Multifunctional IPQAM Modulator

GQ-3670C

User Manual

GOSPELL
TECHNOLOGY SERVES PEOPLE

GOSPELL Digital Technology Co., Ltd

Safety Instructions

- Read this manual carefully before start operating the device.
- Removal of device cover without permission may cause harm to human body and the maintenance bond to be invalidated.
- Handle the device with care to avoid crashing and falling, or otherwise it may cause hazards to the internal hardware parts.
- Keep all inflammable, metal and liquid materials from dropping into the device casing, or otherwise it may cause damages to the device.
- Avoid dusty places and places with heating resources nearby, direct projection of sunlight or instant mechanical vibrations for installation of the device.
- Connect the grounding connector on the rear panel to protective earth contact properly while in operation.
- Choose proper type of cable connectors for connecting network interfaces of the device.
- Avoid rapid and frequent power on/off, or it may cause damages to the semiconductor chipsets.
- Keep proper direction of the power cord when plug into or out from a power socket.
- Connect the grounding pole and signal cable before connecting the power cord.
- Do not touch the power socket with wet hands to avoid electric shocks.
- Take off all jewelry or ornaments, such as ring, necklaces, watches, bracelets, etc., before operating the device, or otherwise the metal contact may possibly cause short circuit and result in components damage.
- Make sure the AC power is unplugged in case of operator services within the device casing or close to power supply are needed.
- Only GOSPELL trained and approved staff is permitted to perform live line operation and maintenance within the device casing.
- Ensure good ventilation when the device is in operation, or otherwise it may cause damages to the device due to overheating.

It is recommended to unplug the power cord from the socket if the device will not be used for a long period of time.

Table of Contents

§ 1 Introduction

Functionality

GQ-3670C is a new generation of Multi-functional IP QAM modulator, which can receive TS from the two IP interfaces, and then multiplex, scramble and multi-channel modulate. It adopts our newly developed functions such as “Module Management”, device scrambling, and channel modulation. The flexible customization and high expansibility can satisfy the user’s current and future DTV system requirements. The module management opens the scrambling function and configures the numbers of output modulation channel through software authorization, as shown in the table below:

License	Functionality
License 1	8*modulation
License 2	8*modulation + scrambling
License 3	16*modulation
License 4	16* modulation + scrambling
License 5	24* modulation
License 6	24* modulation + scrambling
License 7	32* modulation + scrambling
License 8	32* modulation + scrambling

Table 1 License Type List

The product is mainly applied to the DTV network head end room, edge of DTV backbone network, and DTV branch head end room.

Main Features

This product has the following key features:

- Support ITU- T J.83 Annex A /B,/C modulation, output frequence range: 54MHz~860MHz
- QAM modulation: 16/32/64/128/256
- Support different configurations by software authorization
- Support up to 4 simul-crypt CAS and DVB-CSA scrambling
- Support SI/PSI auto-generation and manual uploading during re-multiplexing
- Support auto-generation or manual editing of network information, as well as local network information sectors uploading
- IP interface supports burst or uniform input bit stream, and reform them to increase efficiency of output bit stream
- Support PID filtering, mapping and pass-through
- Support PCR auto-correction
- Support 4-adjecent-channels RF output with output selector switch
- Output bitrate range: single channel 15.5~51.6Mbps
- RF output symbole rate range: single channel 4.2~7Mbaud/s
- Output electrical level range: 95dBuV~115dBuV (8 channels, step 0.25dB)

- Support gain tuning function, tuning range: -2.5~10.5dB
- Provide -20dB RF test interface
- Tracking filter circuit to ensure excellent external band suppression performance
- Support working parameter import and export
- Support Web-based network management, with online upgradable embedded programs
- Multi-lingual management user interface and documentation to suit both regional and overseas markets
- Support monitoring of operation temperature & power supplies

* Please refer to Annex A for detailed technical specifications.

Front Panel

As shown in figure 1, there are one LCD display, one 6-key keypad and three LED indicators on the front panel of GQ-3670C.

The model type and logo information will be displayed on the LCD screen during the device initialization stage. User can check some major working status of the device, and configure some key parameters of GQ-3670C by exploring the operational menu using buttons and LCD screen after system initialization, see section §3.3 for details.

- The POWER LED will be light if the device powers on successfully.
- The STATUS LED will show some working status of the device, see section §3.3 for details.
- The ALARM LED will indicate warning messages of the device, if exists, see section §3.3 for details

Fig.1 Front Panel View of GQ-3670C

Rear Panel

As shown in figure 2, the rear panel of GQ-3670 consists of one power supply socket, one power switch, one RJ45 management port, one RS-232 serial interface, one SFP GbE port and two RJ45 GbE ports (selective) for high speed IP data input, two RF outputs (main+ test), and a grounding point.

- Power Input Port: To connect to 100~240V 50/60Hz AC input;
- Power Switch: To turn GQ-3670C on or off;
- Management Port: RJ45 interface, to connect to management workstation via 100BaseT or Gigabit Ethernet;
- IP Input: RJ45 interface, to connect to the ASI outputs of GC-1818's preceding devices via Cat5e cable or 6e cable;

- RF Outputs: to connect GQ-3670C's output signal to digital CATV system, HFC network or digital terrestrial transmission station via coaxial cables; -20dB port is used for monitoring.
- Grounding Point: it connects the device with conductive earth. Please make sure of proper grounding of the device before start operating it for the safety of the operators and the device itself!

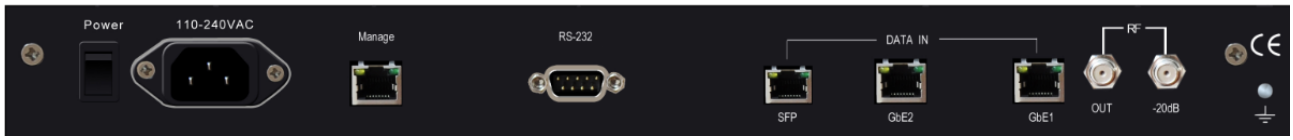


Fig.2 Rear Panel View of GQ-3670C

§ 2 Before Use the Device

Operation Requirements

In order to ensure proper operation of GQ-3670C, there are some requirements for other digital TV and network devices, which will connect with GQ-3670C. Please see below for details:

§ 2.1.1 Requirements for Digital TV Devices

The output signals of the GQ-3670C should comply with DVB-C modulation standard, and the signal frequency range is from 54MHz to 870MHz.. The device which will receive output signal from GQ-3670C, should comply with the following standards:

Transport Stream (TS): This means that the TS stream with one or more channels of digital TV, digital audio broadcasting or any other digital TV services should comply with DVB standard; it must contain PAT and PMT tables, which can completely describe the services.

The TS stream could be transmitted through ASI/Ethernet interface. For output IP interface, the TS packets must be encapsulated into UDP datagram. Each output TS should have unique destination IP address (unicast or multicast) and port number. The length of the UDP payload must be 7*188Byte (TS packets), and the payload must be synchronized by sync byte 0x47. The TS stream (except the stream with UDP format) also can be output from ASI interface, with standard format of 188 byte.

GQ-3670C may be able to receive multiple transport streams from any devices with the TS format complies with the above-mentioned format.

§ 2.1.2 Requirements for Network Devices

The switch used to connect GQ-3670C's management port and the management workstation should be a 100BaseT or Gigabit switch, the maximum data exchange speed of each port must be higher than 40Mbps. For simplified installation, it can be the same switch of data inputs as well, but the two ports need to be configured in different VLANs.

System Requirements

Management workstation must have network connection and support TCP/IP protocol. Microsoft Windows 2000/XP (or higher versions) and Internet Explorer 6.0 (or higher version) are the recommended operating systems of the management workstation, and JavaScript must be supported by the web browser.

§ 3 Operating the Device

Quick Start

Please follow the procedures below if it is the first time for you to use GQ-3670C for constructing digital TV head-end system:

1. Construct your hardware environment, including chassis installation, power supply system deployment, and connecting switches, GQ-3670C, the preceding device(s)(e.g. IRD, encoders, etc.), terminal receivers (DVB-C), TV monitors, management workstation and CAS server properly (refer to Fig. 3).
2. Plan for the IP addresses of management port and data port, the cable connectors (Cat5e cable, RF signal cable) of each preceding/succeeding devices; as well as number of digital TV transport streams, modulating frequency of each stream, symbol rates and modulation methods. It is strongly recommended to take remark of device addresses, port numbers and other configurations and keep it safely for checking purposes in future.
3. Boot up each preceding devices of GQ-3670C and configure the operating parameters, in order to ensure the proper signal receiving/decoding or output of encoded digital TV transport streams. Please refer to the user manuals of preceding devices provided by their suppliers for detailed configuration.
4. Boot up GQ-3670C, If you have known the management port IP address of the GQ-3670C you are currently using, and it is in the same subnet with the management workstation, you may also start configuring GQ-3670C from the management workstation directly. Or otherwise you will need to configure the IP address of management port using front panel control (refer to section§3.3)
5. Login to the web browser from the management workstation, key in the default user name “admin” and password “000000”; add and configure usernames and passwords of users allowed to access the device (refer to section§3.2.2)
6. Configure the data input/output ports, modulated output channels, QAM mode, RF output frequency, EPL and so on(refer to section§3.2.5)
7. Search for input programs tree (refer to section §3.2.6.5); configure the output program settings of GQ-3670C, including: select input program for output stream(refer to section §3.2.6.6), output program scrambling (refer to section §3.2.7); configure the ES PID, ECM/EMM PID, SI/PSI version number of each program, and configure the auto-generated SI parameters or upload SI segments output program parameter (refer to section §3.2.6.6); configure the PID mapping parameters if needed (refer to section §3.2.6.2).
8. If there are scrambled programs in the system, you need configure the CA operating parameters as well. (refer to section §3.2.7.2).
9. Configure the signal receiving and demodulation settings of GQ-3670C’s succeeding devices (e.g. DVB-C receivers) according to the user manuals provided by their suppliers
10. Make use of TS analyzer, QAM analyzer, spectrum analyzer, set-top box testing system, etc. to test the output TS in the head-end equipment room, if normal, then the signal is ready for transmission in the real network.

Web Management Operations of GQ-3670C

Monitoring and control of GQ-3670C can be performed through Web browser. We recommend you to use Microsoft Internet Explorer 6.0 or above and set your screen resolution to 1024 * 768.
The default state of Web management page is in English. If you want to use Chinese, please set the language to Simple Chinese by changing the operation language in the pull-down list in the home page.

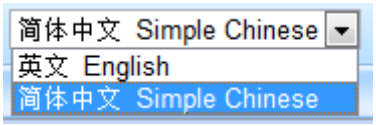


Fig.3 Operation language pull-down list

When you set this to Chinese, if there isn't any Chinese font in your operation system, maybe some unreadable codes appear in your page.

§ 3.1.1 User Login

Entering GQ-3670C' IP address in your URL bar after you open the browser, then you have the Web management page. The device will ask you to input your user name and password to ensure the safety, as shown in the figure below:

Fig.4 Web User Login

There is a factory default administrator user "admin" in GQ-3670C with password of "000000". Please use this user and password to login to the system for the first time operation of GQ-3670C. But changing of password for this user is strongly recommended, and the new password should be kept safely. If you choose "remember my proof", you needn't input your user and password when you login in the next time. But to ensure the safety, please do not choose this option in the pulic server.
After successfully logging into the system, browser will display the default page of GQ-3670C, as shown in the figure below:

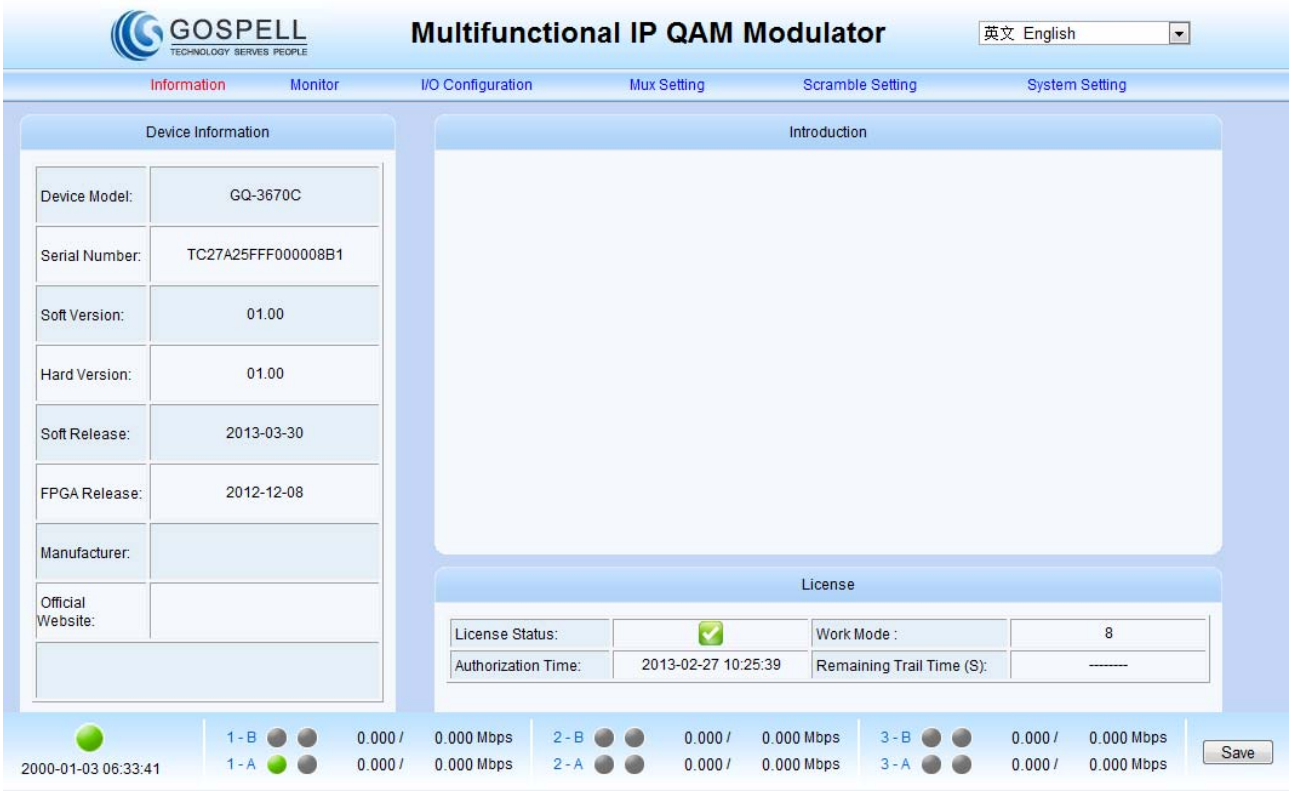
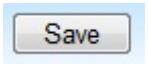


Fig.5 Default Page

In the default page, there are the information of device(model, serial number, etc), authorization state, and some important specifications will be refreshed in real time. You could enter into the “monitor”, “Input & Output configuration”, “multiplex setting”, “scramble setting”, “system setting” page by clicking different hyperlinks in the area of main-menu across the top of this page.

[Remark]

Device will not auto-save your parameters. If the device restarts, the parameters will change to the state, which you saved last time. If you have never saved your parameters, all the parameters will change to the default state. So if you want to save your own parameters, please click 

in lower right corner after you finish setting GQ-3670C

§ 3.1.2 User Management

We recommend you to change the user and password after logging by the default user and password for the safety. You can edit your user information in the user management page.

Click “system setting” in the home page, and then you have the device-setting page, as shown in the figure below:

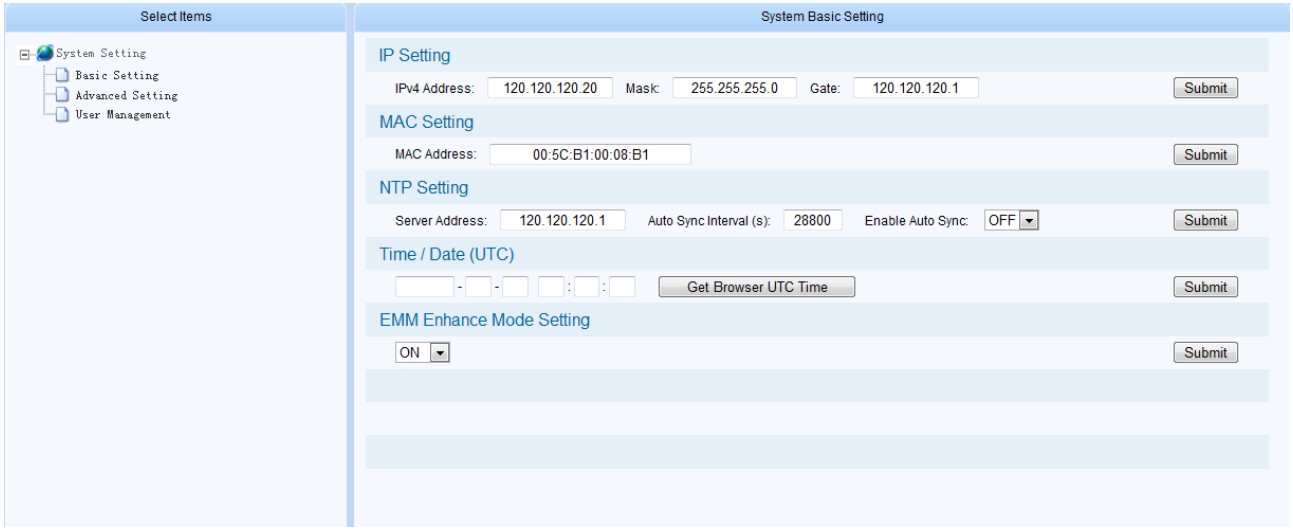
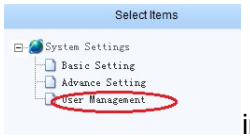


Fig.6 System setting page

Click “user management” 

in the “select items” area on the left side of this page, and then you have the user management page, as shown in the figure below:

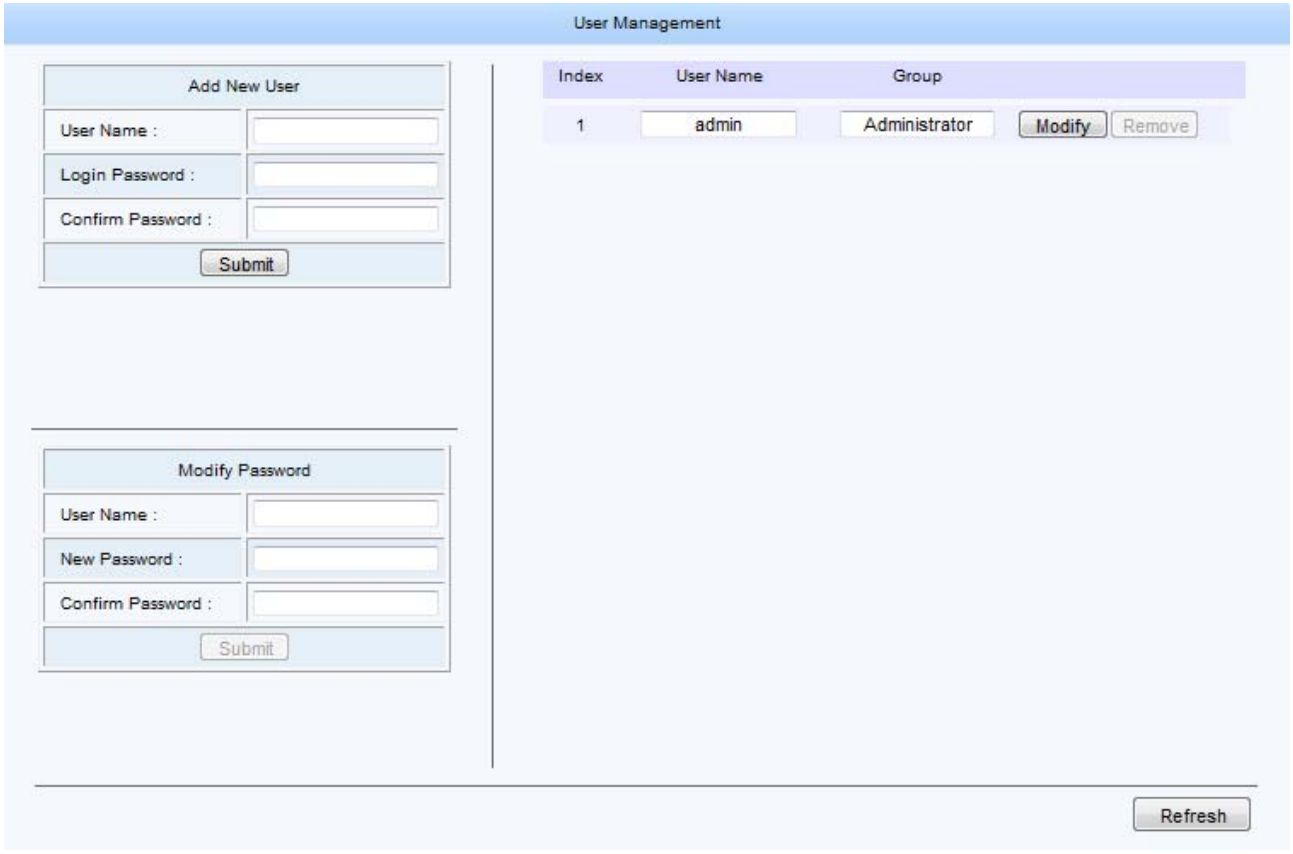


Fig.7 User management page

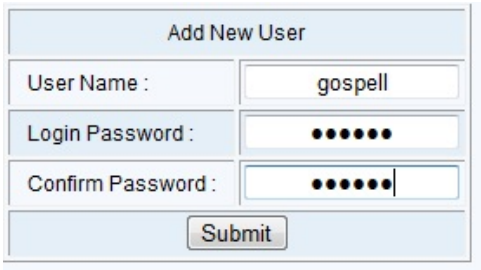
In this page, you could add new user, edit old users' information or delete an user.

[Remark]

Only "admin" user could enter into the user management page.

Add new user

In the area of "adding user", please input correctly users' name and password, and then confirm the password.



