# LBS Customer Support Document

Release Note

Documentation Support

Common Platform

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### *MediaTek Inc.*

Postal address

No. 1, Dusing 1st Rd. , Hsinchu Science Park, Hsinchu City, Taiwan 30078

MTK support office address

No. 1, Dusing 1st Rd. , Hsinchu Science Park, Hsinchu City, Taiwan 30078

Internet

http://www.mediatek.com/

# Document Revision History

| Revision | Date | Author | Description |
|---|---|---|---|
| V1.0 | 2017-03-24 | Jason Su | Initial Release |
| V1.1 | 2019-12-18 | Jason Su | Update network location provider including change after Android Q codebase |
| V1.2 | 2020-02-13 | Archilis Wang | Add info about AGPS Configuration Files including auto_profile and carrier_xml |
| V 1.3 | 2020-03-05 | Jason Su | Add LBS module architecture |
| | | | |
| | | | |
| | | | |

# Table of Contents

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# Lists of Tables

# Lists of Figures

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# 1    Introduction

## 1.1    Purpose

This document provides the release information about GPS, AGPS, LocationEM and associated announcements. It describes how to get start with this release version of MTK GPS related Modules. This document also gives some reference documents you may need to read.

## 1.2    Scope

The document provides the release information, associated announcements and some basic features' introduction about the major version, what's new and what's changed in the minor version.

While it's not a design document or an user manual,  so the features' or the functions' details are not included in this documents. You can refer to the related design documents or user manual for more details.

Table 1-1 presents the reference information of the features which are mentioned but beyond the scope.

*Table 1-1. Reference Information beyond Scope*

| Modules | Reference information |
|---------|----------------------|
| Android | Android L and above |
|  |  |
|  |  |
|  |  |
|  |  |

## 1.3    Who Should Read This Document

This document is primarily intended for:

- Engineers who starts to work on the GPS, AGPS and LocationEM software.
- Engineers who needs to know the new features or new functions in this release version.
- Engineers who needs to know what is changed in this release version.
- Anyone wants to know the basic information about GPS, AGPS and LocationEM.

## 1.4    How to Use This Manual

This segment explains how information is distributed in this document, and presents some cues and examples to simplify finding and understanding information in this document. Table 1-2 presents an overview of the chapters and appendices in this document.

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*Table 1-2. Chapter Overview*

| # | Chapter | Contents |
|---|---------|----------|
| 1 | Introduction | Describes the scope and layout of this document. |
| 2 | References | Reference materials |
| 3 | LBS Technology Introduction | GPS, AGPS, and EPO technologies introduction |
| 4 | Environment Requirement | Android software environment requirements |
| 5 | LocationEM Introduction | LocationEM tool introduction |
| 6 | Network location | Network location function introduction |
| 7 | Build | Feature config setting before build load |
| 8 | Debugging | Debug skill introduction |
| 9 | How to use A-GPS | Trigger A-GPS operations. |
|   |          |          |

## 1.4.1    Terms and Conventions

This document uses special terms and typographical conventions to help you easily identify various information types in this document. These cues are designed to simply finding and understanding the information this document contains.

*Table 1-3. Conventions*

| Convention | Usage | Example |
|------------|-------|---------|
| [1] | Serial number of a document in the order of appearance in the References topic | Look up Chapter 2: System Architecture in [1] |
| void xx(zz) | Source code | static int __stdcall cb_download_bloader_init(void *usr_arg){} |
| ☞ | Important | |
|   |       |   |

# 2    References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

[1] Satellite navigation in WIKI, https://en.wikipedia.org/wiki/Satellite_navigation

[2]  Assisted GPS in WIKI, https://en.wikipedia.org/wiki/Assisted_GPS

# 3 LBS TECHNOLOGY Introduction
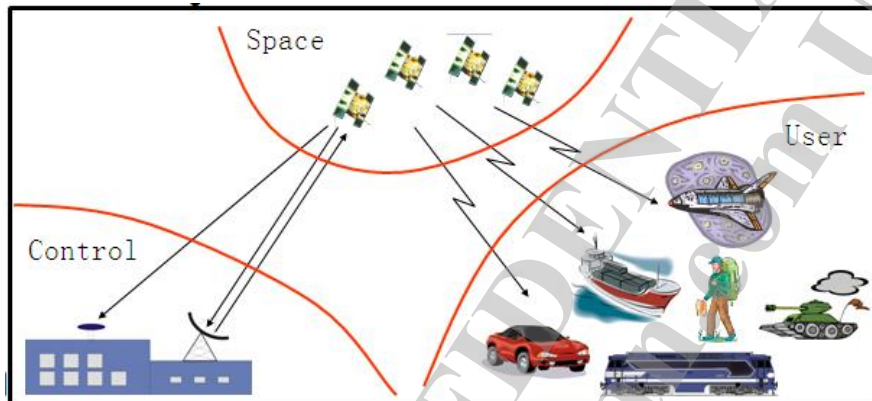
## 3.1 GPS (Global Positioning System)



*Figure 3-1 Segments of a GPS system*

The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their control stations. GPS uses these "man-made stars" as reference points to calculate positions accurate to a matter of meters. In a sense, it is similar to giving every square meter on the planet a unique address.

There are five control stations in the world, which are in Hawaii, Ascension Island, Diego Garcia, Kwajalein and Colorado Springs. They monitor the GPS satellites, checking both their operational health and the exact positions in space. The master ground station transmits corrections for the satellite's ephemeris constants and clock offsets back to the satellites themselves. The satellites can then incorporate these updates in the signals they send to GPS receivers.

GPS space constellation, the most important and complicated segment, is composed of 24 satellites which are located in 6 orbital planes. Each plane has a 55 degrees inclination angle with respect to the equator. Such overall arrangement makes every square meter on the planet observed by more than 4 satellites. In other words, GPS covers the planet seamlessly. 24 satellites are placed into the orbit by the U.S. Department of Defense. GPS was originally intended to design for military applications, but in the 1980s, the government made the system available for civilian use.

GPS user receivers have been miniaturized to just a few integrated circuits and so are becoming very economical, which makes the technology virtually accessible to everyone. These days GPS is finding its way into cars, boats, planes, construction equipment, movie-making gear, farm machinery and even laptop computers. GPS indeed has become a basic utility in smart telephones.

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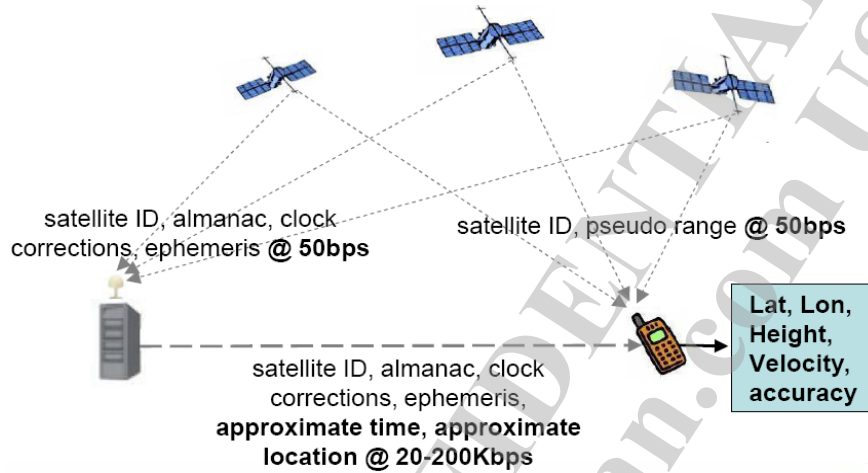
## 3.2 A-GPS (Assisted GPS)



*Figure 3-2 A-GPS topological model*

A-GPS stands for Assisted-GPS. This method uses GPS satellites to determine the position of a UE. It is termed as Assisted-GPS because the method varies from the original GPS in the way that the UE uses satellite information provided by reference GPS receiver located at the base station of the cellular networks.

- Helps calculating positions but cannot position itself alone
- Receives transparent mobile/communication network signals, even indoors or no open sky
- Via base stations which have gathered/computed assistance data ephemeris, almanac, etc. from satellites.
- Originally designed for emergency rescue of mobile communication

**A-GPS data paths**

1. Control plane:

   This approach sends data for A-GPS on the standard defined signaling control channel (thus termed as "control plane"), which is an inherent part of a network operator's mobile call distribution system. The goal of the control plane is to provide high-accuracy, high-availability location response to emergency service providers. The positioning capability has to handle location requests that can come at any time from any environment, and no prior events can be assumed.

2. User plane:

The user plane is generally TCP/IP based to support location services. The user plane is designed to provide enhanced handiness, e.g. speed, accuracy, ease of entry to location information in non-emergency use, for users. The solution is called a "user plane" due to the location-related signaling, both at the service level and the positioning level, appears simply as the user data to the wireless network. In general, the traffic is all carried over IP bearers.

**A-GPS working modes**

1. UE-assisted:

   The UE assists the network in calculating its location and provides the network with the necessary location information it possesses.

   - UE requires assistance data for each positioning session.
   - UE takes raw measurements of GPS signals from all visible satellites and provides them back to the network (SMLC).
   - SMLC computes location of the UE-based on GPS signal measurements
   - Typically used for emergency-type services

2. UE-based:

   The UE obtains the data for calculating the location from the network and calculates its location on its own.

