NTP Server CLI Configuration Guide



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1 Prefix

1.1 How to log in to CLI

To log in to the CLI (Command Line Interface), users need to use the username "ntpuser" to log in to the NTP server, with the initial password "ntpuser2016". The login method can be done via a serial port (speed of 115200) or an SSH connection to the system.
After logging in, users will see the initial CLI interface as follows:

```
NTPS#
```

1.2 CLI interface modes

The NTP Server CLI user interface has the following three modes:

1. Query mode.
2. Global configuration mode.
3. Interface configuration mode.

When a user logs in to the NTP server, the initial user interface to be seen is the query mode interface. The prompt for this mode interface is the hostname followed by a "#". By default, the prompt for query mode is "NTPS#". In this mode, there are no commands that can change the configuration of the NTP server, only a limited number of basic monitoring commands are allowed to run.

If a user needs to configure the NTP server, they need to enter the global configuration mode or interface configuration mode to perform the configuration.

In the global configuration mode, it contains commands that can affect the entire system, such as configuring the hostname, IP routing for NTP's MD5 key, etc. To enter global configuration mode, enter "configure" in the query mode. By default, the prompt for global configuration mode is "NTPS(config)#". In global configuration mode, pressing Ctrl+z (simultaneously pressing the CTRL and z keys) or entering "exit" will return to the query mode.

To change the configuration of an interface, it is necessary to enter the corresponding interface configuration mode. The specific method is to enter the keyword "interface" followed by the name of the interface to be configured in the global configuration mode. For example, "interface ethernet 0" will enter the configuration mode for

ethernet 0, and the configuration in this mode only applies to ethernet 0. The corresponding prompt is like "NTPS(config-if-eth0)#". In the interface configuration mode, pressing Ctrl+z or entering "exit" will return to the global configuration mode.

1.3 CLI basic usage method

1.3.1 The function of the question mark (?)

When a user enters the question mark (?), it means they are seeking help from the CLI. The CLI will display the help information directly without the user needing to press the Enter key. Here, help information refers to the keywords or parameters that the system can accept in the current configuration mode.

Example:
When a user just logs in to the CLI, they will see the following prompt:
NTPS#
After entering the question mark (?), the user will see the following:

```
NTPS#
  !                Comments
  configure    Enter configuration mode
  exit             Exit from the CLI
  ntpdate-q    Run ntpdate -q with a server
  ping             Send messages to network hosts
  reboot           Halt and perform a cold restart
  show             Show runing system information
```

It means that the CLI is currently accepting user input commands such as "configure", "exit", "ntpdate -q", "ping", and so on.

1.3.2 The function of the TAB key

The TAB key executes the automatic completion action. If the system detects multiple possibilities for auto-completion, it will display all possibilities for the user to make further choices.

By combining the TAB and ? keys, users can operate more conveniently and efficiently.

Example:
Upon entering "?" in the CLI login interface, the user will see:

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```
NTPS#
  !                Comments
  configure    Enter configuration mode
  exit             Exit from the CLI
  ntpdate-q    Run ntpdate -q with a server
  ping             Send messages to network hosts
  reboot           Halt and perform a cold restart
  show             Show runing system information
```

If the user wants to execute a "show" command, they only need to add an "s" key and then press the TAB key. The user will then see:

```
NTPS#show
```

Since there is currently only one command starting with "s," the input of the TAB key will cause the system to directly display "show" to the user. It also adds a space after "show" to indicate that additional keywords are required to form a complete "show" command.

If the user continues to enter the "?" key, they will see:

```
NTPS#show
  arp                ARP statistics
  clock              Display the system clock in UTC
  interfaces     Interface status and configuration
  ip                 IP information
  ntp                NTPD status
  satellite      BDS and GPS satellite status
  system             System information
```

If the user wants to execute "show ntp," they only need to enter an "n" key and then press the TAB key. The user will then see:

```
NTPS#show ntp
```

If the user continues to enter the ? key, they will get:

```
NTPS#show ntp
  config       NTPD configuration
  ios          IO statistics
  md5          NTP MD5 key
  monstats     Monitor statistics
  mrulist      MRU list
  pe           Peer variables
  rv           System variables
```


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If the user wants to execute "show ntp md5" and only enters "m" and TAB, they will see:

```
NTPS#show ntp m
md5          monstats mrulist
```

The system detected 3 possible options starting with "m". To execute "md5", the user needs to continue to enter "d" and press the TAB key, and then the user will see:

```
NTPS#show ntp md5
```

Enter “?” again, then the user will see:

```
NTPS#show ntp md5
  keys              All NTP MD5 keys
  trusted-key    All NTP MD5 trusted keys
```

Enter k and TAB, then the user will see:

```
NTPS#show ntp md5 keys
```

Continue to enter “?” again, then the user will see:

```
NTPS#show ntp md5 keys
  <cr>
```

At this point, the command no longer requires any additional parameters, and the system prompts the user to simply press the Enter key to execute the 'show ntp md5 keys' command.

1.3.3 The function of the space bar

The space bar serves as a separator between keywords or parameters. After entering a keyword or parameter, a single space bar is required to separate it.

The CLI requires that there are no consecutive spaces, otherwise the CLI cannot function properly. It is recommended that users use the TAB key for completion operations as much as possible. In this way, the system will automatically add spaces at the required positions, and users do not need to enter spaces manually.

Example:

```
NTPS#
```

Enter 's' at the prompt above and then press the TAB key. The CLI interface will then change to:

```
NTPS#show
```

When the system automatically completes the 'show' keyword and adds a space after it:

```
NTPS#show
  arp              ARP statistics
  clock            Display the system clock in UTC
  interface        Interface status and configuration
  ip               IP information
  ntp              NTPD status
  oled-clock       Display the timezone on the OLED display
  satellite        BDS and GPS satellite status
  system           System information
```

If the user enters another space after the space following 'show', the system will prompt the user to enter a keyword or parameter instead of another space. The user needs to delete one space and then continue with the next operation.

When there are two or more consecutive spaces, entering a question mark (?) or pressing the TAB key does not display the command correctly.

1.4 Command line format conventions

In this document, the following command line format may appear, and they represent the following meanings:

Format	Meaning
Bold	Command line keywords (the part of the command that remains unchanged and must be typed exactly as shown) are represented in bold font.
Italic	Command line parameters (the part of the command that must be replaced with an actual value) are represented in italic font.
[ ]	The parts enclosed in "[ ]" indicate that they are optional when configuring the command.
{ x | y | ... }	It indicates that one of two or more options should be chosen.
{ x | y | ... }*	It indicates that multiple options should be selected from two or more options, with at least one and at most all

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Format	Meaning
	options being selected.
!	Lines beginning with "!" are considered comment lines.

1.5 Making configuration changes take effect

It is important to note that the vast majority of configuration commands are not executed immediately and require a system restart to take effect. The commands that take effect immediately include: hostname, [del] ip route, and password.

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2 Query mode command set

2.1 show arp

Displaying the ARP address table of the system.
Example:

```
NTPS#show arp
? (192.168.5.1) at 00:23:cd:1b:b2:e2 [ether]  on eth0
? (192.168.5.152) at 50:9a:4c:21:df:b5 [ether]  on eth0
? (192.168.5.130) at 08:00:27:46:cf:eb [ether]  on eth0
```

2.2 show clock

Displaying the current system time in UTC time zone.
Example:

```
NTPS#show clock
Wed Mar  3 01:22:37 UTC 2021
```

2.3 show interface {eth *eth-if-num* | bond *bond-if-num*}

Displaying the current information of a specified interface or all interfaces in the system. By default, information for all interfaces in the system is displayed.
Example:

```
NTPS#show interface eth 0
eth0      Link encap:Ethernet  HWaddr 00:01:6C:25:01:90
          inet addr:192.168.5.62  Bcast:192.168.5.255  Mask:255.255.255.0
          inet6 addr: fe80::201:6cff:fe25:190/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:4097300 errors:0 dropped:171761 overruns:0 frame:0
          TX packets:10892 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:253577543 (241.8 MiB)  TX bytes:6341852 (6.0 MiB)
          Interrupt:20
```

2.4 show ip route [table *table-id*]

Displaying the information of a specific routing table in the system. By default, if the

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table-id parameter is not entered, the information for the main routing table (table 254) of the system is displayed.
Example:

```
NTPS#show ip route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
192.168.1.0     0.0.0.0         255.255.255.0   U     0      0        0 eth1
192.168.5.0     0.0.0.0         255.255.255.0   U     0      0        0 eth0
```

2.5 show ip configuration interface {eth *eth-if-num* | bond *bond-if-num*}

Displaying the IP-related configuration information of a specific Ethernet or Bond interface in the system.
Example:

```
NTPS#show ip configuration interface eth 0
Ipv4 configutaion on eth0:
ip address:192.168.0.8
network mask:255.255.255.0
gateway:192.168.0.1
```

2.6 show ntp { config| ios| md5 {keys | trusted-key} | monstats | mrulist | pe| rv}

Displaying the related information of the NTPD process. The parameters of the command are to display: the content of the NTPD configuration file, NTPD IO statistics, MD5 key, NTP client monitoring statistics, MRU list, Peer information, and the system information of NTPD.
Example:

```
NTPS#show ntp pe
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
*GPS_NMEA(0)     .GPS.           0 l    4   16  377    0.000   +0.004
0.013
 1.1.1.1         .STEP.         16 u    -  1024    0    0.000   +0.000   0.000
NTPS#show ntp rv
associd=0 status=0415 leap_none, sync_uhf_radio, 1 event, clock_sync,
version="ntpd 4.2.8p15@1.3728 Wed Oct 14 02:16:28 UTC 2020 (1)",
processor="mips64", system="Linux/4.19.40", leap=00, stratum=1,
precision=-19, rootdelay=0.000, rootdisp=1.150, refid=GPS,
```


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reftime=e3e96411.5eecea2a Wed, Mar 3 2021 1:25:37.370,
clock=e3e9641b.b9dc1e98 Wed, Mar 3 2021 1:25:47.726, peer=60420, tc=4,
mintc=3, offset=+0.003809, frequency=-0.004, sys_jitter=0.012801,
clk_jitter=0.010, clk_wander=0.002

2.7 show satellite

Display the information of BeiDou and GPS discovered by the system.
Example:
NTPS#show satellite
Current time source : SATE
Number of GPS satellite: 6
Number of BDS satellite: 3

2.8 **ntpdate-q** *server-ip*

This command checks the time difference between the local system time and a specified NTP server, but does not modify the local time.
Example:
NTPS#ntpdate-q 192.168.5.60
server 192.168.5.60, stratum 1, offset -0.003292, delay 0.03075
 3 Mar 01:26:33 ntpdate[11736]: adjust time server 192.168.5.60 offset -0.003292 sec

2.9 **ping** *host-ip* [**size** *sz* | **repeat** *times*]

To ping a host. By default, the packet size is 56 bytes, and the ping is repeated five times. You can specify the packet size and the number of pings to send.
Example:
NTPS#ping 192.168.5.60
PING 192.168.5.60 (192.168.5.60): 56 data bytes
64 bytes from 192.168.5.60: seq=0 ttl=64 time=1.146 ms
64 bytes from 192.168.5.60: seq=1 ttl=64 time=0.878 ms
64 bytes from 192.168.5.60: seq=2 ttl=64 time=0.865 ms
64 bytes from 192.168.5.60: seq=3 ttl=64 time=0.881 ms
64 bytes from 192.168.5.60: seq=4 ttl=64 time=0.863 ms

--- 192.168.5.60 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 0.863/0.926/1.146 ms

2.10 reboot

Cold start of the system. Before starting, the user needs to input Y(y) to confirm or N(n) to cancel.
Example:

```
NTPS#reboot
Proceed with reboot? [y/n]
```

2.11 show system

Display information such as device model, serial number, and other details of the system.

