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Android 10.0 Engineering Mode Application Manual

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About This Document

Purpose

It describes the opening method, working method, use of each menu item, solution and behavior of Android 10.0 engineering mode in detail. Engineer can execute engineering mode through password to conducts tests on mobile phone and achieve the relevant parameters required for the test.


Intended Audience

This document is mainly suitable for testing, debugging and development engineers working on UNISOC platform. These engineers must have the following experience and skills:

- Understanding of UNISOC platform.
- Understanding the basic knowledge of mobile communication.

Symbol Conventions

The symbols that may be found in this guide are defined in the following table.

Symbol	Description
 NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Acronyms and Abbreviations

Acronym and Abbreviation	Full Name
AT	Attention
CFU	Call Forwarding Unconditional
EUT	Enterprise Unified Talker
NV	Non-volatile
MCC	Mobile Country Code
MNC	Mobile Network Code
UA	User Agent
PDP	Packet Data Protocol

Acronym and Abbreviation	Full Name
SCELL	Service Cell
NCELL	Neighbor Cell
PLMN	Public Land Mobile Network
TE	Terminal equipment
MS	Mobile Station

Change History

Issue	Date	Description
V1.0	2019-11-13	First Draft.
V1.1	2020-04-16	Modification.
V1.2	2020-04-24	<ol style="list-style-type: none">1. Rename the document from “Android 10.0 UNISOC Engineering Mode Instructions” to “Android 10.0 Engineering Mode Application Instructions”.2. Structure adjustment, content optimization, format updating, etc. <p>Since it does not support the mode switch options, hence the same has been deleted.</p>
V1.3	2020-03-24	<ol style="list-style-type: none">1. Translation from Chinese to English.2. Alignment as per company template.

Keywords

Engineering mode, secret code, TELEPHONY, DEBUG & LOG, CONNECTIVITY, HARDWARE, LOCATION.

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1 Introduction to Engineering Mode

1.1 Overview

Engineering mode is an important tool for debugging, which requires password to access it. In engineering mode, you can set telephony parameters, network parameters, debugging method, and read system information. Since it is independent of upper layer, it troubleshoots the problems of lower layers, even in the development phase.

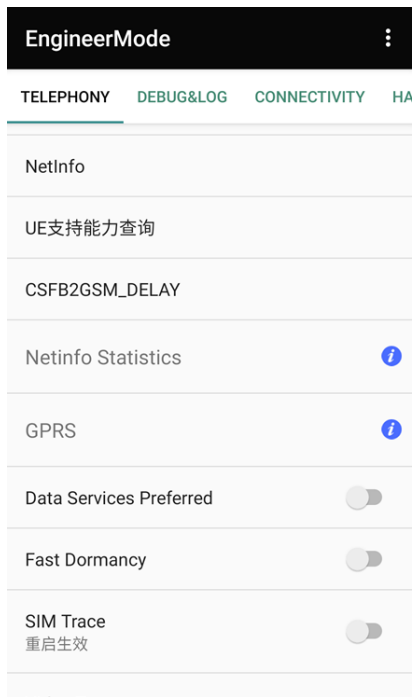
1.2 Access Method

Input (*##83781#*##) in the dial interface to enter the engineering mode to view and configure sub-tabs, which are switched by sliding the tabs.

1.3 Components

It has five components namely as, TELEPHONY Tab, DEBUG & LOG Tab, CONNECTIVITY Tab, HARDWARE Tab and LOCATION Tab.

- TELEPHONY Tab: This tab has protocol stack test option, which includes BandSelect, CFU, network mode switch, NetInfo setting, Netinfo Statistics, GPRS, etc., as shown as Figure Figure 1-1.

