AN5116-06B

Optical Line Terminal Equipment

Routine Maintenance

Version: C

Code: MN000000521

FiberHome Telecommunication Technologies Co., Ltd.

February 2012

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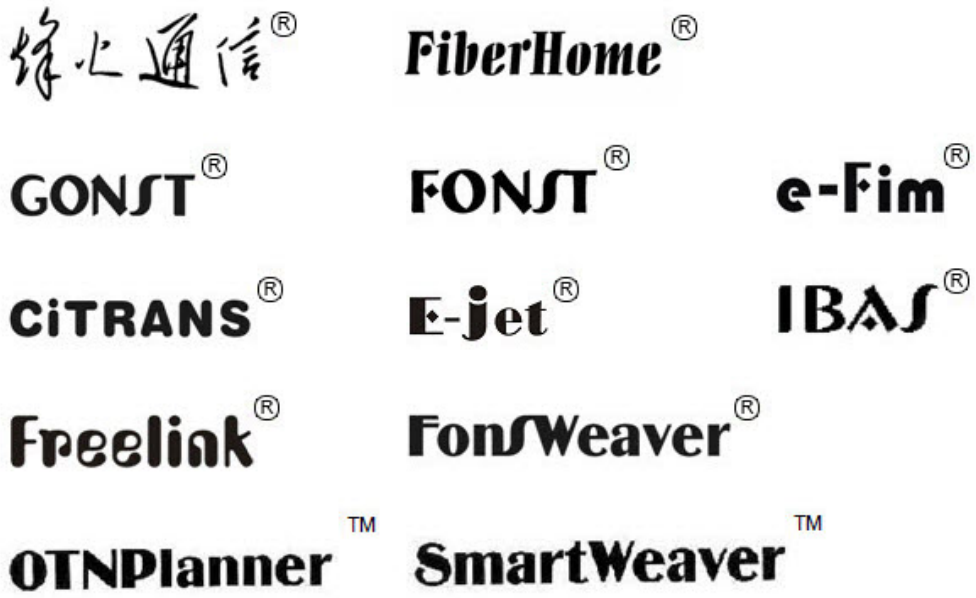

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Preface

Related Documentation

Document	Description
AN5116–06B Optical Line Terminal Equipment Documentation Guide	Introduces the retrieval method, contents, releasing, reading approach, and suggestion feedback method for the complete manual set for the AN5116-06B.
AN5116–06B Optical Line Terminal Equipment Product Description	Introduces the AN5116-06B's network location, functional features, hardware structure, FTTx application model, equipment configuration, network management system and technical specifications. It is the foundation of the complete manual set. Other manuals extend and enrich the concepts introduced in the Product Description.
AN5116–06B Optical Line Terminal Equipment Feature Description	Introduces the key features supported by the AN5116-06B, including GPON / EPON access, GPON / EPON terminal management, VLAN, multicast, voice and safety; and introduces these functions in details in terms of definition, features, specification, principle description, references and so on.
AN5116–06B Optical Line Terminal Equipment Hardware Description	Introduces the appearance, structure, functions, technical specifications, and operating method for the AN5116-06B cabinet, PDP, subrack, cards, cables and wires, facilitating users' mastery of the hardware features of the equipment.
AN5116–06B Optical Line Terminal Equipment Installation Guide	Introduces the overall installation and acceptance inspection procedures from unpacking inspection to poweron examination after the equipment is delivered on site, and provides reference information (e.g. safety principles and wiring scheme of various interfaces) to guide users to install the equipment.
AN5116–06B Optical Line Terminal Equipment EPON Configuration Guide	Introduces the method for configuring the EPON services supported by the AN5116-06B via the ANM2000, such as basic configuration, voice service configuration, data service configuration, multicast service configuration, and software upgrading configuration, to guide users on startup for various services and software upgrading.

Document	Description
AN5116–06B Optical Line Terminal Equipment GPON Configuration Guide	Introduces the method for configuring the GPON services supported by the AN5116-06B via the ANM2000, such as basic configuration, voice service configuration, data service configuration, multicast service configuration, and software upgrading configuration, to guide users on startup for various services and software upgrading.
AN5116–06B Optical Line Terminal Equipment GUI Reference	Introduces the shortcut menu for every card of the AN5116-06B on the ANM2000, including the function, parameter explanation, precautions and configuration example of every command in the shortcut menu of each card, to help users master the operation of the AN5116-06B using the ANM2000.
AN5116–06B Optical Line Terminal Equipment Component Replacement	Introduces the operation procedures for replacing the AN5116-06B's components, including preparations, precautions, early operations, operation process and subsequent operations, so as to guide users with the component replacement on the hardware.
AN5116–06B Optical Line Terminal Equipment Routine Maintenance	Introduces the daily, weekly, monthly, quarterly and annual routine maintenance operations on the AN5116-06B. Users are able to eliminate silent failures in the equipment operation process as early as possible via implementing the routine maintenance.
AN5116–06B Optical Line Terminal Equipment Alarm and Event Reference	Introduces the AN5116-06B alarm / event information, including alarm / event names, alarm / event levels, possible reasons, effects on the system, and processing procedures, to guide users on effective alarm / event processing.
AN5116–06B Optical Line Terminal Equipment Troubleshooting Guide	Introduces the fault processing principles and methods of fault diagnosis and isolation for the AN5116-06B. Also discusses the typical fault cases of various EPON / GPON services. In case of complex issues, users can contact FiberHome for technical support according to the instructions in this document.

Version

Version	Description
A	Initial version. This manual corresponds to V2.0 of the AN5116-06B.
B	This manual corresponds to V2.1 of the AN5116-06B.
C	This manual corresponds to EPON V3.1 and GPON V3.1 of the AN5116-06B. Compared with version B, this version optimizes the contents and the maintenance procedure.

Intended Readers

This manual is intended for the following readers:

- Planning and designing engineers
- Commissioning engineers
- Operation and maintenance engineers

To utilize this manual, these prerequisite skills are necessary:

- EPON technology
- GPON technology
- Multicast technology
- NGN voice technology
- Ethernet switch technology
- Computer network technology

Conventions

Terminology Conventions

Terminology	Convention
AN5116-06B	AN5116-06BOptical Line Terminal Equipment
EC4B	4×EPON-C Interface Card (type B)
EC8B	8×EPON-C Interface Card (type B)
GC4B	4×GPON-C Interface Card (type B)
GC8B	8×GPON-C Interface Card (type B)
XG2B	2×10G EPON-C Interface Card (type B)
C155A	4×GE + 1×10GE Optical Interface Uplink Card (CES Mode)
CE1B	32×E1 Optical Interface Card (CES mode) (type B)
PUBA	Public Card (type A)
HSWA	Core Switch Card (EPON) (card No.: 2.115.334)
	Core Switch Card (type A) (card No.: 2.115.331)
HU1A	4×GE + 1×10GE Optical Interface Uplink Card
HU2A	2×GE + +2×10GE Optical Interface Uplink Card
GU6F	6×GE Optical Interface Uplink Card

Symbol Conventions

Symbol	Refer to	Meaning
	Note	Important features or operation guide.
	Caution	Possible injury to persons or systems, or cause traffic interruption or loss.
	Warning	May cause severe bodily injuries.

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- ☑ Routine Maintenance Purpose
- ☑ Basic Maintenance Requirement
- ☑ Responsibility and Requirement for Maintenance Engineer
- ☑ Tool and Instrument
- ☑ Routine Maintenance Item and Period
- ☑ How to Obtain Technical Support

1.1 Safety Precaution

The safety precautions include:

- Identifying security and warning signs
- ESD protection
- Plugging and unplugging a card
- Safety rules for operation on optical fibers and optical interfaces
- Electrical safety
- Operation safety rules for the ANM2000

1.1.1 Safety and Warning Sign

The maintenance and commissioning operators should know the meanings of the security and warning signs on the AN5116-06B. Table 1-1 lists the meanings and positions of the labels.

Table 1-1 Security and warning signs

Sign	Meaning	Location
	The ESD protection sign. This sign reminds the operators to wear an ESD protection wrist strap, so as to avoid damage to the equipment caused by electrostatic discharge.	As illustrated in Figure 1-1.
	The subrack earth ground symbol. This symbol marks the location of the subrack earth ground.	
	The laser class sign. This sign marks the optical source class of the optical interface on a card. The operators must prevent the optical source from entering eyes directly to avoid bodily harm.	Located on the panels of the cards with optical interfaces.

Table 1-1 Security and warning signs (Continued)

Sign	Meaning	Location
	The warning sign of periodical cleaning on the anti-dust screen. This sign reminds the operators to clean the anti-dust screen periodically.	Located on the panel of the subrack' anti-dust screen.
	The fan unit safety alarm sign. This sign reminds the operators not to touch the running fan blades.	Located on the fan unit panel.

The following figure shows the locations of the ESD protection sign and the subrack earth ground sign on the subrack as an example.

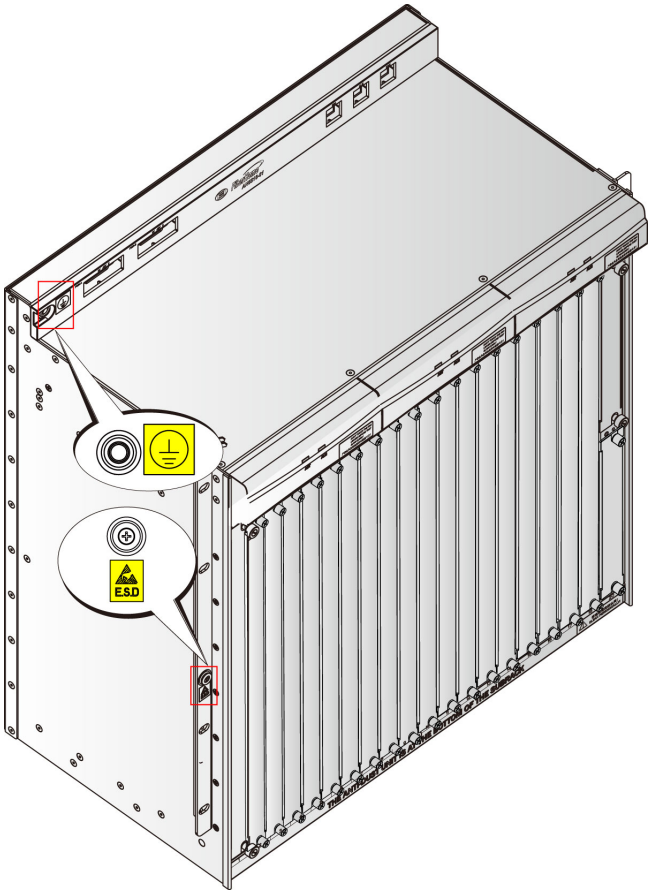


Figure 1-1 Positions of the ESD protection earth ground fastener, subrack earth ground pole

1.1.2 ESD Protection Measure

The electrostatic discharge can damage electrostatic-sensitive components on the cards and subracks; therefore, you must wear the ESD protection wrist strap or take other measures before touching any equipment, card, or IC (Integrated Circuit) chip. Use the ESD protection bags to store and transport cards.

The ESD protection wrist strap is one of the accessories attached to the equipment. Make sure that the metal fastener of ESD protection wrist strap is in good contact with the skin and the other end of wrist strap is correctly connected to the ESD protection earth ground fastener on the cabinet, as shown in Figure 1-2.

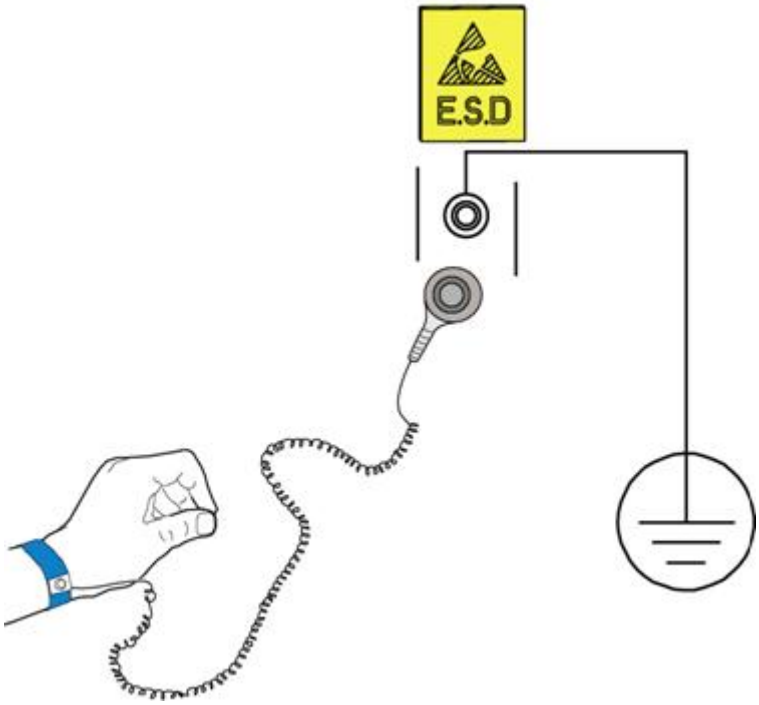


Figure 1-2 Wearing the ESD protection wrist strap

1.1.3 Safety Precaution for Plugging and Unplugging a Card

- Before plugging or unplugging a card, wear the ESD protection gloves or the ESD protection wrist strap and keep both hands dry and clean.
- When holding a card, do not touch components and wiring through on it.
- Before plugging the card, you should confirm:

- The corresponding slot is available.
- Cables or optical fibers are not connected with the card.
- The insertion direction of the card is correct. Do not insert the card in the opposite direction. The insertion direction of the card is shown in Figure 1-3.

◆ Pay attention to the following precautions when plugging the card.

- Operate gently to avoid distorting pins on the subrack backplane.
- Slide the card gently along the slide rails. Prevent the circuit components of the card from contacting each other to avoid shorting or scratching. Install the card following the procedure illustrated inFigure 1-3.

◆ Before unplugging the card, confirm the card is not carrying services. Unplugging the card with services may cause service interruption.

