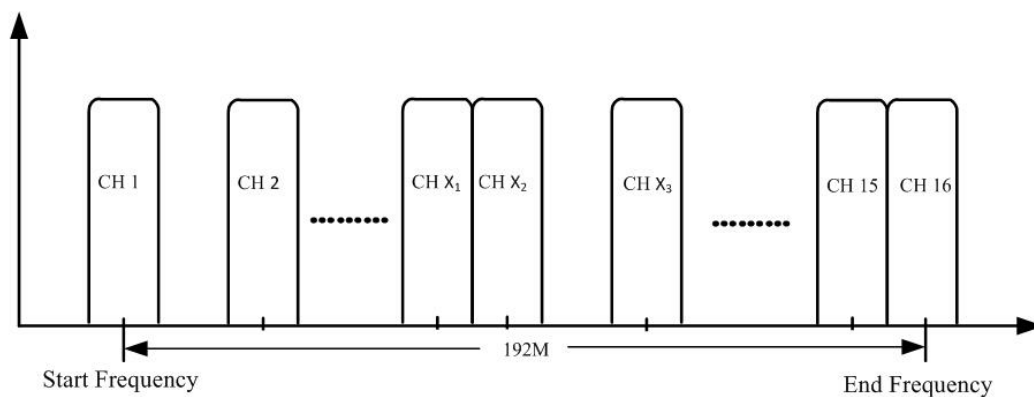
1.2 Key Features

- ❖ 2 GE input, SFP interface
- ❖ Supports up to 1024 channels TS over UDP/RTP, unicast and multicast, IGMP v2\v3
- ❖ Max 840Mbps for each GE input
- ❖ Accurate PCR adjusting
- ❖ CA PID filtering, remapping and PSI/SI editing
- ❖ Up to 180 PIDS remapping per channel
- ❖ DVB general scrambling system (ETR289), simulcrypt standards ETSI 101 197 and ETSI 103 197
- ❖ 16 multiplexed or scrambled TS over UDP/RTP/RTSP output
- ❖ 16 non-adjacent QAM carriers output, compliant to DVB-C (EN 300 429) and ITU-T J.83 A/B
- ❖ RS (204,188) encoding
- ❖ NMS Web-based Network management

1.3 General Mapping



1.4 Carrier Setting Illustration



1.5 Specifications

Input	Input	512×2 IP input, 2 100/1000M Ethernet Port (SFP)
	Transport Protocol	TS over UDP/RTP, unicast and multicast, IGMP V2/V3
	Transmission Rate	Max 840Mbps for each GE input
Mux	Input Channel	1024
	Output Channel	16
	Max PIDs	180 per channel
	Functions	PID remapping(auto/manually optional) PCR accurate adjusting PSI/SI table automatically generating
Scrambling Parameters	Max simulcrypt CA	4
	Scramble Standard	ETR289, ETSI 101 197, ETSI 103 197
	Connection	Local/remote connection
Modulation Parameters	QAM Channel	16 non-adjacent carriers
	Modulation Standard	EN300 429/ITU-T J.83A/B
	Symbol Rate	5.0~7.0Msps, 1ksps stepping
	Constellation	16, 32, 64, 128, 256QAM
	FEC	RS (204, 188)
RF Output	Interface	1 F-type output port for 16 carriers, 75Ω
	RF Range	50~960MHz, 1kHz stepping
	Output Level	-20dBm~+10dBm(87~117dbμV), 0.1dB stepping
	MER	≥ 40dB
	ACLR	-60 dBc
TS output	16 IP output over UDP/RTP/RTSP, unicast/multicast, 2 100/1000M Ethernet Ports	
System	Network management software (NMS)	
General	Demission	420mm×440mm×44.5mm (WxLxH) – 1RU
	Weight	3kg
	Temperature	0~45°C(operation), -20~80°C(storage)
	Power Supply	AC 100V±10%, 50/60Hz or AC 220V±10%, 50/60Hz
	Consumption	15.4W

Chapter 2 - Appearance

2.1 Frontal View:



2.2 Rear Panel Illustration:



1	NMS/CAS: network management port and CA data port
2	RF output port
3	Reset IP: Reset webmaster IP address, recover to default IP address
4	Link/Act Indicators
5	Data Input/Output 1/2 (SFP)
6	Power switch
7	AC Power Socket
8	Ground

Chapter 3 Installation Guide

3.1 In the Box

When you open the Thor Edge QAM powerhouse, please check all items according to packing list.