   - UE requires periodic assistance data from the network (SMLC).
   - UE contains ability to compute its own location and may report back to the network in certain modes.
   - Typically used for commercial services

**Types of location requests**

- Network Induced Location Request (NI-LR): A typical location request used in an emergency call
- Mobile Terminated Location Request (MT-LR): A location request used by the network for supplementary services
- Mobile Originated Location Request (MO-LR): A location request initiated by the mobile for identifying its own location and may be obtained location-based services or navigation information

**Specifications to refer to for A-GPS related information**

- 3GPP_34.171
- 3GPP_34.123
- 3GPP_25.331

- 3GPP_51.010
- 3GPP_44.031
- OMA_AD_SUPL_V1.0
- OMA_TS_ULP_V1.0
- OMA_RD_SUPL_V1.0
- OMA_ETS_SUPL_V1.0
- OMA_AD_SUPL_V2.0
- OMA_TS_ULP_V2.0
- OMA_RD_SUPL_V2.0
- OMA_ETS_SUPL_V2.0

Download link for 3GPP: http://pda.etsi.org/pda/queryform.asp

Download link for OMA SUPL: http://openmobilealliance.org/Technical/current_releases.aspx

We currently support both 2G/3G/4G CP and SUPL V1.0./V2.0

### 3.2.1    A-GLONASS

GLONASS is one of Global Navigation Satellite System(GNSS) which include GPS, Galileo, GLONASS, BeiDou, QZSS and so on. It is a space-based satellite navigation system operated by the Russian Aerospace Defence Forces. And it provides an alternative to Global Positioning System (GPS) and is the only alternative navigational system in operation with global coverage and of comparable precision.

A-GLONASS stands for Assisted- GLONASS. Just like A-GPS, Device uses GLONASS satellite assistance data from network to accurate satellites signal acquisition and so a faster TTFF can be obtained. MTK provide a full solution for A-GLONASS which is compatible with A-GPS. Device can use both A-GPS and A-GLONASS at same time to assist location fixing. User can get more benefit for TTFF and location accuracy from the solution, especially in challenge environment like build-side window-in-side, or high latitudes area.

### 3.2.2    LPP

The standard positioning methods supported for E-UTRAN access are:

- Network-assisted GNSS methods (A-GNSS)

- Downlink positioning (OTDOA)

- Enhanced cell ID method (eCID)

- Uplink positioning (UTDOA)

For UE/network supporting one or more positioning methods mentioned above, a positioning protocol LPP is introduced. LPP (LTE Positioning Protocol) is a point to point positioning protocol with capabilities similar to those in UMTS RRC and GERAN RRLP. Whereas RRLP supports positioning of a target MS accessing GERAN and RRC supports positioning of a target UE accessing UTRAN, LPP supports positioning and location related services for a target UE accessing E-UTRAN.

Similar to RRLP/RRC, LPP also support OMA user plane location solution SUPL 2.0 through LPP payload within SUPL message.

Via LPP protocol, location server in E-UTRAN can enquiry UE's positioning capabilities, provide assistance data, and request UE to provide location information.

**Specifications to refer to for LPP related information**

- 3GPP_24.171
- 3GPP_23.271
- 3GPP_36.305
- 3GPP_36.355
- 3GPP_37.571

## 3.3 EPO (Extended Prediction Orbit)

EPO (Extended Prediction Orbit) is one of MediaTek's innovative proprietary off-line server based A-GPS solution. It can support up to 30 days satellite orbit predictions to customers and users. Greatly enhances GPS user experience by improving Time To First Fix (TTFF).

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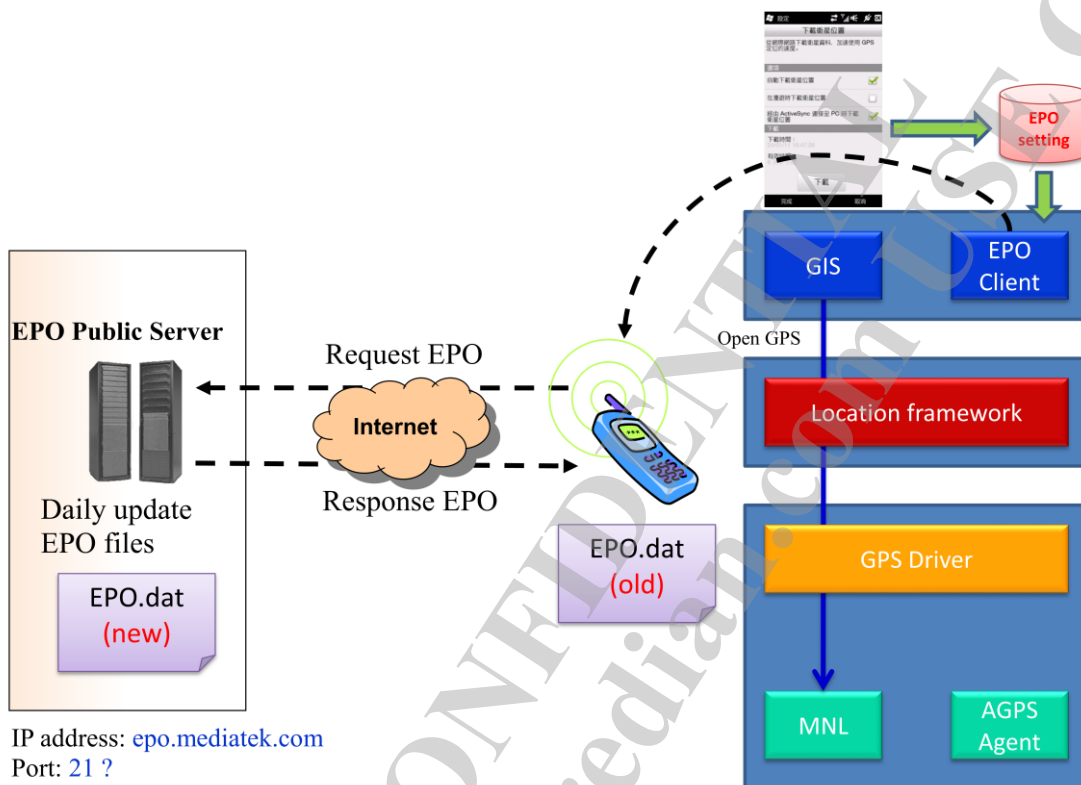
*Figure 3-3 EPO Client Architecture*

Mediatek provides a FTP server that updates the EPO.dat everyday. If end user wants to use this feature, he/she uses the EPO user interface to do the update action. After success to download the EPO.dat from server, EPO client will also notify the GPS driver. And GPS driver will update it to specific place for future use. Then end user can have good TTFF for GPS performance in some of scenarios.

# 4 Environment Requirements

This document is applies to Android OS Lollipop or newer version with MTK hardware.

# 5    MTK LBS Architecture
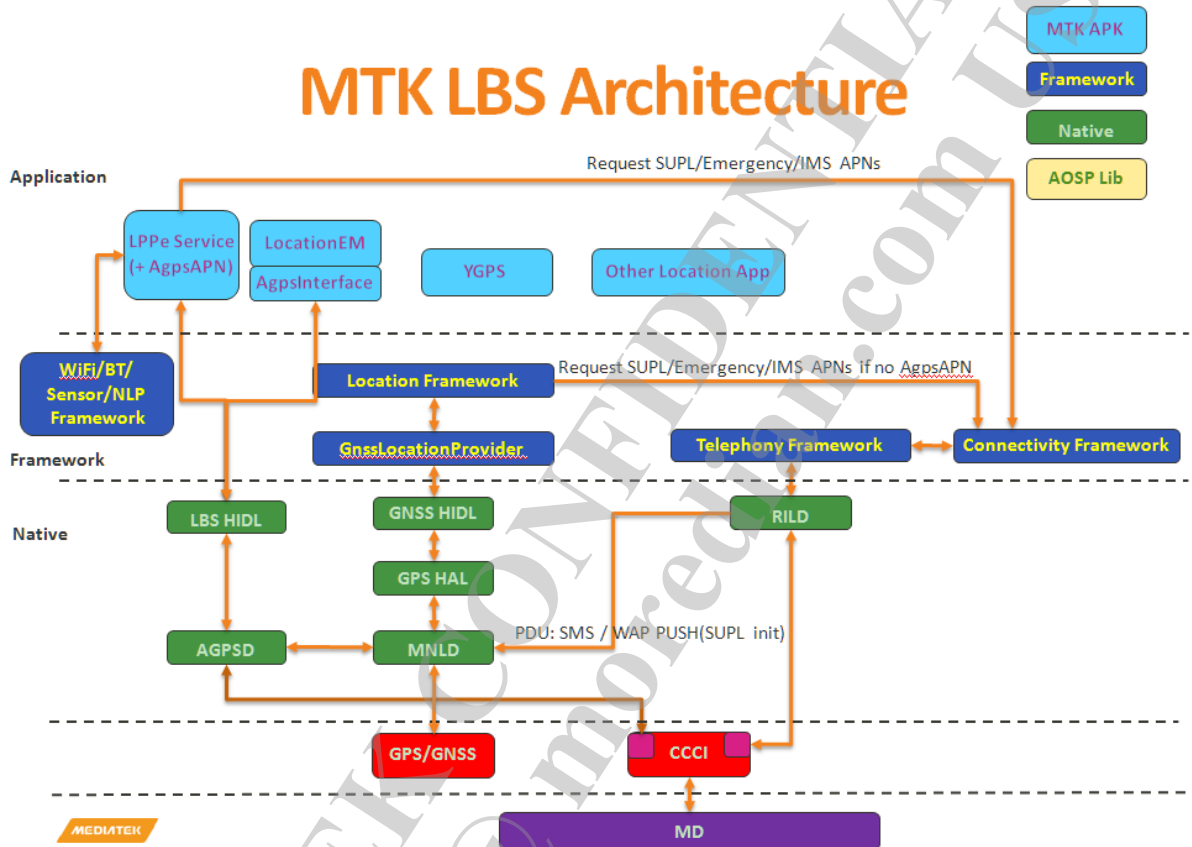


Above diagram shows the LBS modules architecture on Android Q.

