SUMAVISION

Operating Instructions

IPQAM 3.3 modulator
10K511

SUMAVISION TECHNOLOGIES CO., LTD.

Foreword

Statement of this manual

The corresponding products of this manual:
SUMAVISION IPQAM3.3 modulator 10K511
As a professional device, this product can only be operated and used by personnel with professional knowledge at the required operation temperature and place.
This manual is the instructions for the product configuration on IPQAM platform. IPQAM products are plug-in platform structures. Each board card can only realize some functions in the manual. Readers can choose to read the relevant contents of this manual according to the specific device configuration.
Due to the product update and technical development, the manual may be inconsistent with the functional part of board card of the purchased device owing to asynchronous content update.
Without the written permission of the company, no company or individual is allowed to extract or copy part or all of the contents of this manual without authorization and shall not spread in any form.
Sumavision Technologies Co., Ltd. reserves the final right to interpret the contents of this manual.

The Agreements of the Instructions

Before reading the Instructions, please read the following agreements carefully:
1. Font and format
- ✓ The texts in the Instructions are prepared by using V Arial typeface;
- ✓ The first-level titles in the Instructions are prepared in bold using II Arial typeface, the second-level titles are prepared in bold using III Arial typeface, and the third-level titles are prepared in bold using IV Arial typeface.
- ✓ All the notes of the Instructions are prepared by using regular Arial, and are separated before and after the texts by using "=======";

2. Keyboard operation
- ✓ The Arial characters in “<>” refer to the key name or button name, for instance <Enter>, <Tab>, <Back Space> are referred to Return, Tab, Backspace respectively.
- ✓ <Key 1 + Key 2> refers to pressing the key 1 and key 2 on the keyboard at the same time, for instance <Ctrl+Alt+A> refers to pressing "Ctrl", "Alt" and "A" three keys at the same time.
- ✓ < Key 1, Key 2> refers to pressing Key 1 first on the keyboard, releasing, and then

pressing Key 2, for instance <Alt, D> refers to pressing <Alt> key, after releasing the key and then pressing <D> key.

3. Mouse operation

- ✓ Click: Quickly press and release a mouse button.
- ✓ Double-click: Press twice quickly and release a mouse button.
- ✓ Drag: Hold down a mouse button and move the mouse.

4. Signs

- ✓ ⚠Note, carefulness, warning, and danger: to remind users the matters should be paid attention to in the day-to-day maintenance and operation.
- ✓ Description prompts and tips: to necessarily add and describe the descriptions of the operation contents.
- ✓ Help: to describe in detail the parts of the operation contents that it is not easy for users to understand.

Target Readers

This manual introduces the functions and methods of using and maintaining the IPQAM modulator, and is applicable to the following readers:

- ✓ Digital video/audio engineering technicians
- ✓ Digital video/audio system administrators
- ✓ Digital video/audio system engineers

Contact Us

Sumavision Technologies Co., Ltd. is committed to providing a full range of technical support. When users are not familiar with the device or any fault of the device occurs, it is recommended not to disassemble the device, but to contact Sumavision Office or the After-sales Technical Support Department of the Company.

You can contact us by the following addresses:

Address: Building 1, No.15 Kaituo Road, Shangdi Information and Industry Base, Haidian District, Beijing, CHINA, 100085

After-sales Technical Support Hotline: 8008103018

24-hour hotline:

Website: www.sumavision.com

Content

Chapter 1 Overview

1.1 Instruction to product use

SUMAVISION IPQAM 10K511 modulator is a self-developed product of Beijing Sumavision Technologies Co., Ltd. for all-IP networking transmission and VOD (Video-On-Demand) system. It can be placed directly on the head end of the system, sub-head end, and any HUB node of an optical fiber trunk network in a residential quarter for achieving the reception, routing, multiplexing, scrambling, modulation and up-conversion to a RF cable television band of GbE (Gigabit Ethernet) data of MPEG over IP. The typical network diagram of the IPQAM modulator is as shown in FIG. 1-1.

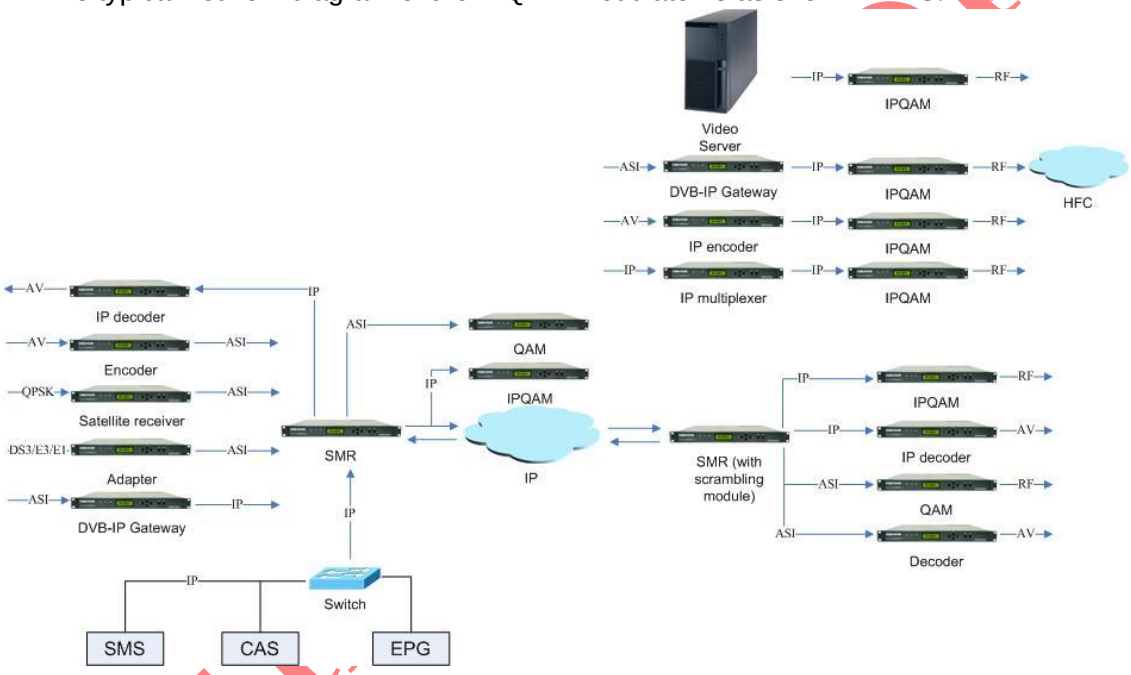


Fig. 1-1 IPQAM modulator Networking Diagram

In FIG. 1-1, the IPQAM receives TS stream data, comprising the following steps of: firstly, finishing the decapsulation, filtering and emptying of UDP (User Datagram Protocol) packet, mapping programs to corresponding QAM (Quadrature Amplitude Modulation) channel according to the preset UDP port number; and then analyzing PID values of Video TS packet and Audio TS packet in various TS streams to finish PID mapping; and multiplexing various SPTS streams mapped in the same output channel as MPTS multi-program code streams, and outputting a RF (Radio Frequency) signal through QAM modulation.

The IPQAM modulator used in the network diagram is SUMAVISION 10K511.

1.2 Product Identification

There are product name, model, and manufacturer, etc. on the front panel of IPQAM modulator, as shown in Fig. 1-2 IPQAM modulator Front Panel.

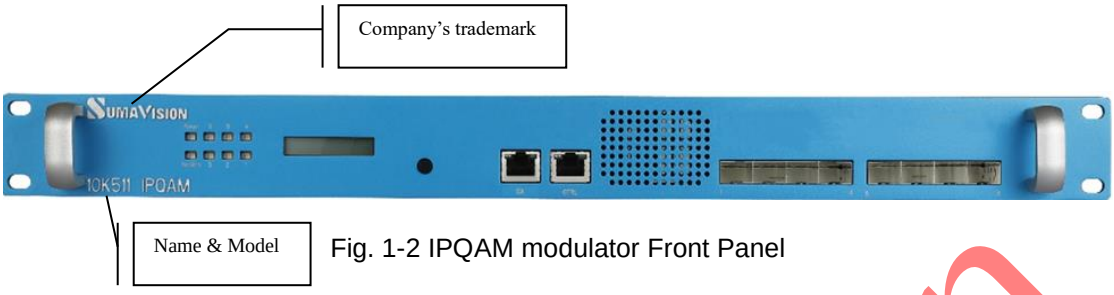


Fig. 1-2 IPQAM modulator Front Panel

Product name: IPQAM modulator

Model: 10K511

Identification description: there's the ex-factory identification on the rear panel of the device, as shown in Fig. 1-3 Ex-factory Identification.

Fig. 1-3 Ex-factory Identification

Where, "S/N" refers to the ex-factory serial number, "IPQAM" stands for the device model and "30010" is the production code.

1.3 Environmental Requirements

1.3.1 Requirements on Transportation Environment

The device must be handled prudently and carefully to avoid damages to the device. Ensure that people who transport, maintain or operate the device have professional skills and are familiar with the operation of device. If there's any question during the transport, maintenance and operation of the device, please contact the Aftersales Technical Support Department of Sumavision, with the way to contact refering to the foregoing contents.

The device is high-grade electronic product, and should be handled gently and kept away from falling or collision. And additionally, attention should be paid to the following:

✓ Please do not place this device on unstable trolleys, shelves, brackets or tables, otherwise, the device may fall and cause serious damages, which can lead to abnormal operation.

✓ During transportation, the trolley used to transport the device should be kept balance. When user has arrived at the designated location or have to stop on the way, ensure whether the trolley is reliable first, and then stop moving to aviod the falling of device, causing malfunction.

✓ Please arrange special person to transport or install this device and avoid many persons participating in the transportation.

1.3.2 Site room environmental requirements

✓ Site room area:

The front door and back door of the cabinet should leave at least 1.2m to 1.5m for opening the door or routine maintenance. The cabinet can not be installed against the wall, and the distance between the cabinet side and the wall should be not less than 0.8m.

✓ Site room floor:

Site room floor should be non-conductive, dust-proof, and its surface smoothness error should be less than 2mm per square meter. The volume resistivity of anti-static material should range from $1\times10^{7}\Omega$ to $1\times10^{20}\Omega$, and the ground current-limiting resistor is 1MΩ. Floor load-bearing should be larger than 450kg/ m^2.

✓ Environment temperature:

The device can operate normally in the environment whose temperature ranges from 10 ℃ to 40 ℃, and the places where conditions permit can install air-conditioning system for cooling.

✓ Relative humidity:

Normal working humidity: ≤90% (20 ℃).

Allowed working humidity: ≤95% (without condensation).

✓ Environmental pressure:

86-105kpa.

✓ Site room doors and windows:

Doors and windows of the site room should be sealed with dust-proof rubber strips, and windows should be double-glazed and strictly sealed.

✓ Site room wall suface:

The wall suface of site room can use wallpapers or be printed with lusterless paint, however, powder coating is not suitable.

✓ Air cleanliness:

The requirements are shown as Table 1-1 Site room dust indicators and Table 1-2 Site room harmful gas indicators.

Table 1-1 Site room dust indicators

Maximum diameter (μm)	0.05	1.00	3.00	5.00
Maximum concentration (particles per cubic meter)	14×10^{5}	7×10^{5}	24×10^{4}	13×10^{4}

Table 1-2 Site room harmful gas indicators

Gas	Average (mg/m^3)	Max. (mg/m^3)
Sulfur dioxide SO_2	0.20	1.50
Hydrogen sulfide, H_2S	0.01	0.30
Nitrogen dioxide, NO_2	0.04	0.15
Ammonia, NH_3	0.05	0.15
Chlorine, Cl_2	0.01	0.30

✓ Fire-fighting requirements:

Site room should be equipped with automatic fire alarm system, hand-held extinguishing system or fixed extinguishing system.

✓ Power supply requirements:

The devices, air-conditioning system and lighting system should have their own power system respectively.

1.3.3 Power supply requirement

Parameters for normal operation of EMR are shown as follows:

- ✓ Power supply:
  Voltage: 100V-240V AC.
  Power frequency: 50Hz-60Hz
- ✓ Power consumption: < 350W
- ✓ Nominal fuse: 8.8A
- ✓ Grounding: the device should be well grounded through the ground terminal.

Chapter 2 Product Descriptions

2.1 Appearance

IPQAM modulator appearance is shown as Fig. 2-1 IPQAM modulator Appearance.

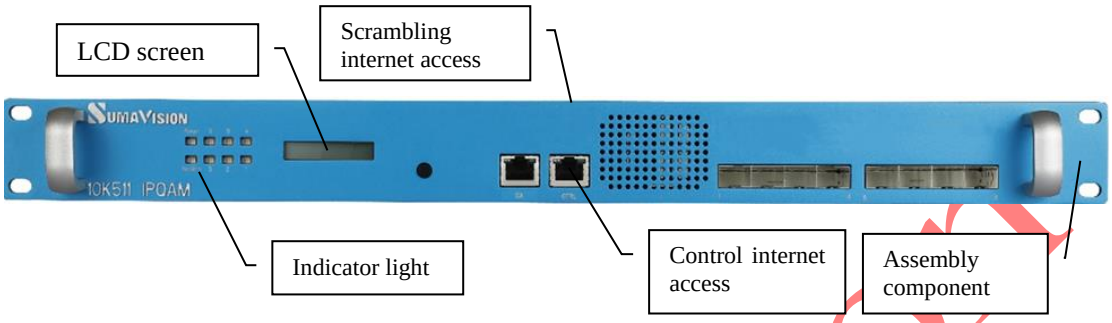


Fig. 2-1 IPQAM modulator Appearance

2.1.1 Description of equipment connector

The front panel of IPQAM modulator 10K511 is provided with 10-gigabit input module interface, gigabit input module interface, status indicator light, LCD screen, key, control network interface, scrambling internet access, ASI monitoring internet access and DTI internet access. Its structure is as shown in FIG. 2-2 and FIG. 2-3.

Fig. 2-2 Front panel

Fig. 2-3 Rear panel

- ✓ Network management control interface, marked as "CTRL"
- ✓ Scrambling control interface, marked as "CA"
- ✓ DTI interface, identified as "DTI"
- ✓ ASI monitoring interface, identified as "ASI"
- ✓ 1~4 and 9~12 internet accesses on the right side are 10-gigabit input module interfaces.
- ✓ 5~8 and 13~16 internet accesses on the right side are gigabit input module interfaces
- ✓ The lower layer of the card slot on the rear panel has "cards 1~3" from left to right, and the upper layer thereof have "cards 4~6" from left to right.
- ✓ From left to right, the RF port of each modulation board card has "RF port 1" and "RF

port 2" respectively.

2.1.2 Instructions to optional configuration

IPQAM 3.3 modulator 10K511 has flexible configuration. There are two types C2Q32 and C3Q16 in accordance with user demands. The two functional characteristics are introduced below.

Model C2Q32:

Totally 4 modulation daughter cards are inserted in the modulator, occupying the left side of the upper and lower layers. Card slots 1, 2, 4 and 5 have eight RF output ports. Each RF output port supports 32 non-temporary frequency outputs.

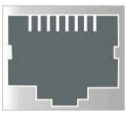
Model C3Q16:

Fully 6 modulation daughter cards are inserted in the modulator. There are 12 RF output ports in total. Each RF output port supports 16 non-temporary frequency outputs.

2.1.3 Network management control interface (CTRL)

The modulator provides the user with an Ethernet interface on the front panel for network master control. The interface type is RJ45, and various parameters are listed in Table 2-1 Ethernet interface connector parameters.

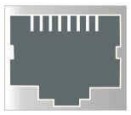
Table 2-1 Ethernet interface connector parameters

Electrical characteristics	Maximum current	2 amps	Its appearances can be shown as the figure below: 
	Insulation resistance	5000 megohms	
	Signal pin DC resistance	30 milli-ohms @100 mA	
	Metal shell shielding force	Min. 20dB (20-200MHz)	
	Applicable ambient temperature	-50～+105 ℃	
Material characteristics	Signal pin contact surface plating	Metal shell, tin-plated	
	Filler	UL90V-0 retardant thermoplastic	
Mechanical characteristics	Durability	750 times	
	Insertion/pullout force	Max. 5 lbs	

2.1.4 CA scrambling interface (CA)

The module provides two Ethernet interfaces for the user on the front panel for CA scrambling. The interface type is RJ45, and its various parameters are as shown in Table 2-2 Ethernet interface connector parameters.

Table 2-2 Ethernet interface connector parameters

Electrical characteristics	Maximum current	2 amps	Its appearances can be shown as the figure below: 
	Insulation resistance	5000 megohms	
	Signal pin DC resistance	30 milli-ohms @100 mA	
	Metal shell shielding force	Min. 20dB (20-200MHz)	
	Applicable ambient temperature	-50～+105 ℃	
Material characteristics	Signal pin contact surface plating	Metal shell, tin-plated	
	Filler	UL90V-0 retardant thermoplastic	
Mechanical characteristics	Durability	750 times	
	Insertion/pullout force	Max. 5 lbs	

2.1.5 10-gigabit Ethernet interface (10GbE)

The front panel of the modulator provides 10-gigabit Ethernet module interfaces 1~4, 9~12. After the 10-gigabit optical module is plugged in, such interfaces can receive 10-gigabit input. It is recommended to use the Cisco 10-gigabit optical port module.

