



AQ1016 IP MUX Scrambling QAM Modulator

**Quick Reference
Guide**

Revision A

ACT AQ1016 1 RU IP MUX Scrambling QAM Modulator

Quick Reference Guide

ACT Document Number: ACT AQ1016 Quick Reference Guide

User Guide Revision A

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This document is produced to assist professional and properly trained personnel with installation and maintenance issues for the product. The capabilities, system requirements and/or compatibility with third-party products described herein are subject to change without notice.

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Revision History

Revision	Date	Reason for Change
A	07/11/2016	Initial Release

Table of Contents

1 Product Overview.....	4
1.1 Outline.....	4
1.2 Key Features.....	4
1.3 Inner Structure.....	5
1.4 Carrier Setting Illustration.....	5
1.5 Specifications	5
2 Physical Presentational Statement.....	7
2.1 Front panel Illustration:.....	7
2.2 Rear Panel Illustration:.....	7
3 Installation Guide	7
3.1 Acquisition Check.....	7
3.2 Installation Preparation.....	8
3.3 Wire Connection	9
4 Web NMS Management.....	10
4.1 Login	10
4.2 Operation	10
5 Troubleshooting	20
6 Packing list.....	20

1 Product Overview

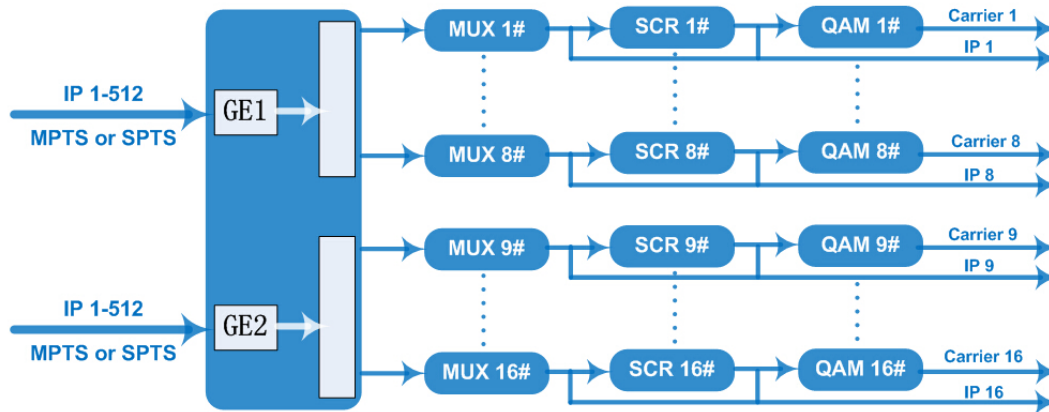
1.1 Outline

Ascent's AQ1016 IP Mux-Scrambling modulator is the latest generational MUX-scrambling-modulating all-in-one device. It has 16 multiplexing channels, 16 scrambling channels, and 16 QAM (DVB-C) modulating channels, and supports a maximum 1024 IP inputs through the GE port and 16 non-adjacent carriers (50 MHz to 960 MHz) output through the RF output interface. The device is also characterized with high integrated level, high performance, and low cost. AQ1016 is highly adaptable to new generation CATV broadcasting systems.

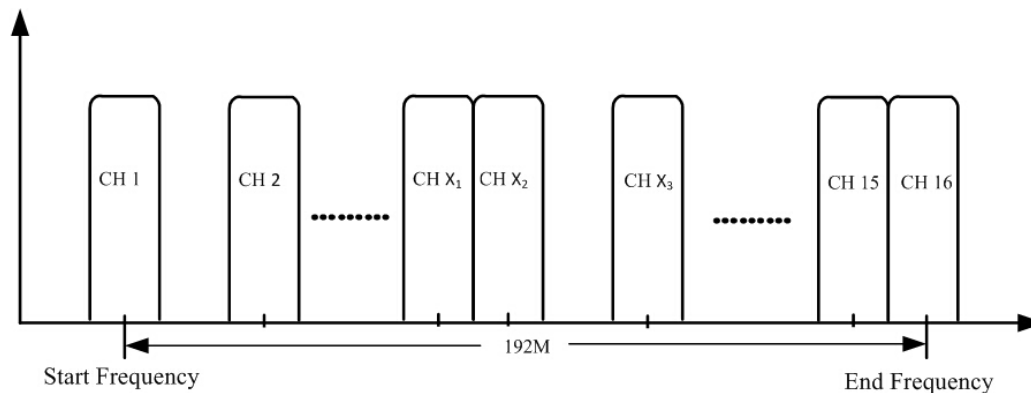
1.2 Key Features

- 2 × GE inputs, Data 1 and Data 2
- Supports up to 1024 channels TS over UDP/RTP, unicast and multicast, IGMP v2/v3
- Max 840 Mbps for each GE input
- Supports accurate PCR adjusting
- Supports CA PID filtering, remapping and PSI/SI editing
- Supports up to 180 PIDS remapping per channel
- Supports DVB general scrambling system (ETR289), Simulcrypt standards ETSI 101 197, and ETSI 103 197
- Supports 16 multiplexed or scrambled TS streams 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
- Supports RS (204,188) encoding
- Support Web-based network management

