Sola-Sat DVB-S2 Modulator
Model MS2-L

User's Manual

NMS Version: V4.01
SW: V0.16
HW: V1.90

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Chapter 1 product outline

1.1 Outline

The DVB-S2 modulator is a high performance modulator developed according to DVB-S2 (EN302307) standard which is the standard of second generation of the European broadband satellite telecommunication. It adopts advanced framing structure, channel coding and modulation technology, increasing over 50% transmission ability more than DVB-S modulator under the same transmission condition and also providing a more powerful receiving ability in the same spectral efficiency. In addition, it is backwards-compatible with DVB-S (EN300421) modulating standard. This DVB-S2 modulator supports local and remote control through NMS software. The DVB-S2 modulator can be used for Broadcasting, Interactive Services, News Gathering and other Broadband satellite applications.

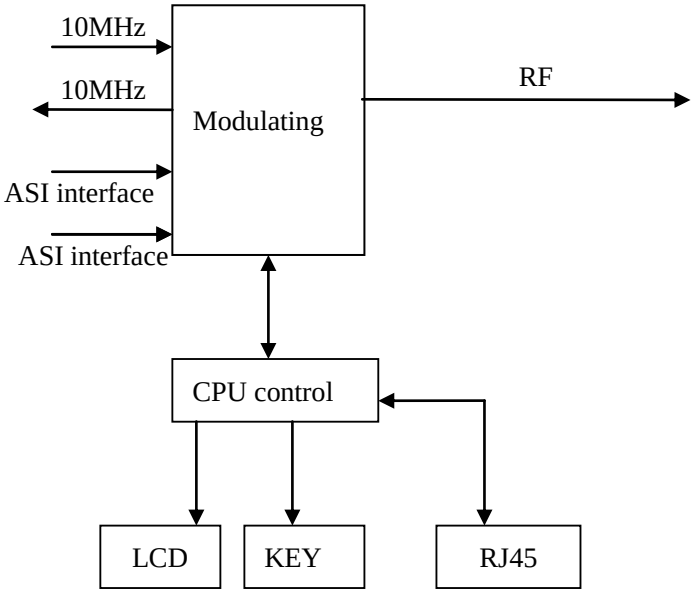
1.2 Features

- Fully compliant with DVB-S2(EN302307) standard
- Backwards-compatible with DVB-S (EN300421) modulating standard
- Two ASI inputs supporting hot backup
- Supporting local and remote control
- Output level attenuation
- 10MHz outer reference clock input
- Output frequency range: 950~2150MHz
- Full-size front panel LCD display and keyboard

1.3 Specifications

MPEG-TS Input	Supporting both packet and byte mode TS input		
	Supporting 188/204Byte transmission stream packet		
	Two ASI inputs, supporting hot backup		
	ASI input connector: BNC, impedance 75Ω		
RF Output	Frequency is continuously adjustable from 950 to 2150MHz		
	Output Level attenuation is continuously adjustable from 0 to 31.5 dB; in step of 0.5 dB.		
	Maximum Output level: 0dBm		
	MER≥32dB		
	Connector: N type, impedance 50Ω		
Channel coding and modulation	Outer coding	DVB-S	DVB-S2
		RS coding	BCH coding
	Inner coding	Convolutional	LDPC coding
	Code Rate	1/2,2/3,3/4,5/6,7/8	1/2,3/5,2/3,3/4,4/5,5/6,8/9, 9/10
	Constellation	QPSK	QPSK,8PSK
	Roll-off Factor	0.2, 0.25, 0.35	0.2, 0.25, 0.35
	Symbol Rate	1-45MBauds	1-30M@8PSK; 1-45 M@QPSK
Miscellaneous	Dimension	44mm×482mm×410mm	
	Environmental	0~45℃(operation), -20~80℃ (storage)	
	Power	100-240VAC±10%,50Hz-60Hz	

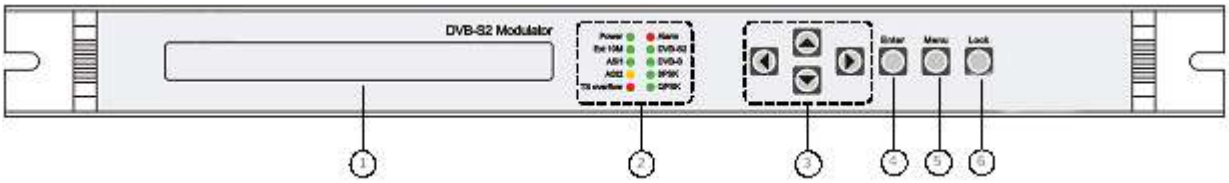
1.4 Function Chart



1.5 Appearance and description

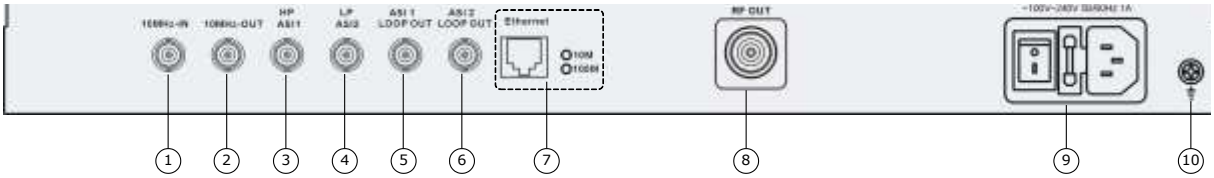
Front Panel Illustration

Indicator area: All the indicators will light on when DVB –S2 modulator works at current mode.



1.	LCD display	
2.	Indicators	Power : Power Indicator
		Ext 10M : 10MHZ Outer Reference Clock
		ASI1 : ASI1 input
		ASI2 : ASI2 input
		TS Overflow: Input TS bit rate over the bandwidth of Transmission Limit
		Alarm : Alarming Indicator
		DVB-S2: Current Modulation is DVB-S2
		DVB-S: Current Modulation is DVB-S
		8PSK: Current constellation is 8PSK
		QPSK: Current constellation is QPSK
3.	Up/Down/Left /Right key	
4.	Enter: Confirmation key	
5.	Menu key	
6.	Locking key	

Rear Panel Illustration



1.	Input of 10Mhz Outer Reference Clock
2.	Output of 10Mhz Inner Reference Clock
3.	ASI1Input
4.	ASI2 Input
5.	ASI1Loop Output
6.	ASI2 Loop Output
7.	Network Interface
8.	RF Output
9.	Power Socket
10.	Grounding pole

Chapter 2 Installation Guide

2.1 Acquisition Check

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

- DVB-S2 modulator
- User's Manual
- ASI Cable
- Power Cord

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

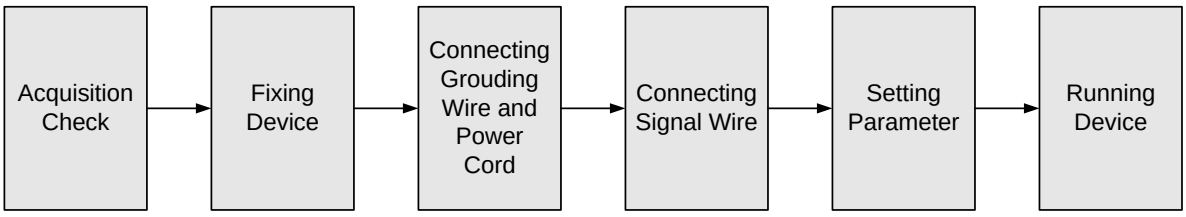
2.2 Installation Preparation

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

The main content of this chapter including:

- Checking the possible device missing or damage during the transportation
- Preparing relevant environment for installation
- Installing modulator
- Connecting signal cables
- Connecting communication port (if it is necessary)

2.2.1 Device's Installation Flow Chart Illustrated as following:



2.2.2 Environment Requirement

Item	Requirement
Machine Hall Space	When user installs machine frame array in one machine hall, the distance between 2 rows of machine frames should be 1.2~1.5m and the distance against wall should be no less than 0.8m.
Machine Hall Floor	Electric Isolation, Dust Free Volume resistivity of ground anti-static material: $1X10^{7}$~$1X10^{10\Omega}$, Grounding current limiting resistance: 1M (Floor bearing should be greater than 450Kg/m^2)
Environment Temperature	5~40°C(sustainable), 0~45°C(short time), installing air-conditioning is recommended
Relative Temperature	20%~80% sustainable 10%~90% short time
Pressure	86~105KPa
Door & Window	Installing rubber strip for sealing door-gaps and dual level glasses for window
Wall	It can be covered with wallpaper, or brightness less paint.
Fire Protection	Fire alarm system and extinguisher
Power	Requiring device power, air-conditioning power and lighting power are independent to each other. Device power requires AC power 100-240V 50-60Hz. Please carefully check before running.

