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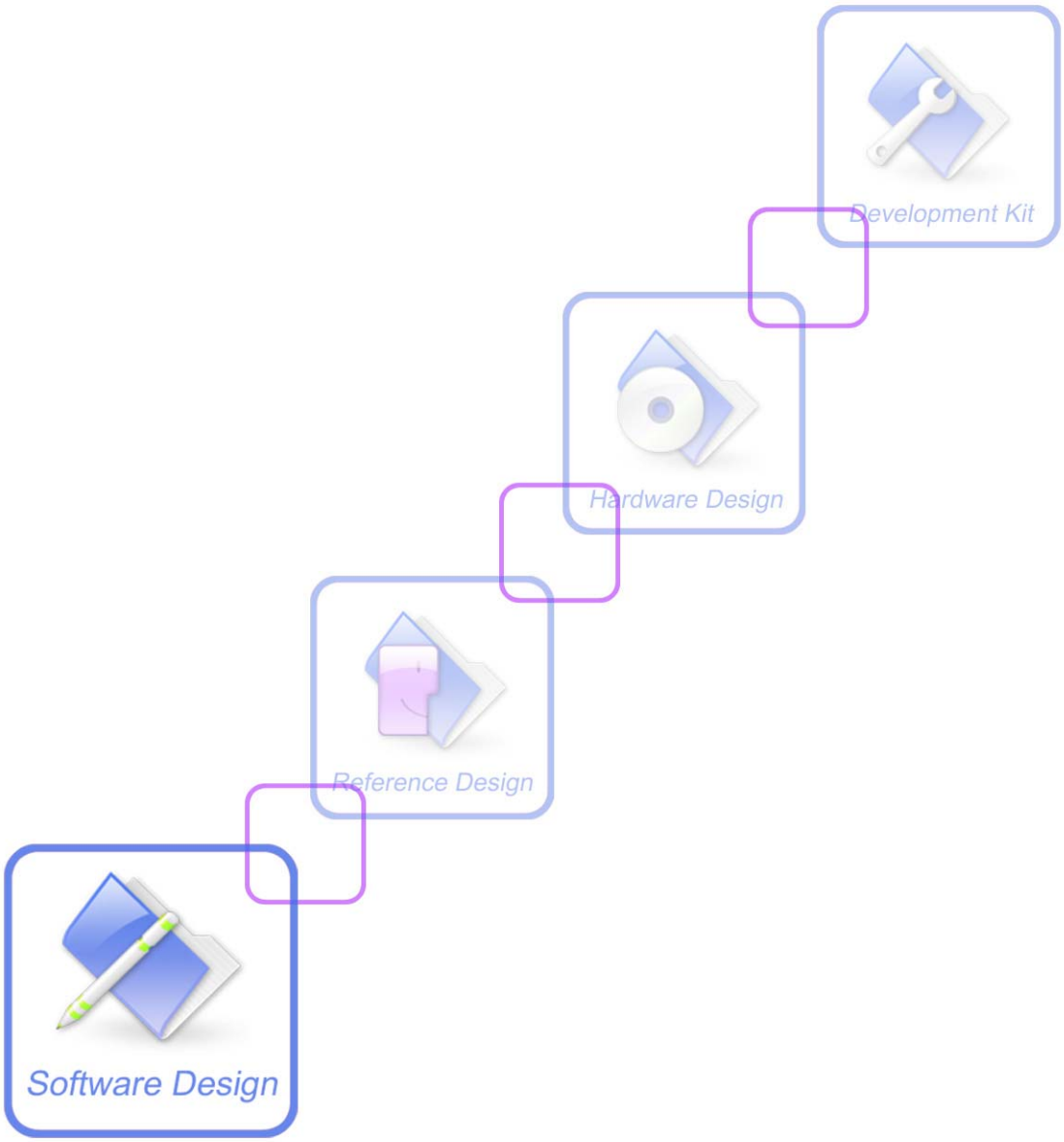
# GPS Application Note



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# Version History

| Version | Chapter | Comments |
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| V1.00 | New Version | |
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# 1. Introduction

## 1.1 Overview

This document gives the usage of SIM52XX GPS functions. User can get useful information about the SIM52XX GPS/A-GPS functions quickly through this document.

The GPS functions are provided in AT command format, and they are designed for customers to design their GPS applications easily. User can access these GPS AT commands through UART/ USB interface which communicates with SIM52XX module.

### SIM52XX GPS features:

- Support S-GPS and A-GPS function.
- Support standalone mode, MS-based mode and MS-assisted mode
- Support cold start and hot start.
- Support a subset of the NMEA-0183 standard.
- Support NMEA sentences output in NMEA port or UART port.
- A-GPS support UP (user plane) and CP (control plane) method.
- MS-assisted mode support single fixed; MS-based mode support seriate fixed.
- Support certificate if necessary.

