GPON Basic Operation and Maintenance

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Objectives

- Upon completion of this course, you will be able to:

  - Describe GPON system operation features

  - Master how to do the GPON basic operation and maintenance

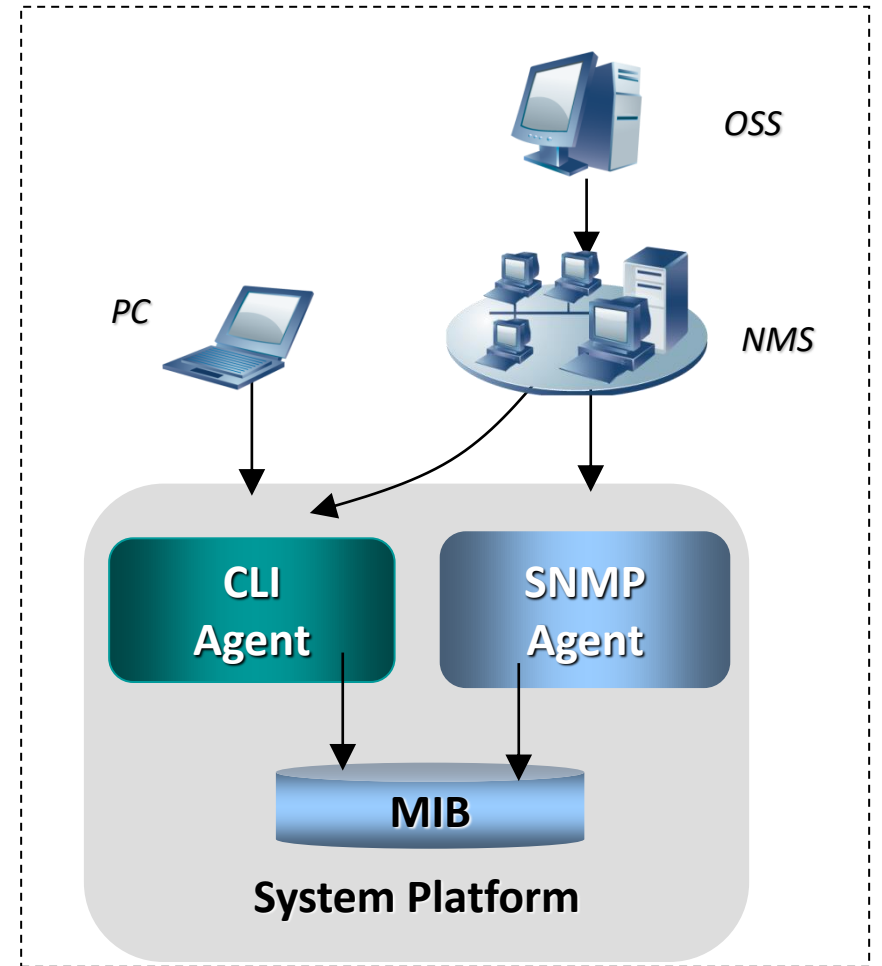 - Know the basic steps to set up the maintenance environment

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Contents

1. Maintenance Environment

2. Command Line Features

3. System Basic Operation & Maintenance

4. Network Management Configuration
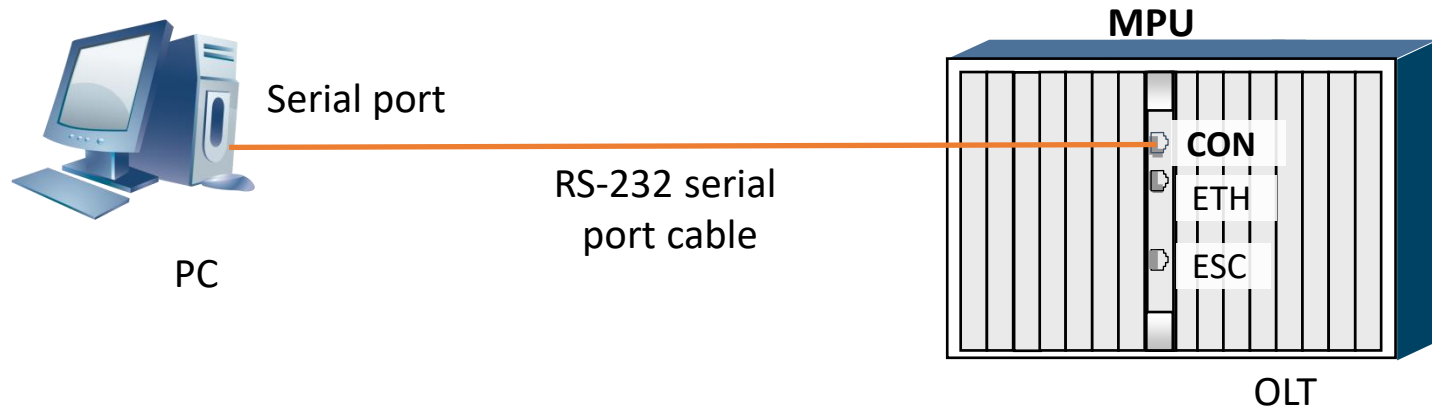
Management Entities

- The OLT supports two management entities

  - CLI(Command Line Interface) agent

    - Serial port

    - Remote Telnet

  - SNMP(Simple Network Management Protocol)

  agent

    - Graphic user interface (GUI)

    - iManager U2000 NMS / iMaster NCE-FAN

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Connect to the System

- Command line interface

  - ◻ Serial port configuration mode

    - The maintenance information goes through the maintenance CON port.

  - ◻ Telnet configuration mode

    - Outband: The maintenance information goes through the maintenance Ethernet port.

    - Inband: The maintenance information goes through the service channel.

Login System - Serial Port Mode

- Run Hyper terminal in the computer and set the correct parameters

Baud rate:9600
Data Bit:8
Parity: None
Stop Bit:1
Flow Control: None
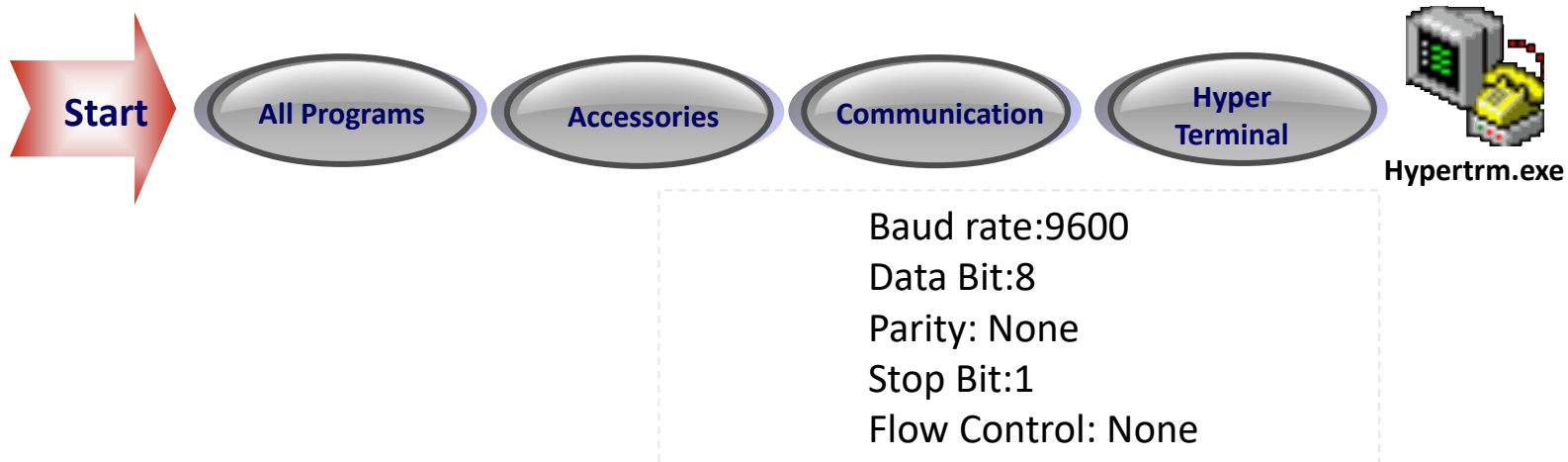
Login System - Telnet Mode
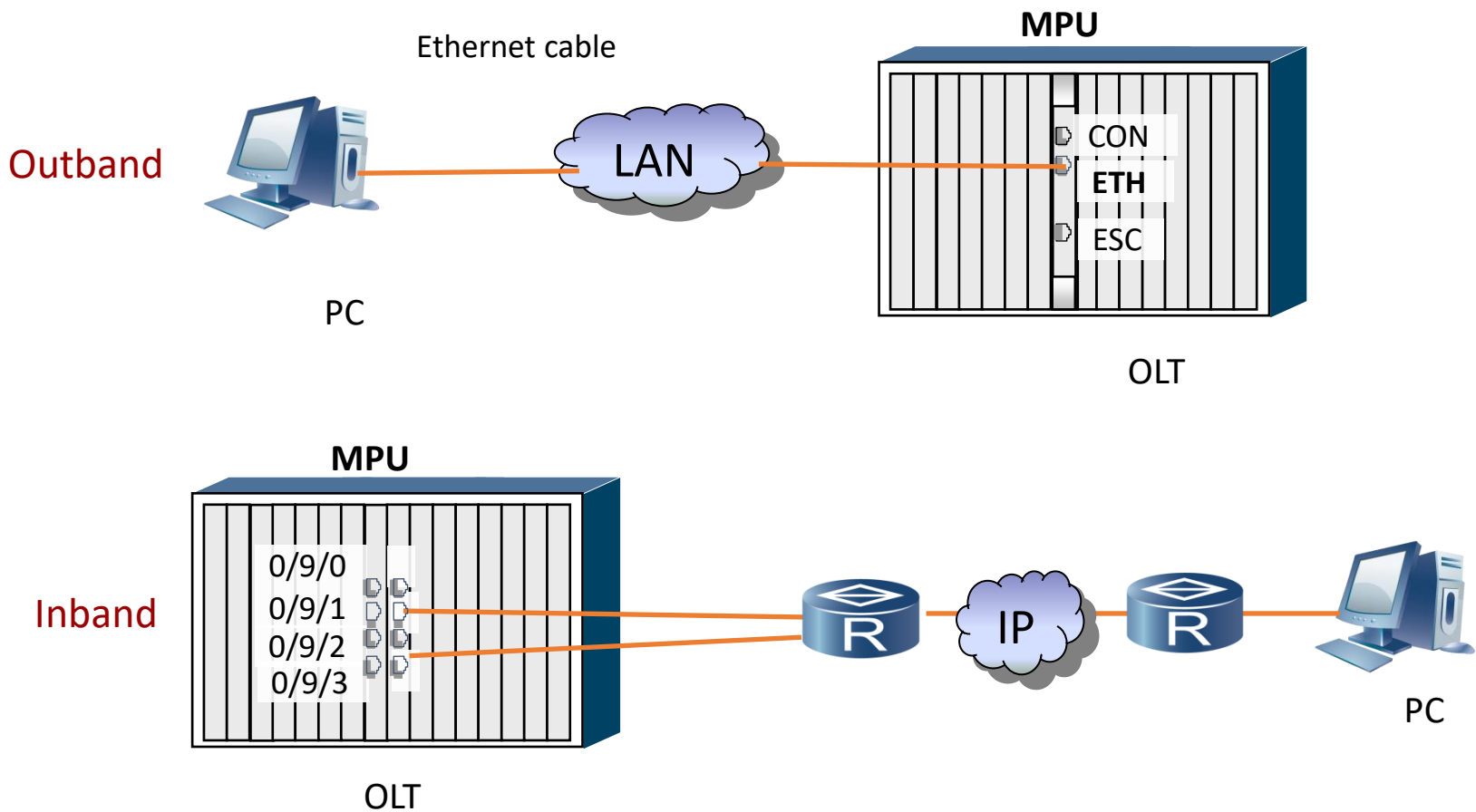
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1. Maintenance Environment

