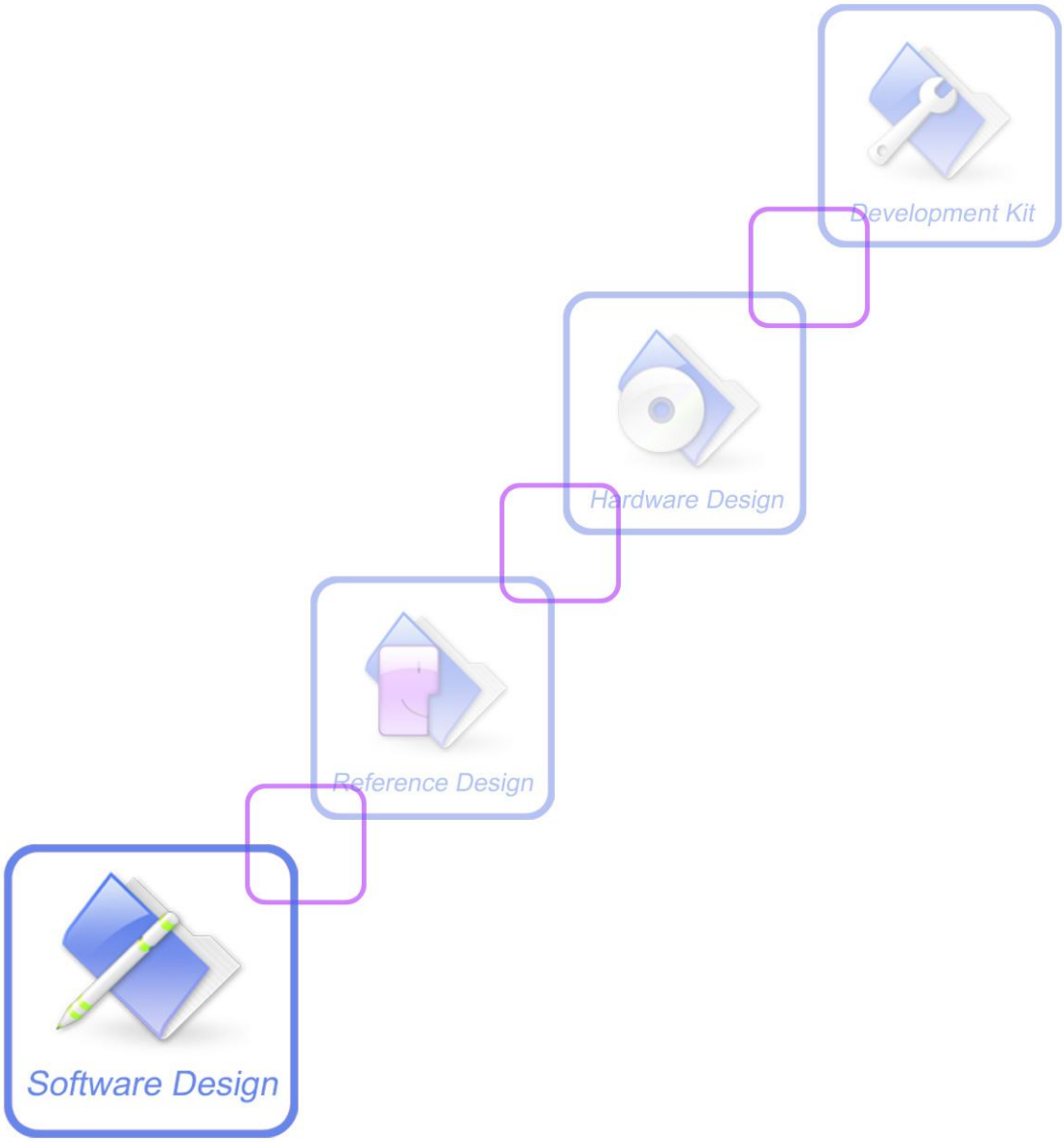
SIMCom
A company of SIM Tech

SIM5360 GPS Application Note



Document Title:	SIM5360 GPS Application Note
Version:	0.02
Date:	2014-05-30
Status:	Release
Document ID:	SIM5360_GPS_Application_Note_V0.02

General Notes

SIMCom offers this information as a service to its customers, to support application and engineering efforts that use the products designed by SIMCom. The information provided is based upon requirements specifically provided to SIMCom by the customers. SIMCom has not undertaken any independent search for additional relevant information, including any information that may be in the customer's possession. Furthermore, system validation of this product designed by SIMCom within a larger electronic system remains the responsibility of the customer or the customer's system integrator. All specifications supplied herein are subject to change.