Wherein, different parameters are shown in Table 2-3 Parameters of 10-gigabit Ethernet interface connector.

Table 2-3 Parameters of 10-gigabit Ethernet interface connector

Interface connector	SFP	The appearance diagram is shown as follows: 
Interface	10GBASE-LR 10G Ethernet	
Interface protocol	Conforming to SFF-8431, SFF-8432, IEEE 802.3ae, 10GBASE-LR/LW and 1200-SM-LL-L protocol of 10G fiber channel	
Interface rate	10Gbps full duplex / 1Gbps full duplex	

2.1.6 Gigabit Ethernet interface (GbE)

Each modulation card on the modulator provides gigabit module interfaces 5~8 and 13~16 for data input for connecting optical port or electrical port module. It is recommended to use Cisco gigabit electrical port module.

Wherein, different parameters are shown in Table 2-4 Parameters of GbE interface connector.

Table 2-4 Parameters of GbE interface connector

Interface connector	SFP	The appearance diagram is shown as follows:
Interface	1000Base-T/1000Base-X	

Interface protocol	In accordance with IEEE 802.3z (optical interface) or IEEE 802.3ab standard (electrical interface)	
Interface rate	1000M self-adaptation	

2.1.7 RF output interface (RF)

Each modulation daughter card on the modulator provides two RF output interfaces. There are eight (or 12) RF output interfaces in total. The output is the cable TV RF signal in the 45-1000MHz frequency band. The output interface is 75Ω British socket of type F. The electrical characteristics, material characteristics, mechanical characteristics and appearance drawings of the connector are shown in Table 2-5 Parameters of RF output interface connector.

Table 2-5 Parameters of RF output interface connector

Electrical characteristics	Normal impedance	75Ω	The appearance diagram is shown as follows:
	Frequency range	0-20GHz	
	Rated value of voltage	500 VRMS (maximum at sea level)	
	Voltage withstanding of dielectric	1500 VRMS (minimum at sea level)	
	Voltage standing wave ratio	1.5 (maximum)	
Material Characteristics	Body and metal fittings	Nickel plating	
Mechanical characteristics	Insertion force	Maximum torque 2.5 lbs	
	Pull-out force	Maximum axial tension 3 lbs	
	Nut tension	Minimum 100 lbs	
	Thrust of central needle	Minimum 6 lbs	
	Durability	At least achieve 500 times of drawing	

2.1.8 Power Socket

The modulator provides two power sockets on the rear panel. The device will be powered on if the power lead is inserting the power socket correctly.

The power sockets used by the modulator fully conform to the international industrial standards, for detailed information, refer to Table 2-6 Power Socket Parameters.

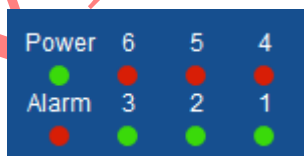
Table 2-6 Power Socket Parameters

GB 1002-1996	Types, basic parameters and dimensions of single-phase plugs and socket-outlets for household and similar purposes	Its appearances can be shown as the figure below: 
GB 2099.1-1996	Plugs and Socket-outlets for Household and Similar Purposes — Part1: General Requirements	

2.1.9 Indicator

Eight indicators are provided on the modulator panel, including:

- Power
- Alarm
- 1
- 2
- 3
- 4
- 5
- 6



After confirming that the device is correctly connected, insert the power cord into the power socket on the rear panel of the device. Turn on the device, if the power light is on, it means that the device has been turned on and possessed conditions for device operation. When the device is in normal operation without any abnormal phenomenon and alarm prompt, the alarm light on the device panel shall be green. In case of alarm for abnormal operation, the alarm light shall be red.

When 1-6 modulation cards of QAM operate normally, the corresponding status lamp is green. Otherwise, it shall be red. When there is no card in the card slot, the corresponding light is not on.

2.2 Heat Emission Descriptions

four exhaust fans are installed on the rear panel of the modulator for reducing temperature rise of the equipment caused by heating various chips inside the equipment during

working in operational process.

2.3 Control Descriptions

SUMAVISION IPQAM 10K511 modulator can achieve the control through Web and SNMP network management system.

Chapter 3 Technical Characteristics

3.1 Main performance parameters

Main functions of modulator are as follows:

- ✓ ITU-T J.83Annex A/B/C international standard, compatible with DVB-C standard;
- ✓ 10GbE Ethernet input to achieve 10GbE data throughput;
- ✓ Supporting ARP, ICMP, IGMP-v3 and other network protocol (possessing active IP filtering characteristics);
- ✓ 10-gigabit interface of main board and gigabit input redundant backup of board card ensures high reliability of data receiving;
- ✓ High integration, single RF port can support output from up to 32 non-adjacent frequencies;
- ✓ The single device can achieve RF signal output from up to 256 frequency points;
- ✓ Supporting up to 256 programs at each frequency point, and dynamically adding and deleting UDP ports;
- ✓ Powerful kernel processing: TS over IP, multiplexing, scrambling, PSI/SI processing, modulation and up conversion;
- ✓ Port level, internet access level and board card level backup mechanism to ensure high reliability of data output;
- ✓ Rich QAM mode: 64, 128, 256;
- ✓ Full frequency agility: 45~1000MHz;
- ✓ Supporting VOD, broadcast, data service and multi-protocol to achieve seamless connection with various types of VOD servers;
- ✓ Supporting HD/SD program transmission;
- ✓ Expanding, upgrading and maintenance can be performed easily with modular plug-in design;
- ✓ Supporting hot plugging and convenient for maintenance;
- ✓ Double power supply backup to ensure device operation;
- ✓ Powerful background configuration function and network management monitoring system to ensure high stability of device operation;
- ✓ Excellent RF indicator ensures high reliability and scalability of next-generation network;
- ✓ Providing WEB network management for intuitive and convenient operation;
- ✓ Centralizing SNMP network management system can realize remote or local all-weather network monitoring;

- ✓ Remote online upgrade function ensures good expansibility.

The output level follows the formula 122-3*log2 (burst point), and models C2Q32 and C3Q16 are respectively shown in Table 3-1 and Table 3-2:

Table 3-1 C2Q32 output level (Note: there is slight difference among levels in case of different cards)

Number of used frequency points	Single frequency point (dbuv)	Interface output (dbuv)
1	122	122
4	116	122
8	113	122
12	111	122
16	110	122

Table 3-2 C3Q16 output level (Note: there is slight difference among levels in case of different cards)

Number of used frequency points	Single frequency point (dbuv)	Interface output (dbuv)
1	122	122
4	116	122
8	113	122
12	111	122
16	110	122
24	108	122
32	107	122

Chapter 4 Dimension and Weight

4.1 Dimensions

IPQAM 10K511 modulator external structure is shown as Table 4-1 IPQAM modulator Physical Parameters.

Table 4-1 IPQAM modulator Physical Parameters

Physical Parameters	Value (Unit)
Height	44.4mm (1U)
Width	482.6mm (19")
Depth	363.7mm

4.2 Weight

The device weights <10kg, and its specific quality is related to the configurations of the device. Please be subject to the device purchased.

Chapter 5 Installation and Debugging

5.1 Unpacking and Checking

Please check whether the package of the device is damaged or not when receiving the device; in case of device's damage, please contact the carrier company or the After-sales Technical Support Department of Sumavision in a timely manner.

If you complete the installation and debugging of the device by yourself, please pay attention to the deformation of device and abnormal sound inside the device when unpacking the device; check whether the device model and name are in conformity with those specified in the contract; whether the serial number of device is identical to that in the *Delivery and Maintenance Certificate of Device*; and whether the power lead, connectors and fittings, operating instructions and Certificate of Fitness are completely contained in the package case of the device.

If the installation and debugging are conducted by the after-sales technical engineers of Sumavision, they will confirm the above-mentioned information with you.

You are required to sign and return the *Delivery and Maintenance Certificate of Device* to our company after confirming there's no problem upon the unpacking and inspection, and according to which we'll provide high-quality satisfactory after-sales services.

5.2 Installation Precautions

Check whether the environmental requirements in Section 3 of Chapter I have been met.

The device can be powered on for debugging after the installation is completed by following the installation steps.

5.3 Steps and Methods of Installation

The IPQAM modulator needs to be installed and used on a 19-inch cabinet. When installing the device, please open the box first, then take out the device. To ensure the device is installed firmly, please put the device on L bracket after installing L bracket on the cabinet, and fasten the device on the assembly cabinet with screws. Device installation can be shown as Fig. 5-1 Assembly cabinet for IPQAM modulator.

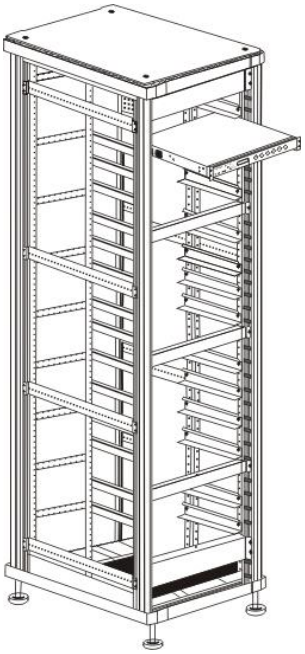


Fig. 5-1 Assembly cabinet for IPQAM modulator

The device can be installed in any plug-in frame of the assembly cabinet. However, the general principle for arranging the location of the device is that the connection between various stand-alone devices should be arranged neatly on the assembly cabinet in accordance with the flow of signal.

5.4 Debugging

Preparations before configuration:

- The device should be stably fixed on the cabinet, and the operation environment is normal.
- The device should be connected to the ground very well.
- Check whether input signals are correctly connected.
- The device has been connected to the power supply correctly.
- If network management is needed to control devices, please connect the device with the computer.

Device power-on inspection:

- Indicators of the device display normal.
- Device keys can respond normally.
- The fans of the device can operate normally without harsh noise.
- No abnormal sounds and offensive smell.

5.5 Debugging and inspection methods

IPQAM modulator 10K511 provides the user with setting menu through the web page. The user can set the parameters of the device, so that the device can meet the needs of the user.

- ✓ Platform

  By querying this page, you can learn the current device operation information and alarm information.

- ✓ Monitoring

  You can view the detailed operation information of each daughter card and each network port.

- ✓ Card

  Set parameters of daughter card and internet access.

- ✓ Multiplexing

  In broadcast mode, programs are multiplexed.

- ✓ Scrambling

  Configure scrambling parameters.

- ✓ Global

  Set output parameters, backup and monitoring parameters in batch.

Chapter 6 Method of application

As an indispensable part of the digital TV system, the modulator is in the mouthpiece position of the system. With high stability and reliability, IPQAM of SUMAVISION supports the user to configure the modulator intuitively and conveniently through the WEB interface and IPQAM network management system.

6.1 Instructions to optional board card

IPQAM modulator 10K511 has flexible configuration. There are two types C2Q32 and C3Q16 in accordance with user demands.

The distinction is shown in Table 6-1 Distinction in Device Model and Configuration.

Table 6-1 Distinction in Device Model and Configuration

Device Model	Quantity of RF output interface	Output burst point of single RF port	Maximum output burst point
C2Q32	8	32	256
C3Q16	12	16	192

6.2 Operating instruction to WEB network management

IPQAM provides a powerful, simple and user-friendly WEB operation interface. IPQAM modulator parameters can be easily configured through WEB to ensure stable operation of the modulator. WEB operation interface mainly comprises six major items: [Monitoring], [Card], [Multiplexing], [Scrambling], [Global] and [Platform].

For different models, input and output ports are slightly different in quantities, but similar in functions. C3Q16 is taken as the example for describing the function and operation method of IPQAM modulator below.

6.2.1 WEB menu name and instruction

Browser requirement

==========

⚠Please use the required browser version and operation system, the specific requirements are as follows:

Operation system	Browser version	Screen resolution
Windows 7/Windows 10	Chrome 54 and superior version	1024*768 and above

==========

Login of WEB

Open the browser and input device IP address in the address bar (viewable via the LCD) with default IP 192.168.1.100, and then press Enter. At this time, the login page will appear, such as shown in Fig. 6-1. After selecting a language, it is required to enter the account number and password. Afterwards, you can enter device WEB network management interface.

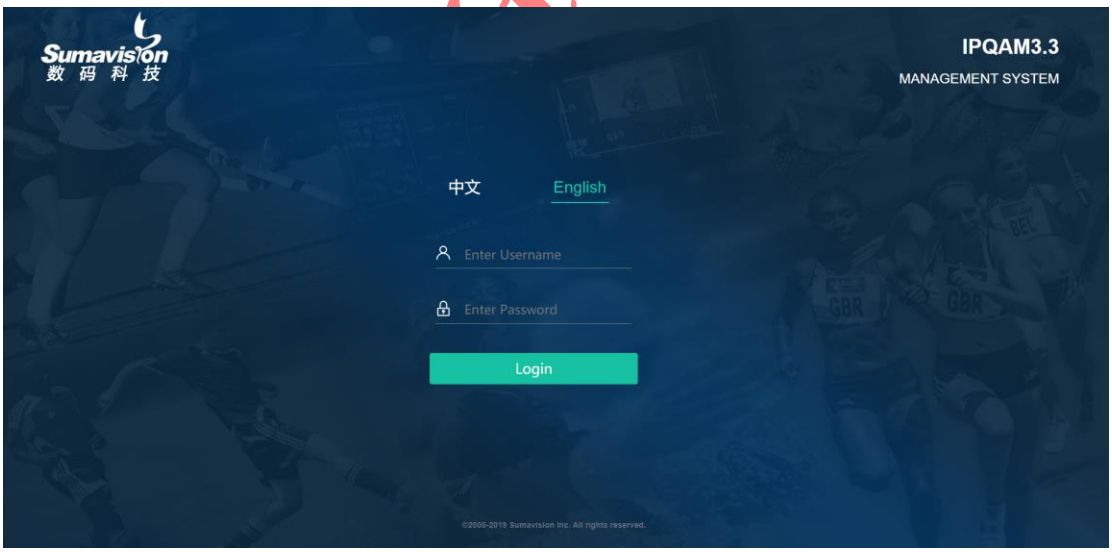


Fig. 6-1 Webmaster login page

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⚠Default user name at delivery:Admin Password: sumavisionrd

Description of WEB interface

WEB network management setting interface of IPQAM modulator is mainly divided into the areas in the figure below:

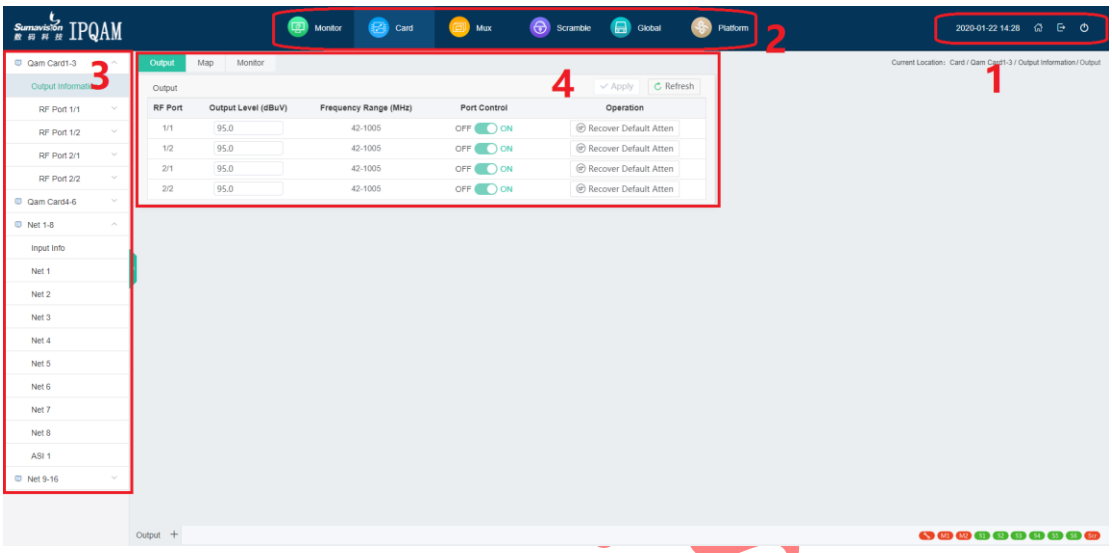


Fig. 6-2 Illustration diagram for WEB network management interface of IPQAM modulator

1. Go back to the homepage, log out the user and restart the function;
2. Function option of IPQAM modulator;
3. Tree list of RF output port and network port;
4. Status and parameter setting area.

Platform

After entering WEB network management interface of the device normally, you can directly enter the [Platform] - [Summary] page, as shown in Fig. 6-3. It is mainly used for inquiring device details, setting control internet access, scrambling internet access, clock synchronization, viewing alarm, viewing log, and also providing functions such as parameter import, export, parameter recovery, factory setting and other functions.