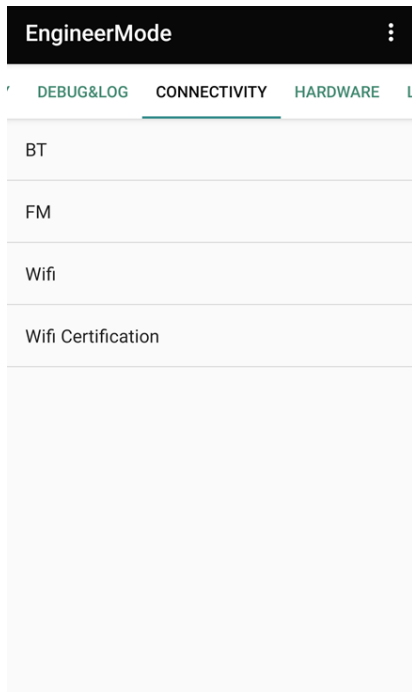
Figure 1-1 TELEPHONY Tab


- **DEBUG & LOG Tab:** This tab has System info, CFT Result, Log settings, Debug Utils, Design For Test, GPS settings, etc. Design For Test is a shortcut setting for CMCC, CTA, CUCC and GCF related tests, as shown as figureFigure 1-2.

Figure 1-2 DEBUG&LOG Tab

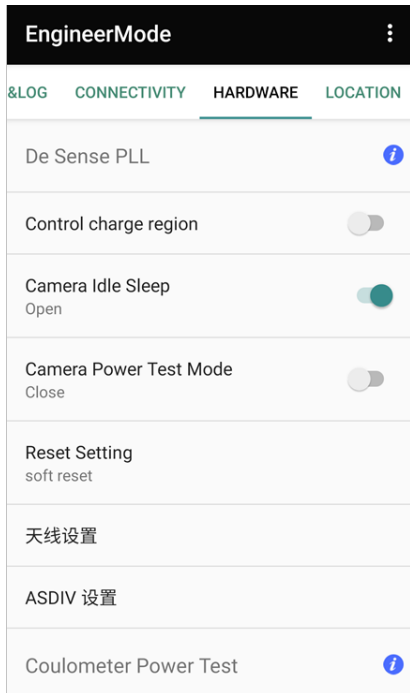

- **CONNECTIVITY Tab:** This tab has test options for device connection, such as Wifi, BT, etc., as shown in figure Figure 1-3.

Figure 1-3 CONNECTIVITY Tab



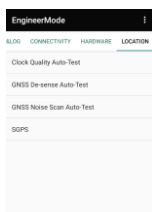
- **HARDWARE Tab:** This tab has the test option related with hardware parameters, such as USB Charge, Camera API, etc., as shown in figure Figure 1-4.

Figure 1-4 HARDWARE Tab



- LOCATION Tab: This tab has SGPS test options, such as automation test for clock frequency drift of different thermal sources, as shown in figure .

Figure 1-5 LOCATION Tab



2 TELEPHONY

2.1 Auto Answer

Function

This function is used to set auto answer mode. When it is enabled, the mobile phone can answer to voice or video calls automatically.

Solution

AT+SPAUTO.

Behavior

Touch the button to enable or disable auto answer function, and it pops up to indicate if the operation is successful.

2.2 Band Selection

Function

This function is used to select band, which is frequently used in single or hybrid band test with dual SIM cards in different network mode.

Solution

- GSM mode uses AT+SBAND.
- TD mode uses AT+SPLOCKBADN.
- WCDMA mode uses AT+SPFDDDBAND.
- LTE mode uses AT+SPLBAND.

Behavior

The bands supported by SIM card are listed for selection according to the capability of SIM card slots. The secondary Sim card supports the GSM mode only.

2.3 CFU

Function

This function is used for call forwarding which automatically triggers call forwarding query when it is enabled in powered on device.

Solution

Set the value of “persist.sys.callforwarding”.

Behavior

It queries and shows current CFU setting upon entering the menu. Touching menu item to set the value and it pops up to indicate if the operation is successful.

2.4 Evdo Status

Function

This function is disabled in CTCC lab test, but enabled in mass production so that, there is a disabled EVDO option in telephony menu by default, which users can manually enable or disable as per their requirement.