After finishing these steps, click "submit" to add a new user. If you add successfully a new user, there will show your user information on the right side, as shown in the figure below:

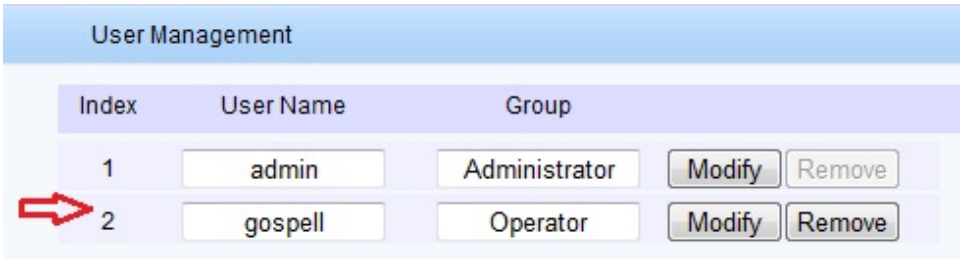


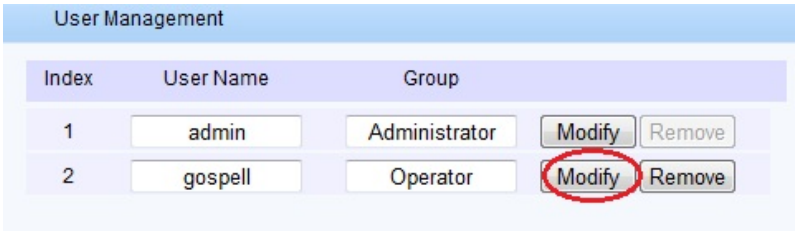
Fig.8 New user information

[Remark]

All new users are normal users. They are only permitted to set different parameters, but they don't have the right to manage the other user or upgrade the system.

Edit users' information

In the user information list in this page, you can edit an user by clicking the "modify" button in the same row.



That makes you edit your password, as shown in the figure below:

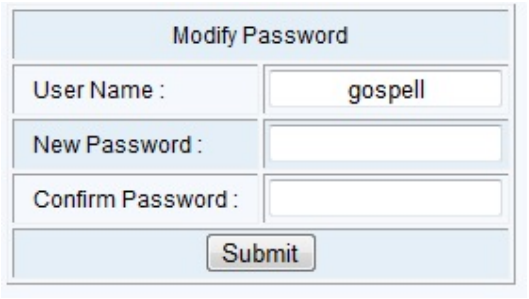


Fig.9 Edit users information

In this bar, you can edit your user's password and that will be accomplish by clicking "submit".

[Remark]

You could not delete the "admin" user, but you can change the password of this user.

When you use GQ-3670C for the first time, you should change admin's password at first and then save this password.

Delete an user

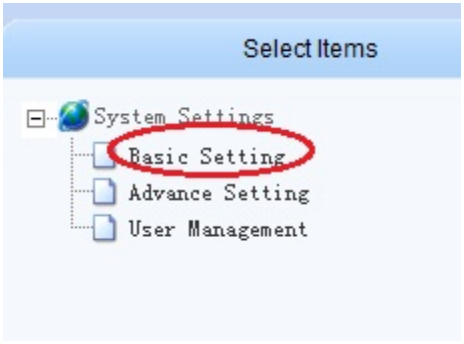
In the user information list in this page, click the "remove" button in the same row to delete this user.

[Remark]

GQ-3670C will not permit you to delete admin user but the normal user.

§ 3.1.3 Basic parameter setting

In the system setting page, click “basic setting” in the “select items” area



To enter basic parameter setting page, as shown in the figure below:

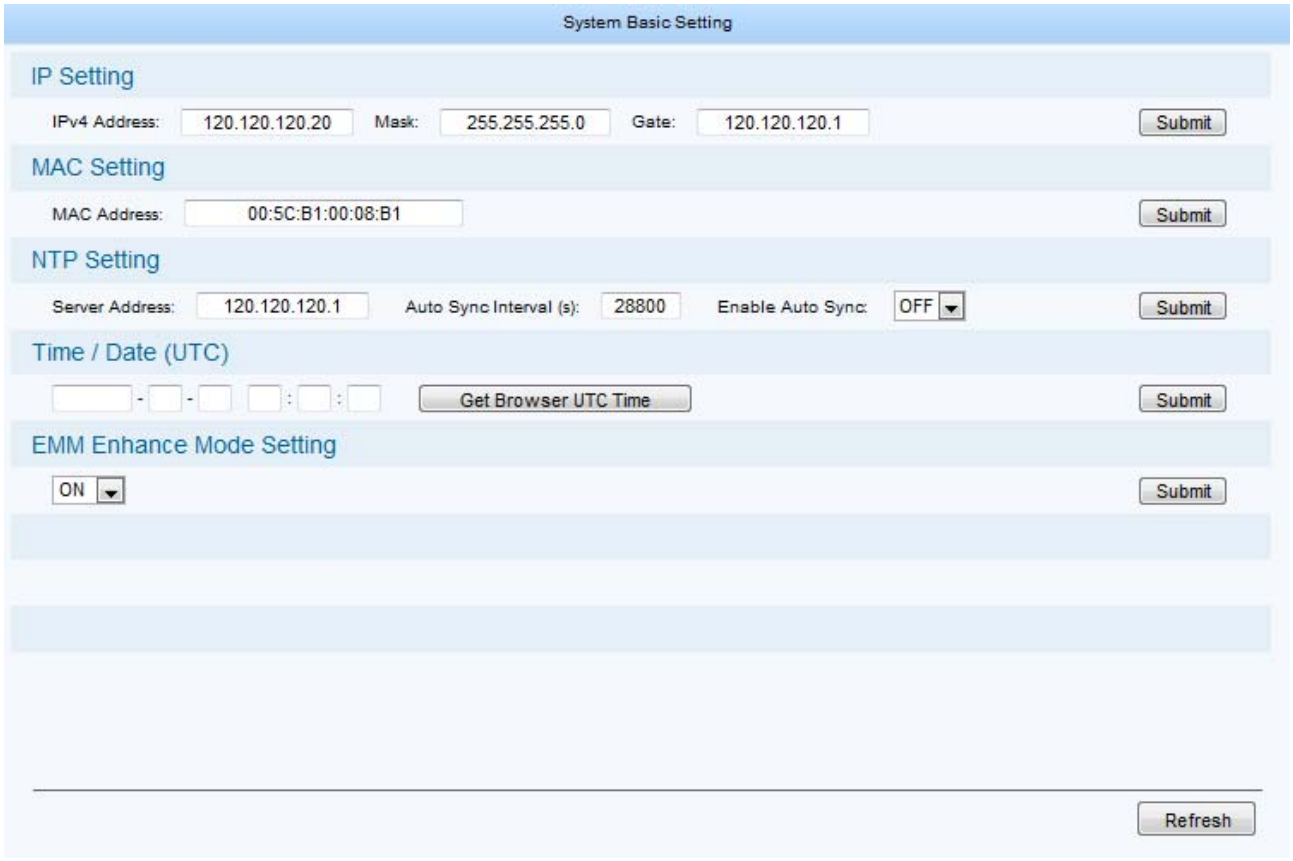
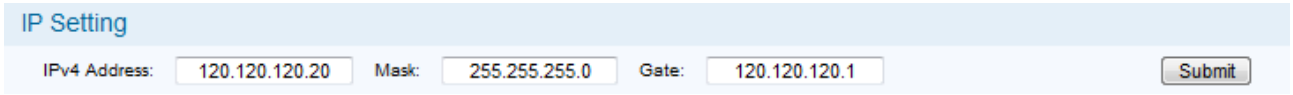


Fig.10 Basic parameter setting page

In this page, you could accomplish the setting of IP address, MAC address, set the IP address of time synchronization server, open or close this service, and set the UTC time synchronization,etc.

IP parameter setting

In the page of figure 11, input a right IP address in the “IP setting” bar, then click “submit” to set GQ-3670C’ network parameter.

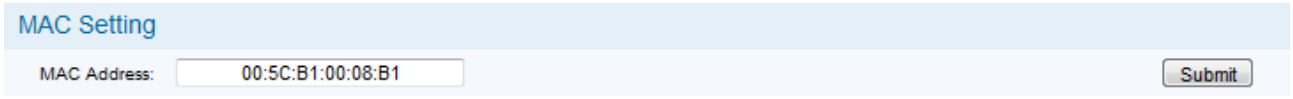


[Remark]

To ensure the working of device, you should guarantee that the management port IP address and GQ-3670C' management server IP are in the same network segment

MAC address setting

In the page of figure 11, input a right MAC address in the "MAC setting" bar, then click "submit" to set GQ-3670C' MAC address.

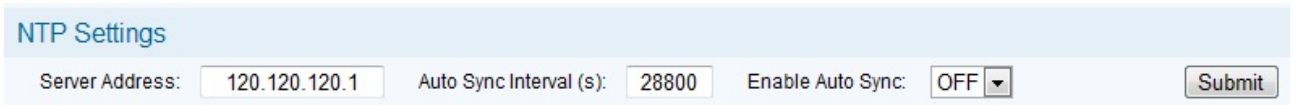


[Remark]

The first three bytes of MAC Address 00:5C:B1 is Gospell's products' MAC Address, it couldn't be changed.

Parameter setting about system clock

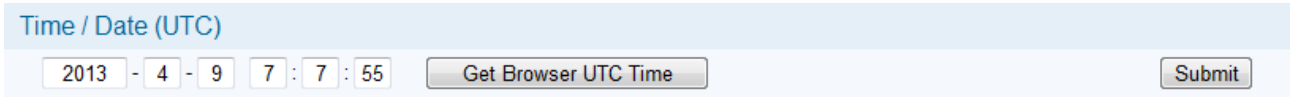
Set time synchronization server: In the page of figure 11, you can set IP address of network clock server, auto synchronization time lag, auto synchronization switch in the "time synchronization protocol" bar.



[Remark]

When you set a right network clock server address, GQ-3670C will update his system clock with the period which the user sets if SNTP service and network clock server are enabled.

Set system clock by manual operation: In the page of figure 11, you can set manually the system clock in the "date/time(UTC)" bar. And you can also click "get UTC time", then click "submit" button to finish setting.

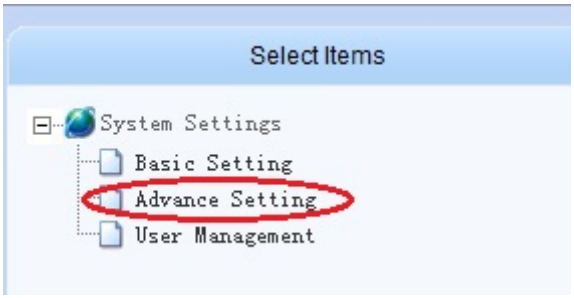


[Remark]

1. If the network clock server address has already configured and enabled, and the SNTP server works properly, the device will get the system clock from the network clock server, at this time, the manually configured clock will be invalid.
2. Select the synchro-browser UTC clock to be the standard UTC(0zone) clock, and this clock may be different from the clock shown on server, e.g. if the server clock is UTC+8:00, the final clock will be differ about 8 hours.

§ 3.1.4 Advanced Parameter setting

In the “system setting” page, click “Advanced setting” in the “select items” area



To enter the parameter setting page, as shown in the figure below:

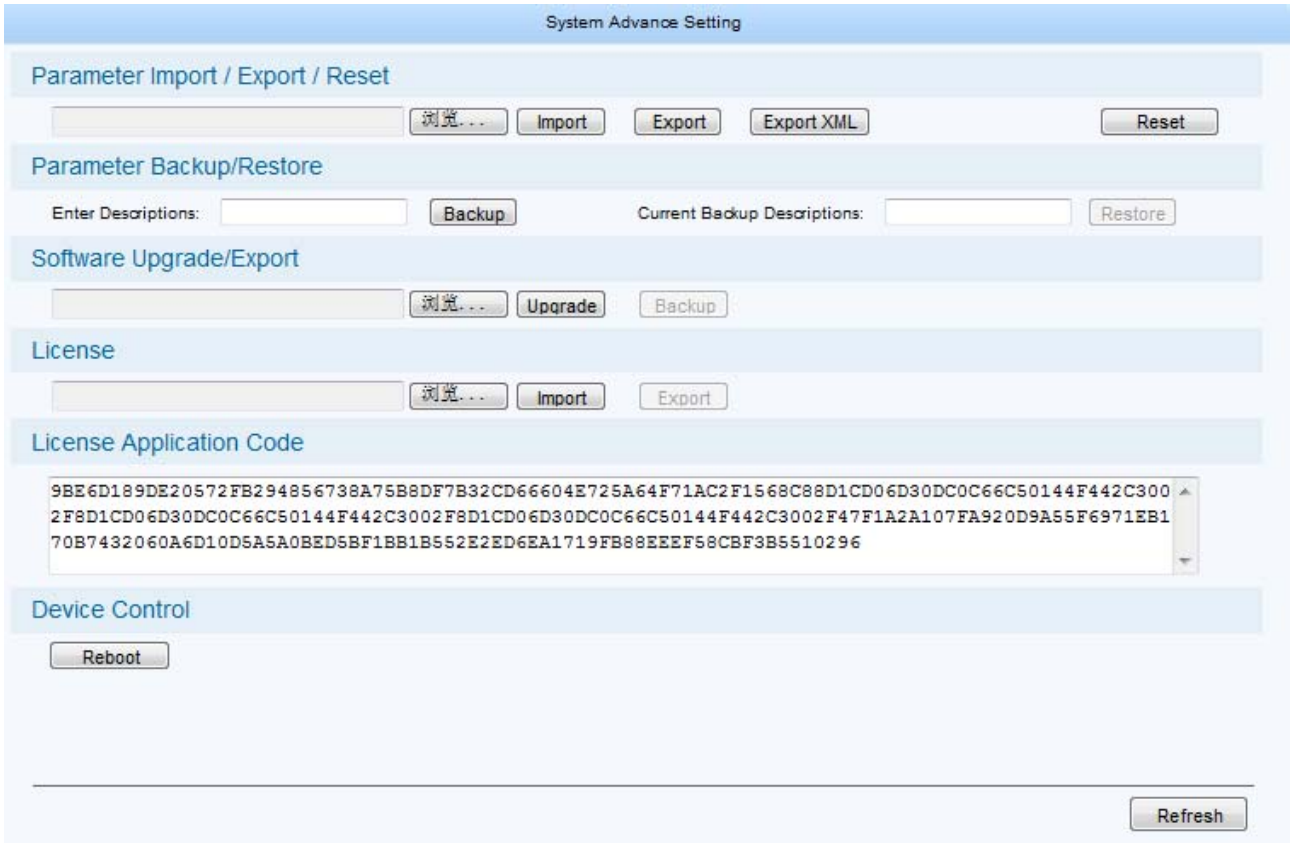


Fig.11 Advanced setting page

In this page, you could import/export/reset the parameters, back-up/recover the parameters, upgrade/back-up the software, import the authorization file, restart the device, etc.

Import/export/reset the parameters

Import the parameters: In the page of figure 12, click “browse” button in the “import/export/reset the parameters” bar to choose the parameters’ file of the device.

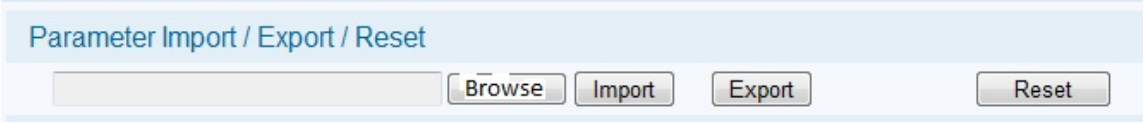
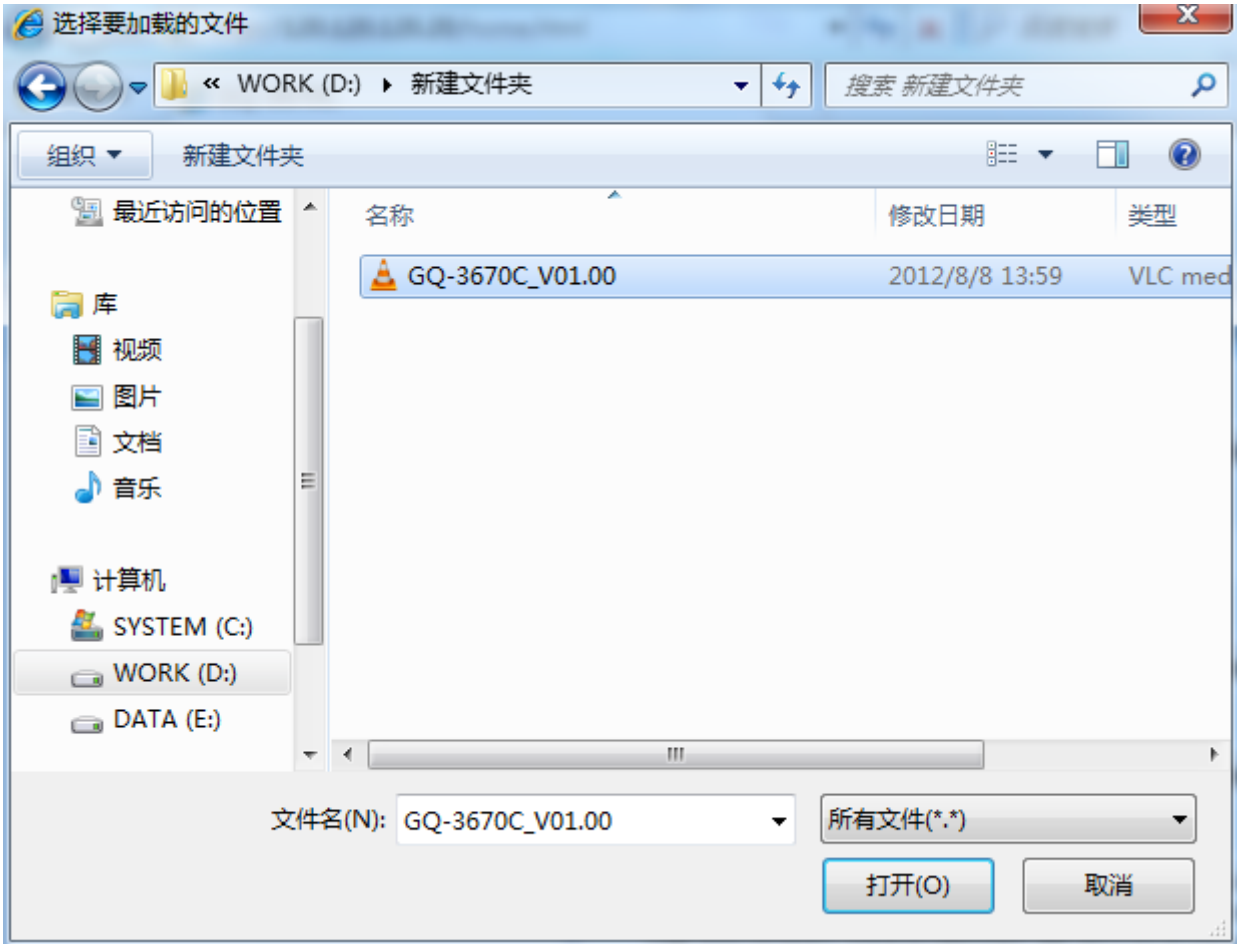


Fig.12 Import/export/reset the parameters page



After choosing the parameters' file, click "Open" button. Then return to last page, click "import" button, system will change the page to uploading management page, as shown in the figure below:

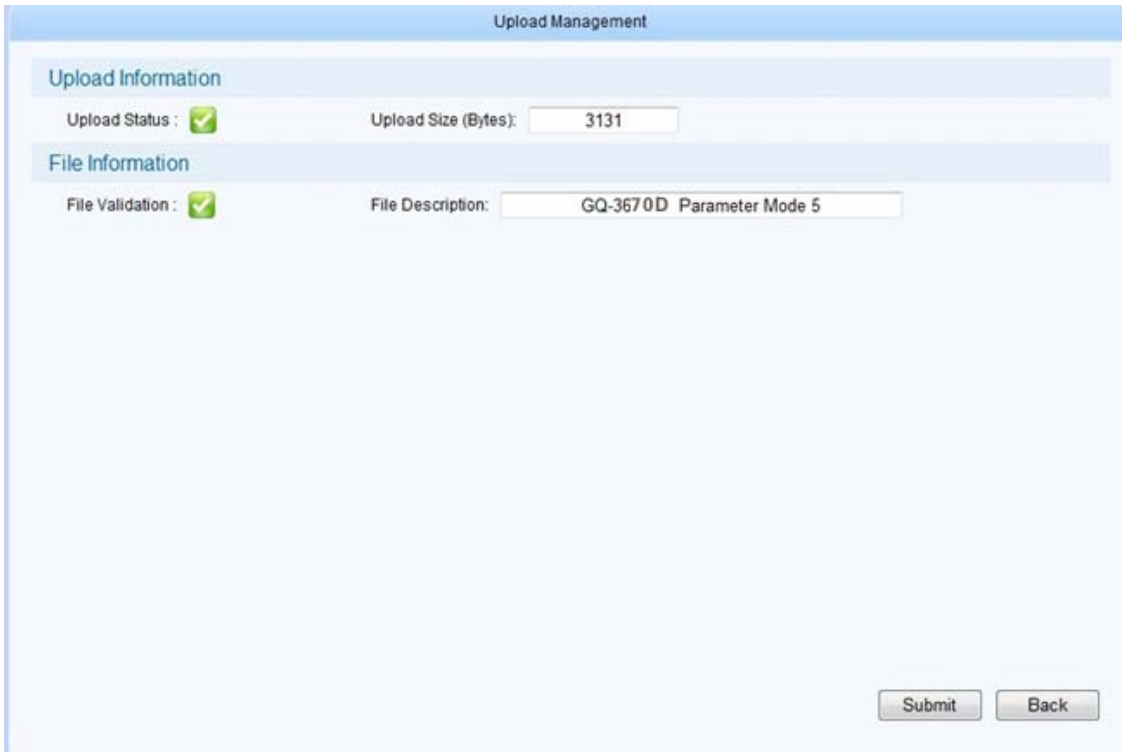


Fig.13 File upload management page

System will checkout the uploading file, if its format is right, there will appear mark in the "upload status" bar and "file validation" bar. Click "submit" button, you'll have this dialog box:

Click "YES" button to import the parameters.

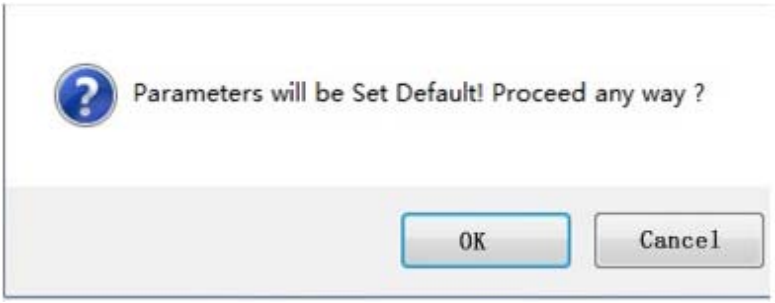
[Remark]

1. Please do not turn off the device or pull the power off when the device is importing the parameters.
2. The device will restart after importing the parameters.

Export the parameters: In the page of figure 13, click "export" button, then you'll have this dialog box:

Click “save” button to choose the path you wanted to save these parameters.

