



20MM-LT06L DVB-T, DVB-C & Satellite Optical Transmitter Operating Manual



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1. Product Summary

1.1 About This Manual

This instruction manual is a complete guide to installing and operating the (1RU) 20MM-LT06L direct modulated optical transmitter. Please read the entire manual before beginning installation.

This manual applies to 20MM-LT06L direct modulated optical transmitter.

- Chapter 1 gives general information about the 20MM-LT06L.
- Chapter 2 describes the technical parameters.
- Chapter 3 describes the panel interface and menu system.
- Chapter 4 tells you how to install the 20MM-LT06L.
- Chapter 5 describes the communication setting
- Chapter 6 describes maintenance and what to do in the event of problems.

1.2 Product Description

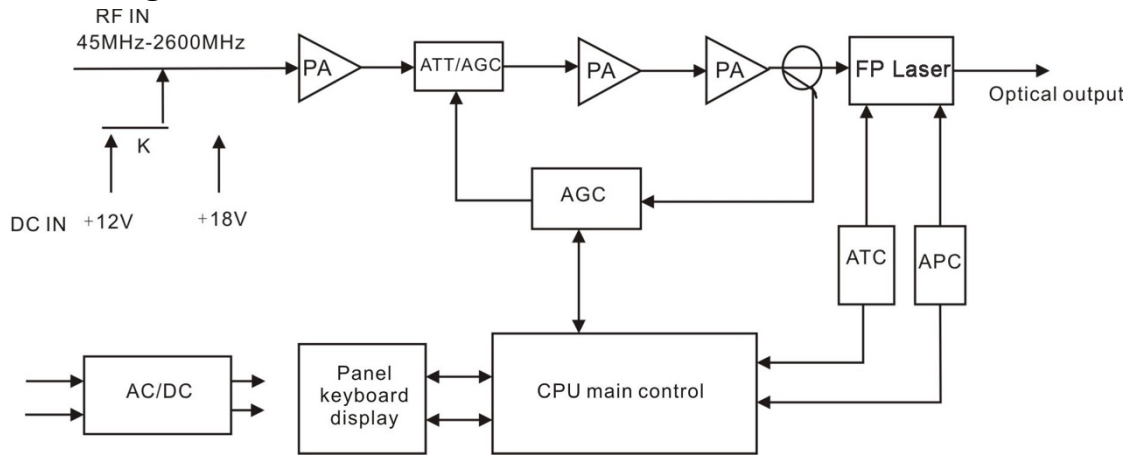
20MM-LT06L satellite optical transmitter adopts a high linearity cooling DFB laser, direct modulated. Simultaneous transmission of 47-862MHz CATV signal and 950~2600MHz satellite direct TV signal in one optical fiber.

20MM-LT06L satellite optical transmitter can use ITU standard wavelengths and be integrated with DWDM for Network upgrades and expansion. Its optical power can be amplified by an EDFA or YEDFA to achieve large area FTTx. It is compatible with FTTx PON technology to achieve FTTH and the multi-network integration of CATV (Analogue, DVB-T,T2, DVB-C), Satellite Television (DVB-S/S2) and Internet.

20MM-LT06L is in 1RU 19” standard rack form, with a built in microprocessor controlling the working parameters via keys and front panel LCD to provide status display and fault diagnosis. Standard RJ45 communication interface, with SNMP network management function. Built-in perfect laser APC and ATC control circuit to ensure the long working life and high reliable of the laser.

SAT-IF adopts a high linearity IF driving amplifier circuit with AGC function to ensure high-quality transmission of Analog TV, Digital TV (DVB-C, DVB-T/T2) and Satellite TV in one optical fiber.