# 6 LocationEM Introduction

## 6.1.1 Location Access

SETTINGS → LOCATION



(1) Location Mode

(2) Recent Location Requests

(3) Location Services
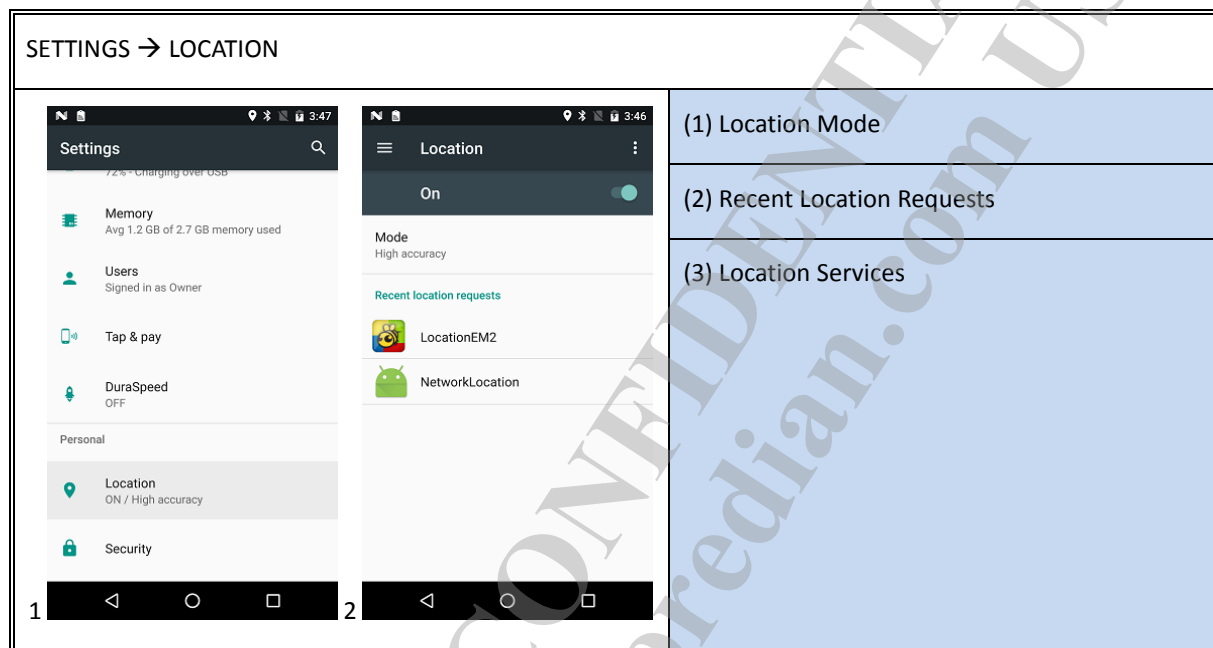
**(1) Location Mode**

Provide three modes to control the location provider source by power level; different combination case by GPS provider and Network provider. For "High Accuracy" mode: Enable both GPS provider and Network provider; for "Battery saving": Enable Network provider only; and "Device only" mode: Only enable GPS provider. From Top-Right corner button can control all source to {On/Off} mode. If you disable it all providers will be disabled.

**(2) Recent Location Requests**

Record the location request history by App monitor service. And it will display Applications' name who request the location.

**(3) Location Services**

It is a location setting service which can be created in it self's ServiceSettingInject method. This service can show some notes for user and click it to launch its location setting.

## 6.2  Engineer Mode

### 6.2.1  GPS

| GPS | | |
|---|---|---|
|  | (1) GPS | |
| | | GPS (OFF) |
| | | GPS (ON) |
| | (2) Delete/ GPS MODE | |
| | | Hot |
| | | Warm |
| | | Cold |
| | | Full |
| | (3) Ref Position | |
| | | Reference latitude |
| | | Reference longitude |
| | (4) Stress Test | |
| | | Stress Test (OFF) |
| | | Stress Test (ON) |
| | (5) Timer | |
| | (6) Location Fix | |
| | (7) Satellite Information | |
| | | PRN |
| | | SNR |
| | | AZI |

| | | ELE |
|---|---|---|
| | | Used in fixed |
| | (8) NMEA Log | |
| | (9) Stress Test Settings | |
| | | Number of fix |
| | | Delay before starting GPS |
| | | Delay before deleting data |
| | | Session Timeout |
| | | Delay before stopping GPS |
| | | Delete aiding data first |

**(1) GPS**

Turn on or off GPS.

**(2) Delete / GPS Mode**

Send the deleting aiding data command to GPS chip for performance test.

The aiding types sent to GPS chip are based on which reset type (hot, warm, cold, full, etc.) you selected in GPS Mode.

**(3) Ref Position**

Set a reference position for calculating the distance between GPS fix and reference location. the unit is meter and the distance will be shown when Location fix is coming.

**(4) Stress Test**

Start or stop the GPS stress test. The executing flow is controlled by the stress test settings.

**(5) Timer**

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The timer will be counted while GPS is enabled. The unit of timer is second.

### (6) Location Fix

When GPS chip can produce the fix, you can see any location information like as latitude, longitude UTC time, altitude, accuracy, bearing, speed, distance, TTFF, first latitude, first longitude and first distance.

### (7) Satellite Information

Display the current satellite information including PRN (pseudo-random number), SNR (signal to noise ratio for the satellite), AZI (the azimuth of the satellite in degrees), and ELE (the elevation of the satellite in degrees) searched by GPS chip.
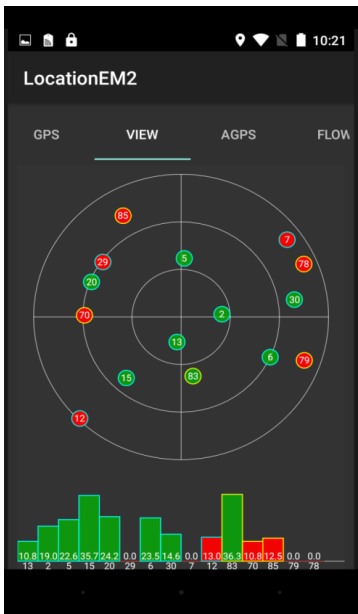
### (8) NMEA Log

Display the NMEA string reported by GPS driver.

### (9) Stress Test Setting

Tester can control the stress test flow using these configurations.

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## 6.2.2     VIEW

| VIEW | |
|------|---|
|  | (1) GPS View |
| | (2) Signal Strength |
| | (3) Used in Fixed |

**(1) GPS View**

From this page, user can know the position of each satellite. Support Multi-Satellites displayed with difference color.

*Table 5-1 Satellites System Color*

| Satellites system | Color |
|-------------------|-------|
| GPS(GP) | Cyan(0xff000000) |
| Glonass(GL) | Yellow(0xffffff00) |
| Beidou(BD) | Blue(0xff0000ff) |

**(2) Signal Strength**

From this page, user can know the signal strength of each satellite.

**(3) Used in Fixed**

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When the satellite is used in fixed by GPS module, it will be marked by green color. Otherwise, it will be marked by red color.

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## 6.2.3　AGPS

| A-GPS | | |
|---|---|---|
| | Last A-GPS Profiling Info | |
| | Enable A-GPS | |
| | CP and UP switching(SI only) | User Plane/Control Plane |
| | CDMA Settings | WCDMA Prefer/CDMA Force |
| | SUPL Settings | |
| | UP Pref Method(SI only) | MSA / MSB / No Prefer |
| | UP Pos Technology | MSA/MSB/ECID/Autonomous/AFLT |
| | UP Pos Protocol | LPP |
| | SUPL Version | SUPL1.0/SUPL2.0 |
| | TLS version | 1.0/1.1/1.2 |
| | Certificate Verification | |
| | UDP Enable | |
| | Change SUPL UT2 TIME | |
| | Change SUPL UT3 TIME | |
| | SUPL VER MINOR | |
| | SUPL VER SERIND | |
| | SLP Template | |
| | | SLP address |
| | | SLP port |
| | | TLS Enable |

| | |
|---|---|
| Periodic Settings | |
| Area Settings | Entering/Inside/Outside/Leaving |
| Show SI QoP Editor | |
| | Accuracy Unit |
| | Horizontal Accuracy |
| | Vertical Accuracy |
| | Location Age |
| | Delay |
| Control Plane Settings | |
| | MOLR Position Method |
| | External Address |
| | MLC Number |
| | EPC MOLR PDU Enable |
| Feature Enabler | |
| | Allow Network Initiated Request |
| | Allow Roaming |
| | CP auto Reset |
| | Log SUPL to File |
| | Log Sensitive Data |
| | Allow AGPS Certification From SD Card |
| | Allow Auto Configuring SUPL Profile Based on Current PLMN |
| | Allow SUPL dedicated APN |

LPPe CP Enable
LPPe UP Enable
AOSP Profiling Enable
Use NLP Settings To Supl
LBS Log Enable

TCP Keep Alive    4

**GNSS Settings**
SIB8/SIB16 Enable
A-GLONASS Enable
A-Beidou Enable
A-Galileo Enable

**Reset To Default**

RESET TO DEFAULT

| | | |
|---|---|---|
| | | Sync AGPS Setting to SLPD |
| | | Allow valid IMSI in SUPL messages |
| | | Show GPS Icon during Network Initiated Session |
| | | LPPe Disable Crowd-Source Location |
| | | LPPe CP Enable |
| | | LPPe UP Enable |
| | | AOSP Profiling Enable |
| | | Use NLP Settings To Supl |
| | | LBS Log Enable |
| GNSS Settings | | |
| | | SIB8/SIB16 Enable |
| | | A-GLONASS Enable |
| | | A-Beidou Enable |
| | | A-Galileo Enable |
| Reset To Default | | |
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|---|---|---|
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**Last A-GPS Profiling Info**

Display last time stamp of AGPS operation, show message transfer between modern, GPS and AGPS.

