FSOS

SNTP Configuration

Contents

1. SNTP Client

1.1 SNTP Overview

Switch system time can be achieved in two ways, one is as sntp client, sntp server automatically synchronizes time; the other is the administrator own configuration.

The Simple Network Time Protocol (SNTP) is used for time synchronization between network devices. Normally, an SNTP server exists in the network and provides reference time for multiple SNTP clients. In this way, time synchronization is achieved among all network devices.

SNTP can work in four modes: unicast, broadcast, multicast, and anycast.

In the unicast mode, the client initiates a request to the server. After receiving the request, the server constructs a response message based on the local time and sends the response message back to the client.

In the broadcast and multicast mode, the server periodically sends broadcast or multicast messages to the client, and the client receives the messages from the server.

In the anycast mode, the client initiates a local broadcast address or a multicast address to send a request. In this case, the server in the network responds to the client. The client selects the server that receives the response message as the server, and discards the messages sent by the other server. After electing out of the server, the work pattern is same as unicast.

In all modes, the client receives a response message to parse the message to obtain the current standard time, and calculates the network transmission delay and local time compensation through a certain algorithm. The data is used to calibrate the current time.

1.2 Configure the SNTP Client

1.2.1 Enable/disable SNTP Client

Enable/disable SNTP client

operation	command	remark
Enter the global configuration mode	configure terminal	-
Enable/disable the SNTP client	[no]sntp client	Required, the default is off
Display the SNTP client configuration	show sntp client	Optional
View the system time	show clock	Optional

1.2.2 Configure the Work Mode of the SNTP Client

According to the network, administrators can use commands to modify the way of SNTP work - unicast, broadcast, multicast, or anycast.

Configure the Work Mode of the SNTP Client

operation	command	remark
Enter the global configuration mode	configure terminal	-
Configure the Work Mode of the SNTP Client	sntp client mode { **broadcast** | **unicast** | **multicast** | **anycast [key *key-id*]** }	Optional, Default is broadcast mode
Display the SNTP client configuration	show sntp client	Optional

1.2.3 Configure the SNTP Server Address

When an SNTP client works in the unicast mode, user must configure the specified SNTP server.

Configure the SNTP Server Address

operation	command	remark
Enter the global configuration mode	configure terminal	-
Configure the SNTP server address	[no]sntp server ***ip-address***	required
Configure the SNTP backup server	[no]sntp server backup ***ip-address***	optional
Display the SNTP client configuration	show sntp client	optional

1.2.4 Modify the Broadcast Transmission Delay

When the SNTP client works in the broadcast or multicast mode, it is necessary to use the broadcast transmission delay parameter. In the broadcast mode, the local system time of the SNTP client is equal to the time taken from the server plus the transmission delay. Administrators can modify the broadcast transmission delay based on the actual bandwidth of the network.

Configure the broadcast transmission delay

operation	command	remark
Enter the global configuration mode	configure terminal	-

Configure the broadcast propagation delay	[no]sntp client broadcastdelay ***value***	Optional. The default value is 3ms
Display the SNTP client configuration	show sntp client	optional

1.2.5 Configure the Polling Interval

User needs to configure the polling interval when the SNTP client works in the unicast or anycast mode. The SNTP client initiates a request to the server every other polling interval to calibrate the local system time.

Configure the Polling Interval

operation	command	remark
Enter the global configuration mode	configure terminal	-
Configure the polling interval	[no]sntp client poll-interval ***value***	Optional. The default is 1000
Display the SNTP client configuration	show sntp client	optional

1.2.6 Configure Timeout Retransmission

Because the SNTP request message is a UDP message, it cannot guarantee that the request message can reach the destination. The timeout retransmission mechanism is adopted. The configured timeout interval is required when the SNTP client works in the unicast or anycast mode. When the client sends a request within a certain period of time without receiving a response, It will be re-sent the request until the number of retransmission exceeds the set value. The configured timeout retransmission mechanism takes effect only when the SNTP client works in the unicast or anycast mode.