Block Diagram:



1.3 Product Applications

- One optical fiber transmits CATV and Satellite band up to 2600MHz
- FTTx PON (EPON, GPON)

2. Technical Parameters

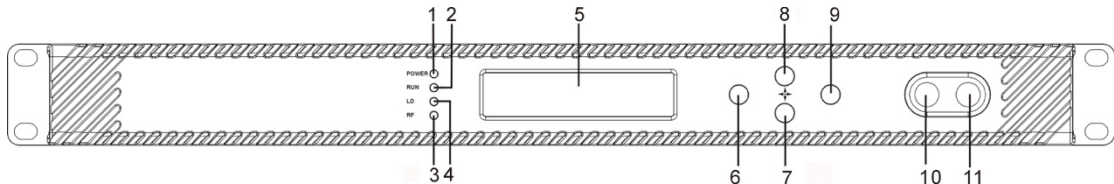
Performance	Index	Unit	Remark
Optical Characteristics			
Laser Type	DFB		Specified by the user
Optical Wavelength	1310, 1550 or specified by the user	nm	Specified by the user
Output Optical Power	2, 4, 6, 8, 10	mW	Specified by the user
Output Return Loss	50	dB	
Optical Connector Type	SC/APC or FC/APC		Specified by the user
CATV RF Characteristics			
Working Bandwidth	45-862	MHz	
Input Range	75~85	dB μ V	Input level
1	\pm 1	dB	
Input Return Loss	14	dB	
C/N	\geq 51	dB	42CH CENELEC 80dB μ V AGC OMI=3.8%
C/CTB	\geq 63	dB	
C/CSO	\geq 58	dB	
Input Impedance	75	Ω	
RF Connector	F type Male/Female		Specified by the user

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SAT-IF Characteristics			
Working Bandwidth	950~2600	MHz	
Input Range	68~83	dB μ V	Input level
Flatness	± 1	dB	
Input Return Loss	10	dB	
C/IM3	≥ 55		Note1
General Characteristics			
Power Supply (AC)	110~265	V	Optional dual power
Consumption	20	mW	
SNMP network management interface	RJ45		
Working Temperature	0~50	$^{\circ}$ C	
Storage Temperature	-40~60	$^{\circ}$ C	
Dimension (W)*(D)*(H)	1U 19 inch 483*395*44	mm	
Note1: C/IM3 is defined as the ratio between the peak of carrier signal and triple beat (IM3) by using a two-tone test (1.0GHz and 1.1GHz).			

3. Panel Interface and Menu System Description

3.1 Front Panel

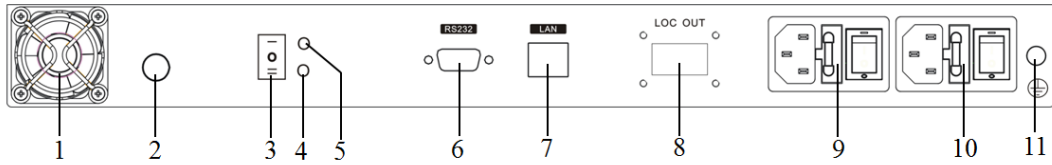


1	Power indicator	2	Run indicator	3	Laser working indicator
4	RF input indicator	5	LCD	6	ESC
7	Down	8	Up	9	Enter
10	Laser switching key	11	RF input test port		

3.1.1 Indicators Status Description

Power indicator	Power on	LED green
Run indicator	Normal	LED green
Laser indicator	ON	LED green
RF input indicator	No input or exceed the normal range	LED flash red
	Normal	LED green

3.2 Rear Panel



1	Fan outlet	2	RF signal input port	3	Voltage output switch
4	+18V indicator	5	+12V indicator	6	RS232 interface
7	LAN interface	8	Optical output interface	9	Power socket
10	Power socket	11	Ground stud		

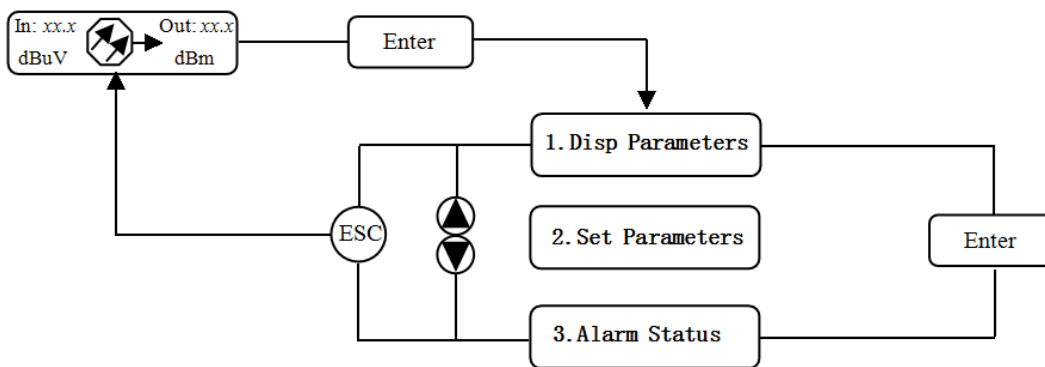
Note: When the voltage output is switched on the ‘—’ side, the +12V indicator is on and the RF signal input port is supplied with +12VDC voltage output.