Solution

AT command interface:

- Query: at+spc2ksetrat?
 - Return value 1 means EVDO enabled.
 - Return value 0 means EVDO disabled.
- Disable EVDO: at+spc2ksetrat=1,0.
- Enable EVDO: at+spc2ksetrat=1,1.

More examples are shown as below:

```
>at+spc2ksetrat?
+SPC2KSETRAT: 1
OK
>at+spc2ksetrat=1,0
OK
>at+spc2ksetrat?
+SPC2KSETRAT: 0
OK
>at+spc2ksetrat=1,1
```

OK

>at+spc2ksetrat?

+SPC2KSETRAT: 1

OK

Behavior

Sliding switch.

2.5 Network Mode

Function

This function is used to set the network mode for camping the test device.

NOTE

For the version customized for CMCC, if inserting a CMCC SIM card into mobile phone with dual card slots, this menu is unavailable according to the warehouse entry test requirements.

Solution

- For WCDMA products: You need “AT^SYSCONFIG” command to execute this. You can also refer to AT command specifications for more details.
- For TD products: You can use AT+SNVM to write NV and send “AT+RESET=1” command to restart modem.
- For LTE products:
 - There are several LTE modes which are mainly divided into 4 major categories where each major category has subcategories.
 - The process of network mode handover is executed in RIL. Here, we need to set the value of the “systemProperties” attribute and restart the device.
 - In order to switch among the major categories of network the device is required to be restarted. By restarting the modem, we can switch the subcategories (of the major categories) of the network. Modem after reboot, detects the change and set the corresponding network mode according to the corresponding value of the “systemProperties” attribute.

Behavior

Insert the SIM card according to the instructions of the test item. The test device will load the interface dynamically according to different product definition, and display the corresponding options.

NOTE

- This item sets the card slots. All the card slots of the phone become same after setting the TD product. If the network mode for the TD + G / G product is set to TD, the second card cannot register and stay on the network.
- This menu operation affects the network selection setting. Therefore, after entering this menu, there will be a status bar notification prompt. You must pull down the status bar to exit the engineering mode network, and restart to select the network.
- WCDMA product provides three options, namely Gsm only, W only, and W prefer.
- TD product provides three options, namely Gsm only, TD only, and TD prefer.

- TD product provides Gsm and TD where TD is preferred.
- LTE product provides three categories, SVLTE, FDD CSF and TDD CSFB.
 - SVLTE: SVLTE, GSM single mode, TD single mode, and TG dual mode.
 - FDD CSFB: LTE FDD/W/GSM CSFB multimode single standby, TD-LTE/W/GSM CSFB multimode single standby, TD-LTE single mode, TD FDD single mode, TD-LTE/LTE FDD dual mode, TD-LTE/LTE FDD/W/GSM CSFB multimode single standby, GSM single mode, W single mode, and WG dual mode.
 - TDD CSFB: TD-LTE/TD/GSM CSFB multimode single standby, TD-LTE single mode, LTE FDD single mode, TD-LTE/LTE FDD dual mode, TD-LTE/LTE FDD/TD/GSM CSFB multimode single standby, GSM single mode, TD single mode and TG dual mode.
 - CSFB: TD-LTE/LTE FDD/W/TD/GSM CSFB multimode single standby, TD-LTE/LTE FDD/W/GSM CSFB multimode single standby, LTE FDD/W/GSM CSFB multimode single standby, TD-LTE/W/GSM CSFB multimode single standby, TD-LTE single mode, LTE FDD single mode, TD-LTE/LTE FDD dual mode, TD-LTE/TD/GSM CSFB multimode single standby, TD-LTE/LTE FDD/TD/GSM CSFB multimode single standby, GSM single mode, WG dual mode, TG dual mode, W single mode and TG dual mode.

2.6 DSDS Mode

Function

This function is used to switch the network mode to L+G/L+W/L+L to provide different scenarios for test.

Solution

The mobile phone is switched to different network modes according to the value of "persist.radio.modem.workmode".

Behavior

Touch to enable or disable this function.

2.7 WCDMA Perferred

Function

This function is only supported on WCDMA products where WCDMA is the preferred network mode.