1.3 Inner Structure



1.4 Carrier Setting Illustration



1.5 Specifications

Input

Input	512 × 2 IP input, 2 × 100/1000M Ethernet Port
Transport Protocol	TS over UDP/RTP, unicast and multicast, IGMP V2/V3
Transmission Rate	Max 840 Mbps for each GE input

Mux

Input Channel	1024
Output Channel	16
Max PIDs	180 per channel
Functions	PID remapping (auto/manual 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 Msps to 7.0 Msps, 1 ksps stepping
Constellation	16, 32, 64, 128, 256QAM
FEC	RS (204, 188)

RF Output

Interface	1 × F-type output port for 16 carriers, 75 Ω impedance
RF Range	50 MHz to 960 MHz, 1 kHz stepping
Output Level	-20 dBm to +10 dBm (87 dBμV to 117 dBμV), 0.1 dB stepping
MER	≥40dB
ACLR	-60 dBc

TS Output

16 × IP outputs over UDP/RTP/RTSP, unicast/multicast
2 × 100/1000M Ethernet Ports

System

Supports Network Management Software (NMS)

General

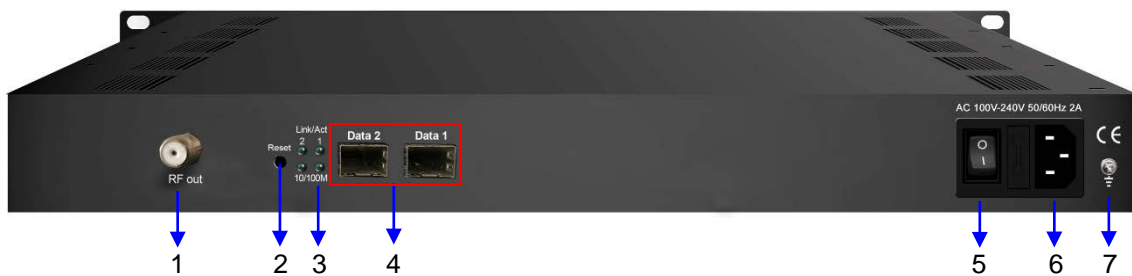
Dimensions (L × W × H)	440 mm × 420 mm × 44.5 mm
Weight	3 kg
Operating Temperature	0 to +45°C
Storage Temperature	-20 to +80 °C
Power Supply	AC 100 V ± 10 %, 50/60 Hz or AC 220 V ± 10 %, 50/60 Hz
Power Consumption	15.4 W

2 Physical Presentational Statement

2.1 Front panel Illustration:



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 it to default IP address
- 4 Link/act indicators
- 5 Data input/output 1/2
- 6 Power switch
- 7 AC power socket
- 8 Grounding

3 Installation Guide

3.1 Acquisition Check

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

- AQ1016 IP QAM Modulator
- User's Manual
- Power Cord

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

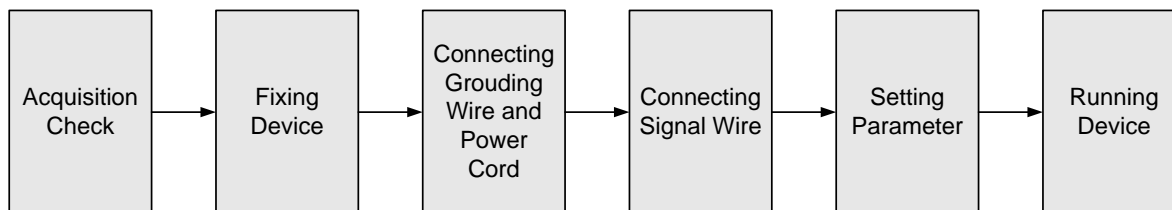
3.2 Installation Preparation

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

The main steps of the installation include:

- Check for missing or damaged components
- Preparing relevant environment for installation
- Installing AQ1016 IP MUX-Scrambling QAM Modulator
- Connecting signal cables
- Connecting communication port (if it is necessary)