**Enable A-GPS**

Enable or disable A-GPS functionality.

**CP and UP switching(SI only)**

Choose which signaling method for A-GPS you would like to run. The default value is UP mode.

**CDMA Setting**

when CDMA network and WCDMA network are available, which AGPS protocol you prefer?

**SUPL Settings**

Configure the SUPL protocol settings

**UP Pref Method(SI only)**

Choose one of A-GPS operation modes prefer to MSA , MSB or No Prefer. The options will appear when chose "User Plane".

**UP Pos Technology**

Enable DUT to enable UP position method of MSA , MSB. The options will appear when chose "User Plane".

**SUPL Version**

Chose UP session as SUPL1.0 or 2.0 protocols.

**TLS version**

Chose TLS connect versions of 1.0, 1.1 or 1.2.

**Certificate Verification**

Enable or disable the certificate verification. The default value is disabled

**UDP Enable**

Enable UDP port listen to monitor NI request form Network

**Change SUPL UT2 TIME**

customize the SUPL UT2 timer

**Change SUPL UT3 TIME**

customize the SUPL UT3 timer

**SUPL VER MINOR**

auto configure the minor of supl_version if above mcc_mnc condition is met

**SUPL VER SERIND**

auto configure the service indicator of supl_version if above mcc_mnc condition is met

**SLP Template**

Quick chose SLP template setting to "SLP Address" & "SLP Port", Include [Google], [Google noTLS], Google IP], [Spirent] , [Rns], [CMSS Lab], [Andrew], [Ericsson], [Ericsson FQDN] , [ORAGNE], [CMCC], [Telstra], [Chunghwa], [T-Mobile], [Vodafone]

**SLP address**

Display the current SLP address

**SLP port**

Display the current SLP port.

**TLS  Enable**

Enable the connection with TLS

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**Periodic Settings**

Periodic relative operator.

**Periodic Start**

Start a Periodic Triggered Session

**Abort**

Abort a triggered session. That will stop the on-going trigger session if exists.

**Area Settings**

Configure the SI Area Event parameters.

 Start an Area Triggered Session or Abort a triggered session. That will stop the on-going trigger session if exists

**Entering area**

The SET reports to the SLP when it first detects that it is inside the predefined area. If repeated reporting is present, the SET then reports once more for each time it detects that it has re-entered the predefined area after having left in the meantime.

**Inside Area**

The SET reports to the SLP when it is within the predefined area.

**Outside Area**

The SET reports to the SLP when it is outside the predefined area.

**Leaving Area**

The SET reports to the SLP when it first detects that it is outside the predefined area. If repeated reporting is present, the SET then reports once more for each time it detect that it has exited the predefined area after having been inside again.

**Show SI QoP Editor**

Show the Quality of position setting

**Accuracy Unit**

Display the different unit of the horizontal accuracy and the vertical accuracy.

**Horizontal Accuracy**

The Horizontal accuracy is one of SUPL QoP (Quality of Position) parameters.

**Vertical Accuracy**

The Vertical accuracy is one of SUPL QoP (Quality of Position) parameters.

**Location Age**

The Location Age is one of SUPL QoP (Quality of Position) parameters.

**Delay**

The Delay is one of SUPL QoP (Quality of Position) parameters.

**Control Plane Settings**

All of Control Plane settings can be changed here.

**MOLR Position Method**

Choose one of CP MOLR position method such as "Location Estimate" or "Assistance Data". The default value is "Location Estimate".

**External Address**

Enable or disable the forwarding external address.

**MLC Number**

Enable or disable the forwarding MLC (Mobile Location Center).

**EPC MOLR PDU Enable**

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Enable it only at LPP CP doing MOLR, AGPS will Inject Payload from configure fie to tell server the DUT's capability

### Feature Enabler

All of features option can be changed here.

### Allow Network Initiated Request

Enable or disable whether to handle the SUPL NI or CP MTLR. If this option is disabled and SUPL NI or CP MTLR is coming, this session will be rejected.

### Allow Roaming

Enable or disable the A-GPS while the device is under roaming. If this option is disabled, the A-GPS will not be run under the roaming case.

### CP auto Reset

Enable or disable CP auto Reset, it's only for MTK internal use. For default case, don't enable it.

### Log SUPL to File

For CMCC requirement, it can output the specific the SUPL message to a file. The path is "/data/agps_supl/log". If the SD-Card is available, the path will be changed to "/sdcard".

### Log Sensitive Data

Remove/allow agps daemon's log with sensitive info (e.g., the current location)

### Allow AGPS Certification From SD Card

Enable the feature, agpsd will load the certificates from device's storage at /sdcard/agps/cacerts

### Allow Auto Configuring SUPL Profile Based on Current PLMN

### Allow SUPL dedicated APN

Enable/disable the dedicated SUPL APN flow

**Sync AGPS Setting to SLPD**

Sync the AGPS setting (ex: SUPL profile, SUPL version, TLS version) from AGPSD to SLPD in runtime

**Allow valid IMSI in SUPL messages**

Enable/disable the valid IMSI in SUPL messages

**Show GPS Icon during Network Initiated Session**

Enable/disable showing GPS icon during E911 location

**LPPe Disable Crowd-Source Location**

Enable/disable LPPe's crowd source location (ex: network location)

**LPPe CP Enable**

Enable/disable CP LPPe functionality

**LPPe UP Enable**

Enable/disable UP LPPe functionality

**AOSP Profiling Enable**

Enable/disable the supl profile configuration from GnssLocationProvider via native_set_agps_server "Auto Configuring SUPL Profile" will be ignored when this option is checked because AOSP Location Framework can load SUPL_HOST and SUPL_PORT from framework resource for different MCC/MNC

**Use NLP Settings To Supl**

Enable/disable to bind nlp setting to SUPL SI flow

**LBS Log Enable**

Enable/disable lbs log to the debugging port

**SIB8/SIB16 Enable**

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Enable/disable SIB8/SIB16

**A-GLONASS Enable**

Enable/disable Glonass aiding if hardware can support A-Glonass

**A-Beidou Enable**

Enable/disable Beidou aiding if hardware can support A-Beidou

**A-Galileo Enable**
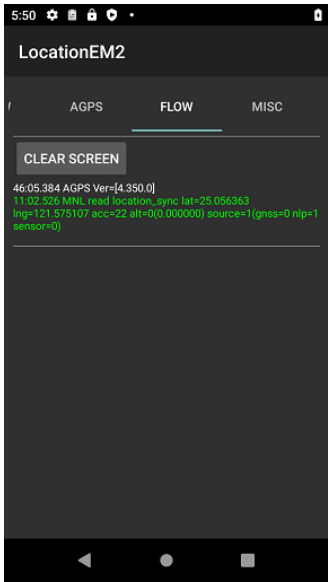
Enable/disable Galileo aiding if hardware can support A-Galileo

**Reset to Default**

The button can help to reset all of A-GPS settings to the default values

### 6.2.4    FLOW

| FLOW | | |
|---|---|---|
|  | (1) Clear Screen | |
| | | (2) Log Display |
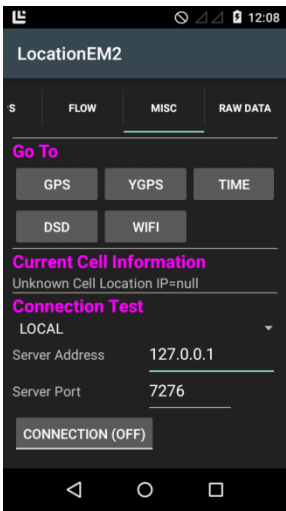
**(1)Clear Screen**

Clear the logs which display on screen

**(2)Log Display**

Output the log from AGPS process show how progress it is.

## 6.2.5    MISC

| MISC | | |
|---|---|---|
|  | (1) Go To | |
| | | GPS |
| | | YGPS |
| | | TIME |
| | | DSD |
| | | WIFI |
| | (2) Current Cell Information | |
| | | mccMnc, lac, cid |
| | | IP |
| | Connection Test | |
| | | (3) Server Address |
| | | (4) Server Port |
| | | (5) Connection |
| | | (6) Connection Result |

**(1) Go To**

They are the convenient buttons for jumping to the specific activity.