Normally it should include the following items:

- H-IPRF-16/32QAM
- User's Manual
- Power Cord

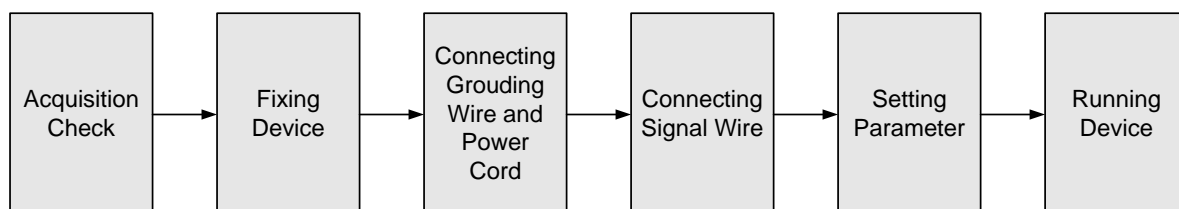
If any item is missing with the list above, please contact Thor Broadcast – 1-800-521-8467

3.2 Installation Preparation

The main steps of the installation include:

- Checking the possible device for missing pieces or damage from transport
- Preparing relevant environment/rack for installation
- Installing the IP to QAM Modulator
- Connecting signal cables
- Connecting communication port (if it is necessary) ; (it is necessary 😊)

3.2.1 Device's Installation Flow Chart Illustrated as follows:



3.2.2 Environment

Item	Requirement
Machine Hall Space	When installing unit on rack, 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, HVAC 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	5~40°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
Fire Protection	Fire alarm system and extinguisher
Power	Device power, HVAC and lighting should be 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.

3.2.3 Grounding

- ✓ 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, lightening. 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 4 Web NMS Management

This is literally how you control the device; there is no front interface with D-Pad

4.1 Login

The factory default IP address is 192.168.0.136 and users can connect the device and web NMS through this IP address.

Connect the PC (Personal Computer) and the device with a net cable, and use ping command to confirm they are on the same network segment. For instance, 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). Launch the web browser and input the device 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.