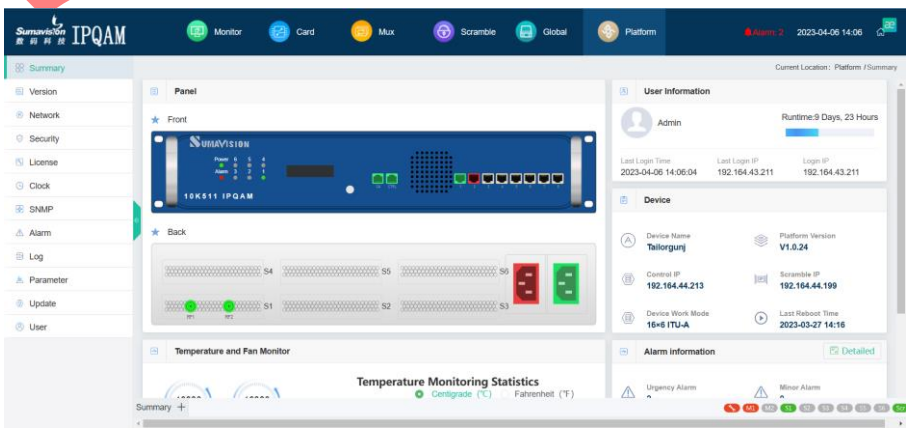


Fig. 6-3 Platform page

Monitoring

In [Monitoring], you can view frequency point information, mapping table information and internet access information.

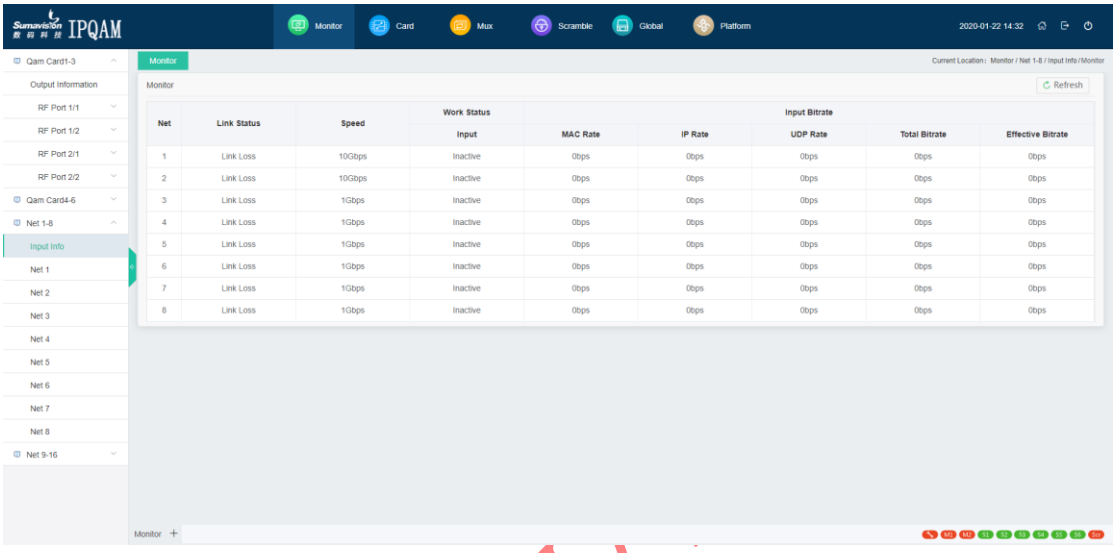


Fig. 6-4 Monitoring page

Card

In [Card] page, you can set frequency point parameter, mapping table parameter and internet access parameter.

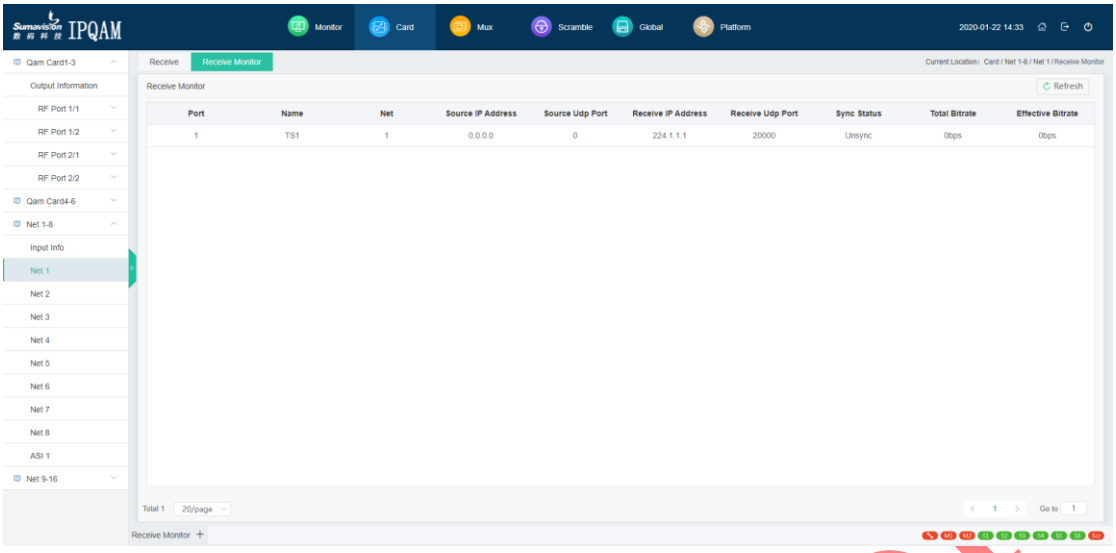


Fig. 6-5 Card page

Multiplexing

The [Multiplexing] page is used for multiplexing and setting table searching parameter for programs. The left side of multiplexing is for input. Search table at the receiving port of the internet access and multiplex it to the output frequency point set at the right side.

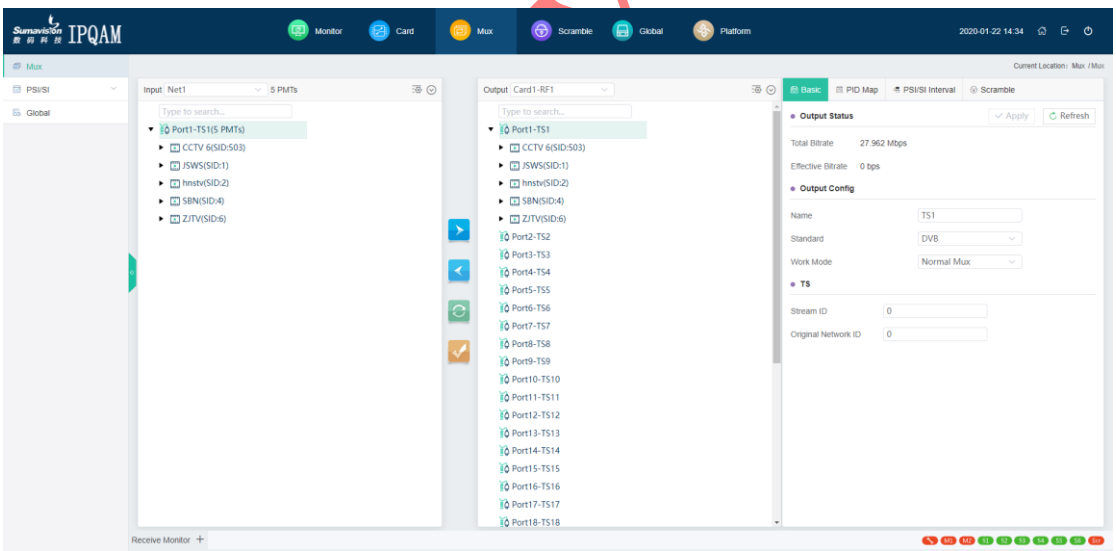


Fig. 6-6 Multiplexing page

Scrambling

[Scrambling] The page is used for configuring scrambling parameters, such as CAS, EMM, CA, ECM cycle.

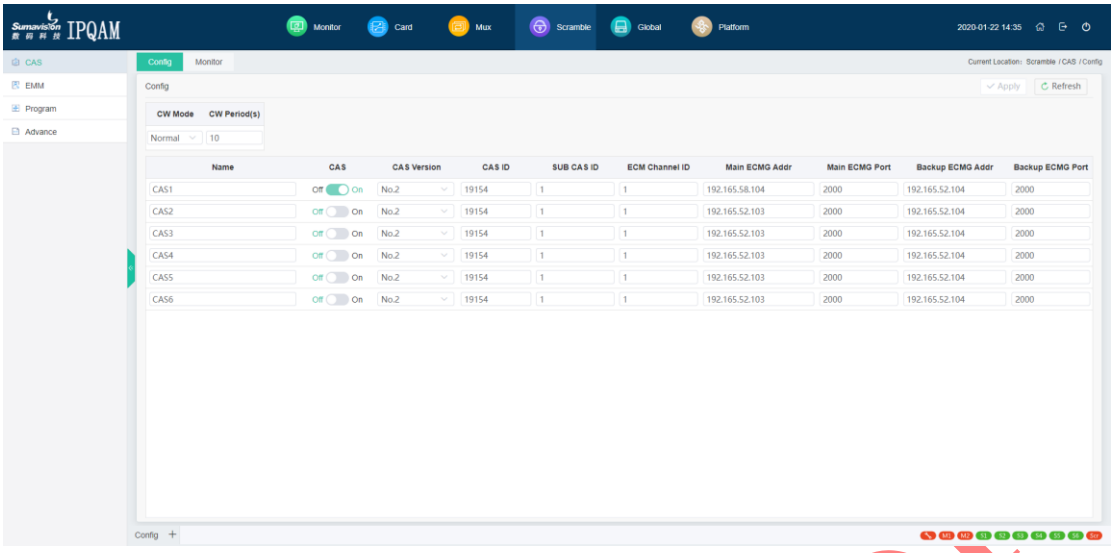


Fig. 6-7 Scrambling page

Global

The [Global] page is used for configuring frequency points in batches, configuring UDP ports in batches, device backup, ASI monitoring, TS monitoring, ERM[1] and card restart.

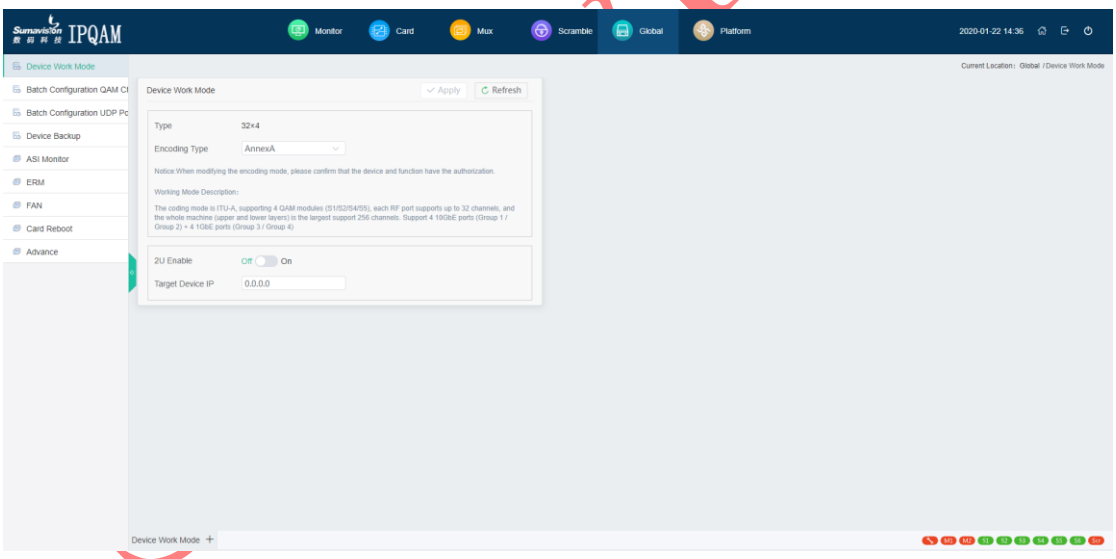


Fig. 6-8 Global page

6.2.2 Internet access input setting

IPQAM modulator can receive the program stream through 10-gigabit inputs and gigabit inputs on the front panel of the device, and modulate and output the program stream

[1] ERM is used for a special project and is not a commonly used function

through the configured modulation card. The step for receiving the code stream is described below.

Network parameter configuration

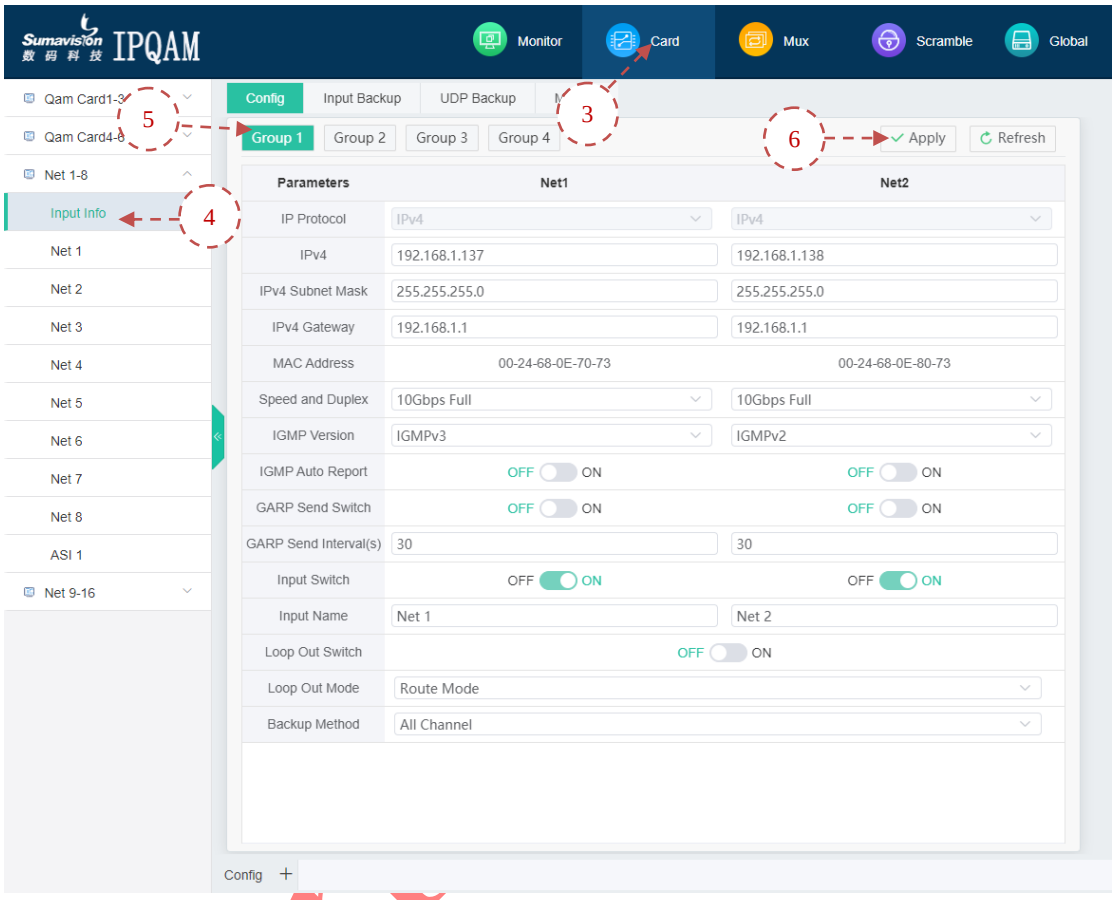


Fig. 6-9 Set network parameters

Step 1: Insert the 10-gigabit optical module or gigabit module into the front panel 10GbE-1 of the device;

Step 2: Optical module and front-end device of 10-gigabit optical fiber connection device (10 -gigabit switch, etc.) interface;

Step 3: Log in the WEB network management of the device and click [Card];

Step 4: Click [Enter Information] in the tree structure on the left side of the page;

Step 5: Select [Configure] - [Group 1];

Step 6: According to the network planning, modify the network parameters of 10-gigabit input channel 1 and channel 2, click [Apply] on the page, the parameter setting will take effect. When the display status in the speed status is [10Gbps Full Duplex], it indicates that the connection is normal.

Table 6-2 10-gigabit input network parameter list

Parameter	Range	Default

IP Protocol	Inalterable	IPv4
IPv4	Unicast IP address	192.168.1.137
IPv4 subnet mask	Mask address of legal subnet	255.255.255.0
IPv4 gateway	Unicast IP does not include 127.XXX.XXX.XXX It must in same network segment with IP of the internet access	192.168.1.1
MAC address	Inalterable	
Speed and duplex	10Gbps full/ 1Gbps full	1Gbps full
IGMP version	IGMPv2 / IGMPv3	IGMPv2
IGMP auto report	Off/on	Off
GARP send switch	Off/on	Off
GARP sendinterval (s)	0~65535	30
Input switch	Off/on	On
Input name	1~31 characters	Net 1
Loop out switch	Off/on	Off
Loop Out Mode	Route Mode/Appoint IP Mode/Appoint MAC Mode	Route Mode
IP address	Legal IP address	0.0.0.0
MAC address	Legal MAC address	00-00-00-00-00-00
Backup method	All channel / 1+1	All channel

Input information query

After setting the input internet access parameters, click [x10GbE Input Information] at left side of WEB network management [Card Monitoring Information] page to view the input code rate information of the 10-gigabit channel. After confirming that the 10-gigabit input receives the code stream of the front-end device, each card can be configured to modulate the 10-gigabit input for output.