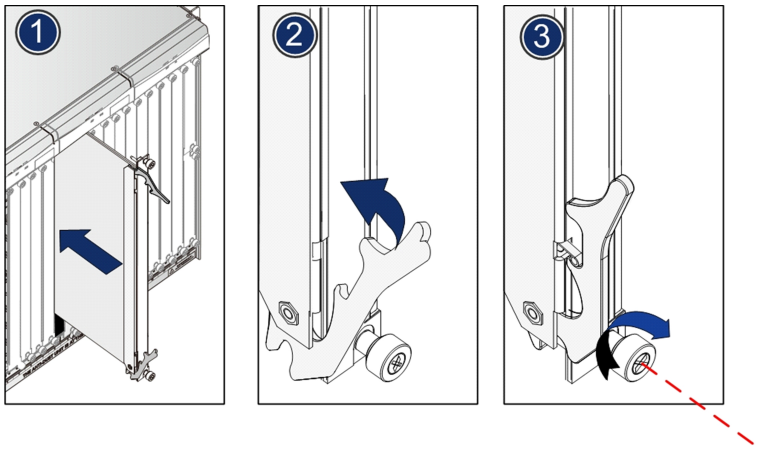


Figure 1-3 Installing the card

1.1.4 Safety Rule for Operation on Optical Fibers and Optical Interfaces

Using dedicated fiber puller

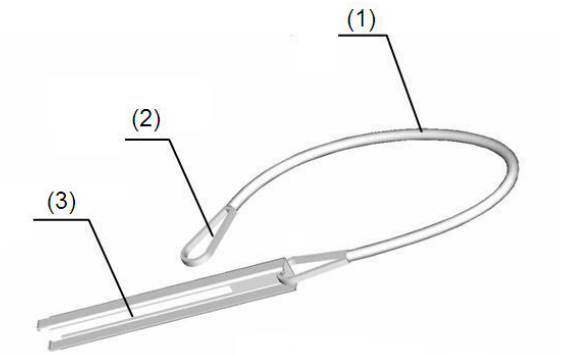
Optical fibers are easily damaged if they are plugged or unplugged by hands without using any tool. The operators should use the dedicated fiber puller to avoid damage to optical fiber and fiber connector caused by rough handling.

Caution:

Please use the fiber puller when plugging / unplugging optical fibers.

The fiber puller, shipped with the equipment, looks like a nipper and has a spring cord, as shown in Figure 1-4.

The fiber puller is secured on the cabinet with the spring cord before delivery. By clipping the fiber connector with the special fiber puller, you can plug or unplug the fiber very conveniently.



(1) Spring cord

(2) Buckle it into the mounting hole on the vertical mounting flange

(3) Fiber puller

Figure 1-4 The dedicated fiber puller

Protecting the optical modules against high optical power

Do not insert the pigtail into the card's optical interface when the pigtail's Tx optical power is unknown. To avoid damage to optical modules, just put the pigtail in the card's optical interface without connecting them or add an attenuator.

Connection of optical fibers

- Check the optical power before connecting the optical fibers; only if the optical power meets the requirement can the fibers be connected. The equipment optical power parameters are shown in AN5116-06B Optical Line Terminal Equipment Product Description.

- Before connecting optical fibers, check whether the optical fiber connector matches the optical interface. If the optical fiber connector does not match the optical interface, use a compatible connector.

Eye protection

Looking the optical output interface or the end of the pigtail connected with the output interface directly will do harm to the eyes. Never get close to or look directly at the optical interface or optical fiber connector.

Avoiding excessive bending of fibers

The optical power may be affected if the fiber is bent or pressed with excessive force. The bend radius should be no less than 38 mm.

Protecting optical interfaces and connectors

- Cover the optical interfaces and optical connectors of the pigtail fibers that are not in use with anti-dust caps. This can avoid eye injuries caused by a direct and unintentional look into the optical interfaces or optical connectors, and prevent dust from entering the optical interfaces or contaminating the optical connectors.
- Cover the optical interfaces of the replaced cards with anti-dust caps to keep the optical interfaces clean.

Cleaning

Use dedicated cleaning tools and materials to clean optical interfaces and fiber connectors.

The following lists some common cleaning tools for operation engineers.

- Dedicated cleaning solvent (the first choice is the isoamyl alcohol and the second choice is the propyl alcohol)
- Non-woven lens tissue
- Dedicated compressed air
- Cotton swab (cotton for medical purposes or other long-staple cotton)
- Dedicated connector cleaner

1.1.5 Electrical Safety Precaution

Short Circuit

- When a shorting occurs, a quick, significant rise in the current will easily result in damage to the equipment and unforeseen safety problems.
- During the operation, avoid metal fillings, water and other conductive materials getting into the in-service equipment so as to prevent damage to electrical apparatus and components caused by a short circuit.
- Avoid shorting caused by incorrect cable connections
- Avoid shorting caused by small animals entering the live equipment

Earth ground

- Confirm that the protection earth ground bar in the equipment room is grounded well.
- Confirm that the equipment is grounded properly.

Equipment power supply

- Make sure the power is shut off before removing the power cable.
- Never expose the power cable. The unnecessary uninsulated parts should be completely covered with an insulating tape.
- When the operation conditions permit, first disconnect the power supply, and then conduct other operations.

1.1.6 Operation Safety Rules for ANM2000

The safety precautions for the ANM2000 are as follows:

- The network management computer should be placed away from direct sunlight, electromagnetic interference, heat source, humidity and dust, and with at least 8cm distance from other objects in order to keep good ventilation.
- Use UPS power supply to avoid loss of network management data caused by accidental power failure.

- The computer case, UPS power supply and switch (or hub) should be connected to the protection earth ground.
- To shut down the network management computer, first exit the operation system normally and then shut off the power supply.
- Do not exit the network management system when it is working normally. Exiting the network management system does not interrupt traffic in the network, but precludes centralized control of the networked equipment.
- The network management computer cannot be used for purposes other than network management. Use of unidentified memory devices should be prohibited so as to avoid computer viruses.
- Do not delete any file in the network management system randomly or copy any irrelevant file into the network management computer.
- Do not visit Internet via the network management computer. Doing so may increase data flow in the net card and hence affects normal network management data transmission or results in other accidents.

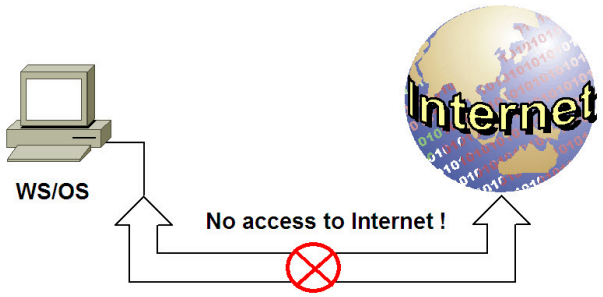


Figure 1-5 No access to Internet

- Do not perform service configuration or expansion during service busy hours via the network management system.
- Do not modify the network management computer's protocol settings, computer name or LAN settings. Doing so may result in abnormal operation of network management system

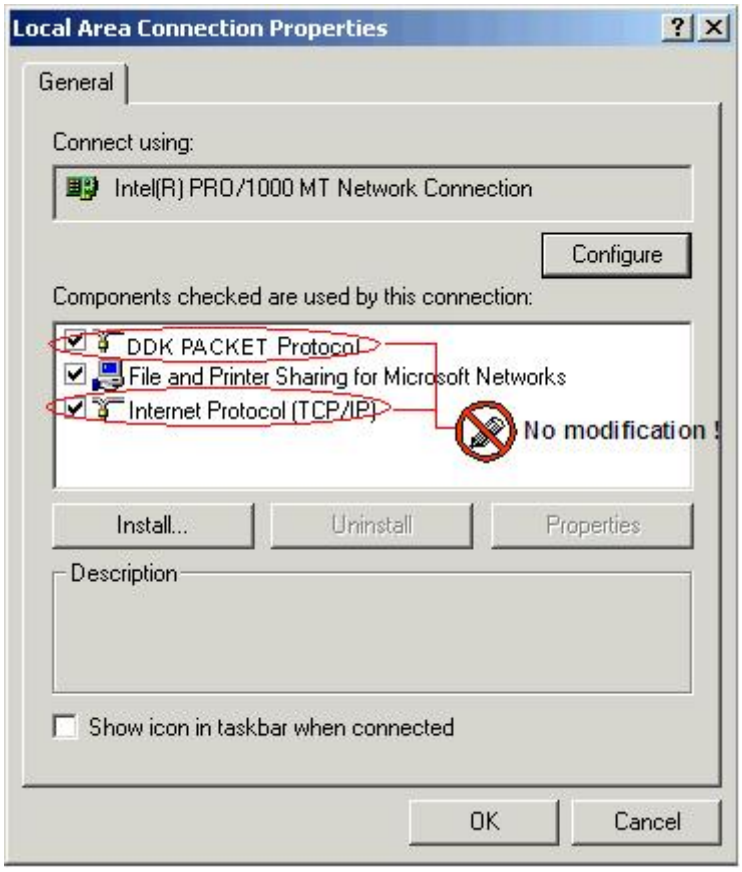


Figure 1-6 Do not modify protocol settings (1)

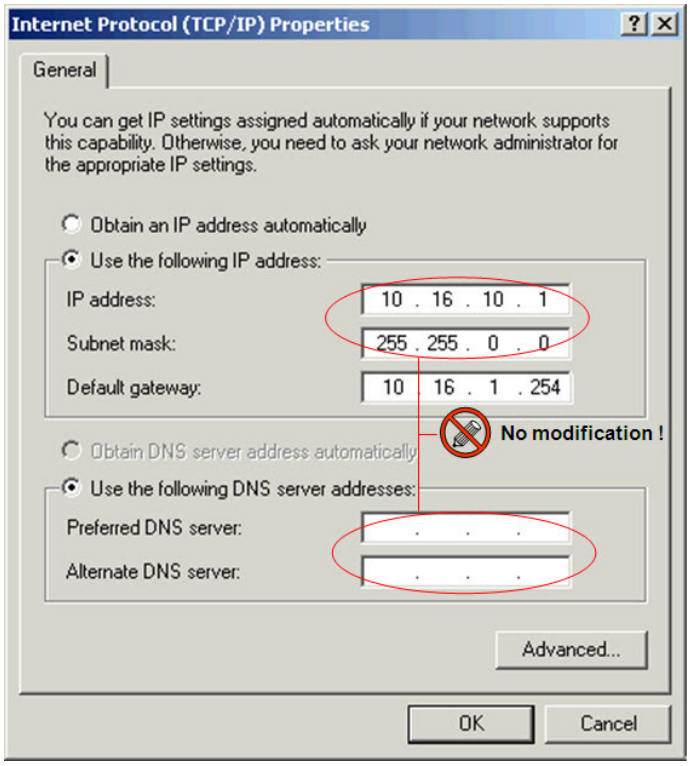


Figure 1-7 Do not modify protocol settings (2)

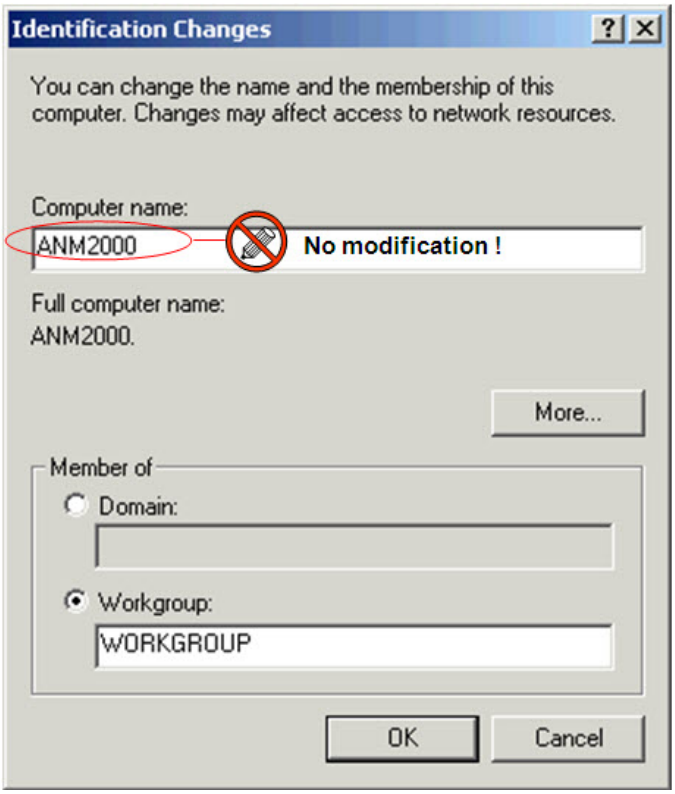


Figure 1-8 Do not modify computer name

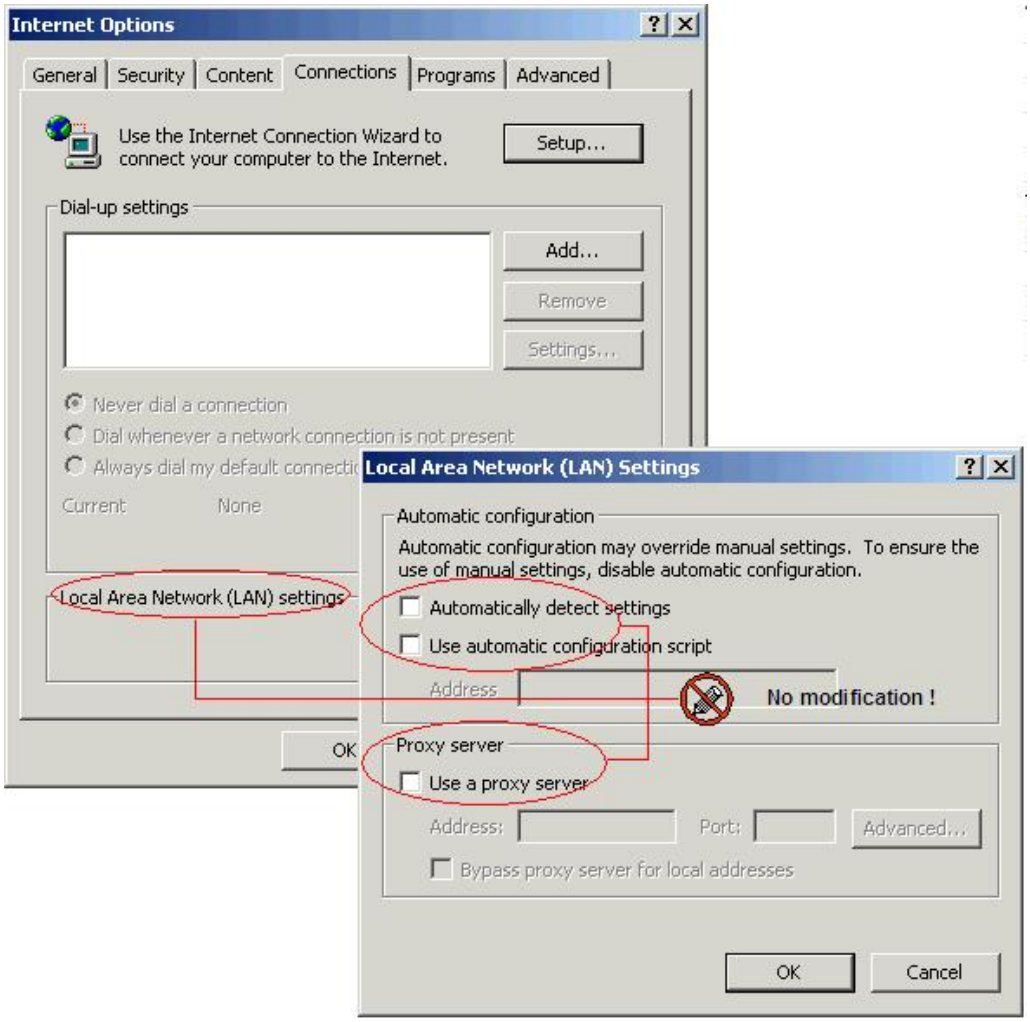


Figure 1-9 Do not modify LAN settings

1.2 Routine Maintenance Purpose

With regular routine maintenance, users can effectively detect silent failures and other operational risks within the system and equipment so as to prevent catastrophic failures and loss of service that can result if these problems are not discovered in a timely manner.