This is the front splash screen with details on your unit – Status & Summary

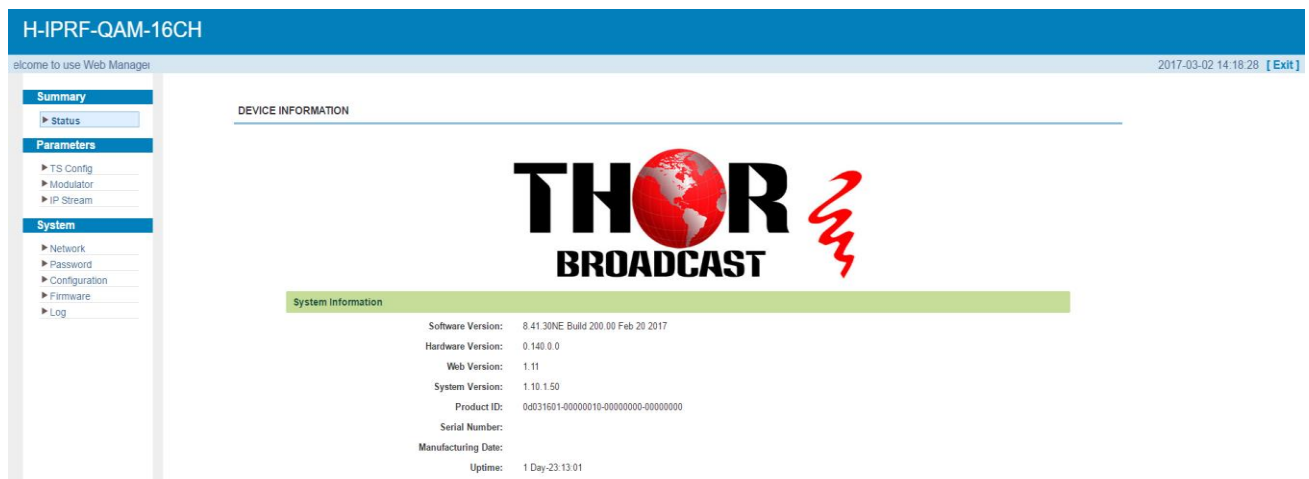


Figure-1

4.2 Operation

4.2.1 Summary

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

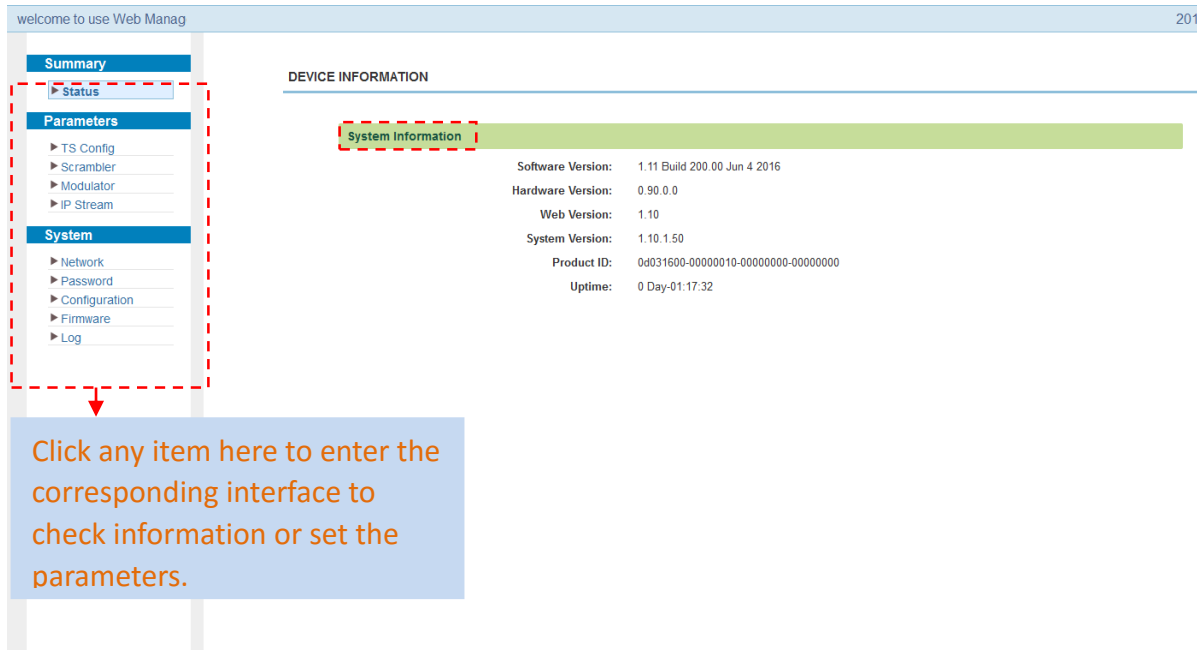


Figure-2

4.2.2 Parameters

Parameters → TS Config:

Click “TS Config”, it displays the interface where users can configure the output TS parameters in this interface. (Figure-3)

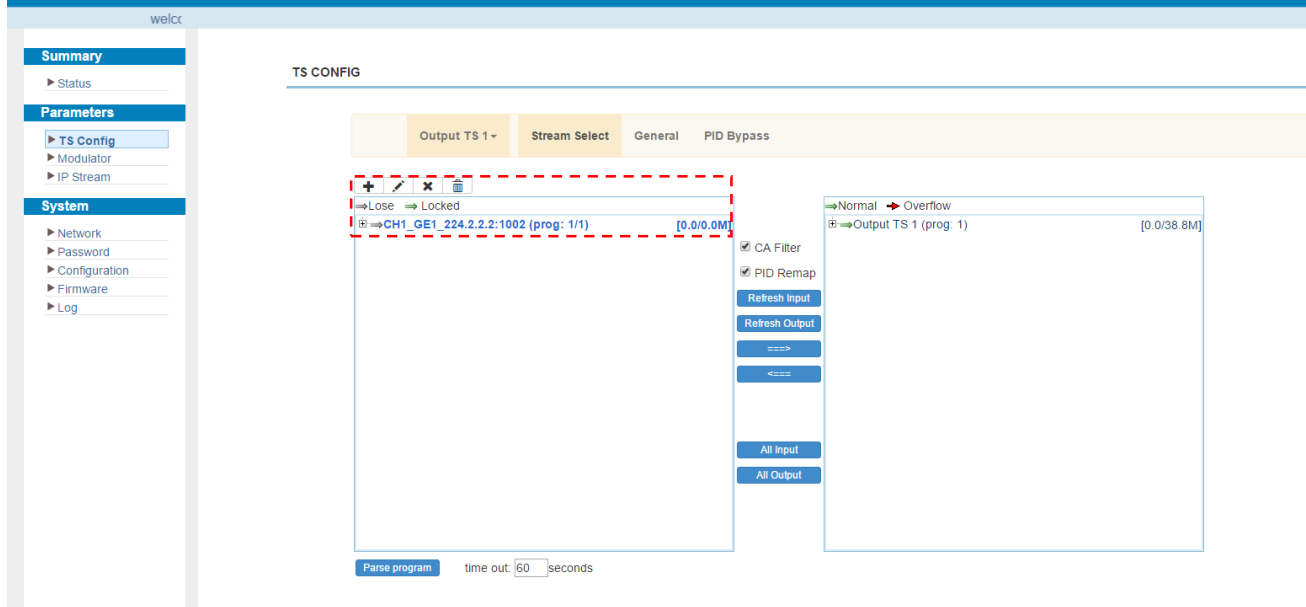


Figure-3

➤ Output TS X

From the menu on top of the webpage, click “Output TS X”, it’ll display the interface as in Figure-4. Select the output TS channels.

