SIM868_GNSS_AGPS_Application Note_V1.01

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Version history

Date	Version	Description of change	Author
2017-01-03	1.00	New version	Xiping.li
2018-09-25	1.01	Update all	Zhao.wang

Scope

This document is a reference for SIM868 GSM+GPS+GLONASS module which is based on MTK platform.

This document does not provide information about NMEA_0183 protocol.

1 Overview

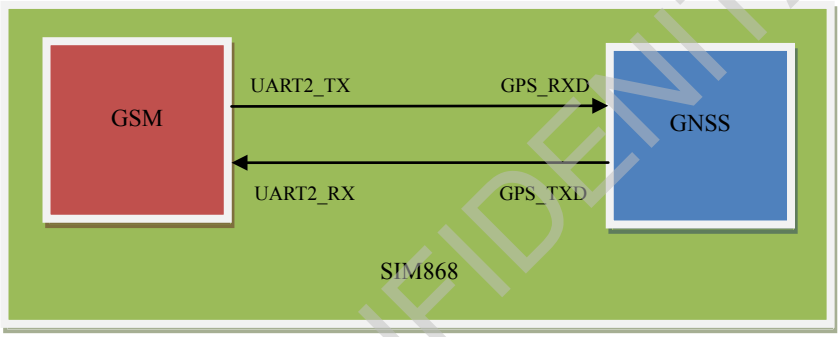
SIM868 supports 3 kinds of fixing technologies,

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.



2 EPO orbit prediction

2.1 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 local RTC time which could be shown by command "AT+CCLK? ".
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 is: http://wepodownload.mediatek.com/EPO_GPS_3_1.DAT

2.2 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.

2.3 EPO operation sample

In the "Grammar" columns of following tables, input of AT commands are in black, module return values are in blue.

Grammar	Description
AT+SAPBR=3,1,"CONTYPE","GPRS" OK	Set bearer parameter
AT+SAPBR=3,1,"APN","3GNET" OK	Set bearer context
AT+SAPBR=1,1	Active bearer context

OK	
AT+SAPBR=2,1 +SAPBR: 1,1,"10.1.60.86" OK	Read bearer parameter
AT+CNTPCID=1 OK	Set GPRS Bearer Profile's ID
AT+CNTP="202.112.29.82",32 OK	Set NTP service URL and local time zone ***Note: Here's 32 actually represent 32/4=8, which means that eight East region, Beijing.***
AT+CNTP? +CNTP: 202.112.29.82,32 OK	Read NTP server and time zone parameter
AT+CNTP OK +CNTP: 1	Synchronize Network Time to local ***Note: Reset NTP service URL and local time zone when it failed***
AT+CCLK? +CCLK: "18/09/25,16:33:15+32" OK	Read local time
AT+CGNSSAV=3,3 OK	Set HTTP download mode and save EPO to PS
AT+HTTPINIT OK	Init HTTP service
AT+HTTPPARA="CID",1 OK AT+HTTPPARA="URL","http://wepodownload.mediatek.com/EPO_GPS_3_1.DAT " OK	Set parameters for HTTP session
AT+HTTPACTION=0 OK +HTTPACTION: 0,200,27648	Get session start Get successfully
AT+HTTPTERM OK	Terminate HTTP service
AT+CGNSCHK=3,1 +CGNSCHK: 3,1,27648,64 OK	Check EPO file size and validation
AT+CGNSPWR=1 OK	Power on GPS
AT+CGNSAID=31,1,1	Send EPO file to GPS

OK +CGNSAID: OK	EPO file has been written to GNSS buffer successfully
AT+CGNSINF +CGNSINF: 1,1,20180925163521.000,31.221303,121.355042 ,71.900,0.00,45.1,1,,1.0,1.3,0.8,,10,10,,,36,, OK	Read GPS location data

3 SimFastFix function

3.1 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.

3.2 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 GNSAID action.

3.3 SimFastFix function sample

In the "Grammar" columns of following tables, input of AT commands are in black, module return values are in blue.

Grammar	Description
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,"10.6.85.39"	Read bearer parameter

OK	
AT+CNTPCID=1 OK	Set GPRS Bearer Profile's ID
AT+CNTP="202.112.29.82",32 OK	Set NTP service URL and local time zone ***Note: Here's 32 actually represent 32/4=8, which means that eight East region, Beijing.***
AT+CNTP? +CNTP: 202.112.29.82,32 OK	Read NTP server and time zone parameter
AT+CNTP OK +CNTP: 1	Synchronize Network Time to local
AT+CCLK? +CCLK: "18/09/25,16:45:10+32" OK	Read local time
AT+CLBS=1,1 +CLBS: 0,121.358992,31.219811,550 OK	Require LBS info, and module will update this info for reference location automatically. Or here feed reference location by command below: AT+CRFLOC="131.220240,21.359977"
AT+CGNSSAV=3,3 OK	Set HTTP download mode and save EPO to PS
AT+HTTPINIT OK	Init HTTP service
AT+HTTPPARA="CID",1 OK AT+HTTPPARA="URL","http://wepodownload.mediatek.com/EPO_GPS_3_1.DAT " OK	Set parameters for HTTP session
AT+HTTPACTION=0 OK +HTTPACTION: 0,200,27648	Get session start 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 OK	Check EPO file size and validation
AT+CGNSPWR=1 OK	Power on GPS
AT+CGNSAID=31,1,1 OK +CGNSAID: OK	Send EPO file to GPS EPO file has been written to GNSS buffer successfully
AT+CGNSINF +CGNSINF: 1,1,20180925164920.000,31.221303,121.355042 ,71.900,0.00,45.1,1,,1.0,1.3,0.8,,10,10,,,36,, OK	Read GPS location data

Appendix

A Related documents

SN	Document name	Remark
[1]	SIM800 Series_AT Command Manual	
[2]	SIM800 Series_GSM Location_Application Note	
[3]	SIM868 GNSS_Application Note	
[4]	SIM868_NMEA Message Specification	

B Terms and Abbreviations

Abbreviation	Definition
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

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