1.3 Basic Maintenance Requirement

Operation requirement for remote maintenance

- Do not modify the data and database configuration unless necessary. Before modifying, back up the original data and record the modification. After modifying, observe for a certain time. After you have confirmed that equipment operates normally, you can delete the backup data.
- Observe the automatic saving status of the alarm database and the performance information database regularly, so as to avoid disk overflow.
- Keep the necessary software and documents properly, so as to facilitate the timely access when required.

Operation requirement for on-site maintenance

- Do not plug / unplug, reset or switch the card unless necessary.
- Check the spare parts that are stored regularly, and prevent them from moisture or mould. Distinguish and keep the faulty parts from the spare parts. When lack of spare parts occurs, replenish the stock in a timely manner.
- During maintenance operations, wear an ESD protection wrist strap or glove.
- Do not operate on the equipment or the cables during a thunderstorm.
- Do not contact the high-voltage power supply directly or through a conductive object.
- Never look directly into the end of the optical fiber jumper connected to an optical transmitter or the end face of its active connector.
- Wear protective gloves during maintenance operations so as to prevent injury from the sharp corners of the equipment.
- Prevent metal filings or components from falling into the subrack in case it may cause a shorting.

1.4 Responsibility and Requirement for Maintenance Engineer

1.4.1 Responsibility of maintenance engineers

- According to the maintenance policy, be conscientious and faithfully perform the regular routine operations, as well as keep accurate records.
- When a critical failure occurs, try to eliminate the fault as soon as possible. Carry out the routine procedures from the maintenance guidelines and immediately report the incident to the department or staff person in charge. Ask for assistance from other departments if necessary. Record the procedures taken and the relevant data collected during the troubleshooting operation of severe faults. Configuration data backups should be made and archived regularly.
- Never modify the network management configuration data or replace cards or software unnecessarily. If any modification or replacement occurs, make records for future reference.

1.4.2 Requirement for maintenance engineers

Maintenance engineers should be conscientious and accurately perform routine operations, so as to detect and eliminate potential failures and risks in a timely manner thus preventing faults from occurring. If a fault occurs, maintenance engineers should collect the related information, analyze and resolve the problem. Thus, we have a high standard for the maintenance engineers in terms of vocational skills, normative operation and psychological quality.

- Completely comprehend the system operating principles, equipment type and main functions.
- Be familiar with the operation on the network management system.
- Be familiar with the network connection of the system.
- Be familiar with the alarm and performance codes of the network management system and correctly understand their meanings.

- Usually, the network management system can precede the users to report the alarms. If the user claim is delivered before the network management system detects the alarm, report the situation to the relevant organizations or departments shortly after the fault is eliminated, so as to improve the performance and enhance the monitoring capability of the network management system.
- Handling principle: When a station receives an alarm or detects any abnormal situation, connect the responsible bureau and confirm the problem. Estimate and isolate the fault point via the network management system or minitoring terminal, and eliminate the fault following the fault processing procedure in a timely manner.
- When severe circuit blocking occurs, departments of all levels should organize the emergency repair immediately.
- If the circuit cannot be repaired in an instant, perform the circuit grooming according to the emergency grooming scheme, so as to recover the subscriber services in use as soon as possible.
- Every station should perform the emergency grooming operations according to the related requirements, and guarantee to recover the services within the given time when the system fails.

1.5 Tool and Instrument

1.5.1 Maintenance Tool

ESD protection wrist strap / glove, flat screwdriver, cross screwdriver, brush, vacuum cleaner, spanner, wire binder, ladder, alcohol, anti-dust paper and so on.

1.5.2 Maintenance Instrument

- Thermometer and hygrometer (for measuring the operating environment of the equipment).
- Multimeter, optical power meter, optical attenuation meter, and error detector (as measuring instruments).

Note:

Examine and calibrate the instrument before use, so as to guarantee the accuracy of the instrument.

1.6 Routine Maintenance Item and Period

Maintenance Item	Recommended Maintenance Period	Category
Checking system alarms	Daily	Remote maintenance item
Checking card status	Daily	
Checking user command log	Daily	
Checking user login log	Daily	
Checking card CPU / memory utilization ratio	Weekly	
Backing up equipment configuration document	Weekly	
Backing up database configuration file	Weekly	
Querying and saving historical alarms	Monthly	
Querying and saving historical performance data	Monthly	
Checking the level and authorization of network management users	Monthly	
Checking system time	Quarterly	
Changing password of the network management system user	Quarterly	
Testing remote login	Quarterly	
Gathering and analyzing equipment data	Quarterly	
Performing active / standby switching	Annually	
Checking equipment's operating environment	Quarterly	On-site maintenance item
Checking cable connection	Quarterly	
Checking equipment indicator LEDs	Quarterly	
Cleaning the fan unit	Quarterly	
Cleaning the anti-dust screen	Annually	

Maintenance Item	Recommended Maintenance Period	Category
Cleaning the equipment	Annually	

1.7 How to Obtain Technical Support

Contact information:

- Tel: +86 27 8769 1549
- Fax: +86 27 8769 1755
- Website: http://www.fiberhomegroup.com
- For contact information for the various FiberHome local offices, visit the website.

2 Remote Maintenance Guide

- ☑ Checking System Alarms
- ☑ Checking Card Status
- ☑ Checking User Command Log
- ☑ Checking User Login Log
- ☑ Checking Card CPU / Memory Utilization Ratio
- ☑ Backing up Equipment Configuration File
- ☑ Backing up Database Configuration File
- ☑ Querying and Saving Historical Alarms
- ☑ Querying and Saving Historical Performance Data
- ☑ Checking Level and Authorization of Network Management Users
- ☑ Checking System Time
- ☑ Changing Network Management System User Passwords
- ☑ Testing Remote Login
- ☑ Checking Active / Standby Switching

2.1 Checking System Alarms

Background information

- Current alarm: An alarm that exists or has cleared but has not been confirmed yet.
- Historical alarm: An alarm that has occurred but is now cleared.
- Alarm indicator: In the object tree of the ANM2000 GUI, each object has two indicators. If the two indicators are displayed horizontally, the one on the left is referred as **Indicator 1** and the one on the right is referred as **Indicator 2**; if the two indicators are displayed vertically, the one on the top is referred as **Indicator 1** and the one at the bottom is referred as **Indicator 2**.

  Indicator 1 shows the type of the alarms that occur on the object. The following table lists the meanings represented by the different colors for **Indicator 1**.

Alarm Level	Color	Meaning
	Grey	The object has a communication alarm.
	Red	The object has a critical alarm.
	Orange	The object has a major alarm.
	Yellow	The object has a minor alarm.
	Blue	The object has a prompt alarm.
	Green	The object has no alarm and is operating normally.

  Indicator 2 shows the type of the alarms that occur on the object's subordinate objects. The following table lists the meanings represented by the different colors for **Indicator 2**.

Alarm Level	Color	Meaning
	Grey	The object has a communication alarm.
	Green	The object has no alarm and is operating normally.

Maintenance period

Daily

Tool and instrument

The ANM2000.

Procedure

- Observing the alarm indicators

  In the object tree pane or the subrack view, observe the object's alarm indicators, which directly show whether the object has alarms and the highest alarming level of all existing alarms on the object.

Note:

The alarm indicators provide a direct indication of the object's current alarms. If both indicators are green, the object has no current alarms and users need not check for them.

- Viewing alarms

  The following table lists the methods for viewing current alarms.

Operation Item	Operation Method
Viewing current alarms	In the ANM2000 window, right-click on the query object inside the object tree pane or the subrack view, and select **Current Alarm** from the shortcut menu that appears.
	In the ANM2000 window, click on the query object inside the object tree pane or the subrack view, and then click the  botton in the toolbar.
	In the ANM2000 window, right-click on the query object inside the object tree pane or the subrack view, and then select **Alarm→Current Alarm** in the main menu.

  The following table lists the methods for viewing historical alarms.

Operation Item	Operation Method
Querying historical alarms	In the ANM2000 window, right-click on the query object inside the object tree pane or the subrack view, and select **Historical Alarm** from the shortcut menu that appears.
	In the ANM2000 window, click on the query object inside the object tree pane or the subrack view, and then click the  botton in the toolbar.

Operation Item	Operation Method
	In the ANM2000 window, right-click on the query object inside the object tree pane or the subrack view, and then select **Alarm→Historical Alarm** in the main menu.

In the following paragraphs, we query the historical alarms of the HSWA card as an example. Below is the procedure:

1. Right-click the HSWA card in the object tree pane, and then in the shortcut menu that appears select **Historical Alarm** to open the **FiberHome Anms: Historical Alarm** tab.
2. Right-click in the blank area of the tab, in the shortcut menu that appears select **Query Filter**.
3. In the **Set Historical Alarm Query Conditions** window that appears, set the query conditions.
   - Select the check boxes in the **Begin Time** pane and configure the starting time of alarms to be queried in the text boxes right to the check boxes.
   - Select the check boxes in the **End Time** pane and configure the ending time of alarms to be queried in the text boxes right to the check boxes.
   - In the **Alarm Level** pane, select the check boxes to configure the level of alarms to be queried.
   - In the **Alarm Type** pane, select the check boxes to configure the type of alarms to be queried.
   - Select the check box of the **Alarm English Name** pane, and then select the check boxes left to the alarm names in the pane, so as to configure the specific alarms to be queried.

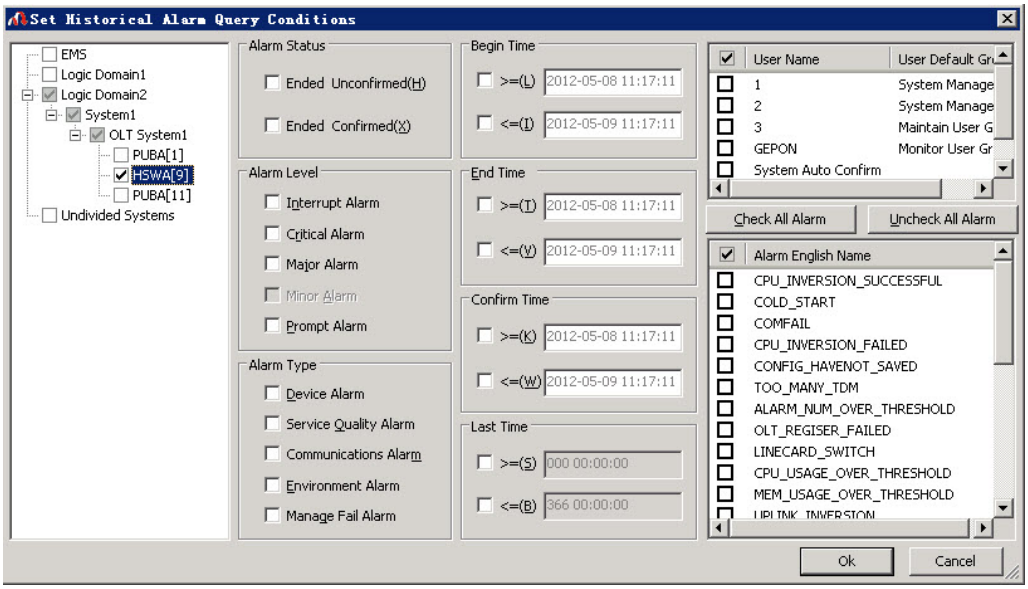


Figure 2-1 Setting historical alarm query conditions

4. After completing the above settings, click the **OK** button to query the alarm history information of the HSWA card under the configured conditions.

Reference standard

No current alarms occur on the system; and in the ANM2000, the indicators of all objects are green.

Exception handling

- If the system has a current alarm, users can right-click on the alarm and select the **Alarm Information** option in the shortcut menu that appears. The dialog box that appears shows the name, cause and solution method for the alarm. Users can analyze the causes and follow the solution scheme displayed, so as to clear the alarm. Refer to the AN5116-06B Optical Line Terminal Equipment Alarm and Event Reference for detailed information. If the alarm is not cleared, please contact FiberHome for technical support.
- If a critical alarm or a major alarm has been frequently occurring on the system for a period of time, users should keep a record of its occurrence and analyze the system for possible silent faults, so as to eliminate potential problems in a timely manner and reduce the risks that will affect the reliable operation of the equipment.

2.2 Checking Card Status

Maintenance period

Daily

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Checking card status	In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and select **Get Information→Card Version** from the shortcut menu that appears.

Check the current card status of the AN5116-06B. Below is the procedure:

1. In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and select **Get Information→Card Version** from the shortcut menu that appears, as shown in the following figure.