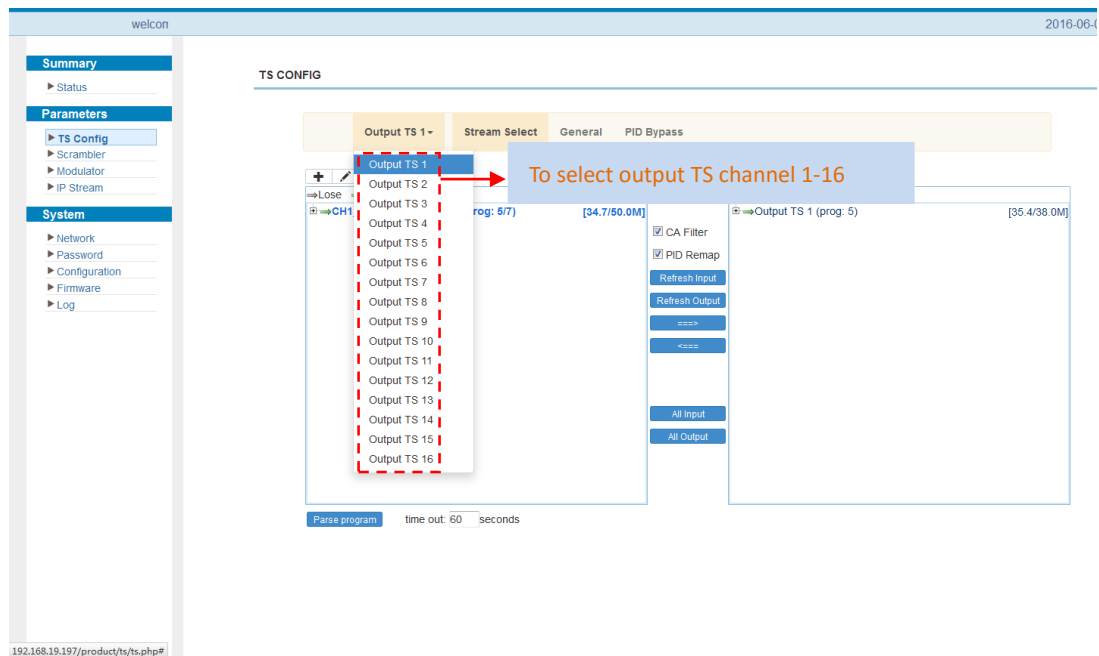


Figure-4

➤ Stream Select

From the menu on top of the webpage, click “Stream Select”, it displays the interface where you can choose the programs to Mux. (Figure-5)