Reset the parameters: In the page of figure 13, click “reset” button, then you’ll have this dialog box:

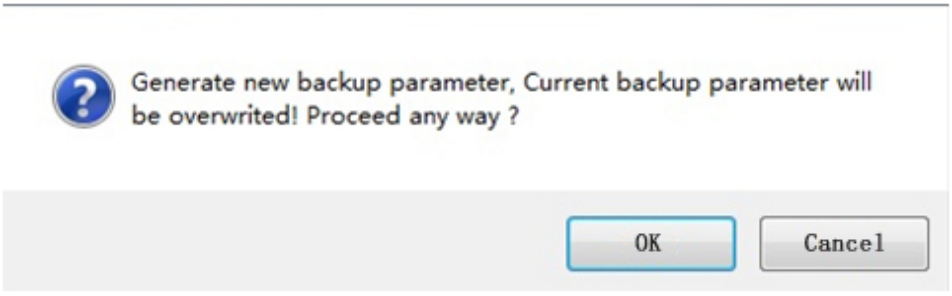


Back-up/recover the parameters

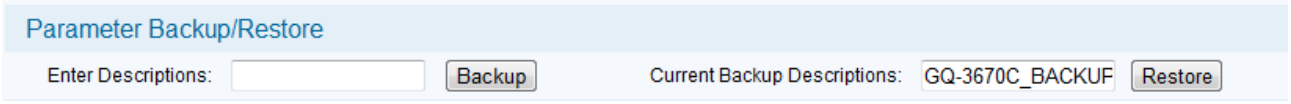
Back-up the parameters: In the page of figure 14, there is a “parameter back-up/recover” bar:

Fig.14 “parameter back-up/recover” bar

Fill in the “input parameter description information” (just like 2012-08-22), click “back-up” button, you’ll have this dialog box:



Click ”YES” button, system will create a new back-up file. In the same time, “input parameter description information” will show you the new back-up file description, as shown in the figure below:



[Remark]

System could only save a unique back-up file each time, the new back-up file will cover the last one.

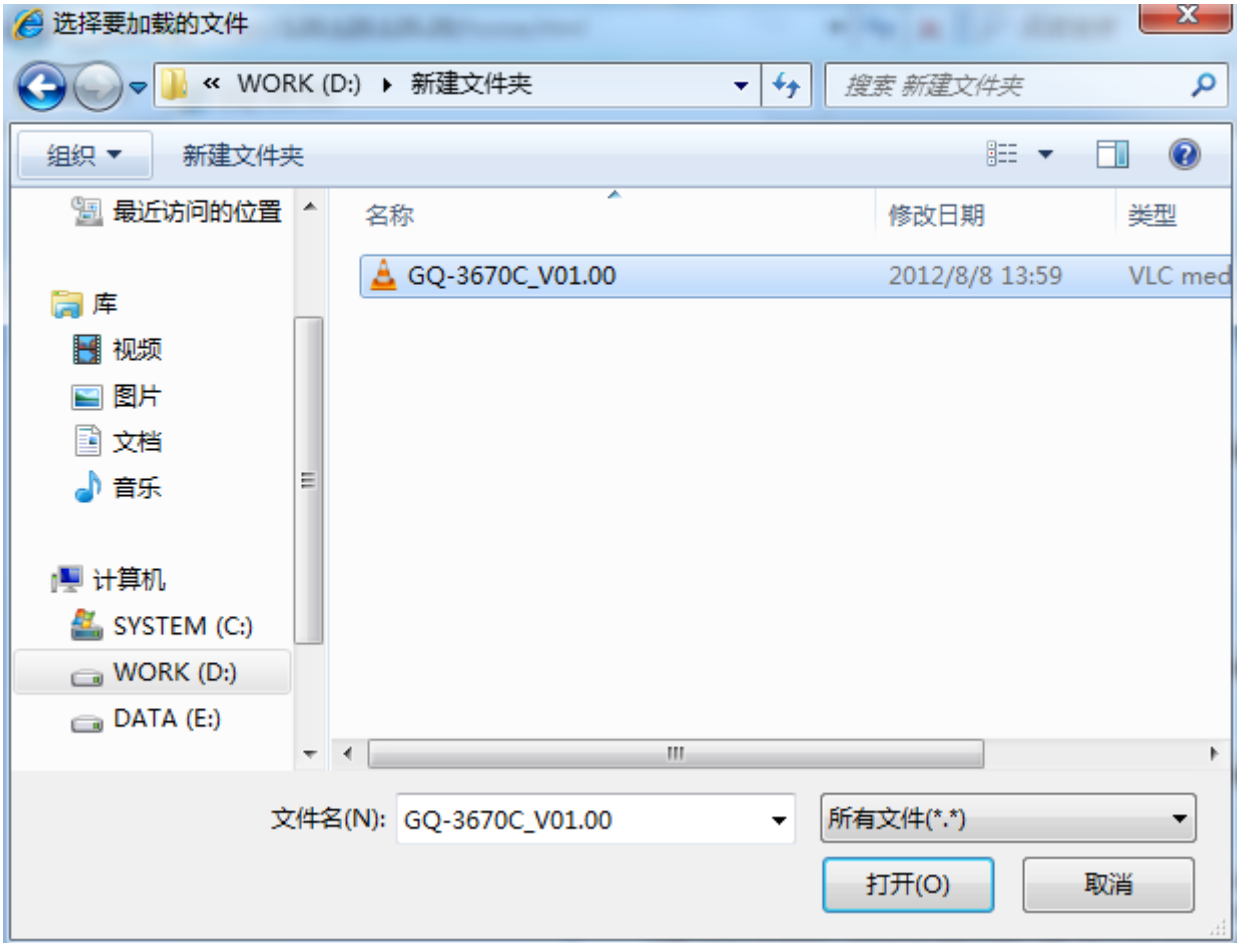
Recover the parameters: When the device has a back-up file, click “recover” button, you’ll have this dialog box:

Click “YES” button to import the parameters.

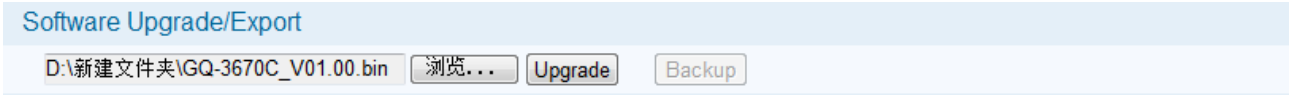
Upgrade/back-up the software

As shown in the figur12, you e can choose the upgrade file in the “software upgrade/back-up” bar, then import it to upgrade the device.

Click “browse” button, you’ll have this dialog box:



Select the upgrade file, click “Open” button, as shown below:



Click “upgrade” button, system will change the page to uploading management page, as shown below:

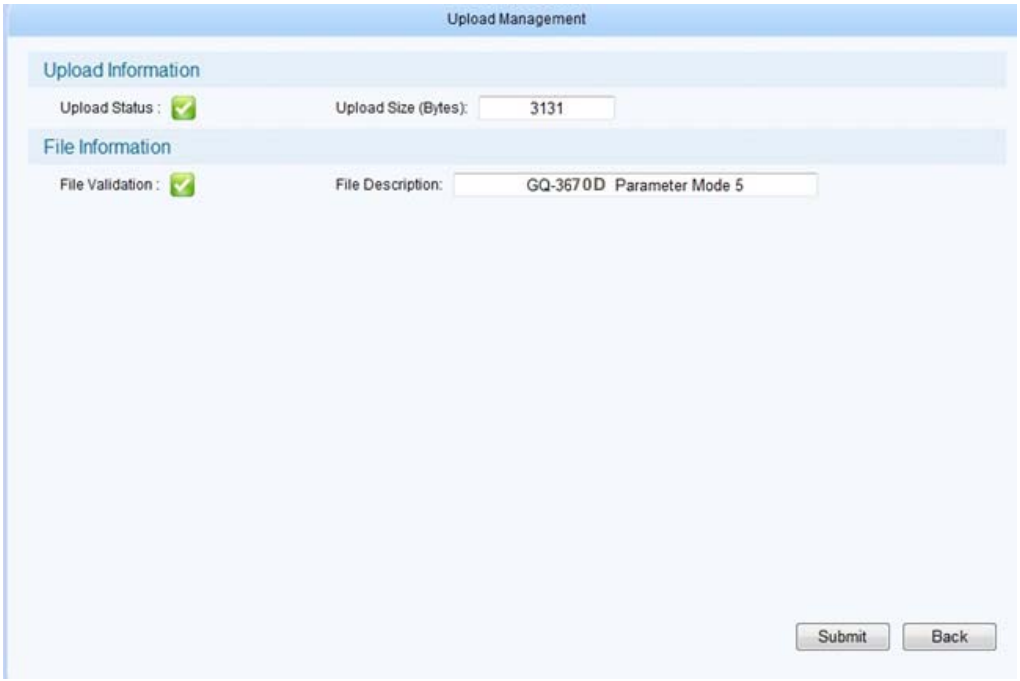
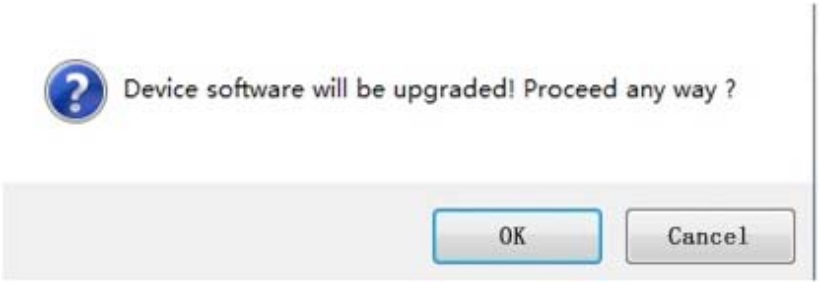


Fig.15 File upload management page

System will checkout the uploading file, if its format is right, there will appear mark in the "upload status" bar and "file validation" bar. Click "submit" button, you'll have this dialog box:



Click "YES" button to upgrade the device.

After upgrading, you can check the device version information in the "device information" bar.

Soft Version:	01.00
Hard Version:	01.00
Soft Release:	2012-09-05
FPGA Release:	2012-07-23

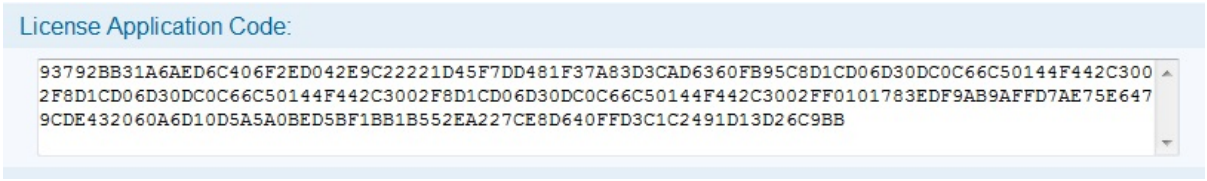
[Remark]

1. Please do not turn off the device or pull the power off when the device is importing the parameters.
2. The device will restart after upgrading.

Device authorization

GQ-3670C has new build-in module management function; multi-configuration could be upgraded in the way of software authorization.

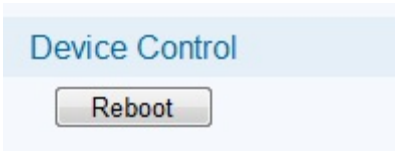
as shown in the table 1: GQ-3670C has 6 types of authorization, please verify the authorization type before you buy this device. After buying this device, if you want to get a higher configuration, you can also contact with our salesman to buy the authorization. For managing the authorization, you should give us the authorization applies code, as shown below:



After receiving the authorization applies code, we'll send you immediately the authorization file.

Device control

As shown in the figure 11, there is a "restart" option in the "device control" bar.



Click "restart" button, you'll have this dialog box:

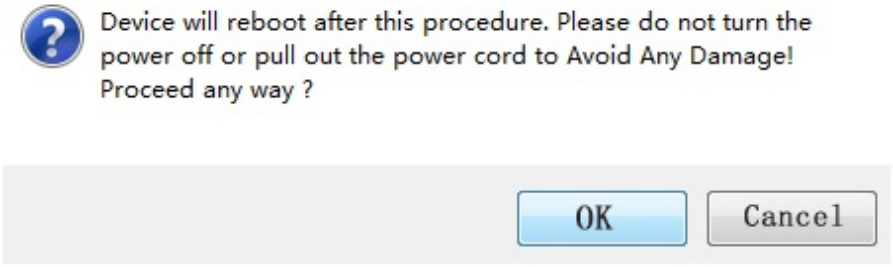


Fig.16 Device restart information

Click "YES" button, to restart the device.

§ 3.1.5 Input/output configuration

Click “Input/output configuration” hyperlink in the navigation menu of the home page to input/output setting page of GQ-3670C,as shown in figure 17:

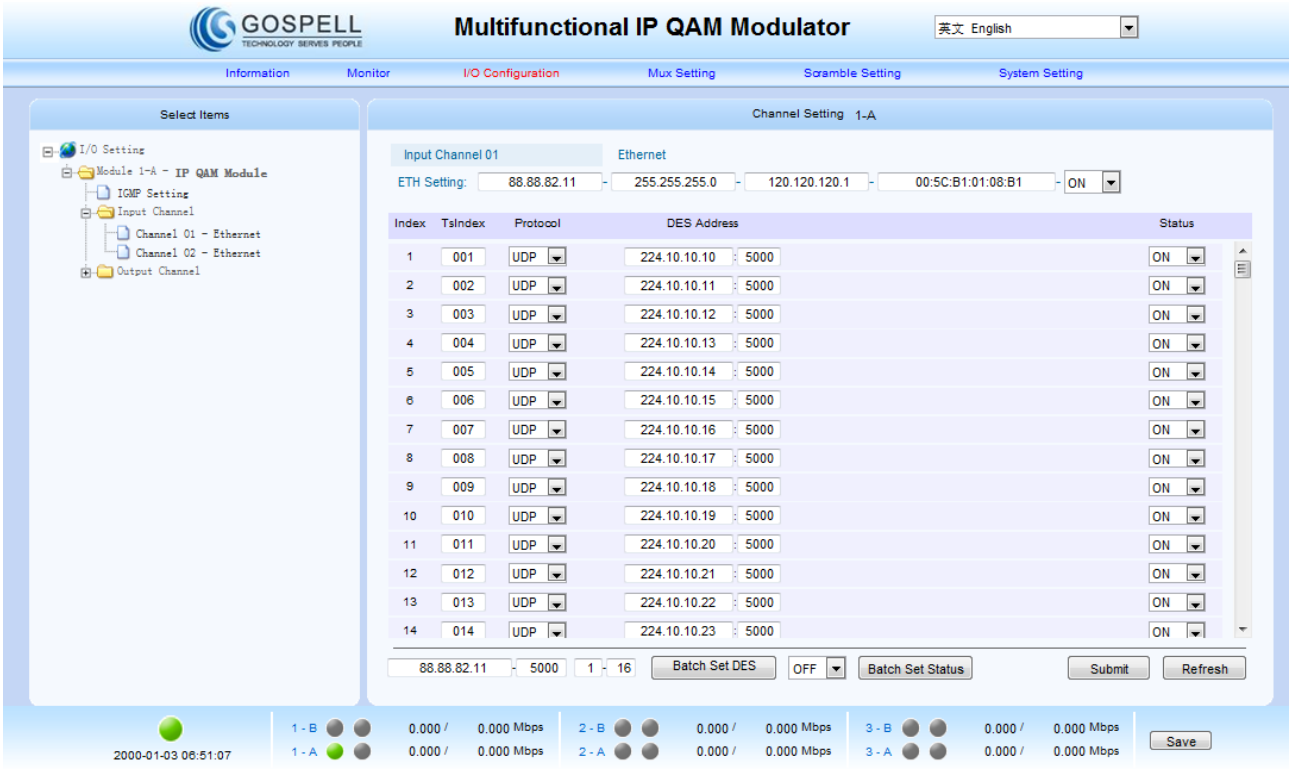


Fig.17 Input/output configuration page

The number and the name of input/output channel of the device are listed in the “Select Items” in the left side of this page, as shown below:

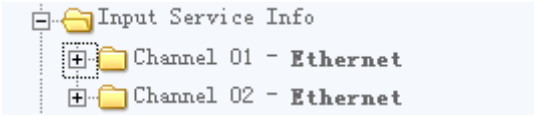


Fig.18 List of the input/output channel

Ethernet parameter Setting

Click “Channel 01- Ethernet” hyperlink as shown above, the configurable parameters are shown in the “channel setting”, as shown below:

Fig.19 Channel setting

Configuration of the Modulation channel

As shown in figure 20, click “modulator” hyperlink, the page of the configuration of Modulation channel is shown in “channel settings” page, as shown below:

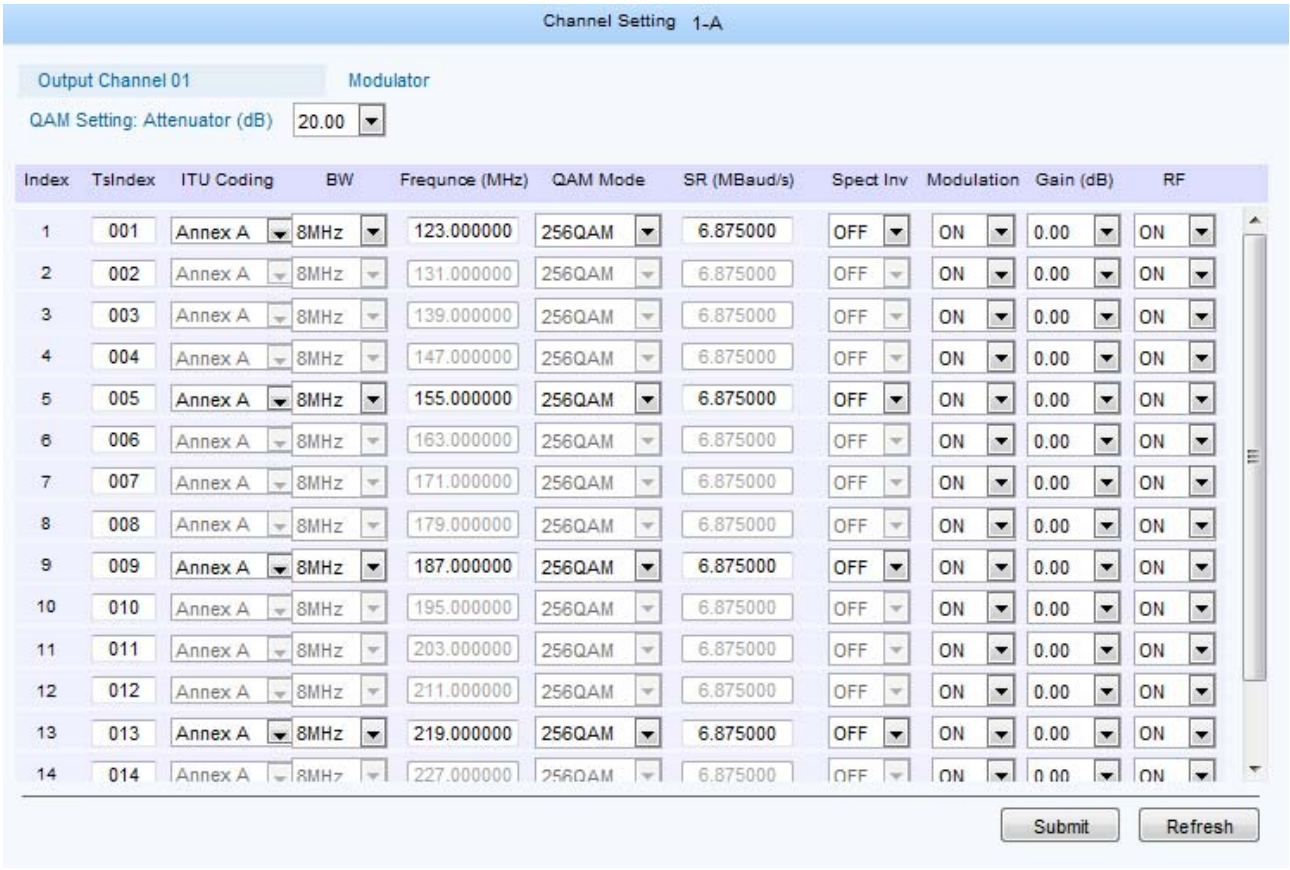
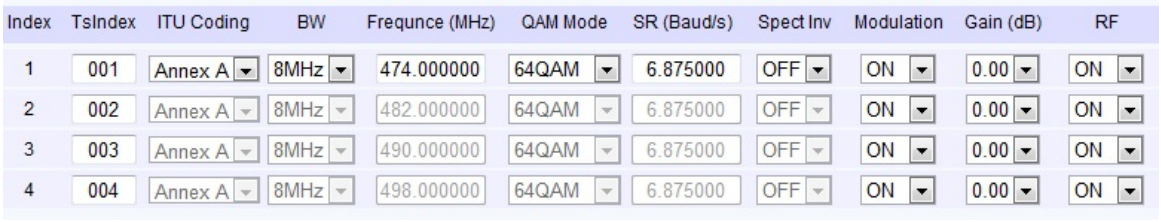


Fig.20 Configuration page of Modulation channel

Channel parameters: Standard of the ITU encoding, bandwidth, frequency, modulation module, symbol rate, inversion of spectrum, switch of the modulation, gain and switch of the RF can be set in this page of the “channel settings”.