2. **Command Line Features**

3. System Basic Operation & Maintenance

4. Network Management Configuration

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Command Line Modes

- The OLT provides multiple command modes to implement hierarchical protection for preventing any unauthorized access.

BTV mode
OLT(BTV)#

broadband tv

BTV   *quit*

Login

User mode   *enable*   **Privilege mode**   *config*   **Global config mode**
OLT>   **OLT#**   **OLT(config)#**

quit   *disable*   *quit*

meth maintenance ethernet is 0

interface...   *quit*

return

Port/Interface mode
OLT(config-if-...)#
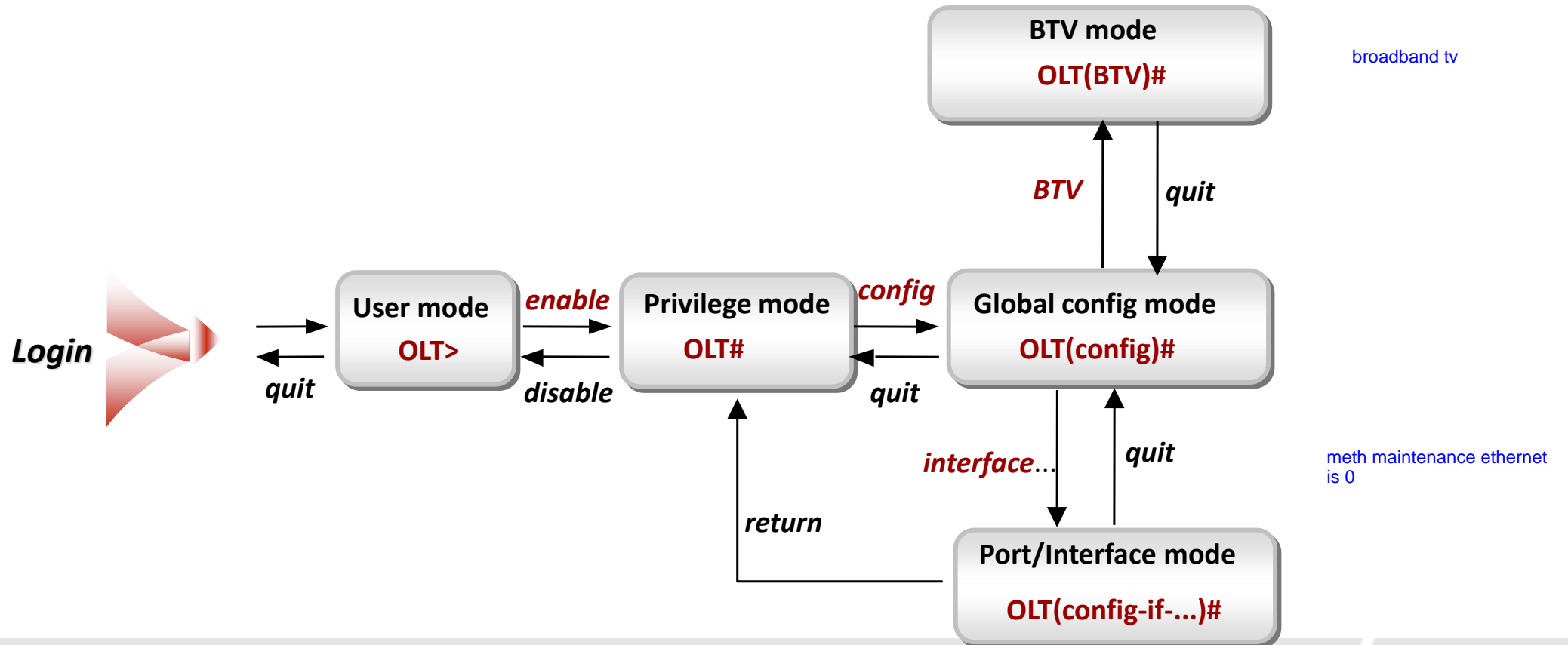
Obtain Help Information

- Obtain Help Information

  - OLT(config)#**interface** ?
    - cable   Change into cable command mode
    - emu   Enter an environment monitor unit
    - epon   Change into EPON command mode
    - eth   Change into ETH command mode
    - gpon   Change into GPON command mode
    - ....

  - OLT(config)#**interface** [Enter]
    - { cable<K>|emu<K>|epon<K>|eth<K>|gpon<K>|gponnni<K>|loopback|meth|mpu<K>|null|optical-receiver<K>|optical-transmitter<K>|top<K>|tunnel|vlanif }:

- Intelligent matching

  - OLT>**ena** [space/Tab]

  - OLT>**enable**

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Display History Commands

- Display History Commands

  - OLT(config)#**display history-command**
    - --
    - No.   Command
    - --
    - 10   terminal
    - ...
    - 7   interface
    - 6   config
    - 5   en
    - ...
    - 2   interface
    - 1   interactive
    - --

  Key Board

  - OLT(config)#**history-command max-size**
    - { historycmdvalue<U><0,256> }: **50**

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CLI Command Control Characters

- Deletes the characters before the cursor

    □ Press <Backspace ←>

- Moves the cursor to the left / right of one character

    □ Press <Left arrow key ← or Ctrl A>

    □ Press <Right arrow key → or Ctrl D>

- Displays history commands

    □ Press <Up/Down arrow key ↑/ ↓>

    □ Press < Ctrl P/ Ctrl O>

    □ Enter display history command

- Suspends the display and the running of commands

    □ Press < Q or Ctrl C>

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Command Line Parameter Meaning

Character	Meaning
<K>	Keyword
<E>	Enumeration. Items following it are the available options.
<U>	ULONG. Information following it is the range of the value to be entered
<L>	LONG. Information following it is the range of the value to be entered.
<S>	Character string. Information following it is the length of the character string to be entered.
<I>	IP address
<M>	MASK, such as the mask of an IP address.
<PA>	MAC address
<H>	Hexadecimal number. The system supports the input of "0x".
<D>	<yyyy-mm-dd> Date
<T>	<hh:mm:ss> Time
<Cr>	Enter. It means the end of the command.

Command Syntax and Format

Format	Description
Boldface	The keywords of a command are in boldface.
Italics	command parameters are in italics.
[ ]	Items in square brackets [ ] are optional.
{ x | y | ... }	Alternative items are grouped in braces and separated by vertical bars. One is selected.
[x | y | ...]	Alternative items that are optional are grouped in square brackets and separated by vertical bars. One or none is selected.