Solution

AT+SPWPREFERSWITCH.

Behavior

Touch to enable or disable.

2.8 Netinfo

Function

- For GSM, the following information is displayed:
 - Cell ID, frequency point, BSIC, C/I and signal strength of service cells.
 - Cell ID, frequency point, BSIC, C/I and signal strength of intra system neighboring cells.
 - Cell ID, frequency point, BSIC, C/I and signal strength of inter system neighboring cells.

NOTE

Inter-system refers to the scenarios between different network modes, such as measurement of TD-SCDMA and WCDMA in GSM.

- For 3G network mode, the following information is displayed:
 - Cell ID, RNC ID frequency point, scrambling code, C/I, signal strength of service cells (For WCDMA mode, DC-HSDPA status, Cell ID, frequency point, Ecno, signal strength of PCELL and SCELL are additionally displayed).
 - frequency point, scrambling code, C/I, signal strength of intra systems neighboring cells.
 - frequency point, scrambling code, C/I, signal strength of inter systems neighboring cells.

NOTE

Inter-system refers to the scenarios between different network modes, such as measurement of TD-SCDMA and WCDMA in GSM.

- For 4G network mode, the following information is displayed:
 - Cell ID, E-NODEB ID, frequency point, SINR, signal strength, transmission mode and network bandwidth of serving cells.
 - Cell ID, frequency point, SINR, signal strength of neighbor cells of intra systems.
 - Cell ID, frequency point, SINR, signal strength of neighbor cells of intra systems.

NOTE

Description of inter-system scenarios, such as obtaining GSM/System information in TD-LTE.

- Requirements:
 - Real-time display.
 - Automatic data acquisition according to resident network modes covering GSM/WCDMA/TD-SCDMA/TD-LTE/LTE-FDD.
 - Differentiating SIM1 and SIM2.

Solution

AT+SPENGMD.

Behavior

Display the information in table format, and make a query in every 200 ms.

2.9 UE Cat Capability Query

Function

This function is used to get UE Cat capability information.

Solution

AT+SPUECAT.

Behavior

Click the menu item to see if it supports this function.

2.10 CSFB2GSM_DELAY

Function

This function is used to set GRRP camping and random access of SIM0 and SIM1 which is supported in LTE products only.

Solution

AT + SPSETGRRP.

Behavior

Touch to enable or disable.

2.11 Netinfo Statistics

Function

This function is used to display drive test information:

- Cell reselection times, success rate and average delay.
- Cell handover times, success rate and average delay.
- Online time statistics.
- Network drop statistics.
- Statistics of handover times between dual-carrier and single-carrier in LTE and WCDMA mode.

Solution

- AT+SPENGMD=0,7,1 gets the number of cell reselection times and the success rate.
- AT+SPENGMD=0,7,2 gets the number of cell handover times and the success rate.
- AT+SPENGMD=0,7,7 gets the time in 2G / 3G / LTE.
- AT+SPENGMD=0,2,2 gets the number of network drop in 2G / 3G.

- AT+SPENGMD=0,3,4 gets the switching times between dual carrier and single carrier in LTE and WCDMA mode.

Behavior

Access path: Telephony-> Netinfo statistics (UNISOC Drive Test)-> SIM0/SIM1.

- The reselection information is displayed in the RESELECT tab.
- The switching information is displayed in the HANDOVER tab.
- Online time is displayed in the ATTACHTIME tab.
- The number of network drops is displayed in the DROPTIMES tab.
- The number of switching times between dual carrier and single carrier is displayed in the CARRIERHANDOVERTIMES tab.

2.12 GPRS

Function

This function is used to test activation/deactivation of GPRS and PDP, and also sends GPRS data.

Solution

- AT+CGATT can attach or detach GPRS service.
- AT+CGACT, AT+CGDCONT, AT+CGEQREQ activates or deactivates PDP.
- AT+SGPRSDATA transmits data.