3.2.1 Device's Installation Flow Chart Illustrated as follows:



3.2.2 Environment Requirements

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 m to 1.5 m and the distance against the wall should be no less than 0.8 m.
Machine Hall Floor	Electric isolation, Dust-free Volume resistivity of ground anti-static material: $1 \times 10^7 \Omega$ to $1 \times 10^{10} \Omega$, Grounding current limiting resistance: 1 M (Floor bearing should be greater than 450 kg/m ²)
Environment Temperature	+5 °C to +40 °C (sustainable), 0 to +45 °C (short time) installing air-conditioning is recommended
Relative Humidity	20 % to 80 % sustainable 10 % to 90 % short time
Pressure	86 to 105 kPa
Door & Window	Install rubber strips for sealing door-gaps and dual level glasses for window
Wall	Can be covered with wallpaper, or non-bright paint.
Fire Protection	Fire alarm system and extinguisher
Power	Device power, air-conditioning power, and lighting power should all be independent to each other. Device power requires AC power 220 V \pm 10 % 50/60 Hz or 110 V \pm 10 % 50/60 Hz. Please carefully check before running.

3.2.3 Grounding Requirements

- Good grounding for all function modules ensures reliability and stability of these devices. They are also the best way to prevent lightning arresting and interference rejection.
- The coaxial cables' outer conductor and isolation layer should keep proper electric conducting with the metal housing of the device.
- The grounding conductor should have a 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 the grounding wire are electrically conducive and rust-proof.
- It is prohibited to use any other device as part of the grounding electric circuit
- The area of conduction between the grounding wire and device's frame should be no less than 25 mm².

3.2.4 Frame Grounding

All of the machine's frames should be connected with a protective copper strip. The grounding wire should be as short as possible and avoid circling. The area of conduction between the grounding wire and grounding strip should be no less than 25 mm².

3.2.5 Device Grounding

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

3.3 Wire Connection

3.3.1 Power Cord Connection

The power socket is located on the right of the rear panel, and the power switch is on the left of the front panel. User can plug one end of the power cord to the socket and insert the other end to AC power. When the device is solely connected to protective ground, it should have an independent path, and share the same ground with other devices. When the device adopts a united path, the grounding resistance should be smaller than 1 Ω .



Warning

Before connecting power cord to AQ1016 IP QAM Modulator, user should set the power switch to "OFF".

3.3.2 Signal and NMS Cable Connection

The signal connections include the connection of the input signal cable and the connection of the output signal cable.

4 Web NMS Management

This device does not support LCD operation, and modifications can only be made using Web NMS.

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 an RJ45 Ethernet cable, and use the ping command to confirm they are on the same network segment. For instance, if the PC IP address is 192.168.99.252, we then change the device IP to 192.168.99.xxx (xxx can be any integer between 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 shown in Figure - 1. Input the Username and Password (Both the default Username and Password are "admin", and then click "Login" to start the device setup.