GPS → Location services

YGPS → YGPS

TIME → Date & time services

DSD → Data service diagnostic

WIFI → Wi-Fi settings

**(2) Current Cell Information**

Show the current cell information and IP address.

**(3) Server Address**

Input a server address you want to test.

**(4) Server Port**

Input a server port you want to test.
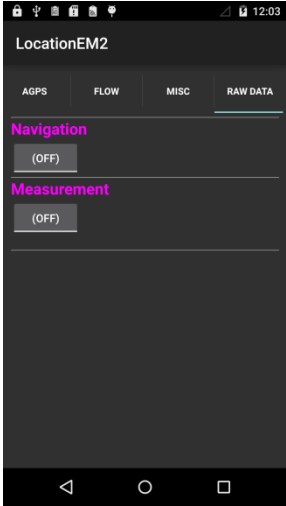
**(5) Connection**

Start or stop the connection test.

**(6) Connection Result**

Show the server connection result including the timestamp, DNS query, success result or the reason of the connection failure.

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## 6.2.6　Raw Data

| RAW DATA | | |
|---|---|---|
| | (1) | |
| | | Navigation |
| | | Measurement |
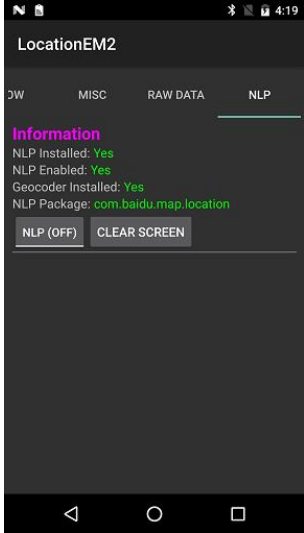
**(1) Navigation**

Start/Stop query raw data message about GPS Navigation.

**(2) Measurement**

Start/Stop query raw data message about GPS Measurement.

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## 6.2.7　　NLP

| RAW DATA | | |
|---|---|---|
| | (1) | |
| | | NLP |
| | | Clear Screen |

**(1) NLP**

Start/Stop network location update request to location framework.

**(2) Clear Screen**

Clear the network location reported messages.

# 7 Network location

## 7.1 Network location providers

Beside GPS, mobile device platform can provide location fix service by network based information. The mobile system collects device network status parameters such as Wi-Fi MAC address or mobile cell info, and sends to network location service server. By database queries in server site, it sends back the location position to client device. The client application called "network location provider" is a service of mobile device, which collects device information and handles the communications with remote network location server. Currently, Android devices may support network location fixing by installing Google GMS package or 3rd party network location provider. The Google network location provider is one service of GMS package. MTK turnkey load has default pre-installed Baidu network location provider before Android P. The Baidu NLP package is in the following path:

- alps/vendor/mediatek/proprietary/binary/3rd-party/free/Baidu_Location  (Android L)
- alps/vendor/mediatek/proprietary/packages/3rd-party/Baidu_Location  (Android M)
- alps/vendor/mediatek/proprietary/packages/3rd-party/LBS/Baidu_NLP  (Android N, O, P)
- No 3rd party NLP package is included (Android Q and after)

After Android Q MTK released codebase won't include any 3rd party network location provider package. OEM customer should license the package from network location provider vendors.

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## 7.2 Enable Network location

SETTINGS → LOCATION
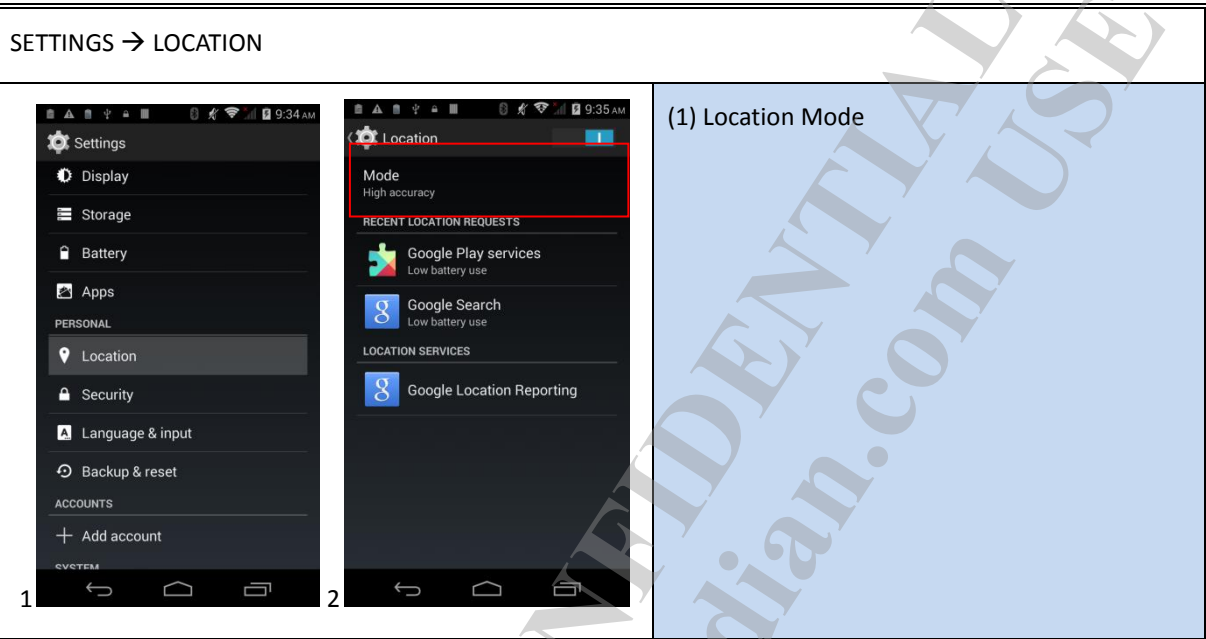


(1) Location Mode

**Location Mode**

To enable the network location fix service, select either "High accuracy" (both GPS and network provider) or "Battery saving" (network provider only).

- This option is phased out from Android P.

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## 7.3  Change Network location providers

OEM customers may use another 3<sup>rd</sup> party network location provider e.g. AutoNavi to replace default Baidu NLP. Customer may follow the following steps to set another vender's NLP.

1. Put 3<sup>rd</sup> party NLP package into codebase, you may refer to Baidu NLP package path:
    a. alps/vendor/mediatek/proprietary/packages/3rd-party/LBS/Baidu_NLP  (Android N and later)
2. Update alps/device/mediatek/common/device.mk to build NLP package.
    a. Change the package name of Baidu_Location to other 3<sup>rd</sup> party NLP package name.
3. Update system configuration at:
    a. alps/vendor/mediatek/proprietary/frameworks/base/res/res/values/config.xml
    b. Replace Baidu NLP java package name "com.baidu.map.location" by other 3<sup>rd</sup> party NLP java package name.
4. Rebuild the load.

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# 8    Build

## 8.1   How to Switch On/Off A-GPS Features

In order to dynamically switch on/off A-GPS, the Android build system provides optional tags of configuration (MTK_GPS_SUPPORT, MTK_AGPS_APP) for you to customize the features. "Switch off" means A-GPS MMI menus will not appear in the menu list of the user mode and engineer mode. Related modules mtk_agps, libagpssupl.so and libssadp.so will not be generated or included into system.img. (If the modules already exist, use only the remake command to build the project.)

Due to the reason that A-GPS cannot work without GPS, we set up dependency of AGPS and GSP for your convenience to switch A-GPS.

- If you set MTK_GPS_SUPPORT = no, MTK_AGPS_APP also has to be set to "no". Otherwise, the project building will stop to show error messages indicating that AGPS cannot switch without the GPS support, and only setting up MTK_AGPS_APP to "no" can the building be passed without errors.
- If you set MTK_GPS_SUPPORT = yes, MTK_AGPS_APP can be set to "yes" or "no".

All the dependency functions above are integrated into the Android building system. See the instructions below for how to switch on/off A-GPS.

- Switch on A-GPS

  Set MTK_GPS_SUPPORT = yes and MTK_AGPS_APP = yes in device.mk

- Switch off A-GPS

  Set MTK_AGPS_APP = no in device.mk

## 8.2   A-GPS Configuration Files

The purpose of A-GPS configuration files are for customers to customize the A-GPS behavior.

Here are the path info about our A-GPS configuration files.