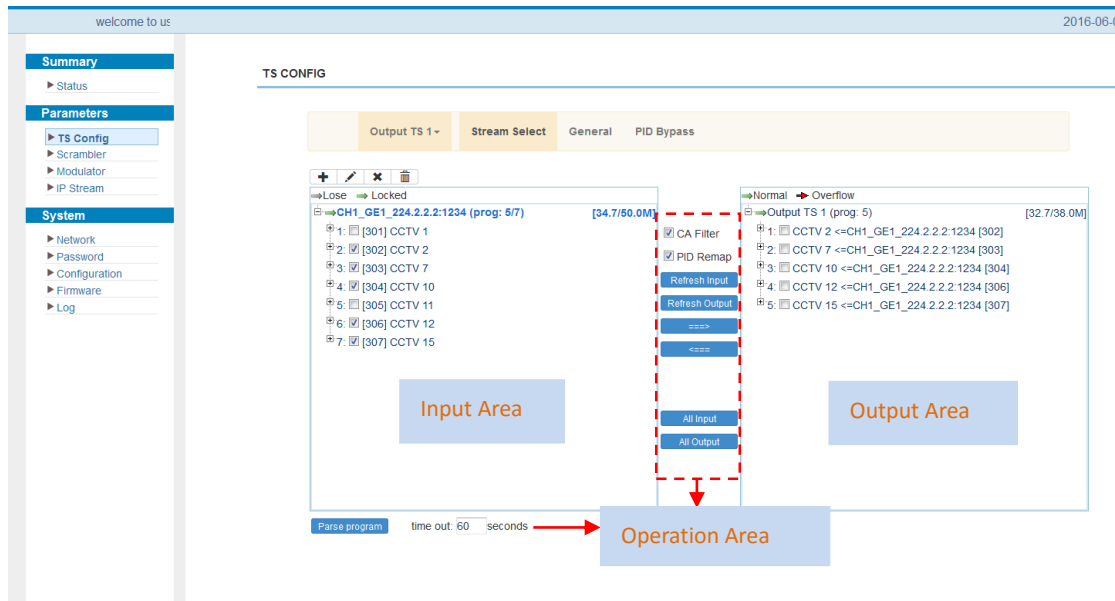


Figure-5

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

- CA Filter** : Enable/disable the CA Filter function. By clicking the box, you can filter the input CA to avoid disturbing the devices scrambling function.
- PID Remap**: To enable/disable the PID remapping
- Refresh Input** Refresh the input program information
- Refresh Output** 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.
- <===** You 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 seconds 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 **CCTV 2 <**, it triggers a dialog box (Figure 6) where you can input new information.

Program Information [close]

Program From Input: CH1_GE1_224.2.2.2:1234 [302]

Service Name: CCTV 2

Program Number: 101

Service Type: 0x01

Service Provider: CCTV

PMT Descriptor Tag: 0x00

PMT Descriptor Data: (Hex)

PMT PID: 0x0020

PCR PID: 0x0021

MPEG-2 Video PID: 0x0022

MPEG-2 Audio PID: 0x0023

Apply Close

Figure 6

➤ General

From the menu on the top of the webpage, click “General”, it displays the interface where you can set parameters for each output channel. (Figure-7)

welcome 2016

Summary

- ▶ Status

Parameters

- ▶ TS Config
- ▶ Scrambler
- ▶ Modulator
- ▶ IP Stream

System

- ▶ Network
- ▶ Password
- ▶ Configuration
- ▶ Firmware
- ▶ Log

TS CONFIG

Output TS 1 - Stream Select **General** PID Bypass

Stream

Output Mode: Mux out

SDT Insert:

Share BAT:

PMT Insert:

TOT Insert:

ON ID: 1

PCR Speed BW: 0

PAT Insert:

BAT Insert:

CAT Insert:

TDT Insert:

TS ID: 1

PCR Correct:

PCR State BW: 0

NIT

NIT Insert:

Network ID: 1

Version Mode: Automatic

Private Data: 0x00000000

Network Name: network-1

Version Number: 0 (0-31)

Index	TS ID	ON ID	Frequency	Constellation	Symbol Rate	
						+

VCT

VCT Insert:

Modulation Mode: 4

Apply

Add description

Figure-7

Click and then click to apply the modified parameters.(Figure-8)

NIT Descriptor [close]

TS ID: 1

ON ID: 1

Frequency: 450.000 MHz

Constellation: 16 QAM

Symbol Rate: 6875 Ksps

FEC Inner: 1/2 conv.

FEC Outer: not outer FEC

Add Close

Figure-8

➤ **PID Pass**

From the menu on the top of the webpage, click “PID Pass”, to display the interface where to add the PIDs which need pass through. (Figure-9)