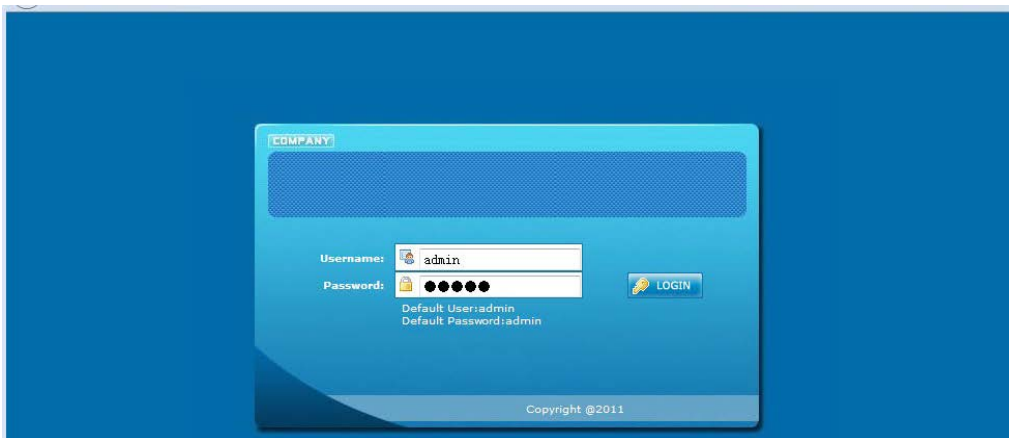


Figure - 1

4.2 Operation

4.2.1 Summary

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

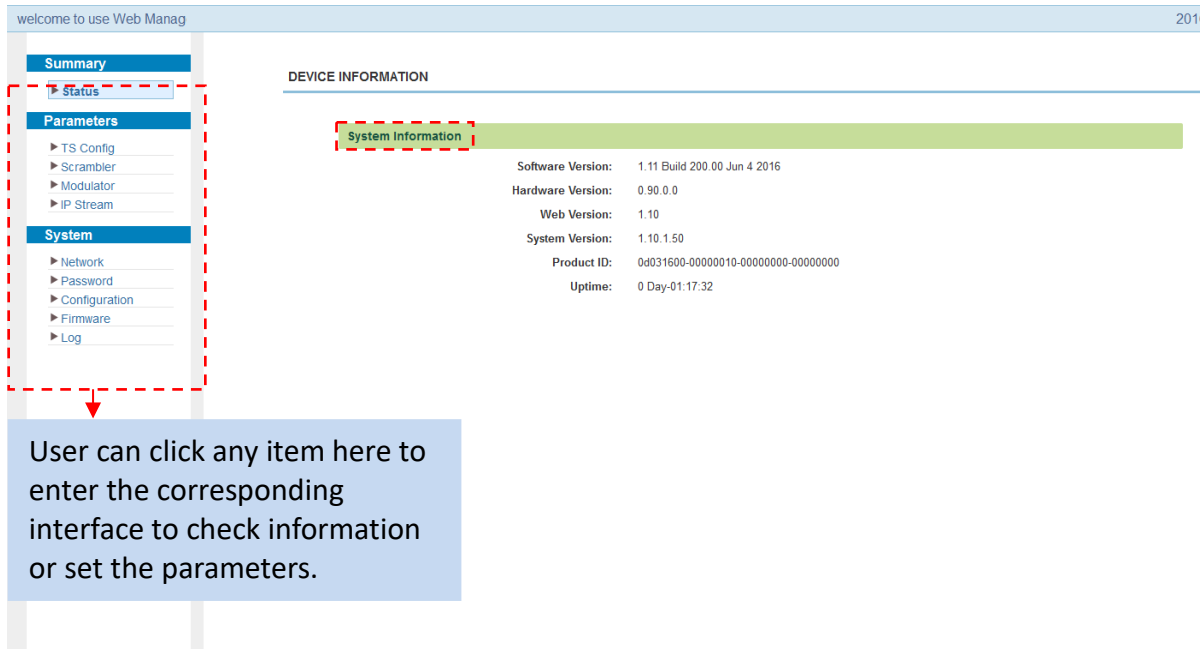


Figure - 2

4.2.2 Parameters

Parameters → TS Config:

Click “TS Config” to display the interface where users can configure output TS parameters.
 (Figure - 3)

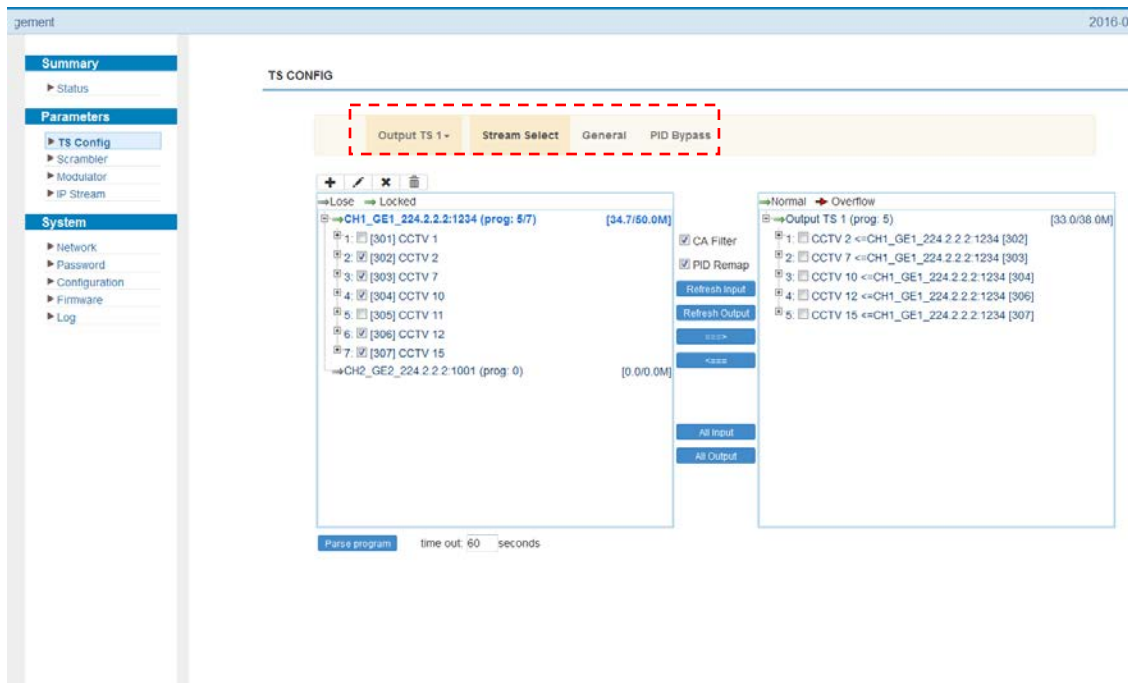


Figure - 3

➤ Output TS X

From the menu near the top of the webpage, click “Output TS X” to display the interface as shown in Figure - 4. Users can select the output TS channels.

