

# System Clock and NTP

Document revision NaN (Mon Jul 10 13:21:55 GMT 2006)

This document applies to V2.9

## Table of Contents

[Table of Contents](#)

[System Clock](#)

[Summary](#)

[Property Description](#)

[Notes](#)

[Example](#)

[System Clock DST adjustment](#)

[Description](#)

[Property Description](#)

[Example](#)

[Summary](#)

[Specifications](#)

[Related Documents](#)

[Description](#)

[Client](#)

[Property Description](#)

[Example](#)

[Server](#)

[Property Description](#)

[Notes](#)

[Example](#)

[Time Zone](#)

[Notes](#)

[Example](#)

## System Clock

### Summary

System clock allows router to track current date and time.

### Specifications

License required: *level1*

Home menu level: */system clock*

### Property Description

**date** (*text*) - date in format "mm/DD/YYYY"

**dst-active** (*read-only*: yes | no; default: **no**) - whether the Daylight Saving Time is currently active

**time** (*time*) - time in format "HH:MM:SS"

**time-zone** (*text*) - UTC timezone in format "+HH:MM" or "-HH:MM"

## Notes

It is recommended that you reboot the router after time change to obviate the possible errors in time measurements and logging.

Date and time settings become permanent and effect BIOS settings.

If NTP update gives time shifted by 1 hour, although the time zone is set correctly, you may want to adjust the DST setting in **/system clock dst** menu.

## Example

To view the current date and time settings:

```
[admin@Local] system clock> print
    time: 08:26:37
    date: nov/18/2004
    time-zone: +00:00
    dst-active: no
[admin@Local] system clock>
```

To set the system date and time:

```
[admin@Local] system clock> set date=nov/22/2022 time=11:10:21 time-zone=+0
[admin@Local] system clock> print
    time: 11:10:25
    date: nov/22/2022
    time-zone: +00:00
    dst-active: no
[admin@Local] system clock>
```

## System Clock DST adjustment

Home menu level: **/system clock dst**

### Description

In most countries, a Daylight Saving Time regime is activated in spring and deactivated in autumn. This configuration menu provides DST adjustment facility, to drift the timezone according to your local legislation and practice.

### Property Description

**dst-delta** (*text*; default: **+01:00**) - UTC timezone drift in format "+HH:MM" or "-HH:MM" to be added to the local timezone during DST period

**dst-end** (*date | time*) - date and time when DST ends (when the delta is to be dropped).

**dst-start** (*date | time*) - date and time when DST begins (when the delta is to be applied).

### Example

To make DST zonechange active from **mar/27/2005 03:00:00** till **oct/30/2005 03:00:00**:

```
[admin@MikroTik] system clock dst> set dst-start="mar/27/2005 03:00:00"
dst-end="oct/30/2005 03:00:00"
[admin@MikroTik] system clock dst> print
dst-delta: +01:00
dst-start: mar/27/2005 03:00:00
dst-end: oct/30/2005 03:00:00
[admin@MikroTik] system clock dst>
```

## General Information

### Summary

NTP protocol allows synchronizing time among computers in network. It is good if there is an internet connection available and local NTP server is synchronized to correct time source. List of public NTP servers is available at <http://www.eecis.udel.edu/~mills/ntp/servers.html>

### Specifications

Packages required: *ntp*

License required: *level1*

Home menu level: */system ntp*

Standards and Technologies: [\*NTP version 3 \(RFC 1305\)\*](#)

Hardware usage: *Not significant*

### Related Documents

- [Software Package Management](#)
- [IP Addresses and ARP](#)

### Description

Network Time Protocol (NTP) is used to synchronize time with some NTP servers in a network. MikroTik RouterOS provides both - NTP client and NTP server.

NTP server listens on UDP port 123

NTP client synchronizes local clock with some other time source (NTP server). There are 4 modes in which NTP client can operate at:

- **unicast** (Client/Server) mode - NTP client connects to specified NTP server. IP address of NTP server must be set in `ntp-server` and/or `second-ntp-server` parameters. At first client synchronizes to NTP server. Afterwards client periodically (64..1024s) sends time requests to NTP server. Unicast mode is the only one which uses `ntp-server` and `second-ntp-server` parameters.
- **broadcast** mode - NTP client listens for broadcast messages sent by NTP server. After receiving first broadcast message, client synchronizes local clock using unicast mode, and afterwards does not send any packets to that NTP server. It uses received broadcast messages to adjust local clock.