2.2.3 Grounding Requirement

- All function modules' good grounding is the basis of reliability and stability of devices. Also, they are the most important guarantee of lightning arresting and interference rejection. Therefore, the system must follow this rule.
- Coaxial cable's outer conductor and isolation layer should keep proper electric conducting with the metal housing of device.
- Grounding conductor must adopt copper conductor in order to reduce high frequency impedance, and the grounding wire must be as thick and short as possible.
- Users should make sure the 2 ends of grounding wire well electric conducted and be antirust.
- It is prohibited to use any other device as part of grounding electric circuit
- The area of the conduction between grounding wire and device's frame should be no less than 25mm^2.

2.2.4 Frame Grounding

All the machine frames should be connected with protective copper strip. The grounding wire should be as short as possible and avoid circling. The area of the conduction between grounding wire and grounding strip should be no less than 25mm^2.

2.2.5 Device Grounding

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

2.3 Electrical Cable Connection

The grounding wire conductive screw is located at the right end of rear panel, and the power switch, fuse, power supply socket is just beside ,whose order goes like this, power switch is on the left ,power supply socket is on the right and the fuse is just between them.

- Connecting Power Cord

  User can insert one end into power supply socket, while insert the other end to AC power.

- Connecting Grounding Wire

  When the device solely connects to protective ground, it should adopt independent way, say, share the same ground with other devices. When the device adopts united way, the grounding resistance should be smaller than 1Ω.

☞**Caution:**

Before connecting power cord to DVB-S2 modulator, user should set the power switch to "OFF".

2.4 Signal Cable Connection

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

2.4.1 ASI input and loop output cable illustration:

2.4.2 RF output interface connection

User can firstly find the RF out interface on the device according to the connector mark described on the rear panel illustration, and then connect the coaxial cable (in the accessories). One end is connected to the modulator's RF out connector while the other end to the power transmitter's RF input. The modulator's RF output interface and its connection are illustrated as follow:

Chapter 3 Operation

DVB-S2 modulator's front panel is user operation interface. Before operating, user can decide whether directly use the default setting or customize the input and output parameters setting. The detail operations go as follows:

Keyboard Function Description:

MENU: Canceling presently entered value, resuming previous setting; Return to previous menu.

ENTER: Activating the parameters which need modifications, or confirming the change after modification.

LEFT/RIGHT: To choose and set the parameters.

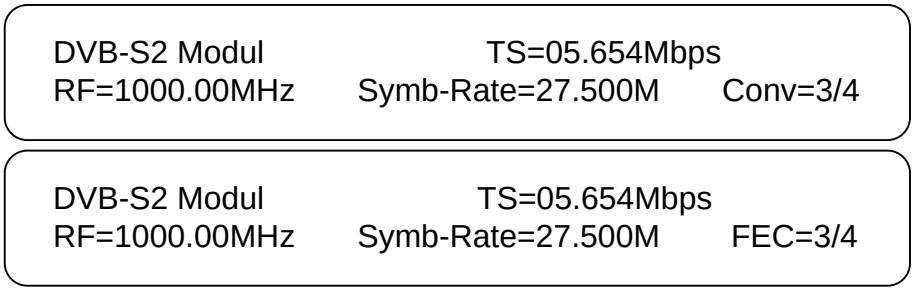
UP/DOWN: Modifying activated parameter or paging up/down when parameter is inactivated.

LOCK: Lock the screen / cancel the lock state. After pressing lock key, the system will question the users to save present setting or not. If not, the LCD will display the current configuration state.

At the "Resume Factory Setting" page, user can firstly press "ENTER" key, consequently system resumes factory parameter setting.

3.1 Main Interface

After switching on the modulator, the LCD will display the company name, device name and the real-time input bit-rate in the first row, while the output RF frequency, Symbol rate and FEC (forward error correction) are displayed in the second row.

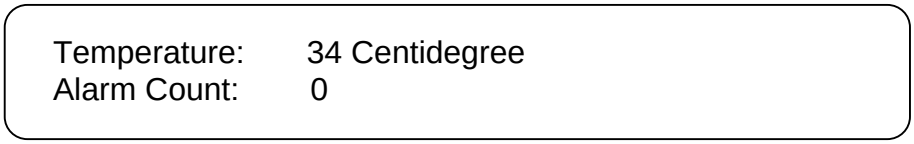


3.2 General setting

By pressing "LOCK" key to enter the main menu, the LCD will display the following pages:

By pressing UP or DOWN key to the specified menu item, then pressing ENTER to enter the submenu as following pages:

3.2.1 Alarm Status



3.2.1.1 Temperature

The figure displayed in the first row shows the real-time housing temperature.

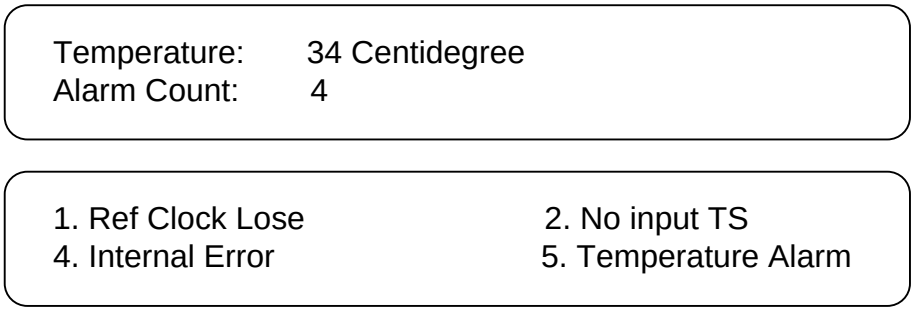
3.2.1.2 Alarm count

The Alarm count in the second row indicates the amount of the alarms. Whenever an abnormal event happens, the number will increase 1.

3.2.1.3 Alarm description

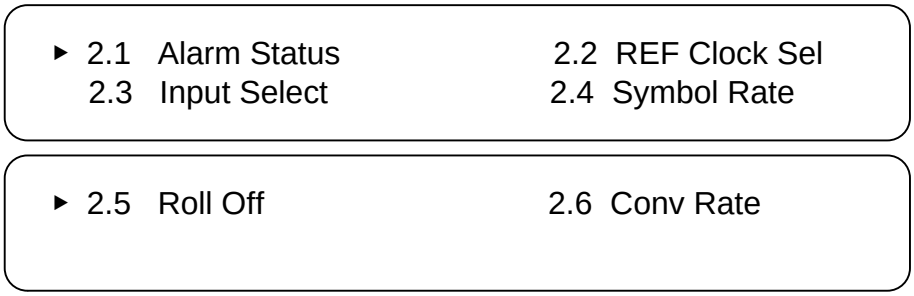
If the alarm count is not equal to 0, it must be at least one alarm happening. User can press ENTER key to enter the submenu to check the alarm details. These alarms include the following events:

1. **Ref Clock Lose:** When choosing outer 10MHz reference clock as modulator's working clock, the modulator cannot detect reference clock input.
2. No input TS
3. Input TS bit rate over the bandwidth of Transmission Limit
4. Internal error of the modulator
5. When the modulator's house temperature exceeds 70 centigrade.