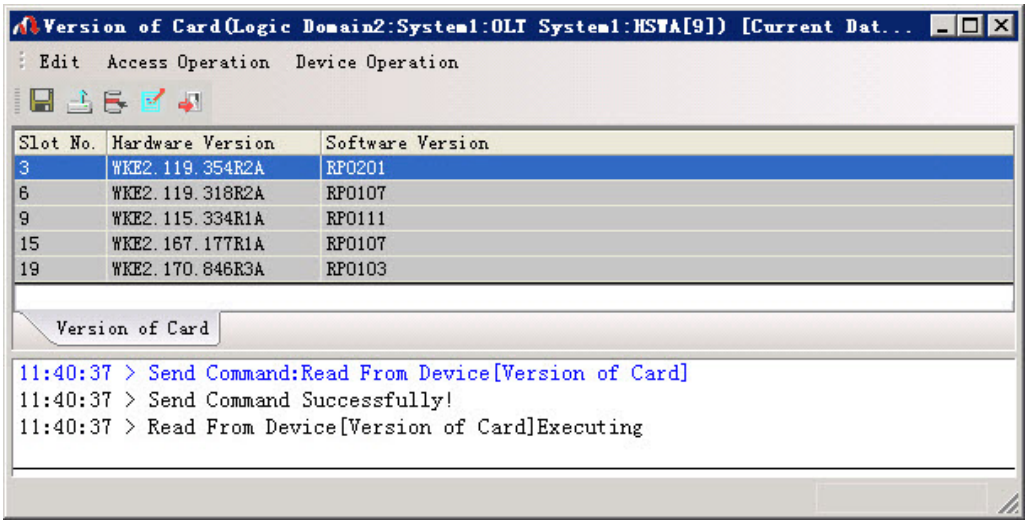


Figure 2-2 Checking card software / hardware version information

2. Confirm that the slot number, the software version and the hardware version information of the card are displayed normally.
3. End.

Reference standard

The card is present; and the slot number as well as the software and hardware version information of the card can be queried via the command.

Exception handling

If the card is not present: Check whether the card is unplugged or has faults; check whether the connection with the main control unit is normal.

2.3 Checking User Command Log

Maintenance period

Daily

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Checking user command log	In the ANM2000 window, select **Security→View The Command Log** in the main menu and open the **View The Command Log** tab.

View the historical command operation log in the ANM2000 window and to check whether there is any unauthorized operations, follow the procedures below.

1. In the ANM2000 window, select **Security→View The Command Log** in the main menu and open the **View The Command Log** tab.

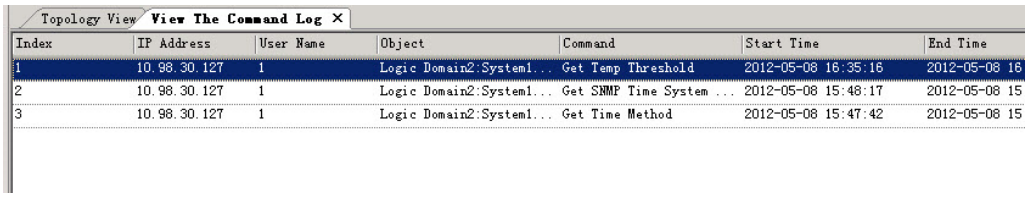


Figure 2-3 Viewing the command logs

2. View the command operations and check whether there is any unauthorized or unsuccessful operation. If yes, record it.

3. End.

Reference standard

There is no unsuccessful command in the command log of the system user and the operation record is complete.

2.4 Checking User Login Log

Maintenance period

Daily

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Checking user login log	In the ANM2000 window, select **Security→View The User Login Log** in the main menu and open the **View The User Login Log** tab.

View the historical user login log in the ANM2000 window and record the names and other related information of the logged-in users. Below are the specific procedures:

1. In the ANM2000 window, select **Security→View The User Login Log** in the main menu and open the **View The User Login Log** tab.

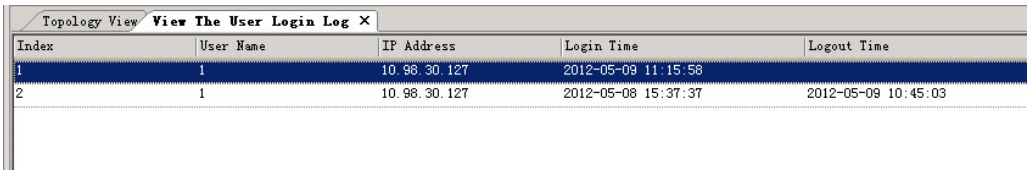


Figure 2-4 Viewing the login logs

2. Check and record the user name, IP address and login time.
3. End.

Reference standard

In the user login log, there is no illegal user logging into the ANM2000 system.

2.5 Checking Card CPU / Memory Utilization Ratio

Background information

- CPU utilization ratio: The ratio of non-idle cycles versus total cycles for the CPU on the card.
- Memory utilization ratio: The ratio of used memory versus total memory of the card.

Note:

The CPU / memory utilization ratio of the uplink card cannot be viewed.

Maintenance period

Weekly

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Checking card CPU / memory utilization ratio	In the ANM2000 window, right-click on the card inside the object tree pane, and then select **RealTime Performance→CPU/Memory Proportion** in the shortcut menu that appears.

In the following paragraphs, we query the CPU / memory utilization ratio of the AN5116-06B's core switch card as an example. Below is the procedure.

1. In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and then select **RealTime Performance→CPU/Memory Proportion** in the shortcut menu that appears.
2. Click the 

button on the toolbar to start the performance collecting.
3. Click the 

button on the toolbar to end the performance collecting.
4. View and record the CPU and memory utilization ratio of the HSWA card.

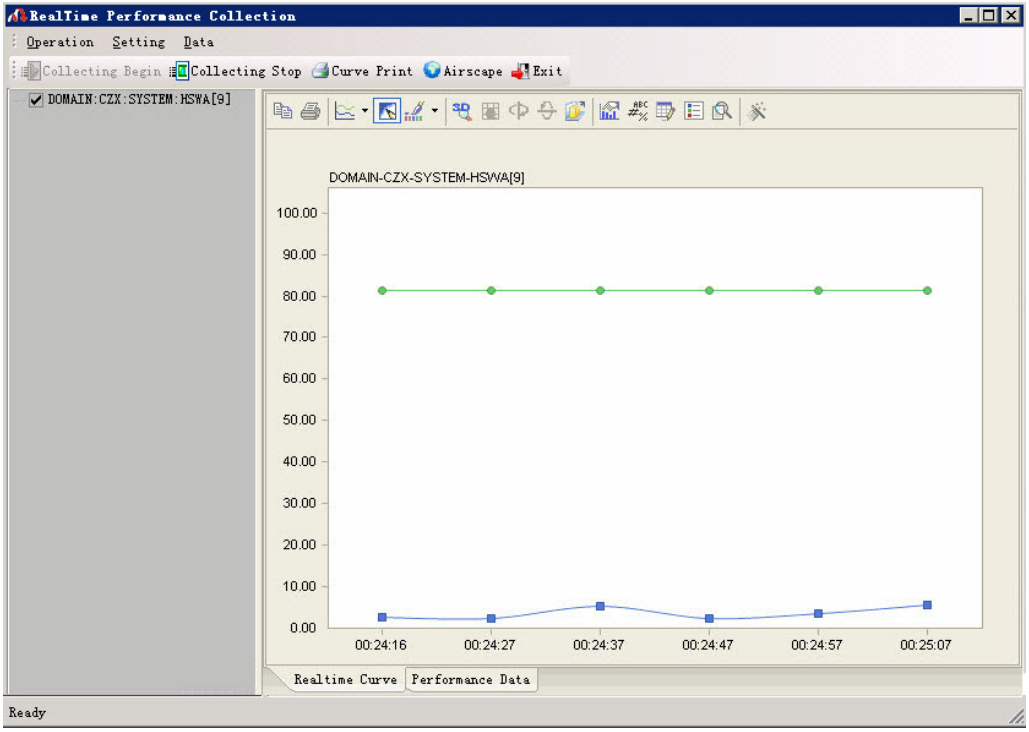


Figure 2-5 CPU / memory utilization ratio of the HSWA card

Note:

The green curve shows the memory utilization ratio; and the blue curve shows the CPU utilization ratio.

5. End.

Reference standard

The CPU and memory utilization ratios are both lower than the currently configured threshold value, which is 90% by default.

Exception handling

When both the CPU and memory utilization ratios exceed the currently configured threshold value, the CPU / memory utilization ratio threshold crossing alarm is generated. Users can refer to the AN5116-06B Optical Line Terminal Equipment Alarm and Event Reference for detailed processing procedures.

2.6 Backing up Equipment Configuration File

Maintenance period

Weekly

Tool and instrument

- The ANM2000.
- A backup server

Procedure

Operation Item	Operation Method
Backing up equipment configuration file	In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and then select **System Maintenance→Export Config** in the shortcut menu that appears.

Export the database configuration file in the Flash of the equipment to the designated directory under the FTP server. The specific steps for this operation are as follows:

1. In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and then select **System Maintenance→Export Config** in the shortcut menu that appears.
2. Export the configuration file and save it to the designated backup server.

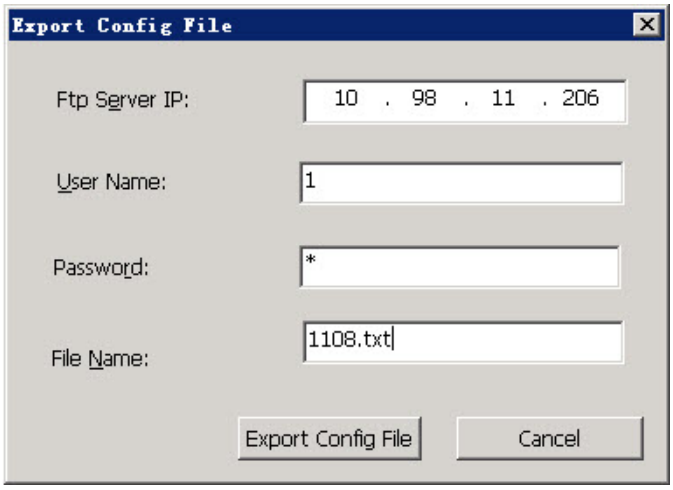


Figure 2-6 Backing up the equipment configuration file

3. End.

Reference standard

Back up the configuration file that is delivered to the equipment to the designated server every week.

Exception handling

The backup operation is unsuccessful: Check whether the FTP server IP address, user name and login password are correct, or whether the FTP server software is enabled.

2.7 Backing up Database Configuration File

Maintenance period

Weekly

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Backing up database configuration file	In the ANM2000 window, select **System→Export Configuration** in the main menu.

Export the database configuration file of the ANM2000 system to the designated directory on the network management system computer. The specific steps for this operation are as follows:

1. In the ANM2000 window, click **System** in the main menu, and then select **Export Configuration** from the shortcut menu that appears.

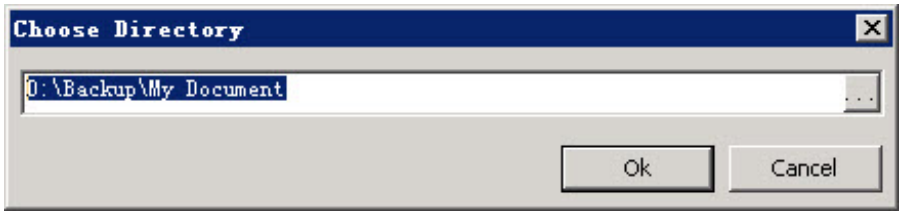


Figure 2-7 Exporting the configuration data

2. Export the configuration data to the designated directory on the network management system computer.
3. End.

Reference standard

Back up the database configuration file of the ANM2000 system to the designated directory on the network management system computer.

2.8 Querying and Saving Historical Alarms

Background information

Historical alarm: An alarm that has occurred but is now cleared.

Maintenance period

Monthly

Tool and instrument

The ANM2000.

Procedure

- See Checking System Alarms for the method of querying historical alarms.
- Saving historical alarms

Operation Item	Operation Method
Saving historical alarms	In the ANM2000 window, select **Configuration→Historical Database Capacity Management** in the main menu and then click the **Historical Alarm** tab.

Save the historical alarms of the AN5116-06B via the ANM2000 system. The procedure is as follows:

1. In the ANM2000 window, select **Configuration→Historical Database Capacity Management** in the main menu and then click the **Historical Alarm** tab.
2. Set the related parameters for saving the alarm history data.
   - Click the check box left to **Time threshold** item, and set the saving period in the text box right to the item; e.g., 7 days.
   - Input the starting time of automatic saving in the text box right to **Auto Dump Time**, e.g., 7:00:00.
   - Select the check box of **Single File**.

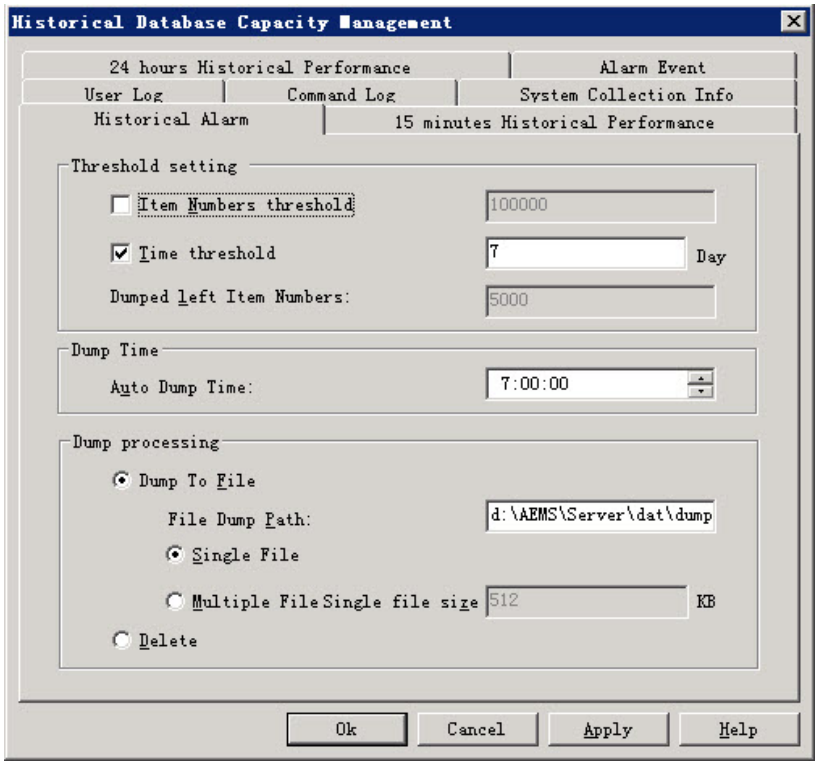


Figure 2-8 Saving historical alarms

3. Click **OK**. If the alarm history data quantity reaches the saving threshold, the data will be automatically saved to the designated file under the ANM2000's installation directory; the path is d:\AEMS\Server\dat\dump\alarmhis.
4. End.