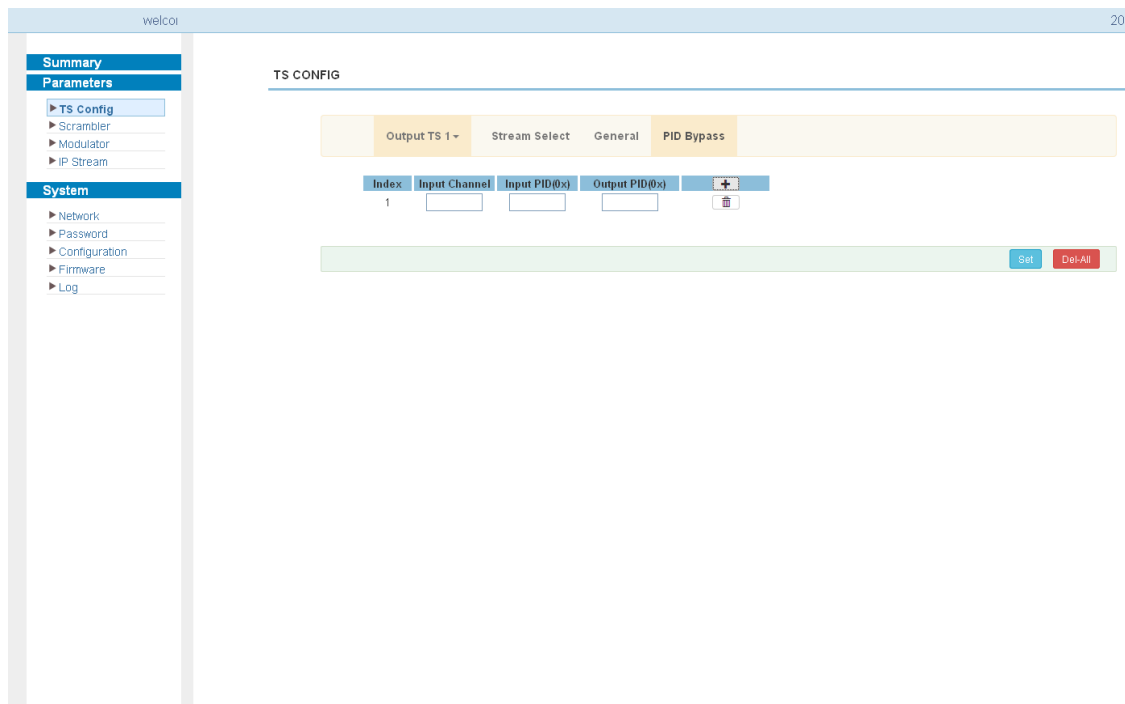


Figure-9

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-10)

Scramble channel select

PROGRAM SCR

Scr CH 2 - CAS 1 CAS 2 CAS 3 CAS 4

CA channel select

ECMG EMMG

ECMG IP Address: 192.168.19.250

ECMG Port: 4111

ECMG CH ID: 1

Stream Share AC:

EMM PID: 0x1fff

EMMG Port: 6000

EMMG Mode: TCP

Super CAS ID: 0x70020001

Protocol Version: 2

IP Address: 192.168.19.181

Crypto. Period: 5 sec

Current Period: 0

Buttons: Set Program, AC Table, Set CAS

EMMG and ECMG working state, green means it works normally, while red means communication error or no communication.

This field indicates the current outputting programs. The programs selected will be scrambled.

Figure-10

Parameters → Modulator:

From the menu on left side of the webpage, click 'Modulator', it will display the interface as shown in Figure-11 where to set RF output parameters.

MODULATOR

Center Frequency: 710.000 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	650.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	34.7/38.0 M
2	658.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
3	666.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
4	674.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
5	682.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
6	690.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
7	698.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
8	706.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
9	714.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
10	722.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
11	730.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
12	738.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
13	746.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
14	754.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
15	762.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M
16	770.000 MHz	64 QAM	6875 Ksps	0.0 dB	●	0.0/38.0 M

Click to set all channels RF QAM output parameters

Click to set each channel RF QAM output

Figure-11

Quickly Config. [close]

Standard: J.83A(DVB-C)

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

Channel Enable:

Start Frequency: 650.000 (30 ~ 900 MHz)

Bandwidth: 8.000 MHz

Constellation: 64 QAM

Symbol Rate: 6875 (5000 ~ 7000 Ksps)

Gain offset: 0.0 (-10 ~ 0 dB)

Apply Close

Channel 1 Config. [close]

Standard: J.83A(DVB-C)

Level(All Carriers): -10.0 (-12 ~ +13 dBm)

Channel Enable:

Frequency: 474.000 (30 ~ 900 MHz)

Constellation: 64 QAM

Symbol Rate: 6875 (5000 ~ 7000 Ksps)

Gain offset: 0.0 (-12 ~ 0 dB)

Apply Close

Parameters → IP Stream:

Thor's Edge QAM supports TS to output in IP (16*MPTS) format through the DATA port.

Click 'IP Stream', it will display the interface as shown in Figure-12 where to set IP out parameters.

welcome to use Web Me

Summary

- ▶ Status

Parameters

- ▶ TS Config
- ▶ Scrambler
- ▶ Modulator
- ▶ IP Stream

System

- ▶ Network
- ▶ Password
- ▶ Configuration
- ▶ Firmware
- ▶ Log

IP STREAM

Channel Info.(Alarm/Active/Total): 0/1/16

Channel	IP Address	Port	Protocol	Pkt Length	Null PKT Filter	Status	Bit(Act/Max)	
1	224.2.2.2	2001	UDP	7	<input type="checkbox"/>	●	32.5/38.0 M	✍
2	224.2.2.2	2002	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
3	224.2.2.2	2003	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
4	224.2.2.2	2004	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
5	224.2.2.2	2005	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
6	224.2.2.2	2006	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
7	224.2.2.2	2007	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
8	224.2.2.2	2008	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
9	224.2.2.2	2009	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
10	224.2.2.2	2010	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
11	224.2.2.2	2011	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
12	224.2.2.2	2012	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
13	224.2.2.2	2013	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
14	224.2.2.2	2014	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
15	224.2.2.2	2015	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍
16	224.2.2.2	2016	UDP	7	<input type="checkbox"/>	●	0.0/38.0 M	✍

Figure-12

Channel 1 Config. [close]

Enable:

Source Select: Scrambed TS

IP Address: 224.2.2.2

Port: 2001

Protocol: UDP

Pkt Length: 7

Null PKT Filter:

Apply Close

System → Network:

Click 'Network', it will display the interface as shown in Figure-13 where to set network parameters.