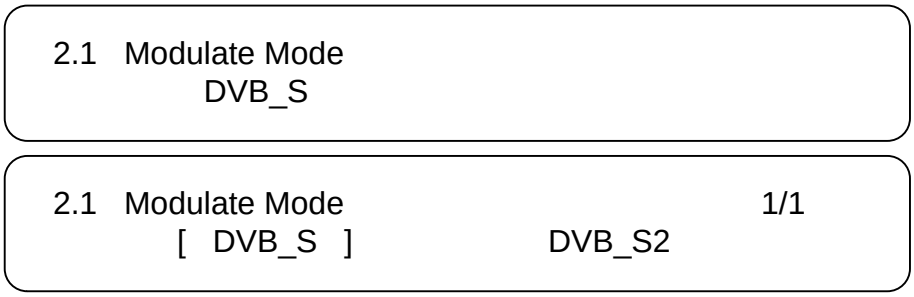


3.2.2 System setting

By pressing UP/DOWN or LEFT/RIGHT to choose this item, ENTER and LEFT/RIGHT to set the parameters. The system displays following pages:



3.2.2.1 Modulation State



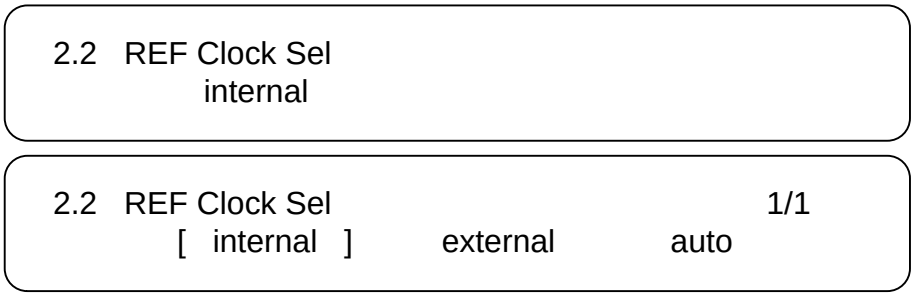
After entering the submenu by pressing ENTER key, user can choose the "modulation state" to choose the needed modulation mode.

DVB-S: this modulator works as DVB-S modulator (QPSK modulator).

DVB-S2: this modulator works as DVB-S2 modulator.

3.2.2.2 Reference Clock Select

After entering the submenu by pressing ENTER key, user can choose from which the "Reference Clock" comes.

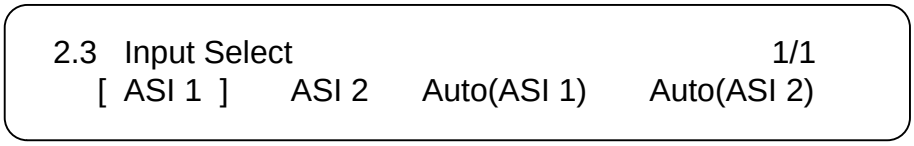


Internal: This modulator uses internal 10MHz crystal oscillator as reference clock.

External: This modulator uses external 10 MHz input as reference clock.

Auto: The modulator will preferably select the external 10MHz input if it exists. Otherwise the modulator will select the internal 10MHz crystal oscillator's output as reference clock.

3.2.2.3 Input select



After entering the submenu by pressing ENTER key, user can choose from which the input TS comes.

ASI1: The input TS comes from port ASI1.

ASI2: The input TS comes from port ASI2.

Auto (ASI1): The modulator will preferably select the input TS from ASI1 if it exists; otherwise it will select the input TS from ASI 2.

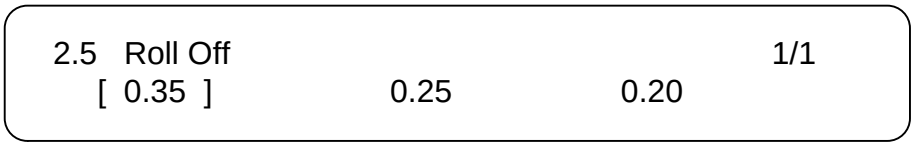
Auto (ASI2): The modulator will preferably select the input TS from ASI2 if it exists; otherwise it will select the input TS from ASI 1.

3.2.2.4 Symbol rate

Range: 0-45M@QPSK Constellation

0-30M@8PSK Constellation

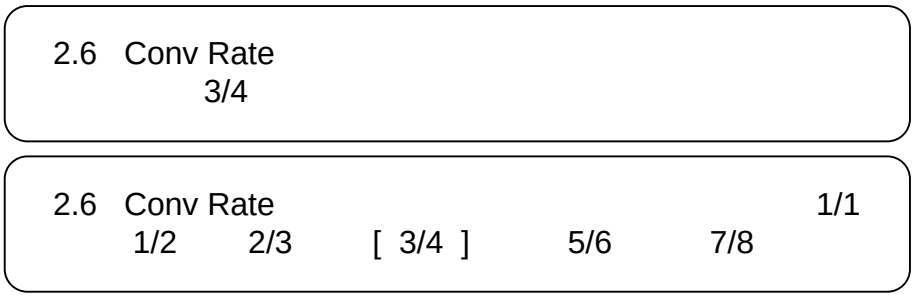
3.2.2.5 Roll-off factor



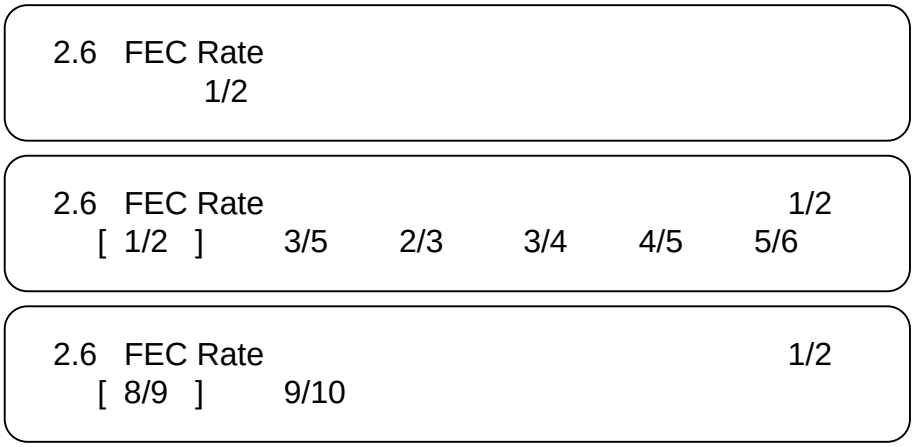
User can set the roll-off factor of the DVB-S and DVB-S2

There are 3 possible options, including 0.35, 0.25 and 0.20.

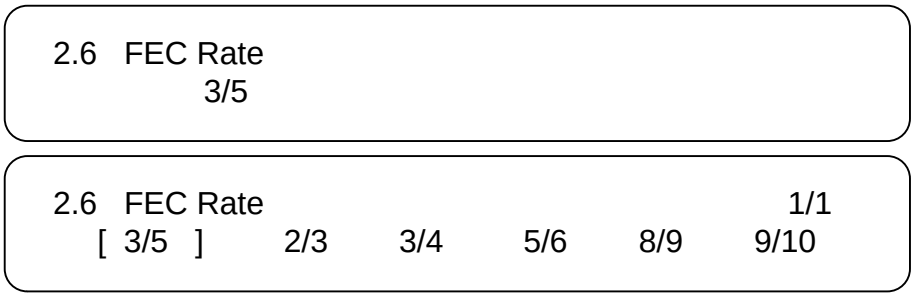
3.2.2.6 FEC rate/Convolutional rate



User can set convolutional value at this submenu when modulator works as DVB-S modulator. The possible options include 1/2, 2/3, 3/4, 5/6, 7/8.