```
Device model                    : SinoSync2000
SN                              : 2010000001
OS type                         : Linux
Architecture                    : mips64
Crystal oscillator              : RBATOMIC
Number of ethernet port: 2
Firmware version                : 4.0.1
NTP service level               : primary
```

2.12 show system uptime

Display the cumulative uptime of the system up to the present moment.
Example:

```
NTPS#show system uptime
 06:20:56 up 10 days 2:37,    load average: 1.03, 1.05, 1.01
```


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3 Global configuration mode command set

3.1 display timezone

Command format:**display timezone** {-12 | -11 |-10 | -9:30 |-9 |-8 |-7 | -6 | -5 | -4 | -3:30 |-3 |-2 | -1 | 0 | +1 | +2 | +3 | +3:30 | +4 | +4:30 | +5 | +5:30 | +6 | +6:30 | +7 | +8 | +9 | +9:30 | +10 | +10:30 | +11 | +11:30 | +12 | +12:45 | +13 | +14}
Configure the time zone for the time displayed on the OLED screen.
Example:
Configuration requirement: Set the time zone for the time displayed on the OLED screen to UTC+8.
Step 1 Do configuration
NTPS(config)#display timezone +8
Step 2 Verification
NTPS#show display timezone
TIMEZONE:UTC+8

3.2 hostname *host-name*

To configure the hostname of a system.
Example:
Configuration requirement: Change host name to NTPSERVER:
NTPS(config)#hostname NTPSERVER
NTPSERVER(config)#
The configuration takes effect immediately, and the CLI prompt will also change accordingly.

3.3 ip route *ip-network/ ip-netmask gateway-ip out-if-name*

To add a static route.
Example:
Configuration requirement: To add a static route to the network 100.1.1.0/24 with a next-hop address of 192.168.5.1 and exit interface of eth0.
Step 1 Do configuration
NTPS(config)#ip route 100.1.1.0/24 192.168.5.1 eth 0
Step 2 Verification
NTPS#show ip route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface

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100.1.1.0	192.168.5.1	255.255.255.0	UG	0	0	0 eth0
192.168.5.0	0.0.0.0	255.255.255.0	U	0	0	0 eth0

3.4 del ip route *ip-network/ ip-netmask*

To delete a static route.
Example:
Configuration requirement: To delete a static route to the network 100.1.1.0/24.
Step 1 Do configuration
NTPS(config)#del ip route 100.1.1.0/24
Step 2 Verification
NTPS#show ip route
Kernel IP routing table

Destination	Gateway	Genmask	Flags	Metric	Ref	Use Iface
192.168.5.0	0.0.0.0	255.255.255.0	U	0	0	0 eth0

3.5 password

Set the user name as ntpuser and the password. After changing the password, you need to use the new password of ntpuser to log in to the CLI interface of the system again. After changing the password, you need to use the new password to log in to the CLI interface of the system again.
Example:
Do configuration
NTPS(config)#password
Changing password for ntpuser
New password:
Retype password:
passwd: password for ntpuser changed by root

3.6 ntp log client

Enable the recording function of the NTP client. After enabling it, the NTP server will save a record file related to the NTP client for use by the monitoring software we provide.
Configuration requirements: enable the recording function of the NTP client.
Step 1 Do configuration
NTPS(config)#ntp log client
Step 2 Verification
NTPS#show ntp config
enable auth

keys /etc/ntp.keys
server 127.127.20.0 mode 17 minpoll 4 maxpoll 4 prefer
fudge 127.127.20.0 flag1 0 time2 0.087
restrict default nomodify noquery notrap
restrict 127.0.0.1
disable monitor
broadcast
trustedkey 1
statsdir /var/log/ntpstats/
statistics peerstats
filegen peerstats file clientstats type day enable

3.7 del ntp log client

Disable the recording function of the NTP client. After disabling, will the NTP server save the recording files related to the NTP client.