Reference standard

The alarm history information can be viewed normally. And the alarm history data can be normally saved from the ANM2000 database to the file under the designated directory.

2.9 Querying and Saving Historical Performance Data

Background information

Check the performance history parameters of an object, so as to know the recent performance status of the system.

Maintenance period

Monthly

Tool and instrument

The ANM2000.

Procedure

◆ Querying and saving historical performance data

Operation Item	Operation Method
Querying historical performance data	In the ANM2000 window, right-click the system in the object tree pane, and select **Historical Performance** from the shortcut menu that appears.

View the 15-minute historical performance of the AN5116-06B in the ANM2000 window. Below is the procedure:

1) In the ANM2000 window, right-click the system in the object tree pane, and from the shortcut menu that appears select **Historical Performance** to open the **FiberHome Anms: Historical Performance** tab.
2) Right-click in the blank area of the tab, select **Query Filter** in the shortcut menu that appears.
3) In the **Set historical performance query conditions** window that appears, select the object(s) to be queried.
   - Select the check boxes in the **Begin Time** pane and configure the starting time of the historical performance event to be queried in the text boxes right to the check boxes.

- In the **Performance Type** pane, select a check box to configure the type of performance history information to be queried.
- Select the check boxes in the **Performance Value** pane and configure the parameters of the historical performance events to be queried in the text boxes right to the check boxes.
- Select the check box of the **Performance English Name** pane, and then select the check boxes left to the performance names in the pane, so as to configure the specific performance events to be queried.

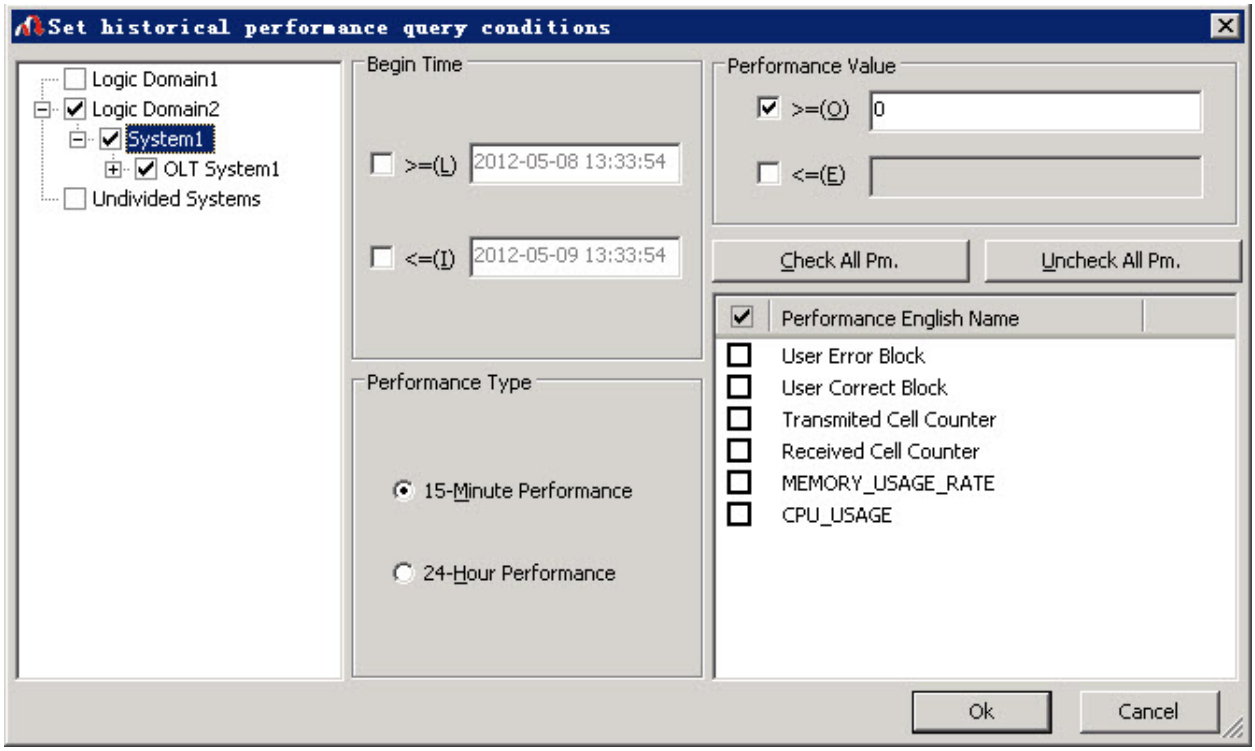


Figure 2-9 Setting performance query parameters

◆ Saving 15-minute historical performance data

Operation Item	Operation Method
Saving 15-minute historical performance data	In the ANM2000 window, select **Configuration→Historical Database Capacity Management** in the main menu and then click the **15 minutes Historical Performance** tab.

Save the 15-minute historical performance data of the AN5116-06B via the ANM2000 system. The procedure is as follows:

1) In the ANM2000 window, select **Configuration→Historical Database Capacity Management** in the main menu and then click the **15 minutes Historical Performance** tab.

2) Set the related parameters for saving the performance history data.

   - Click the check box left to **Time threshold** item, and set the saving period in the text box right to the item; e.g., 7 days.
   - Input the starting time of automatic saving in the text box right to **Auto Dump Time**, e.g., 7:00:00.
   - Select the check box of **Single File**.

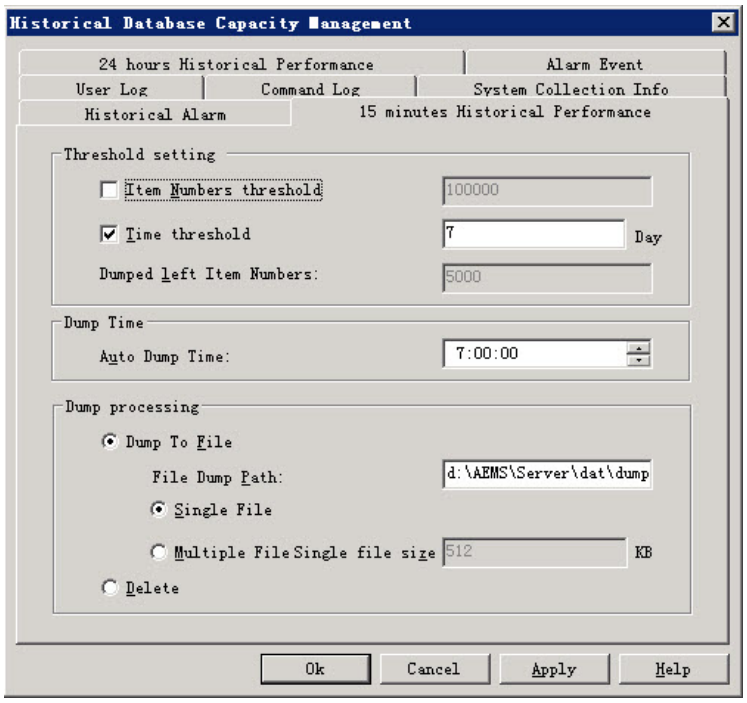


Figure 2-10 Saving 15-minute historical performance data

3) Click **OK**. If the performance history data quantity reaches the saving threshold, the data will be automatically saved to the designated file under the ANM2000's installation directory; the path is d:\AEMS\Server\dat\dump \pmhis15\.

◆ Saving 24-hour historical performance data

Operation Item	Operation Method
Saving 24-hour historical performance data	In the ANM2000 window, select **Configuration→Historical Database Capacity Management** in the main menu and then click the **24 hours Historical Performance** tab.

Save the 24-hour historical performance data of the AN5116-06B via the ANM2000 system. The procedure is as follows:

1) In the ANM2000 window, select **Configuration→Historical Database Capacity Management** in the main menu and then click the **24 hours Historical Performance** tab.

2) Set the related parameters for saving the performance history data.

   - Click the check box left to **Time threshold** item, and set the saving period in the text box right to the item; e.g., 7 days.
   - Input the starting time of automatic saving in the text box right to **Auto Dump Time**, e.g., 7:00:00.
   - Select the check box of **Single File**.

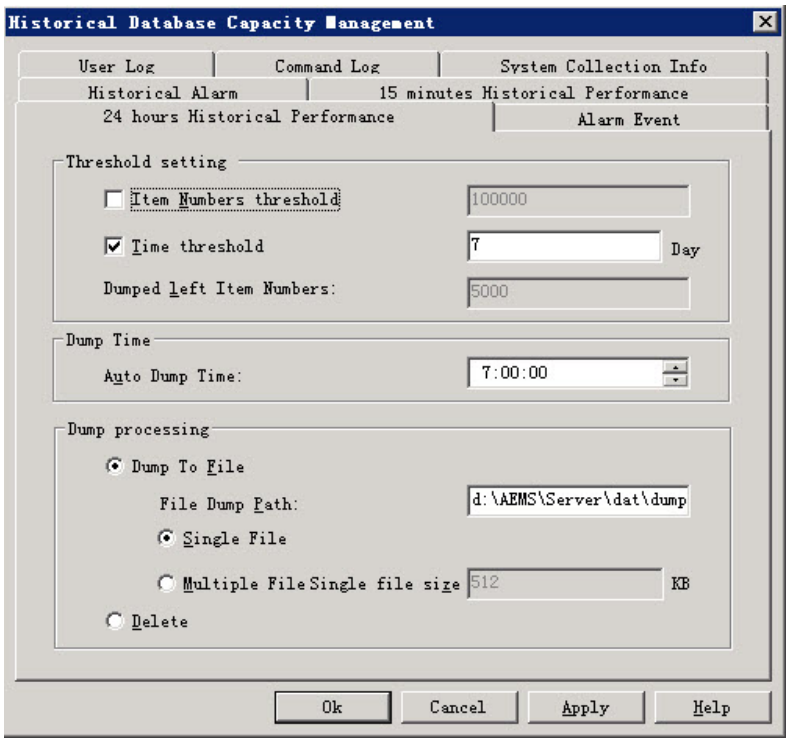


Figure 2-11 Saving 24-hour historical performance data

3) Click **OK**. If the performance history data quantity reaches the saving threshold, the data will be automatically saved to the designated file under the ANM2000's installation directory; the path is d:\AEMS\Server\dat\dump \pmhis24\.

Reference standard

The performance history information can be viewed normally. When the 15-minute / 24-hour performance history data reaches the time threshold or quantity threshold, the data can be automatically saved from the ANM2000 database to the designated directory.

2.10 Checking Level and Authorization of Network Management Users

Background information

- Operation authorization: The operations that are allowed to be performed by the user.
- User level: According to different operation authorizations, the users are divided into four groups: system management user group, .maintenance management user group, operation user group and monitoring user group.

Maintenance period

Monthly

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Checking Level and Authorization of Network Management Users	In the ANM2000 window, select **Security→User Management** in the main menu.

Check the level and authorization of the current ANM2000 users. The specific steps for this operation are as follows:

1. In the ANM2000 window, select **Security→User Management** in the main menu.

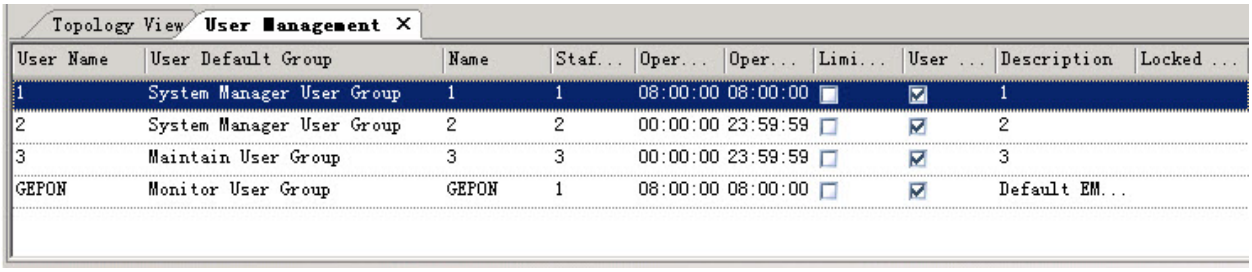


Figure 2-12 The user management tab

2. Check whether the user information displayed is consistent with the planning data.
   - If yes, go to step 3.
   - If no, please modify the user level and authorization, and record the modification.
3. End.

Reference standard

The level and authorization of each ATNM2000 user are consistent with the planned data.

2.11 Checking System Time

Background information

- System time: Time of the active HSWA card on the AN5116-06B.
- Network management system time: The system time displayed on the ANM2000 window.

Maintenance period

Quarterly

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Checking system time	In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and select **Get Information→System Time** from the shortcut menu that appears.
Time recalibration	In the ANM2000 window, right-click the system in the object tree pane, and select **Config→Time Calibration** from the shortcut menu that appears.

Check the current AN5116-06B system time. If it is different from the network management system time, synchronize the ANM2000 computer time to the time of the active HSWA card. The specific steps for this operation are as follows:

1. In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and select **Get Information→System Time** from the shortcut menu that appears, as shown in the following figure.