Index	TsIndex	ITU Coding	BW	Frequnce (MHz)	QAM Mode	SR (Baud/s)	Spect Inv	Modulation	Gain (dB)	RF
1	001	Annex A	8MHz	474.000000	64QAM	6.875000	OFF	ON	0.00	ON
2	002	Annex A	8MHz	482.000000	64QAM	6.875000	OFF	ON	0.00	ON
3	003	Annex A	8MHz	490.000000	64QAM	6.875000	OFF	ON	0.00	ON
4	004	Annex A	8MHz	498.000000	64QAM	6.875000	OFF	ON	0.00	ON

Range of the parameter settings:

Standard of the ITU Encoding: Annex A/B/C

Frequency range: 54 – 860 MHz

Bandwidth：6/8MHz

Modulation Module:16/32/64/128/256QAM

Inversion of spectrum：ON/OFF

Switch of Modulation：ON/OFF

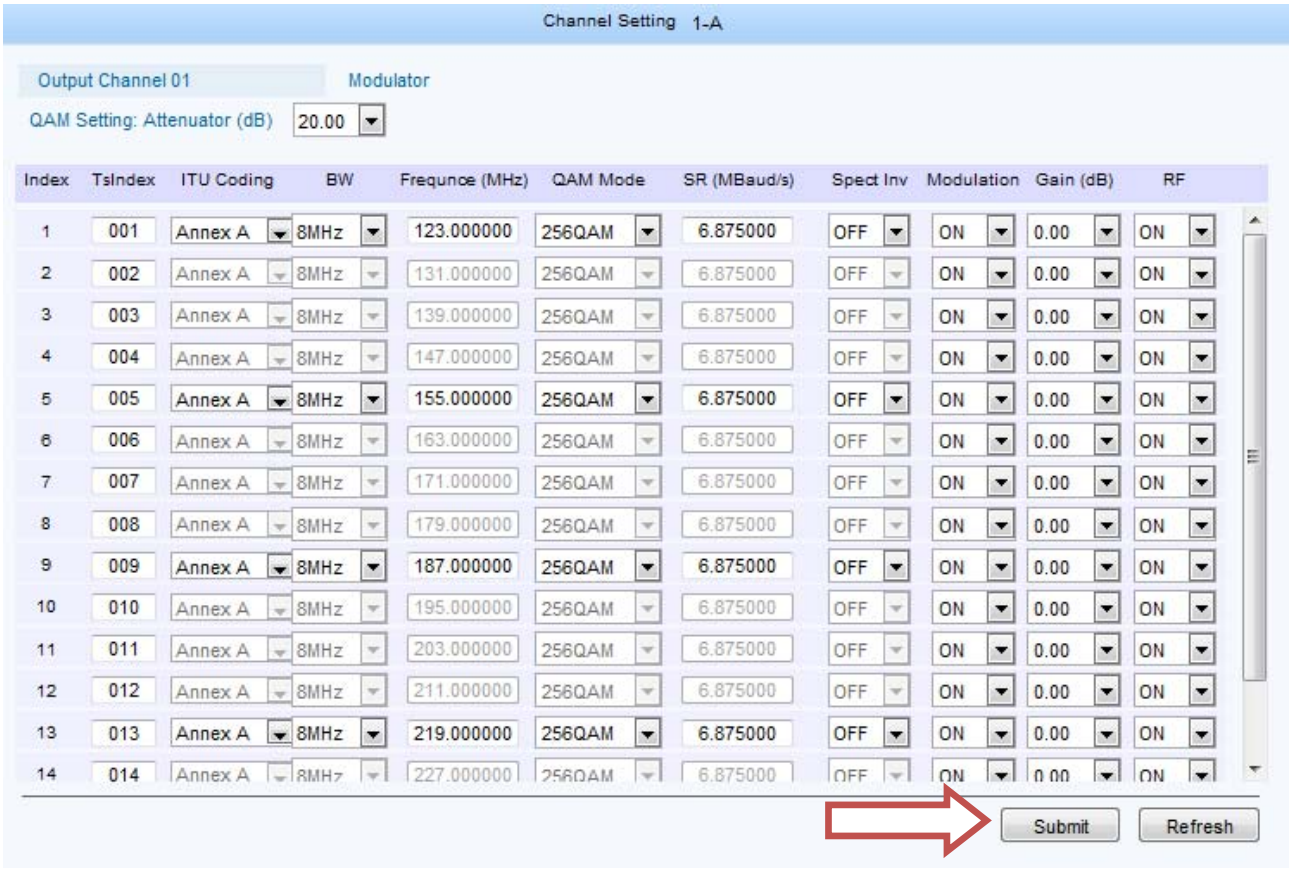
Gain：0.00 – 20.00 (0.5 step size)

Switch of RF：ON/OFF

[Remark]

1. J.83 Annex A is the standard of Europe, J.83 Annex B is the standard of North American; Annex C is the standard of Japan; at present Annex A is used in China.
2. The symbol rate of Annex B in ITU encoding standard is fixed at 5.057MBaud/s. For Annex A, the symbol rate is in the range from 4.200Mbaud/s to 7Mbaud/s, and it’s in the range from 4.200Mbaud/s to 5.310Mbaud/s for Annex C， the minimum step size is 1KBaud.
3. The bandwidth is defined as 6MHz in Annex B and Annex C.
4. If the channel parameters are displayed as grey (as shown as the channel 2,3 and 4 in figure 21), it means your device is not authorized the corresponding functions.

After the configuration, click “Submit” button at right-bottom of the page to save the setting.


Channel Setting 1-A
Output Channel 01
Modulator
QAM Setting: Attenuator (dB) 20.00
Index TsIndex ITU Coding BW Frequnce (MHz) QAM Mode SR (MBaud/s) Spect Inv Modulation Gain (dB) RF
1 001 Annex A 8MHz 123.000000 256QAM 6.875000 OFF ON 0.00 ON
2 002 Annex A 8MHz 131.000000 256QAM 6.875000 OFF ON 0.00 ON
3 003 Annex A 8MHz 139.000000 256QAM 6.875000 OFF ON 0.00 ON
4 004 Annex A 8MHz 147.000000 256QAM 6.875000 OFF ON 0.00 ON
5 005 Annex A 8MHz 155.000000 256QAM 6.875000 OFF ON 0.00 ON
6 006 Annex A 8MHz 163.000000 256QAM 6.875000 OFF ON 0.00 ON
7 007 Annex A 8MHz 171.000000 256QAM 6.875000 OFF ON 0.00 ON
8 008 Annex A 8MHz 179.000000 256QAM 6.875000 OFF ON 0.00 ON
9 009 Annex A 8MHz 187.000000 256QAM 6.875000 OFF ON 0.00 ON
10 010 Annex A 8MHz 195.000000 256QAM 6.875000 OFF ON 0.00 ON
11 011 Annex A 8MHz 203.000000 256QAM 6.875000 OFF ON 0.00 ON
12 012 Annex A 8MHz 211.000000 256QAM 6.875000 OFF ON 0.00 ON
13 013 Annex A 8MHz 219.000000 256QAM 6.875000 OFF ON 0.00 ON
14 014 Annex A 8MHz 227.000000 256QAM 6.875000 OFF ON 0.00 ON
Submit
Refresh

§ 3.1.6 Multiplex setting

Click “MUX Setting” hyperlink in the navigation menu of the home page to Multiplexing setting page of GQ-3670C, as shown in figure 21.

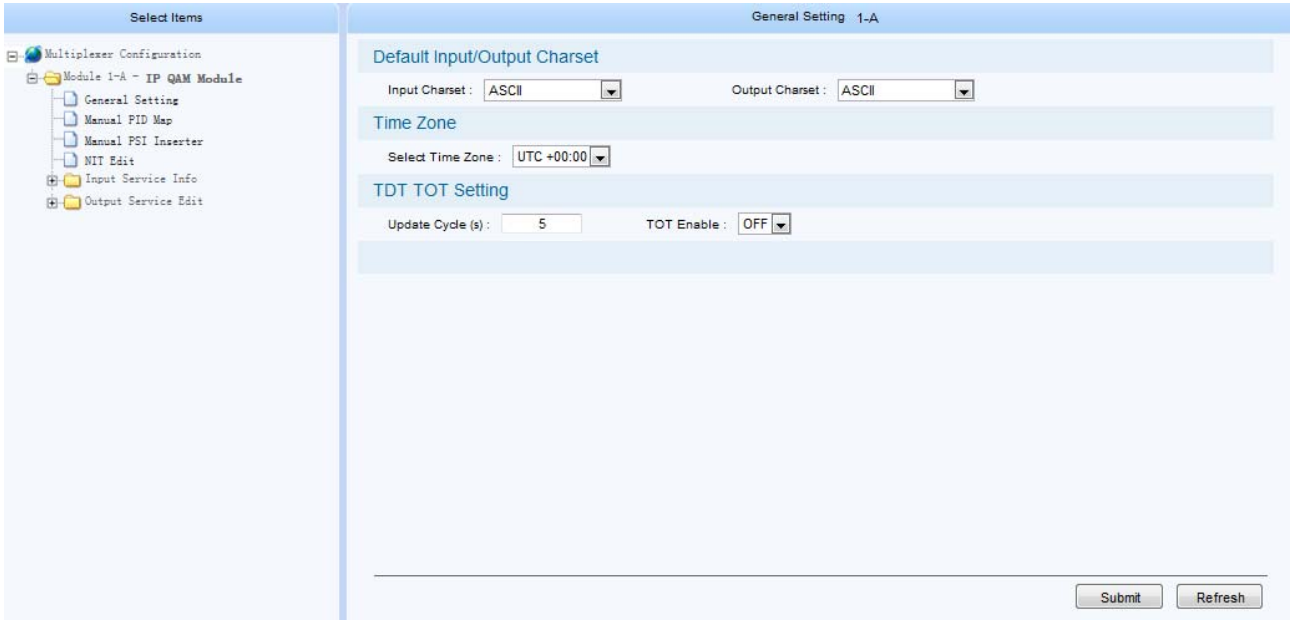


Fig.21 Multiplexing setting of programs

The multiplex parameter configurations are listed in the “Select Items” in the left side of this page, including the general setting, manual PID map, manual PSI inserter, NIT edit, input service and output service.

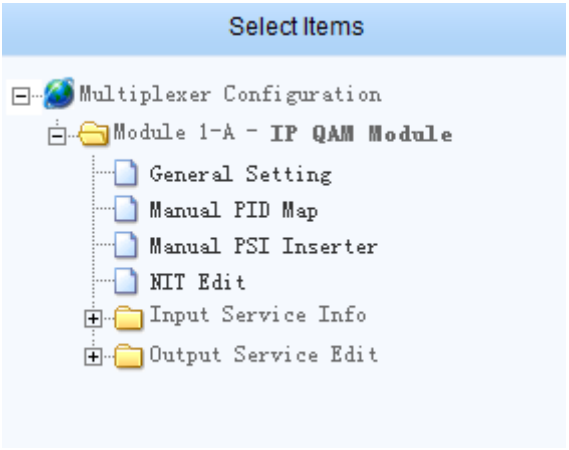


Fig.22 List of the multiplex parameter configurations

General setting

Click “General Setting” hyperlink, the basic information of the system is displayed in the right side of the page, as shown below:

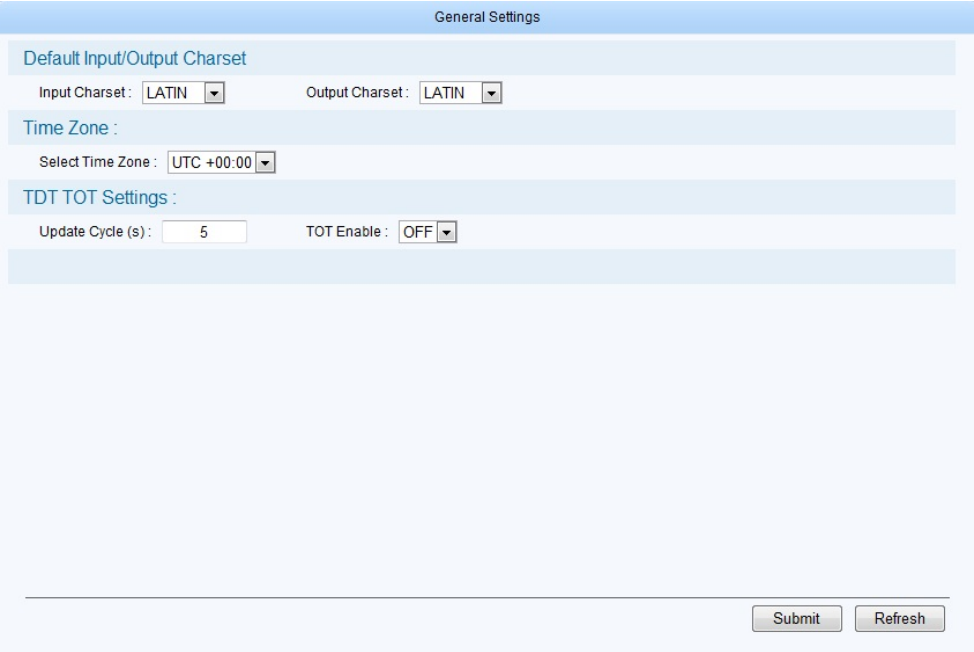


Fig.23 Base setting of program multiplexing

The default of input/output character-sets, time zone and TDT/TOT can be set in this page.

The setting of the default character-sets

The character-sets setting and transform functions built in GQ-3670C to ensure the received program information over transport stream can be displayed correctly, meanwhile ensure this information can be displayed correctly in the next device.

It can be set in the column of default character-sets of input/output.

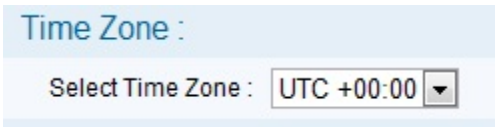
There are 3 kinds of character-sets: LATIN、GB2312、UTF-8

[Remark]

In China, GB2312 is usually be used. If the input TS brings his own character-sets, this setting will be ignored

Setting of time zone

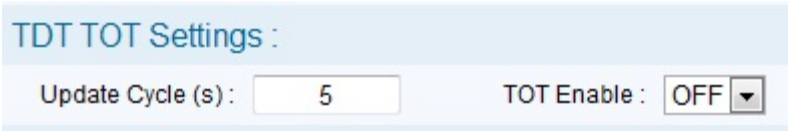
Setting of time zone affect TOT table, after analyze the TOT table at the receiver side, the receiver can get this time zone. It can be set in the column of Time zone:



[Remark]
In china, time zone is usually UTC + 8:00.

TDT/TOT Setting

The TDT table update cycle and TOT switch can be set in the column of TDT/TOT setting.



TDT update cycle (per second): update the TDT table with cyclical time.
TOT switch: set it on, the device insert TOT table in the sent transport stream.

After the configuration, click “Submit” button at right-bottom of the page to save the setting.

[Remark]
Whether TDT/TOT is sended depends on the switch in Output setting, see section §3.2.6.6.1 for details.

PID mapping function

The system will discard the private PID, if it cannot be recognized. The needed private PID can be mapped by the PID mapping function, and mapped private PID can be passed through and transmitted by the device.

Add new PID mapping function

As shown in figure 24, click “Manual PID Map” hyperlink, the PID mapping setting page will display in the right side. The following figure shows the “PID mapping” page:

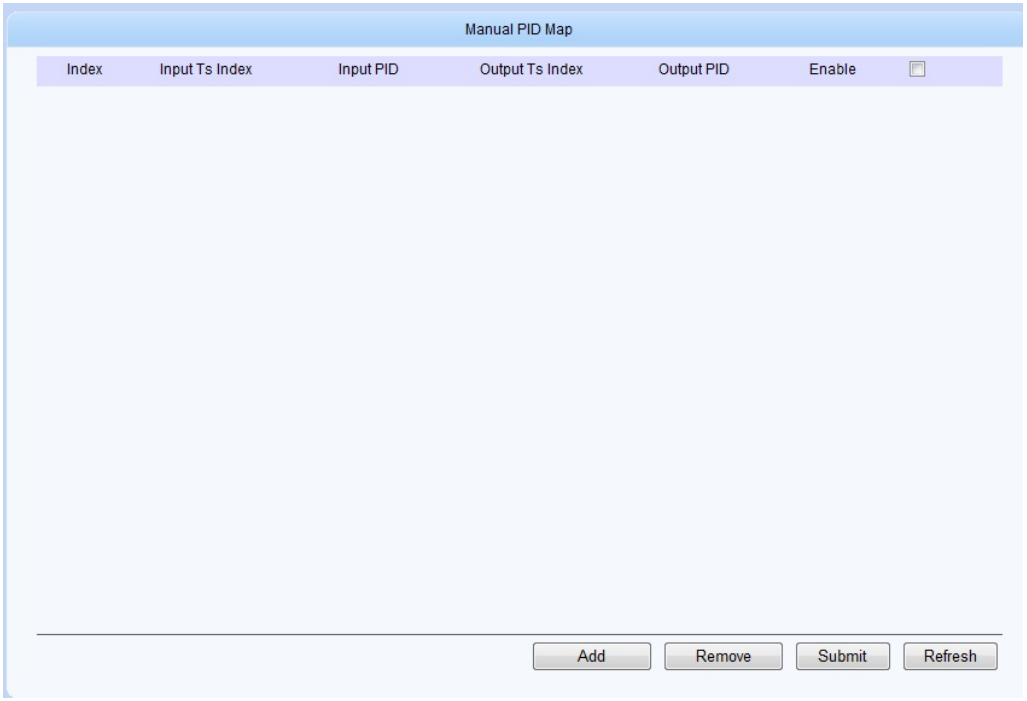
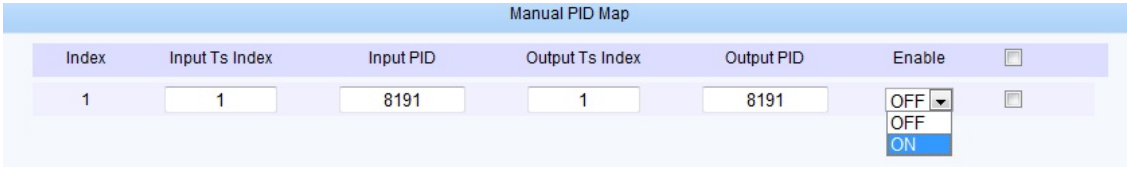


Fig.24 PID mapping

Click “add” button in the bottom of this page, a new column of PID parameter setting will display, as shown below:



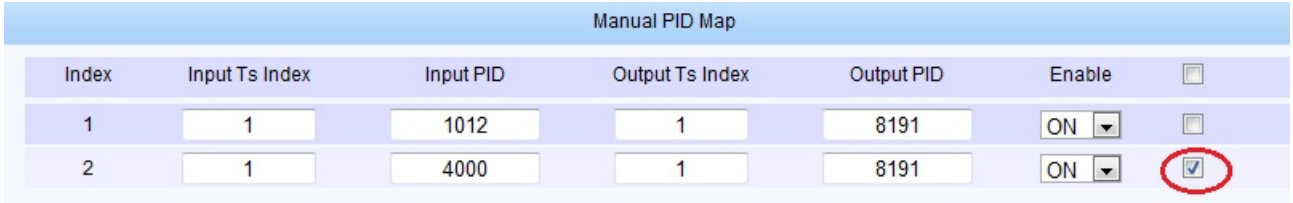
Input TS index: choose the input TS channel from 1 to 8.
Input PID: select the PID, which is needed to map.
Output TS index: choose the output channel from 1 to 4.
Output PID: set a PID number from the input PID.
Switch: switch on, the selected PID will map to selected channel.

After the configuration, click “Submit” button at right-bottom of the page to save the setting.

[Remark]

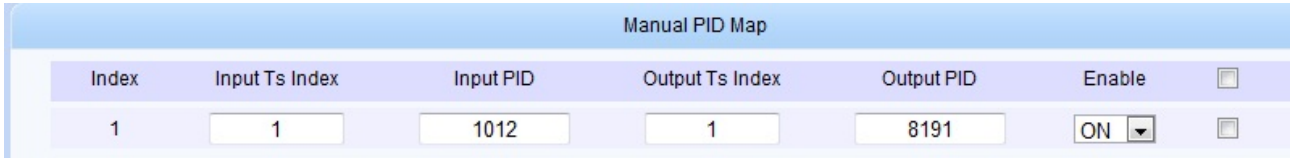
1. When the input TS index is out of the boundary of 1-500, the operation will failure.
2. When the output TS index is out of the boundary of 1-32, the operation will failure.
3. The input/output PIDs are decimal number

Delete PID mapping



As shown above, select the check box in any column, after that click the “Delete” button in the bottom of

this page, then, click “Submit”, the selected PID mapping will delete.



As shown above, the second PID mapping has been deleted.

PSI information insertion

GQ-3670C support the PSI data update, i.e.: OTA file, BAT, SDT e.g.. The maximum size of the total updated file is 1024 Kbyte and the bandwidth of the updated data is smaller than 4096Kbps.

Add upload file

As shown in figure 25, click the “Manual PSI Inserter” hyperlink, the PSI information insertion page will display in the right side of the main page.

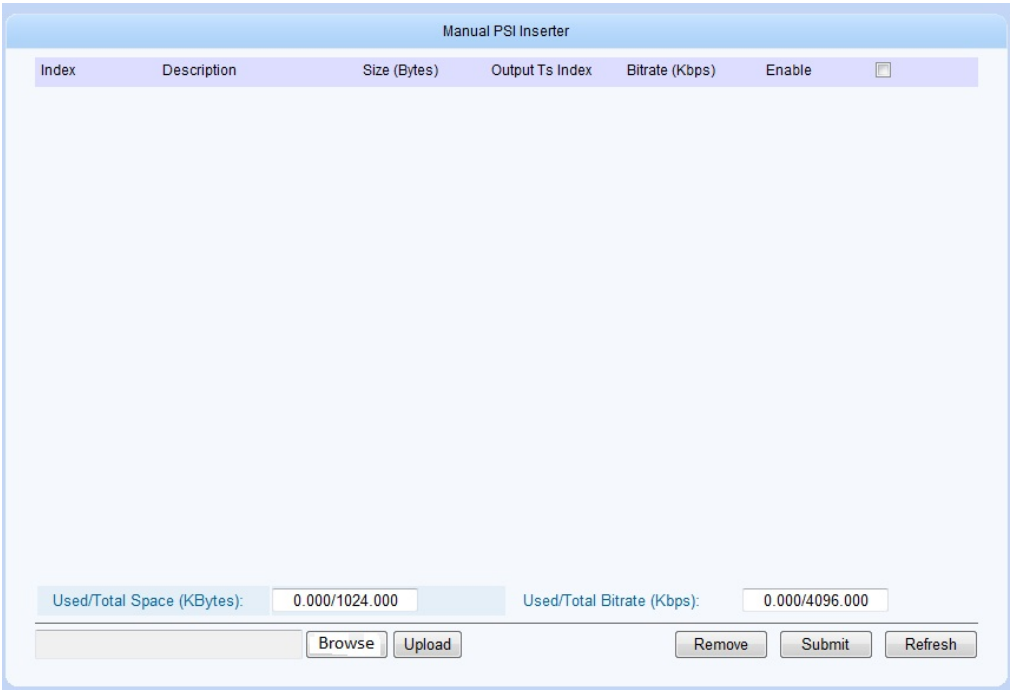
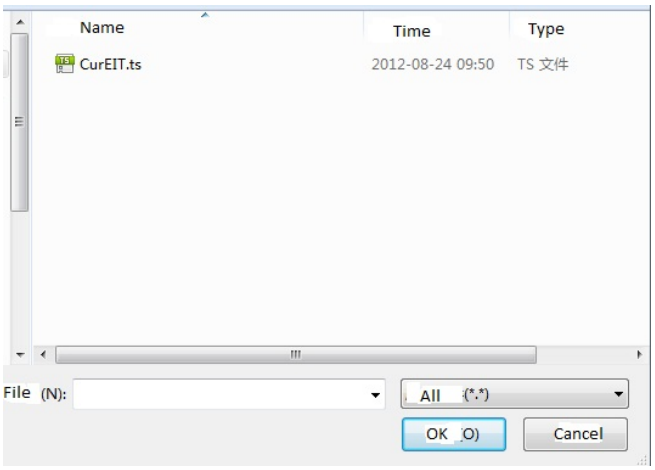


Fig.25 PSI information insertion

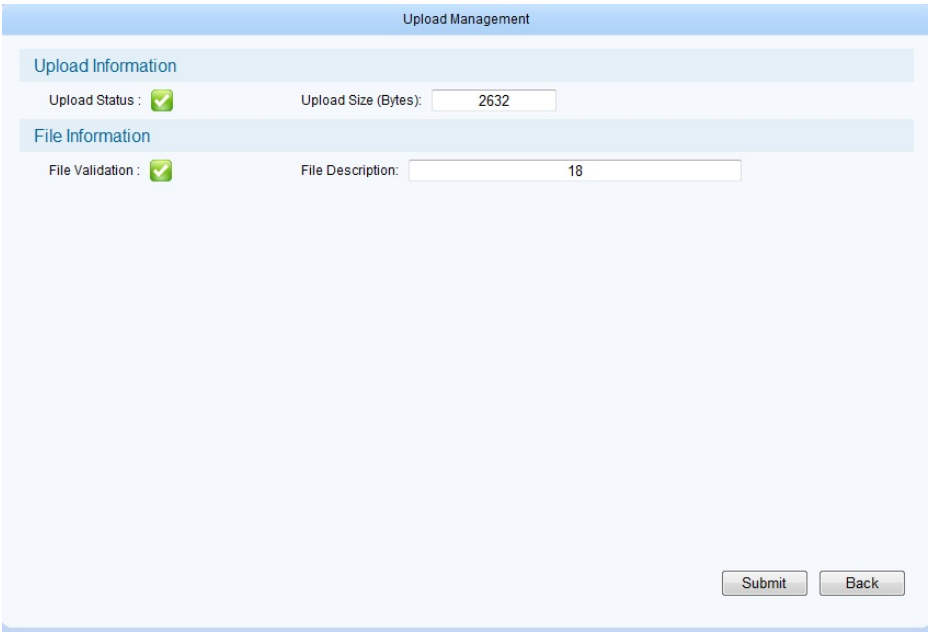
Click left- bottom “browse” and select the updating file.