*Table 8-1. Path in Codebase*

| Android Version | Path |
|---|---|
| 4.4.2  (KK2) | alps/mediatek/frameworks/base/agps/etc/agps_profiles_conf.xml |
| 5.0 (L) | alps/vendor/mediatek/proprietary/frameworks/base/agps/etc/agps_profiles_conf2.xml |
| 6.0 (M) ~ 10.0 (Q) | alps/device/mediatek/common/agps/agps_profiles_conf2.xm |
| 10.0 (Q) with Split Build Enabled (e.g., q0.mp1) | alps/device/mediatek/vendor/common/agps/agps_profiles_conf2.xml |
| 11.0 (R) | alps/device/mediatek/vendor/common/agps/agps_profiles_conf2.xml<br>alps/device/mediatek/vendor/common/agps/carrier/agps_profiles_conf2_carrier_*.xml |

*Table 8-2. Path in Device (ODM Default Values)*

| Android Version | Path |
|---|---|
| 4.4.2 (KK2) ~ 6.0 (M) | /etc/agps_profiles_conf2.xml |
| 7.0 (N) ~ 10.0 (Q) | /vendor/etc/agps_profiles_conf2.xml |
| 11.0 (R) | /vendor/etc/gnss/agps_profiles_conf2.xml<br>• Provide the default of common values<br>• It also contains the definition of carrier_mapping.<br>• Absent items will use values from mtk_agpsd's init function<br>• Called original xml<br>/vendor/etc/gnss/carrier/agps_profiles_conf2_carrier_*.xml<br>• Provide the special values for a carrier<br>• Absent items will use values from original xml<br>• Called carrier xml |

*Table 8-3. Path in Device (after edited by LocationEM, auto-config or ODM tools)*

| Android Version | Path |
|---|---|
| 4.4.2 (KK2) ~ 6.0 (M) | /data/agps_supl/agps_profiles_conf2.xml |
| 7.0 (N) ~ 10.0 (Q) | /data/vendor/agps_supl/agps_profiles_conf2.xml |
| 11.0 (R) | /data/vendor/agps_supl/agps_profiles_conf2.xml<br>• Called current xml<br>/data/vendor/agps_supl/agps_profiles_conf2_prv.xml<br>• Backup for the common values<br>before using the special values for a carrier<br>• We will load it when the (MCC,MNC) of the IMSI does not in<br>carrier_mapping.<br>• Called prv xml. |

The layout of a AGPS configuration XML file is like the following table.

*Table 8-4. Layout in XML*

| &lt;mtk_agps_profiles&gt; | The root element for the XML file |
|---|---|
| &lt;cur_supl_profile /&gt; | The current activated supl profile |
| &lt;supl_profile /&gt;<br>:<br>&lt;supl_profile /&gt; | The list of inactivated supl_profiles is to define the list of SLP Template in LocationEM |
| &lt;cdma_profile /&gt; | ▪ Provide options for 3GPP2 A-GPS behavior<br><br>▪ For internal test, not for real network |
| &lt;agps_setting /&gt; | Provide options for MTK A-GPS Daemo |
| &lt;gnss_setting /&gt; | ▪ Provide options for GNSS module<br><br>▪ Send them to MNLD (MTK Navigation Layer Daemon) |

| <mtk_agps_profiles> | The root element for the XML file |
|---|---|
| <cp_setting /> | ▪ Provide options for 3GPP Control Plane A-GPS behavior<br><br>▪ Send them to the LBS module of our 3GPP Modem |
| <up_setting /> | ▪ Provide options for User Plane A-GPS behavior<br><br>▪ Send them to the SUPL Task in MTK A-GPS Daemon |
| <carrier_mapping><br>  <mcc_mnc /><br></carrier_mapping><br>  :<br><carrier_mapping><br>  <mcc_mnc /><br></carrier_mapping> | Each carrier_mapping defines the mapping from a set of mcc_mnc to a carrier name.<br><br>This part is supported from Android 11.0<br><br>Only the original xml can support carrier_mapping. |
| </mtk_agps_profiles> | |

The detail configurations are as below:

**mtk_agps_profiles**

| Attribute | example | Description |
|---|---|---|
| maj_ver | "1" | Major version for the XML file |
| min_ver | "2" | Minor version for the XML file |
| carrier_xml_enable | "false" | "false": disable the carrier xml **(default)**<br>"true": enable the carrier xml<br>This is supported from Android 11.0 (R).<br>Only the original xml can support this option. |

Example:

```
<mtk_agps_profiles   maj_ver="1"   min_ver="2"   carrier_xml_enable="true">
```

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## supl_profile

| Attribute | example | Description |
|---|---|---|
| name | "China Mobile AGPS server" | SLP name will be displayed on LocatioEM2 - SLP Template list |
| addr | "221.176.0.55" | SLP's IP address |
| port | "7275" | SLP's port number |
| tls | "true" | "false": disable TLS connection<br><br>"true": enable TLS connection **(default)** |
| mcc_mnc | "22010" | auto configure the supl_profile if the current MCC and MNC on DUT are the same as mcc_mnc paramter you specified |
| supl_version | "1" | x of SUPL x.y.z<br><br>"1": SUPL1.0 **(default)**<br><br>"2": SUPL2.0 |
| supl_ver_minor | "0" | y of SUPL x.y.z |
| supl_ver_ser_ind | "0" | z of SUPL x.y.z |
| tls_version | "0" | "0": TLS1.0 **(default)**<br><br>"1": TLS1.1<br><br>"2": TLS1.2 |
| sha_version | "0" | "0": SHA1 for SUPL1.0 and SHA256 for SUPL2.0 **(default)**<br><br>"1": SHA1 for SUPL1.0 and SUPL2.0<br><br>"2": SHA256 for SUPL1.0 and SUPL2.0 |
| esupl_apn_mode | "0" | "0" to use Emergency / IMS APN if they are available as GSMA IR92 **(default)**<br><br>"1" to use Emergency APN if it is |

|  | available | |
|---|---|---|
|  | "2" to use IMS APN if it is available | |
|  | "3" not to use Emergency / IMS APN, just as a normal supl | |
| app_id | "ap0004" | This attribute is used to DM3.0 |
| provider_id | "221.176.0.55" | This attribute is used to DM3.0 |
| default_apn | "CMCC WAP" | This attribute is used to DM3.0 |
| optional_apn | "CMNET" | This attribute is used to DM3.0 |
| optional_apn_2 | "" | This attribute is used to DM3.0 |
| address_type | "IPv4address:port" | This attribute is used to DM3.0 |

Example:

```
<!-- CMCC-->
<supl_profile name="CMCC"
    addr="221.176.0.55"
    port="7275"
    tls="true"
    app_id="ap0004"
    provider_id="221.176.0.55"
    default_apn="CMCC WAP"
    optional_apn="CMNET"
    optional_apn_2=""
    address_type="IPv4address:port"
/>
```

**agps_setting**

| Attribute | Example | Description |
|---|---|---|
| agps_enable | "yes" | Whether to enable A-GPS when device first boot up |

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| | | |
|---|---|---|
| | | "no": don't enable A-GPS |
| | | "yes": enable A-GPS |
| agps_protocol | "0" | "0" : User Plane **(default)** |
| | | "1" : Control Plane |
| gpevt | "false" | Enable GPEVT message forwarding function. Default: False |
| e911_gps_icon_enable | "false" | "false": disable showing GPS icon during E911 location **(default)** |
| | | "true": enable showing GPS icon during E911 location |
| e911_open_gps | "false" | "false": disable opening GPS earlier when E911 call is dialed **(default)** |
| | | "true": enable opening GPS earlier when E911 call is dialed |
| tc10_ignore_fw_config | "false" | "false": disable TC10's configuration from location framework **(default)** |
| | | "true": enable TC10's configuration from location framework |
| lppe_network_location_disable | "false" | "false": disable LPPe's crowd source location **(default)** |
| | | "true": enable LPPe's crowd source location |
| agps_nvram_enable | "true" | "false": disable AGPS NVRAM functionality |
| | | "true": enable AGPS NVRAM functionality **(default)** |
| lbs_log_enable | "false" | "false": disable tc10 lbs log to the debugging port |
| | | "true": enable tc10 lbs log to the debugging port **(default)** |
| lppe_crowd_source_confident | "90" | determine how confident you would like to fill in LPPe HA3D Position for crowd source location. |
| | | available value: "0" ~ "90". |

| | | And "90" is the **default** |
|---|---|---|
| ignore_si_for_e911 | "true" | "false": disable ignoring MOLR / SI for Emergency Call **(default)** |
| | | "true": enable ignoring MOLR / SI for Emergency Call |

Example:

```
<agps_setting
  agps_enable="true"
  agps_protocol="0"
  gpevt="false"
  e911_gps_icon_enable="false"
  e911_open_gps="false"
  tc10_ignore_fw_config="false"
  lppe_network_location_disable="false"
  agps_nvram_enable="true"
  lbs_log_enable="false"
  lppe_crowd_source_confident="90"
  ignore_si_for_e911="false"
/>
```

**gnss_setting**

| Attribute | Example | Description |
|---|---|---|
| sib8_16_enable | "true" | "false": disable SIB8/SIB16 |
| | | "true": enable SIB8/SIB16 **(default)** |
| a_glonass_satellite_enable | "true" | "false": disable Glonass aiding if hardware can support A-Glonass |
| | | "true": enable Glonass aiding if hardware can support A-Glonass **(default)** |
| a_beidou_satellite_enable | "true" | "false": disable Beidou aiding if hardware can support A-Beidou |

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| | | |
|---|---|---|
| | | **(default)** |
| | | "true": Beidou aiding if hardware can support A-Beidou |
| a_galileo__satellite_enable | "true" | "false": disable Galileo aiding if hardware can support A-Galileo **(default)** |
| | | "true": enable Galileo aiding if hardware can support A-Galileo |

Example:

```
<gnss_setting
  sib8_16_enable="true"
  a_glonass_satellite_enable="true"
  a_beidou_satellite_enable="true"
  a_galileo_satellite_enable="true"
/>
```