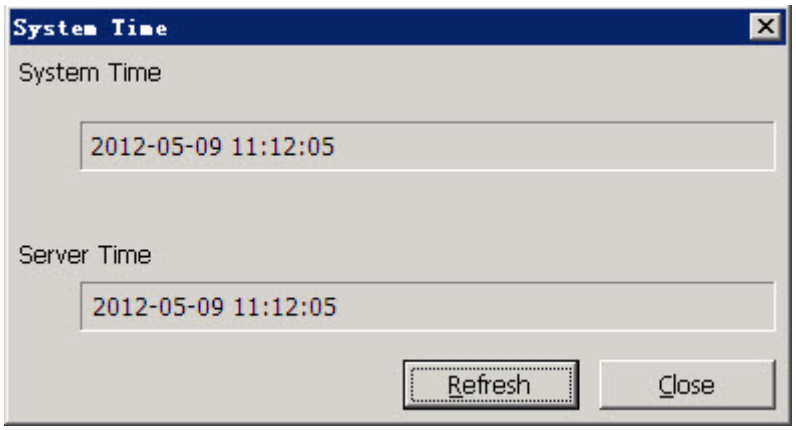


Figure 2-13 The system time

2. Check whether the network management system time is consistent with the system time. If no, calibrate the time following the exception handling procedure below.
3. End.

Reference standard

The time of the network management system is consistent with the system time.

Exception handling

When the network management system time is not consistent with the system time, follow the procedure below to synchronize them:

1. In the ANM2000 window, right-click the system in the object tree pane, and select **Config→Time Calibration** from the shortcut menu that appears. Then the **Sending Commands** dialog box appears.

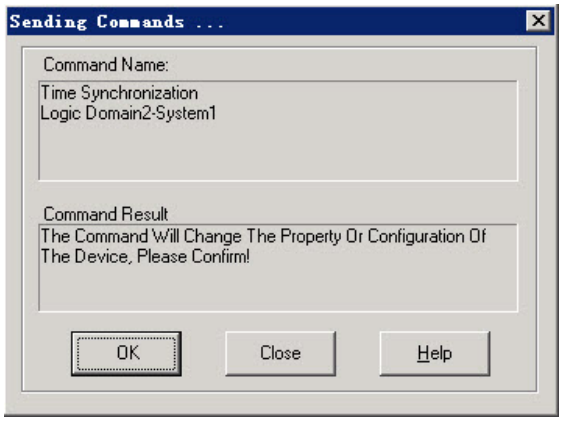


Figure 2-14 The **Sending Commands** dialog box

2. Click the **OK** button to implement the time calibration command. When the time calibration is completed, click the **Close** button.

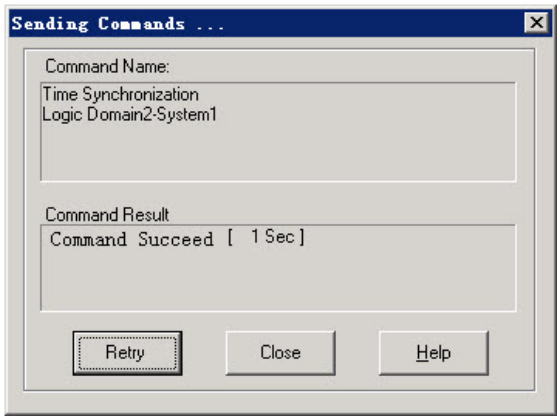


Figure 2-15 The system calibration is successful

3. End.

2.12 Changing Network Management System User Passwords

Background information

User default user group: The ANM2000 system divides the users into four groups according to the authorities. Users of different groups have different operation authorities. Only the member of the system management user group can modify other users' passwords without providing the original password.

Maintenance period

Quarterly

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Changing network management system user passwords	In the ANM2000 window, select **Security→User Management** in the main menu.

Below is the procedure of modifying the network management user passwords:

1. In the ANM2000 window, select **Security→User Management** in the main menu and access the **User Management** tab. And the **User Information** dialog box appears at the right side of the tab.

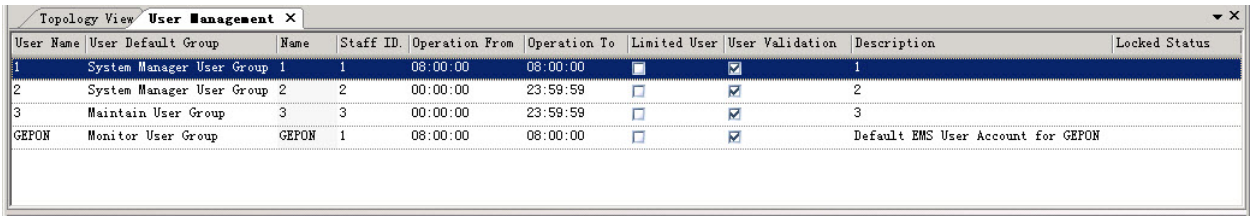


Figure 2-16 The user management tab

2. Right-click on the user whose password needs to be changed to modify in the **User Information** dialog box.

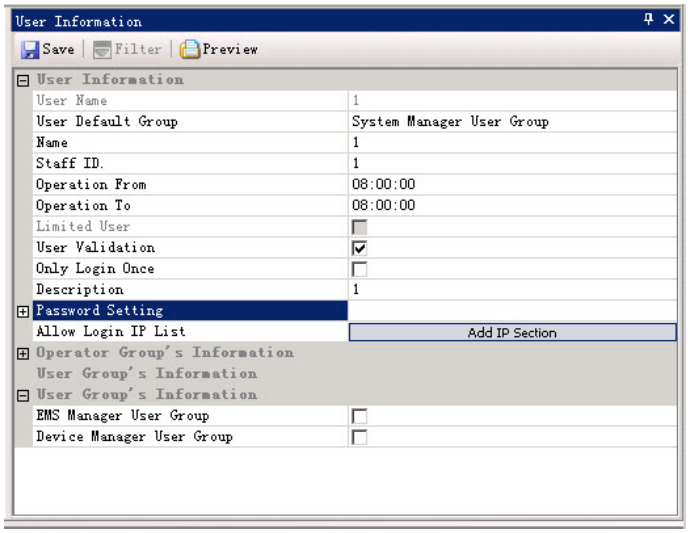


Figure 2-17 The network management system user information

3. Click **Password Setting**, then input the new password twice; once in the blank after the **Password** item and again in the blank after the **Confirm Password** item.

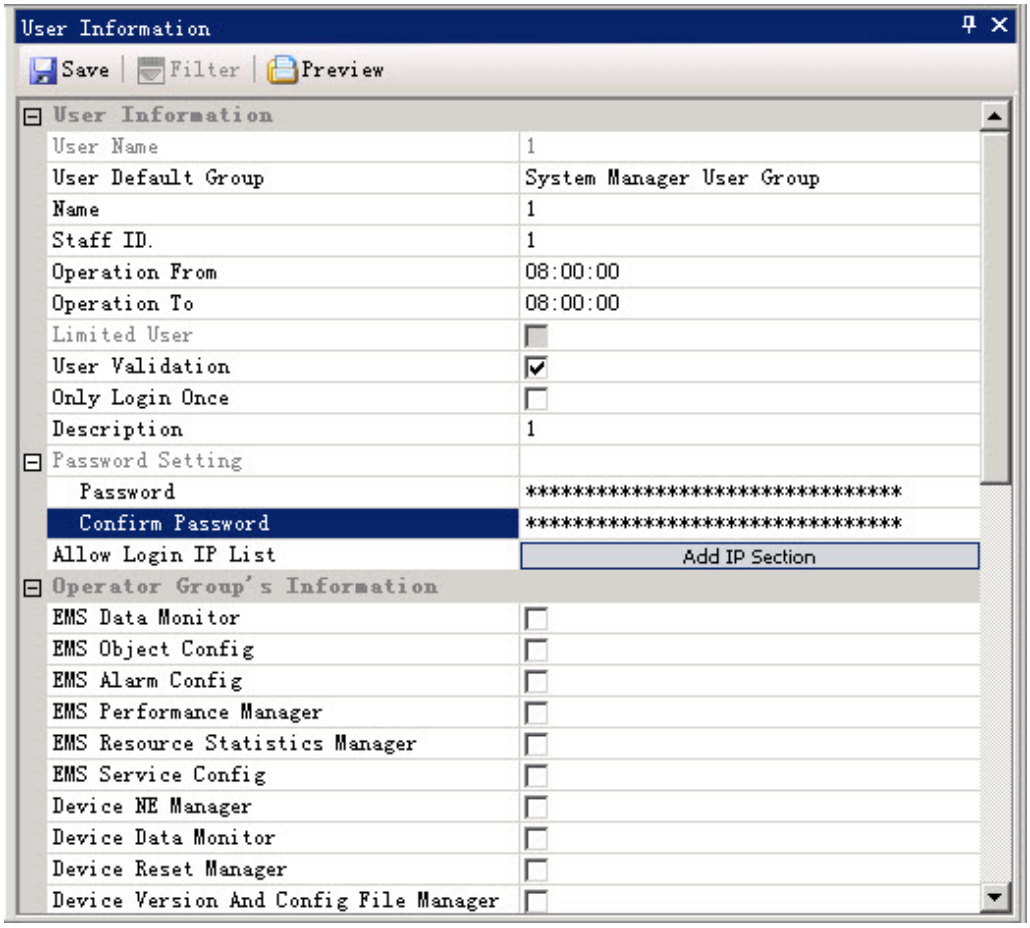


Figure 2-18 Changing the password of the network management system users

4. End.

Reference standard

Modify the network management system user passwords regularly based on user requirements or planning data.

2.13 Testing Remote Login

Background information

Telnet is a standard protocol and a method of the Internet remote login service. It enables users to operate on the remote equipment with a local computer.

Maintenance period

Quarterly

Tool and instrument

The ANM2000.

Procedure

Operation Item	Operation Method
Checking the Telnet login	In the ANM2000 window, right-click on the system inside the object tree pane, and in the shortcut menu that appears select **Telnet** to open the DOS window.

Check whether the users can telnet to the equipment via the ANM2000 system. The specific steps for this operation are as follows:

1. In the ANM2000 window, right-click on the system inside the object tree pane, and in the shortcut menu that appears select **Telnet** to open the DOS window.

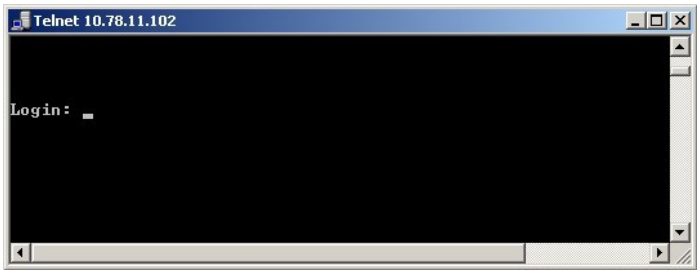


Figure 2-19 The remote login

2. Enter the user name and password and telnet to the CLI NMS.
3. End.

Reference standard

Users can telnet to the CLI NMS normally.

Exception handling

When users can not telnet to the CLI NMS, take the following procedures: Send a Ping command from the network management system computer, and check whether the equipment can be pinged. If not, please check whether the physical link is abnormal.

2.14 Checking Active / Standby Switching

Background information

Active / standby switching: When the active core switch card has faults, the services can be switched to the standby core switch card.

Note:

If the equipment has two core switch cards in active / standby mode, deliver the active / standby switching command via the network management system, and the services will not be interrupted.

Maintenance period

Annually

Tool and instrument

The ANM2000.

Procedure

1. Check the active / standby status of the core switch card.

   Check the current active / standby status of the core switch card on the AN5116-06B. The specific steps for this operation are as follows:

   1) In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and select **Get Information→System status** from the shortcut menu that appears.

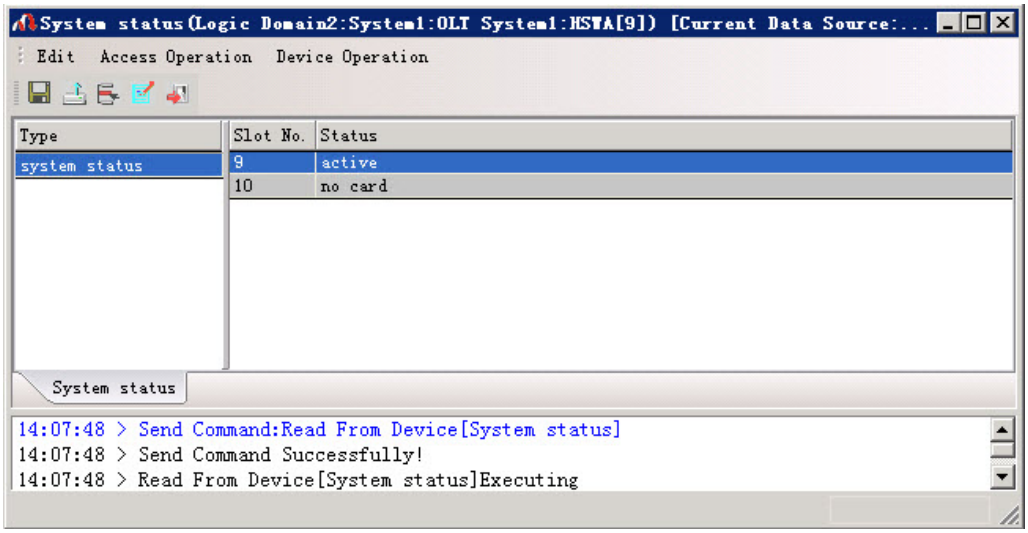


Figure 2-20 Querying active / standby status of the core switch cards

2) View the operating status of the core switch card in the **System status** window that appears, and check whether the active / standby status is correct.

3) End.

2. Active / standby switching

Check whether the switching between the active and standby core switch cards of the AN5116-06B can be executed normally. The specific steps for this operation are as follows:

1) In the ANM2000 window, right-click on the HSWA card inside the object tree pane, and then select **Control Command→Force Switch** in the shortcut menu that appears.

2) Click the **OK** button in the **Sending Commands** dialog box that appears.

3) End.

After the switching is completed, wait until the operating status of the active and standby core switch cards becomes stable and then switch the services back to the original active core switch card. By default, slot 9 is for the active core switch card and slot 10 is for the standby core switch card.

Reference standard

- If the equipment has two core switch cards, the arrangement of the active / standby core switch card should be consistent with the planning data.
- The switching between the active and standby core switch cards is successful.

Exception handling

- The active / standby status of the core switch card is abnormal: Check whether the active core switch card has faults, and find what causes the switching. If the active core switch card has faults, replace it and then switch the services back to the new active core switch card.
- Switching failure between the active and standby core switch cards: Check whether the active core switch card has faults, and find the causes of the switching failure as indicated by the alarm information. If the active core switch card has faults, please replace it in a timely manner.