After select, click the “upload” bottom 

.

The system will automatically skip to the upload management page, as shown below:



The system will adjust the uploaded PSI file, if the file is uploaded correctly and the file layout is correct, the column of “upload status” and “file validation” will display this characteristic:  .

Click the “Submit” button below, the upload will succeed, as shown below:

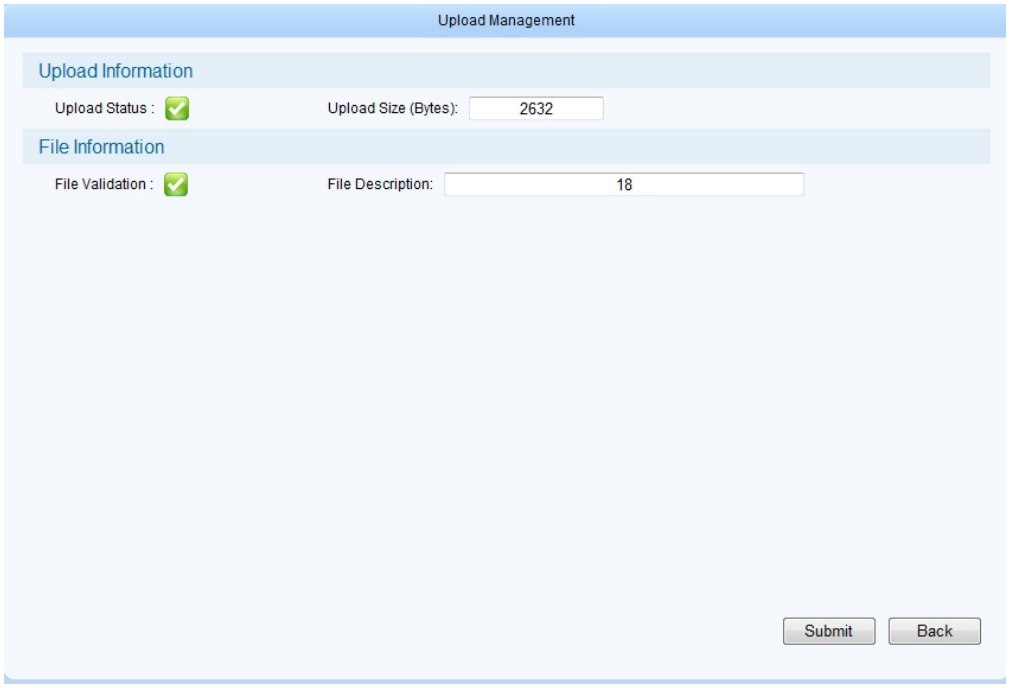


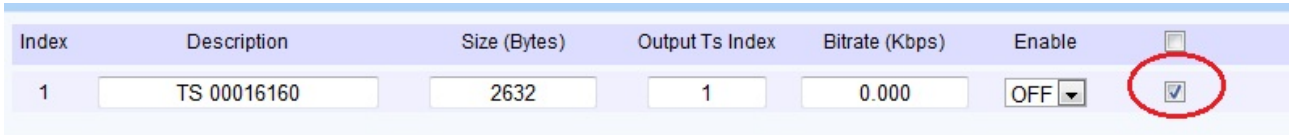
Fig.26 The PSI file upload successfully

The “Switch” 

,can set transmission of the PSI file.

Delete the upload file

As shown below, select the check box in any column:



Click the “Delete” button in the bottom of this page, then, click “Submit”, the selected PSI information will be deleted.

NIT edit

The NIT of the transport stream of DTV support the information of the physical layer of the network, GQ-3670C support to edit NIT manually.

As shown in figure 27, click “NIT edit” button, the NIT edit page is shown in the right side of the main page:

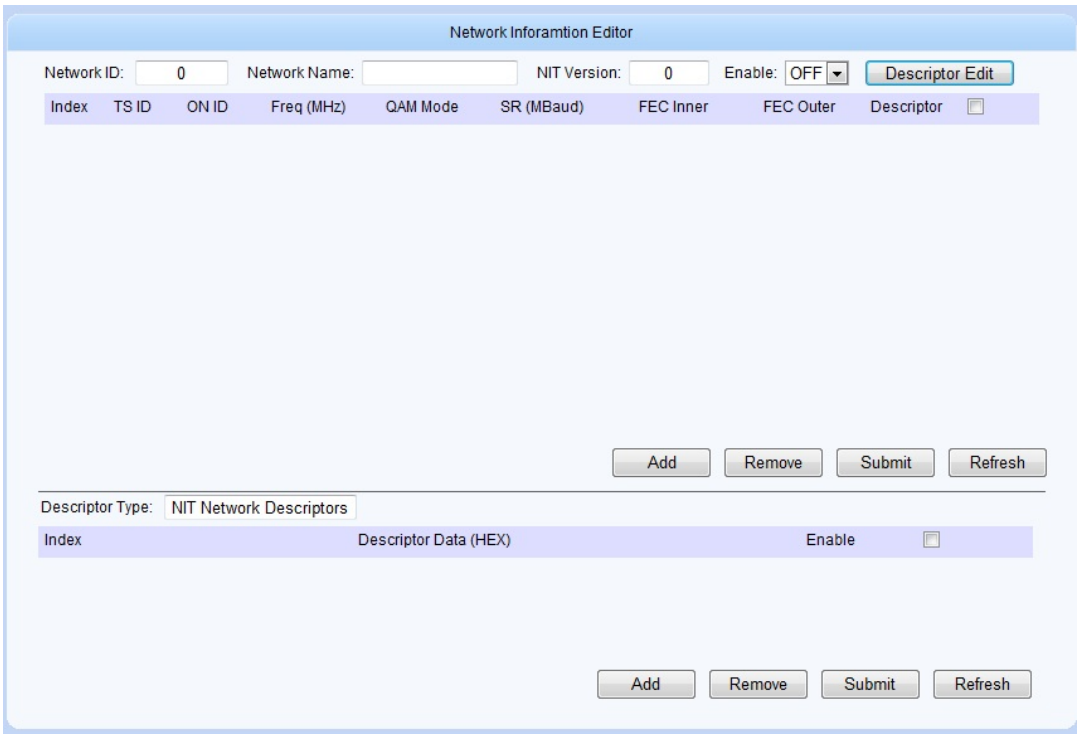


Fig.27 NIT edit

Add NIT information

Click “Add” button in the page, then the NIT can be edited, as shown below:

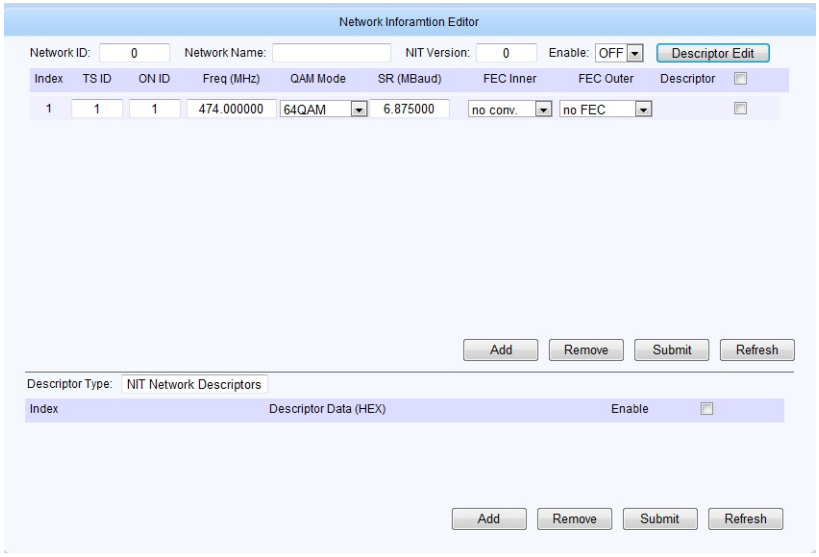


Fig.28 NIT information editing

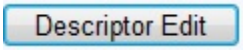
The parameter of NIT including: network ID, network name, NIT version, frequency, modulation mode, symbol rate, FEC inner-coding, FEC outer-coding.

After the configuration, click “Submit” button at right-bottom of the page to save the setting.

GQ-3670C supports the edit of NIT Network Descriptor and NIT TS Descriptor.

[Remark]

The range of NIT version: 0-31

NIT Network descriptor edit: click 

button at the right-top of the page, the box of the descriptor type will display below.

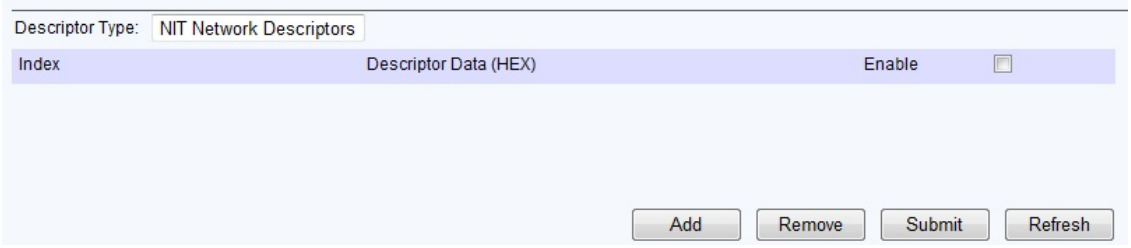
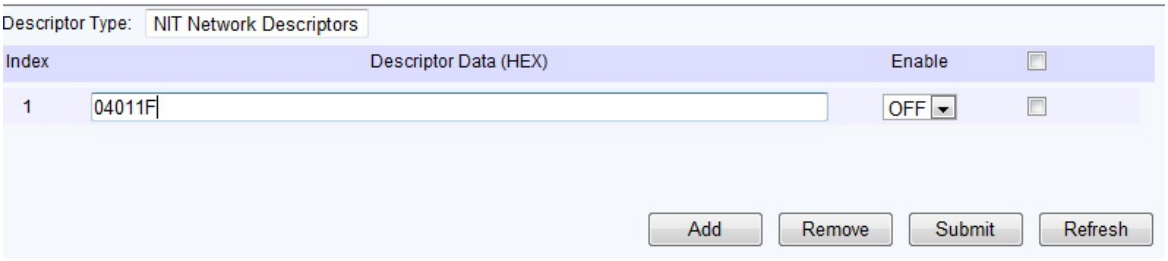


Fig.29 NIT Network descriptor edit

Click “Add” button, a new column of NIT network descriptor will display and can be edited, as shown below:



“Switch” can control the transmission of the descriptor, and click “Submit” button to save the configuration.

Select the check box in any column, after that click the 

button in the bottom of this page, then, click “Submit”, the selected NIT network descriptor will delete.

NIT TS descriptor edit: as shown in figure 30, click the corresponding “edit” button after the NIT information, the box of descriptor type display: NIT TS descriptor:

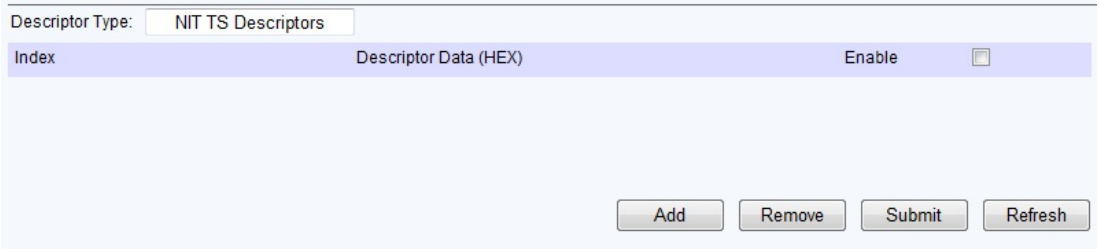


Fig.30 NIT TS descriptor edit

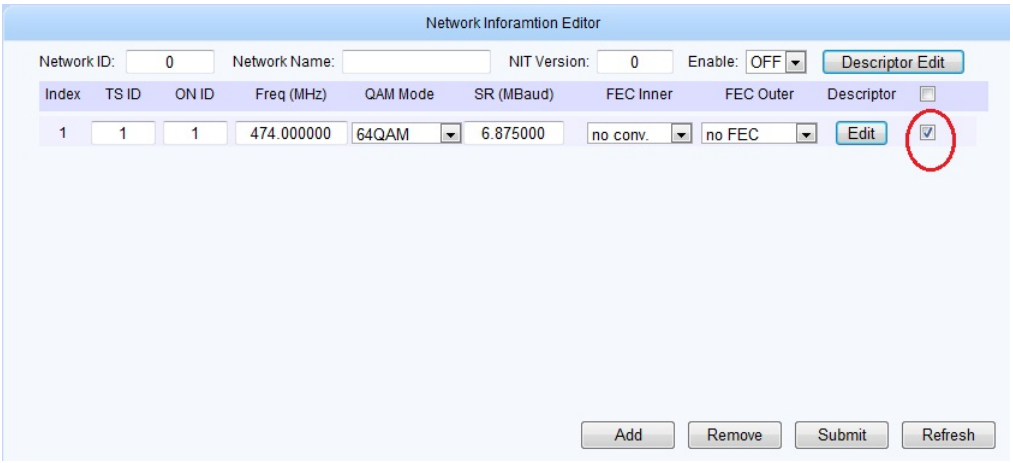
The edit of NIT TS descriptor is same as the NIT Network Descriptor, the detail please check the specification of the “edit of NIT Network Descriptor”

[Remark]

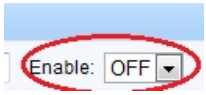
1. NIT descriptor utilize hexadecimal number.
2. Ensure the Descriptor meet the standard of DVB SI.

Delete NIT information

As shown below, select the check box in any column, after that click the “Delete” button in the bottom of this page, then, click “Submit”, the selected NIT information will be delated.



Overall switch

As shown in figure 28, there is a 

button at the right top of the page. This button can control the transmission of all the NIT information. In every output channel setting, NIT could be closed individually.

Input program

As shown in figure 31, click “⊞” button, which at the left side of the “input program” hyperlink, the input program menu spread up, as shown below:

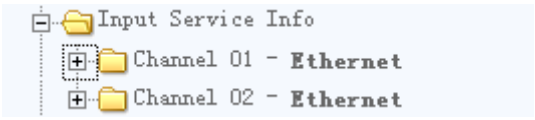


Fig.31 Input program menu

The type of the current input channel is displayed in the input program menu. As shown in figure 32, spread “channel 01” menu, the number of this type of channel can be checked.

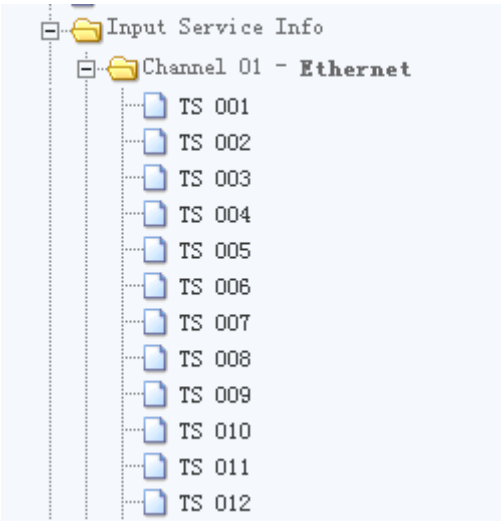


Fig.32 Input channel list

As shown in figure 33, click any hyperlink of channel (i.e.: “TS 016”), the input TS program information can be checked at the right side of the page.

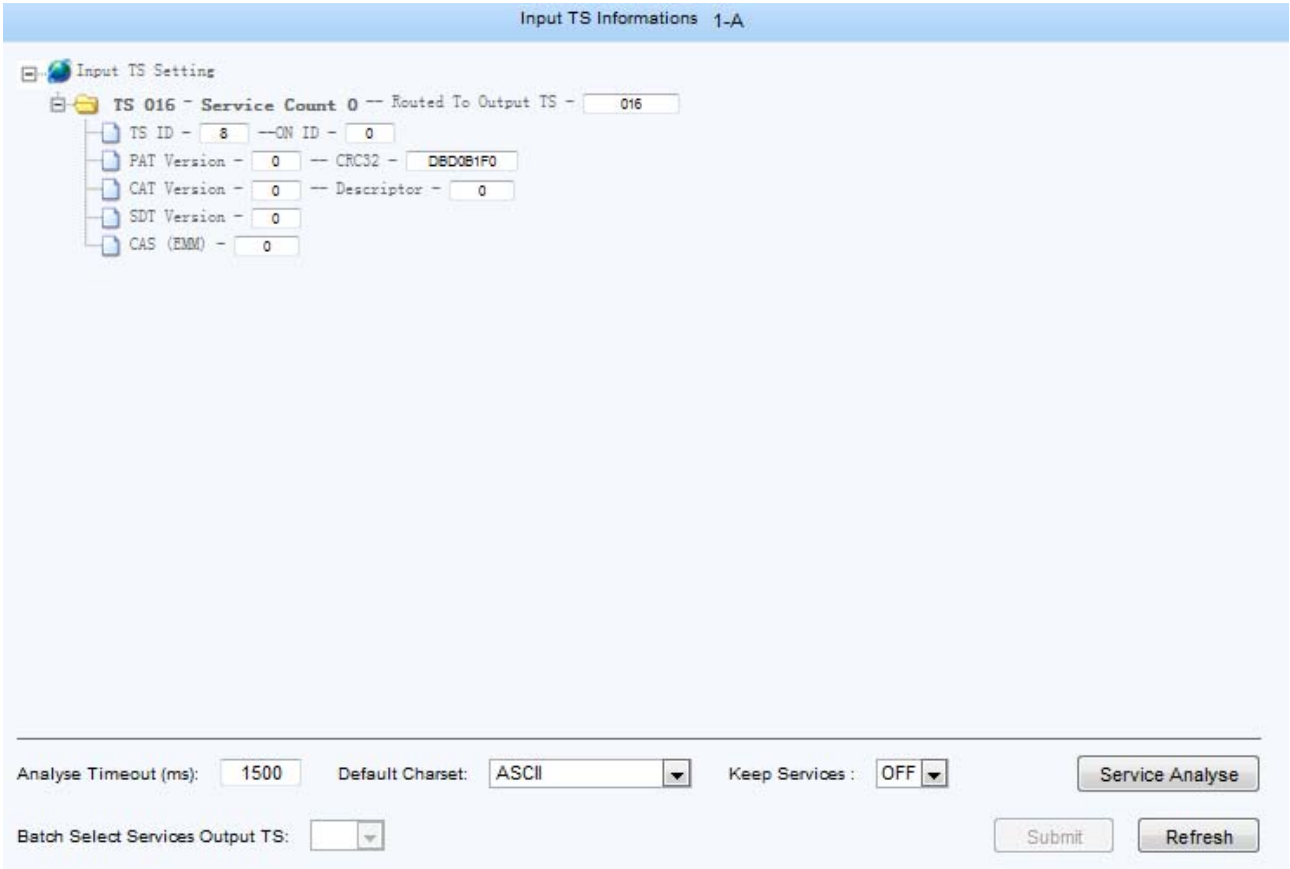
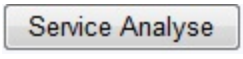


Fig.33 Input TS program information

Program search

As shown in figure 34, click 

button at the bottom of the page, the system will search the corresponding channel automatically, and display the information, as shown below:

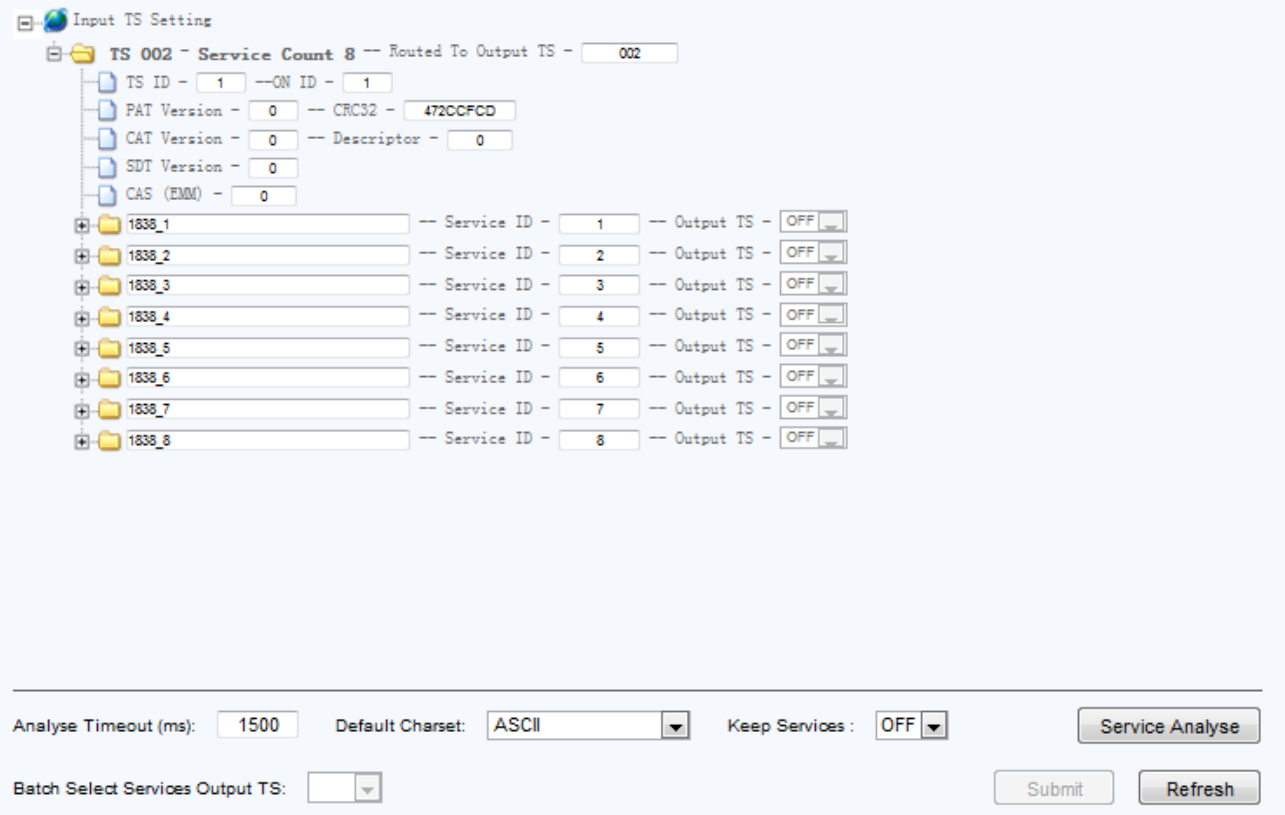


Fig.34 Input program information

Program information

The information of the TS is displayed above the program list, as shown below:

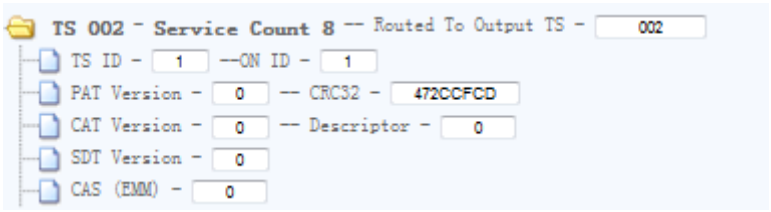


Fig.35 TS information

Click the "⊞" button at the right side of any program name, the details spread up below:

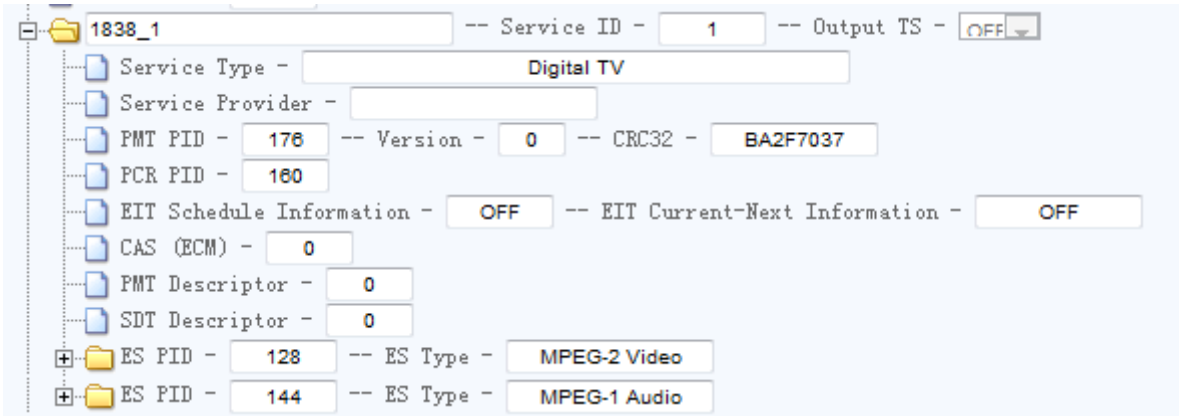


Fig.36 Program TS information

Single program multiplexing

When user multiplex the single program, the multiplexing output channel of this program can be chose, as shown below:

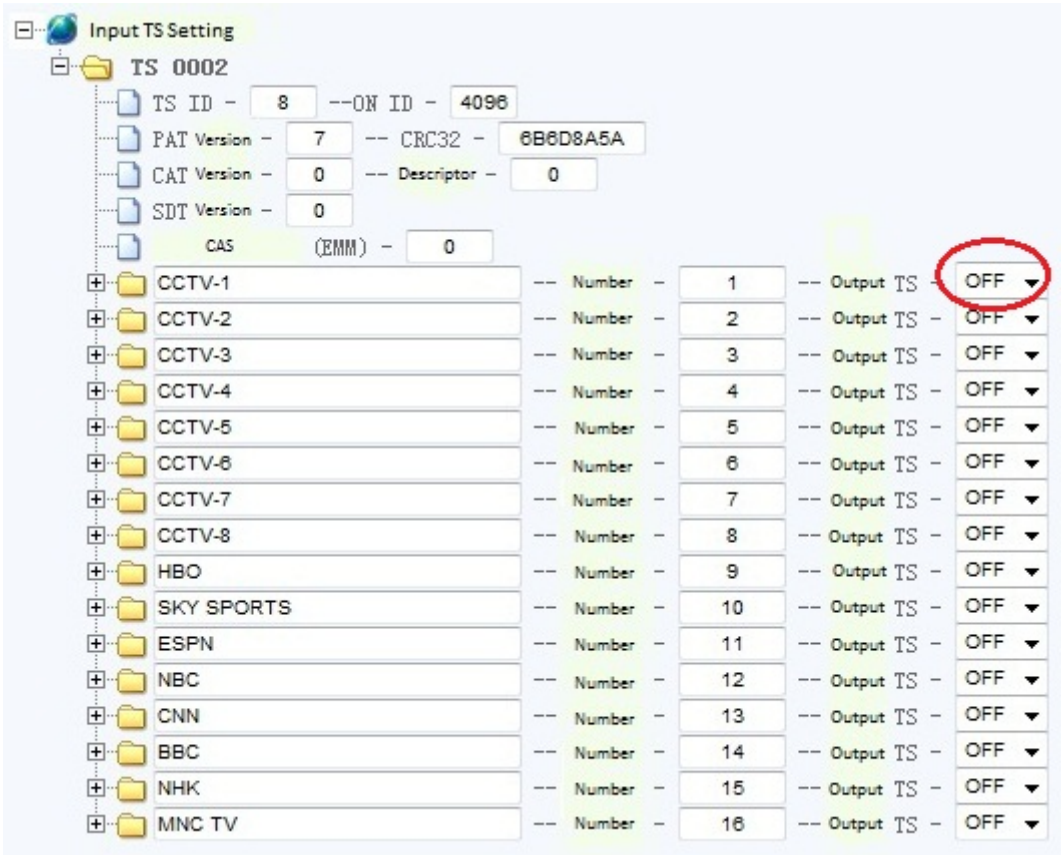


Fig.37 Program TS information

After the configuration, click “Submit” button at right-bottom of the page to save the setting.

Batch program multiplexing

GQ-3670C support batch program multiplexing. It means multiplex all the programs of one channel to another selected channel. As shown below:

Fig.38 Program TS information

Open the drop-down list box of “the output location of the batch select program” and select the channel,

click the “Submit” button, the multiplexing sets successfully as shown below:

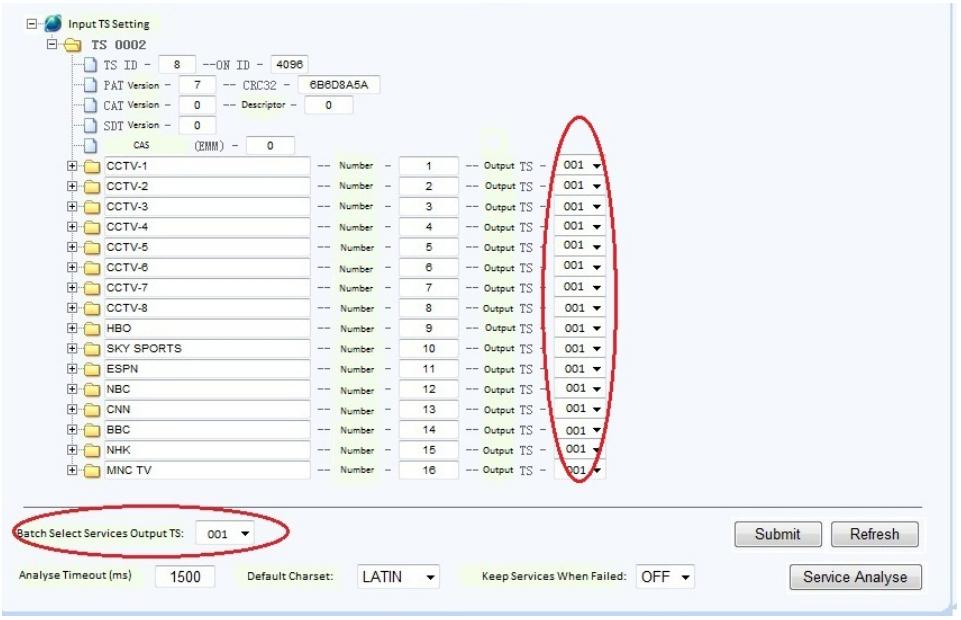


Fig.39 Batch multiplexing

Other function

As shown in figure 39, “Keep Services When Failed”, “Default Charset” and “Analyze Timeout” are also in this page:

Search overtime: when the search time is over the user setting, the search will stop.
Default input character-sets: detail in 3.2.6.1.1
Switch of deletion after failure: when the search failure, switch on will delete all the information of current page.

Output service

As shown in figure 40, unfold “Output Service” to open the input program channel menu, shown as below:

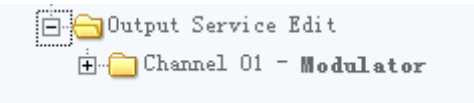


Fig.40 Output Channel Menu

Output program channel will list the type of output channel. As shown in figure 41, unfold “channel 002” menu to check the number of channels, shown as below:

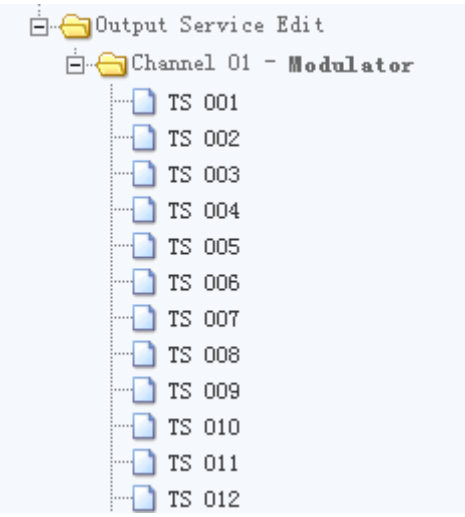


Fig.41 Output Channel List

Shown as figure 42, click a channel link, for example “TS001”, to enter the output TS program information page, shown as below:

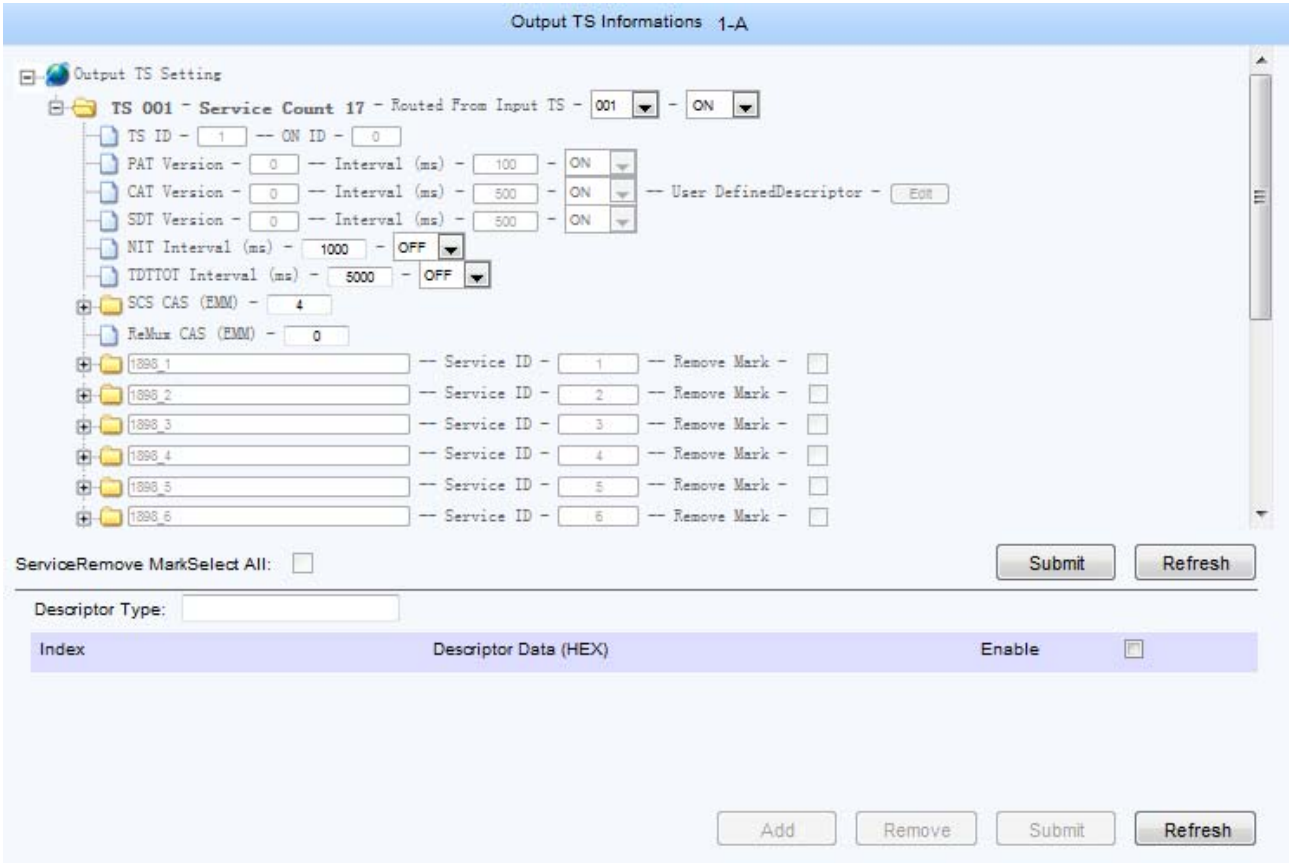


Fig.42 Output TS information page

Output TS Information Monitoring and Configuration

Shown as figure 43, the output TS information page will display the TS related information, such as TS ID, PAT version, PMT version, SDT version, CAS, output programs, etc.

Pass-through: users can choose to pass through the input stream by turn on the pass-through switch, shown as below:

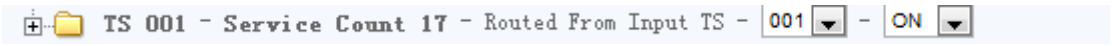


Fig.43 Pass-through Selection

[Remark]

In pass-through mode, the TS is unable to be edited.

PSI/SI Information: users can manually configure the PSI/SI information of the output TS.

Configurable parameters includes:

- TS ID

- PAT version, PAT sending interval

- CAT version, CAT sending interval, CA descriptor

Click the “Edit” button, the “TS CAT Descriptors” box at the bottom of the page will be displayed, shown as below:

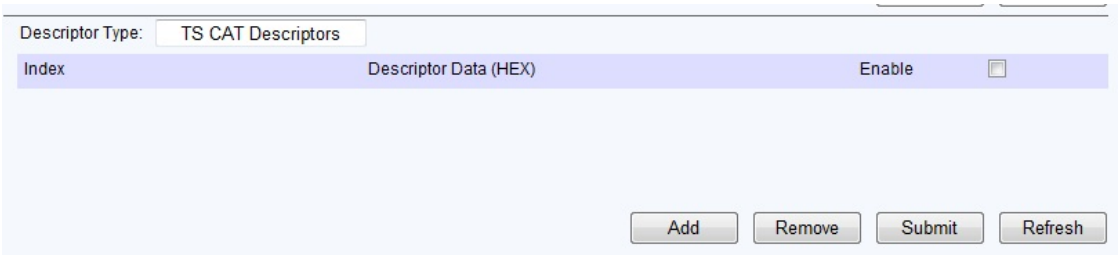
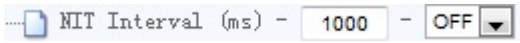


Fig.44 CAT descriptor editing

The way to edit CAT descriptor is the same as the way to edit NIT descriptor, see section 3.2.6.4.1.

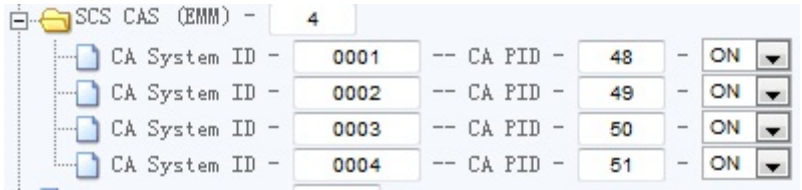
- SDT version, SDT sending interval

- NIT sending interval



- TDT/TOT sending interval

- CA switch

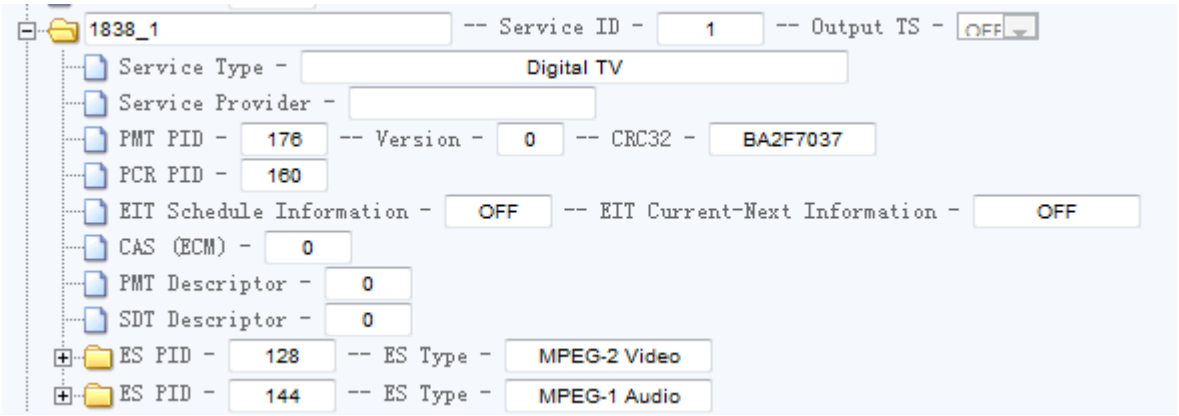


[Remark]

PAT、CAT、SDT version range： 0 – 31.

Program Information Edit

GQ-3670C allows users to edit each individual program information. Click ⊞ button at the front of the program name to open the program information.



Editable information include program name, program number, PMT information, PCR PID, EIT information, CA related information, ES information, etc.

- TS information

Users can type the program name, program number, and provider in the corresponding boxes, and click “Submit” button to validate the setting.

- PMT information

Users can type the value of PMT PID, PMT version, sending interval in the corresponding boxes, and click “Submit” button to validate the setting.

- PCR PID

Users can type the value of PCR PID in the corresponding box, and click “Submit” button to validate the setting.

- EIT information

Users can turn ON/OFF the EIT time table tag, EIT previous/succeeding information tag, and click “Submit” button to validate the setting.

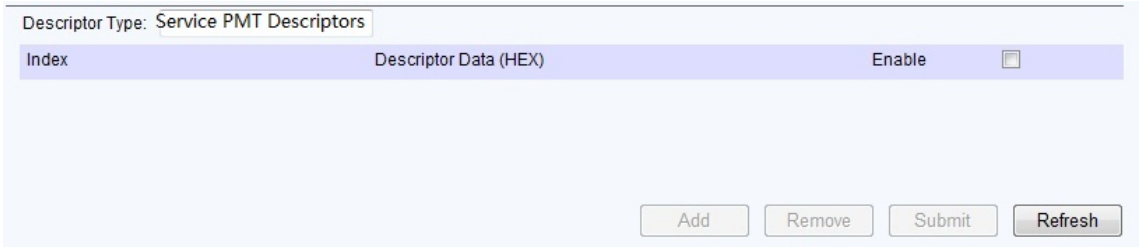
- CA information

Click ⊞ button in front of SCS CAS to open the CA information list.

Users can type the value of CA PID in the corresponding box and turn ON/OFF the CA channel, then click “Submit” button to validate the setting.

- PMT descriptor

To edit the PMT descriptors, click the “Edit”, then the “Service PMT Descriptors” box at the bottom of the page will display Service PMT Descriptors, shown as below:



The way to edit PMT descriptor is the same as the way to edit NIT descriptor, see section 3.2.6.4.1.

- SDT descriptor

To edit the SDT descriptors, click the “Edit”, then the “Descriptor Type” box at the bottom of the page will display Service SDT Descriptors, shown as below:

The way to edit SDT descriptor is the same as the way to edit NIT descriptor, see section 3.2.6.4.1.

- ES information

Click ⊞ button in front of the TS to open the TS information list.

Users can type the value of ES PID in the corresponding box and turn ON/OFF the sending switch. To edit ES descriptor, click “Edit” button, then the “Descriptor Type” box at the bottom of the page will display Service ES Descriptors, shown as below:

The way to edit ES PMT is the same as the way to edit NIT descriptor, see section 3.2.6.4.1.

Delete Program

To delete a program, check its corresponding service remove box, shown as below:

Fig.45 Delete Single Program

Click “Submit” button to delete the program. To delete all programs, check the “Service Remove Mark Select All” box at the lower left corner, shown as below:

Fig.46 Delete All Programs

All programs’ service remove mark will be automatically checked, then click “Submit” button to delete all programs.

