

# Verifying NTP Status with the show ntp associations Command

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## Introduction

You can use Network Timing Protocol (NTP) to synchronize time and clocks across network connections. On Cisco routers, you can use the show ntp associations command to see the status of NTP peerings. This document explains how to use the show ntp associations command output to determine if NTP is working and communicating properly. There is a considerable amount of information in the output, including packet loss information. This information is meant to supplement the information available in the Cisco IOS® Command Reference for the [show ntp associations](#) command.

## Prerequisites

## Requirements

There are no specific requirements for this document.

## Components Used

This document is not restricted to specific software and hardware versions.

## Conventions

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

## Understanding the show ntp associations Command

Let's first examine the output of the **show ntp associations** command and then describe in detail the information that this command presents. Below is an example of output, followed by an explanation of certain output fields.

```
Router#show ntp associations

address          ref clock          st      when  poll
reach  delay  offset  disp
~172.31.32.2    172.31.32.1      5       29   1024
377    4.2   -8.59   1.6
+~192.168.13.33 192.168.1.111    3       69   128
377    4.1   3.48   2.3
*~192.168.13.57 192.168.1.111    3       32   128
377    7.9   11.18  3.6
* master (syncd), # master (unsyncd), + selected, -
candidate, ~ configured
```

The poll field represents the polling interval (in seconds) between NTP poll packets. As the NTP server and client are better synced and there aren't dropped packets, this number increases to a maximum of 1024. The offset field is the calculated offset (in milliseconds) between the client and server time. The client slows down or speeds up its clock to match the server's time value. The offset decreases toward zero over time. It probably will never reach zero since the packet delay between the client and server is never exactly the same, so the client NTP can't ever exactly match its clock with the server's. Additional details about the output field are explained in the [Basic System Management Commands](#) document.

If there's an asterisk (\*) next to a configured peer, then you are synced to this peer and using them as the master clock. As long as one peer is the master then everything is fine. However, the key to knowing

that NTP is working properly is looking at the value in the reach field. Let's look at this field in more detail.

## Examples of Reach Field Values

The reach field is a circular bit buffer. It gives you the status of the last eight NTP messages (eight bits in octal is 377, so you want to see a reach field value of 377). If an NTP response packet is lost, the missing packet is tracked over the next eight NTP update intervals in the reach field. The table below provides explanations for possible reach field values using the loss of an NTP response packet as an example.

Reach Field Value (Reported/Binary)	Explanation
377 = 1 1 1 1 1 1 1 1	Time 0: Last eight responses from server were received
376 = 1 1 1 1 1 1 1 0	Time 1: Last NTP response was NOT received (lost in network)
375 = 1 1 1 1 1 1 0 1	Time 2: Last NTP response was received
373 = 1 1 1 1 1 0 1 1	Time 3: Last NTP response was received
367 = 1 1 1 1 0 1 1 1	Time 4: Last NTP response was received
357 = 1 1 1 0 1 1 1 1	Time 5: Last NTP response was received
337 = 1 1 0 1 1 1 1 1	Time 6: Last NTP response was received
277 = 1 0 1 1 1 1 1 1	Time 7: Last NTP response was received
177 = 0 1 1 1 1 1 1 1	Time 8: Last NTP response was received
377 = 1 1 1 1 1 1 1 1	Time 9: Last NTP response was received

## Differences When Configured as Master

When the router is using its own clock as a master clock (using the **ntp master** command), the output from **show ntp associations** looks like the following:

```
address          ref clock      st    when  poll
reach  delay    offset  disp
*~127.127.7.1   127.127.7.1  6     20    64
377    0.0      0.00   0.0
* master (syncd), # master (unsyncd), + selected, -
candidate, ~ configured
```

The interesting value here is in the stratum field, which is one less than the configured value, **ntp master 7** in this case. The router polls its own internal clock, but the clock is never unreachable, and the router never increases the poll interval to more than every 64 seconds.

## What Does a Pound Sign Indicate?

A pound sign (#) displayed next to a configured peer in the **show ntp associations** command output indicates that the router isn't syncing with the peer even though NTP request and response packets are being exchanged. In this case, check the output of the **show ntp associations detail** command or the NTP debugs to see why the clocks aren't syncing. You can use the [show ntp associations detail](#) and [show ntp status](#) commands to obtain additional information regarding the state of NTP.

One possible reason for the pound sign is that the NTP client's clock differs by more than 4000 seconds from the NTP server's clock. On Cisco routers a time difference of greater than 4000 seconds is considered out of range, and prevents the router from syncing to the server. This doesn't apply when you first configure an NTP peer on a Cisco router or at a reload. In this case, the NTP client's (the Cisco router's) clock is changed to match the NTP server's clock, no matter how large the difference.

Make sure you check the time zone of the client's clock; local time is displayed, but time values in NTP messages are in UTC (GMT) time zone. You can manually change the client's clock to within a few minutes of the NTP server's clock.

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