- example:
  - Command format: **ip address** *ip-addr* { *mask-length* | *mask-ipaddr* } [**sub**] [**description** *text*]
  - OLT(config-if-vlanif10)# ip address 202.38.160.1 25
  - OLT(config-if-vlanif10)# ip address 202.38.160.1 255.255.255.0 description voip_service

CLI Error Prompts

Error Message	Cause
Unknown command	The entered command or keyword is not found, the parameter type is incorrect or the parameter value exceeds the threshold.
Incomplete command	The entered command is incomplete.
Too many parameters	You have entered too many parameters.
Ambiguous command	The entered command is ambiguous.

Q&A

1. How many Super users are there in the OLT?   the root user.
                                                  1

2. How to get help from command line?   ?

3. Which keys are used for Intelligent matching?   space en of tab

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3. System Basic Operation & Maintenance

3.1 User Account Management

3.2 System Basic Configuration

3.3 Hardware Operation

3.4 System Maintenance

User Profile and User

User Profile 1 → User A, User B, User C

All these users can login to the OLT from 8:00AM to 5:00PM, and the user account validity is three months

User Profile 2 → User G, User H, User K

All these users can login to the OLT from 10:00AM to 3:00 PM, and the user account validity is one month

User profile is a group collection of control parameters:
length of the user name and password
Validity period of the user name and password
Permitted login time

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User Authorities

Authority level	Function
Common user	Only query the basic settings of the OLT
Operator	Configure the OLT and some services
Administrator	Manage all the functions and services of the OLT, and can manage all the lower level users
Super User root	The highest authority, manage all the functions and services and for managing all the lower level users

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User Management (1/8)

- Query all the user profiles

- OLT(config)#**display terminal user-profile**
  - {all<K> | name <K>}:**all**

  - User profile name   : root

  - Validity period of the user name   : 0

  - Validity period of the password   : 0

  - Permitted start time of logon by a user : 00:00

  - Permitted end time of logon by a user   : 00:00

User Management (2/8)

- Add a new user-profile

  - OLT(config)#**terminal user-profile add**

    - User profile name(<=15 chars):**huawei**

    - Validity period of the user name(0--999 days)[0]:**30**

    - Validity period of the password(0--999 days)[0]:**30**

    - Permitted start time of logon by a user(hh:mm)[00:00]:**9:00**

    - Permitted end time of logon by a user(hh:mm)[00:00]:**17:00**

    - Repeat this operation? (y/n)[n]:

User Management (3/8)

- Add a new user

  - OLT(config)#**terminal user name**
    - User Name(length<6,15>): **huawei**
    - User Password(length<6,15>):
    - Confirm Password(length<6,15>):
    - User profile name(<=15 chars)[root]: **huawei**
    - User's Level:
    -    1. Common User 2. Operator 3. Administrator:**3**
    - Permitted Reenter Number(0--4):**4**
    - User's Appended Info(<=30 chars): **test_user**
    - Adding user successfully
    - Repeat this operation? (y/n)[n]:

User Management (4/8)

- Query all the terminal user

> - OLT(config)#**display terminal user**
>   - {all<K> |…|name<K>|online <K> }:**all**
>
>   - ---
>
>   - Name Level   Status Reenter Profile   Append
>
>   -   Num   Info
>
>   - ---
>
>   - root Super   Online   1   root   -----
>   - huawei Admin   Offline   4   huawei   test_user
>
>   - ---
>
>   - Total record(s) number: 2

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User Management (5/8)

- Modify the user password

  - OLT(config)#**terminal user password**

    – User name (<=15 chars):**huawei**

    – New password(length<6,15>):

    – Confirm Password(length<6,15>):

    – Information takes effect Repeat this operation? (y/n)[n]: **n**

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User Management (6/8)

- Modify the user other attribute

  - OLT(config)#**terminal user user-profile**

  - OLT(config)#**terminal user level**

  - OLT(config)#**terminal user reenter**

  - OLT(config)#**terminal user apdinfo**

If we modify the current online user, the new configuration will take effect when the user log in the system next time!

User Management (7/8)

- Query the online terminal user

  - OLT(config)#**display client**

    – ---

    – ID Client name   Domain name   IP Address   Login Time

    – ---

    – 1 root   --   Serial   2012-04-12   20:01:01+08:00

    – ---

- Kick off the online user

  - OLT(config)#**client kickoff**

    – {clientID<U><1,22>}:**1**

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User Management (8/8)

- Delete the user

  - OLT(config)#**undo terminal**

    - {debugging<K>|hold<K>|monitor<K>|user<K>}:**user**

    - {name<K>}:**name**

    - Command:

    - undo terminal user name

    - User Name(<=15 chars):**huawei**

    - Are you sure to delete the user?(y/n)[n]:

Q&A

1. How many authority levels provide by OLT?

2. How to control user login time?

3. Which command is used to kick off the online user?

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3. System Basic Operation & Maintenance

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Configure Miscellaneous Stuff

- Set the system time
  - OLT(config)#**time**
    - {Date<D><yyyy-mm-dd>|Time<T><hh:mm:ss>|date-format<K>|dst<K>|time-stamp<K> }:**19:35:55 2015-07-12**

- Query system time
  - OLT(config)#**display time**
    - {<cr>|date-format<K>|dst<K>|time-stamp<K>}:
    - command: display time 2012-04-12 20:09:18+08:00

- Set the system identity
  - OLT(config)#**sysname**
    - {prompt<S><Length 1-50>}:**HUAWEI_OLT**
  - HUAWEI_OLT(config)#

System Information

- Query the detailed version

  > - OLT(config)#**display version**
  >
  > - OLT(config)#**display version 0/6**

- Query the system log information

  > - OLT(config)#**display log all**

- Set the idle-timeout

  > - OLT(config)#**idle-timeout 120**

- Query the current state of data synchronisation

  > - OLT(config)#**display data sync state**

Contents

3. System Basic Operation & Maintenance

Board Statuses

Board	Status
Main Control Board	Active-Normal
	Standby-Normal
	Standby-failed
Service Board /Uplink Board	Auto_find
	Config (transition status)
	Normal
	Failed

when there is hardware but no config

in config state

als de board er is hoef je geen add te doen maar slechts confirmen

1 The board can be automatically found after inserted into the slot but not registered in the system

2 Confirm the board, the status becomes normal, the config status is a transitional status

3 Faults happen, the status becomes failed

Board Management (1/4)

- Query all the boards in the frame

  - OLT(config)#**display board 0**
    - --
    - SlotID BoardName Status   SubType0 SubType1   Online/Offline
    - ---
    - 0
    - 1   H901GPHF   Normal
    - 2   H901GPHF   Normal
    - 3   H901XGHD   Normal
    - ... ...
    - 9   H901MPLB   Active_normal
    - 10   H901MPLB   Standby_failed   Offline
    - ... ...

Board Management (2/4)

- Query one board in the frame

  - OLT(config)#**display board 0/5**
    - --
    - Board Name   : H901OXHD
    - Board Status   : Normal
    - --
    - Port Port Optic   Native MDI Speed Duplex Flow- Active Link
    -     Type Status VLAN   (Mbps)   Ctrl   State
    - --
    - --
    -    0 10GE absence   - -   10000   full   off   active offline
    -    1 10GE absence   - -   10000   full   off   active offline
    -    2 10GE absence   - -   10000   full   off   active offline
    -    3 10GE absence   - -   10000   full   off   active offline
    -    4 10GE absence   - -   10000   full   off   active offline
    -    5 10GE absence   - -   10000   full   off   active offline
    -    6 10GE absence   - -   10000   full   off   active offline
    -    7 10GE absence   - -   10000   full   off   active offline

Board Management (3/4)

- Add a board

  - OLT(config)#**board add**
    - { frameid/slotid<S><Length 3-15> }: **0/4**
    - { H901CIUA|H901EDSH|H901EPHF|H901GPHF|H901GPSF|H901NXED|H901OGHK|H901OXHD|
      H901PILA|H901XEHD|H901XGHD }:**H901EPHF**

- Confirm a board

  - OLT(config)#**board confirm**
    - { frameid/slotid<S><Length 3-15>|frameid<U><0,512> }:**0/4**

Board Management (4/4)

- Reset board

  - **OLT(config)#board reset**
    - { frameid/slotid<S><3-15> }:**0/3**
    - Command: board reset 0/3 Are you sure to reset board? (y/n)[n]:**y**
    - 0 frame 3 slot reset board message sent successfully...

- Prohibit a board

  - **OLT(config)#board prohibit**   undo board prohibit to change back to normal
    - { frameid/slotid<S><3-15> }:**0/3**
    - Command: board prohibit 0/3
    - Prohibiting board will interrupt all services on this board, are you sure to prohibit board? (y/n)[n]:y

Notes: These commands will result in the service interrupt.

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System Energy-Saving Mode

- Enable Energy-saving function

  - OLT(config)#**system energy-saving mode**

    - { <cr>|mode<E><basic,deep,optimal,standard> }: basic

- Power off a board

  - OLT(config)#**board power-off**   om aan te maken power-on

    - { frameid/slotid<S><Length 1-15> }:**0/3**

    - Command:

      board power-off 0/3

    The board is powered off successfully

Notes: These commands will result in the service interruption.