3 On-site Maintenance Guide

- ☑ Inspecting Operating Environment of Equipment
- ☑ Checking Cable Connections
- ☑ Checking Indicator LEDs on Equipment
- ☑ Checking Operating Status of Fan Unit
- ☑ Cleaning Fan Unit
- ☑ Cleaning Anti-dust Screen
- ☑ Cleaning Equipment

3.1 Inspecting Operating Environment of Equipment

Maintenance period

Quarterly

Tool and instrument

- A thermometer
- A hygrometer
- A multimeter

Procedure

1. Use the thermometer to measure the environmental temperature of the equipment.
2. Use the hygrometer to measure the environmental humidity of the equipment.
3. Use the multimeter to measure the power supply voltage of the equipment.
4. End.

Reference standard

- Environmental temperature: 0℃ to +50℃.
- Relative humidity: ≤90%.
- Power supply voltage: -48V DC (-40V to -57V).

Exception handling

- The environmental temperature is too high / low: Turn on the air conditioner or take other measures to adjust the temperature to normal.
- The relative humidity is too high: Turn on the air conditioner or take other humidity adjustment measures to adjust it to normal.
- The power supply voltage is too high / low: Repair the power supply system and make the power supply voltage within the normal range.

3.2 Checking Cable Connections

3.2.1 Checking Power Cable

Maintenance period

Quarterly

Tool and instrument

- An ESD protection wrist strap or ESD protection glove
- A multimeter

Procedure

1. Check the equipment power cable and confirm that both ends of the cable are securely and firmly connected.
2. Check whether the power cable is aged.
3. Check whether the label on the power cable is complete and correctly filled out.

Reference standard

The power cable is in good condition, has a reliable connection, is not aged, and the connection points are not corroded or oxidized.

Exception handling

- If the power cable is not firmly connected to the interfaces, reconnect it to the interface and make sure the connection is reliable.
- If there is any part missing, damaged on the power cable label, or the label is incorrectly filled out; make a new one with the correct information and attach it to the right place according to the regulations.
- If the cable is aged, replace it in a timely manner. After completing the replacement, use a multimeter to test whether the cable is reliably connected.

3.2.2 Checking Earth Ground Cable

Maintenance period

Quarterly

Tool and instrument

- An ESD protection wrist strap or ESD protection glove
- A multimeter

Procedure

1. Check whether the earth ground cable connection between the equipment and the cabinet protection earth ground is reliable.
2. Check whether the connection points are corroded or oxidized.
3. Check whether the earth ground cable is aged.

Reference standard

The earth ground cable is in good condition, has a reliable connection, is not aged, and the connection points are not corroded or oxidized.

Exception handling

- If the earth ground cable is aged, or the connection points are corroded, replace it with a new earth ground cable whose diameter is the same as that of the original one. After completing the replacement, use a multimeter to test whether the new earth ground cable is reliably connected.
- If the cable is not firmly connected to the interfaces, reconnect it to the interface and make sure the connection is reliable.
- If there is any part missing, damaged on the cable label, or the label is incorrectly filled out; make a new one with the correct information and attach it to the right place according to the regulations.

3.2.3 Checking Ground Resistance

Maintenance period

Quarterly

Tool and instrument

- A multimeter
- A grounding resistance meter

Procedure

1. Connect one end of the multimeter to the equipment earth ground cable and the other end to the earth ground bar or earth ground body. Check whether the resistance of the earth ground cable is less than 5Ω.
2. End.

Reference standard

The grounding of the earth ground cable is in good condition. The the resistance of the earth ground cable is less than 5Ω.

Exception handling

If the ground resistance between the earth ground cable and the earth ground bar / earth ground body is more than 5Ω, replace and re-arrange the earth ground cable.

3.2.4 Checking Other Cables

Maintenance period

Quarterly

Tool and instrument

An ESD protection wrist strap or ESD protection glove

Procedure

1. Check whether the cable connections to the interfaces on the equipment are firm.
2. Check whether the labels on the cables are complete and correctly filled out.
3. Check whether the unused optical interfaces are covered with anti-dust caps.
4. End.

Reference standard

- The cable connections to the equipment interfaces are firm.
- The cable labels are complete and correctly filled out.
- The unused optical interfaces are covered with anti-dust caps.

Exception handling

- If the cable is not firmly connected to the interfaces, reconnect it to the interface and make sure the connection is reliable.
- If there is any part missing, damaged on the cable label, or the label is incorrectly filled out; make a new one with the correct information and attach it to the right place according to the regulations.
- If an unused optical interface is found without an anti-dust cap, put an anti-dust cap on it.

3.3 Checking Indicator LEDs on Equipment

3.3.1 Checking Cabinet Indicator LEDs

Maintenance period

Quarterly

Tool and instrument

- An ESD protection wrist strap or ESD protection glove
- The ANM2000.

Procedure

Check the cabinet indicator LEDs to determine whether the equipment inside the cabinet generates alarms. The specific steps for this operation are as follows:

1. Check the indicator LEDs on the cabinet and see whether the red LED or the yellow LED is illuminated.
   - If yes, go to step 2.
   - If all the indicator LEDs on the cabinet top are not illuminated, the equipment is operating normally. Go to step 3.
2. Check via the ANM2000 to see whether the AN5116-06B inside the cabinet has alarms. If yes, handle them in a timely manner.
3. End.

Reference standard

- When the equipment is operating normally, none of the indicator LEDs at the cabinet top will be illuminated.
- When the equipment has a critical alarm, the red LED is illuminated.
- When the equipment has a non-critical alarm, the yellow LED is illuminated.

Exception handling

If the cabinet indicator LEDs cannot reflect the equipment alarm information, check whether the subrack alarm cable and the alarm cable for the head of row cabinet are reliably connected. If yes, replace the subrack alarm cable and the alarm cable for the head of row cabinet in a timely manner.

3.3.2 Checking Card Indicator LEDs

Background information

- ACT indicator LED

  The following table lists the operating status of each card as signified by the ACT indicator LEDs of the cards.

Card	Indicator LED Label	Color	Status	Description
HSWA	ACT	Green	ON	The card is operating normally.
			Blink slowly	The card is initializing.
			Blink quickly	The card is in the standby mode and is receiving the configuration command from the active card.
			OFF	The card is not powered on.
EC4B / EC8B / GC4B / GC8B / XG2B	ACT	Green	ON	The card is operating normally.
			Blink slowly	The card is initializing, or is starting but has not established an active / standby communication link.
			Blink quickly	The card is receiving the configuration command or is establishing an active / standby communication link.
			OFF	The card is not powered on or not started.
C155A / CE1B	ACT	Green	ON	The card is operating normally.
			Blink slowly	The card is initializing.
			Blink quickly	The card is receiving the configuration command.
			OFF	The card is not powered on.
HU1A / HU2A / GU6F	ACT	Green	ON	The card is operating normally.
			Blink slowly	The card is initializing.
			Blink quickly	The card is receiving the configuration command.
			OFF	The card is not powered on.
PUBA	ACT	Green	ON	The card is operating normally.
			Blink slowly	The card is initializing.
			Blink quickly	The card is receiving the configuration command.
			OFF	The card is not powered on.

- ALM indicator LED

  The following table lists the operating status of each card as signified by the ALM indicator LEDs of the cards.

Card	Indicator LED Label	Color	Status	Description
HSWA	ALM	Red	ON	The card is in reset status or has alarms.
			OFF	The card is operating normally.
EC4B / EC8B / GC4B / GC8B / XG2B	ALM	Red	ON	The card is in reset status or has alarms.
			OFF	The card is operating normally.
C155A / CE1B	ALM	Red	ON	The card is in reset status or has alarms.
			OFF	The card is operating normally.
HU1A / HU2A / GU6F	ALM	Red	ON	The card is in reset status or has alarms.
			OFF	The card is operating normally.
PUBA	ALM	Red	ON	The card is in reset status or has alarms.
			OFF	The card is operating normally.

- MS indicator LED

  The following table lists the operating status of each card as signified by the MS indicator LEDs of the cards.

Card	Indicator LED Label	Color	Status	Description
HSWA	MS	Green	ON	The card is in active status.
			OFF	The card is in standby status.
EC4B / XG2B	MS	Green	ON	The optical interface is in the active status of a PON protection group.
			OFF	The optical interface is in the standby status of a PON protection group or the PON protection group is not configured.
GC4B	MS	Green	ON	This PON interface has the ONU pre-authorization information.
			OFF	This PON interface has no ONU pre-authorization information.

Maintenance period

Quarterly

Tool and instrument

An ESD protection wrist strap or ESD protection glove

Procedure

Check the current card LED indicators of the AN5116-06B. Below is the procedure:

1. Check the indicator LEDs of the HSWA card: Observe whether the ACT indicator LEDs of the active and standby HSWA cards blink normally; see whether the ALM indicator LEDs are illuminated, if yes, deal with the related alarms in a timely manner; check whether the MS indicator LEDs are normal and whether the switching occurs.
2. Check the indicator LEDs of the EC4B / EC8B / GC4B / GC8B / XG2B card: Observe whether the ACT indicator LED blinks normally; see whether the ALM indicator LED is illuminated, if yes, deal with the related alarms in a timely manner; check whether the PON interface protection group status indicated by the MS indicator LED of the card is normal.
3. Check the indicator LEDs of the C155A / CE1B card: Observe whether the ACT indicator LED blinks normally; see whether the ALM indicator LED is illuminated, if yes, deal with the related alarms in a timely manner.
4. Check the indicator LEDs of the HU1A / HU2A / GU6F card: Observe whether the ACT indicator LED blinks normally; see whether the ALM indicator LED is illuminated, if yes, deal with the related alarms in a timely manner.
5. Check the indicator LEDs of the PUBA card: Observe whether the ACT indicator LED blinks normally; see whether the ALM indicator LED is illuminated, if yes, deal with the related alarms in a timely manner.
6. End.

Reference standard

The indicator LEDs on each card blink normally and alarm indicators are off.

Exception handling

If the card indicator LEDs are abnormal, replace the card in a timely manner and send the faulty card back to FiberHome for repair.

3.4 Checking Operating Status of Fan Unit

Background information

If the fan unit cannot run normally, the temperature of the equipment may become overhigh, which may damage the equipment components and severely affect the equipment performance.

Maintenance period

Quarterly

Tool and instrument

- An ESD protection wrist strap or ESD protection glove
- A cross screwdriver.

Operation procedures

1. Observe whether the fan unit is operating normally. Listen to the sound of the fan unit when it is running.
2. Observe whether the indicator LEDs on the fan unit's panel are normal.

Reference standard

- Every fan unit is running in a good condition. No abnormal sound is heard.
- The ACT indicator LED on the fan unit's front panel is illuminated. The ALM indicator LED is extinguished.

Exception handling

- If the fan unit has abnormal sound, it may be caused by the loosen screws on the fan or the foreign body obstruction. Check and repair the fan unit in a timely manner.
- If the ALM indicator of the fan unit is illuminated, check the alarm reported by the fan unit via the ANM2000. Take corresponding measures according to the specific alarm information.
- If the fan unit is faulty, replace it in a timely manner.

3.5 Cleaning Fan Unit

Caution:

Do not clean the fan unit with water or other liquid, otherwise the fan unit control board and the fan may be damaged.

Maintenance period

Quarterly

Tool and instrument

- Several large plastic bags (boxes or trolleys) which can hold the fan unit
- A roll of adhesive tape
- A hair brush
- An ESD protection wrist strap
- A vacuum cleaner

Prerequisite

A standby fan unit can operate instead of the fan unit to be cleaned.

Procedure

Below are the operations of cleaning the fan units:

1. Put on the ESD protection wrist strap (with its plug correctly connected to the ESD protection earth ground fastener).
2. Firmly depress the latch spring of the fan. Then draw the fan unit partially out with a stable force so that the fan is removed from the fan unit.
3. After confirming that the fan unit has stopped rotating, draw out the fan unit from the subrack completely, as shown in Figure 3-1.

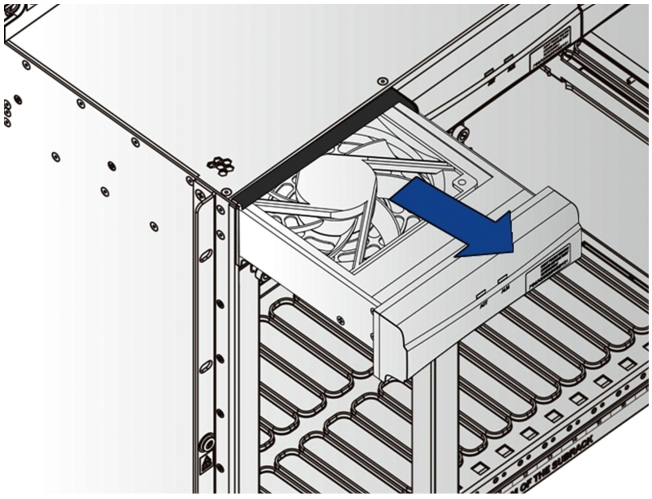


Figure 3-1 Removing the Fan Unit

4. Put the unplugged fan unit into the plastic bag (box or trolley) so that the dust on the fan unit will not be spread throughout the equipment room.
5. Mark the fan unit by attaching a piece of adhesive tape with the number of the fan unit to its front panel.
6. In a separate room, clean the fan unit, brush and collect the dust with a hair brush and a vacuum cleaner.
7. Bring the cleaned fan unit back to the equipment room and insert it into the original position. (Users can also choose not to re-insert the unit if it has already been replaced by a spare fan unit.) When installing the fan unit, hold it gently with the hands, align the guide rails on both sides of the fan unit with the guide rail grooves on the subrack respectively and push it slowly into the subrack. When the fan unit reaches the proper position, release the latch springs on both sides. The fan unit will be locked in the subrack automatically and will begin working. See Figure 3-2.