§ 3.1.7 Scramble Setting

Click “Scramble Setting” link in the navigation bar to enter the program scramble setting page, shown as below:

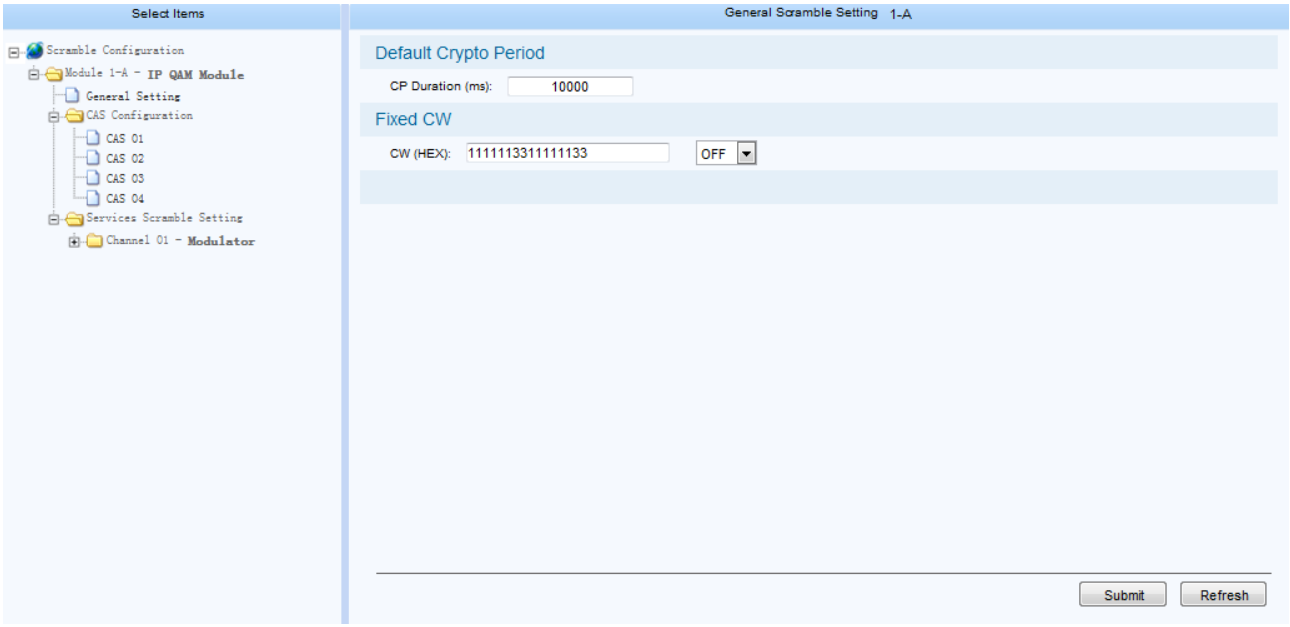


Fig.47 Scramble Setting page

In “Select Items” column, there are scrambling configuration options including General Setting, CAS Configuration, and Services Scramble Setting.

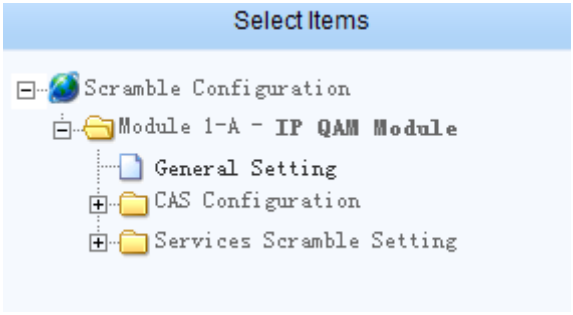


Fig.48 Select Items

General Scramble Settings

Click “General Scramble Settings” link, it will show General Scramble Setting page, shown as below:

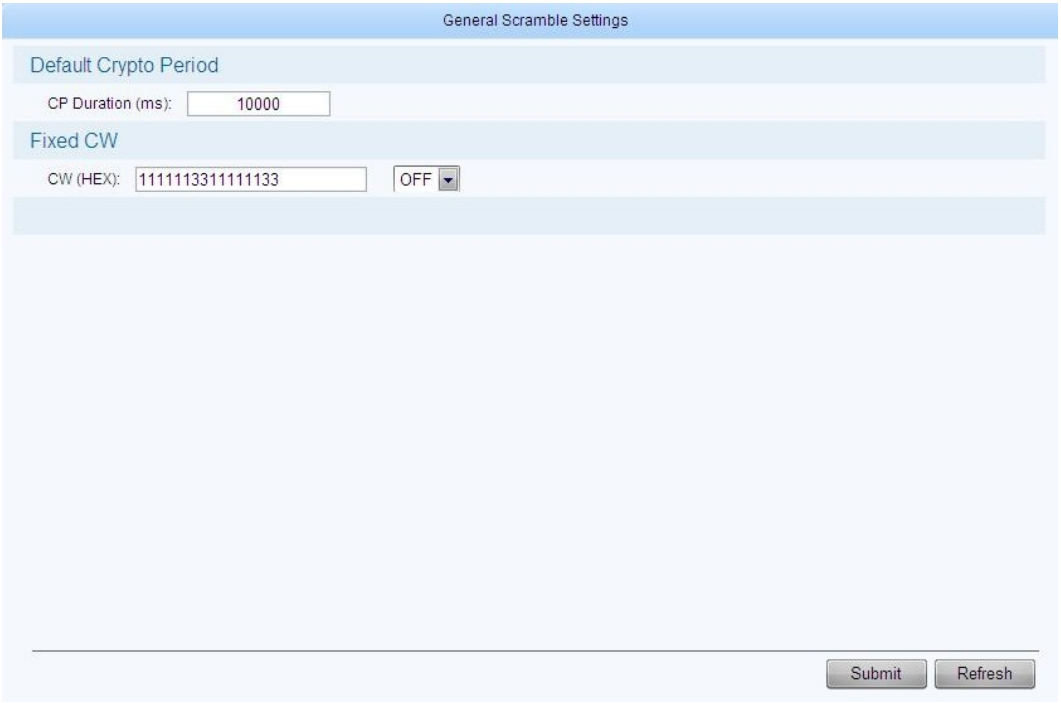


Fig.49 General Scramble Setting

In this page, users can configure the default crypto period and fixed control word (CW).

Default Crypto Period: the time period of changing the control word, range between 10000 – 60000 milliseconds. Click “Submit” button to validate the setting.

Fixed CW: when it is ON, CW will be a user-defined fixed value despite the default crypto period. Click “Submit” button to validate the setting.

CAS Configuration

CA Parameter Settings

GQ-3670C support up to 4 CAS simul-crypt, with each CA channel can be configured independently. Shown as figure 50, unfold “CAS Configuration” menu to select the CA channel 1-4:

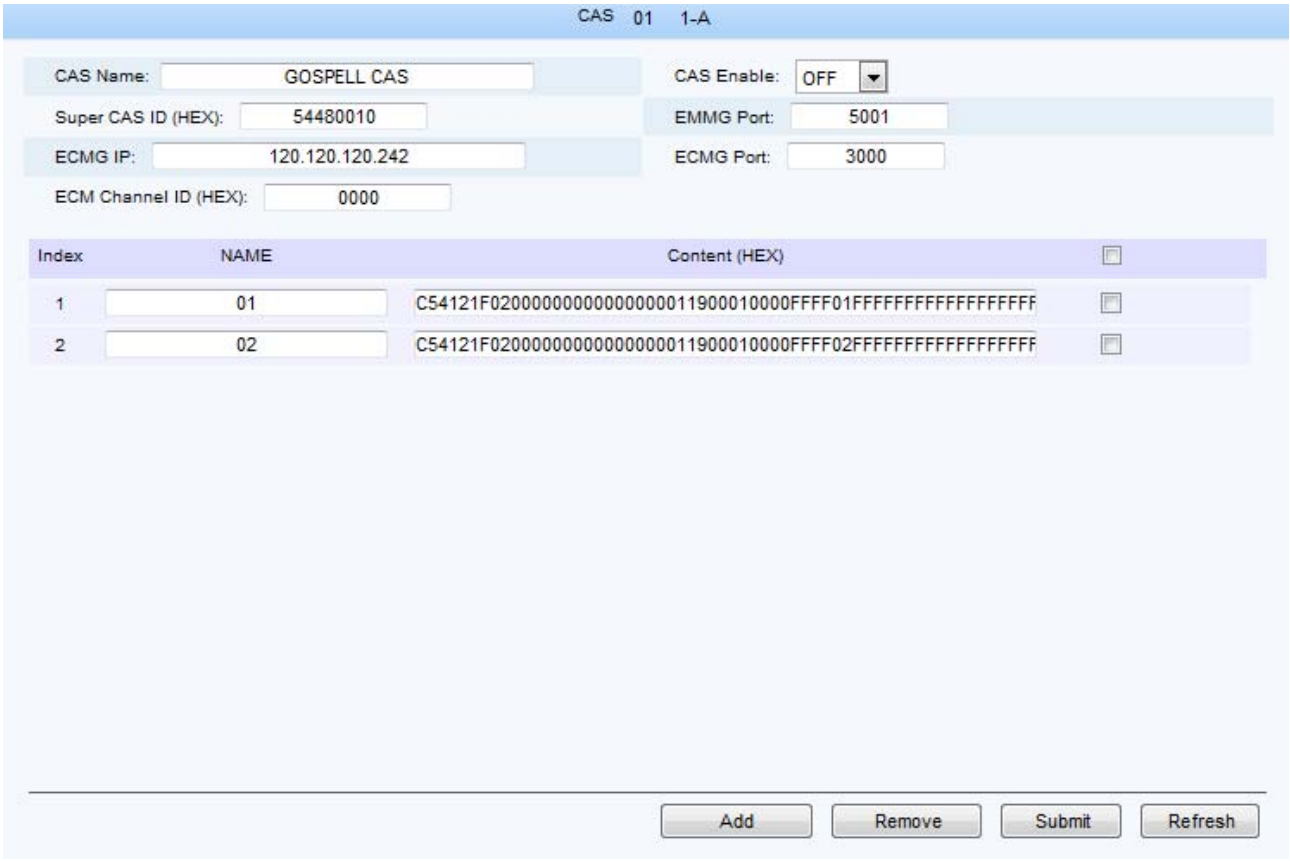


Fig.50 CAS Configuration

Following items can be configured in the CAS configurations page: CAS Name, CAS Enable switch, Super CAS ID, EMMG Port, ECMP IP, ECMG Port. After the configuration, click “Submit” button to validate the settings.

[Remark]

CAS will work properly as well as the configurations of corresponding EMM PID and ECM PID only when the CAS is ON, see section 3.2.6.6.2.

ECMG IP: the IP address of the ECM generator;

ECMG Port (DEC): the port number of the ECM generator;

[Remark]

To ensure GQ-3670C can correctly receive the ECM data from the CAS, the value of ECMG IP and ECMG port on the GQ-3670C must be the same as their counterparts on the CAS server.

Super CAS ID (HEX): valid range between 0 – 0xFFFFFFFF.

[Remark]

1. The super CASID for different CAS should not be the same;
2. Super CASID for each CAS company must be the legal value which is authorized by the DVB-CAS organization.

EMMG Port: the port number of the EMM generator;

[Remark]

To ensure GQ-3670C can correctly receive the EMM data from the CAS, the value of EMMG port on the

GQ-3670C must be the same as its counterpart on the CAS server.

After the configuration, users can check the communication status between GQ-3670C and CAS on the bottom of the page, shown as below:

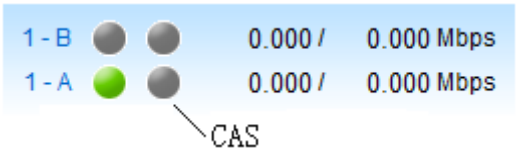


Fig.51 Communication Status

As shown in figure 51, when the communication between GQ-3670C and CAS is valid, the status lights for CAS display ; otherwise, the light will be ; if CAS is open but doesn't scramble, the light will be .

Edit AC Information

Access Criteria (AC) information is defined by CAS company. It is included in certain programs or programs' ECM. The data in AC includes information such as programs package properties, area lock information, etc.

Each AC information consists of AC index, name, and content.

As shown in figure 52, click "Add" button to add AC information:

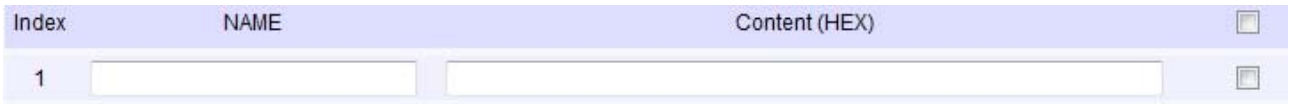


Fig.52 AC Editing Box

As shown in figure 52, users can type AC information's name and content. After the editing, click "Submit" button to validate the settings. To delete the AC, check the square box at the end of the AC information, click "Remove" button and then click "Submit" button to validate the setting,

[Remark]

1. AC information to be added should be provided by the CAS company.
2. When editing the AC content, it is suggested that users open the AC data in binary form provided by CAS company and copy/paste it into the editing box instead of manually typing.
3. When the AC information which being used is modified, the corresponding scrambled programs will temporarily de-scrambled; but the status of scrambling will be restored immediately once the modification is submitted.
4. AC information couldn't be deleted when it is being used.

Services Scramble Setting

As shown in figure 53, unfold "Services Scramble Setting" menu to configure the scrambling options for each programs:

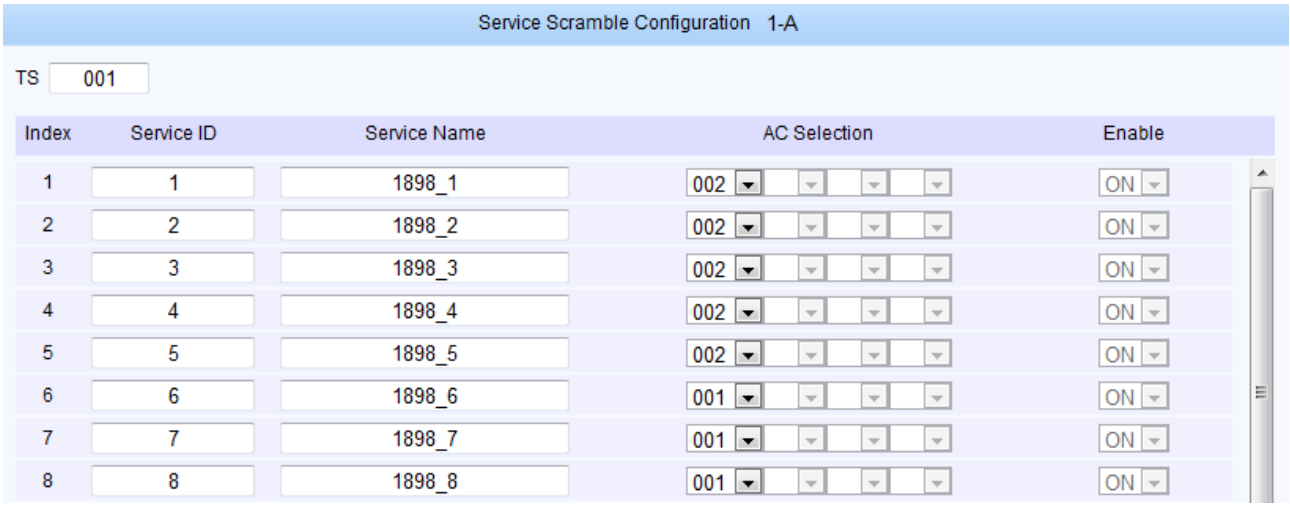


Fig.53 Service Scramble Setting

To scramble the program, first choose AC information for it, shown as below:

Fig.54 Select AC

AC Selection will display 4 AC information for each CAS. After the selection, switch the “Enable” to be ON, then click “Submit” to validate the setting.

[Remark]

1. To scramble the encrypted programs (which already have CA descriptors in PMT), their CA original CA descriptors will be replaced by new CA descriptor which are generated by GQ-3670C. For pass-through mode, those original CA descriptors will be persisted.
2. GQ-3670C supports up to 4 CAS simul-crypt. The CAS’s AC information is available for use only when the CAS is ON.
3. For different CAS, AC information may have different meanings.
4. To correctly scramble programs, the EMM PID of the transport stream and the ECM PID of the programs should be correctly configured, as well as other CA parameters (see section 3.2.7.2.2).

§ 3.1.8 Monitor

Click “Monitor” button in the navigation bar to enter the monitoring page, shown as below:

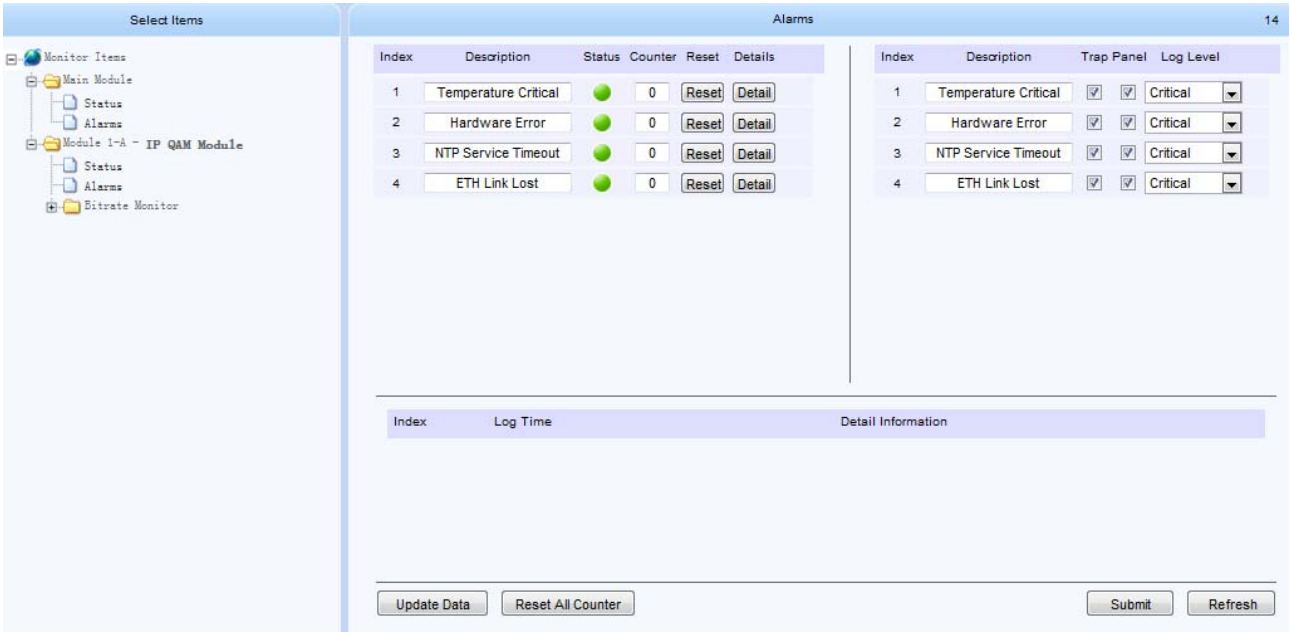


Fig.55 Monitoring Page

In the monitoring page, users can monitor the device temperature, working voltage, different bitrate informations and other alarming related information. In the “Select Items” column, there are two categories: Alarms and Bitrate Monitor, shown as below:

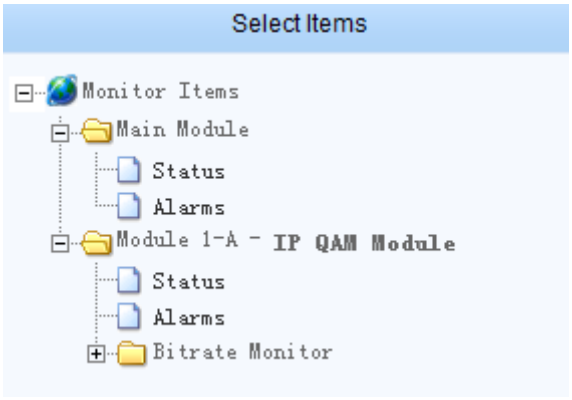


Fig.56 Select Items

Alarms

Unfold “Alarms” menu to open the alarming information page, shown as below:

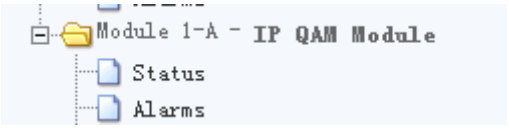


Fig.57 Alarms Menu

Alarms Display

Click “Display” button, the alarm display page will be shown as below:

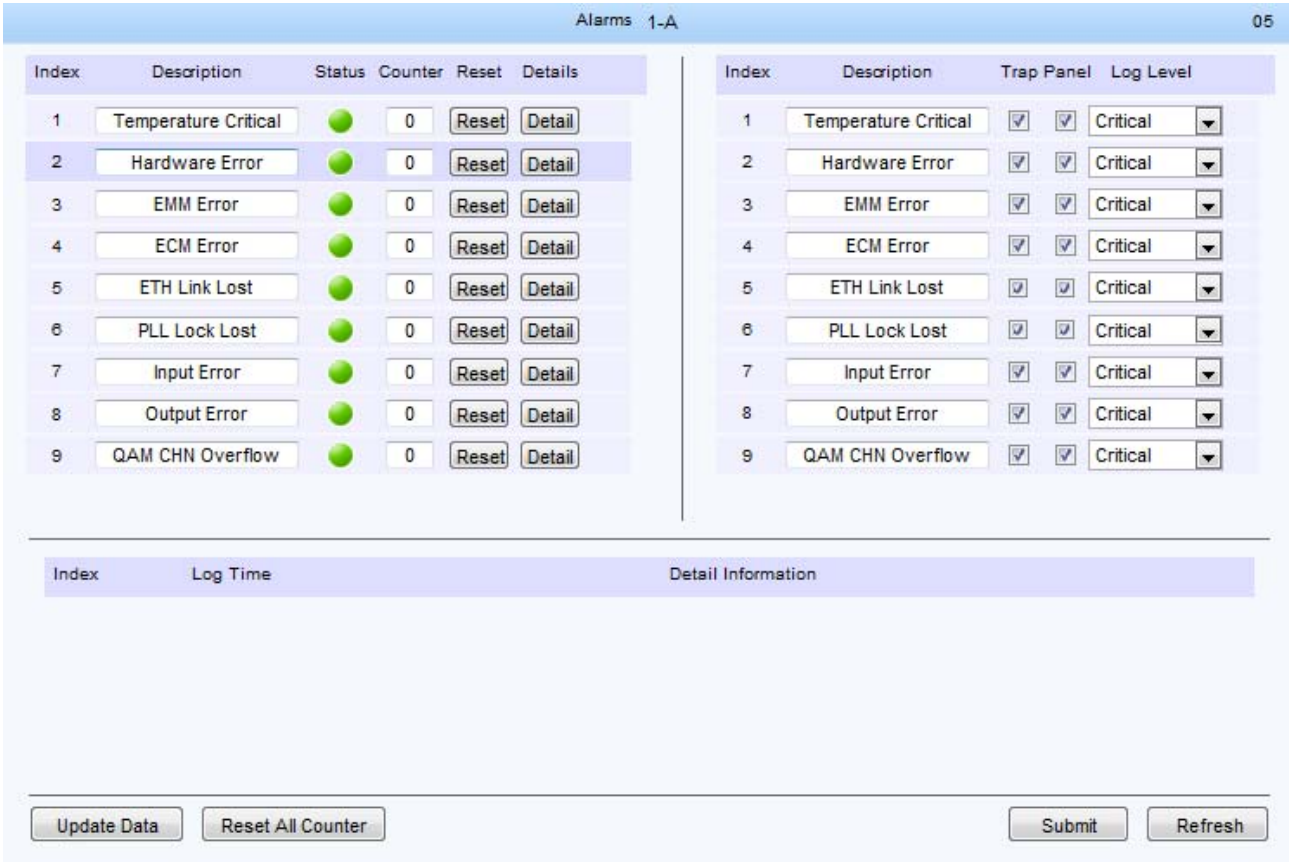


Fig.58 Alarm Information

Shown as figure 58, left column displays the device temperature and the right column displays the alarm information. When there is no alarm, the status light will be  ; when there is an alarm, the status light will turn to  , and the counter will start to count the number of errors occurred, shown as below:

Shown as figure 60, for the alarm information setting on the right column, users can configure the Trap switch, Panel switch, and the log level.