Q&A

to put a board in maintenance status

1. What's the function of 'prohibit' ?

to save power/ energy

to isolate a board, to prevent unesesary alarms

2. Why do we need to confirm the boards?

other wise we can not use it for service, config

3. How to reset the standby control board?

reset is only for de service boards

switch over cmd to switch over from standby to active

system switch-over

rechtsklik in nce en klik switchover

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3. System Basic Operation & Maintenance

Testing Network Connectivity

- Check if the destination is reachable

  - OLT(config)#**ping 192.168.1.1**

    - PING 192.168.1.1: 56 data bytes, press CTRL_C to break

    - Reply from 192.168.1.1: bytes=56 Sequence=0 ttl=254 time = 1 ms

    - Reply from 192.168.1.1: bytes=56 Sequence=0 ttl=254 time = 1 ms

- Locate the fault point on the network

  - OLT(config)#**tracert 10.11.106.133**

    - Trace route to 10.11.106.133 max hops 30 ,packet 40 bytes

    - press CTRL_C to break

    - 1   2 ms   2 ms   2 ms   10.11.120.126

    - 2   *   *   *   Request timed out.

    - 3   *   *   *   Request timed out.

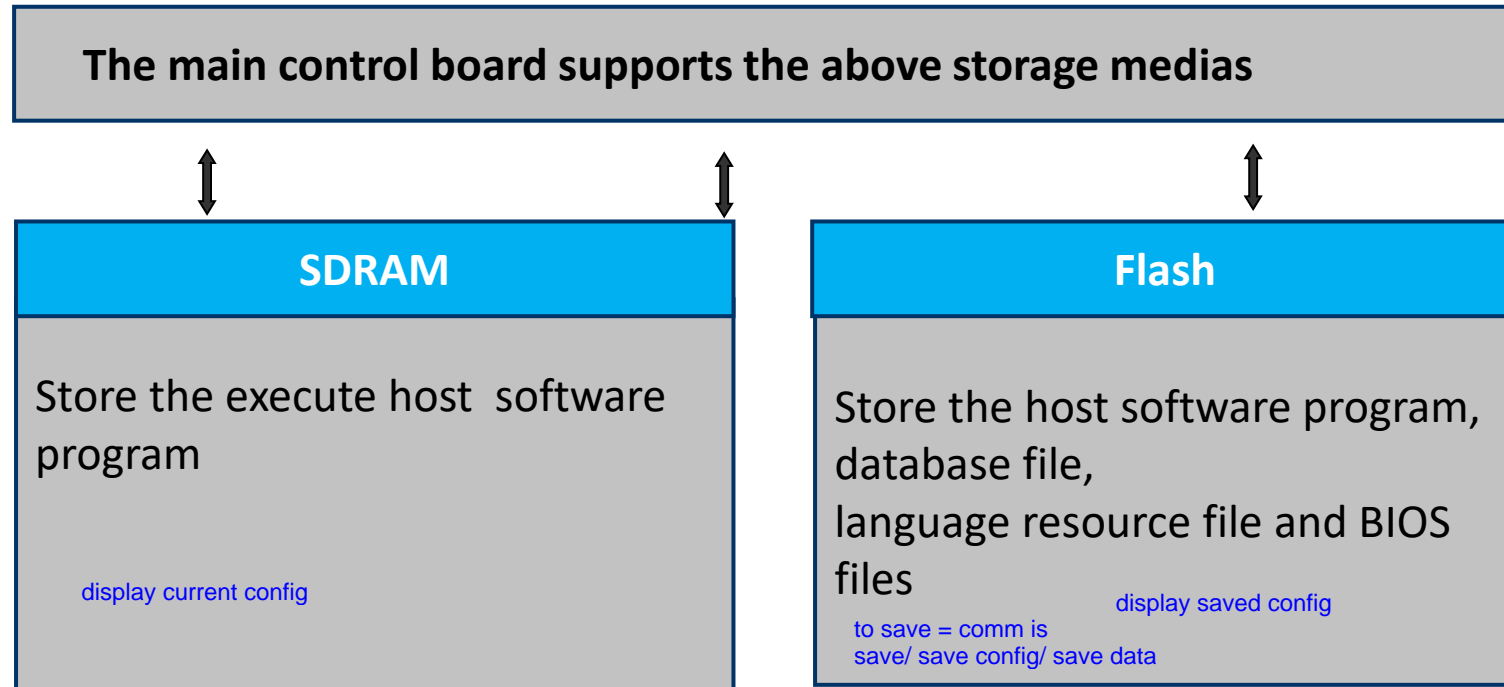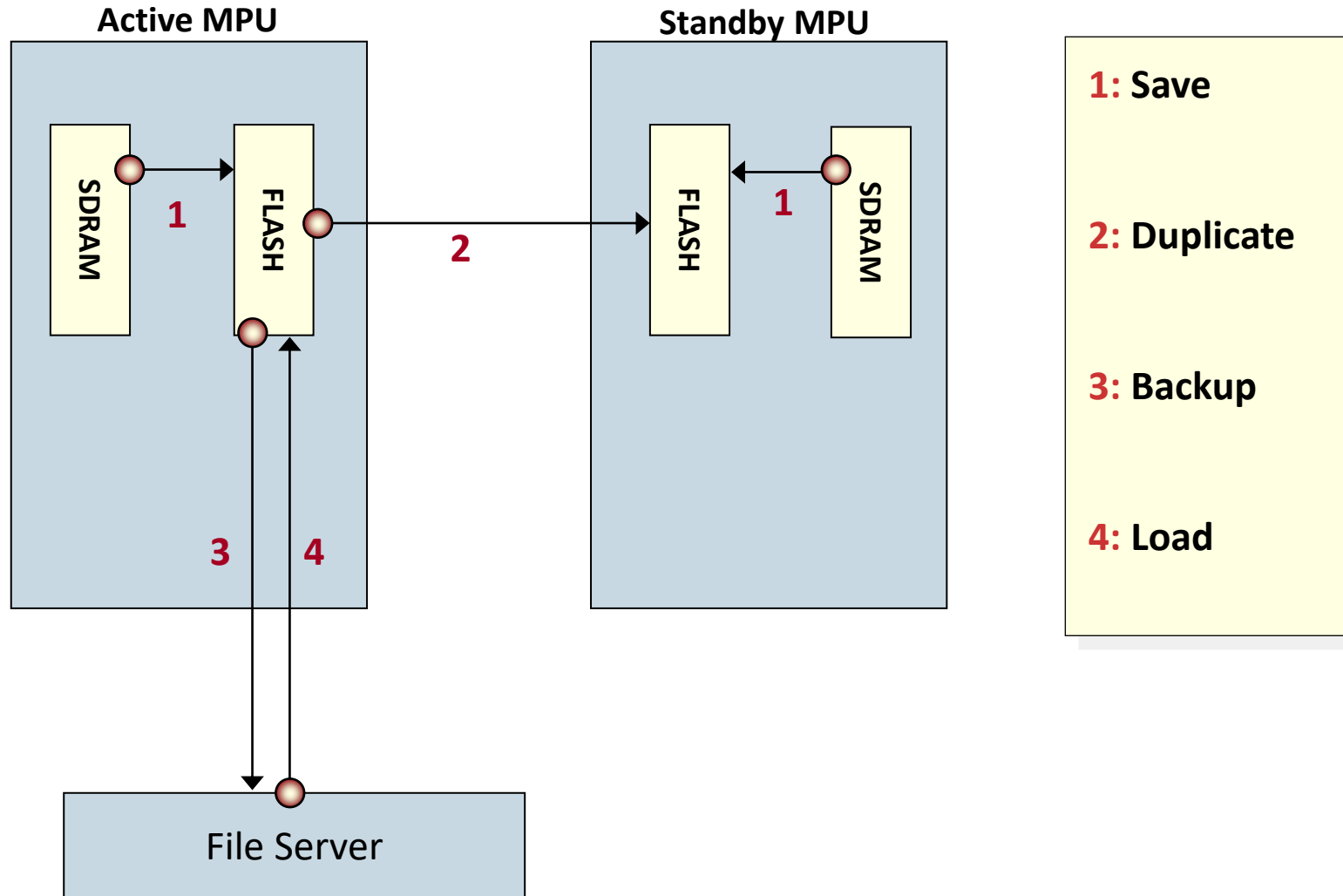   - 4   3 ms   3 ms   2 ms   10.11.106.133

Managing the Data - Files

The control board manages the following files:

- BootRom program

- Host program

- System database

- Language resource

- Service board program

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Managing the Data - Storage Media

The main control board supports the above storage medias

SDRAM	Flash
Store the execute host software program

display current config | Store the host software program, database file,
language resource file and BIOS files   display saved config
to save = comm is
save/ save config/ save data |

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Managing the Data - Diagram

How to Backup System Data

- Operation Steps:

  - Step1: Launch the TFTP internet application

  - Step2: Set the directory for files in PC

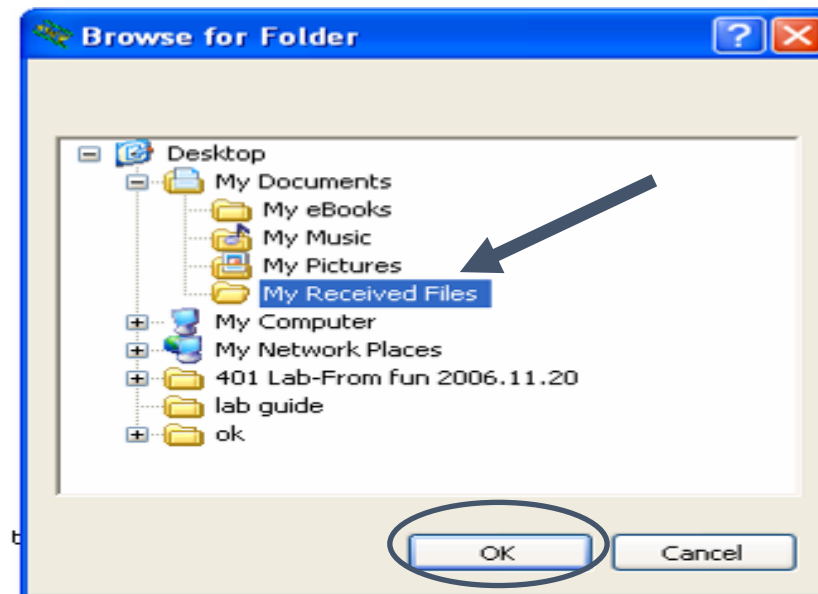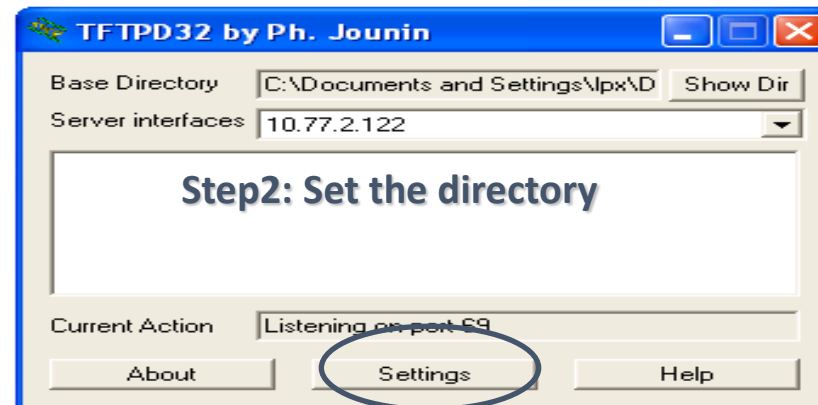 - Step3: Save the data

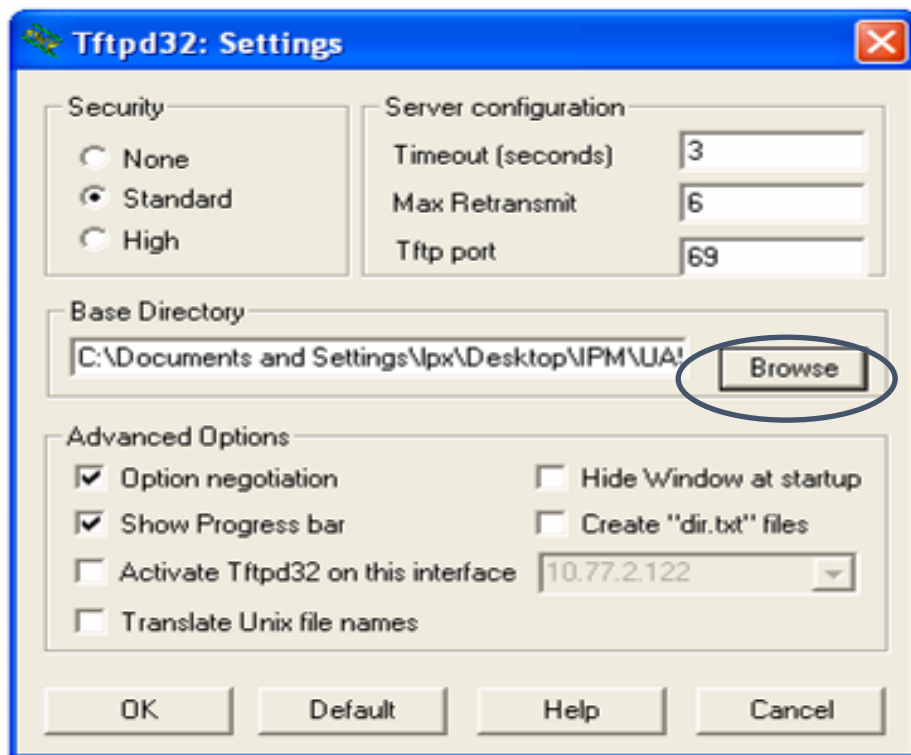 - Step4: Backup the data to PC

OLT

IP:10.77.1.100

Backup

PC

LAN

IP:10.77.2.122

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Backup Steps

Step1: Launch the TFTP

Step2: Set the directory
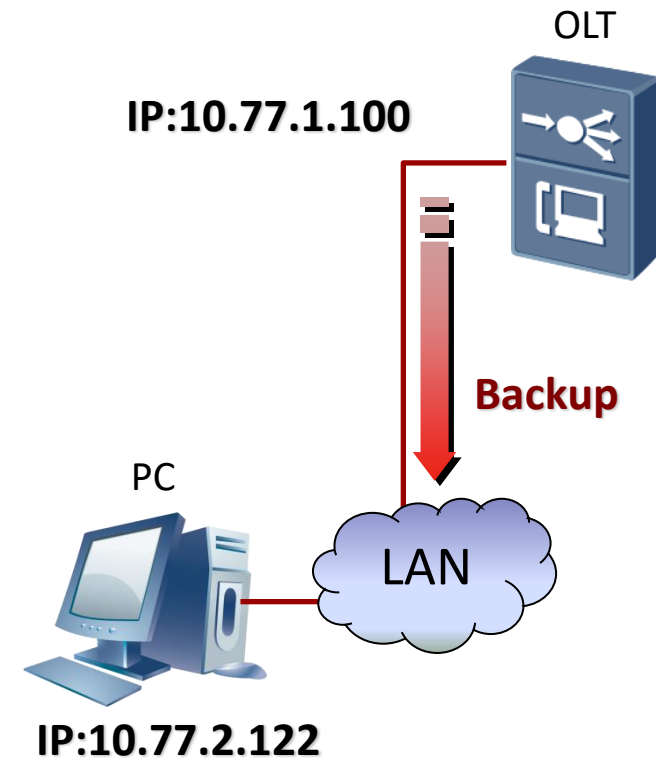
Backup Steps

- Step3: Save the data to flash memory

  - OLT(config)#**save**

- Step4: Backup the data to PC

  - OLT(config)#**backup data**

    - { ftp<K>|sftp<K>|tftp<K>|xmodem<K> }:**tftp**

    - { ServerIpAddress<I><X.X.X.X> }:**10.77.2.122** pc server ip

    - { filename<S><Length 1-128> }:**newdata** name of new data

System Upgrade

- The key step is STEP 5--cross-version of the data synchronization.
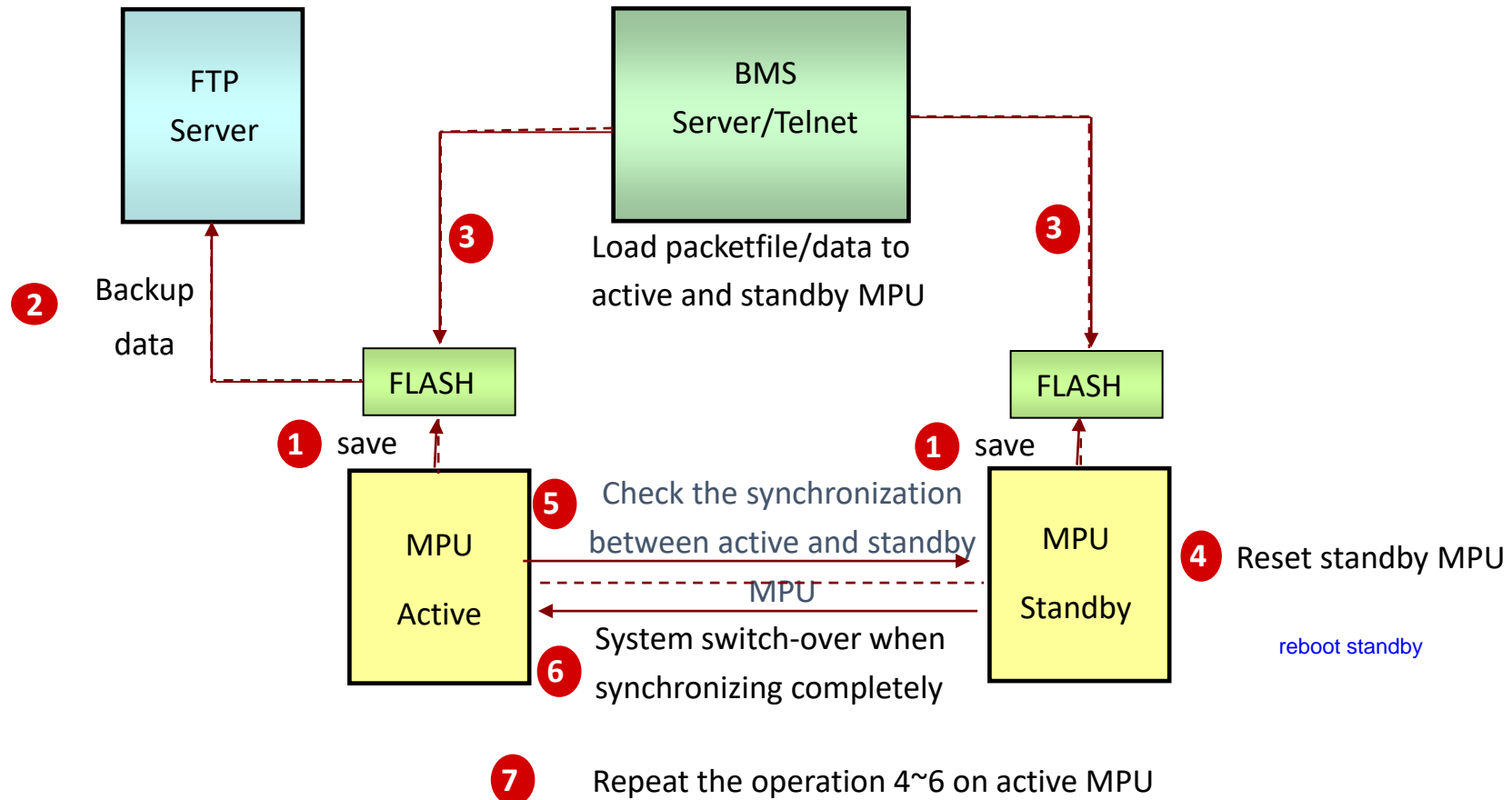
Upgrade Procedure

