



Spirent Test Center™ Application Note #5

Spirent TestCenter NTP Operation

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Spirent Communications, Inc.

27349 Agoura Road
Calabasas, CA 91301
USA

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Spirent TestCenter NTP Operation

This application note provides an introduction to Network Time Protocol (NTP), and how to use it to synchronize timing among Spirent TestCenter chassis.

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Introduction to NTP

Network Time Protocol (NTP) provides accurate and synchronized time across the Internet. NTP may be used as an alternative to using the GPS and CDMA kits, which use ETR devices to provide timing synchronization.



Note: Spirent TestCenter chassis that need to be synchronized should not use a mixture of NTP and ETR devices to achieve synchronization. If ETR devices are used, NTP should be disabled. Using NTP for timing synchronization yields less accurate results than using an ETR device, such as GPS or CDMA.

NTP is organized hierarchically as a client-server model. At the top of this hierarchy there are a small number of machines known as reference clocks. A reference clock is known as stratum 0 and is typically a cesium clock or a GPS that receives time information from satellites. Attached to these machines there are the so-called stratum 1 servers (that is, stratum 0 clients), which are the top-level time servers available to the Internet; that is, they are the best NTP servers available. The “stratum” term is used to indicate the number of “steps” a system lies away from its primary timing source.

Following this hierarchy, the next level in the structure are the stratum 2 servers, which in turn are the clients for stratum 1 servers. The lowest level of the hierarchy consists of stratum 16 servers. Generally speaking, every server synchronized with a stratum n server is termed as being at stratum $n+1$ level. So, there are a few stratum 1 servers, which are referenced by stratum 2 servers, which in turn are referenced by stratum 3 servers, which are referenced by stratum 4 servers, and so on.

A stratum 1 time server typically has better than 1 millisecond (ms) accuracy with respect to UTC, depending on its reference clock. On the Internet, because of network delays, a stratum 2 time server has anywhere from 10 to 100 ms accuracy to UTC and each subsequent time server adds approximately 10 to 100 ms of inaccuracy.

NTP servers operating in the same stratum may be associated with others in a peer-to-peer basis, so they may decide who has the higher quality of time and then can synchronize to the most accurate.

In addition to the client-server model and the peer-to-peer model, a server may broadcast time to a broadcast or multicast IP addresses and clients may be configured to synchronize to these broadcast time signals.

The result is that NTP clients can operate with NTP servers in three ways:

- Client-server
- Peer-to-peer
- Sending the time using broadcast or multicast addressing

General Usage Information

Each Spirent TestCenter chassis has the NTP client service enabled by default, but it is not configured to use an NTP reference server. The result is that NTP is inactive until a reference server is added to the local configuration (see “[NTP Configuration](#)” on page 6 for configuration commands). After a server is added, the NTP client starts polling for timing information. The NTP algorithms are such that they will only attempt to slowly adjust the chassis clock to align it with NTP time. If a large step is required, the NTP service will simply exit and many of the configuration commands will simply fail. In this condition, the best solution is to configure the chassis to use the reference server and then reboot. During startup, the chassis will set its initial system time from this server and the NTP software will have a good time base from which to make minor adjustments.

For best results, use a local NTP server with lowest stratum; giving preference to locality over stratum. In configuring an NTP reference, use a single server rather than a pool of servers.

Using NTP for Spirent TestCenter

All that is needed for a Spirent TestCenter chassis to achieve timing synchronization using NTP is to have NTP installed, configured, and running on the chassis and for the chassis to have a connection to the Internet through an Ethernet port.

Timing Selection Hierarchy

Even though NTP is installed and running on the chassis, the chassis software makes the final determination on which timing source to use, based on timing accuracy. The following hierarchy is generally used for selecting a timing source:

- Direct connection to a master chassis using a synchronization cable (highest priority)
- GPS ETR
- CDMA ETR
- NTP
- Chassis internal clock (lowest priority)

The chassis automatically switches to the most accurate timing source it can find.



Note: If ETR devices are used to synchronize a chassis, NTP for that chassis should be disabled.

NTP Configuration

This section includes the steps to set up and use NTP.



Note: After NTP is configured and enabled, it takes several minutes for the Spirent TestCenter chassis NTP algorithms to “lock” to the NTP reference servers and start adjusting the local clock. It takes several more minutes for the local clock to become accurate enough to use for multi-chassis synchronized tests. A good rule of thumb is that 20 minutes total are required from initial NTP configuration to when the chassis clock is adjusted to NTP server time; however, the amount of time varies depending on how close the chassis clock was to the “real” time at the beginning of the adjustment cycle. If the chassis senses that there is a more than a 10 ms difference between its clock and the NTP time, the chassis waits for NTP to become more stable before considering it a valid time reference.



Important: Before performing any of the actions in this section, you must be logged on to the Spirent TestCenter chassis.



To see the basic NTP commands:

- 1 At the prompt, type: **ntp** <enter>
- 2 The chassis returns the command syntax and usage (see [Figure 1 on page 6](#)).

```
admin> ntp
Spirent NTP interface utility
Usage: ntp status
      ntp enable
      ntp disable
      ntp server set [address]
      ntp server del [address]

For backwards compatibility:
      ntp client <command>
      ntp server <command> [address]

client commands:
      status - returns ntp sync status
      enable - starts the NTP service, if not already running
      disable - stops the NTP service, if running

server commands:
      list | summary - returns ntp sync status
      add <address> - adds the ntp server to config
      del <address> - removes the ntp server from config
      status <address> - returns ntp sync status

admin>
```

Figure 1. NTP Command Syntax

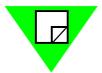


To check the synchronization source on the local Spirent TestCenter chassis:

Type: **ntp status** <enter>

A message is returned showing the source of synchronization, time of source, synchronization offset (in microseconds), and local clock adjustments (in ppm) for the chassis. For example:

```
Local clock is synchronized to NTP server
Server: 10.100.25.149
Time: Fri Sep 30 22:34:55 UTC 2016
Offset: 23
Frequency: 17
Theta: 0
```



Note: In the event of a large synchronization offset, the chassis must be rebooted. The NTP algorithm attempts to slowly adjust the chassis clock to NTP time, if too large an adjustment step is required it may take significant time to converge.



To enable NTP:

Type: **ntp enable** <enter>



To disable NTP:

Type: **ntp disable** <enter>



Note: Any configured servers must be deleted. See below to delete NTP server.



To add an NTP server:

Type: **ntp server add <address>** <enter>

Where <address> is the IP address of the NTP server.

For example:

```
ntp server add 10.100.25.149
```

A response is given similar to the following:

```
Adding 10.100.25.149 to configuration...done
```



To delete an NTP server:

Type: **ntp server del <address>** <enter>

Where <address> is the IP address of the NTP server

For example:

```
ntp server del 10.100.25.149
```

A response is given similar to the following:

```
Removing 10.100.25.149 from configuration...done
```

How to Contact Us

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Phone: +1 818-676-2616

Hours: Monday through Friday, 05:00 to 17:00, Pacific Time

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E-mail: support@spirent.com

Web: <https://support.spirent.com>

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E-mail: support@spirent.com

Web: <https://support.spirent.com>

Phone: +86 (400) 810-9529 (toll-free mainland China only)

Phone: +86 (10) 8233 0033 (China)

Hours: Monday through Friday, 09:00 to 18:00, Beijing Time

Information about Spirent Communications and its products and services can be found on the main company website at <https://www.spirent.com>.

Company Address

Spirent Communications, Inc.
27349 Agoura Road
Calabasas, CA 91301
USA