Behavior

Just execute below mentioned tests on the main card:

- Set GPRS attachment status.
- Activate or deactivate the specified PDP context.
- Set and send GPRS data.

There are two input boxes in which the first one is used to set the length (1-16000) of the sent data and the second one is used to input the specified GPRS data.

2.13 Data Service Preferred

Function

This function is used to verify the impact of paging of secondary card on the service of primary card.

Solution

AT+SPBPM.

Behavior

Touch to enable or disable.

2.14 Fast Dormancy

Function

This function is used to enable Fast dormancy function to set the time for the phone for fast sleep.

Solution

Set the value of "persistent.radio.fd.disable" to pass the default and the custom values to Ril where the custom value is set by AT*FDY.

Behavior

By default, this function is enabled in the device and controlled by the slider switch. The default value for fast sleep is 5s which can be customized by the user. The time range for fast sleep is between 1 ~ 65535 seconds, which becomes effective after putting the desired value from the given range.

2.15 Sim Trace

Function

This function is used to open the usim driver log to locate the issues related to special usim cards.

Solution

AT+SPUSIMDRVLS.

Behavior

Touch to enable or disable.

2.16 Video Type

Function

This function is used to set the video format in video call test.

Solution

Set the value of " debug.videophone.videotype".

Behavior

Select the video format to be tested in the menu.

The function is not implemented currently.

2.17 App Settings

2.17.1 UA setting

Function

This function is used to set the UA manually.

Solution

Read the Default UA, Other UA, Custom UA, and the configuration of current Choice in the Settings. The content of UA configuration is displayed when it is selected, and by clicking OK it is modified and written back to Choice item.

Behavior

User can select configured UA or input UA manually. Touch OK to enable the setting, while Cancel to disable it.

2.18 PS Related

Protocol setting.

2.18.1 Frequency

Function

This function is used to lock and unlock the frequency points.

Solution

AT+SPFRQ.

Behavior

It provides 16 Input Boxes, 1 Lock Button, and 1 Unlock Button, where all the data is displayed in the 16 input boxes. The user can modify and save the data by touching the Lock Button or clear it by touching the Unlock Button. Cell lock function is unavailable for LTE.

2.18.2 AOC Setting

Function

This function is used to enable or disable the call charge/cost query function.

NOTE

This function requires operator support, and also SIM card to activate related functions.

Solution

AT+CAOC.

Behavior

Click to enable or disable.

2.18.3 AOC MAX

Function

This function is used to set the maximum value of accumulated call cost; no further calls are allowed after reaching this value.

Solution

AT+CMM.

Behavior

Maximum value is entered in the input box which can be confirmed or cancelled.

2.18.4 HSPA Setting

Function

This function is used to test HSDPA / HSUPA performance of the protocol stack, Which is compatible with external field environment configuration.

Solution

- Open: AT+SPENGMD=1, 10, 2, 3 supports HSDPA and HSUPA, R7.
- Close: AT+SPENGMD=1, 10, 2, 1 supports HSDPA, doesnot support HSUPA, R5.

Behavior

Touch to enable or disable.

2.19 VT Option

Function

This function is a switch for Video call.

Solution

"persist.sys.support.vt" determines if the video call function is enabled. TRUE and FALSE indicates enable and disable status of the function, which requires the device to restart.

Behavior

Click to enable or disable.

2.20 QoS Switch

Function

This function is used to switch and save the default parameters of UMTS QoS to mobile phone, and send it to network through PDP Context when PDP is activated.

Solution

Modify property "persist.sys.qosstate" as "1" or "0".

- When it is 1, use AT+CGEQREQ=cid, 2, 0, 0, 0, 0, 2, 0, "1e4", "0e0", 3, 0, 0 to switch the default QoS parameters.
- When it is 0, the QoS parameters do not change.

Behavior

Touch to enable or disable.

2.21 Activation of USB Interface

Function

This function is used to control if USB function selection interface pops up after inserting USB cable, which is a requirement of CMCC warehouse entry test.

Solution

This is controlled by SWITCH_FOR-USB_ACTIVE.