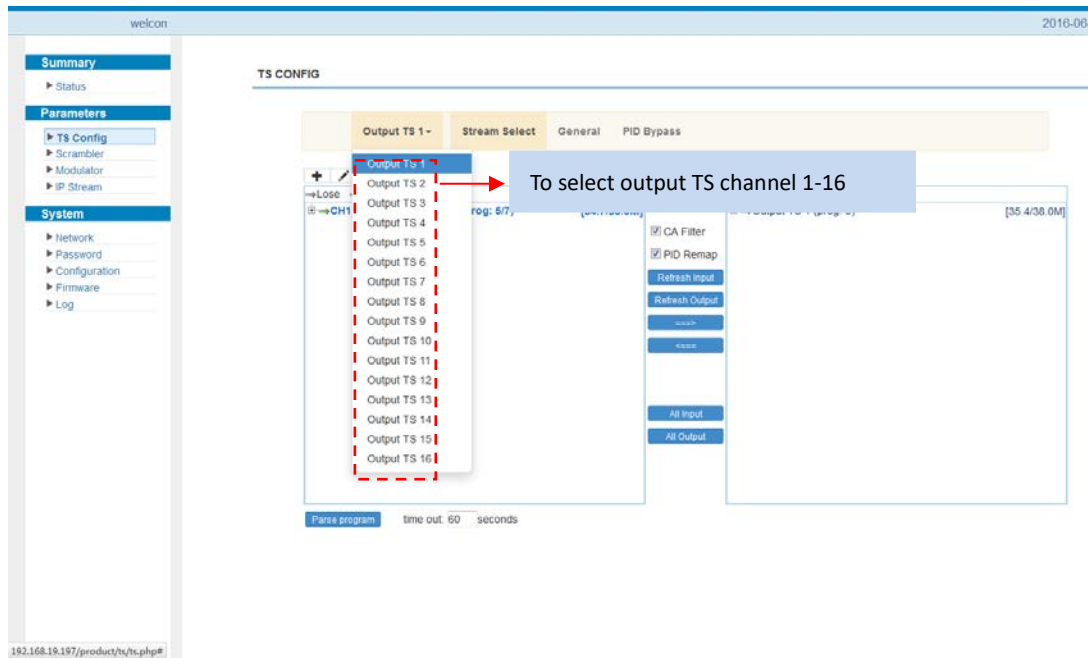


Figure - 4

➤ Stream Select

From the menu near the top of the webpage, click “Stream Select” to display the interface where users can choose programs to MUX out. (Figure - 5)

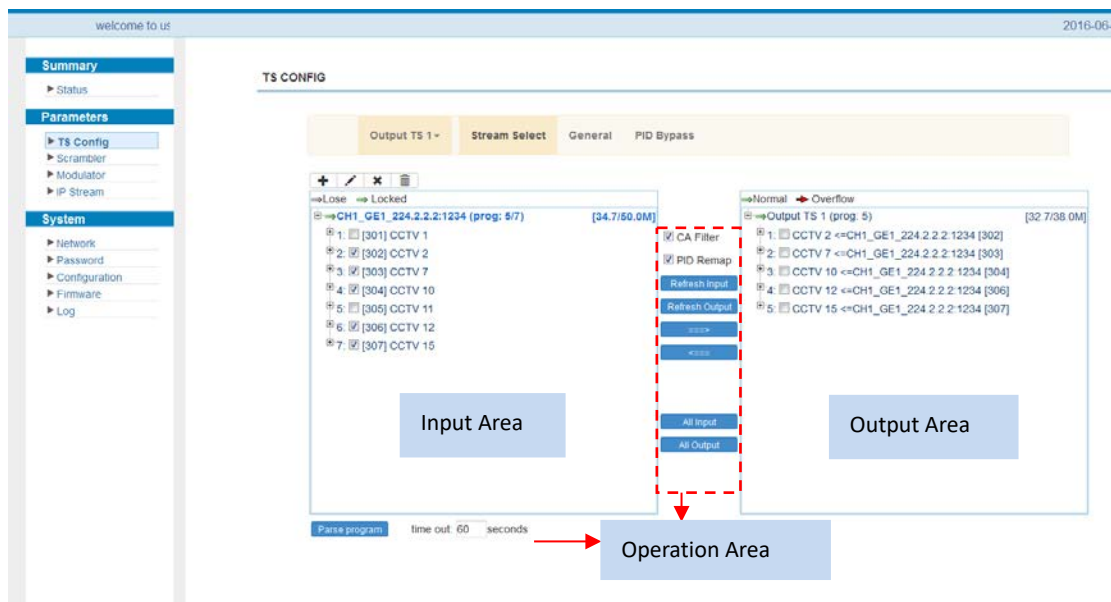


Figure - 5

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

☒ **CA Filter**: To enable/disable the CA Filter function. By clicking the box, users can filter the input CA to avoid disturbing the device's scrambling function.