**cp_setting**

| Attribute | Example | Description |
|---|---|---|
| molr_pos_method | "0" | "0":(Location Estimate) **(default)** <br> "1": (Assistance Data) |
| external_addr_enable | "false" | enable/disable the external address ,available value: true, false **(default)** |
| external_addr | "0123456789*#+" | external_address |
| mlc_number_enable | "false" | enable/disable the mlc number, available value: true, false **(default)** |
| mlc_number | "0123456789*#+" | MLC number |
| cp_auto_reset | "false" | enable/disable to send PMTK997_5, available value: true, false **(default)** |
| epc_molr_lpp_payload_enable | "false" | enable/disable to send LPP payload in the EPC-MOLR message , |

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| | | available value: true, false **(default)** |
|---|---|---|
| epc_molr_lpp_payload | "" | specify the LPP payload in the EPC-MOLR message in hexString format (ex: "010203ff" = { 0x01, 0x02, 0x03, 0xff }, the purpose of this parameter is used for LAB testing only, please do not change it. |
| cp_2g_disable | "false" | "false": enable CP GSM functionality (tc10 requirement) **(default)**<br><br>"true": disable CP GSM functionality (tc10 requirement) |
| cp_3g_disable | "false" | "false": enable CP UMTS functionality (tc10 requirement) **(default)**<br><br>"true": disable CP UMTS functionality (tc10 requirement) |
| cp_4g_disable | "false" | "false": enable CP LTE functionality (tc10 requirement) **(default)**<br><br>"true": disable CP LTE functionality (tc10 requirement) |
| cp_lppe_enable | "true" | "false": disable CP LPPe functionality<br><br>"true": enable CP LPPe functionality **(default)** |
| cp_lppe_wlan_enable | "true" | "false": disable CP LPPe Wireless LAN functionality<br><br>"true": enable CP LPPe Wireless LAN functionality **(default)** |
| cp_lppe_srn_enable | "true" | "false": disable CP SRN (short range network, e.g., Bluetooth) functionality<br><br>"true": enable CP LPPe SRN (short range network, e.g., Bluetooth) functionality **(default)** |
| cp_lppe_sensor_enable | "true" | "false": disable CP LPPe sensor (e.g., Barometers) functionality<br><br>"true": enable CP LPPe sensor (e.g., |

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Barometers) functionality **(default)**

| | | |
|---|---|---|
| cp_lppe_dbh_enable | "true" | "false": disable CP LPPe Device Based Hybrid functionality |
| | | "true": enable CP LPPe Device Based Hybrid functionality **(default)** |

Example:

```
<cp_setting
  molr_pos_method="0"
  external_addr_enable="false"
  external_addr="0123456789*#+"
  mlc_number_enable="false"
  mlc_number="0123456789*#+"
  cp_auto_reset="false"
  epc_molr_lpp_payload_enable="false"
  epc_molr_lpp_payload="D2000010237B2026404FB8007202BFFFFFFF80000000020C0000100940FB9001202B7FFFFF8000000000061800002018A00"
  reject_non911_nilr_enable="false"
  cp_2g_disable="false"
  cp_3g_disable="false"
  cp_4g_disable="false"
  cp_lppe_enable="true"
  cp_lppe_wlan_enable="true"
  cp_lppe_srn_enable="true"
  cp_lppe_sensor_enable="true"
  cp_lppe_dbh_enable="true"
/>
```

**up_setting**

| Attribute | Example | Description |
|---|---|---|
| ca_enable | "false" | Enable to verify DUT's pre-installed certificate with |

downloaded certificate file during TLS handshaking.

| | | |
|---|---|---|
| ni_request | "true" | Whether enable network to request user position ,"false": don't enable<br><br>"true": enable |
| roaming | "true" | Whether to use A-GPS when device is under roaming. |
| cdma_preferred | "true" | when CDMA network and WCDMA network are available, which AGPS protocol you prefer? |
| pref_method | "0" | the preferred method in SUPL_START and SUPL_POS_INIT.<br><br>"0": SET assisted Preferred<br><br>"1": SET Based Preferred **(default)**<br><br>"2": no Preference |
| supl_verison | "1" | x  of SUPL x.y.z<br><br>Choose which SUPL version you want to use. |
| tls_version | "0" | TLS version for TLS connection |
| sha_version | "0" | SHA version for calculating VER |
| supl_log | "false" | enable or disable the AGPS log |
| msa_enable | "true" | enable/disable the MSA capability |
| msb_enable | "true" | enable/disable the MSB capability |
| ecid_enable | "true" | enable/disable the eCID capability |
| otdoa_enable | "true" | enable/disable the OTDOA capability |
| udp_port_enable | "false" | enable/disable the UDP 7275 port by default, if you enable it, you may cause Android/CTS failure for checking netstat |
| dedicated_apn_enable | "true" | enable/disable the dedicated SUPL APN flow |
| preferred_2g3g_cell_age | "300" | max age of 2G / 3G cell info in history, the unit is in second |
| lpp_enable | "true" | Enable/disable the LPP capability |
| cert_from_sdcard | "false" | enable/disable the AGPS certification installation from the internal SDCard (~ Android 8) |

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| | | |
|---|---|---|
| | | or from "/vendor/etc/security/cacerts_supl/lab" (Android 9 does not allow vendor modules accessing the internal SDCard).<br><br>Please use "false" for Android 9 and laters because the lab root certs are not secure (they may be issued by a<br><br>non-trusted CA or their related private keys may be public).<br><br>And enable this option for lab test by using Engineering Mode Utility<br><br>available value: true **(default)**, false |
| auto_profile_enable | "true" | enable/disable the auto profile configuration based on current mcc or mcc_mnc specified in cur_supl_profile or supl_profile<br><br>We will disable auto_profile_enable when carrier_xml_enable="true"<br><br>available value: true **(default)**, false |
| ut1 | "11" | customize the SUPL UT1 timer<br><br>available value: 1~60,<br>**default** value is 11 (OMA spec) |
| ut2 | "11" | customize the SUPL UT2 timer<br><br>available value: 1~60,<br>**default** value is 11 (OMA spec) |
| ut3 | "10" | customize the SUPL UT3 timer<br><br>available value: 1~60,<br>**default** value is 10 (OMA spec) |
| sync_to_slp | "false" | sync the AGPS setting (ex: SUPL profile, SUPL version, TLS version) from AGPSD to SLPD in runtime<br><br>available value: true, false **(default)** |
| imsi_enable | "true" | enable/disable the valid IMSI in SUPL messages<br><br>available value: true **(default)**, false |
| no_sensitive_log | "true" | remove/allow agps daemon's log with sensitive info (e.g., the current location)<br><br>available value: true **(default)**, false |
| supl_ver_minor | "0" | y of SUPL x.y.z |

| | | Minor of SUPL version for ULP<br><br>available value: 0~255,<br>**default** value is 0<br><br>choosable value in LocationEM: 0~5 |
|---|---|---|
| supl_ver_ser_ind | "0" | z of SUPL x.y.z<br>Service Indicator of SUPL version for ULP<br><br>available value: 0~255,<br>**default** value is 0<br><br>choosable value in LocationEM: 0~5 |
| tls_reuse_enable | "false" | enable/disable tls session reuse mode<br><br>available value: true, false **(default)** |
| imsi_cache_enable | "false" | enable/disable the IMSI cache mechanism<br><br>available value: true, false **(default)** |
| supl_raw_data_enable | "false" | enable/disable SUPL raw data dump to main log (logcat)<br><br>available value: true, false **(default)** |
| allow_ni_for_gps_off | "false" | From Android 10, GVC (GNSS Visibility Control) is introduced.<br><br>And GVC is mandatory to get the GMS License.<br><br>If GVC is not supported (~ Android 9), this option will allow normal NI request when GPS is off in location setting<br><br>If GVC is supported (Android 10 ~), this option may not have chance to be checked because GVC will not allow any NI without emergency call when gps is off<br><br>available value: true, false **(default)** |
| force_otdoa_assist_req | "false" | force to fill otdoa assistance request when posMethod=agpsSETassisted,agpsSETassistedpref,ver2-agnssSETassisted or agnssSETassistedpref<br><br>Notice that some servers may not allow to get otdoa assistance request when posMethod is not OTDOA<br><br>available value: true, false **(default)** |
| up_lppe_enable | "true" | enable/disable UP LPPe functionality |

| | | available value: true **(default)**, false |
|---|---|---|
| esupl_apn_mode | "0" | how to choose APN for eSUPL<br><br>available value:<br><br>• 0 to use Emergency / IMS APN if they are available as GSMA IR92 **(default)**<br>• 1 to use Emergency APN if it is available<br>• 2 to use IMS APN if it is available<br>• 3 not to use Emergency / IMS APN, just as a normal supl |
| tcp_keepalive | "4" | enable/disable TCP Keepalive functionality for SUPL<br><br>available value:<br><br>• 0 disable **(default)**<br>• > 0 enable to send TCP keepalive packetets and interval value is tcp_keepalive in second |
| aosp_profile_enable | "false" | enable/disable the supl profile configuration from GnssLocationProvider via native_set_agps_server (tc3 requirement)<br><br>auto_profile_enable will be ignored when aosp_profile_enable is true because AOSP Location Framework can load SUPL_HOST and SUPL_PORT from framework resource for different MCC/MNC<br><br>available value: true, false **(default)** |
| bind_nlp_setting_to_supl | "false" | enable/disable to bind nlp setting to SUPL SI flow<br><br>If it is enabled, the SUPL SI is enabled only if NLP setting is enabled by user<br><br>If it is disabled, agps_enable will be used and it's same as previous design<br><br>available value: true, false **(default)** |
| up_lppe_wlan_enable | "true" | "false": disable UP LPPe Wireless LAN functionality<br><br>"true": enable UP LPPe Wireless LAN functionality **(default)** |
| up_lppe_srn_enable | "true" | "false": disable UP SRN (short range network, e.g., Bluetooth) functionality<br><br>"true": enable UP LPPe SRN (short range network, e.g., Bluetooth) functionality **(default)** |
| up_lppe_sensor_enable | "true" | "false": disable UP LPPe sensor (e.g., Barometers) |