Behavior

Touch the button to enable or disable the function, and there is popup to indicate success or failure of the operation.

2.22 DNS Filter

Function

This function is used to debug telephony and controls DNS process.

Solution

- Disable: setDnsFilterEnable(0).
- Enable: setDnsFilterEnable(1).

Behavior

Use switch to enable or disable.

2.23 VoLTE Setting

Function

This function is used to set APN, IMPI, IMPU, P-CSCF, etc., of VOLTE mobile phone. AT commands executes all the functions, you can refer to “VOLTE Engineering Mode Parameter Table Setting” for detailed information.

Solution

All functions are executed by AT commands.

Behavior

Click to set or fill in.

2.24 PDP TEST

Function

This function is used to add the PDN and PDP control switch which doesn't require retrying after deactivation.

Solution

It is controlled by changing the properties like “persist.sys.volte.iot” and “persist.sys.pdp.noretry”.

Behavior

Click to view the list and enable or disable.

2.25 NV Item List

Function

This function is provided to the operator Telcel to check network information and support of VAMOS, CPC, etc.

Solution

Send the following AT commands: AT^SYSCONFIG, AT+COPS, AT+SPENGMD, AT+SPUECAT, AT+SPBANDCTRL, AT+CAVIMS, AT+CGSMS, AT+SPTTEST.

Behavior

Click to view the information.

2.26 Ignore DualVoLTE Whitelist

Function

This function is used to verify VoLTE dual channel DSDA support by operators which is currently supported by the whitelist operators only.

Solution

In order to enable or disable this function, you need to set the value of "persist.radio.dsda.w.ignore".

Behavior

Click to enable or disable.

2.27 VoWiFi White List Enable

Function

This function is used to control if the system triggers VoWiFi camping in case of whitelist card.

Solution

Set the value of "persist.sys.vowirfi.lab.sim".

Behavior

Click to enable or disable and restart the device.

2.28 UPLMN Switch

Function

This function is used for users to control UPLMN list and is applicable only for CTA lab tests, which should be enabled before the test.

Solution

Set the value of "persist.sys.uplmn.enable".

Behavior

Touch to enable or disable.

2.29 IMS APN

Function

This function is used to control IMS APN display of telephony.

Enable: User can set the IMSAPN switch of telephony.

Solution

Set the value of "persist.sys.ims.visibility".

Behavior

Click to enable or disable.

This button is in gray on mobile phones not supporting LTE.

2.30 Load APN

Function

This function is used to test "3G bip" case, which is related to BIP protocol of telephony.

Solution

Set the value of "persist.sys.loaded.apn".

Behavior

Touch to enable or disable.

2.31 NXP

Function

This function is used to check/enable/disable NXP in different modes.

Solution

AT+SPTEST.

Behavior

There are 27 different modes which can be checked.

2.32 MOS

Function

This function is used to check/enable/disable the MOS test mode.

- Enable: "MOS test mode".
- Disable: "Non-MOS test mode".

Solution

AT+SPCAPABILITY.

Behavior

- In MOS test mode:
The second and tenth items of NXP are deselected by default.
- In non-MOS test mode:
The second and tenth items of NXP are checked by default.

2.33 C2k Test Configuration

Function

This function is used to control the configuration of different NV required for different tests (CTCC warehouse entry test, real network test, SRRC instrument test, etc.).

Solution

There are 5 submenu items, which are namely as:

- Default setting (AT command: AT + SPCASPARAM = 141).
- CTCC test setup (AT command: AT + SPCASPARAM = 143).
- Roaming registration settings (AT command: AT + SPCASPARAM = 145).

- Extended test setting 1 (according to the actual situation, the name can be modified later, AT command: AT + SPCASPARAM = 147).
- Extended test setting 2 (according to the actual situation, the name can be modified later, AT command: AT + SPCASPARAM = 149).

Behavior

There is one new-added menu with 5 options under engineering mode, which is for CDMA2000 test configuration, and the first option is the default one.

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3

DEBUG & LOG

3.1 Adb shell

Function

This function is used to execute Adb Shell command in mobile.