- Save the database file

OLT(config)#**save data**

- Backup the database file to TFTP server

OLT(config)#**backup data tftp 10.71.51.228 db_MPU_old.dat**

Update the database file to new version via the update tool

- Load the packet file to both MPU

OLT(config)#**load packetfile tftp 10.71.51.228 MPUpacket.bin**

- Load the new version to both MPU

OLT(config)#**load data tftp 10.71.51.228 MPU_new.dat all**

Upgrade Procedure

- Reset the standby MPU

  - OLT(config)#**reboot standby**

- Check the synchronization between active and standby MPU

  - OLT(config)#**display data sync state**

- Switchover when synchronizing completely

  - OLT(config)#**system switch-over**

- Do the same operations on the initial MPU

  - OLT(config)#**reboot standby**

  - OLT(config)#**display data sync state**

  - OLT(config)#**system switch-over**

How to Switchover System

- Save data

  - OLT#**save**

    – { <cr>|configuration<K>|data<K> }:

    – Command: save

  - OLT# It will take several minutes to save configuration file, please wait...

- Perform the active/standby switchover

  - OLT(config)#**system switch-over**

    – Are you sure to switch over? (y/n)[n]:**y**
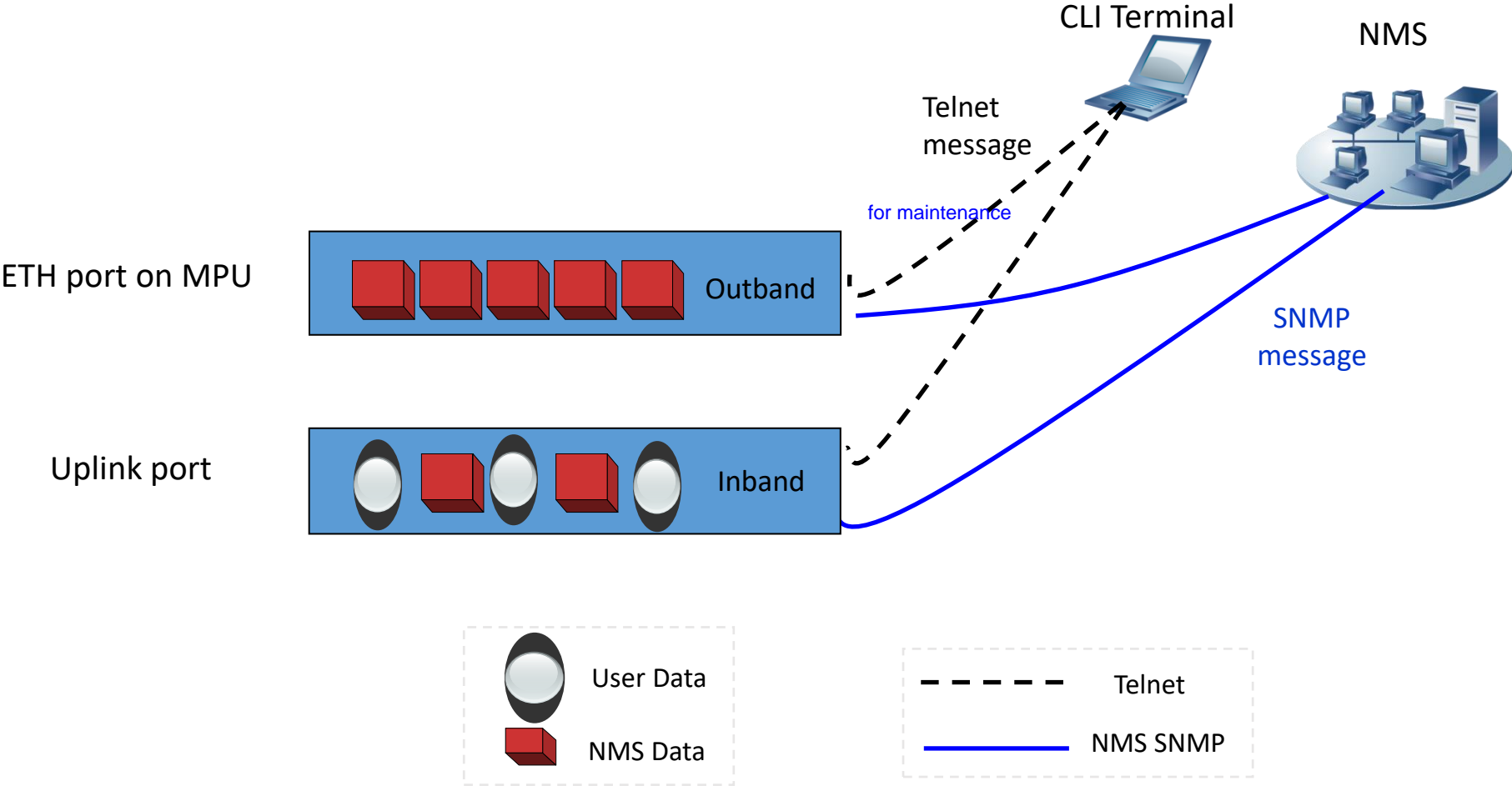
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Q&A

1. How to change the name of system?   sysname name

2. How to check the connectivity of the network?   tracerout
      ping ip adres
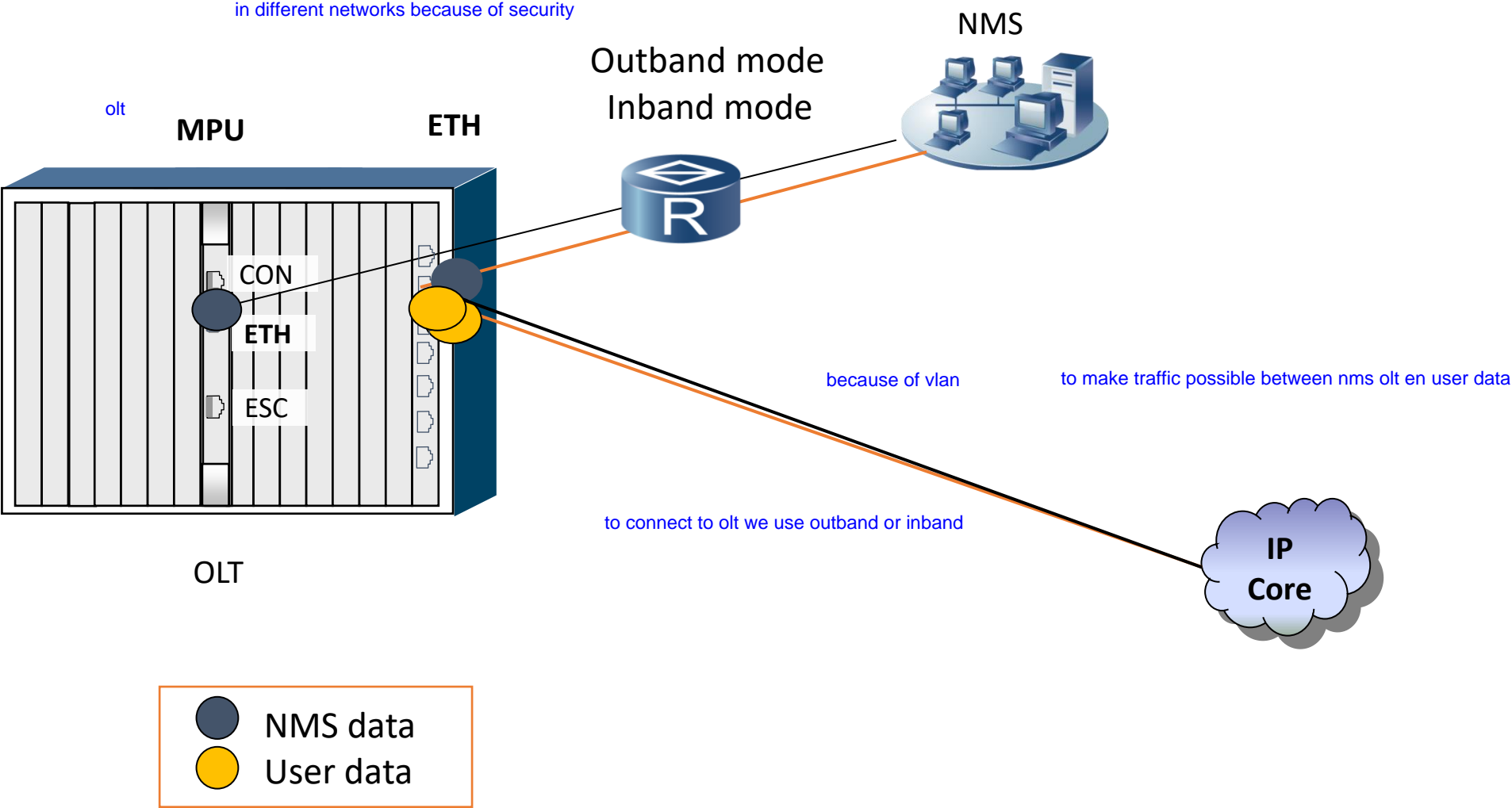
3. How to set the terminal timeout?   idle-time out ...