When the voltage output is switched on the ‘○’ side, the RF signal input port has no voltage output.

When the voltage output is switched on the ‘=’ side, the +18V indicator is on and the RF signal input port is supplied with +18VDC voltage output.

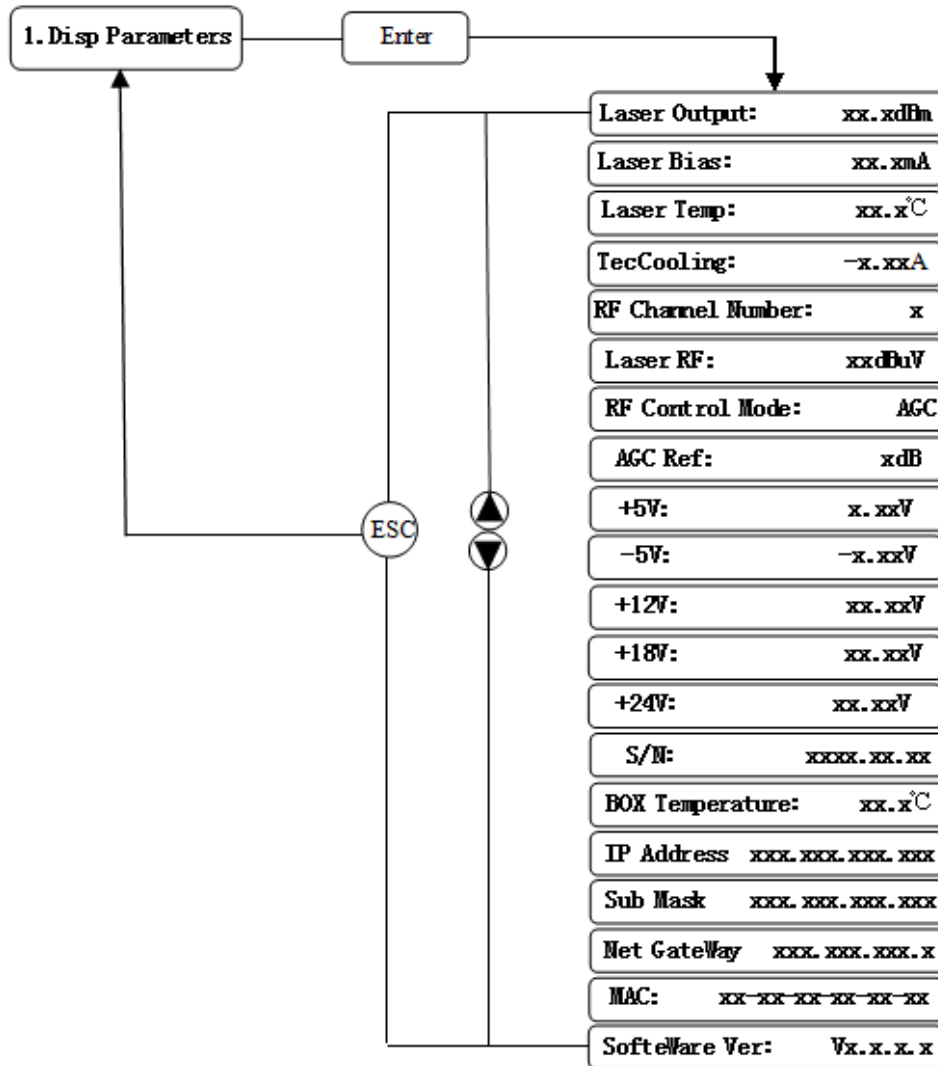
3.3 Menu Operation

3.3.1 Main Menu



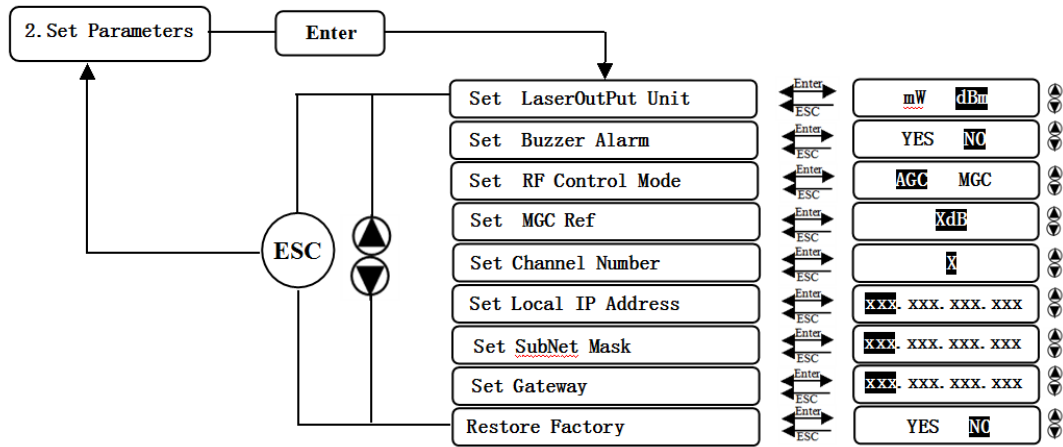
Display parameters	Description
	Boot display
1.Disp Parameters	Menu 1: Display parameters
2.Set Parameters	Menu 2: Set parameters
3.Alarm Status	Menu 3: Alarm status

3.3.2 Display Menu



Display parameters	Description	Display parameters	Description
Laser Output	Output optical power	+24V	+24V monitor voltage
Laser Bias	Laser current	S/N	Serial number
Laser Temp	Laser temperature	BOX Temperature	Box temperature
TEC Cooling	Cooling current	IP Address	IP address
RF Control Mode	RF control mode	Sub Mask	Subnet mask
AGC Ref	AGC attenuation	Net Gateway	Gateway
+5V	+5V monitor voltage	MAC	Mack address
-5V	-5V monitor voltage	Software Ver	Software version number
+12V	+12V monitor voltage		
+18V	+18V monitor voltage		

3.3.3 Setup Menu



Display parameters	Description	Remark
Set Laser Output Unit	Set optical power output unit	mW and dBm optional
Set Buzzer Alarm	Set buzzer alarm	YES is on, NO is off
Set RF Control Mode	Set RF control mode	AGC and MGC optional
Set MGC Ref	Set attenuation under MGC mode	Adjustable range 0~15dB
Set AGC Ref	Set attenuation under AGC mode	AGC control range -3~+3dB
Set Channel Number	Set channel number	
Set Local IP Address	Set IP address	
Set Subnet Mask	Set subnet mask	
Set Gateway	Set gateway	
Restore Factory	Restore factory settings	