☒ **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 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 users 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: 0x02

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 near the top of the webpage, click "General" to display the interface where users can set parameters for each output channel. (Figure - 7)

Figure - 7



Click  to display the interface as shown below, and click  to apply the modified parameters. (Figure - 8)

Figure - 8

➤ PID Pass

From the menu near the top of the webpage, click "PID Pass" to display the interface where users can add the PIDs which need pass-through. (Figure - 9)

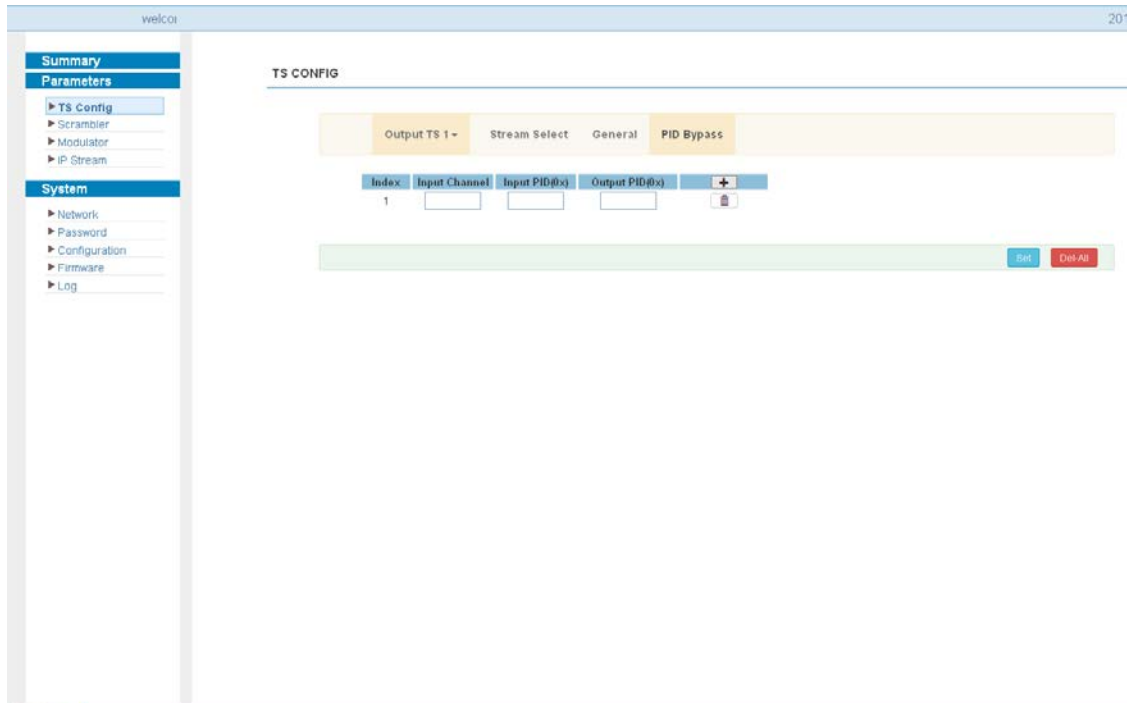


Figure - 9

Parameters → Scrambler:

From the menu on the left side of the webpage, click “Scrambler” to display the interface where users can choose the programs to scramble. (Figure - 10)

