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SIM868 Series_GNSS _AGPS_Application Note

GPRS Module

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About Document

Version History

Version	Date	Owner	What is new
V1.00	2017-01-03	Xiping.li	New version
V1.01	2018-09-25	Zhao.wang	Update all
V1.02	2019-01-10	Zhao.wang	Update all
V1.03	2018-03-25	Zhao.wang	Modified EPO address
V1.04	2020-06-15	Fumei.zeng	Change the style
V1.05	2020-09-15	Fumei.zeng	Modify chapter 3.3

Scope

This document is a reference for SIM868 series GSM+GPS+GLONASS module which is based on MTK platform.SIM868 series including SIM868, SIM868E and SIM868L.

This document does not provide information about NMEA_0183 protocol.

Contents

1 Introduction

1.1 Purpose of the document

Based on module AT command manual, this document will introduce GNSS application process.

Developers could understand and develop application quickly and efficiently based on this document.

1.2 Related documents

[1] SIM800 Series_AT Command Manual
[2] SIM800 Series_GSM Location_Application Note
[3] SIM868 Series_GNSS_Application Note
[4] SIM868_NMEA Message Specification
[5] SIM800 Series_NTP_Application Note
[6] SIM800 Series_FS_Application Note

1.3 Conventions and abbreviations

Abbreviation	Description
APN	Access Point Name
URC	Unsolicited Result Code
FTP	File Transfer Protocol
GGA	Global Positioning System Fixed Data
GLL	Geographic Position - Latitude/Longitude
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
AGPS	Assisted GPS
DGPS	Differential Global Positioning System
GPRS	General Packet Radio Service

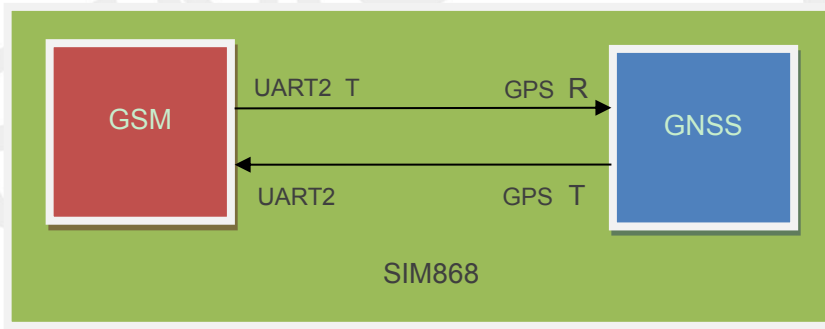| GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
HPA	Horizontal Position Accuracy
VPA	Vertical Position Accuracy
GEO-Fence	A geographic area
HDOP	Horizontal Dilution of Precision
HTTP	Hypertext Transfer Protocol
NMEA	National Marine Electronics Association
PDOP	Position Dilution of Precision
PDP	Packet Data Protocol
RMC	Recommended Minimum Specific GNSS Data
VDOP	Vertical Dilution of Precision
VTG	Course Over Ground and Ground Speed
ZDA	Time & Date

2 GNSS AGPS Overview

SIM868 supports 3 kinds of fixing technologies,

1) GNSS EASY self-generated orbit prediction, off-line mode.
2) GNSS EPO orbit prediction, TTFF could be 10s minimum in open sky.
3) SimFastFix function, TTFF could be 5s minimum in open sky.

Notice:

1) EASY technology is enabled in GNSS standard alone mode by default; first cold start will not help, after warm start, TTFF will be reduced to 15s around. EASY technology only takes 3 days ephemeris data from now on.
2) EPO and SimFastFix technologies require GPS UART interface to be connected to GSM UART2 interface as below. These two technologies will take effect immediately after cold start.

3 EPO orbit prediction

3.1 EPO operation requirement

1）UTC time is important before EPO data operation, because module will validate EPO data expiration date based on RTC time. You can get real time clock by following ways.

    a) Network time from cell tower by AT command AT+CLTS=1/AT&W. Next reboot module will get real time clock from network operator if it is supported, and update it to UTC time which could be shown by command "AT+CCLK? "(*Note: The timezone is zero*).

    b) Network time from NTP server. This will require GPRS service available. And enable SAPBR protocol for NTP function; please refer to document "SIM800 Series NTP Application Note.pdf".

2）EPO file from server. User can get MTK EPO file from HTTP server. MTK http server provides EPO files for different days, and updates it every single day.

HTTP server address: http://wepodownload.mediatek.com/EPO_GPS_3_1.DAT

3.2 EPO orbit prediction process

1) Make sure module attach GPRS service;
2) Synchronize network UTC time;
3) Get EPO file from MTK http server and save it to module file system;
4) Enable GNSS and pass EPO file to GNSS engine;
5) Read GNSS fixing location from GNSS engine.

Notice:
EPO file should be re-installed after GNSS cold start.