3.3.4 Alarm Menu

Display alarm content	Description
RF Alarm	RF alarm
Laser Temp	Laser temperature alarm
Laser Bias:	Laser current alarm
Output Alarm	Output alarm
Laser Tec	Laser cooling current alarm
+5V Alarm	+5V voltage alarm
-5V Alarm	-5V voltage alarm
+12V Alarm:	+12V voltage alarm
+18V Alarm:	+18V voltage alarm
+24V Alarm	+24V voltage alarm

4. Installing the 20MM-LT06L Optical Transmitter


4.1 Receiving and Inspecting


As you unpack your unit, inspect the shipping container and equipment for damage. Save the shipping material for future use. If the container or the equipment is damaged, notify both the freight carrier and Matchmaster.

CAUTION: To protect yourself from potential injury and to protect the equipment from further damage, do not perform any operational tests if the equipment appears to be damaged.

4.2 Precautions

Heed the following precautions when working with the 20MM-LT06L.

 Warning	Read the installation instructions before connecting the system to the power source.
--	--

 Warning	The power socket ends must be accessible at all times, as it serves as the mains disconnection.
--	---

4.3 Mounting the 20MM-LT06L

4.3.1 Mount the 20MM-LT06L in a cabinet

To mount the 20MM-LT06L in a standard 19-inch equipment cabinet:

1. Place the unit in the cabinet.
2. Use four mounting screws to attach the mounting ears on the front panel to the cabinet.
3. Reliably ground the equipment, the ground terminal is on the rear panel.
4. Visually inspect each key (button) on the front panel to ensure that it is not trapped under the edge of its hole. If a key is trapped, tap the key to enable it to move freely.