Configuration requirements: enable the recording function of the NTP client.
Step 1 Do configuration
NTPS(config)#del ntp log client
Step 2 Verification
NTPS#show ntp config
enable auth
keys /etc/ntp.keys
server 127.127.20.0 mode 17 minpoll 4 maxpoll 4 prefer
fudge 127.127.20.0 flag1 0 time2 0.087
restrict default nomodify noquery notrap
restrict 127.0.0.1
disable monitor
broadcast
trustedkey 1
statsdir /var/log/ntpstats/
#statistics peerstats
#filegen peerstats file clientstats type day enable
#表示这一行的配置失效

3.8 ntp md5 key *key-id key-string*

Add or change the value of NTP MD5 key. The index is key-id.
Example:
Configuration requirements: Configure the NTP MD5 key with index 1 as ntp-access-key-1.

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Step 1 Do configuration
NTPS(config)#ntp md5 key 1 ntp-access-key-1
Step 2 Verification
NTPS#show ntp md5 keys
1 M ntp-access-key-1
2 M gbltime

3.9 del ntp md5 key *key-id*

Delete NTP MD5 key, the index is key-id.
Example:
Configuration requirements: Delete the NTP MD5 key whose index is 1.
Step 1 Do configuration
NTPS(config)#del ntp md5 key 1
Step 2 Verification
NTPS#show ntp md5 keys
2 M gbltime

3.10 ntp md5 trusted-key { *key-id1* | *key-id2* }*

Configure NTP MD5 trusted key. At least one NTP MD5 key-id must be selected, and at most two NTP MD5 key-ids must be selected.
Example:
Configuration requirements: Set the NTP MD5 key with index 1 and 2 as MD5 trusted-key.
Step 1 Do configuration
NTPS(config)#del ntp md5 key 1
Step 2 Verification
NTPS#show ntp md5 trusted-key
trustedkey 1

3.11 del ntp md5 trusted-key { *key-id1* | *key-id2* }*

Delete all NTP MD5 trusted keys in the system.
Example:
Configuration requirements: Delete all NTP MD5 trusted keys in the system.
Step 1 Do configuration
NTPS(config)# del ntp md5 trusted-key
Step 2 Verification
NTPS#show ntp md5 trusted-key
NTPS#

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3.12 **ntp server** *server-ip*

When the system is used as a level 2 NTP server, add the IP address of the NTP server. Every time it is executed, add an IP of the NTP server.
Example:
Configuration requirements: Add 192.168.5.100 as NTP server.
Step 1 Do configuration
NTPS(config)# ntp server 192.168.5.100
Step 2 Verification
NTPS#show ntp config
enable auth
keys /etc/ntp.keys
server 127.127.20.0 mode 17 minpoll 4 maxpoll 4 prefer
fudge 127.127.20.0 flag1 0 time2 0.087
restrict default nomodify noquery notrap
restrict 127.0.0.1
disable monitor
broadcast
statsdir /var/log/ntpstats/
#statistics peerstats
#filegen peerstats file clientstats type day enable
server 192.168.5.10

3.13 **del ntp server** *server-ip*

When the system is used as a level 2 NTP server, delete the IP address of the NTP server.
Example:
Configuration requirements: Add 192.168.5.100 as NTP server.
Step 1 Do configuration
NTPS(config)# del ntp server 192.168.5.100
Step 2 Verification
NTPS#show ntp config
enable auth
keys /etc/ntp.keys
server 127.127.20.0 mode 17 minpoll 4 maxpoll 4 prefer
fudge 127.127.20.0 flag1 0 time2 0.087
restrict default nomodify noquery notrap
restrict 127.0.0.1
disable monitor
broadcast

statsdir /var/log/ntpstats/
#statistics peerstats
#filegen peerstats file clientstats type day enable

3.14 do

This is not a configuration command, it is for the convenience of users to check the system status/configuration in configuration mode. In the configuration mode, the user can use the keyword do plus the command in the enable mode to execute some commands in the enable mode, without switching to the enable mode.

Example:
When doing configuration, the user wants to check the peer status of NTP:

```
NTPS(config)#do show ntp pe
      remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
*GPS_NMEA(0)     .GPS.            0 l    6   16  377    0.000   -0.012
0.010
 1.1.1.1         .STEP.          16 u    -  1024    0    0.000   +0.000   0.000
```


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4 Interface configuration mode command set

4.1 Configuration command set on Ethernet interface

4.1.1 **ip addres***s ip-addres/mask* **gatewa***y gate-way-ip-addres*

Configure the IP address, mask and gateway address of the interface.
Example:
Configuration requirements: Configure the IP of interface Ethernet1 as 192.168.1.2/24 and the gateway as 192.168.1.1.
Step 1 Do configuration
NTPS(config)#interface ethernet 1
NTPS(config-if-eth1)#ip address 192.168.1.2/24 gateway 192.168.1.1
Step 2 Verification
NTPS#show ip configuration interface eth 0
Ipv4 configuration on eth0:
ip address:192.168.0.8
network mask:255.255.255.0
gateway:192.168.0.1

4.1.2 del ip address

Remove the IP address, mask and gateway address of the interface.
Example:
Configuration requirements: Delete the IP information on interface Ethernet1.
Step 1 Do configuration
NTPS(config)#interface ethernet 1
NTPS(config-if-eth1)#del ip address
Step 2 Verification
NTPS#show ip configuration interface eth 0
There is no ip on Eth0.

4.2 Configuration command set on Bond interface

Configure the IP address, mask and gateway address of the interface.
Example:
Configuration requirements: Configure the IP of interface Bond0 as 192.168.1.2/24 and the gateway as 192.168.1.1

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Step 1 Do configuration
NTPS(config)#interface bond 0
NTPS(config-if- bond0)#ip address 192.168.1.2/24 gateway 192.168.1.1
Step 2 Verification
NTPS#show ip configuration interface bond 0
BOND=N
IP=192.168.1.2
MASK=255.255.255.0
GATEWAY=192.168.1.1
SLAVES=eth0 eth1
MODE=active-backup

4.2.1 del ip address

Remove the IP address, mask and gateway address of the bond interface.
Example:
Configuration requirements: Remove the ip configuration on interface Bond0.
Step 1 Do configuration
NTPS(config)#interface bond 0
NTPS(config-if- bond0)#del ip address
Step 2 Verification
NTPS#show ip configuration interface bond 0
BOND=N
IP=
MASK=
GATEWAY=
SLAVES=eth0 eth1
MODE=active-backup

4.2.2 member ethernet *eth-if-num1 eth-if-num2*

Set the Ethernet interface member of the bond interface.
Example:
Configuration requirements: Set the Ethernet interface of Bond0 to Eth1 and Eth2.
Step 1 Do configuration
NTPS(config)#interface bond 0
NTPS(config-if-bond0)#member ethernet 1 2
Step 2 Verification
NTPS#show ip configuration interface bond 0
BOND=N
IP=192.168.1.2

MASK=255.255.255.0
GATEWAY=192.168.1.1
SLAVES=eth1 eth2
MODE=active-backup

4.2.3 del members

Delete all Ethernet interface members of the bond interface.
Example:
Configuration requirements: Delete all Ethernet interfaces of Bond0.
Step 1 Do configuration
NTPS(config)#interface bond 0
NTPS(config-if-bond0)#del members
Step 2 Verification
NTPS#show ip configuration interface bond 0
BOND=N
IP=192.168.1.2
MASK=255.255.255.0
GATEWAY=192.168.1.1
SLAVES=
MODE=active-backup

4.2.4 disable

Shut down a bond interface, when the bond interface is shut down, the previously configured interface member and IP information on the interface will not be deleted, but will become invalid.
Example:
Configuration requirements: Shut down interface Bond0.
Step 1 Do configuration
NTPS(config)#interface bond 0
NTPS(config-if-bond0)#disable
Step 2 Verification
NTPS#show ip configuration interface bond 0
BOND=Y
IP=192.168.1.2
MASK=255.255.255.0
GATEWAY=192.168.1.1
SLAVES=
MODE=active-backup

4.2.5 enable

Enable the Bond interface, the Bond interface member and IP information continue to use the previous configuration.
Example:
Configuration requirements: Enable interface Bond0.
Step 1 Do configuration

```
NTPS(config)#interface bond 0
NTPS(config-if-bond0)#enable
```

Step 2 Verification

```
NTPS#show ip configuration interface bond 0
BOND=N
IP=192.168.1.2
MASK=255.255.255.0
GATEWAY=192.168.1.1
SLAVES=
MODE=active-backup
```


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