3.3 EPO operation sample

```
//Example of EPO operation sample
AT+SAPBR=3,1,"CONTYPE","GPRS"
OK                                          //Set bearer parameter
AT+SAPBR=3,1,"APN","3GNET"
OK                                          //Set bearer context
AT+SAPBR=1,1
OK                                          //Active bearer context
AT+SAPBR=2,1
+SAPBR: 1,1,"10.1.60.86"
                                            //Read bearer parameter

OK
AT+CNTPCID=1
OK                                          //Set GPRS Bearer Profile's ID
AT+CNTP="202.112.29.82"
OK                                          //Set NTP service URL
AT+CNTP?
+CNTP: 202.112.29.82,0
                                            //Read NTP server

OK
AT+CNTP
OK                                          //Synchronize Network Time to local
                                            //Note: Reset NTP service URL when it failed

+CNTP: 1
AT+CCLK?
+CCLK: "19/01/10,05:50:08+00"
                                            //Read UTC time

OK
AT+CGNSSAV=3,3
OK                                          //Set HTTP download mode and save EPO to FS
AT+HTTPINIT                                 //Init HTTP service
OK
AT+HTTPPARA="CID",1                         //Set parameters for HTTP session
OK
AT+HTTPPARA="URL","http://wepodownl
oad.mediatek.com/EPO_GPS_3_1.DAT "
OK
AT+HTTPACTION=0                             //Get session start
OK


+HTTPACTION: 0,200,27648                    //Get successfully
AT+HTTPTERM                                 //Terminate HTTP service
```

OK	
AT+CGNSCHK=3,1	
+CGNSCHK: 3,1,27648,64	//Check EPO file size and validation
OK	
AT+CGNSPWR=1	
OK	//Power on GPS
+CGNSPWR: 1	
	//Send EPO file to GPS
AT+CGNSAID=31,1,1	
OK	
+CGNSAID: OK	//EPO file has been written to GNSS buffer successfully
AT+CGNSINF	
+CGNSINF:	
1,1,20190110055021.000,31.221303,121.355042,71.900,0.00,45.1,1,,1.0,1.3,0.8,,10,10,,,36,,	//Read GPS location data
OK	

4 SimFastFix function

4.1 SimFastFix function requirement

There have three necessary requirements for SimFastFix function.
1) UTC time, as mentioned in section 2 above.
2) Reference location. Module supports GSM LBS function, this function can feed this reference location to SimFastFix. Also, user can give reference location info by manual with AT command.
3) EPO data.

4.2 SimFastFix function process

1) Make sure module attach GPRS service;
2) Synchronize network UTC time;
3) Feed reference location longitude/latitude by LBS function or by manual (AT+CRFLOC);
4) Get EPO file from MTK http server and save it to module file system;
5) Enable GNSS and pass EPO file to GNSS engine;
6) Read GNSS fixing location from GNSS engine.

Notice:
a) EPO file should be re-installed after GNSS cold start.
b) Reference location buffer will be cleared after command AT+CGNSAID. So this location info should be flesh and feed again (by command AT+CLBS or AT+CRFLOC) every time before CGNSAID action.

4.3 SimFastFix function sample

```
//Example of SimFastFix function sample
AT+SAPBR=3,1,"CONTYPE","GPRS"          //Set bearer parameter
OK
```

AT+SAPBR=3,1,"APN","3GNET" OK	//Set bearer context
AT+SAPBR=1,1 OK	//Active bearer context
AT+SAPBR=2,1 +SAPBR: 1,1,"10.6.85.39" OK	//Read bearer parameter
AT+CNTPCID=1 OK	//Set GPRS Bearer Profile's ID
AT+CNTP="202.112.29.82" OK	//Set NTP service URL
AT+CNTP? +CNTP: 202.112.29.82,0 OK	//Read NTP server
AT+CNTP OK	//Synchronize Network Time to local
+CNTP: 1 AT+CCLK? +CCLK: "19/01/10,05:50:08+00" OK	//Read UTC time
AT+CLBS=1,1 +CLBS: 0,121.358992,31.219811,550 	//Require LBS info, and module will update this info for reference location automatically.
OK 	//Or here feed reference location by command below: AT+CRFLOC="121.355882,31.218726"
AT+CGNSSAV=3,3 OK	//Set HTTP download mode and save EPO to FS
AT+HTTPINIT OK	//Init HTTP service
AT+HTTPPARA="CID",1 OK	//Set parameters for HTTP session
AT+HTTPPARA="URL","http://wepodownload.mediatek.com/EPO_GPS_3_1.DAT" OK	
AT+HTTPACTION=0 OK	//Get session start
+HTTPACTION: 0,200,27648	//Get successfully
AT+HTTPTERM OK	//Terminate HTTP service

AT+FSLS=C:\User	
Epo	
Gps_pos	//List EPO file
OK	
AT+CGNSCHK=3,1	
+CGNSCHK: 3,1,27648,64	//Check EPO file size and validation
OK	
AT+CGNSPWR=1	
OK	//Power on GPS
+CGNSPWR: 1	
	//Send EPO file to GPS
AT+CGNSAID=31,1,1	
OK	
+CGNSAID: OK	//EPO file has been written to GNSS buffer successfully
AT+CGNSINF	
+CGNSINF:	
1,1,20190110055020.000,31.221303,121.35	
5042,71.900,0.00,45.1,1,,1.0,1.3,0.8,,10,10,,,	//Read GPS location data
36,,	
OK	