Configure the timeout retransmission attempts and time interval

operation	command	remark
Enter the global configuration mode	configure terminal	
Configure the timeout retransmission interval	[no]sntp client retransmit-interval ***value***	Optional. Default 5s
Set the timeout retransmission attempts	[no]sntp client retransmit ***value***	Optional. Default 0
Display the SNTP client configuration	show sntp client	optional

1.2.7 Configure Legacy Server List

When an SNTP client works in broadcast or multicast mode, it will trust and receive the protocol messages from any SNTP server. If there is a malicious attack on the network server (which provides the wrong time), the local time cannot be synchronized to standard time.

After the list of valid servers is configured on the SNTP client, the client can only receive

messages whose source addresses are in the legal server list, thus improve the security.

Configure legal server list

operation	command	remark
Enter the global configuration mode	configure terminal	-
Configure legal server list	sntp client valid-server ***ipaddress wildcard***	optional
Delate legal server list	no sntp client valid-server { **all** | ***ipaddress wildcard*** }	optional
Display the SNTP client configuration	show sntp client	optional

1.2.8 Configure Authentication

To further improve security, user can enable MD5 authentication between the SNTP server and the client. The SNTP client receives only authenticated messages. The authentication configuration is as follows:

Configure Authentication

operation	command	remark
Enter the global configuration mode	configure terminal	-
Switch certification	[no] sntp client authenticate	Optional, close by default
Configure the password for authentication	[no]sntp client authentication-key ***key-number*** md5 ***value***	optional
Configure a trusted password ID	[no]sntp trusted-key ***key-number***	Optional, For multicast and broadcast mode only, it must be equal to authentication-key
Configure the password ID used by the server	[no]sntp server key ***key-number***	Optional, it must be equal to authentication-key
Configure the password ID for anycast configuration	**sntp client mode anycast key** *key-number*	optional
Display the SNTP client configuration	show sntp client	optional

1.2.9 Manual Calibration of the System Clock

In addition to switch, which acts as sntp client automatically synchronize time from the sntp server, the other way is the administrator manual calibration system clock.

If the switch has built-in lithium battery, the switch power is off, the system clock runs normally; if there is no built-switch lithium battery, the switch power is off, the system clock stops running.

Configure system clock

operation	command	remark

Enter execution configuration mode	-	-
Configure the system clock	clock set ***HH:MM:SS YYYY/MM/DD***	required
Enter the global configuration mode	configure terminal	optional
Configure the system time zone	[no]clock timezone ***zone-name hours- offset minutes-offset***	optional
View the system time	show clock	optional

Example

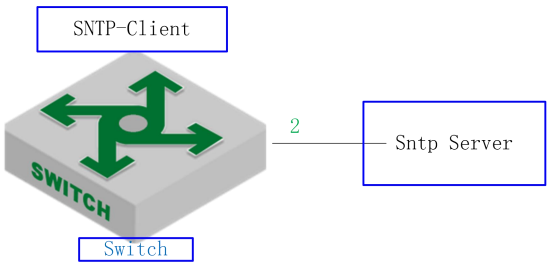
Configure the system clock
Switch#clock set 17:50:50 2015/11/25
Set clock successfully.
Clock will be reset to 2013/01/01 00:00:00 after system rebooting because there is no realtime clock chip.

Switch#show clock

Wed 2015/11/25 17:51:03 CCT 08:00

1.2.10 SNTP Client Configuration Example

1. Networking Requirements
The switch acts as the sntp client to synchronize time from the sntp server.
Make sure that the switch communicates properly with the sntp server.