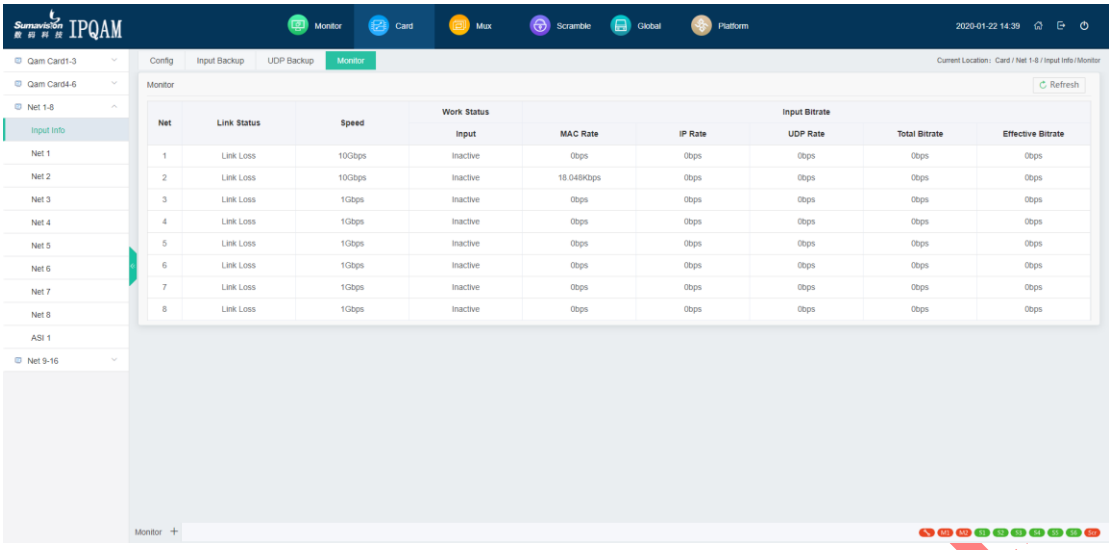


Fig. 6-10 Input code rate information

Input network port backup setting

Input network port backup refers to that each set of input on the front panel of the device can achieve network port backup. In case of abnormal transmission of the main channel, the device uses the input of the standby channel to ensure the stability of device output.

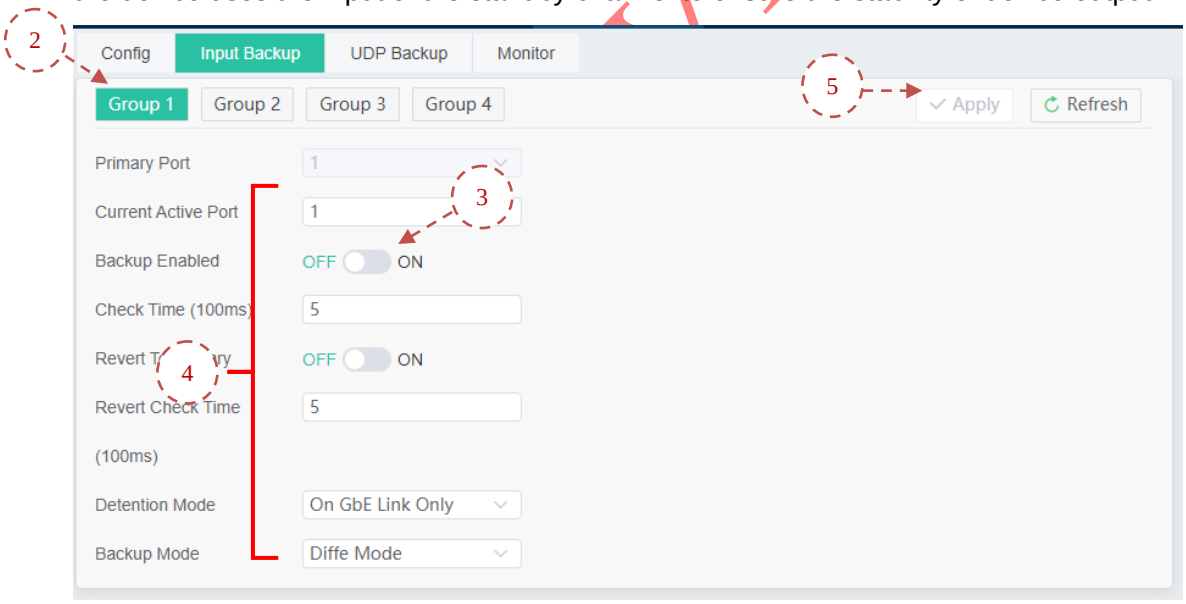


Fig. 6-11 10-gigabit input backup setting

Step 1: Open [1+1 Backup] on the [Configuration] page;

Step 2: In the [Input Backup] page, open the page with backup to be set, such as [Group 1];

Step 3: Open [Backup Enable];

Step 4: Set [Switching Condition] and [Backup Mode] as required and set [Failback Main Channel Enable] as on, and then set [Switching Time] and [Failback Time];

Step 5: Click [Apply] to take effect.

Table 6-3 Input internet access backup parameter list

Parameter	Range	Default
Primary Port	1/2	1
Current Active Port	1/2	1
Backup Enable	Off/on	Off
Check Time (100ms)	0~65535	5
Revert to Primary	Off/on	Off
Revert Check Time (100ms)	0~65535	5
Detention Mode	On GbE Link Only/ On GbE Input System Rate/On GbE Input Valid Rate	On GbE Link Only
Minimum Rate(Kbps)	0~10000000	0
Maximum Rate(Kbps)	0~10000000	0
Backup Mode	Diffe mode / same mode	Diffe mode

UDP backup of input internet access

The two 10-gigabit inputs on the front panel of the device can realize the program flow where the second 10-gigabit port loops out the first channel of input, thereby achieving input monitoring, the specific setting is as follows.

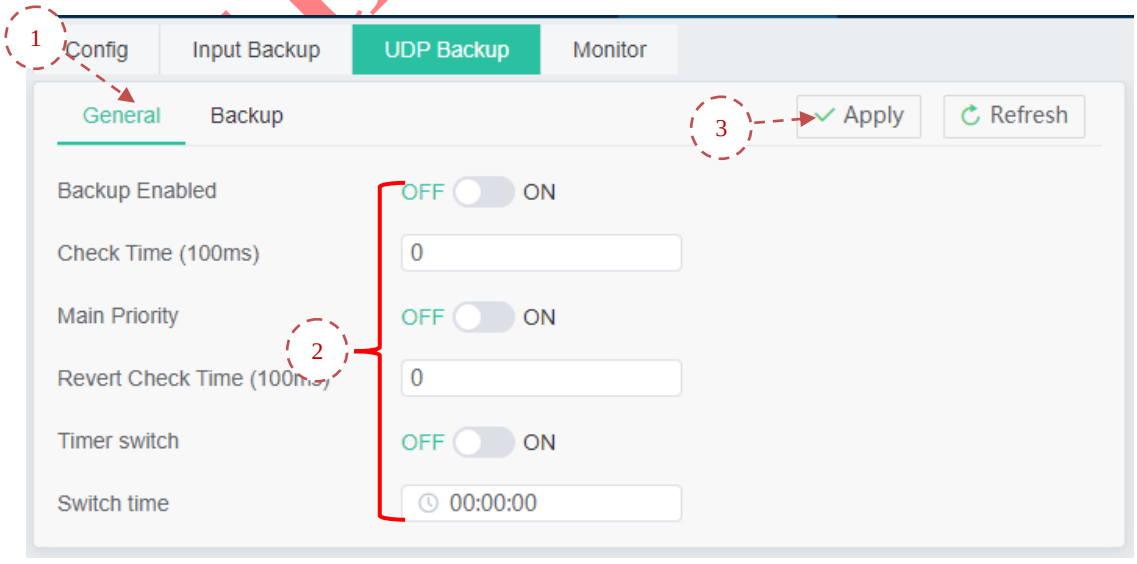


Fig. 6-12 10-gigabit input backup setting

Step 1: Enter [UDP Backup] - [General] page;

Step 2: Open [Backup Enable] and [Main Path Priority Enable], and set [Switching Time] and [Failback Time] as required;

Step 3: Click [Apply] to take effect.

Table 6-4 Input backup parameter list of internet access UDP

Parameter	Range	Default
Backup enable	Off/on	Off
Check time (100ms)	0~1000	0
Main Priority	Off/on	Off
Revert Check time (100ms)	0~1000	0
Timer switch	Off/on	Off
Switch time	xx: xx: xx	00:00:00

6.2.3 Operation of VOD mode

When the device is used for VOD mode modulation output, it is required to set the output parameters, RF port parameters, debugging output frequency point parameters and mapping table parameters in turn.

Set output parameters

Set the modulation output level, frequency range and port switch of RF port.

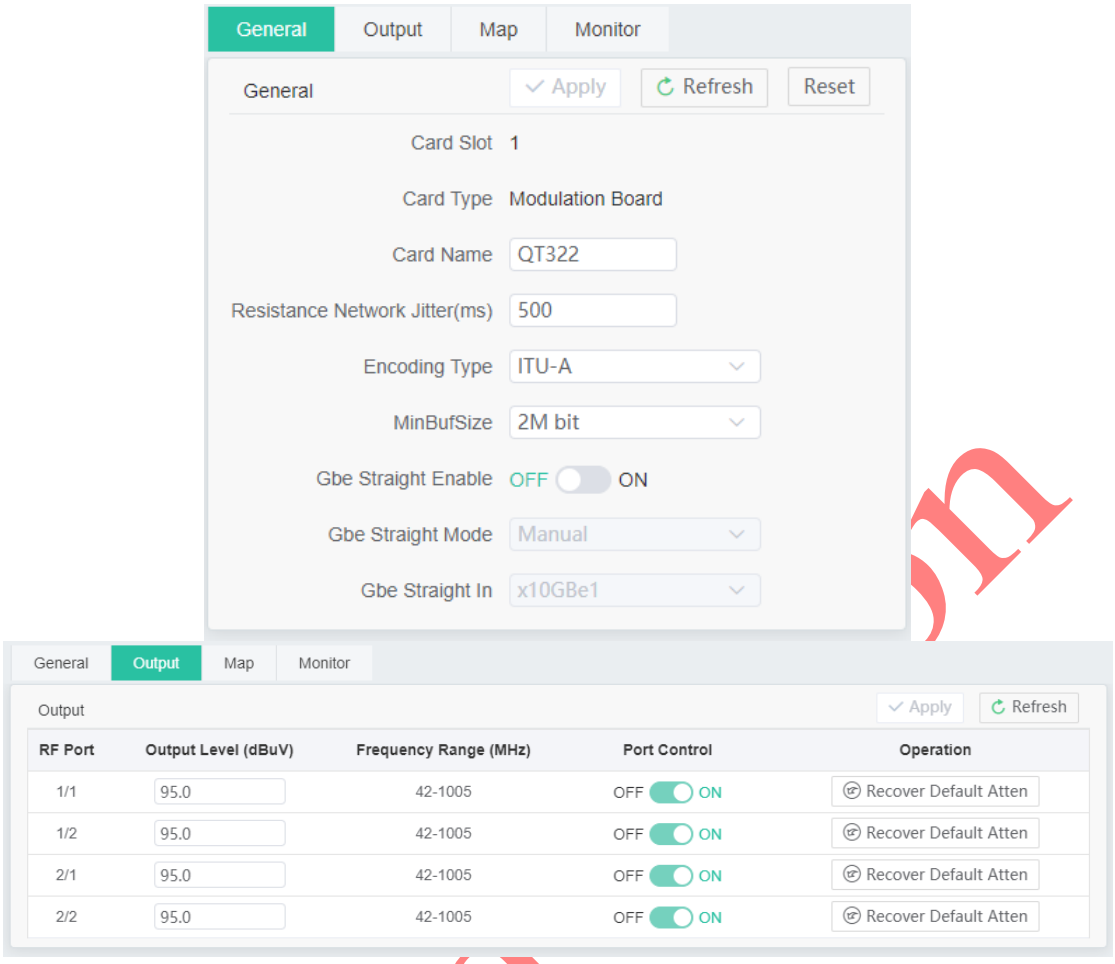


Fig. 6-13 Output parameter

Step 1: Enter the [General] page, set and apply the output parameters as required;

Step 2: Enter the [Output] page, set the [Output Level], and click [Apply] to take effect.

Table 6-5 RF port parameter list

Parameter	Range	Default
Card Slot	Inalterable	1
Card Type	Inalterable	Modulation Card
Card Name	1~31 characters	QT322
Resistance Network jitter(ms)	1~1000	500
Encoding Type	ITU-A/ITU-B/ITU-C	ITU-A
MinBufSize	2M bit/4M bit/8M bit	2M bit
Gbe Straight Enable	On/off	Off
Gbe Straight mode	Manual/ Auto	Manual
Gbe Straight In	None / x10Gbe1~8	x10Gbe1
Output level (dBuV)	95~122	95
Frequency range (MHz)	Inalterable	42~1005
Port Control	Off/on	On

Set modulation output frequency point parameter

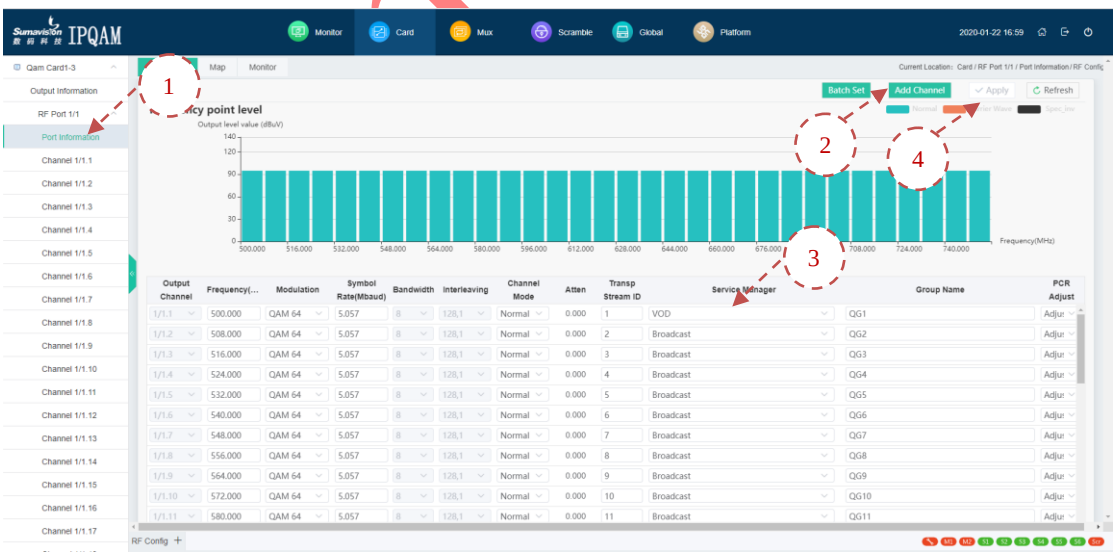


Fig. 6-14 Frequency point adding and batch adding

Step 1: Click corresponding RF port and enter [Port Information] page;

Step 2: Click [Add Frequency Point] or [Batch Setting] as required;

Step 3: Set the output frequency point parameters: Frequency value, modulation mode, symbol rate, frequency point mode, transport stream ID, service management, group

name, PCR adjustment, SDV, dynamic UDP start value;

Step 4: Click [Apply] to take the parameter effective.

Table 6-6 Add frequency point parameter list

Parameter	Range	Default
Frequency (MHz)	42~1005	500
Modulation	QAM 64/QAM 128/QAM 256	QAM64
Symbol rate (Mbaud)	3.5~7	6.875
Bandwidth	8/6	8
Interleaving	128,1/128,2/64,2/128,3/32,4/128,4/16,8/128,5/8,16/128,6/128,7/128,8/	128,1
Channel mode	Mute/Normal/Carrier Wave/Delete/Spec_inv	Normal
Atten	0~6	0
Transport stream ID	0~65535	0
Service management	VOD/Broadcast	VOD
Group name	1~31 characters	QG0
PCR Adjust	Adjust/Bypass/Rebuild	Adjust

Description about batch adding of frequency point:

When many frequency points are added and the frequency point increases regularly, it is recommended to use the batch adding function, set the start value of different items and increment information of each frequency point, set the start and end frequency points, and click Set after applying the rules. Namely, multiple frequency points can be added at a time.