The screenshot shows the 'NETWORK' configuration page. The left sidebar has a 'System' menu with 'Network' selected. The main area has three sections:

- NMS:** IP Address: 10.0.0.104, Subnet Mask: 255.0.0.0, Gateway: 10.0.0.1, Web Manage Port: 80, MAC Address: 20.3f.12.34.56.78
- Scrambler:** IP Address: 192.168.19.197, Subnet Mask: 255.255.255.0, Gateway: 192.168.19.1
- DATA:** IP Address: 192.168.100.100, Subnet Mask: 255.255.255.0, Gateway: 192.168.100.1, MAC Address: 20.4f.12.34.56.78, TS Output: GE1 GE2

Figure-13

System → Password:

From the menu on left side of the webpage, click "Password", it will display the screen as shown in Figure-14 where to set the login account and password for the web NMS.

The screenshot shows the 'PASSWORD' configuration page. The left sidebar has a 'System' menu with 'Password' selected. The main area contains a warning message and the following fields:

- Current UserName: admin
- Current Password: [input field]
- New UserName: [input field]
- New Password: [input field]
- Confirm New Password: [input field]

Figure-14

System → Configuration:

From the menu on left side of the webpage, click “Configuration”, it will display the screen as Figure-15 where to set your configurations for the device.

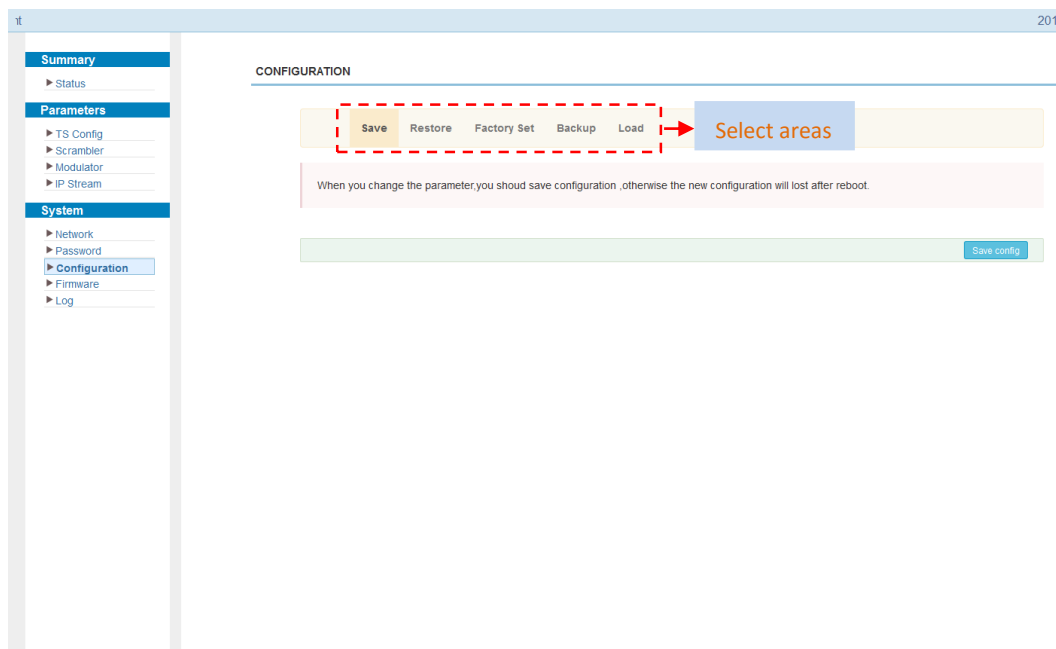


Figure-15

System → Firmware:

From the menu on left side of the webpage, click “Firmware”, it will display the screen as shown in Figure-16 where to update firmware for the device.