Contents

Out-band and In-band Networking

Out-band and In-band Networking

in different networks because of security

NMS

Outband mode
Inband mode

olt

MPU   **ETH**

CON

ETH

ESC

R

because of vlan   to make traffic possible between nms olt en user data

to connect to olt we use outband or inband

IP Core
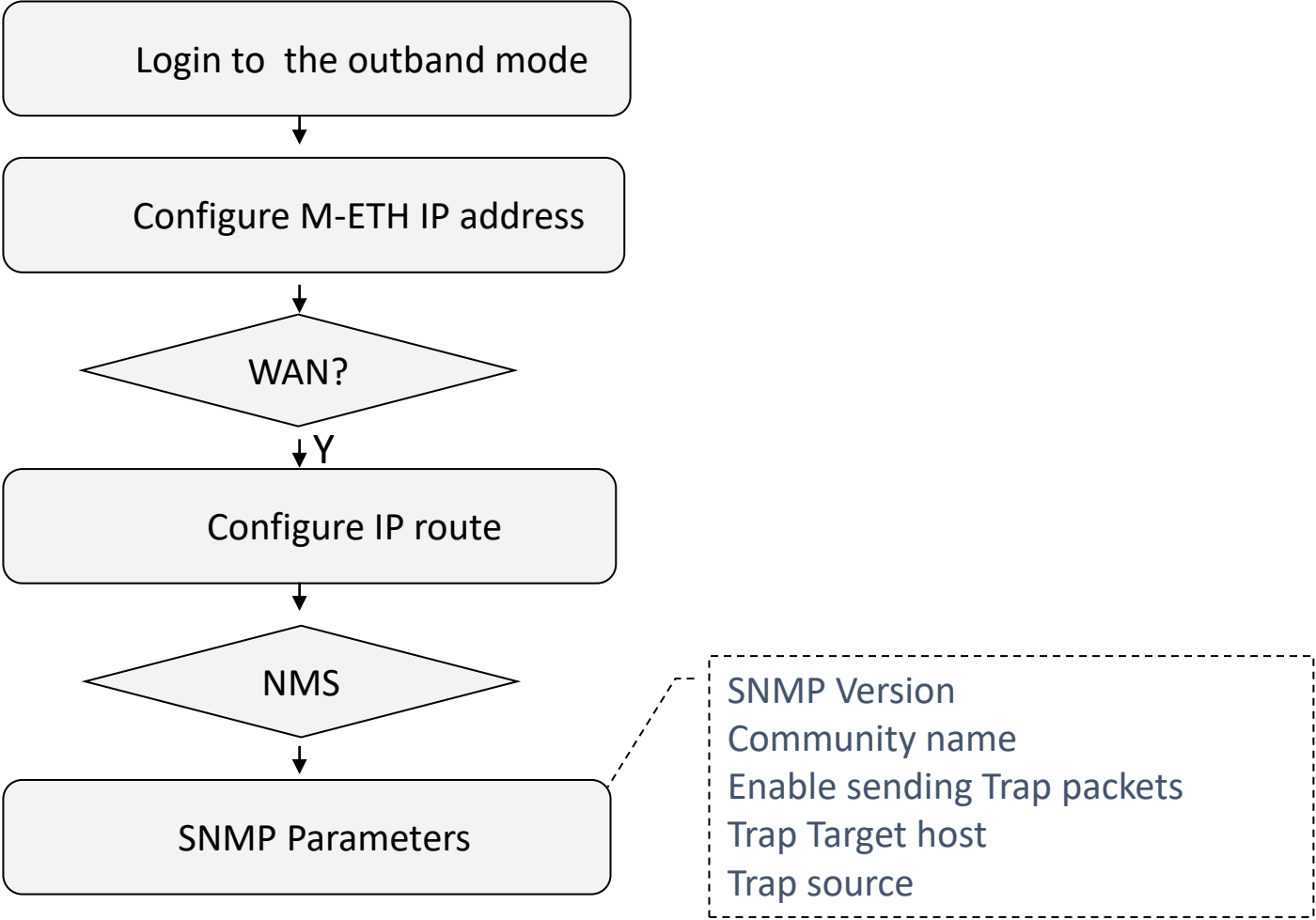
OLT

NMS data
User data

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4 . Network Management Configuration

4.1 Outband Network Management Configuration

4.2 Inband Network Management Configuration

4.3 Network Management SNMP Introduction

Configuration Steps

Login to the outband mode

↓

Configure M-ETH IP address

↓

WAN?

↓Y

Configure IP route

↓

NMS

↓

SNMP Parameters

SNMP Version
Community name
Enable sending Trap packets
Trap Target host
Trap source

Data Planning

main processing unit

MPU

CON

ETH

ESC

OLT
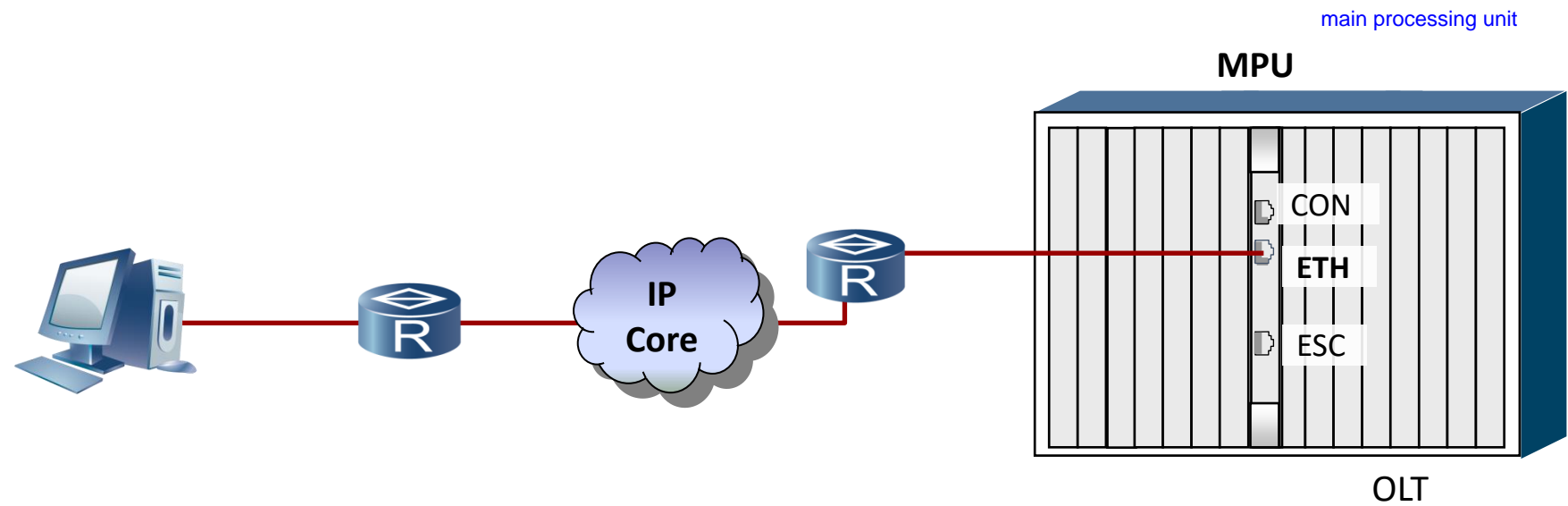
Item	Data Plan
Outband Management IP	192.168.50.250/ 255.255.255.0
Gateway IP	192.168.50.1
Terminal or NMS Server IP	10.10.1.1/24

