

# GPS Synchronization

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This document applies to V3.0

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## General Information

### Summary

Global Positioning System (GPS) receiver can be used by MikroTik RouterOS to get the precise location and time (which may be used as NTP time source)

### Specifications

Packages required: *gps*

License required: *level1*

Home menu level: */system gps*

Standards and Technologies: *GPS, NMEA 0183, [Simple Text Output Protocol](#)*

Hardware usage: *Not significant*

### Description

Global Positioning System (GPS) is used for determining precise location of a GPS receiver. There are two types of GPS service:

- Precise Positioning Service (PPS) that is used only by U. S. and Allied military, certain U. S. Government agencies, and selected civil users specifically approved by the U. S. Government. Its accuracy is 22m horizontally, 27.7m vertically and 200ns of time
- Standard Positioning Service (SPS) can be used by civil users worldwide without charge or restrictions except that SPS accuracy is intentionally degraded to 100m horizontally, 156m vertically and 340ns of time

GPS system is based on 24 satellites rotating on 6 different orbital planes with 12h orbital period. It makes that at least 5, but usually 6 or more satellites are visible at any time anywhere on the Earth. GPS receiver calculates more or less precise position (latitude, longitude and altitude), speed and time based on signals received from 4 satellites (three are used to determine 2D position and fourth is used to correct time and calculate altitude - 3D position), which are broadcasting information needed to calculate their exact current positions (using ephemeris - satellite own precise orbit - and almanach - information and coarse orbit of all satellites in the system) and UTC time (using GPS time and UTC deviation correction).

MikroTik RouterOS can communicate with many GPS receivers which are able to send the positioning and time via asynchronous serial line or USB using NMEA 0183, NMEA/RTCM or Simple Text Output Protocol. Note that you might need to configure the router's serial port in order to work with your device. For example, many GPS receivers work on 4800bit/s bitrate, to the same should be set in the **/port** menu for the respective serial port.

Precise time is mainly intended to be used by built-in NTP server, which can use it as a time source without any additional configuration if GPS is configured to set system time.

## Additional Documents

- [Global Positioning System - How it Works](#)

## Synchronizing with a GPS Receiver

Home menu level: */system gps*

### Property Description

**enabled** (*yes | no*) - whether the router will communicate with a GPS receiver or not

**port** (*name*) - the port that will be used to communicate with a GPS receiver

**set-system-time** (*time*) - whether to set the system time to the value received from a GPS receiver or not

### Notes

If you are synchronizing system time with a GPS device, you should correctly choose time zone if it is different from UTC as satellites are broadcasting time bound to UTC +00:00 timezone.

### Example

To enable GPS communication through serial0 port:

```
[admin@MikroTik] system gps> print
    enabled: no
      port: (unknown)
set-system-time: yes
[admin@MikroTik] system gps> set enabled=yes port=serial0
[admin@MikroTik] system gps> print
    enabled: yes
      port: serial0
set-system-time: yes
[admin@MikroTik] system gps>
```

## GPS Monitoring

Home menu level: */system gps monitor*

### Description

This command is used for monitoring the data received from a GPS receiver.

### Property Description

**altitude** (*read-only: text*) - altitude of the current location

**date-and-time** (*read-only: text*) - UTC date and time received from GPS server

**latitude** (*read-only: text*) - latitude of the current location

**longitude** (*read-only: text*) - longitude of the current location

**speed** (*read-only: text*) - mean velocity

**valid** (*read-only: yes | no*) - whether the received information is valid or not (e.g. you can set a GPS receiver to the demo mode to test the connection, in which case you will receive information, but it will not be valid)

### Example

```
[admin@MikroTik] system gps> monitor
  date-and-time: jul/23/2003 12:25:00
  longitude: "E 24 8' 17'"
  latitude: "N 56 59' 22'"
  altitude: "-127.406400m"
  speed: "0.001600 km/h"
  valid: yes

[admin@MikroTik] system gps>
```