Support GPS start automatically when module power on, it support standalone mode only

## 1.2 GPS mode introduction

In MS-assisted mode, when a request for position location is issued, available network information is provided to the location server and assistance is requested from the location server. The location server sends the assistance information to the handset. The handset/mobile unit measures the GPS observables and provides the GPS measurements along with available network data (that is appropriate for the given air interface technology) to the location server. The location server then calculates the position location and returns results to the requesting entity.

In MS-based mode, the assistant data provided by the location server encompasses not only the information required to assist the handset in measuring the satellite signals, but also the information required to calculate the handset's position. Therefore, rather than provide the GPS measurements and available network data back to the location server, the mobile calculates the location on the handset and passes the result to the requesting entity.

In standalone mode, the handset demodulates the data directly from the GPS satellites. This mode has some reduced cold-start sensitivity, and a longer time to first fix as compared to the assisted modes. However, it requires no server interaction and works out of network coverage.

**Table 1 GPS mode of operation**

| MS-assisted | Server | Module |
|---|---|---|
| Location server sends aiding data that is valid for the current fix | Send aiding data | |
| Module sends code phases | | Code phases |
| Server calculates position | Calculate position | |
| **MS-based** | **Server** | **Module** |
| Location server sends aiding data that is valid for the current fix | Send aiding data | |
| Module calculates position | | Calculate position |
| **Standalone** | **Server** | **Module** |
| Module demodulates data from GPS satellite | | Demodulates GPS satellite data |
| Module calculates position | | Calculate position |

### 1.3 References

The present document is based on the following documents:

[1] SIMCOM_SIM52xx_ATC_EN.pdf

### 1.4 Terms and Abbreviations

For the purposes of the present document, the following abbreviations apply:

- AT ATtention; the two-character abbreviation is used to start a command line to be sent from TE/DTE to TA/DCE
- A-GPS Assisted Global positioning system
- GPS Global positioning system
- S-GPS Simultaneous Global positioning system

## 2. A-GPS Quick Start – Setting

The purpose of this section is to help get you start with A-GPS setting.

### 2.1 Set A-GPS server address

UP method through PS region, so must set A-GPS server and PDP context profile. The server address gets from the local carrier.

- Set the PDP context profile method:

*AT+CGSOCKCONT=1,"IP","myasn"*

The first parameter is the profile number of CGSOCKCONT, and "IP" is the protocol stack type that MMS will use. "myasn" is the ASN that will be used for PDP activation, this parameter should be set to the real ASN string set by carrier. Following is the PDP context profile and server URL setting example:

- Set the A-GPS server method:

*AT+CGPSURL="111.222.333.444:8888"*

### 2.2 Set certificate if necessary

If the GPS server need certificate, must select security mode, and input the certificate. The certificate must be imported into EFS by PC tool.

- Select the transport security:

*AT+CGPSSSL=1*

The certificate is get from local carrier.

## 3. Start GPS

### 3.1 Start GPS standalone mode

Three methods can start GPS standalone mode:

1. AT+CGPS=1,1 (or AT+CGPS=1)
2. AT+CGPSCOLD
3. AT+CGPSHOT

These commands must execute when GPS engine off.

## 3.2 Start A-GPS mode

When using MS-based mode, mode will transform to standalone mode automatically after get the ephemeris information from the server. MS-assisted mode is single fixed; MS-based mode is seriate fixed.

### 1. AGPS server doesn't support certificate:

| **MS-assisted mode** | no certificate |
|---|---|
| Set APN | AT+CGSOCKCONT=1,"IP","*myasn*" |
| Set server address (not support certificate ) | AT+CGPSURL="111.222.333.444:8888" |
| Set security mode | AT+CGPSSSL=0 |
| Start GPS | AT+CGPS=1,3 |
| AT port response (URC) | +CAGPSINFO:3122256517,12135328531,135,15052009,012749.0 |
| NMEA port response | $GPGSV,3,1,10,02,22,135,26,08,11,045,23,09,11,180,22,10,33,056,22*71<br>$GPGSV,3,2,10,15,78,281,44,21,22,315,41,24,67,315,47,26,45,225,30*78<br>$GPGSV,3,3,10,27,33,157,,29,22,247,46*76<br>…… |
| | |
| **MS-based mode** | no certificate |
| Set APN | AT+CGSOCKCONT=1,"IP","*myasn*" |
| Set server address (not support certificate ) | AT+CGPSURL="111.222.333.444:8888" |
| Set security mode | AT+CGPSSSL=0 |
| Start GPS | AT+CGPS=1,2 |
| AT command (get fixed position) | AT+CGPSINFO |
| AT port response | *+CGPSINFO: 3113.393766,N,12121.176625,E,061108,075358.0,19.5,0* |
| NMEA port response | $GPGSV,3,1,11,02,19,142,20,08,16,045,21,09,19,180,22,10,41,063,29*7B<br>$GPGSV,3,2,11,15,77,317,46,18,09,286,31,21,28,315,43,24,73,310,47*7F<br>$GPGSV,3,3,11,26,53,241,31,27,39,158,20,29,30,250,41*45<br>$GPGGA,013925.0,3113.340070,N,12121.176208,E,1,08,2.9,164.0,M,,,,*08<br>$GPRMC,013925.0,A,3113.340070,N,12121.176208,E,,,150509,,,A*61<br>$GPGSA,A,3,08,10,15,18,21,24,26,29,,,,,4.4,2.9,3.3*37<br>$GPVTG,,T,,M,0.0,N,0.0,K*4E<br>…… |