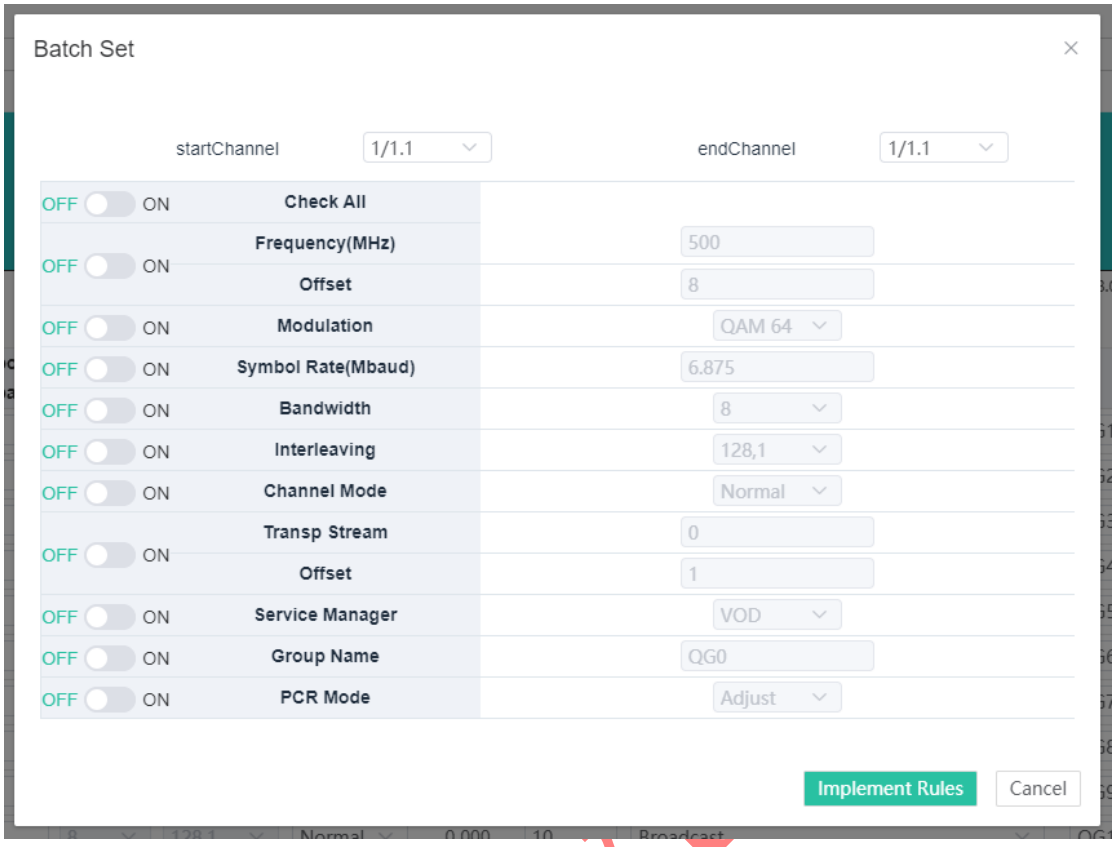


Fig. 6-15 Batch adding of frequency point

Step 1: Check All in the batch rule or check part of the items separately for modification;

Step 2: Set the initial value (frequency, QAM mode, symbol rate) of the frequency point to be added in batches in the batch rule in the frequency point adding page. Select VOD for QAM management and normal frequency point mode;

Step 3: Set the frequency increment in the batch rule of frequency adding page;

Step 4: Set the start frequency point and end frequency point in the batch rule of frequency point adding page (for different modulation cards, different maximum frequency points can be added);

Step 5: Click [Apply Rule] to make the rule effective;

Step 6: Click [Set] on the page to take frequency point adding effective.

Table 6-7 Parameter list of batch adding of frequency point

Parameter	Range	Default
Frequency	42~1005Mhz	500
Offset	As long the end value doesn't exceed 1005Mhz.	8
Modulation	QAM 64/QAM 128/QAM 256	QAM 64
Symbol rate	3.5~7	6.875
Bandwidth	Cannot be set, determined by output page [Encode Mode]	
Interleaving	Cannot be set, determined by output page [Encode Mode]	
Channel mode	Mute/Normal/Carrier Wave/Delete/Spec_inv	Normal
Transport stream	0~65535	0
offset	As long as the end value doesn't exceed 65535	1
Service management	VOD/Broadcast	VOD
Group Name	Legal Group name	QG0
PCR Adjust	Adjust/Bypass/Rebuild	Adjust
Start Channel	1.1~1.n	1.1
End Channel	1.1~1.n	1.1

Set mapping table parameter

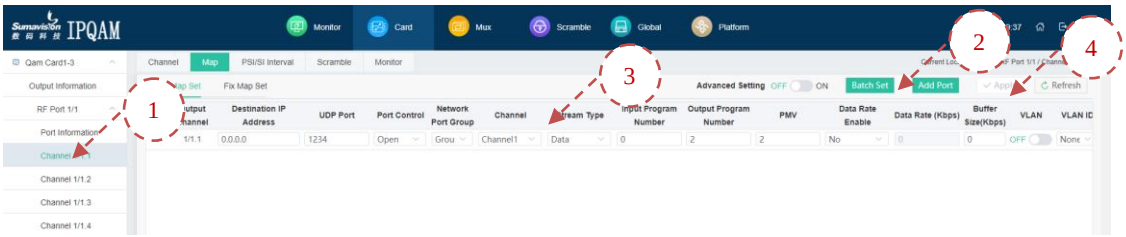


Fig. 6-16 Port point adding and batch adding

Step 1: Enter [mapping table] page;

Step 2: [Add Port] or [Batch Setting] as required;

Step 3: Set the port receiving parameters (destination IP address, UDP port, etc.) according to the front-end code stream sending value;

Step 4: Click [Apply] on the page to take the parameter settings effective.

Table 6-8 Parameter list of mapping table

Parameter	Range	Default
Destination IP address	Legal IP address	0.0.0.0
UDP port	1~65535	49156
Port Control	Mute/Open/delete	Mute
Network port group	Group 1~ Group 8	Group 1
Channel	Channel 1 / Channel 2	Channel 1
Stream Type	Normal/DataP/DataR/Data	Normal
Input program Number	0~65535	0
Output program Number	0~65535	n
PMV	0~510	0
Data rate enable	Yes/no	No
Data Rate	0~200000kbps	0
Buffer Size	0~200000kbps	0

Description of random addition of mapping table in batch:

When more ports are added and port increases regularly, it is recommended to use Batch Adding for the port. Fill in the start values of different items for the port, the increment of each line and the increment among different frequency points, set the information of start frequency point, end frequency point, start line and end line, and click [Set] after applying the rules to add multiple ports at a time.

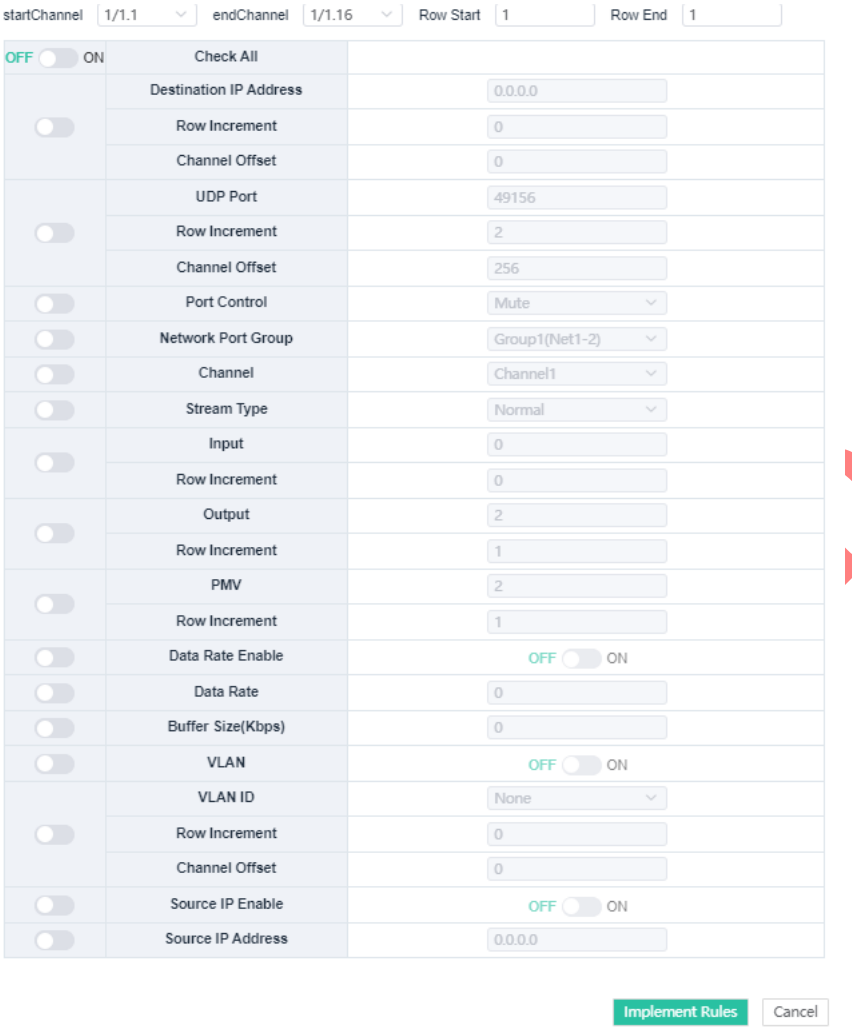


Fig. 6-17 Batch setting of mapping table

Table 6-9 Add Parameter List in Mapping Table

Parameter	Range	Default
Destination IP address	Legal IP address	0.0.0.0
UDP port	1~65535	49156
Port Control	Mute/Open/delete	Mute
Network port group	Group 1~ Group 8	Group 1
Channel	Channel 1 / Channel 2	Channel 1
Stream Type	Normal/DataP/DataR/Data	Normal
Input program Number	0~65535	0
Output program Number	0~65535	n
PMV	0~510	0
Data rate enable	Yes/no	No
Data Rate	0~200000kbps	0
Buffer Size	0~200000kbps	0

==========

⚠ 1. Row increment refers to the increment information among ports in the same frequency point. For example, set the destination IP row increment as 0 and UDP port interval as 2. The increment of mapping input program number is 0, the increment of output program number is 1, and PMV increment is 1;

2. Frequency point increment indicates the port increment information among different frequency points. For example, set the destination IP increment as 0 and UDP port increment as 256.

==========

After setting the mapping table parameters, you can enter the [Monitoring] page to view the input and modulation output information of the modulation card. If the parameters are set correctly and the program source is normal, you can see the input information of each port and the modulation output information of each frequency point. At this time, the set-top box can be used to receive the output from modulator and perform decoding so as to view the program subject.

6.2.4 Operation of broadcast mode

To use the broadcast mode of the device, you need to perform the following operations: Set the receiving parameters, frequency point parameters and multiplex programs.

Set the receiving parameters

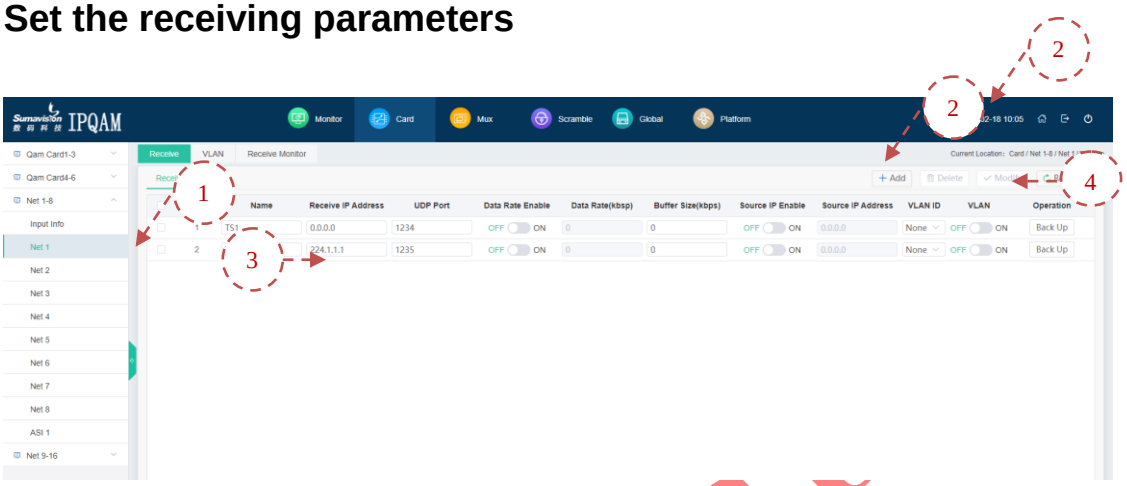


Fig. 6-18 Set the receiving parameters

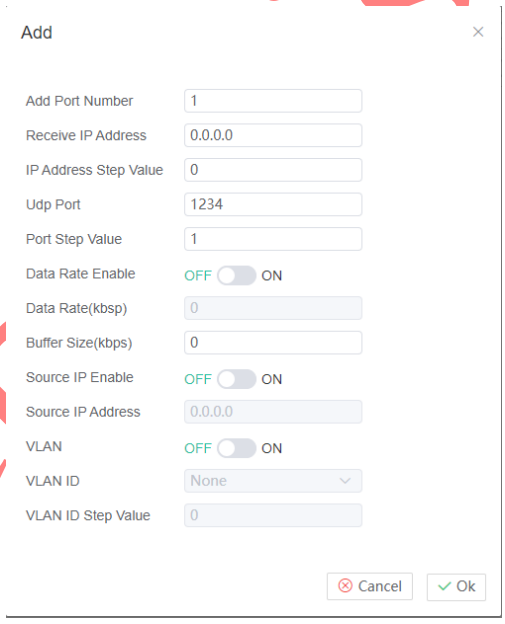


Fig. 6-19 Add page

Step 1: Connect the network cable to the internet access, and enter the [Receive] page of the internet access on the network management.

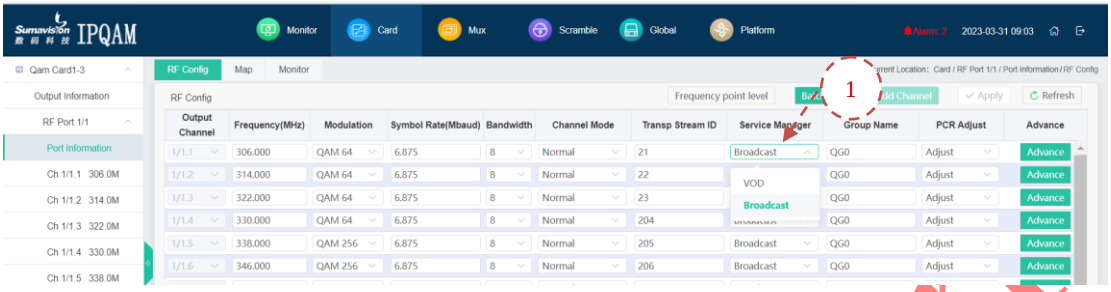
Step 2: Click [Add Port];

Step 3: Set the receiving parameters in the pop-up page;

Step 4: Click [Modify] to take effect. View whether the content is received successfully in the monitoring page.

Set frequency point parameters

Fig. 6-20 Set frequency point parameters



Different from VOD, set [Service Manager] as broadcast.

Set multiplexing parameters

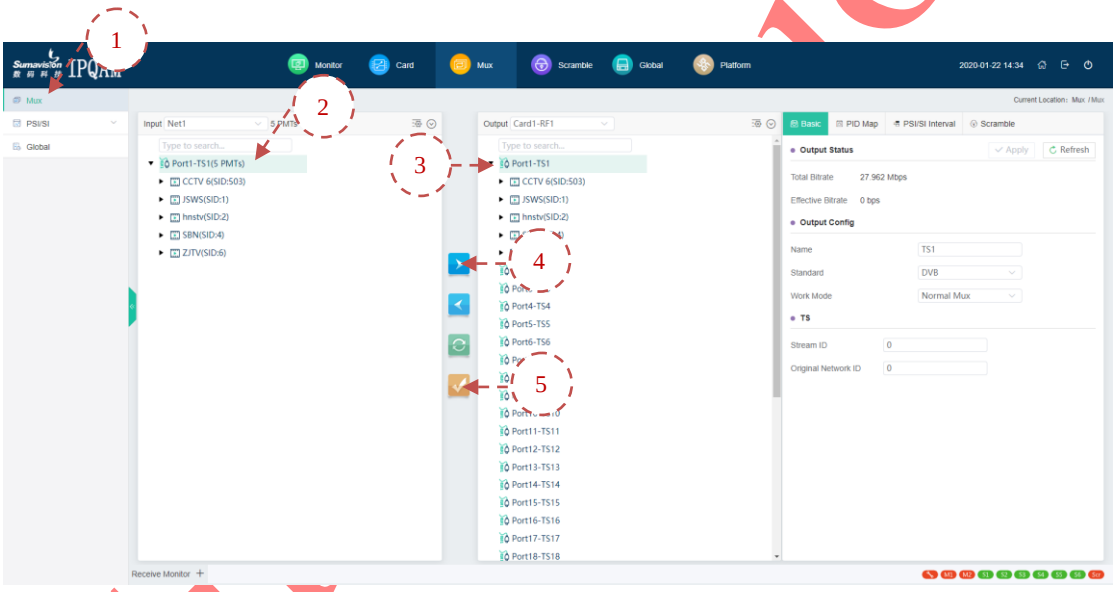


Fig. 6-21 Set multiplexing parameters

Step 1: Enter [Multiplexing] page;

Step 2: Select the desired internet access in the input drop-down menu, perform right-click and click [Refresh] in the pop-up drop-down menu;

Step 3: Click left key to check the output RF port;

Step 4: Click [→] in center of the page with left key;

Step 5: Click [√] in center of the page with left key;

==========

- When multiplexing all programs of the input port to the output port, you can select the input port through click with mouse. Afterwards, click multiplexing for setting;
- When it is beyond the limitation of the output port, the multiplexing operation will be unsuccessful; at most 2,048 programs can be multiplexed.