Solution

In order to enter this command first click the interface of this function added in the DEBUG & LOG of engineering mode.

Behavior

In order to enter any shell command including the iperf command, you first need to enter the adb shell added in DEBUG & LOG module.

3.2 System Update

Function

This function is used to run OTA upgrade. OTA is an independent SystemUpdate.apk for system version query, download and update.

NOTE

This only supports internal server of UNISOC for testing and verification.

Solution

Call SystemUpdate through Intent. If the apk is not preinstalled in the system version, this option is grayed.

Behavior

Click to enter.

3.3 System Info

3.3.1 Version Info

Function

Read the version information, which includes:

- Hardware info
- Hardware Version
- AP Version
- CP Version
- CP2 Version
- GPS Version
- TP Version

Solution

- Hardware info: ro.product.hardware field.
- Hardware Version: sys.hardware.version field.
- AP Version: Build.DISPLAY information.
- CP Version: AT+CGMR/AT+SPDSPVERSION.
- BT: socket: wcn at+spatgetcp2info.
- GPS: parse/data/cg/supl/supl.xml.

Behavior

Click the menu text to display the information.

3.3.2 Power Log

The log of Power.

3.4 CFT Result

Function

This function is used to display the calibration results.

Solution

Obtain the information through the command “AT+SGMR=0,0,3”, in which Calibration information is read-only., including GSM Calibration Info, WCDMA calibration Info, LTE calibration Info and so on.

Behavior

Click the menu to see the text contents.

3.5 YLog

Please refer to " Engineering Mode Log Manager instructions" for various configurations of capturing Log.

3.6 Test Design

This function is used to configure the test environment.

Unless specified, the most of the interfaces are slider switch and pop up selection box, invoked by AT. This is not described further.

3.6.1 RPS Switch

Function

This function enables the cores to share load while softirq occupancy rate is 100% in throughput test.

When this function is enabled, other cores share the load, so softirq does not reach 100%, which increase the rate.

This function is enabled or disabled by this switch.

Solution

You can enable or disable this by switch.

Behavior

Switch.

3.6.2 Ping Packet Function

Function

This function is used to check the ping packet link during IOT test as executing UE Ping server on computer connected by USB cable is tough for the testers.

Solution

After UE Attach process completes, send the PING command to server from UE side in engineering mode. You can select IP type, set Ping packet time, ping packet interval and ping packet size.

Behavior

- Select IP address type on interface, IPv4 or IPv6.
- Fill in the server address, Ping packet time, Ping packet interval, Ping packet size. If the values except server address are not filled in, it will use the default value.
- Use Ping button to pack ping after filling the parameters and the status of the same will be displayed there.

3.6.3 PDN Test

Function

This function is used for PDN test in IOT test as the current function is complex and difficult for the testers as it is done by the APK and AT commands.

Solution

The first default bearer is built during UE Attach process, and multiple PDNs can be built in engineering mode where each PDN corresponds to different APNs. You can set parameters to build dedicated bearer and activate it, and associate dedicated bearer with default bearer, and deactivate them. simultaneously.

Behavior

There are three types of APN namely as default, mms and supl in Settings-> APN interface.

- There are three buttons to activate 3 default bearers on the interface. Each button corresponds to default bearers of different APNs.
- You can activate dedicated bearer directly through dedicated bearer menu on the interface or activate it after setting the parameters (especially selecting the default bearer associated with the dedicated bearer).

AT command for building dedicated bearer:

- at+cgdscont=7,1 /* 7 means dedicate pdn cid, 1 means default pdn cid */.
- at+cgeqos=7,1,128,128,384,384
- at+cgtft=7,2,5,"192.168.1.81.255.255.255.255",1
- at+cgact=1,7

- Each default bearer has a button to deactivate it.

3.6.4 GPRS attach/detach Service

Function

Execute the command "AT+CGATT" to attach or detach GPRS service.

Solution

NA.

Behavior

NA.

3.6.5 SMS Resending

Function

This function is to control the automatic SMS resending.