Sntp client diagram

2. Configuration steps
#switch runs the broadcast, multicast, unicast, and anycast modes respectively.

Configuration of the authentication mode and broadcast mode
Enable the sntp client and configure it in broadcast mode (the broadcast mode is enabled by default).
Switch(config)#sntp client mode broadcast

Configure the trusted server (not configurable)
Switch(config)#sntp client valid-server 192.168.1.99 0.0.0.0
Switch(config)#sntp client

Configure the authentication key (make sure the configuration is consistent with that of the sntp server)
Switch(config)#sntp client authentication-key 1 md5 test
Configure the trusted key ID
Switch(config)#sntp trusted-key 1
Enable the authentication function
Switch(config)#sntp client authenticate

View the time synchronization result
Switch(config)#show sntp client
  Clock state   : synchronized   Current mode   : broadcast
  Use server   : 192.168.1.99   State   : idle
  Server state : synchronized   Server stratum   : 1
  Authenticate : enable   Bcast delay   : 3ms
  Last synchronized time: THU NOV 26 06:07:44 2015
  Summer-time is not set.
  Valid server list:
    Server address:192.168.1.99   wildcard:0.0.0.0

Multicast mode and authentication configuration
Enable the sntp client and configure it as the multicast mode
Switch(config)#sntp client mode multicast
Configure the trusted server list
Switch(config)#sntp client valid-server 192.168.1.99 0.0.0.0
Switch(config)#sntp client

Configure the authentication key (make sure the configuration is consistent with that of the sntp server)
Switch(config)#sntp client authentication-key 1 md5 test
Configure the trusted key ID
Switch(config)#sntp trusted-key 1
Enable the authentication function
Switch(config)#sntp client authenticate

View the switch time synchronization result
Switch(config)#show sntp client
  Clock state   : synchronized   Current mode   : multicast
  Use server   : 192.168.1.99   State   : idle
  Server state : synchronized   Server stratum   : 1

```
Authenticate : enable                Bcast delay         : 3ms
Last synchronized time: THU NOV 26 06:20:59 2015
Summer-time is not set.
Valid server list:
  Server address:192.168.1.99        wildcard:0.0.0.0
```

Configure unicast mode and authentication
Enable the sntp client and configure it as unicast
Switch(config)#sntp client
Switch(config)#sntp client mode unicast
Configure the sntp server
Switch(config)#sntp server 192.168.1.99

Configure the authentication key (make sure the configuration is consistent with that of the sntp server)
Switch(config)#sntp client authentication-key 1 md5 test
Configure the password ID for the server
Switch(config)#sntp server key 1
Enable the authentication function
Switch(config)#sntp client authenticate

View the time synchronization result
Switch(config)#show sntp client

```
Clock state    : synchronized       Current mode        : unicast
Use server     : 192.168.1.99       State               : idle
Server state : synchronized         Server stratum    : 1
Retrans-times: 3                      Retrans-interval: 30s
Authenticate : disable               PrimaryServer: 192.168.1.99
Backup Server: 0.0.0.0               Poll interval     : 1000s
Last synchronized time: THU NOV 26 09:05:29 2015
Last received packet's originateTime: TUE JAN 01 00:00:24 2013
Summer-time is not set.
```

Configure the authentication mode for anycast mode
Enable the sntp client and configure it to work in anycast mode
Switch(config)#sntp client mode anycast
Configure the sntp server (may not configure)
Switch(config)#sntp server 192.168.1.99
Switch(config)#sntp client

Configure the authentication key (make sure the configuration is consistent with that of the sntp server)

Switch(config)#sntp client authentication-key 1 md5 test
configure anycast mode and the key ID (if the authentication is not necessary, you don't configure)
Switch(config)# sntp client mode anycast key 1

Enable the authentication function
Switch(config)#sntp client authenticate

View the time synchronization result
Switch(config)#show sntp client
Clock state : synchronized Current mode : anycast
Use server : 192.168.1.99 State : idle
Server state : synchronized Server stratum : 1
Retrans-times: 3 Retrans-interval: 30s
Authenticate : enable Authentication-key: 1
Poll interval : 1000s
Last synchronized time: THU NOV 26 09:22:25 2015
Last received packet's originateTime: THU NOV 26 17:22:24 2015
Summer-time is not set.