==========

6.2.5 Backup function operation

The IPQAM device provided by SUMAVISION offers a variety of backup functions, including input internet access backup, UDP port backup and device backup. Together with front-end device produced by SUMAVISION, it can provide high stability and reliability. Various backup function settings provided by the device are introduced in turn

Input network port backup setting of board card

Refer to 6.2.2.

Input UDP port backup setting

Refer to 6.2.2.

Device backup

Device backup refers to two IPQAMs with same configuration can achieve the backup of device grade. If the main device is abnormal, you can switch to the standby device to guarantee the stability of modulation stage input and output.

1.Backup mode: same mode/different mode

The same mode, i.e., the corresponding service port settings of the two devices are identical, and the currently unused device will not respond to any network packets.
The different mode, i.e., the IP of the 10 Gigabit channel of the main and backup devices is not the same, but the others are the same.

2.Backup principle: When the device in use is in the same condition as the selected switching condition, the main device will check the status of the backup device. If the backup device is normal, the main device will turn off its own output and send a message to the backup device, which will open the output.

3. Switching time: The device backup switches instantly, i.e., when an alarm occurs, the switching will be done immediately. Manual switching is also available.

4.Switching back: The device backup does not support automatic switching back; it needs to be manually switched back by the user.

5. Switching conditions: Different groups of conditions can be set at the same time.

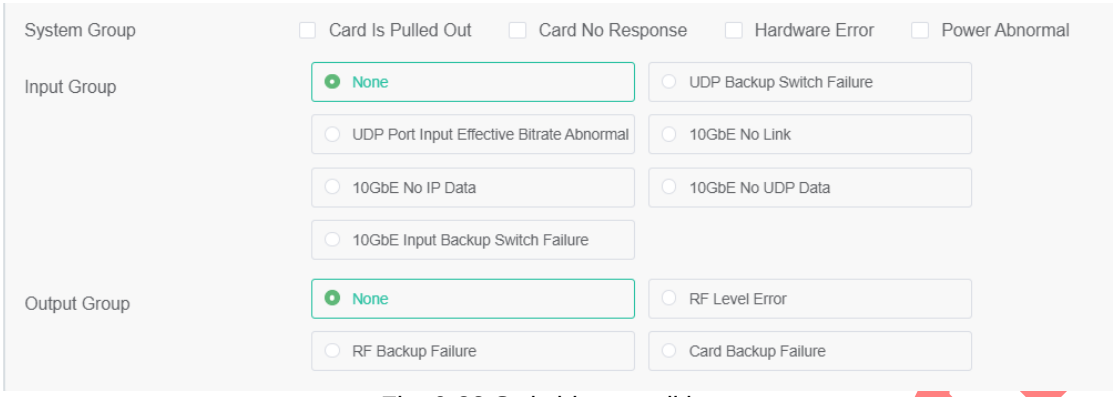


Fig. 6-22 Switching conditions

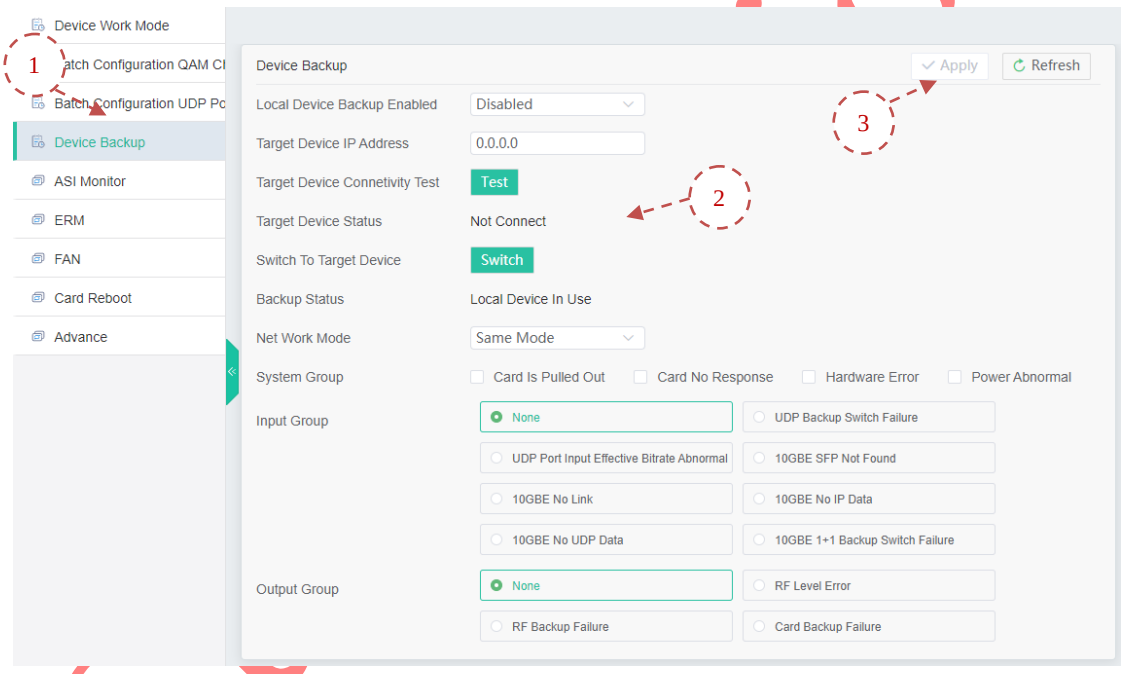


Fig. 6-23 Standby setting of device

6. Switching method

Step 1: Synchronize the parameters of the backup device with the main device via FTP or the parameter import/export function;

Step 2: Enter [Device Standby] page; (Global-- Device Standby)

Step 3: Click to set backup parameter of device: Open [Local Backup Enable] and set main device or backup device as required. Enter IP address of the other device to [IP address of target machine];

Step 4: Click [Apply] to take effect.

If you have set a switching condition, then the device will automatically switch according to the conditions

==========

⚠In device backup, when the main device is used, you can switch to backup device for output. When the main device restores, you will not automatically switch to main device for output. At this time, you should click the toggle button in Device Backup Setting in Fig. 6-23 Standby setting of device.

==========

Table 6-10 Backup parameter list of device

Parameter	Range	Default
Local Device backup enabled	Disabled/Main Device/Backup Device	Disabled
Target device IP address	Legal IP address	0.0.0.0
Net Work mode	Same mode /Diffe mode	Same mode
Input group	None / UDP backup switch failure/ UDP port input effective bitrate abnormal / 10GbE SFP not found/ 10GBE No Link / 10GbE no IP data / 10GbE no UDP data / 10 GBE 1+1 backup switch failure	None
Output group	None / RF level Error/ RF backup failure / Card backup failure	None

Card Backup

Card backup is the mutual backup between QAM cards of the same IPQAM device. When the main card meets the switching conditions, it will be switched to the backup card.

1、 Backup principle: when the switching condition of the in-use Qam card occurs and the alarm condition is selected, the equipment is switched from the main Qam card to the backup Qam card.

2、 Switching time: The card backup is switched immediately, that is, when an alarm occurs, the switching is carried out immediately. Manual switching is also an option.

3、 Revert: The card backup does not support the automatic revert function, and the user needs to perform the manual revert.

4、 Switch condition:

1） System group (multiple choices are allowed): the card is pulled out, the card does not respond, and the hardware is abnormal;

2） Output group (only support single selection): abnormal level, RF backup failure.

5、 Usage:

Manual switching:

1） Configure all the same parameters for the main card and the backup card;

2） On the card backup page, set the main card and the backup card, open the backup enable, and set the switching conditions of the system group and the output group;

3） Click the switch, and the status of the machine is displayed as "Switch to the backup card";

4） Click the revert, and the local machine status is displayed as "No switching".

Automatic switching:

1） Configure all the same parameters for the main card and the backup card;

2） On the card backup page , set the main card and the backup card, open the backup enable, and set the switching conditions of the system group and the output group;

3）When the switching conditions are met, it will be automatically switched, and the status of the machine will be displayed as "Switch to backup card";

4） After the alarm is recovered, click the cutback, and the machine status is displayed as "No switch".

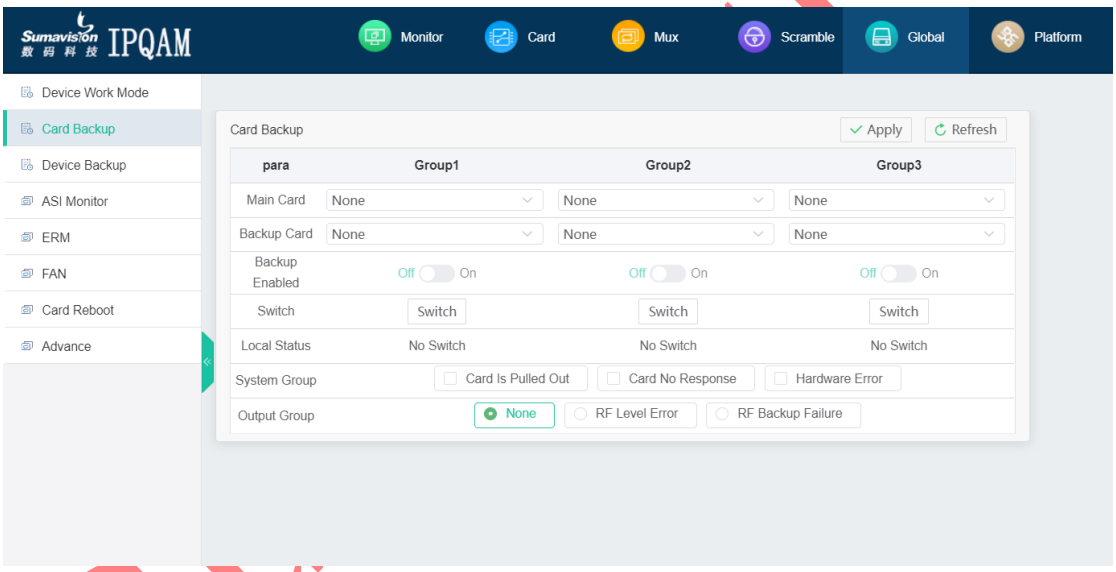


Fig. 6-24 Card Backup

RF Backup

RF backup refers to the backup between RFs within the same card. The two RF ports in the card can be a backup group. One RF port in the group is the main port and the other RF port is the backup port. When the main port meets the switching conditions, it will be switched to the backup port.

1. Backup principle: when the main port meets the switching conditions, the device switches from the main port to the backup port.

2. Switching time: RF backup is immediate switching, that is, switching immediately when

an alarm occurs.

3. Revert: RF backup does not support the automatic revert function and requires the user to perform manual revert.

4. Switching condition: abnormal RF output level (output level differs from the set value by more than 5dBuV) or abnormal hardware (PLL not locked/DAC not locked).

5. Usage:

Manual switching:

1) Configure the same parameters for the two RF ports in the card;

2) On the RF backup page, turn on the backup enable;

3) Click Switch, and the backup status is displayed as "Switch to backup port";

4) Click Revert, and the backup status is displayed as "No Switch".

Automatic switching:

1) Configure the same parameters for the two RF ports in the card;

2) On the RF backup page, turn on the backup enable;

When the switching conditions are met, it will be switched automatically, and the backup status will be displayed as "Switch to backup port";

After the alarm is recovered, click the revert, and the backup status is displayed as "No switching".

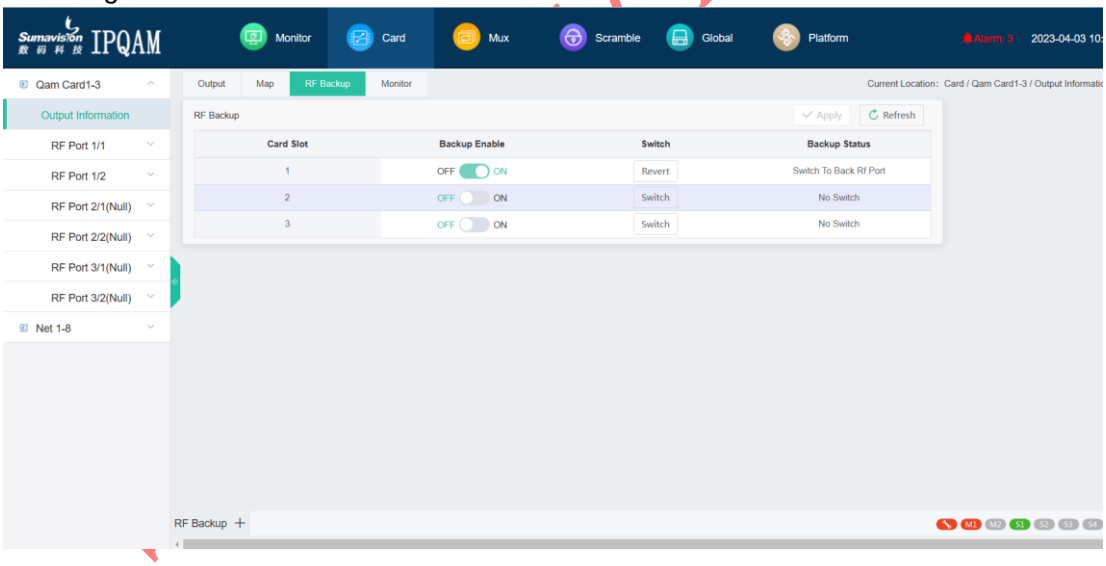


Fig. 6-25 RF Backup

6.2.6 ASI monitoring function operation

The front panel of SUMAVISION's IPQAM equipment provides an ASI monitoring interface. Through the interface, the program flow status of input and modulation output can be monitored conveniently. The functional usage is introduced below.

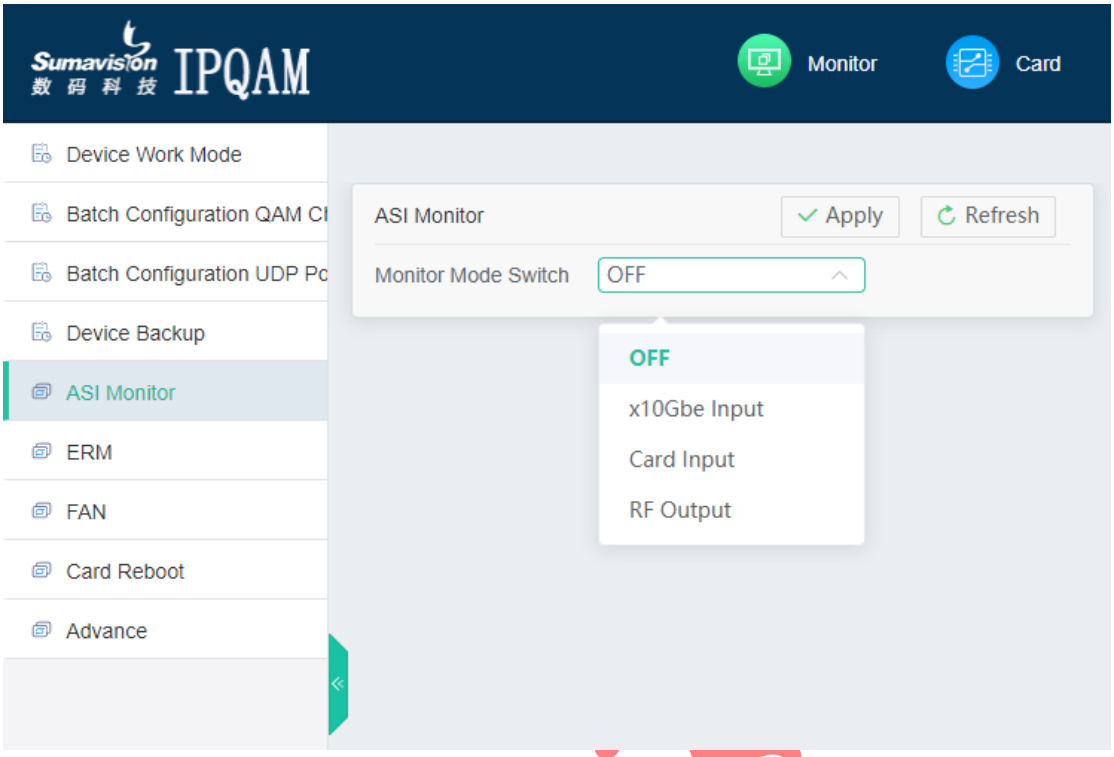


Fig. 6-26 ASI monitoring option

Table 6-11 ASI monitoring parameter list

Parameter	Range	Default
Monitor Mode Switch	Off /x10Gbe Input/ card input / RF output	Off
Card	Card 1 / card 2 / card 3 / card 4 / card 5 / card 6	Card 1
Gbe	10GbE1 / 10GbE2 / 10GbE3 / 10GbE4 / 10GbE5 / 10GbE6 / 10GbE7 / 10GbE8 / 10GbE9 / 10GbE10 / 10GbE11 / 10GbE12 / 10GbE13 / 10GbE14 / 10GbE15 / 10GbE16 /	10GbE1
Destination IP address	Legal IP address	0.0.0.0
UDP port	1~65535	1
RF port	RF port 1 / RF port 2	RF port 1
Channel	1~32	1
Pid detect switch	Off/on	Off
Pid (hex)	0x0~0x1fff	0