- **multicast** mode - acts the same as broadcast mode, only instead of broadcast messages (IP address 255.255.255.255) multicast messages are received (IP address 224.0.1.1).
- **manycast** mode - actually is unicast mode only with unknown IP address of NTP server. To discover NTP server, client sends multicast message (IP 239.192.1.1). If NTP server is configured to listen for these multicast messages (manycast mode is enabled), it replies. After client receives reply, it enters unicast mode and synchronizes to that NTP server. But in parallel client continues to look for more NTP servers by sending multicast messages periodically.

## Client

Home menu level: */system ntp client*

### Property Description

**enabled** (*yes | no*; default: **no**) - whether the NTP client is enabled or not

**mode** (*unicast | broadcast | multicast | manycast*; default: **unicast**) - NTP client mode

**primary-ntp** (*IP address*; default: **0.0.0.0**) - specifies IP address of the primary NTP server

**secondary-ntp** (*IP address*; default: **0.0.0.0**) - specifies IP address of the secondary NTP server

**status** (*read-only: text*) - status of the NTP client:

- **stopped** - NTP is not running (NTP is disabled)
- **error** - there was some internal error starting NTP service (please, try to restart (disable and enable) NTP service)
- **started** - NTP client service is started, but NTP server is not found, yet
- **failed** - NTP server sent invalid response to our NTP client (NTP server is not synchronized to some other time source)
- **reached** - NTP server contacted. Comparing local clock to NTP server's clock (duration of this phase is approximately 30s)
- **timeset** - local time changed to NTP server's time (duration of this phase is approximately 30s)
- **synchronized** - local clock is synchronized to NTP server's clock. NTP server is activated
- **using-local-clock** - using local clock as time source (server enabled while client disabled)

## Example

To enable the NTP client to synchronize with the **159.148.60.2** server:

```
[admin@MikroTik] system ntp client> set enabled=yes primary-ntp=159.148.60.2
[admin@MikroTik] system ntp client> print
    enabled: yes
      mode: unicast
primary-ntp: 159.148.60.2
secondary-ntp: 0.0.0.0
      status: synchronized
[admin@MikroTik] system ntp client>
```

## Server

Home menu level: */system ntp server*

## Property Description

**broadcast** (*yes* | *no*; default: **no**) - whether NTP broadcast message is sent to 255.255.255.255 every 64s

**enabled** (*yes* | *no*; default: **no**) - whether the NTP server is enabled

**manycast** (*yes* | *no*; default: **yes**) - whether NTP server listens for multicast messages sent to 239.192.1.1 and responds to them

**multicast** (*yes* | *no*; default: **no**) - whether NTP multicast message is sent to 224.0.1.1 every 64s

## Notes

NTP server activities only when local NTP client is in **synchronized** or **using-local-clock** mode.

If NTP server is disabled, all NTP requests are ignored.

If NTP server is enabled, all individual time requests are answered.

**CAUTION!** Using **broadcast**, **multicast** and **manycast** modes is dangerous! Intruder (or simple user) can set up his own NTP server. If this new server will be chosen as time source for your server, it will be possible for this user to change time on your server at his will.

## Example

To enable NTP server to answer unicast requests only:

```
[admin@MikroTik] system ntp server> set manycast=no enabled=yes
[admin@MikroTik] system ntp server> print
  enabled: yes
 broadcast: no
 multicast: no
manycast: no
[admin@MikroTik] system ntp server>
```

## Time Zone

Home menu level: */system clock*

## Notes

NTP changes local clock to UTC (GMT) time by default.

## Example

Time zone is specified as a difference between local time and GMT time. For example, if GMT time is 10:24:40, but correct local time is 12:24:40, then time-zone has to be set to +2 hour:

```
[admin@MikroTik] system clock> print
  time: dec/24/2003 10:24:40
 time-zone: +00:00
[admin@MikroTik] system clock> set time-zone=+02:00
[admin@MikroTik] system clock> print
  time: dec/24/2003 12:24:42
 time-zone: +02:00
```

```
[admin@MikroTik] system clock>
```

If local time is before GMT time, time-zone value will be negative. For example, if GMT is 18:00:00, but correct local time is 15:00:00, time-zone has to be set to -3 hours:

```
[admin@MikroTik] system clock> set time-zone=-3  
[admin@MikroTik] system clock> print  
    time: sep/24/2004 08:13:28  
    time-zone: -03:00  
[admin@MikroTik] system clock>
```