| | | |
|---|---|---|
| | | functionality |
| | | "true": enable UP LPPe sensor (e.g., Barometers) functionality **(default)** |
| up_lppe_dbh_enable | "true" | "false": disable UP LPPe Device Based Hybrid functionality |
| | | "true": enable UP LPPe Device Based Hybrid functionality **(default)** |
| ip_version_prefer | "0" | select the preferred mode for IP version when connnecting to the SUPL server (Softbank requirement) |
| | | available value: |
| | | • 0 IPv6 if we have both **(default)** |
| | | • 1 IPv4 if we have both |
| up_lpp_in_2g3g_disable | "false" | decide if we need to turn off lpp in 2G / 3G network (ATT requirement) |
| | | US ATT SUPL server may not provide assistance data if we have the lpp capability in 2G / 3G network |
| | | available value: true, false **(default)** |
| up_rrlp_in_4g_disable | "false" | decide if we need to turn off RRLP in 4G network when we have SUPL 2.0 and LPP (ATT requirement) |
| | | US ATT SUPL server may not provide assistance data if we have the rrlp capability in 4G network |
| | | available value: true, false **(default)** |
| up_si_disable | "false" | decide if we need to reject SUPL SI request (Sprint requirement) |
| | | Sprint_2019Feb_GTR-LBS-00219 asks us not to trigger SUPL SI. |
| | | Sprint_2019Feb_GTR-LBS-00222 asks us to support NI including normal and emergency |
| | | Sprint_2019Feb_GTR-LBS-00223 asks us to use Sprint SLP in our configuration |
| | | If we turn off agps_enable, we will allow Emergency NI only (reject SI and normal NI) |
| | | If we turn on up_si_disable, we will allow both normal NI and Emergency NI (reject SI only) |

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So this option is more suitable for Sprint requirements.

available value: true, false **(default)**

| | | |
|---|---|---|
| aosp_pos_mode_enable | "false" | decide if we can accept the set_position_mode (MSA / MSB) from AOSP Location Framework |
| | | If it is false, we will use pref_method to fill the preferred method for SI |
| | | If it is true, we will use the value from set_position_mode |
| | | available value: true, false **(default)** |
| privacy_override_mode | "0" | If GVC is not supported (~ Android 9), this option is ignored |

If GVC (GNSS Visibility Control) is supported (Android 10 ~), we use this option to

decide the behavior of a privacy-override / e-supl NI session.

available value:

- 0: Do not support privacy override supl (SUPL-2.0-con-023 may be failed) (GMS License expects this behavior)
- 1: Allow hiding the location icon for the privacy override SUPL INIT  (SUPL-2.0-con-023 can be passed if GVC allows non-framework locationing)
- 2: Allow locationing for the privacy override SUPL INIT even if GVC does not allow non-framework locationing
- 4: Allow locationing for the emergency SUPL INIT without emergency call even if GVC does not allow non-framework locationing
- 8:  Ignore GVC for SUPL

combined value:

- 3  Allow hiding the location icon and allow locationing for the privacy override SUPL INIT even if GVC does not allow non-framework locationing   (SUPL-2.0-con-023 can be passed)
- 7  Allow locationing for the emergency SUPL INIT without emergency call and allow hiding the location icon and allow locationing for the privacy override SUPL INIT even if GVC does not allow non-framework locationing

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Example:

```
<up_setting
ca_enable="false"
ni_request="true"
roaming="true"
cdma_preferred="0"
pref_method="1"
supl_version="1"
tls_version="0"
sha_version="0"
supl_log="false"
msa_enable="true"
msb_enable="true"
ecid_enable="true"
otdoa_enable="false"
qop_hacc="22"
qop_vacc="0"
qop_loc_age="0"
qop_delay="0"
udp_port_enable="false"
dedicated_apn_enable="true"
preferred_2g3g_cell_age="300"
lpp_enable="true"
cert_from_sdcard="true"
/>
```

### carrier_mapping

| Attribute | Example | Description |
|---|---|---|
| name | "T-Mobile_US" | Assume each carrier xml is /vendor/etc/gnss/carrier/agps_profiles_conf2_carrier_%name%.xml This option defines the actual value of %name% |

## mcc_mnc　(inner element of carrier_mapping)

| Attribute | Example | Description |
|---|---|---|
| v1<br>~<br>v999999 | "310210" | Each can define a mcc_mnc value.<br>6-digit ，5-digit， and 3-digit are acceptable.<br><br>When getting a new IMSI, use its leading digits to compare the mcc_mnc values<br>If matching, a suitable carrier xml will be loaded automatically. |

Example:

```
<carrier_mapping name="Test_SIM1">
 <mcc_mnc
  v1="00101"
 />
</carrier_mapping>
<carrier_mapping name="Test_SIM2">
 <mcc_mnc
  v1="00102"
 />
</carrier_mapping>
<carrier_mapping name="ATnT_US">
 <mcc_mnc
  v1="310030"
  v2="310070"
  v3="310170"
  v4="310280"
  v5="310380"
  v6="310410"
  v7="310560"
  v8="310680"
  v9="310950"
  v10="311180"
 />
</carrier_mapping>
```

# 9 Debugging
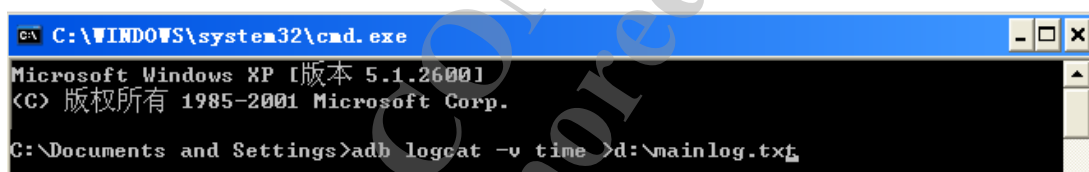
## 9.1 How to Record Debugging Messages

There are two types of log messages that can be recorded by different methods.

### 9.1.1 Log-cat

You can use the Android logging system tool "log-cat" to record the A-GPS debugging messages in the command line:

Example: Record the main log to mainlog.txt

*adb  logcat  -v  time  >d:\mainlog.txt*

```
C:\WINDOWS\system32\cmd.exe                                    - □ ×
Microsoft Windows XP [版本 5.1.2600]
(C) 版权所有 1985-2001 Microsoft Corp.

C:\Documents and Settings>adb logcat -v time >d:\mainlog.txt
```

### 9.1.2 Log SUPL to Files

In the engineer mode menu of A-GPS, we provide the item "Log SUPL to File" for you to log out the critical log sentences to a file (/data/agps_supl/log/…) during the SUPL processing, and it is only applicable to the user plane. From this log file we can find out the main procedure of the SUPL session. If you would like to obtain detailed log information, choose log-cat instead.
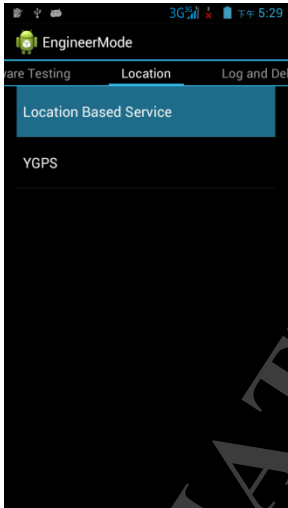
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# 10　How to use A-GPS

## 10.1 Pre-condition

1. Make sure the available SIM is inserted to DUT

2. Make sure the data connection is available

3. There is no firewall to block the A-GPS session accessed with server

4. GPS is enabled by Settings → Location access → GPS satellite

## 10.2 How to trigger an A-GPS session

The chapter is a guideline to start up an A-GPS position. Follow up those steps (1), (2) and (3), to finish a positioning request.

| Launch LocationEM tool | |
|---|---|
|  | 1. Enter engineer mode (dial: *#*#3646633#*#*) <br><br> 2. Go to "Location" tab <br><br> 3. click "Location Based Service" |

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| | |
|---|---|
|  | 1. The A-GPS status will be turned on while launching the LocationEM<br><br>2. Configure the A-GPS parameter before you start a A-GPS session |
| **Start GPS** | |
|  | 1. Go to "GPS" tab,<br><br>2. Press the "GPS(OFF)" to start using GPS<br><br>3. Wait for 2~3 seconds, if you can see the toast "SI Request Received for {UP, CP, EVDO} Session", it means the A-GPS is triggered by GPS driver and A-GPS session is on-going now.<br><br>4. If you don't see any toast, please follow step 5 and 6 to force triggering a A-GPS session<br><br>5. Select "Full" item in "GPS MODE".<br><br>6. Click "Delete" button.<br><br>7. After step 6, you should see the toast "SI Request Received for {UP, CP, EVDO} Session". |

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