4.3.2 Connecting the RF Cables

Verify the type of RF input F connector according to the ordering information, and then connect with the matched RF cable.

4.3.3 Connecting the Optical Fiber Cables

20MM-LT06L has one output optical connector.

DANGER: The fiber carries invisible laser radiation. AVOID DIRECT EXPOSURE TO BEAM. Never operate the unit with a broken fiber or with a fiber connector disconnected.

1. Verify the optical fiber connector type is matched with 20MM-LT06L according to the ordering information. (SC/APC)
2. Verify that the fiber cable connector has been cleaned properly. If the fiber cable connector needs to be cleaned, follow the cleaning procedure outlined in “Cleaning Patch Cord or Pigtail Fiber Optical Connectors”.
3. Verify that the 20MM-LT06L optical connector has not been exposed to any contamination.

NOTE: Any contamination of the optical connector can significantly degrade optical link performance. This degradation will most likely manifest itself as poor signal-to-noise (SNR) performance.

4. Note the key characteristics of the mating connectors and align them accordingly.

4.3.4 Connecting the Ethernet Cable

You can connect the 20MM-LT06L to your TCP/IP network in order to monitor and control the transmitter remotely. After you complete the installation procedures described in this chapter, you can use a network management system (NMS) to monitor and control the 20MM-LT06L.

To connect the 20MM-LT06L, you must use a shielded and grounded Category 5 Ethernet cable.

To connect the Ethernet cable:

1. Connect an Ethernet cable to the transmitter’s RJ-45 Ethernet port and to your TCP/IP network. The Ethernet port is on the rear of the transmitter.
2. Verify that the green Link LED is illuminated, indicating that there is a connection.

4.3.5 Connecting Power

20MM-LT06L uses 110-265VAC power supply. Follow the power connection procedure below.

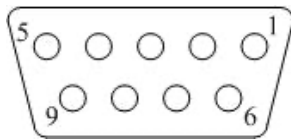
It has two 110-265V power supplies that require input voltage from 110 to 265 VAC, at 50 to 60Hz single phase. The AC power plug is located on the rear panel.

Connect the power; it takes about 60 seconds for all systems to operate.

5. Communication Setup

5.1 RS232 Communication Interface Description

Adopt DB9 standard connector, the pin definitions as follow:



- 1: No Connect
- 2: TX
- 3: RX
- 4: No Connect
- 5: GND
- 6: No Connect
- 7: No Connect
- 8: No Connect
- 9: No Connect

The serial communication uses the standard NRZ form, 1 starts bit, 8 data bits, 1 stop bit and the baud rate is 38400.

5.2 Set up the Hyper Terminal

If you have not setup the Hyper Terminal in your Windows system, follow the steps:

Click “start menu →program→ accessory→communication→Hyper Terminal”:

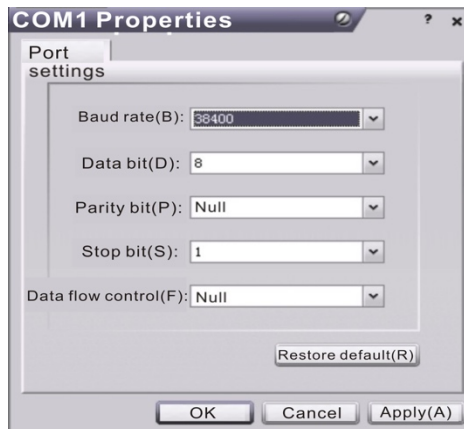
This results in the following screen:



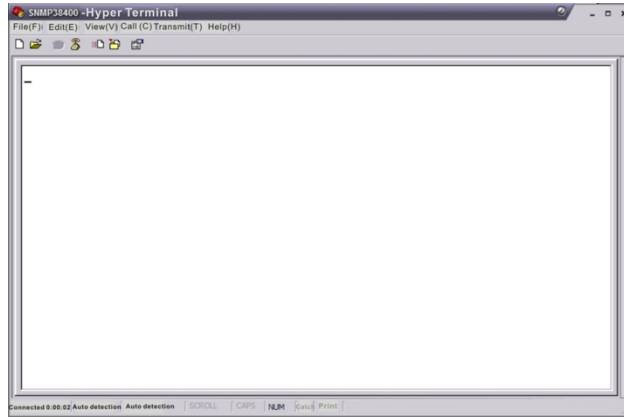
Then you input your connection name, such as “SNMP38400” , and choose the serial port to connect with your equipment. As follows:



Press the “OK” button shows the configuration page of serial port. As follows:



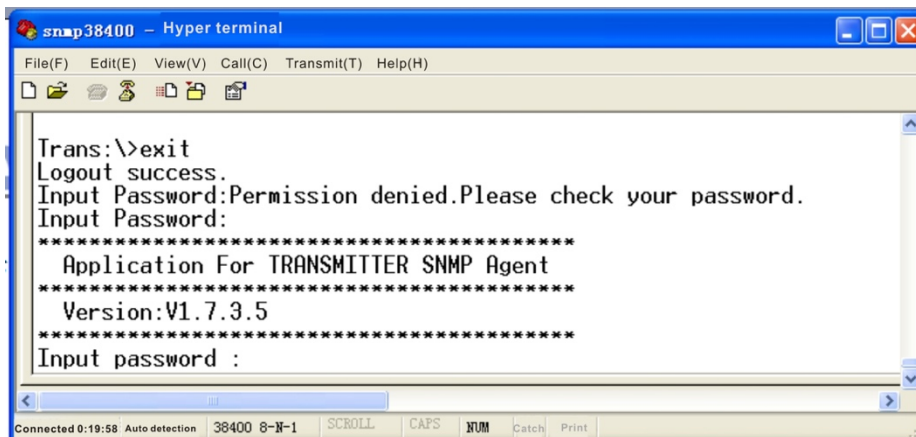
Change the serial port configuration to 38400-baud rate, 8 data bits, no parity bit, 1 stop bit, no data flow control, press the “OK” button, and you have set up the Windows serial port Hyper Terminal.



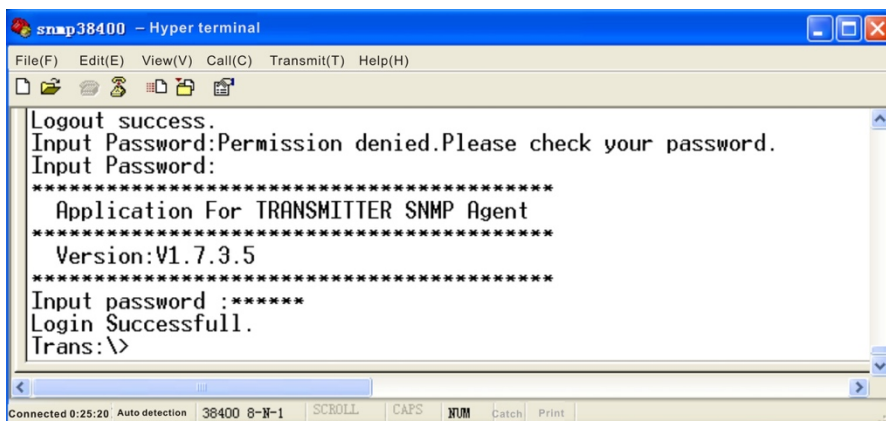
You can click “file→save” menu to save this configuration of Hyper Terminal for later use.

5.3 Operating Parameter Configuration

Under the condition of power off, use the serial port lines to connect the RS232 port with the computer port. Open the Windows Hyper Terminal which you have set up. Then turn on the power, you will see the page as follows. Enter the password to enter the configuration interface.



Enter the password, display the following screen:



You can input your command in this page, and then configure the operating parameter of the application program.