Monitoring of input flow

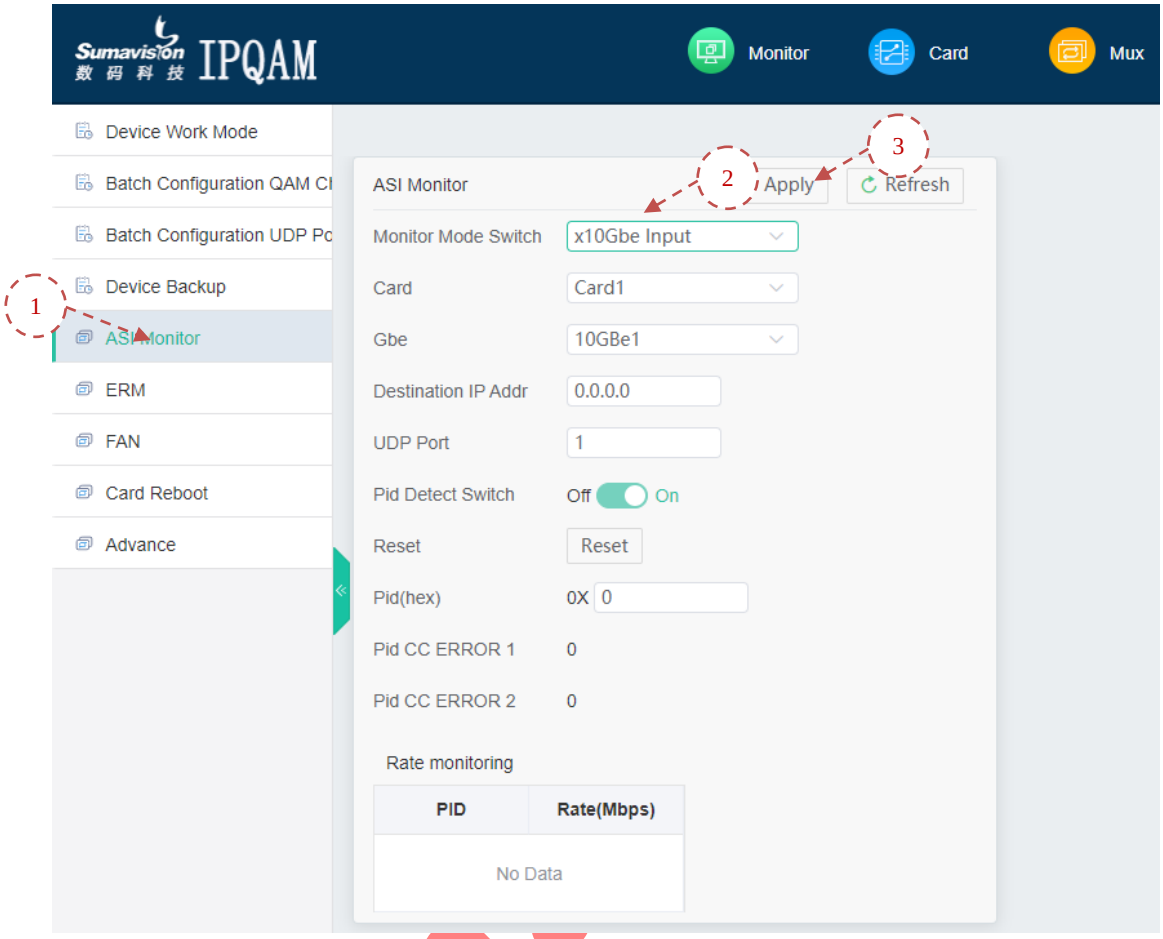


Fig. 6-27 Monitoring of input flow

At first, connect the internet access and transport stream analyzer with the cable from internet access to the NBC interface, and then log in to the network management:

Step 1: Open [ASI Monitoring] page;

Step 2: Set the input to be monitored;

Step 3: Click [Apply] to take effect.

Modulate output stream monitoring

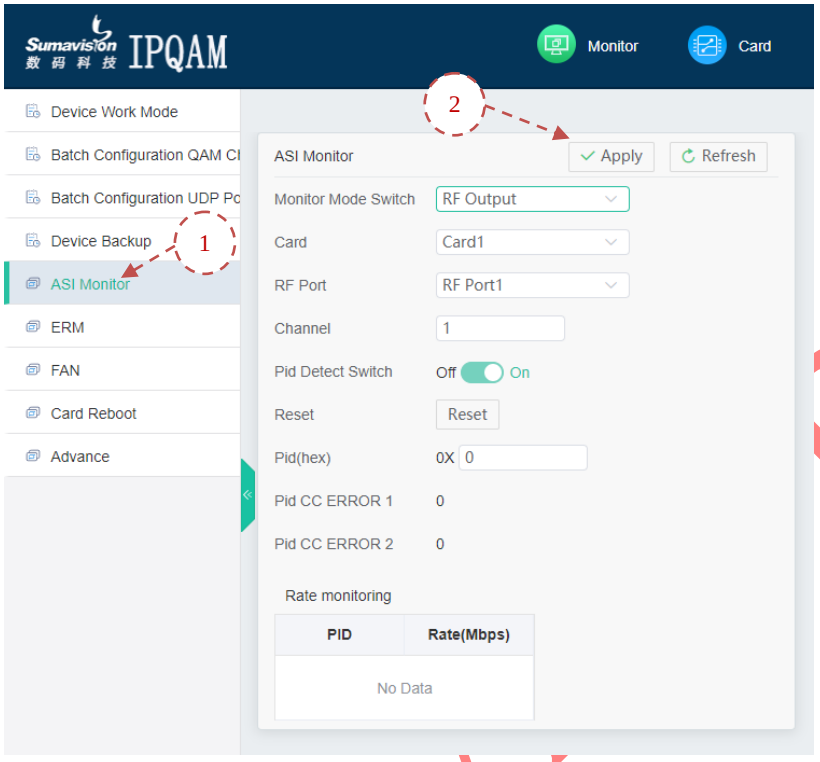


Fig. 6-28 Output stream monitoring

Step 1: Click [ASI Monitoring] in the tree table on the left side of WEB network management, and set RF output to monitor related parameters;

Step 2: Click [Apply] to take effect.

6.2.7 Scrambling setting operation

IPQAM device support of SUMAVISION scramble the input program. Before configuring scrambling, it is required to connect the scrambling internet access (identified as CA) of IPQAM with the scrambling server. IP of the scrambling internet access can be viewed and modified in WEB network management [Platform] - [Network] - [Internet Access 2] page of IPQAM.

Usage of scrambling function is introduced in detail below:

Program scrambling setting

The operation sequence is as follows:

Step 1: Click [Platform] page of WEB network management, click [Network] at left of page, click the subpage of [Internet Access 2], configure scrambling IP as per planning and then click [Apply] for validation;

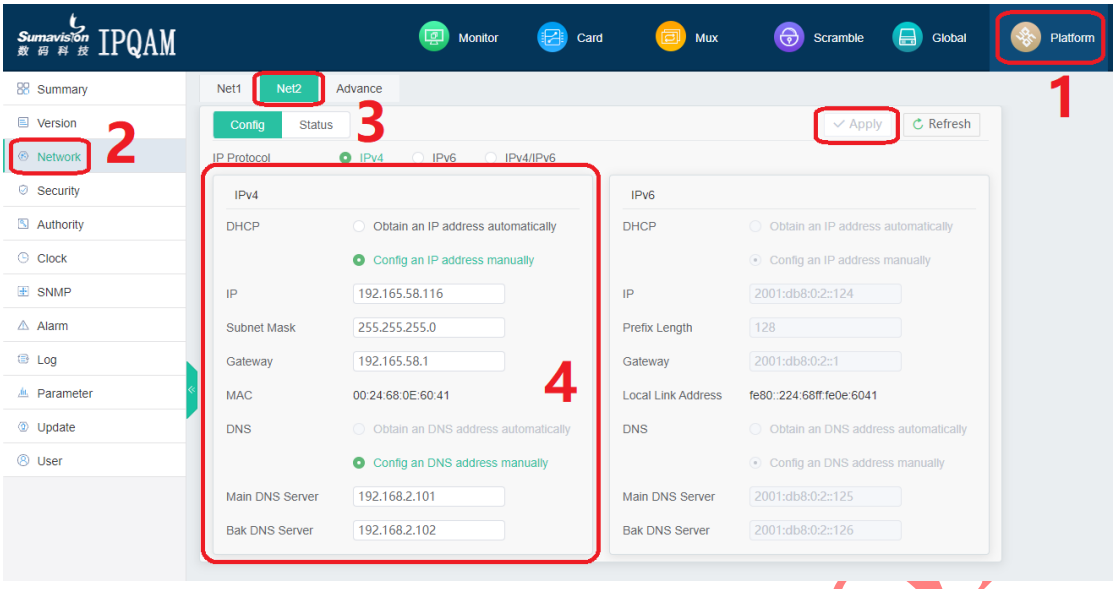


Fig. 6-29 Configuring scrambling IP

Step 2: Click [Scrambling] setting of WEB network management, click left [CAS] and fill in correct CAS parameter. These parameters are supplied by CAS server. After setting is completed, click [Apply] for validation;

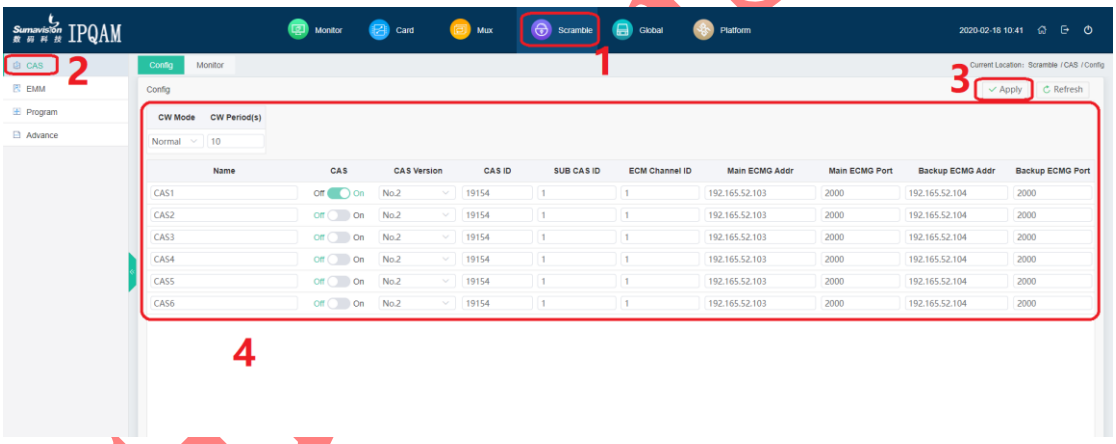


Fig. 6-30 Setting of scrambling CAS parameter

Step 3: Enter [Scrambling]-[EMM] page, set EMM parameter information, turn on the switch and then other parameters are supplied by CAS server. Click [Apply] to take effect parameters. Afterwards, click [Monitoring] page to inquire the configured EMM status information;

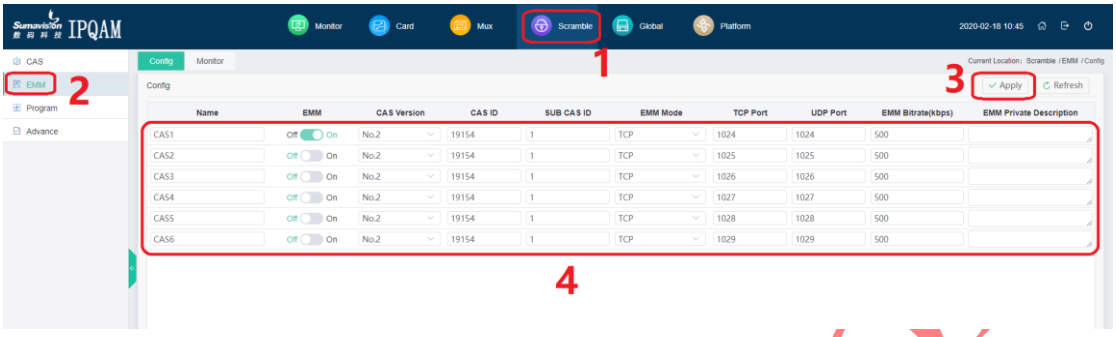


Fig. 6-31 Configuration of scrambling EMM parameter

Step 4: Enter [Scrambling]-[Program] page, select the port to be set, enter [EMM] subpage and turn on EMM switch. Furthermore, set EMM pid and then click [Apply] for validation in the end;

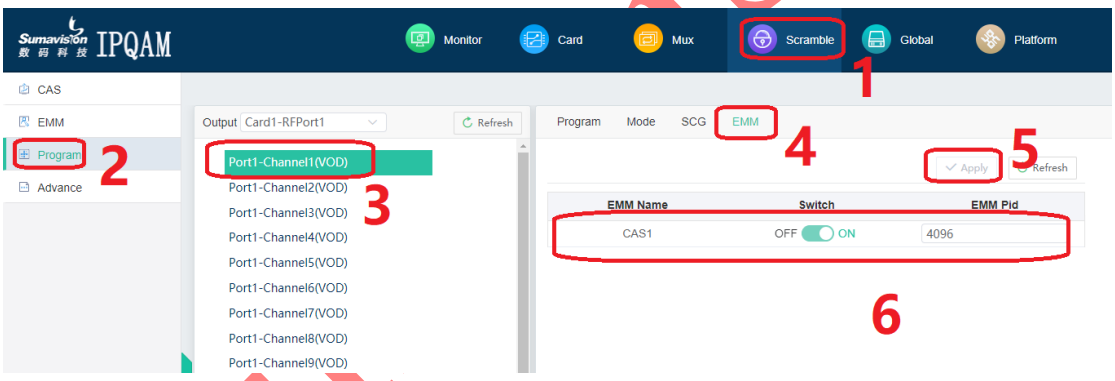


Fig. 6-32 EMM pid setting

Step 5: Enter [Scrambling]-[Program] page, select the port to be set, enter [Program] subpage, select the program to be scrambled, turn on the switch and then set correct ECM pid and AC value. In the end, click [Apply] to take effect the setting;

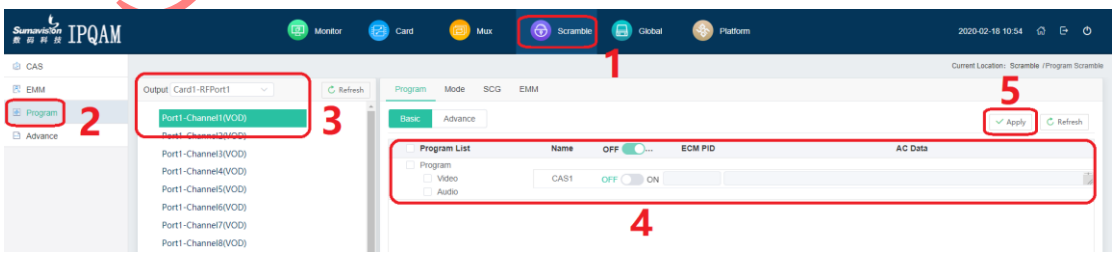


Fig. 6-33 ECM and AC setting

Table 6-12 Scrambling parameter list

Parameter	Range	Default
CW mode	Normal/Main/Backup	Normal
CW Period (s)	8~6500	10
Name	1~64 characters	CAS1
CAS switch	Off/on	Off
CAS Version	No.1/No.2/No.3	No.2
CAS ID	0~65535	19154
SUB CAS ID	0~65535	1
ECM Channel ID	0~65535	1
Main ECMG Address	Unicast IP address	192.165.52.103
Main ECMG Port	0~65535	2000
Backup ECMG Address	Unicast IP address	192.165.52.104
Backup ECMG Port	0~65535	2000
Name	1~64 characters	CAS1
EMM switch	Off/on	Off
CAS Version	No.1/No.2/No.3	No.2
CAS ID	0~65535	19154
SUB CAS ID	0~65535	1
EMM mode	TCP/TCP+UDP	TCP
TCP port	0~65535	1024
UDP port	0~65535	1024
EMM Bitrate (kbps)	0~10000	500
EMM Private Description	0~128 hexadecimal characters	
ECM Period (ms)	70~1023	100

SCG Clean Up	Off/on	Off

Chapter 7 Fault analysis and troubleshooting

7.1 Alarm information

When the modulator runs abnormally, the status indicator on the front panel will display red to prompt the user. The user can preliminarily decide the cause for the modulator alarm by querying the detailed alarm information on the [Alarm Information] page on the WEB page, and take corresponding measures. If the user cannot solve the abnormal problem of the modulator independently, he can call the user service department of SUMAVISION.