Copyright

This document contains proprietary technical information which is the property of SIMCom Limited., copying of this document and giving it to others and the using or communication of the contents thereof, are forbidden without express authority. Offenders are liable to the payment of damages. All rights reserved in the event of grant of a patent or the registration of a utility model or design. All specification supplied herein are subject to change without notice at any time.

Copyright © Shanghai SIMCom Wireless Solutions Ltd. 2013

Version History

Version	Chapter	Comments
V0.01	New Version	
V0.02	GPS mode introduction	Add gps mode

Contents

Version History 2
Contents 3
GPS Application Note 4
1. Introduction 4
1.1 Overview 4
1.2 GPS mode introduction 4
1.3 gpsoneXTRA introduction 5
1.4 References 6
1.5 Terms and Abbreviations 6
2. A-GPS Quick Start – Setting 6
2.1 Set A-GPS server address 6
2.2 Set certificate if necessary 7
3. Start GPS 7
3.1 Start GPS standalone mode 7
3.2 Start A-GPS mode 7
4. Get GPS position information 9
4.1 standalone mode 9
4.2 A-GPS mode 9
5. Qualcomm gpsoneXTRA mode 10
5.1 gpsoneXTRA execute flow 10
5.2 gpsoneXTRA setting 10
5.3 gpsoneXTRA AT flow 11
5.4 Vendor propositional XTRA execute flow 11
6. Q&A 11
6.1 FAQ 11
Contact Us 13

GPS Application Note

1. Introduction

1.1 Overview

This document gives the usage of SIM5360 GPS functions. User can get useful information about the SIM5360 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 SIM5360 module.

SIM5360 GPS features:

- Support S-GPS and A-GPS function.
- Support GLONASS 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 and GLONASS 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. GPS is preferred than GLONASS, so if GPS has fixed the position, the GNSS engine will close GLONASS, in order to save the power. If you want GPS and GLONASS hybrid, you can first change mode with AT Command

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 and GLONASS satellite data
Module calculates position		Calculate position

1.3 gpsoneXTRA introduction

1.3.1 gpsOneXTRA assistance

Provides enhanced standalone performance. Eliminates the need to demodulate the GPS signal for ephemeris, almanac, iono, UTC, or health.

Normally requires -144 dBm or stronger for all SVs in view

TTF can be reduced by 18 to 30 sec (or more in harsh signal environments)

1.3.2 gpsOneXTRA assistance data file content

Current assistance data (ephemeris, almanac, iono, UTC, health)
Predicted satellite coordinates and clock biases valid for up to 7 days

1.3.3 gpsOneXTRA assistance data delivery

Propriety binary file (approximately 40 kB, depending on number of active satellites)
File transfer via HTTP
Time assistance via SNTP/HTP

1.3.4 gpsOneXTRA assistance file source and policy

Qualcomm generated the assistance file and Qualcomm partner hosted.

1.4 References

The present document is based on the following documents:

[1] SIMCOM_SIM5360_ATC_EN_V0.12.doc

1.5 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","myAPN"

The first parameter is the profile number of CGSOCKCONT, and "IP" is the protocol stack type that MMS will use. "myAPN" 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”,”*myAPN*”
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 $GPGSV,3,2,10,15,78,281,44,21,22,315,41,24,67,315,47,26,45,225,30*78 $GPGSV,3,3,10,27,33,157,,29,22,247,46*76 ……
MS-based mode	no certificate
Set APN	AT+CGSOCKCONT=1,"IP","*myAPN*"
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 $GPGSV,3,2,11,15,77,317,46,18,09,286,31,21,28,315,43,24,73,310,47*7F $GPGSV,3,3,11,26,53,241,31,27,39,158,20,29,30,250,41*45 $GPGGA,013925.0,3113.340070,N,12121.176208,E,1,08,2.9,164.0,M,,,,*08 $GPRMC,013925.0,A,3113.340070,N,12121.176208,E,,,150509,,,A*61 $GPGSA,A,3,08,10,15,18,21,24,26,29,,,,,4.4,2.9,3.3*37 $GPVTG,,T,,M,0.0,N,0.0,K*4E ……