System supports the following commands:

help	List internal commands of the system;
ethcfg	Configure the Ethernet operating parameters;
settrap	Configure the aim host IP address of the SNMP Trap;
community	Configure the SNMP group name;
Restore	Restore the factory default values;
setsn	Set serial number;
setpswd	Set login password;
entplogo	Set company logo and equipment model;
Exit	Logout;

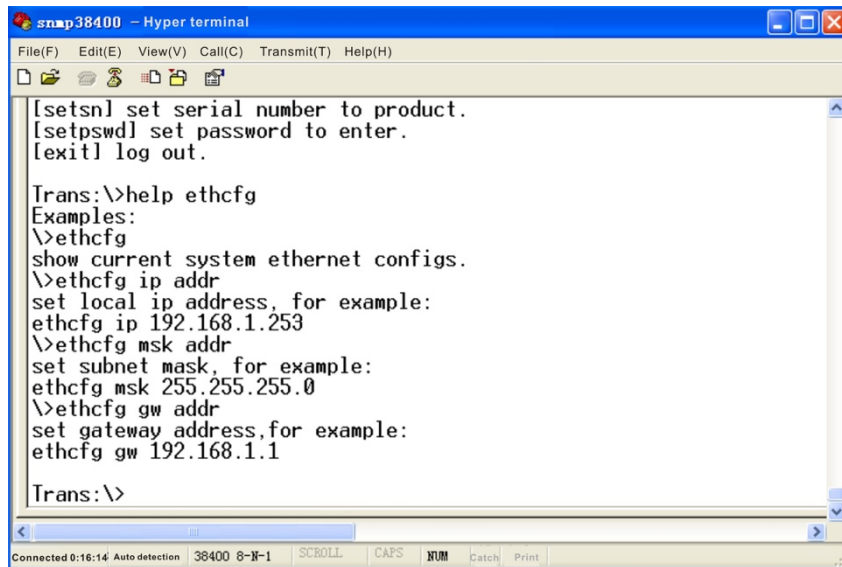
Specific using as follows :

help

This command shows current application program version, program name and the internal commands list of the system as follows:

```
snmp38400 - Hyper terminal
File(F) Edit(E) View(V) Call(C) Transmit(T) Help(H)
Trans:\>help
*****
Application For TRANSMITTER SNMP Agent
*****
-----
Version: 1.7
Build time: Jun 04 2012 09:25:05
-----
Command list:
[help] show command help.
[ethcfg] ethernet module config.
[settrap] config remote ip list for trap pdu.
[community] config snmp community for agent.
[entplogo] config enterprise logo string.
[setsn] set serial number to product.
[setpswd] set password to enter.
[exit] log out.
Trans:\>
```

You can also use the “help” command to show help information of other commands, such as “help ethcfg” , ethcfg’s help information appears as follows:



```
snmp38400 - Hyper terminal
File(F) Edit(E) View(V) Call(C) Transmit(T) Help(H)

[setsn] set serial number to product.
[setpswd] set password to enter.
[exit] log out.

Trans:\>help ethcfg
Examples:
\>ethcfg
show current system ethernet configs.
\>ethcfg ip addr
set local ip address, for example:
ethcfg ip 192.168.1.253
\>ethcfg msk addr
set subnet mask, for example:
ethcfg msk 255.255.255.0
\>ethcfg gw addr
set gateway address, for example:
ethcfg gw 192.168.1.1

Trans:\>
```

ethcfg

This command configures the Ethernet parameters, including IP address, subnet mask and gateway. You can refer to the help information for its use.

settrap

This command shows or modifies the aim host IP address list of the SNMP Trap, IP address of 0.0.0.0 and 255.255.255.255 don't exist. SNMP Trap does not send to these two addresses.

community

This command configures the read-only group name and read-write group name. "Group name" is the concept of SNMP agreement like the password. Use the command "community ro" to configure the read-only, and "community rw" for the read-write. For example, input "community rw public", "public" is the read-write group name. The group name for read-only and read-write are both "public" as the equipment default setting from factory.

setpswd

This command is used to modify login password.

entplogo

This command is used to set company logo and equipment model.

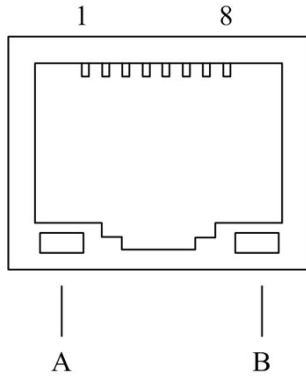
Exit

This command is used to logout.

5.4 Remote Monitoring: SNMP

LAN communication interface

Adopt RJ45 standard connector, the pin definitions as follow:



1: TX+

2: TX-

3: RX+

4: No Connect

5: No Connect

6: RX-

7: No Connect

8: No Connect

A: Green indicator flashing means that the LAN port is sending data.