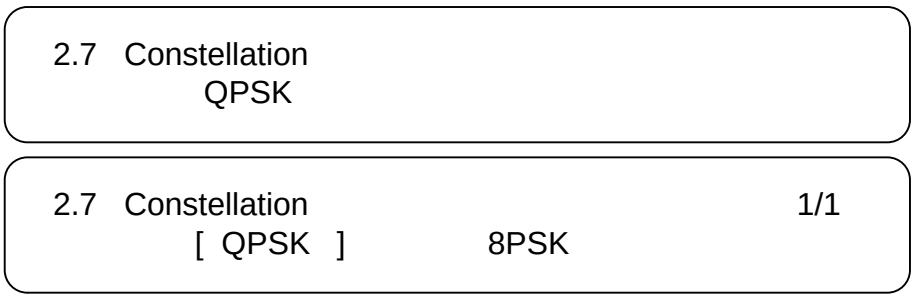
User can set FEC value at this submenu when modulator works as DVB-S2 modulator. The possible FEC rates include 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 when the constellation is QPSK.



User can set FEC value at this submenu when modulator works as DVB-S2 modulator. The possible FEC rates include 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 when the constellation is 8PSK.

3.2.2.7 Constellation

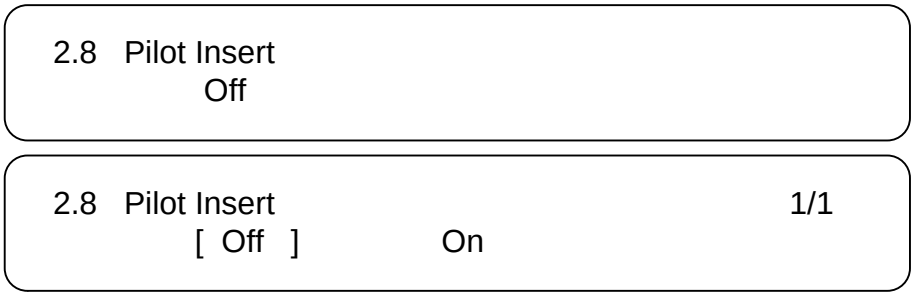
(This menu item only shows when MODUALTO STATE is DVB-S2)



User can choose the DVB-S2 modulation's constellation, either QPSK or 8PSK.

3.2.2.8 Pilot Insert

(This menu item only shows when MODUALTO STATE is DVB-S2)



User can choose whether to insert the Pilot block.

Off: without pilots

On: with pilots

3.2.3 Output setting

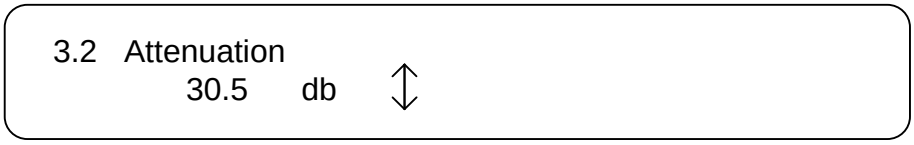
Pressing UP/DOWN or LEFT/RIGHT to choose this item, ENTER and LEFT/RIGHT to set the parameters. The system displays following page:

3.2.3.1 RF setting

After entering the submenu by pressing ENTER key, user can set RF output frequency. The RF output frequency range is from 950 to 2150MHz.

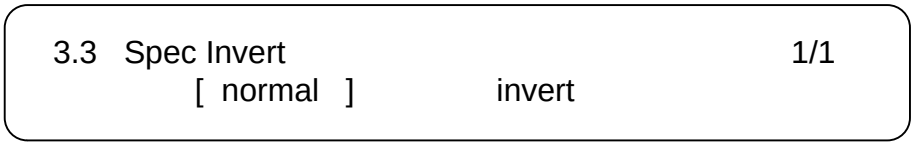
3.2.3.2 RF ATT Setting

User can set the attenuation of the RF output at this submenu. The RF attenuation range is from 0-31.5db in 0.5db step.



3.2.3.3 Spectrum Invert

User can set the Spectrum of RF output invert or not.



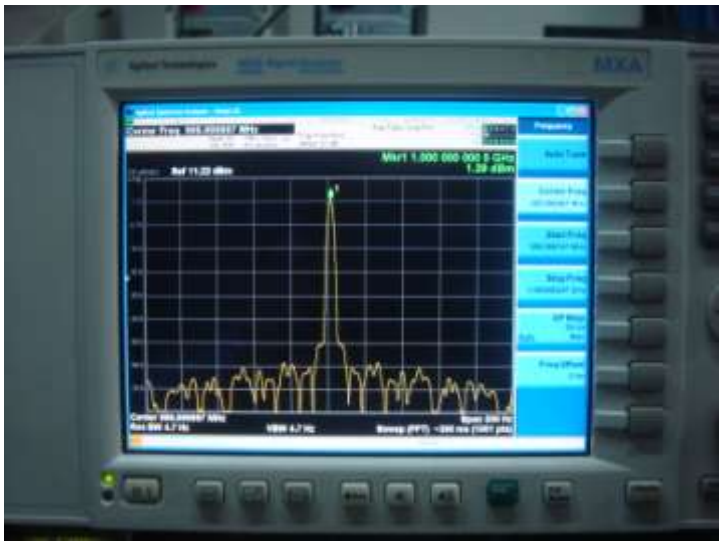
3.2.3.4 RF Output

3.4 RF Output
single tone

3.4 RF Output 1/1
[single tone] modulation off

User can set the RF output mode for different applications.

Single tone: the RF output is only carrier without modulation.

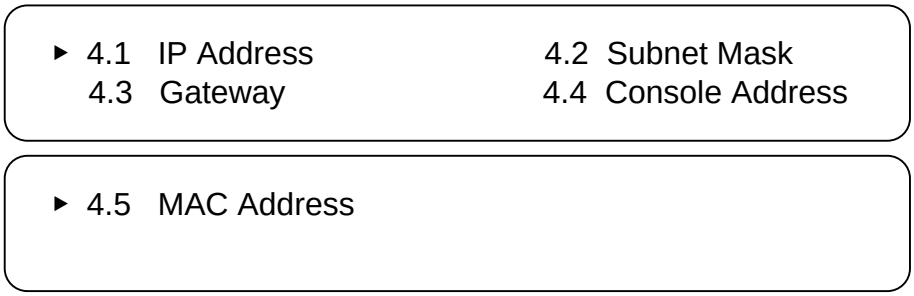


Modulation: The RF output carrier with modulation.

Off: Turn off the RF output.

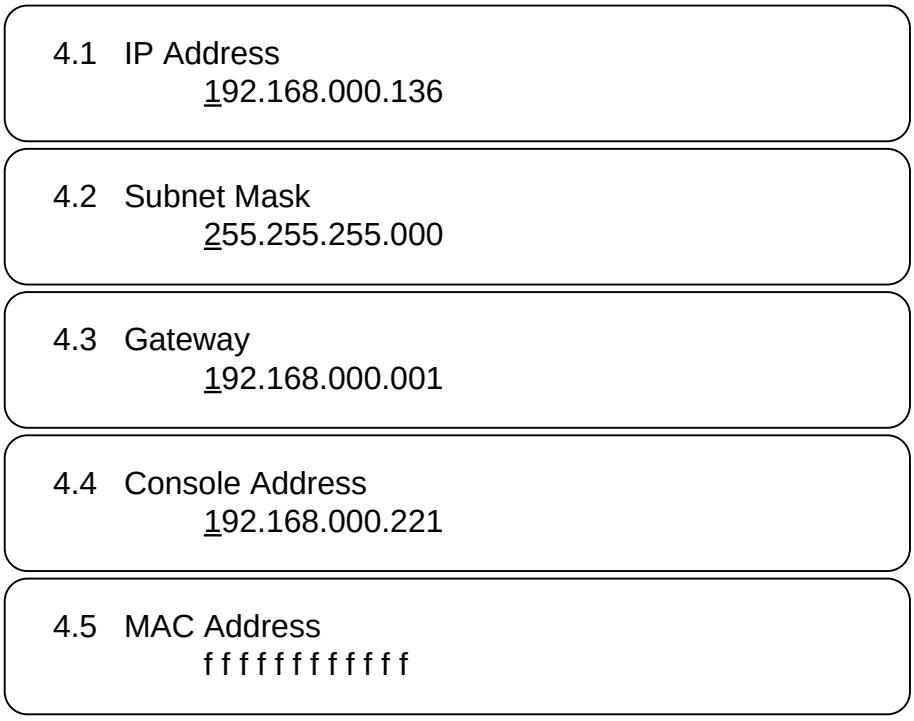
3.2.4 Network setting

Press "Up/Down" to choose this item. "Enter" and "Left/Right" to set the parameters. The system displays following pages.