7.1.1 WEB network management cannot be opened

Cause of failure:

1） The PC where the backstage WEB network management is located is not connected to the network;

2） The device is not connected to the network;

Solution:

1） Check computer setting

"Ping" command can be used to check whether the network connection is established. The format of "ping" command is "ping device IP address (xxx.xxx.xxx.xxx)". First ping the IP address "Ping XXX. XXX. XXX. XXX" of the local network management computer. If it is not available (the return result is "request time out"), it indicates that there is a problem with the computer hardware and software. Check whether the network adapter in WIN2000 "network" attribute is installed correctly and whether the TCP/IP protocol is installed correctly. Check whether the network adapter is installed correctly through "device management" in the "system" icon in WIN2000 "control panel". If there is an "exclamation mark" or "question mark" on the device, it means that the device is not running normally; You can reinstall the network adapter and TCP/IP protocol and restart the computer. (If you change the network card configuration, restart the computer).

If possible, the two computers can be connected with the direct network cable to PING each other. If successful, the network management computer and the network cable are proved to be correct.

2） Connect the network cable, the ETN light of the modulator shall be on, and the green light of the network card on the computer shall be on and the red light shall be off.

If not, check the network cable at first. For network cable check, check whether both ends of the network cable can be connected with a multimeter. Pay attention to the difference between the directly connected network cable and the standard network cable. (Note: one pair of twisted pair shall be used for 1 and 2 of the network cable, and then one pair for 3 and 6. Generally, the transmission distance can be 60m, otherwise the transmission distance is greatly limited.)

If the network cable test is correct, it may be that the network cable connector is not in good contact, so it is considered to remake the network cable connector.

For the system connected by hub, check whether the hub operates normally, such as whether the power connection of hub is normal, and the network cable connecting network management or modulator cannot be plugged into the port marked with "UPLINK"; During normal connection, the corresponding port indicator light on the hub should be on. Otherwise, change a socket and try again.

3） PING the IP address of the modulator on the network management computer.

After passing the above two tests, PING the IP address of the modulator on the network management computer. If PING fails, check whether the IP address of the device has been manually modified.

If the PING command is normal, but you are still unable to log in, the problem should be in the main control board or host software.

7.1.2 Alarm information displays: Clock synchronization error

Cause of failure:

1） The clock synchronization enable is turned on, and the time synchronization server is not set;

2） The time synchronization server cannot provide time synchronization normally.

Solution:

1） Modify the network management PC settings to provide time synchronization services for other devices in the network;

2） Enter WEB network management [System Setting] page of the device, click clock synchronization, and set address for primary and secondary SNTP servers;

7.1.3 Alarm information displays: Too low fan speed

Cause of failure:

1） Cooling fan of device is abnormal;

Solution:

1） Enter WEB network management card monitoring information page to check device information items, observe the fan speed, and then contact the customer service personnel of SUMAVISION;

7.1.4 Alarm information displays: Too high input code rate

Cause of failure:

1） The effective code rate of the input TS stream of the device is too high;

2） The device's parameters are not set correctly.

Solution:

1） The maximum code rate can be recalculated according to the set different QAM modes and symbol rates;

2） Confirm whether QAM mode is selected and symbol rate is select reasonably for modulator;

3） Modify the front-end equipment and set a reasonable input TS stream rate.

7.1.5 Network management prompts too high temperature of QAM card

It is very likely that the cooling fan of the device stops operation, so please perform troubleshooting in time.

7.1.6 The indicator light doesn't light up after turning on

Cause of failure:

1) The power cord is not connected properly;

2) The fuse on the power socket is blown.

Solution:

1） Reconnect the power cord;

2） Replace the fuse.

7.1.7 Alarm information displays: 10-gigabit port 1 is not connected

Cause of failure:

1） The 10-gigabit port 1 on the front panel of the device is not inserted into the SFP module;

2） The SFP module inserted into the 10-gigabit port 1 on the front panel of the device is damaged;

3） The duplex mode set by the web master of the device is not consistent with the SFP module;

Solution:

1） Inspect and insert the 10-gigabit input 1 into the 10-gigabit optical module;

2） Replace the inserted 10-gigabit optical module;

3） Check whether network management is consistent with SFP module;

7.1.8 Other alarm information

See Appendix for details

Chapter 8 Maintenance

This chapter describes the troubleshooting methods of IPQAM 10K511 Modulator. In the routine maintenance, refer to the analysis method and processing method in this chapter for quick analysis, addressing, processing and troubleshooting. If a special failure cannot be solved according to the method described in this guidance, please contact the the Customer Service Department of Sumavision Technologies Co., LTD. for further technical support.

8.1 Maintenance method

To make the IPQAM modulator operate under the best operating status, extend the service life of device, discover and eliminate the potential problems in time, and ensure normal operation of the device, the routine maintenance must be carried out regularly.

The IPQAM modulator should be maintained according to the following rules.

- Must prepare for the detailed device maintenance target plan.

  The IPQAM modulator should be checked and maintained every day. If not, some small failures will develop into worse, so proper daily inspection, monthly inspection, quarterly inspection and annual inspection plans should be developed according to the operation features of the device, including the maintenance and inspection class in every period (class I maintenance, class II maintenance and class III maintenance) and detailed maintenance contents.

- Appoint the maintenance person.

  It is the key for the device maintenance. The combination mode of “one person inspection and several persons’ inspection” is recommended for the IPQAM modulator maintenance.

- Establish the device maintenance archive.

  The individual maintenance archive should be kept since the IPQAM modulator is purchased till it is abandoned. The maintenance and repair should be recorded in details. The replaced and changed parts and wire should be marked on the circuit diagram and device maintenance archive, so the diagram is consistent with the actual device. Meanwhile, it can facilitate others to maintain and repair the device.

8.2 Maintenance details

The following details should be paid attention to in the routine maintenance of the IPQAM modulator device.

- The transmission device is of great importance, and should have trained person for the routine maintenance.

- Keep the site room clean, dustproof and damp-proof.
- Follow the “Device Maintenance Target Plan” for routine inspection and test of the device, and record the checking results.
- Wipe the dustproof mesh of the fan every week. If the surface temperature of the device is too high, check whether the dustproof mesh of the fan is blocked.
- The device is inspected according to the specifications & instruction manual of Sumavision Technologies Co., Ltd. The man-made accident should be prevented.
- Wear the anti-static bangle when operating the device hardware.
- The connection between other devices in the cabinet and the IPQAM modulator should not be plugged-in or unplugged freely; to plug-in or unplug the connection, you’re required to mark the original location for plugging.
- If the IPQAM modulator can be controlled in the control center by using the network management software, the network management password of the IPQAM modulator should be strictly managed and regularly changed, which is only distributed to the responsible maintenance person. The administrator password can only be known by the responsible maintenance person.
- Installing other software in the computer for network management system transmission and playing games with such computer are strictly prohibited; the computer with network management system should be installed the real-time virus detection software for regular virus killing.
- The computer with network management system uses UPS for power supply and regular data backup will be conducted.
- Don’t reset the device easily and change the service data.
- For any alarm with unidentified reasons, please contact the After-sales Technical Support Department of Sumavision Technologies Co., Ltd.

8.3 Routine maintenance

Refer to Table 8-1 for routine maintenance.

Table 8-1 Routine maintenance

Maintenance type	Maintenance contents	Operation guide	Reference standard	Reference maintenance hour (man×hour)
Inspect external environment	Power supply in site room (DC/AC)	Check the power monitoring system or test the power output voltage.	The voltage output is normal. The power gives no abnormal alarm.	0.05
	Temperature in site room	Measure temperature.	Temperature range: 5 ℃-40 ℃; 15 ℃-30 ℃ is recommended	
	Humidity in site room	Measure relative humidity.	Relative humidity: 20%-80%; 40%-65% is recommended.	
Inspect the device operation status.	Indication status of the device panel	Observe the indicator of the device panel.	Normally the power indicator, operation indicator and Gigabit indicator keep on.	0.1
Inspect the device operation status.	State of official telephone (2-3 times a month)	Test call situation.	Site selection call and conference call can be normal.	0.1
Network management maintenance contents	Log on the network management system	Low-level users log on the network management system, and it is proposed each maintenance personnel have an account.	Network management system can log in normally.	0.1
	Alarm inspection	The alarm query and view function of the network management system are used to view current and historical alarm.	Unknown alarm in the system.	0.3
	Monitoring of performance events	The performance data query of the network management system is used to inquire the current and historical performance data.	The performance of equipment is reported normally.	0.5

Maintenance type	Maintenance contents	Operation guide	Reference standard	Reference maintenance hour (man×hour)
	Log query	Use the operation log query of the network management system.	No attempt to log on the network management system; No unknown data change operations.	0.05

8.4 Monthly maintenance

Refer to Table 8-2 for monthly maintenance.

Table 8-2 Monthly maintenance

Maintenance type	Maintenance contents	Operation guide	Reference standard	Reference maintenance hour (man×hour)
Inspect external environment	State the cooling holes in the cabinet	View the state of cooling holes	It should be clean around the cooling holes, with no debris	0.1
Network management maintenance content	Inspect the start-up and closing of the network management system	Start, shut down network management software and computer.	It should be in both normal start-up and shutdown.	0.05
	Change the login password of the network management users	Change the user's password every month.	Change the password every month.	0.05
	Maintenance of network computers	Check the directory and the hard disk space, and antivirus.	Contents and documents are normal, with no illegal files (such as games), and the hard disk space is sufficient.	0.5
	Status of a variety of hardware interface	Check the working conditions of the mouse, keyboard, monitor, printer and others.	It can be normally used.	0.05

8.5 Quarterly Maintenance

Refer to Table 8-3 for quarterly maintenance.

Table 8-3 Quarterly maintenance

Maintenance type	Maintenance contents	Operation guide	Reference standard	Reference maintenance hour (man×hour)
Inspect the cabinet cleanness	Inspect the cabinet cleanness	Observe the inside and outside the cabinet.	The cabinet surface is clean. There is no much dust inside the cabinet. Otherwise, the cabinet should be cleaned	0.5
Inspect the device cleanness	Inspect the device cleanness	Observe device surface	There no much dust outside the device. Otherwise, it should be cleaned. Watch out the external wiring of the device in cleaning.	0.5

8.6 Annual Maintenance

Refer to Table 8-4 for annual maintenance.

Table 8-4 Annual maintenance

Maintenance type	Maintenance contents	Operation guide	Reference standard	Reference maintenance hour (man×hour)
Inspect grounding, ground cable and power lead connection	Check the earth resistance	Use the earth resistance tester for testing.	The joint grounding resistance is less than 1 ohm.	1
	Check the ground cable connection.	Inspect whether the ground cable is reliably and securely connected to the ground cable group of the office.	(1) The connection is secure and reliable. (2) No wire aging exists. (3) No erosion exists on the ground cable group, with proper anti-corrosion.	0.2
	Inspect the power lead connection	Inspect whether the power lead is reliably and securely connected to the power lead of the office.	(1) The connection is secure and reliable. (2) No wire erosion and aging exist.	0.2

8.7 Clean-up and maintenance

Pay attention to the following contents for the clean-up and maintenance of the device.

- Clean the working site; wipe the device shell with a soft cloth. The water can not be penetrated into the device.
- Do not plug in and out all connection cables with current without instructions.
- Check whether the cable is pressed or pulled by the heavy object, whether the plug and socket are connected tightly, ensure that the cable is not extruded by the external force and is placed in order. The connection part is under good contact.
- Check whether the device and cable label are missing and incorrect. Keep the label intact and correct.
- Check whether the engineering document is complete and correct. Keep the

engineering document complete for check at any time.

8.8 Operation and maintenance

Pay attention to the following contents for the maintenance when the device is operating.

- Check whether the ground cable and power supply are normal. Ensure the power supply works properly before turning on the power.
- Sequence for starting the device: start the power supply of peripheral devices, and power on the cabinet, and ensure the device for signal input works normally before starting the IPQAM modulator.
- Sequence for device shutdown: contrary to the sequence for starting the device. Power off the IPQAM modulator, and then other devices.
- Observe the indicators on front panel of the IPQAM modulator and observe the system running in the studio and the control room. In case of any abnormity, the maintenance instructions in this chapter can be referred for solution as soon as possible.
- Before the system is used, power on and inspect the system, adjust the peripheral device, and guarantee that the IPQAM modulator functions are normal.
- The local configuration can't be changed without instructions. The configuration can only be changed by the professional operator.
- Do not place the IPQAM modulator in highly noisy environment.

Chapter 9 Storage and Transport

9.1 Storage

Requirement:

Humidity: ≤95% (20℃) ;

Temperature: -20℃～60℃

Don’t store with corrosive liquids and gases.

Don’t place the device nearby strong electromagnetic fields.

Prohibit infection by radioactive substances.

9.2 Transport

The IPQAM modulator is packaged by using the special packaging of Sumavision. In case of intact packaging, such transportation modes like highway, railway, airline and shipping are acceptable. In case of damaged packaging, the device should be transported after being packaged by professional electronic product transportation companies.

During the transportation, the device should be handled gently to avoid throwing, falling or severe collision, and kept the labeling on the package upward.

Appendix 1: Alarm and solution

	Alarm display	Alarm cause/trigger condition	Solution
1	Fan abnormal	Fan speed is 0	Check the fan wiring or replace the fan
2	Temperature Abnormal	Too high FPGA core temperature	Adjust fan speed to reduce device temperature or turn off the power to cool the device
3	FPGA Abnormal	Failed FPGA configuration cannot be recovered. It is required to restart the device	Check whether there is a FPGA file in the daughter card. If not, restart after upgrading
4	SNTP Sync Error	Neither SNTP clock main board nor SNTP clock can be synchronized	(1) Check whether the set IP of SNTP server is correct (2) Whether the corresponding server is running
5	ERM Connect Error	It is unable to be connected to ERM server	(1) Check whether the set IP of ERM server is correct (2) Whether the corresponding server is running
6	Device Backup Test Failure	In case of device backup, click the test button. If the object device does not respond, this alarm will be generated	Warning alarm
7	Device Backup Switch to Object device	Alarm generated when switching to the object device manually or when the local device meets the switching conditions under the condition of device backup	Warning alarm
8	Device Backup Object device IP Set Error	In case of device backup, the IP address set by the object device is not the local IP address	Check whether IP set for the object device is consistent with the device
9	Device Backup Main and backup role error	Under the condition of device backup, the two devices participating in the backup are set as host or standby devices at the same	Check whether the master-slave relationship set for two devices in the backup group is correct

		time	
10	Device Backup Object device Link Down	Under the condition of device backup, the IP address of the object device set by the local device is unreachable	(1) Check whether the object device IP set in data of the local device is correct (2) Check whether the object device operates normally
11	Device Backup Switch Failure	Under the condition of device backup, the host meets the switching conditions, but the standby device is abnormal	Check whether the standby device operates normally
12	Net a-b x10GbE x Unlink	Corresponding Ethernet cable of GBE is not connected	Check corresponding Ethernet cable of GBE port
13	Net a-b x10GbE x Gateway Unreachable	The device fails to ping the gateway for five times continuously (30s interval each time).	(1) Check whether the gateway data are set normally (2) Check whether the gateway operates
14	Card x RF x PLL Unlock	PLL clock is not locked	(1) Check related circuit of daughter card (2) Replace the daughter card
15	Card x RF x DAC Unlock	Abnormal DDR	(1) Check related circuit of daughter card (2) Replace the daughter card
16	Card x RF x Output Level High (Low)	The set level value differs from the actual output level value by more than 5dBuv	(1) Check whether the level is set normally (2) Check RF output circuit (3) Replace the daughter card
17	Card x RF x Ch x Rate Overflow	Effective code rate overflow detected at a frequency point of RF port	Check whether the IP stream output to this frequency point is too large
18	Card x RF x ddr_port x Rate Overflow	The network jitter or too small code rate adjustment parameter causes the input code rate overflow of DDR port	(1) Check whether the setting of the adjustment code rate parameter is too small (2) Check whether network jitters too greatly
19	CASx(EMM:x)	Abnormal connection with	(1) Inspect whether the set

	Unconnected	EMMG	EMMG IP is correct (2) Whether corresponding EMMG operates
20	CASx(ECMG:x) Unconnected	Abnormal connection with ECMG	(1) Inspect whether the set ECMG IP is correct (2) Whether corresponding ECMG operates
21	Card x Port x SCG1(SID:x) CASx(ECMG:x) ECM_stream(ID:x) Abnormal	Failed in establishing scrambling Stream	(1) Inspect whether the corresponding scrambling server is normal (2) Inspect whether the set SCG parameter is correct