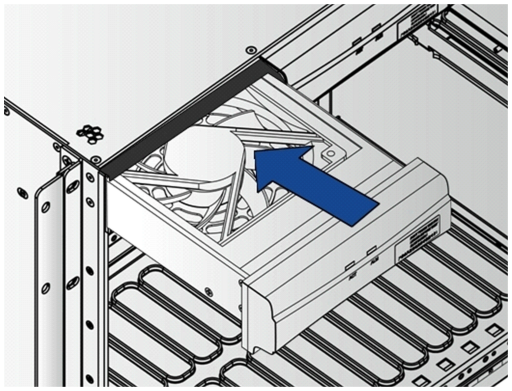


Figure 3-2 Installing the Fan Unit

8. End.

Reference standard

- The fan rotates normally with adequate air flow and there is little dust on it.
- The fan unit works normally without any abnormal sound.
- The fan unit is cleaned regularly based on the equipment running environment.

3.6 Cleaning Anti-dust Screen

3.6.1 Cleaning Cabinet Anti-dust Screen

Maintenance period

Annually

Tool and instrument

- Several large plastic bags (boxes or trolleys) which can hold the anti-dust screen
- A roll of adhesive tape
- A hair brush
- A vacuum cleaner

Procedure

Below are the procedures for cleaning the anti-dust screen.

1. Remove the sponge anti-dust screen from the anti-dust screen fastener on the cabinet front / rear door, as shown in Figure 3-3.

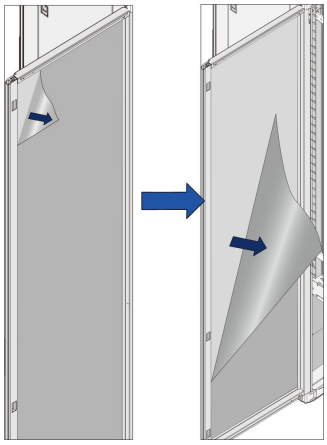


Figure 3-3 Removing the cabinet anti-dust screen

2. Put the removed anti-dust screen into the plastic bag (box or trolley) so that the dust on the anti-dust screen will not be spread throughout the equipment room.
3. Attach a piece of adhesive tape with the number of the cabinet to the anti-dust screen.
4. Secure a spare anti-dust screen to the anti-dust screen fastener on the cabinet front / rear door, and make sure that the anti-dust screen is firmly secured and smooth, as shown in Figure 3-4.

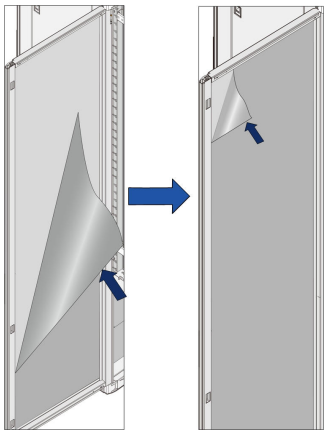


Figure 3-4 Installing the cabinet anti-dust screen

5. When cleaning the removed anti-dust screen, brush and collect the dust with a hair brush and a vacuum cleaner. After the cleaning is completed, return it to the equipment room and keep it as a spare anti-dust screen.
6. End.

Reference standard

There is no dust on the anti-dust screen and the air cooling of the system is normal.

3.6.2 Cleaning Subrack Anti-dust Screen

Maintenance period

Annually

Tool and instrument

- Several large plastic bags (boxes or trolleys) which can hold the anti-dust screen
- A roll of adhesive tape
- A hair brush
- A vacuum cleaner

Procedure

Below are the procedures to clean the anti-dust screen.

1. Gently pull out the anti-dust screen to make its bottom came loose from the subrack, as shown in Figure 3-5.

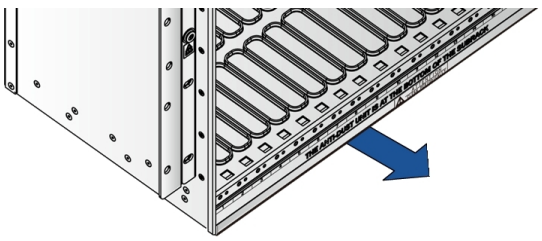


Figure 3-5 Gently pulling the anti-dust screen

2. Gently push in the anti-dust screen to make its top loose from the slide rail grooves, as shown in Figure 3-6.

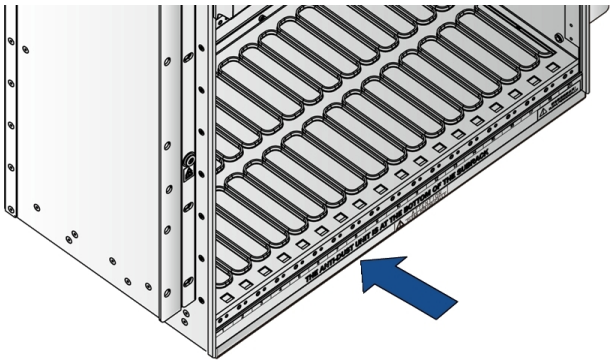


Figure 3-6 Gently pushing the anti-dust screen

3. Remove the anti-dust screen, as shown in Figure 3-7.

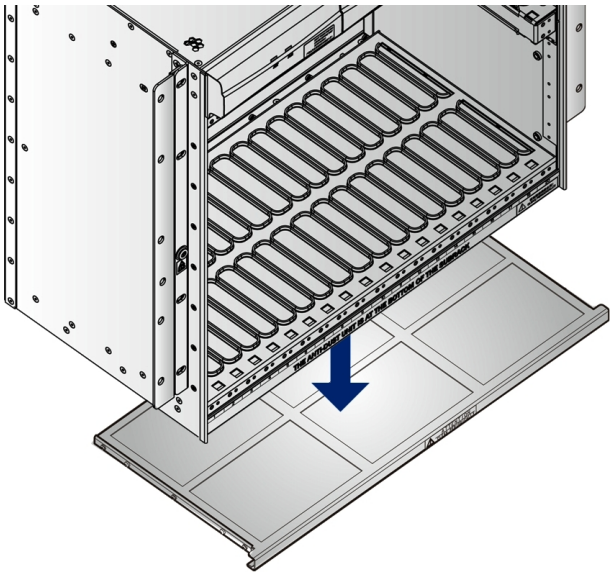


Figure 3-7 Taking out the anti-dust screen

4. Put the removed anti-dust screen into the plastic bag (box or trolley) so that the dust on the anti-dust screen will not be spread throughout the equipment room.
5. Bring the anti-dust screen out of the equipment room and clean it in the designated area. Brush the anti-dust screen with a hair brush and collect the dust with a vacuum cleaner.
6. After the cleaning, align the slide rails on both sides of the cleaned anti-dust screen with the slide rail grooves on the subrack respectively, and gently push the anti-dust screen inward to the original position. See Figure 3-8.

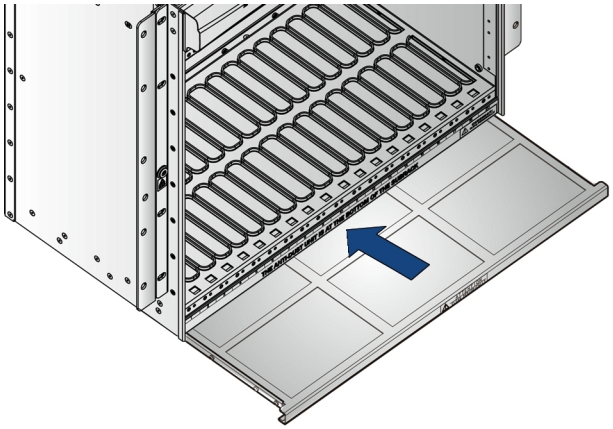


Figure 3-8 Installing the anti-dust screen

7. End.

Reference standard

There is no dust on the anti-dust screen and the air cooling of the equipment is normal.

3.7 Cleaning Equipment

Maintenance period

Annually

Tool and instrument

- A hair brush
- A vacuum cleaner

Procedure

Below are the cleaning procedures of the equipment and the accessory devices.

1. Clean the surfaces of the cabinet.
2. Clean the surfaces of the equipment.
3. Clean the accessory devices such as the cabling rack and distributing frame.

4. End.

Reference standard

There is no dust on the cabinet and the equipment. The system air cooling is normal. The equipment room is clean and tidy.

Appendix A Routine Maintenance Worksheet

A.1 Daily Maintenance Worksheet

Daily Maintenance Worksheet				
Bureau name: _____Date: ____/____/____ (MM/DD/YY)				
Maintenance Item		Result	Remark	Maintainer
Checking system alarms	Querying current alarms	The current alarms can be queried normally. ☐Yes ☐No The current alarm exists. ☐Yes ☐No		
	Querying historical alarms	The historical alarms can be queried normally. ☐Yes ☐No		
Checking card status		The status of all cards is normal. ☐Yes ☐No		
Checking user command log		There is no illegal operation and logs are complete. ☐Yes ☐No		
Checking user login log		No illegal user logs in the network management system. ☐Yes ☐No		
Record of problems and the troubleshooting procedures:				
Description of remaining issues:				

A.2 Weekly Maintenance Worksheet

Weekly Maintenance Worksheet			
Bureau name: _____Date: ____/____/____ (MM/DD/YY)			
Maintenance Item	Result	Remark	Maintainer
Checking card CPU / memory utilization ratio	The CPU / memory utilization ratio of the card is normal. ☐Yes ☐No		
Backing up the equipment configuration file	The backup operation of the equipment configuration file is completed. ☐Yes ☐No		
Backing up the database configuration file	The backup operation of the database configuration file is completed. ☐Yes ☐No		
Record of problems and the troubleshooting procedures:			
Description of remaining issues:			

A.3 Monthly Maintenance Worksheet

Monthly Maintenance Worksheet			
Bureau name: _____Date: ____/____/____ (MM/DD/YY)			
Maintenance Item	Result	Remark	Maintainer
Checking the operating status of fan unit	The operating status of the fan unit is normal. ☐Yes ☐No		
Querying and saving historical alarms	The historical alarms can be queried normally. ☐Yes ☐No		
Querying and saving historical performance data	The historical performance data can be queried normally. ☐Yes ☐No		

Monthly Maintenance Worksheet			
Inspecting the level and authorization of the network management system users	The levels and authorizations of the network management system users are normal. ☐Yes ☐No		
Record of problems and the troubleshooting procedures:			
Description of remaining issues:			

A.4 Quarterly Maintenance Worksheet

Quarterly Maintenance Worksheet			
Bureau name: _____Date: ____/____/____ (MM/DD/YY)			
Maintenance Item	Result	Remark	Maintainer
Checking the system time	The time of the network management system is consistent with the system time. ☐Yes ☐No		
Changing the password of the network management system users	The password of the network management system user can be modified normally. ☐Yes ☐No		
Checking the remote login	The remote login is normal. ☐Yes ☐No		
Inspecting the operating environment of the equipment	The operating environment of the equipment is normal. ☐Yes ☐No		

Quarterly Maintenance Worksheet			
Checking the cable connections	The connection of the power cable is normal. ☐Yes ☐No The connection of the earth ground cable is normal. ☐Yes ☐No The connections between the cables and the interfaces are firm. ☐Yes ☐No The cable labels are complete. ☐Yes ☐No The unused optical interfaces are covered with the anti-dust caps. ☐Yes ☐No		
Checking the indicator LEDs on the equipment	The cabinet indicator LEDs are illuminated normally. ☐Yes ☐No The card indicator LEDs are illuminated normally. ☐Yes ☐No		
Checking the operating status of fan unit	The fan works normally without any abnormal sound. ☐Yes ☐No		
Cleaning the fan unit	The fan unit is completely cleaned. ☐Yes ☐No After cleaning, the fan unit can operate normally without abnormal sound. ☐Yes ☐No		

Quarterly Maintenance Worksheet
Record of problems and the troubleshooting procedures:
Description of remaining issues:

A.5 Annually Maintenance Worksheet

Annual Maintenance Worksheet			
Bureau name: _____Date: ____/____/____ (MM/DD/YY)			
Maintenance Item	Result	Remark	Maintainer
Checking the active / standby switching	The displayed status of the active / standby core switch card is normal. ☐Yes ☐No The switching between the active and standby core switch cards can be executed normally. ☐Yes ☐No		
Cleaning the anti-dust screen	After cleaning, the anti-dust screen has no dust, and the airflow to the system is normal. ☐Yes ☐No		
Cleaning the equipment	The equipment has no dust. ☐Yes ☐No		
Record of problems and the troubleshooting procedures:			
Description of remaining issues:			

Product Documentation Customer Satisfaction Survery

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To help us better understand your needs, please focus your answers on a single documentation or a complete documentation set.

Documentation Name	
Code and Version	

Usage of the product documentation:

1. How often do you use the documentation?

☐ Frequently ☐ Rarely ☐ Never ☐ Other (please specify) _____

2. When do you use the documentation?

☐ in starting up a project ☐ in installing the product ☐ in daily maintenance ☐ in trouble shooting ☐ Other (please specify) _____

3. What is the percentage of the operations on the product for which you can get instruction from the documentation?

☐ 100% ☐ 80% ☐ 50% ☐ 0% ☐ Other (please specify) _____

4. Are you satisfied with the promptness with which we update the documentation?

☐ Satisfied ☐ Unsatisfied (your advice) _____

5. Which documentation form do you prefer?

☐ Print edition ☐ Electronic edition ☐ Other (please specify) _____

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1. Is the information organized and presented clearly?

☐ Very ☐ Somewhat ☐ Not at all (your advice) _____

2. How do you like the language style of the documentation?

☐ Good ☐ Normal ☐ Poor (please specify) _____

3. Are any contents in the documentation inconsistent with the product?

_____

4. Is the information complete in the documentation?

☐ Yes

☐ No (Please specify) _____

5. Are the product working principles and the relevant technologies covered in the documentation sufficient for you to get known and use the product?

☐ Yes

☐ No (Please specify) _____

6. Can you successfully implement a task following the operation steps given in the documentation?

☐ Yes (Please give an example) _____

☐ No (Please specify the reason) _____

7. Which parts of the documentation are you satisfied with?

_____

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9. What is your opinion on the Figures in the documentation?

☐ Beautiful ☐ Unbeautiful (your advice) _____

☐ Practical ☐ Unpractical (your advice) _____

10. What is your opinion on the layout of the documentation?

☐ Beautiful ☐ Unbeautiful (your advice) _____

11. Thinking of the documentations you have ever read offered by other companies, how would you compare our documentation to them?

Product documentations from other companies:_____

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12. Additional comments about our documentation or suggestions on how we can improve:

_____

_____

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