Note: The MAC address is according to the factory setting, and it's unique.

Under the following submenus, there are parameters which can be set manually; user can press "Up/Down" to choose this item. "Enter" and "Left/Right" to set the parameters. The system displays following pages.



3.2.5 Saving config

User can choose to save the current configured parameters by pressing ENTER key. The system displays following page:

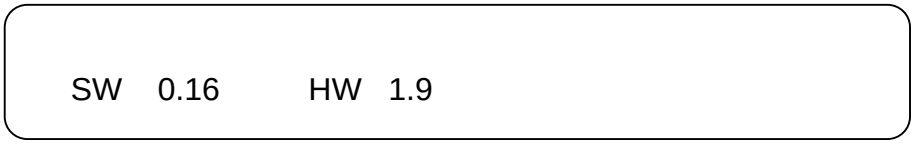
3.2.6 Load config

At this menu, press UP/DWON key and ENTER to confirm.

User can restore the device into the last saved configuration by choosing **"6.1"** and restore the device into factory configuration by choosing **"6.2"**.

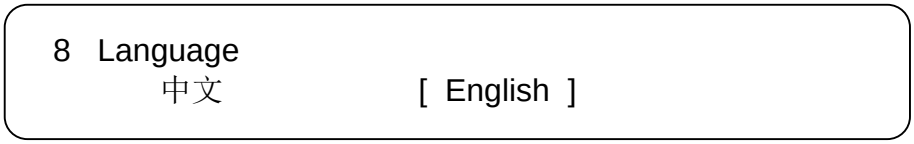
3.2.7 Version

User can check the hardware version and software version of the equipment.



3.2.8 Language Settings

After entering this menu, user can press LEFT/RIGHT to choose language. The option with bracket is the current choice.



Chapter 4 NMS Setting

Network Management System Profile

Network management system is applied to digital TV equipment operation, control and management and parameters setting, etc. It centralizes digital TV equipment through network.

4.1 Installation

The software doesn't need special installation. User can just copy "Network Management Software X.XXY.exe" to the specified directory (X.XX is version number, Y represents language. For example: the version number of network management software 4.01E.exe is 4.01 English version) or place different versions of network management software to the same directory. When the network management software is running, it will generate two documents as follows:

- Network management software X.XXY.log (It preserves the log file.)
- Info. Bin (It's the user configuration data.)

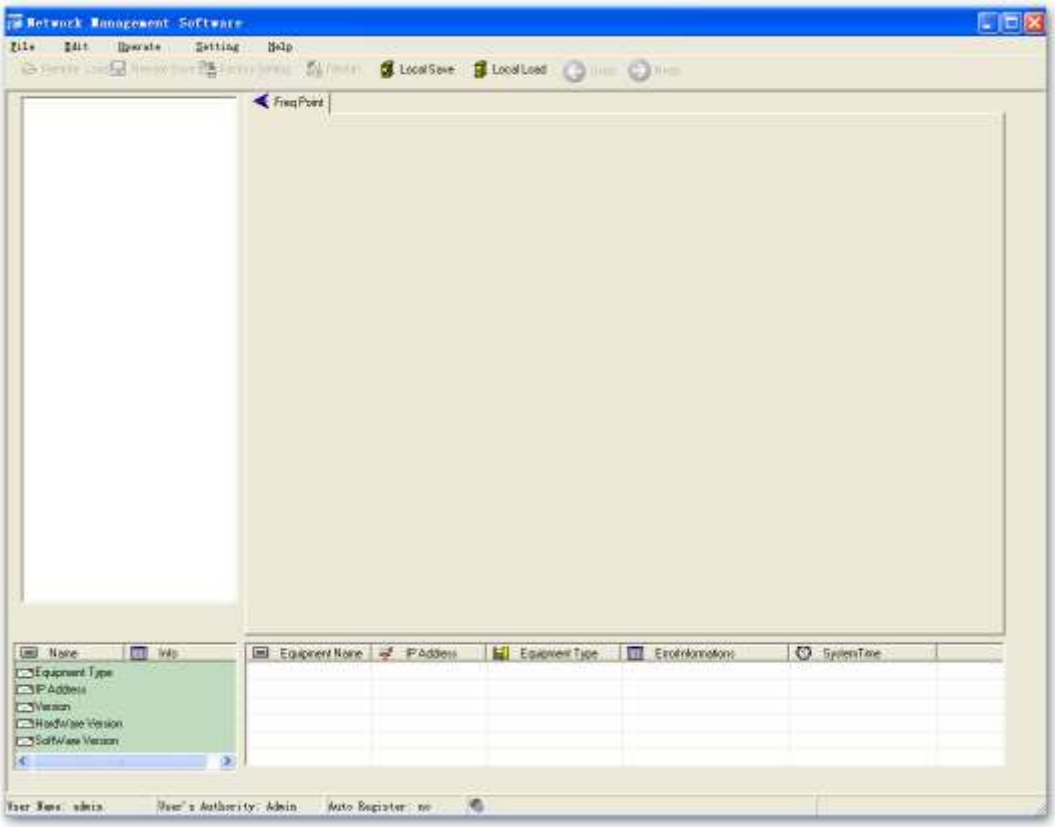
4.2 Software Operation

4.2.1 Login Interface

A login interface will pop up firstly when the software is running and give user prompts to input user name and password, the menu shows as follows:

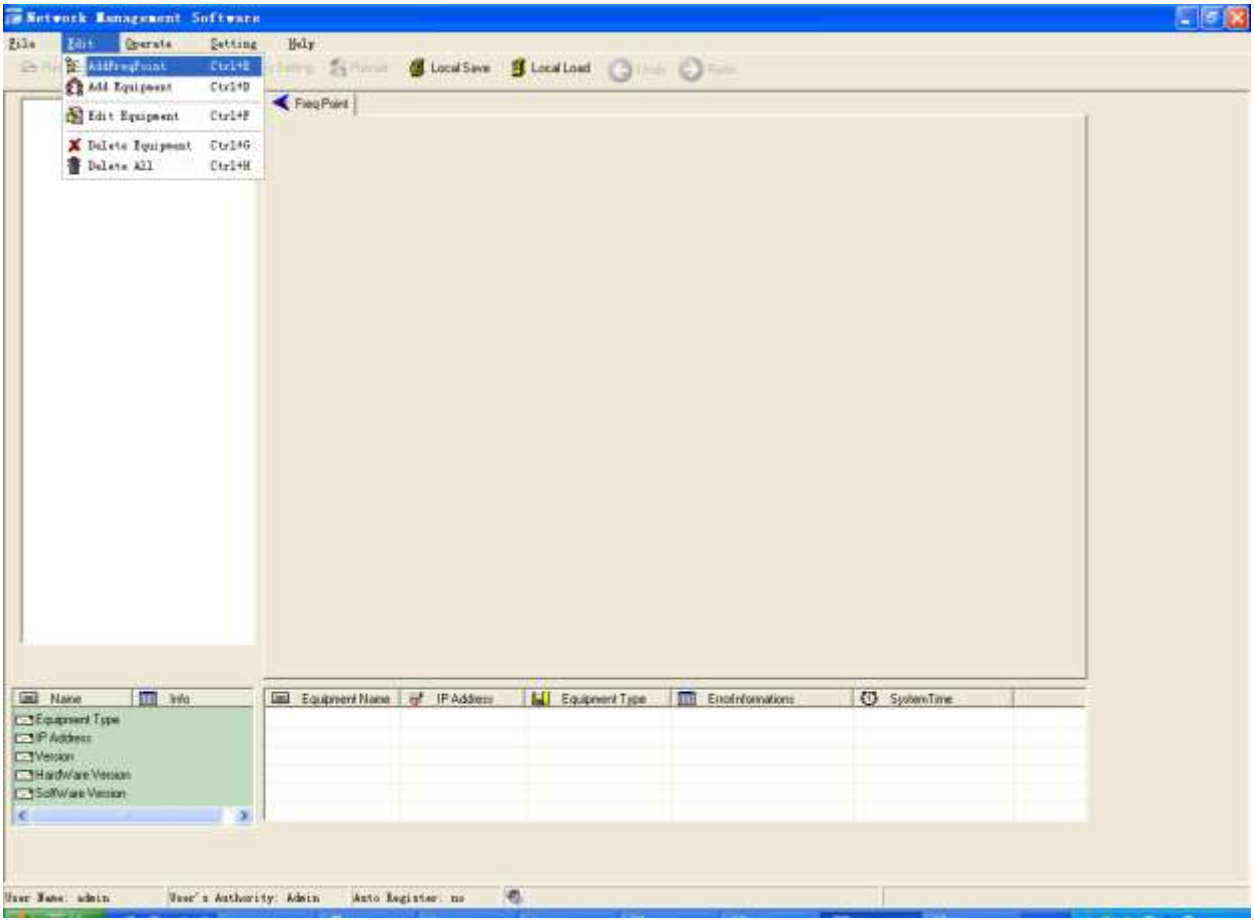
User can login the NMS by pressing **Confirm** key after inputting user name and password. Upon the inputs, the software will verify them with database record automatically. If both of them are correct, the main interface will appear. Both of the default user name and password are **admin**.

4.2.2 Main Interface

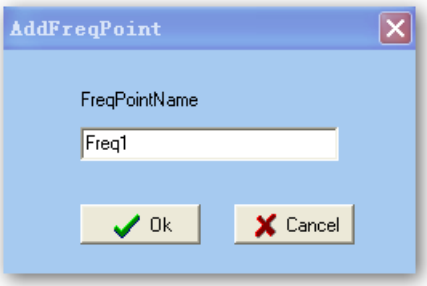


User can create a device node tree in the left column by adding, modifying and deleting the device node. This software provides a powerful node operation function, and the user can edit various parameters in the device tree for management and classification.

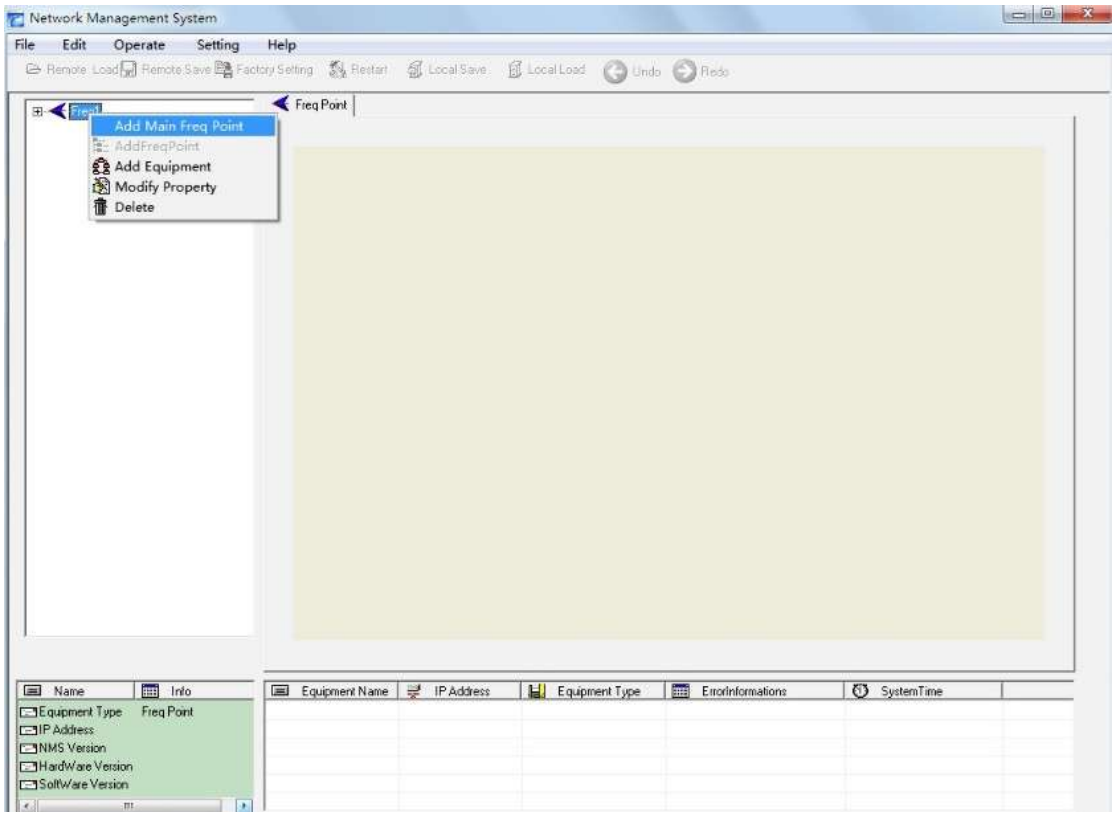
4.2.3 Adding Frequency Point



The Add Freq Point dialog box popes up when the user clicks the Add Freq Point item in the Edit pull down menu on the menu row. The device will confirm the given frequency while user clicks **OK**.