Trap: when it is ON, GQ-3670C will send the trap information to server through SNMP.
Panel: when it is ON, the alarm light on the front panel of GQ-3670C will display the alarm.
Log Level: set level of severity for the alarm, from lowest to highest level: disable, info, warning, critical. SNMP will judge the severity of the alarm depending its log level.

When finish the settings, click “Submit” button to validate them.
[Remark]
The realization of Trap and log level is relate to the SNMP, for specific instructions, see the SNMP user manual.

The counter will automatically restore to zero even the error is cleared. Users need to click the “Reset”

button to reset the counter to zero.

[Remark]

The status light will stay red as long as the counter is not zero (though there may not be any real-time errors).

Alarm Setting

Click the “Setting” link to enter the alarm setting page, shown as below:

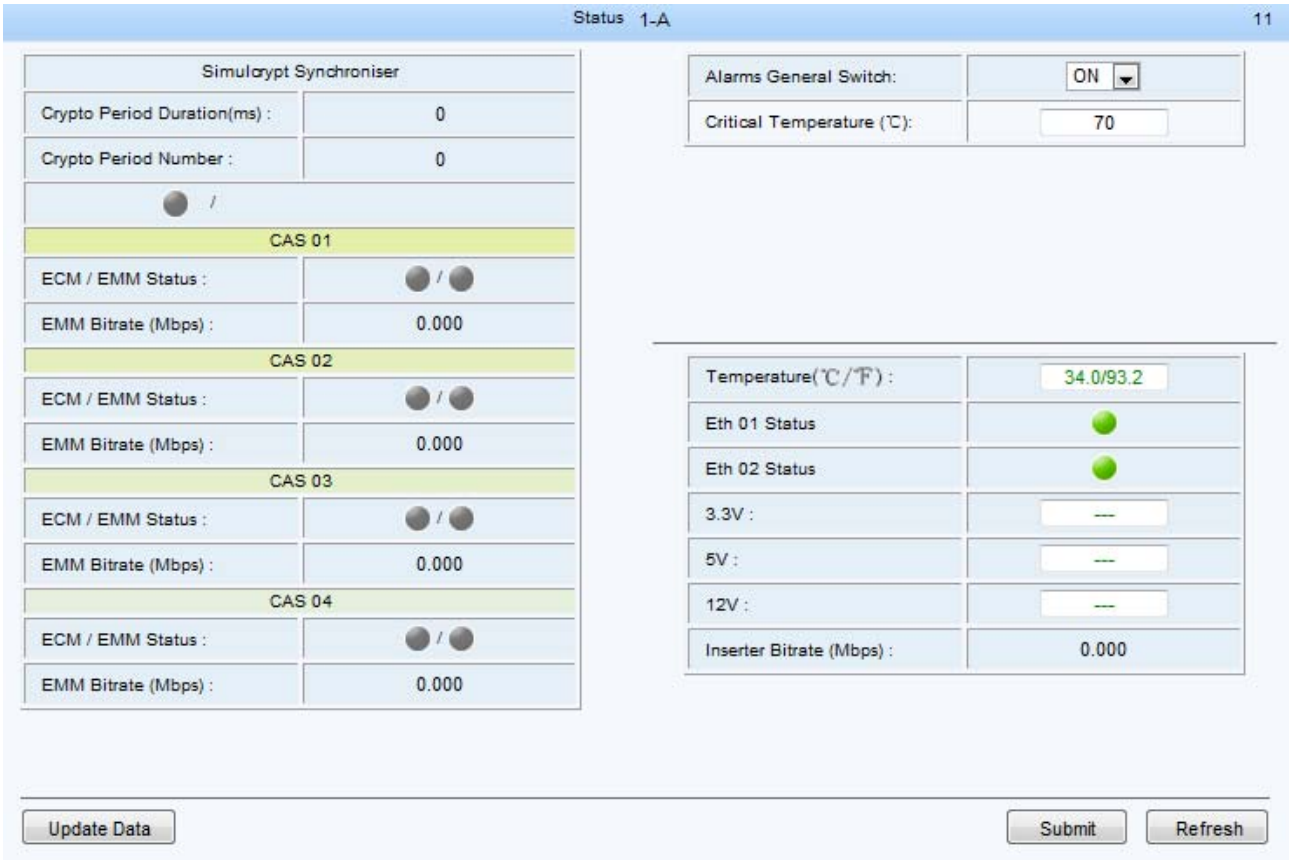


Fig.59 Alarm Setting page

As shown in figure 60, the left column is for the temperature alarm setting and the right column is for other alarm information settings.

General Switch: choose between ON/OFF to enable/disenable the temperature alarms. Click “Submit” to validate the setting.

Critical Temperature: set the upper limit temperature, click “Submit” to validate the setting.

Temperature:current temperature of each module(℃/℉)

Eth Status:current status of each cooling Fan

3.3V/5V/12V: real-time readings of each voltage detectors

Inserter Bitrate:current bitrate comes from core system of each module comes from core system

Bitrate Monitor

Unfold the “Bitrate Monitor” menu to select to monitor the input/output bit rate, shown as below:

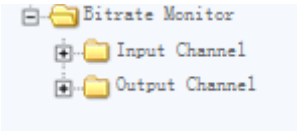


Fig.60 Bitrate Monitor Menu

Input Channel Bit Rate

Unfold the “Input Channel” menu to enter the input channel bit rate monitoring page, shown as below:

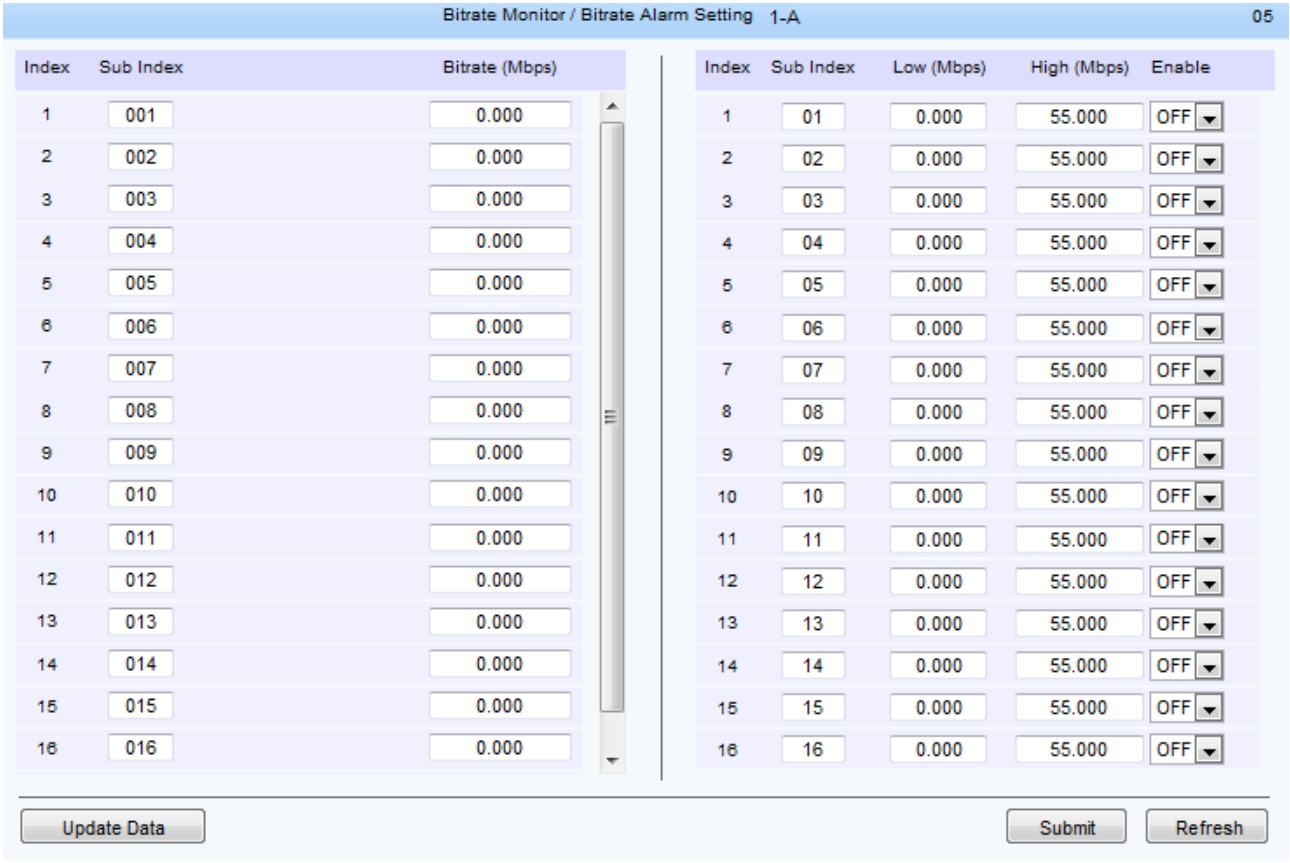


Fig.61 Input Channel Bit Rate Monitoring

Shown as figure 62, the left column displays the real-time bit rate of each channel; the right column enable users to set the bit rate alarm setting, including lower limit, upper limit, and the enable switch.

Lower Limit: when the real-time bit rate is lower than this lower limit value, it will trigger an alarm.
Upper Limit: when the real-time bit rate is higher than this upper limit value, it will trigger an alarm.
Enable Switch: turn ON/OFF the alarm.

When finish the settings, click “Submit” button to validate them.

Output Channel Bit Rate

Unfold the “Output Channel” menu to enter the output channel bit rate monitoring page, shown as below:

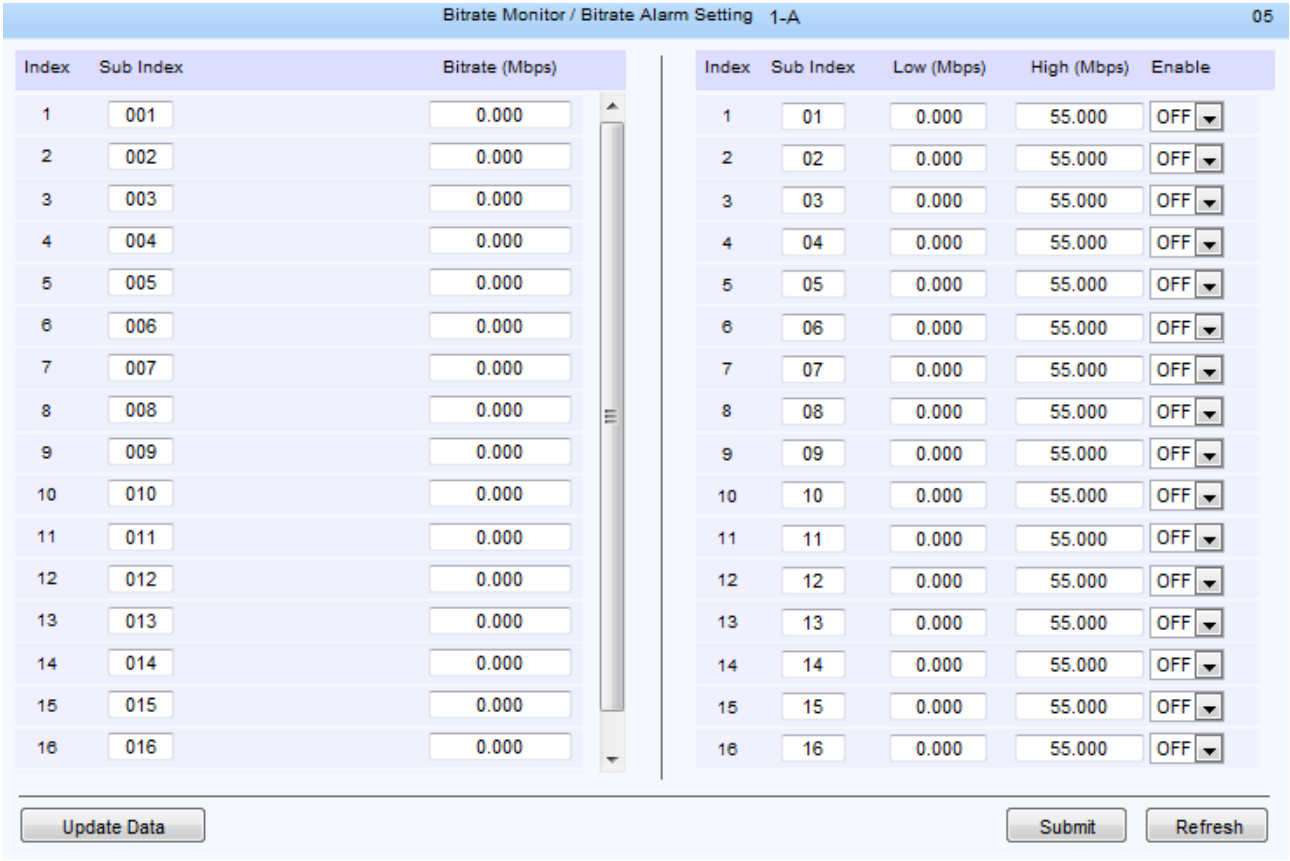


Fig.62 Output Channel Bit Rate Monitoring

Shown as figure 63, the left column displays the real-time bit rate of each channel; the right column enable users to set the bit rate alarm setting, including lower limit, upper limit, and the enable switch

Lower Limit: when the real-time bit rate is lower than this lower limit value, it will trigger an alarm.
Upper Limit: when the real-time bit rate is higher than this upper limit value, it will trigger an alarm.
Enable Switch: turn ON/OFF the alarm.

When finish the settings, click “Submit” button to validate them.

System Bit Rate

Shown as figure 65, the lower right corner displays the system input, output, and insert bit rate, shown as below:

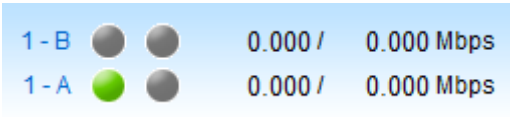


Fig.63 System Bit Rate Monitoring

Front Panel Operation of GQ-3670C

Front panel LCD display of GQ-3670C will show some initializing messages of the device at boot up stage, such as but not limited to company logo, model number, etc. If there is an error during boot up, then it will display the error message.

The front panel display will be locked if there is no key pressed within 60 seconds after device booting. System configuration and menu browsing cannot be performed through the front panel keypad while it is in LOCK status, and the LCD display will show current working status and alert messages (if available) alternately.

User may unlock the LCD display by pressing "UP" and "DOWN" key continuously while it is locked, in order to activate the front panel menu. After activating the menu, the LCD display will show the first sub-menu of the main menu (VIEW ALARMS), as shown in the figure below:

Fig.64 Front Panel Menu

When entering operating menu, user may switch between different sub-menus by pressing “LEFT” and “RIGHT” keys.

The front panel sub-menu items of GQ-3670C are shown in the below table:

Menu ID	Function	Operating Description	Remarks
1.0	Alarms	Display the system alarm information if available. Use “↑” and “↓” keys to switch between alarms if there are more than one alarms.	Read-only
2.0	Serial No.	Display serial number of the device	
2.1	Software Version	Display software version information.	
2.2	Hardware Version	Display hardware Version information.	
2.3	Software Release Date	Display software release date.	
2.4	FPGA Release Date	Display FPGA version information.	
3.0	Local IP	Set the management port IP address of GQ-3670C. Press “ENTER” key to remove cursor. Use “←” and “→” keys to switching	The IP address should be within the same subnet with the management

		between different digits of the IP address. Press “ENTER” key to apply changes.	workstation.
3.1	Subnet Mask	Set the management port subnet mask of GQ-3670C. Press “ENTER” key to remove cursor. Use “←” and “→” keys to switching between different digits of the subnet mask. Press “ENTER” key to apply changes.	Default is 255.255.255.0
3.2	Default Gateway	Set the management port gateway of GQ-3670C. Press “ENTER” key to remove cursor. Use “←” and “→” keys to switching between different digits of the default gateway. Press “ENTER” key to apply changes.	
3.3	MAC Address	Display the MAC address.	Read-only
4.0	Factory reset	Execute a factory reset. Press “ENTER” key to enter the selection mode. Use “←” and “→” keys to select.	Select “Yes” to reboot the device.
4.1	Factory Defaults	Restore to factory defaults. Press “ENTER” key to enter the selection mode. Use “←” and “→” keys to select. Press “ENTER” key to apply changes.	Select “Yes” to reboot the device.
5.0	Language	Set the menu language on front panel. Press “ENTER” key to enter the selection mode. Use “←” and “→” keys to select. Press “ENTER” key to apply changes.	Support Chinese/English menu.

After complete menu operation, user may lock the front panel LCD display and keypad by Pressing “MENU” and “ENTER” key continuously.

Annex A: Technical Specifications of GQ-3670C

A.1 Common Technical Specifications

Characteristic	Properties	Specifications
Power Supply & Consumption	AC Input Voltage	85～260VAC
	AC Input Frequency	50/60Hz
	Power Consumption	75W
	No. of Power Supply Modules	2 operation in parallel
Operating/Storage Environment	Operating Temperature	5°C ~40°C (41°F ~104°F)
	Storage Temperature	-25°C ~70°C (-13°F~158°F)
	Air Pressure	86～106KPa
	Humidity	10%～90%

A.2 Interfaces

Characteristic	Properties	Specification
Data Input Interface	Connector	RJ45
	Quantity	2
	Data Format	TS OVER IP(UDP) Bytes packet
	Impedance	75Ω
	MAC	IEEE 802.3 1000BASET
	Input Data Rate	0~800Mbps
Management Port	Connector	RJ45
	Quantity	1
	Functionality	Management and CAS
	MAC	IEEE 802.3 1000BASET
	Network Protocol	TCP/IP
	Application	HTTP4.0/HTML1.1/XML/CGI(Web Management) NTP

A.3 Multiplexing Specifications

Characteristic	Properties	Specification
TS input	Input TS number	0~500
	Total services number(total)	0~512
	Service number per input TS	0~64
TS output	Output TS number	0~16
	Total services number(total)	0~512
	Service number per output TS	0~64
PSI for output TS	Standard(syntax and send period)	ISO/IEC 13818-1 DVB SI(ESI EN300468)
	Table type	PAT/PMT: Generated automatically SDT: Generated automatically or use uploaded files NIT/BAT: Use uploaded files TDT/TOT: Optional

A.4 Scrambling & CAS interfaces

Characteristic	Properties	Specification
Scrambling	Scrambling algorithm	DVB-CSA
	Embedded scramblers number	4
	Table update	CAT/PMT
CAS Interface	Simul-Crypt CAS number	0~4
	SCS interface	ETSI TS 103 197
	ECMG interface	TCP
	EMMG interface	TCP/UDP
	EMM bandwidth	0~1Mbps/TS

A.5 RF Output Technical Specifications

Characteristic	Properties		Specification
RF Output	Output Frequency		54MHz~860MHz
	Maximum Output EPL (main)		90-110dBuV (4 Channels，0.5dB as step size)
	Maximum Output EPL (monitoring)		70-90dBuV (4 Channels，0.5dB as step size)
	Impedance		75Ω
	Reflection Loss		≥12dB
	Carrier Suppression		>58dB
	MER		≥38dB（QAM Constellation: 64QAM Symbol Rate: 6.857MBaud）
	SNR（Out of band）		≥50dB
	Gain fine-tune		0.00～5.00dB (Step size is 0.25dB)
	Phase Noise	@1KHz	≥90dBc/Hz
		@10KHz	≥100dBc/Hz
		@100KHz	≥105dBc/Hz
	Accuracy of center frequency		±25KHz

Annex B: QAM Reference Information

J.83 Annex A: Table of constellation, bandwidth, symbol rate and bit rate.

Constellation	QPSK	16QAM	32QAM	64QAM	128QAM	256QAM
Minimum bit Rate(Mbps)	2	4	5	6	7	8
Maximum bit Rate(Mbps)	14	28	35	42	49	56
Minimum Bandwidth(MHz)	1.15	1.15	1.15	1.15	1.15	1.15
Maximum bandwidth(MHz)	8.05	8.05	8.05	8.05	8.05	8.05
Minimum Symbol Rate(Mbaud)	1	1	1	1	1	1
Maximum Symbol Rate(Mbaud)	7	7	7	7	7	7

Channel Bandwidth = 1.15 * Symbol Rate
Symbol Rate = Output Bit Rate/m
m = 2，4，5，6，7，8 Corresponding：QPSK，16QAM，32QAM，64QAM，128QAM and 256QAM

8MHz Maximum Output Bit Rate

Constellation	C/N Threshold	Maximum Valid Bit Rate	Channel Utilization Ratio
16QAM	22dB	25.8Mbps	3.2 bit/Hz
32QAM	25dB	32.2Mbps	4.0 bit/Hz
64QAM	28dB	38.7Mbps	4.8 bit/Hz
128QAM	31dB	44.2Mbps	5.5 bit/Hz
256QAM	34dB	51.6Mbps	6.4 bit/Hz

Maximum Valid Bit Rate = Output Bit Rate * 188 / 204

Annex C: Frequently Asked Questions

Symptoms	Possible Causes	Recommended Solutions
No display at boot up	The power supply cable is not plugged in	Plug in the power supply cable
The error message " cannot find server" appears on the screen when access equipment by a web browser	Network connect error	Check if the manage computer and the manage port of GQ-3670C has been connected to a same network
	IP address mismatch	Input correct IP address in URL bar
	Subnet mismatch, i.e., manage port of GQ-3670C and computer locate in different subnet	Modify the manage port IP of GQ-3670C by front panel operations.
Fail to scan any input programs	Improper connection of BNC cable at data input.	Check if the cable is properly connected.
	BNC cable problem.	Check if the cable is properly worked, or change the cable.
Fail to scan programs in specific input	Source device is not working properly	Check malfunction in the source device
Succeeding device fails to receive any program	Improper connection of RF output cable	Connect the RF output cable properly.
	Low EPL at RF output	Re-configure output EPL
Succeeding device fails to receive data in specific output.	The succeeding device is not working properly.	Check malfunction in the succeeding device（e.g. DVB-C receiver）
Serious mis-decoding occurs in all programs.	Program data overflow.	Reduce number of programs or streams in order to maintain the total output bit rate under the total modulated output bit rate.
	EPL at RF output is too low or too high	Re-configure output EPL
	There are other output frequencies in the system	Re-plan system resources with proper frequency arrangement.
Serious mis-decoding occurs in specific program.	Preceding device of this program is not working properly.	Check the configuration errors and malfunction in the preceding device.

Postscript

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