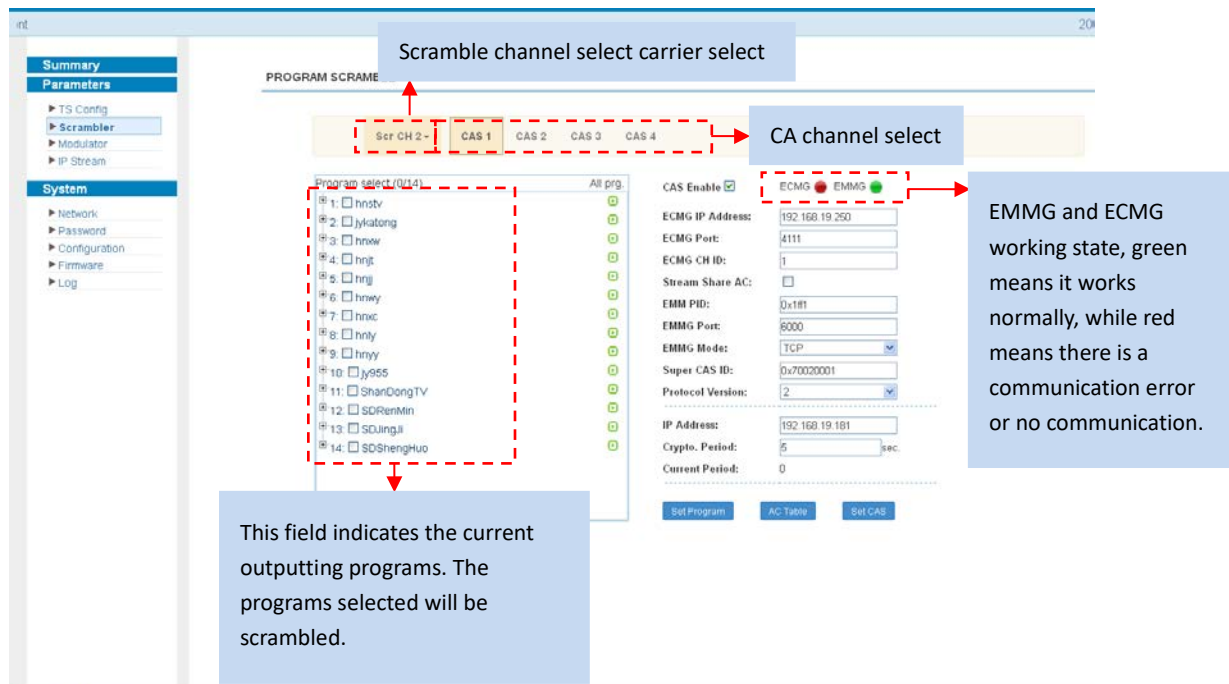


Figure - 10

Parameters → Modulator:

From the menu on left side of the webpage, click 'Modulator' to display the interface as shown in Figure - 11 where users can 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 parameters

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: 674.000 (30 ~ 900 MHz)
Constellation: 64 QAM
Symbol Rate: 6875 (5000 ~ 7000 Ksps)
Gain offset: 0.0 (-12 ~ 0 dB)

Apply Close

Parameters → IP Stream:

AQ1016 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 users can set IP out parameters.

welcome to use Web Ms

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: Scrambled 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 users can set network parameters.

Y 20°

Summary

- Status

Parameters

- TS Config
- Scrambler
- Modulator
- IP Stream

System

- Network
- Password
- Configuration
- Firmware
- Log

NETWORK

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

Apply

Scrambler

IP Address: 192.168.19.197
Subnet Mask: 255.255.255.0
Gateway: 192.168.19.1

Apply

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 ☒

Apply

Figure - 13

System → Password:

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

The screenshot shows the 'PASSWORD' configuration page. On the left is a sidebar menu with categories: Summary (Status), Parameters (TS Config, Scrambler, Modulator, IP Stream), and System (Network, Password, Configuration, Firmware, Log). The 'Password' option under the System category is selected. The main content area has a title 'PASSWORD' and a pink instruction box: 'Modify the login name and password to make the device safety. If forget the name or password you can reset it by keyboard. The default login name and password is "admin". Also please note the capital character and lowercase character.' Below this are input fields for 'Current UserName' (pre-filled with 'admin'), 'Current Password', 'New UserName', 'New Password', and 'Confirm New Password'. An 'Apply' button is at the bottom right.

Figure - 14

System → Configuration:

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

The screenshot shows the 'CONFIGURATION' page. The sidebar menu is identical to Figure 14, but the 'Configuration' option under the System category is selected. The main content area has a title 'CONFIGURATION' and a row of buttons: 'Save', 'Restore', 'Factory Set', 'Backup', and 'Load'. The 'Save' button is highlighted with a red dashed box, and a red arrow points from it to a blue button labeled 'Select areas'. Below this is a pink instruction box: 'When you change the parameter, you should save configuration, otherwise the new configuration will lost after reboot.' At the bottom right is a 'Save config.' button.

Figure - 15

System → Firmware:

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

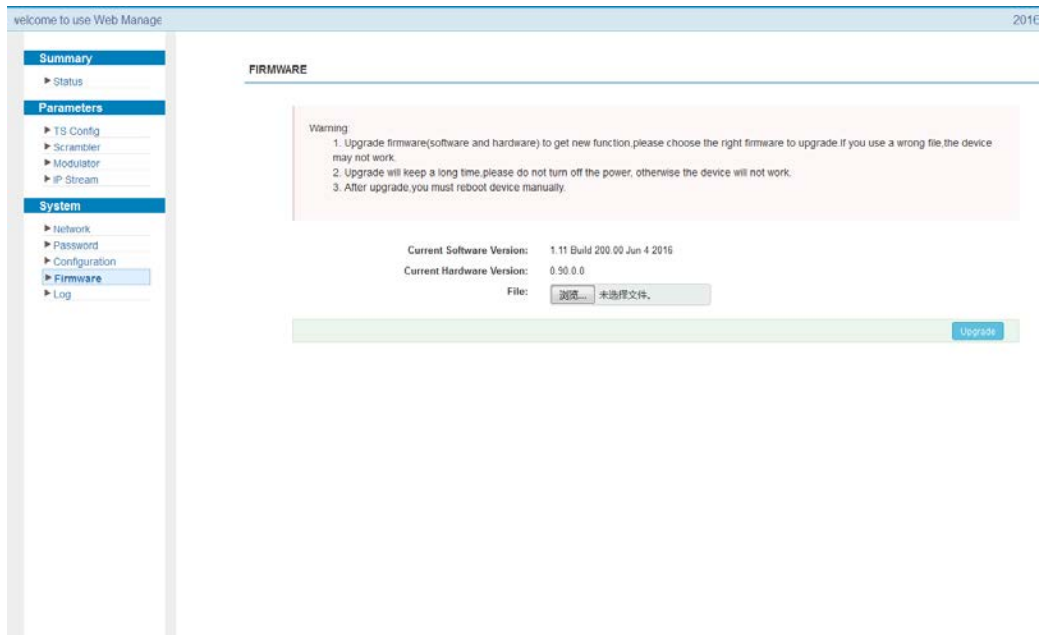


Figure - 16

System → Log:

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

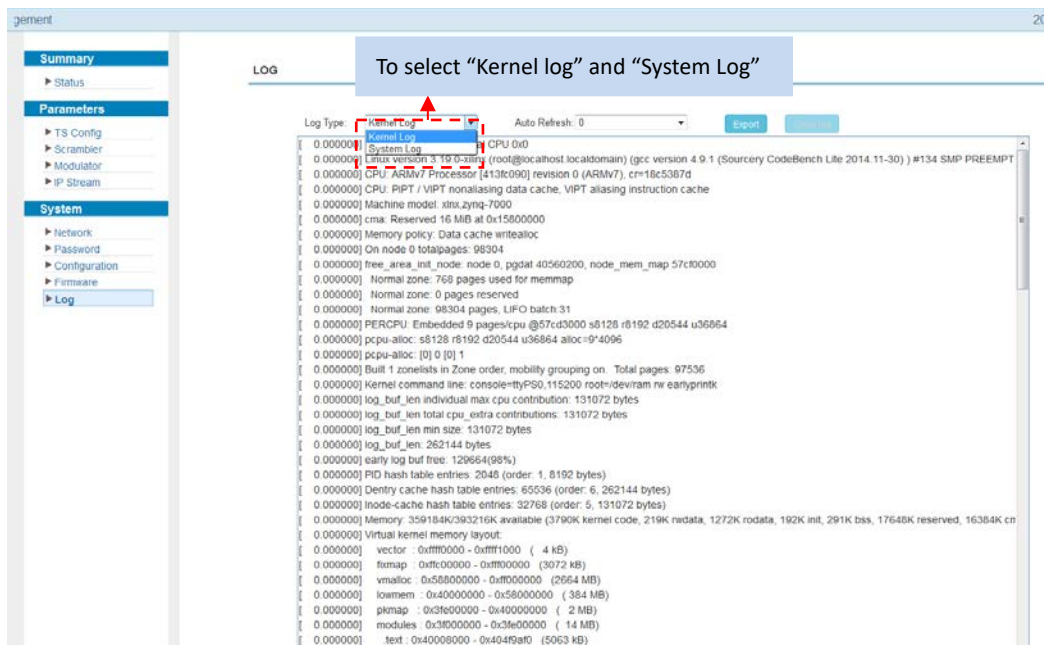


Figure - 17

5 Troubleshooting

Ascent's ISO9001 quality assurance system has been approved by the CQC organization. In order to guarantee the products' quality, reliability, and stability, all Ascent products have passed extensive testing and inspection before being shipped out of the factory. The testing and inspection scheme covers all optical, electronic, and mechanical criteria which have been published by Ascent Communication Technology. To prevent potential hazards, please strictly follow operation conditions.

Prevention measures

- Install the device in a place with environment temperatures between 0 to 45 °C
- Ensure good ventilation for the heat-sink on the rear panel and other heat-sink bores if necessary
- Check that the input AC voltage within the power supply working range and the connection is correct before switching on the device
- Check if the RF output level varies within a tolerable range if necessary
- Check to see if all signal cables have been properly connected
- Do not frequently switch on/off the device; the interval between every switching on/off should be greater than 10 seconds.

Conditions needed to unplug power cord

- Power cord or socket is damaged
- Any liquid has flowed into the device
- Any circumstance that might cause a circuit short
- Device is in a damp environment
- Device has suffered from physical damage
- Device will be idle for a long period of time
- After switching on and restoring to factory settings, device still cannot work properly
- Maintenance needed

6 Packing list

- | | |
|----------------------------|------|
| • AQ1016 IP QAM Modulator | 1 pc |
| • User's Manual (optional) | 1 pc |
| • Power Cord | 1 pc |



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