B: Yellow indicator means that the network connection is normal.

SNMP basic background

Simple Network Management Protocol (SNMP) is an application layer protocol. It makes the management information between network devices exchange easier. It is part of the TCP / IP protocol group. SNMP enables the end-users to manage network performance, find and solve network problems, and arrange for future network upgrades.

Management Information Base (MIB) is the organized hierarchical information set. Use SNMP to visit these MIB. They are composed of manageable information and identified by the object identifier.

SNMP

Transmitter configuration of network communication

When the transmitter initial work, the IP address and gateway are in the default state, you need to configure them. The configuration of initial state can be achieved through the RS-232 interface or the front panel keys. Other configurations see our <Network Management Instructions>.

6. Maintenance and Troubleshooting

6.1 Cleaning Fiber Optic Connectors

DANGER: The fiber optic connector carries invisible laser radiation while working, so should avoid charged operation.

Dirty optical connectors are the leading source of poor performance in a broadband optical fiber network. Dirty optical connectors lead to optical signal loss and reflections, which in turn can seriously degrade signal-to-noise (SNR) performance and, in some cases, distortion performance. We recommend that you clean all mating fiber connectors before connecting them to an optical transmitter.

In addition, if you suspect that the optical connector of 20MM-LT06L may have been exposed to contamination (by a dirty fiber cable connector, for example), you should properly clean the optical connector before connecting the optical fiber.

CAUTION: Improper cleaning of an optical connector can do more harm than good. Never spray a clean-air product onto the surface of an optical connector. Spraying air onto an optical connector can cause condensation on the connector surface, leaving water spots and trapping dust. Failing to wipe a connector on dry lens paper immediately after wiping on paper wet with isopropyl alcohol can also lead to condensation on the connector. Using low-grade cleaning paper or other cloth to wipe an optical connector can leave microscopic fibers on the optical connector surface.

6.1.1 Cleaning Patch Cord or Pigtail Fiber Optical Connectors

To clean optical connectors, we recommend using a fiber optic connector cleaning cartridge (such as NTT Cletop). If a cleaning cartridge is not available, follow these steps.

To clean the optical connector of a patch cord or pigtail:

1. Fold a piece of unused dry lens cleaning paper twice, for a four-ply thickness.
2. Use a drop of high-grade isopropyl alcohol to wet part of the paper.
3. Lay the connector on the lens cleaning paper with the tip touching the paper.
4. In one continuous motion, pull the connector from the wet part of the paper to the dry part.

6.2 Troubleshooting

Should a problem occur, see if the symptoms are listed in Table 6-1.

Table 6-1: Troubleshooting Solutions

Indicator status	Alarm menu content	Fault phenomenon	Solution
Run indicator green flash	Normal	Normal	Operation Normal
RF indicator red flash	RF IN Status LOW (HIGH)	RF input is low (high)	Verify the optical transmitter is operating within the proper input level threshold range (-25~-5dBm). If that does not correct the problem, contact Customer Service.
Laser indicator red flash	Laser Bias HIGH	The laser is off	Contact Customer Service.
	Laser TEC HIGH	The laser is off	Verify that the unit is operating within the proper temperature range (0~+50°C). Verify that nothing is obstructing airflow through the openings in the front and back of the unit. Recall factory settings by pressing the key on the front panel (see Section 3). If that does not correct the problem, contact Customer Service.
	Output Power Status HIGH (LOW)	The laser is off	Reboot the equipment. If that does not correct the problem, contact Customer Service.
None	None	The optical output power is lower than the nominal value	Check the fiber drawer. Follow the connector cleaning procedure (see Section 6.1). If that does not correct the problem, contact Customer Service.

6.3 After-sales Service Description

1. If the equipment fault is resulted from the users' improperly operating or unavoidable environment reasons, charges will apply for replacement or repair.
2. Any site maintenance of the faulted equipment must be operated by professional technicians to avoid further damage.

6.4 Disclaimer

We reserve the right to change any products described herein at any time, and without prior notice. We assume no responsibility or liability arising from the use of the products described herein, except as expressly agreed to in writing by us. The use and purchase of this product does not convey a license under any patent rights, copyrights, trademark rights, or any intellectual property rights of us. Nothing hereunder constitutes a representation or warranty that using any products in the manner described herein will not infringe any patents of third parties.