### 2. AGPS server support certificate:

| **MS-assisted mode** | use certificate |
|---|---|
| Import certificate | By PC tool |
| Set APN | AT+CGSOCKCONT=1,”IP”, ”*myasn*” |
| Set server address (support certificate ) | AT+CGPSURL=”111.222.333.444:8888” |
| Set security mode | AT+CGPSSSL=1 |
| Start GPS | AT+CGPS=1,3 |
| AT port response (URC) | +CAGPSINFO:3122256517,12135328531,135,15052009,012749.0 |
| NMEA port response | $GPGSV,3,1,10,02,22,135,26,08,11,045,23,09,11,180,22,10,33,056,22*71<br>$GPGSV,3,2,10,15,78,281,44,21,22,315,41,24,67,315,47,26,45,225,30*78<br>$GPGSV,3,3,10,27,33,157,,29,22,247,46*76<br>…… |
| | |
| **MS-based mode** | use certificate |
| Import certificate | By PC tool |
| Set APN | AT+CGSOCKCONT=1,”IP”, ”*myasn*” |
| Set server address (support certificate ) | AT+CGPSURL=”111.222.333.444:8888” |
| Set security mode | AT+CGPSSSL=1 |
| Start GPS | AT+CGPS=1,2 |
| AT command (get fixed position) | AT+CGPSINFO |
| AT port response | *+CGPSINFO: 3113.393766,N,12121.176625,E,061108,075358.0,19.5,0* |
| NMEA port response | $GPGSV,3,1,11,02,19,142,20,08,16,045,21,09,19,180,22,10,41,063,29*7B<br>$GPGSV,3,2,11,15,77,317,46,18,09,286,31,21,28,315,43,24,73,310,47*7F<br>$GPGSV,3,3,11,26,53,241,31,27,39,158,20,29,30,250,41*45<br>$GPGGA,013925.0,3113.340070,N,12121.176208,E,1,08,2.9,164.0,M,,,,*08<br>$GPRMC,013925.0,A,3113.340070,N,12121.176208,E,,,150509,,,A*61<br>$GPGSA,A,3,08,10,15,18,21,24,26,29,,,,,4.4,2.9,3.3*37<br>$GPVTG,,T,,M,0.0,N,0.0,K*4E<br>…… |

# 4. Get GPS position information

### 4.1 standalone mode

AT+CGPSINFO command should return fixed position information, and it can report GPS position string automatically by user setting.

The report format:
*+CGPSINFO: 3113.393766,N,12121.176625,E,061108,075358.0,19.5,0*

### 4.2 A-GPS mode

If using MS-based mode, get fixed position information like standalone mode.

If using MS-assisted mode, GPS position string will report automatically.
The report format:
+CAGPSINFO:3122256517,12135328531,135,15052009,012749.0

## 5. Q&A

### 5.1 FAQ

Some frequently asked questions may be helpful for using GPS.

***Why GPS don't start?***
Please execute AT+CGPSCOLD, AT+CGPSHOT or AT+CGPS=1 to start GPS. If you want to start GPS automatically when power on module, you can set AT+CGPSAUTO=1.

***Why can't get NMEA sentence?***
1. Make sure GPS is running.
2. Check current opened port is NMEA port. If AT+CGPSSWITCH=2, should open UART port.

***Why A-GPS don't get the fixed position?***
1. Make sure all the setting is correct. Re. A-GPS quick start setting.
2. Make sure AGPS server address is usable.
3. Is module camp on WCDMA or GSM network?

***Why standalone mode can't fixed?***
1. Is GPS antenna connecting normally?
2. Is there exist GPS signal? If indoor or no GPS signal, standalone mode can't fieed.

***How to get fixed position information?***
1. AT+CGPSINFO command should get position information after fixed. It's URC information.

2. Parse NMEA sentence $GPGGA or $GPRMC.
3. If use MS-assisted, fixed position information will report automatically after fixed.

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