Configure M-ETH IP Address

- Step1:Login to the outband mode

> - OLT(config)#**interface meth 0**

- Step2:Configure the IP address of the ETH

> - OLT(config-if-meth0)#**ip address**
>   - {ip_address<I>}:**192.168.50.250**
>   - {integer<U><0,32>|ip_addr<I><X.X.X.X>}:**255.255.255.0**

- Query the IP address

> - OLT(config)#**display ip interface meth 0**

Configure IP Route

- Step3: Configure the IP-route

  - OLT(config)#**ip route-static**

    – {ip_addr<I><X.X.X.X>|default-preference<K>}: **10.10.1.0** ← **Destination Network**

    – {ip_addr<I><X.X.X.X>|integer<U><0,32>}: **255.255.255.0** ← **Subnet mask**

    – {NULL<K>|MEth<K>|Vlanif<K>|LoopBack<K>|ip_addr<I>

      <X.X.X.X>}:**192.168.50.1** ← **Gateway**

    – {<cr>|preference<K>}:

Contents

4 . Network Management Configuration

Configuration Steps

```
┌─────────────────────────────────────────┐
│       Configure the management VLAN      │
└─────────────────────────────────────────┘
                     │
                     ▼
┌─────────────────────────────────────────┐
│      Add uplink port to management VLAN  │
└─────────────────────────────────────────┘
                     │
                     ▼
┌─────────────────────────────────────────┐
│      Login to  the VLAN interface mode   │
└─────────────────────────────────────────┘
                     │
                     ▼
┌─────────────────────────────────────────┐
│      Configure management IP address     │
└─────────────────────────────────────────┘
                     │
                     ▼
                  ◇ WAN? ◇
                     │ Y
                     ▼
┌─────────────────────────────────────────┐
│             Configure IP route           │
└─────────────────────────────────────────┘
                     │
                     ▼
                  ◇ NMS? ◇
                     │
                     ▼
┌─────────────────────────────────────────┐
│             SNMP Parameters              │
└─────────────────────────────────────────┘
```

SNMP Version
Community name
Enable sending Trap packets
Trap Target host
Trap source

Data Planning

Item	Data Plan
Management VLAN	4000
Uplink port	0/19/0
Inband Management IP	10.50.1.1/ 255.255.255.0
Gateway IP	10.50.1.10
Terminal or NMS Server IP	10.10.1.1/24

Configure the Management VLAN

vlan types
standard   only to connect uplink ports   for management

ddata en voice   smart   uplink en service at the same time multyple service en uplink

multicast, point to multypoint   mux   service ports en uplink ports but only 1 service port

super   can save ip adres, can transport multiple vlans throug 1 ip adres

- Step1:Create the management VLAN

  - OLT(config)#**vlan**

    – {attrib<K>|bind<K>|desc<K>|forwarding<K>|loop<K>|packet-policy<K>|priority<K>|reserve<K>|service-profile<K>

      |vlan-list<S><Length 1-256>|vlanid<U><2,4093>}:**4000**

      vlan 1 is an internal vlan

    – {<cr>|to<K>|vlantype<E><mux,standard,smart,super>|to<K>}:**smart**

- Step2:Configure the uplink port of management VLAN

  - OLT(config)#**port vlan**

    atributes
    common   s vlan

    Q in Q   svlan+cvlan

    stakking

    – {vlan-list<S><Length 1-256>|vlanid<U><1,4093>}:**4000**

    – {frame/slot<S><Length 1-15>|inner-vlan-list<K>|to<K>}:**0/19**

    – {portlist<S><Length 1-256>}:**0**

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Configure Management IP Address and IP Route

- Step3:Configure the Layer3 address of management VLAN

  - OLT(config)#**interface vlanif 4000**

  - OLT(config-if-Vlanif4000)#**ip address**

    - {ip_addr<I><X.X.X.X>}:**10.50.1.1**

    - {ip_addr<I><X.X.X.X>|integer<U><0,32>}:**255.255.255.0**

    - {<cr>|description<K>|sub<K>}:

- Step4: Configure the IP-route (In the different network)

  - OLT(config)#**ip route-static 0.0.0.0 0.0.0.0 10.50.1.10**

The management VLAN has the Layer 3 address as the system IP address.

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Contents

## 4 . Network Management Configuration

4.1 Outband Network Management Configuration

4.2 Inband Network Management Configuration

4.3 Network Management SNMP Introduction

Basic Concepts of SNMP

- SNMP: Simple Network Management Protocol

  - Used to ensure the transmission of management information between any two points

  - It's easy for the network administrator to retrieve and modify information at any node in the network, detect faults, diagnose faults, plan the capacity and generate reports.
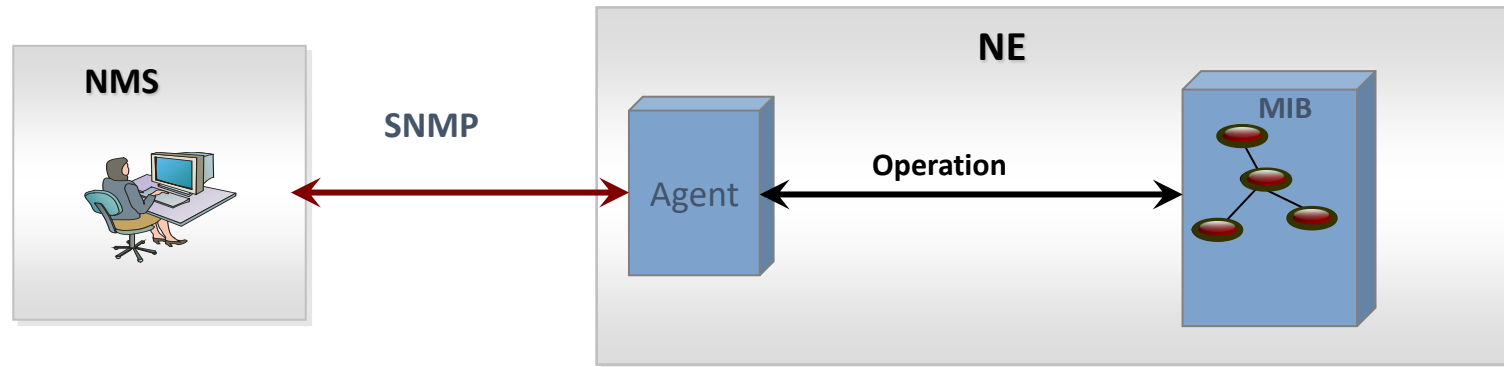
There are three versions, SNMP V1, V2 and V3. Currently, SNMPV2/V3 are widely applied to the network.

SNMP Configuration (1/3)

- Step1: Set the SNMP version

  > - OLT(config)#**snmp-agent sys-info**
  >   - {contact<K>|location<K>|version<K>}:**version**
  >   - {all<K>|v1<K>|v2c<K>|v3<K>}:**v2c**

- Step:2 Configure the community name and the access right

  > - OLT(config)#**snmp-agent community**
  >   - {read<K>|write<K>}:**read**
  >   - { STRING<8-32>|cipher<K> }: **public123**
  >   - {<cr>|mib-view<K>}:
  > - OLT(config)#**snmp-agent community write private123**

SNMP Configuration (2/3)

- Step3: Set the IP address of the target host for traps.

  - OLT(config)#**snmp-agent target-host**
    - {trap-filterprofilename<K>|trap-hostname<K>|trap-paramsname<K>}:**trap-paramsname**
    - {paramsname<S><Length 1-32>}:**huaweiNMS**
    - { v1<K>|v2c<K>|v3<K>}:**v2c**
    - {securityname<K>}:**securityname**
    - {securityname<S><Length 1-32>}:**private**

  - OLT(config)#**snmp-agent target-host**
    - {trap-filterprofilename<K>|trap-hostname<K>|trap-paramsname<K>}:**trap-hostname**
    - {hostname<S><Length 1-32>}:**huawei**
    - {address<K>}:**address**
    - {ip-addr<I><X.X.X.X>}:**10.10.1.1**   nce
    - {trap-paramsname<K>|udp-port<K>}:**trap-paramsname**
    - {paramsname<S><Length 1-32>}:**huaweiNMS**

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SNMP Configuration (3/3)

- Step4: Enable sending Trap packets

  - OLT(config)#**snmp-agent trap enable standard**

- Step5: Configure the source of the Trap packets (in case of outband mode)

  - OLT(config)#**snmp-agent trap source**

    - {meth<K>|vlanif<K>}:**meth**

    - {<0-0>}:**0**   outband

Q&A

outband= how it is config, int dedicated

inband= int shared

1. What's the difference between outband and inband modes ?

2. What's the SNMP protocol used for?

to establish communication between olt and nce fan (nms)

fan= fixed area netwerk

mae mobile broadband all demand engine

Summary

- Command line interface (CLI)

  - Serial port (First time login)

  - Remote Telnet (Inband and outband)

- The hardware management(frame/board/port)

- The board status

- Set up the outband management mode

- Set up the inband management mode

- Set up the SNMP management

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Thank You

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