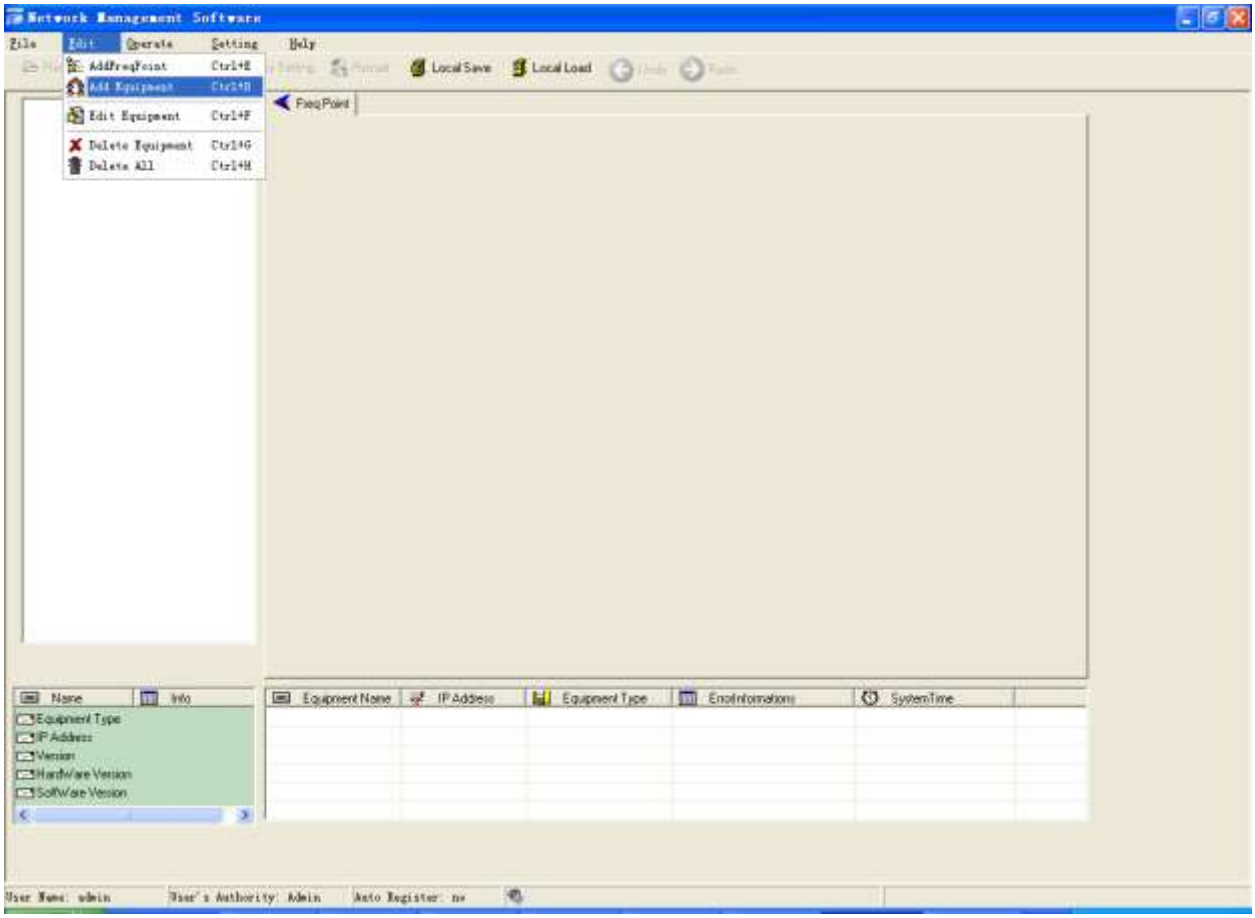


User can also click right mouse key to pop up the short-cut menu in device tree or in the left blank column, then the corresponding dialog box will pop up by choosing **Add Main Freq Point.** The device will confirm the given frequency while user clicks **OK.**

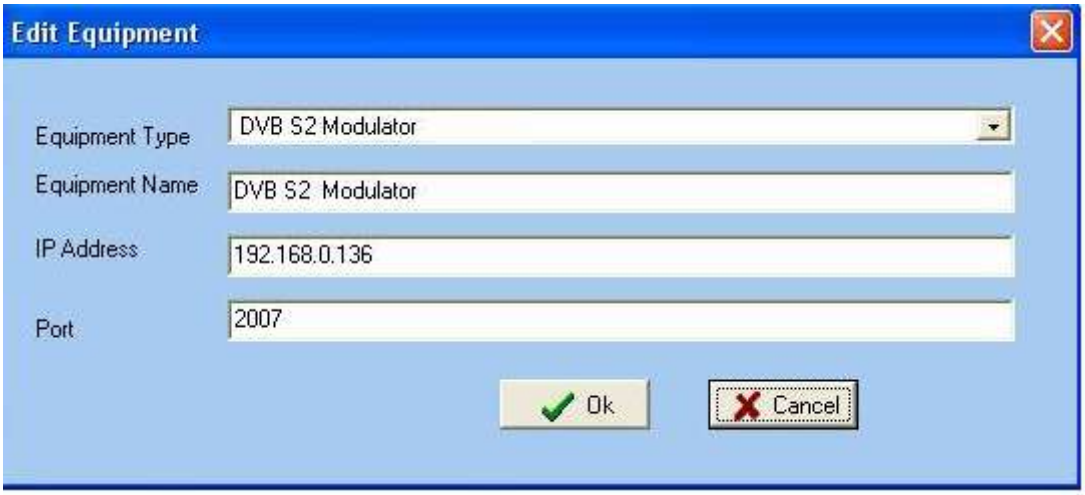


4.2.4 Adding Equipment under Given Frequency Point

User should choose the frequency point in advance, and then the dialog box of Add Equipment will pop up when user clicks "Add Equipment" item in the Edit pull down menu on the menu row.



4.2.5 Edit Equipment Interface

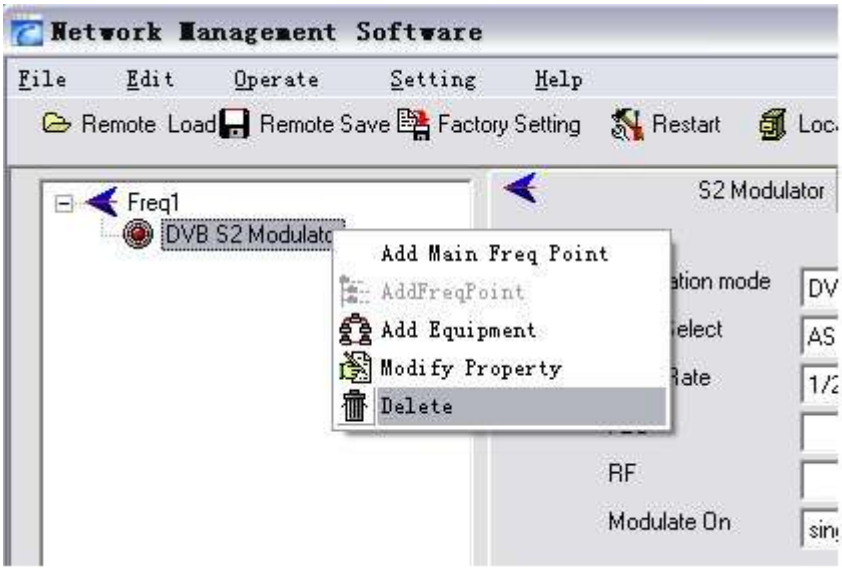


User should follow the steps as below:

- Choosing the connected equipment type in drop down list of "Equipment Type" by clicking the "▼".
- Inputting the Equipment Name
- Inputting the device IP Address
- Inputting the device Port Number

4.2.6 Delete Equipment

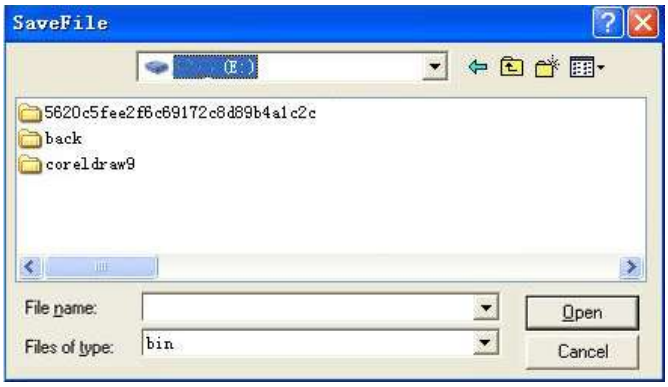
User can choose the equipment to be deleted in the left column, and then click the "delete" item in the pull down menu which appears by clicking the right mouse key.



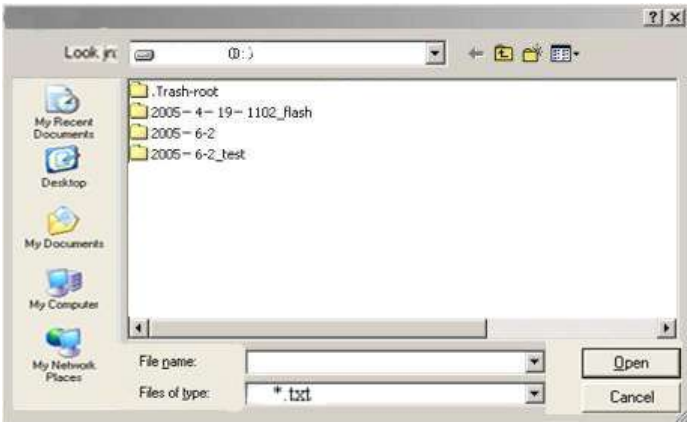
4.2.7 Save Configuration

After finishing all the parameters setting, user can click Remote Save button on the toolbar to save the modifications to the device's flash, while user can also reload the saved parameters from device's flash and refresh the device's parameters setting according to the loaded values by clicking Remote Load

Alternatively, user can also click the Local Save button on the toolbar to popup the "save file" dialog box, which gives prompts to save all the device's parameters as binary files in the computer's hard disk.