2. AGPS server support certificate:

MS-assisted mode	use certificate
Import certificate	By PC tool
Set APN	AT+CGSOCKCONT=1,"IP", "*myAPN*"
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	$GPGSV,3,1,10,02,22,135,26,08,11,045,23,09,11,180,22,10,33,056,22*71

response	$GPGSV,3,2,10,15,78,281,44,21,22,315,41,24,67,315,47,26,45,225,30*78 $GPGSV,3,3,10,27,33,157,,29,22,247,46*76 ……
MS-based mode	use certificate
Import certificate	By PC tool
Set APN	AT+CGSOCKCONT=1,"IP", "*myAPN*"
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 $GPGSV,3,2,11,15,77,317,46,18,09,286,31,21,28,315,43,24,73,310,47*7F $GPGSV,3,3,11,26,53,241,31,27,39,158,20,29,30,250,41*45 $GPGGA,013925.0,3113.340070,N,12121.176208,E,1,08,2.9,164.0,M,,,,*08 $GPRMC,013925.0,A,3113.340070,N,12121.176208,E,,,150509,,,A*61 $GPGSA,A,3,08,10,15,18,21,24,26,29,,,,,4.4,2.9,3.3*37 $GPVTG,,T,,M,0.0,N,0.0,K*4E ……

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

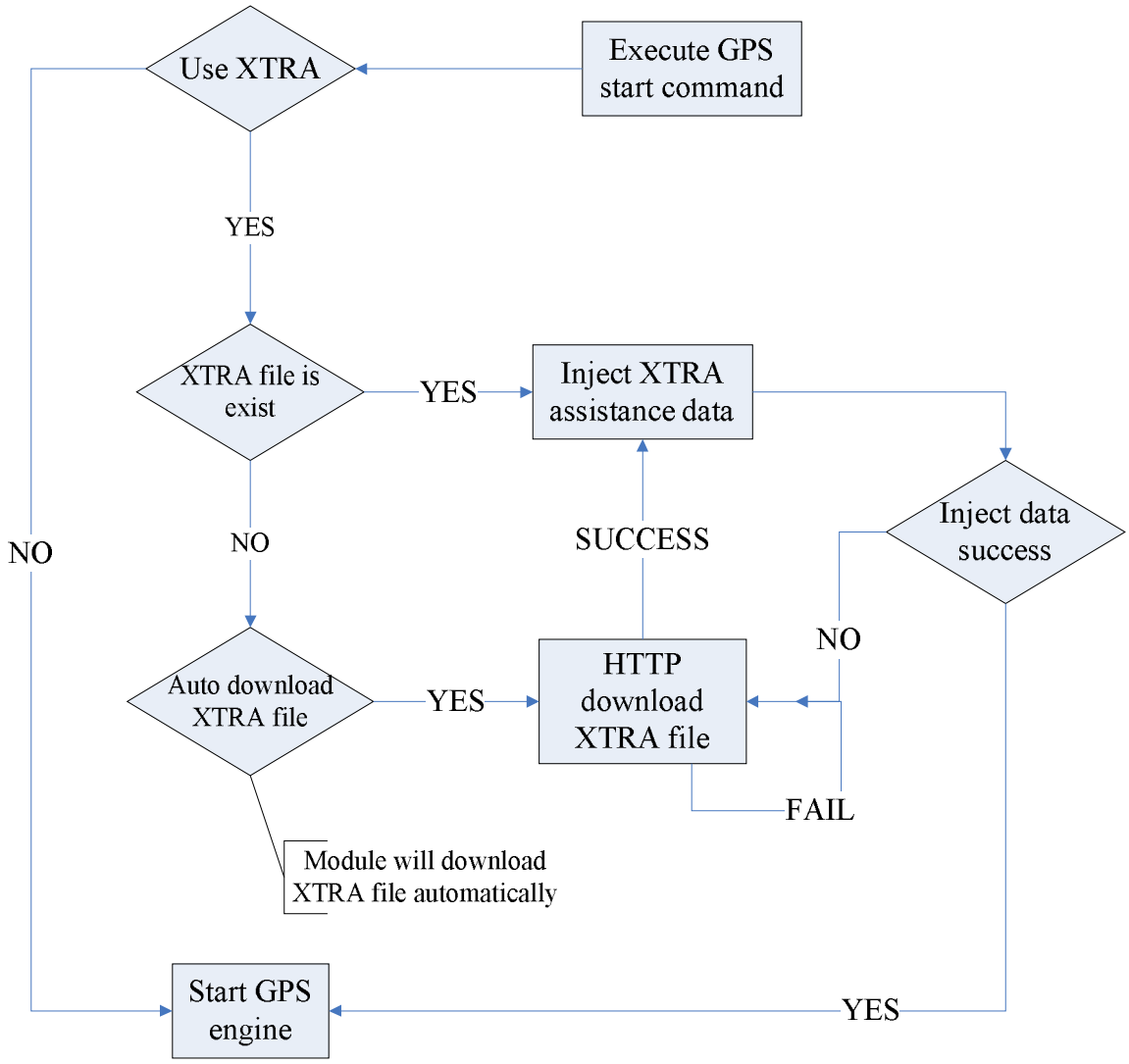
If using MS-based mode, get fixed position information like standalone mode.