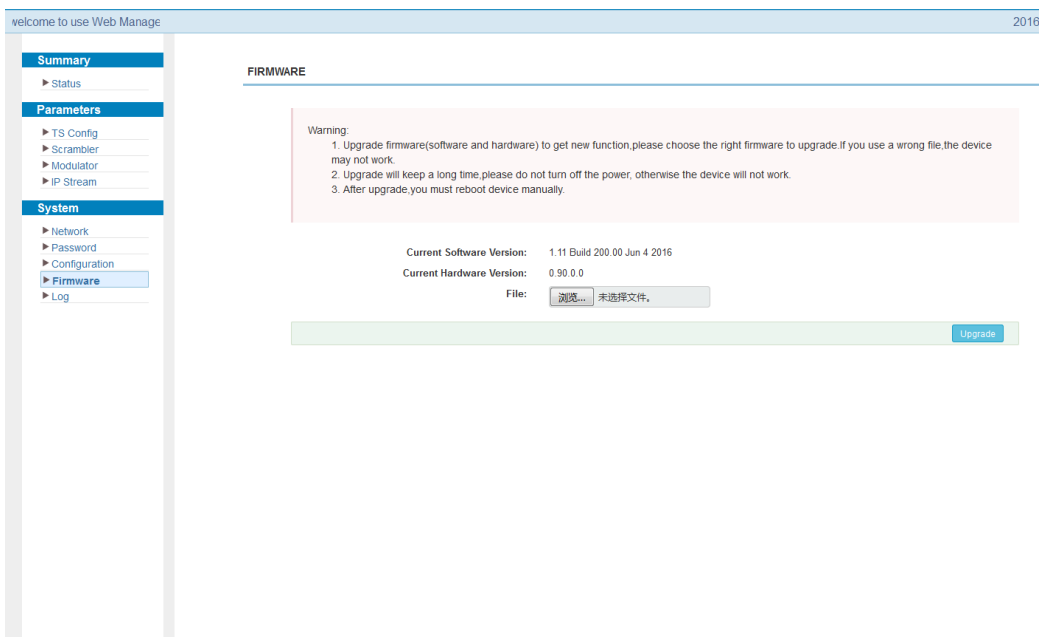


Figure-16

System → Log:

From the menu on left side of the webpage, click “Log”, it will display the screen as shown in Figure-17 where to check the “Log”.

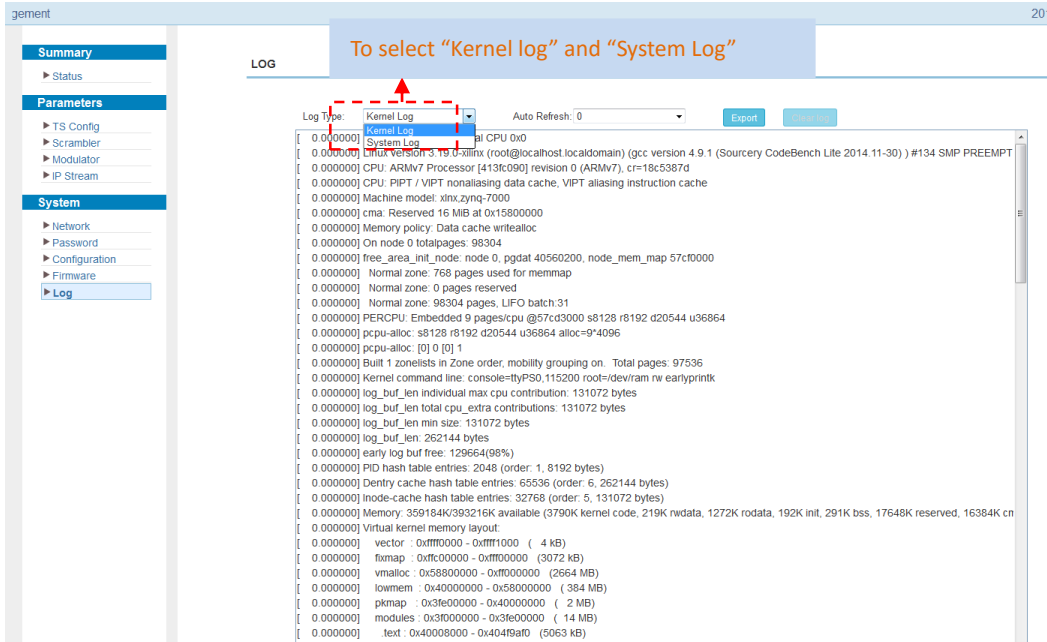


Figure-17

Chapter 5 - 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 have 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 6 Packing list

- Thor Broadcast IP QAM Modulator 1 pc
- User's Manual 1 pc
- Power Cord 1 pc

Thor Fiber & Thor Broadcast
Los Angeles CA
1-800-521-8467 ext 2 for Support