Similarly, user can choose to click the Local Load button on the toolbar to popup the read file dialog box, to read the stored binary file and set the device's parameters according to the loaded binary files.

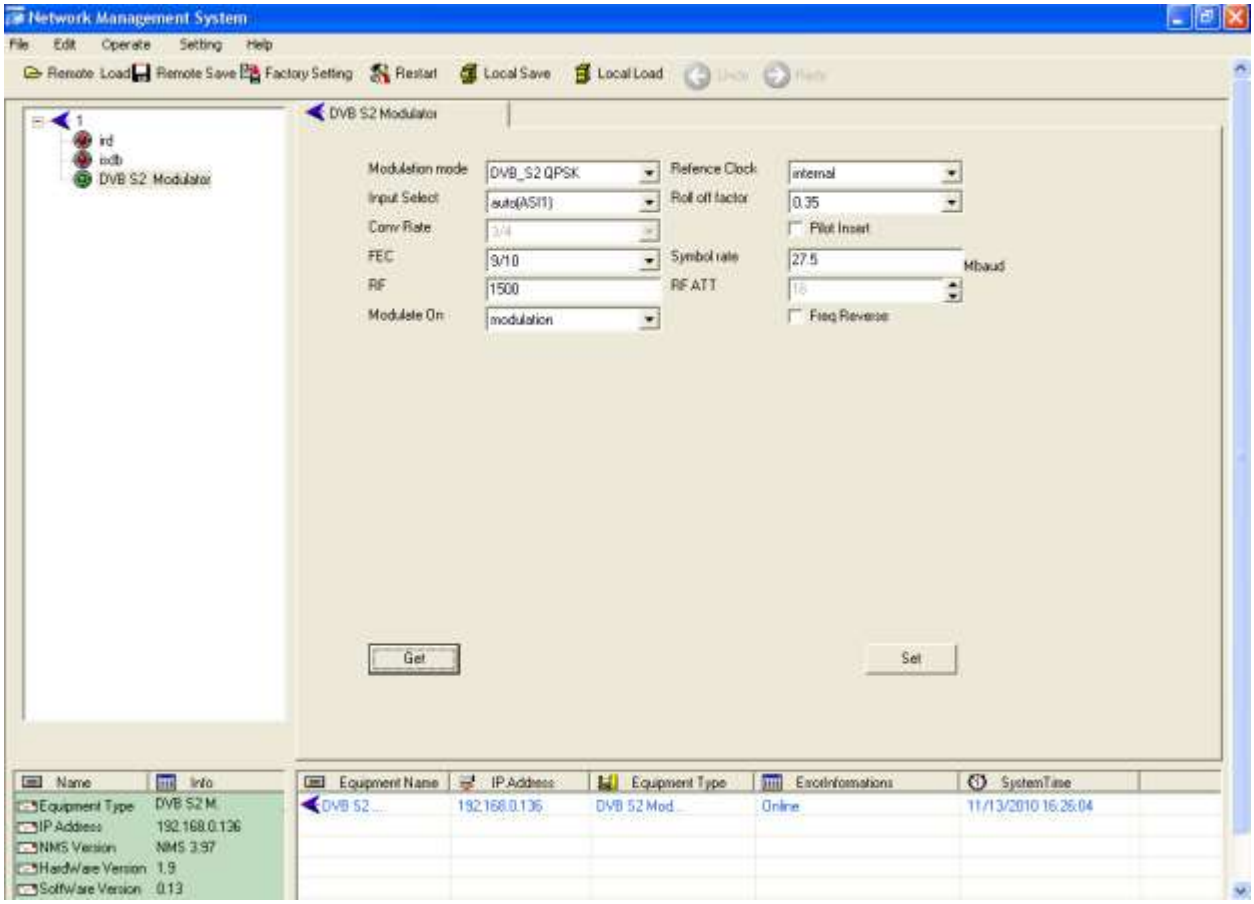


4.3 DVB-S2 Modulator Operation

User can choose the DVB-S2 modulator in the device tree.

Set: making the current parameters, which show in the NMS software, activate.

Get: reading the current device's activating parameters and show them on NMS software.



4.3.1 Modulation Mode

User can select the modulator's working mode and relevant constellation at this drop-down list.

DVB-S: This modulator works as DVB-S modulator (QPSK modulator)

DVB-S2 QPSK: This modulator works as DVB-S2 modulator with QPSK constellation.

DVB-S2 8PSK: This modulator works as DVB-S2 modulator with 8PSK constellation.

4.3.2 Reference Clock

Internal: This modulator uses internal 10MHz crystal oscillator as reference clock.

External: This modulator uses external 10 MHz input as reference clock.

Auto: The modulator will preferably select the external 10MHz input if it exists. Otherwise the modulator will select the internal 10MHz crystal oscillator's output as reference clock.

4.3.3 Input Select

ASI1: The input TS comes from port ASI1.

ASI2: The input TS comes from port ASI2.

Auto (ASI1): The modulator will preferably select the input TS from ASI1 if it exists; otherwise it will select the input TS from ASI 2.

Auto (ASI2): The modulator will preferably select the input TS from ASI2 if it exists; otherwise it will select the input TS from ASI 1.

4.3.4 Roll off factor

User can set the roll-off factor of the DVB-S and DVB-S2

There are 3 possible options, including 0.35, 0.25 and 0.20.

4.2.5 Conv Rate

This option only activate when the modulation mode is DVB-S, in other words, this modulator works as DVB-S modulator. The possible convolutional options include 1/2, 2/3, 3/4, 5/6, 7/8.

4.2.6 FEC Code Rate

User can set FEC value at this menu when modulator works as DVB-S2 modulator. The possible FEC rates include 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 when the constellation is QPSK.

4.2.7 Pilot Insert

User can choose whether to insert the Pilot block in the check box.

4.2.8 Symbol Rate

Range: 0~45M@QPSK Constellation

0~30M@8PSK Constellation

4.2.9 RF ATT

User can set the attenuation of the RF output. The RF attenuation range is from 0-31.5db in 0.5db step.

4.2.10 Modulation On Optional:

User can set the RF output mode for different applications.

Single tone: the RF output is only carrier without modulation.

Modulation: The RF output carrier with modulation.

Off: Turn off the RF output.

4.2.11 RF

User can set RF output frequency. The RF output frequency range is from 950 to 2150MHz.

Chapter 5 Troubleshooting

The supplier's ISO9001 quality assurance system has been approved by CQC organization. For guarantee the products' quality, reliability and stability. All products have been passed the testing and inspection before ship out factory. The testing and inspection scheme already covers all the Optical, Electronic and Mechanical criteria which have been published by the supplier. To prevent potential hazard, please strictly follow the operation conditions.

Preventive Measures

- Installing the device at the place in which environment temperature between 0 to 45 °C
- Making sure good ventilation for the heat-sink on the rear panel and other heat-sink bores if necessary
- Checking the input AC voltage within the power supply working range and the connection is correct before switching on device
- Checking the RF output level varies within tolerant range if it is necessary
- Checking all signal cables have been properly connected
- Frequently switching on/off device is prohibited; the interval between every switching on/off must greater than 10 seconds.

Conditions need to unplug power cord

- Power cord or socket damaged.
- Any liquid spilled onto device.
- Any cause of a short circuit
- Device in damp environment
- physical damage to the device
- Prolonged idle period.
- After switching on and restoring to factory setting, device still not working properly.

Chapter 6 Packing List

- DVB-S2 modulator 1pcs
- User's manual 1pcs
- Power cord 1pcs
- ASI Cable 1pcs