If using MS-assisted mode, GPS position string will report automatically.
The report format:

+CAGPSINFO:3122256517,12135328531,135,15052009,012749.0

5. Qualcomm gpsoneXTRA mode

5.1 gpsoneXTRA execute flow



5.2 gpsoneXTRA setting

a) Make sure the APN is correct (AT+CGSOCKCONT), gpsoneXTRA download the assistance file from server by HTTP protocol.

b) Module time (AT+CCLK) must synchronize by HTP protocol, and local time zone must be set.

c) Enable the XTRA function (AT+CGPSXE=1)

5.3 gpsoneXTRA AT flow

1. Enable the gpsoneXTRA function. Execute AT+CGPSXE=1, then restart the module. (This function will take effect after module restart)
2. Setting APN. Execute AT+CGSOCKCONT=1,”IP”,”myAPN”
3. Download the XTRA assistance file form HTTP server. Execute AT+CGPSXD=0. Module will report +CGPSXD: 0 if download successfully.
4. Set HTP server AT+CHTPSERV=”ADD”,”www.google.com”,80,1
5. Set local time zone AT+CCLK="11/09/27,09:27:31+32" (This time is maybe imprecise, but time zone must set local value. +32 is the Beijing time zone)
5. Synchronize time AT+CHTPUPDATE
6. Start GPS AT+CGPSCOLD

5.4 Vendor propositional XTRA execute flow

1. Time synchronizes: Consumer must use synchronize the module time before using XTRA. Time zone must set by AT+CCLK. If consumers don’t want to use HTP to synchronize the time, time also can be set by AT+CCLK. But the time must be accurate.
2. Download the XTRA file by AT command (AT+CGPSXD). The XTRA assistance file can be used about 7 days. But we suggest download the file one time everyday.
3. Start the GPS.

6. Q&A

6.1 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 fix?

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

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.

Why module can't download XTRA file by HTTP?

1. Make sure the APN setting correct.
2. Make sure the module camp on the PS, i.e. AT+CGREG? Return 0,1

How to disable or enable the XTRA function?

1. Setting by AT+CGPSXE=<on/off>, the parameter 0 means disable and 1 means enable. It must restart the module after setting.

Can XTRA enhance the TFF?

1. Yes, TTF can be reduced by 18 to 30 sec (or more in harsh signal environments) for standalone cold start.

Which setting is necessary for using XTRA?

1. Time synchronizes.
2. Download XTRA file by HTTP.

If http used for XTRA download, can it use for another http connection?

1. No, HTTP only allows one connection.

Contact Us

Shanghai SIMCom Wireless Solutions Ltd.

Add: Building A, SIM Technology Building, No.633, Jinzhong Road, Changning District 200335

Tel: +86 21 3252 3300

Fax: +86 21 3252 3301

URL: http:/www.sim.com/wm/