3.7 Power Dissipation Setting

Function

The switch of DFS/DVFS. When DVFS is disabled, you can change mobile phone voltage and frequency. Voltage and frequency appear in pair.

Solution

VDDARM and CPU frequency input box and DFS/DVFS switch.

When DVFS is disabled, you can set voltage and CPU frequency manually.

- DFS on: echo 0 > `sys/devices/platform/scxx30-dmcfreq.0/devfreq/scxx30-dmcfreq.0/ondemand/set_freq`
- DFS off: echo 533000 > `sys/devices/platform/scxx30-dmcfreq.0/devfreq/scxx30-dmcfreq.0/ondemand/set_freq`
- DVFS on: echo sprdemand > `/sys/devices/system/cpu/cpu0/cpufreq/scaling_governor`
- DVFS off: echo performance > `/sys/devices/system/cpu/cpu0/cpufreq/scaling_governor`

When the DVFS is disabled:

- Set the voltage: echo voltage > `/sys/power/cpufreq_voltage`
- Set the CPU frequency: echo cpufrequency > `/sys/power/cpufreq_frequency`

Behavior

There are two sliders to control DFS and DVFS, and two input boxes for voltage and frequency. The option is grayed if no underlying layer nodes available.

3.8 MIPI Log

Function

This function is used to set MIPI Log channel.

Solution

- 0: stop sending data.
- 1: training channel
- 2: WTL channel

The upper layer is controlled by `"/sys/devices/platform/soc/soc:ap-ahb/402e0000.sprd-mipi-log/channel"` file node.

Behavior

Click on interface.

3.9 Performance Tool

3.9.1 Starting the Window

Function

This function is used to check If there is screenshot function in the application.

Solution

This is controlled by "persist.sys.startingwindow".

Behavior

Click to enable or disable.

3.9.2 Systrace

Function

NA.

Solution

NA.

Behavior

Switch.

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3.10 System Setting

3.10.1 GPU Frequency

Function

This function is used to display GPU frequencies and options for GPU Log output.

Solution

It is controlled by "/sys/module/mali/parameters/gpu_freq_cur " file node and the property "debug.egl.trace".

Behavior

Click to enable or disable.

3.11 Launcher debug

Function

It is the testing/debugging switching added in Launcher module.

Solution

It is controlled by system attribute value in engineering mode.

Behavior

Touch to enable or disable.

3.12 Browser debug

Function

This function is used to control chromium log in engineering mode to debug Browser module and output webkit logs for R&D.

Solution

It is controlled by system attribute value in engineering mode.

Behavior

Touch to enable or disable.

3.13 Switch Machine Info

Function

This function provides statistics of counts and causes of power-on, power-off and modem assert, and battery information, etc.

- Power on info: Function of dumping the power-on statistics to SD card.
- Power off info: Function of dumping power-off statistics SD card.
- Modem assert Info: Function of dumping of modem assert statistics to SD card.

3.14 Never Sleep

Function

This function is used to set never sleep function in mobile phone.

Solution

It is controlled by setting very large value of Setting.System.SCREEN_OFF_TIMEOUT.

Behavior

Click to enable or disable.

NOTE

Do not enter setting -> display menu if this function is enabled. It will detect if the setting value is valid, and return to default value if no value provided.

3.15 Watch Dog

Function

This function is used to set Watch dog switch in Cm4.

Solution

This is executed by file node/dev/sctl_pm.

Behavior

Touch to enable or disable.

3.16 USB Debug

Function

This function is used to open USB debugging function in developer mode of user version.

Solution

It is enabled or disabled by Settings.Global.DEVELOPMENT_SETTINGS_ENABLED value.

Behavior

Touch to enable or disable.

NOTE

By default, this function is disabled in the user version. Even though you enable it manually, it will reset to disabled mode after mobile phone restarts.

3.17 PreCheck

Function

This function is to check configuration page before warehouse entry test.

Behavior

It checks the version number of ap, cp, bt, Wifi, calibration or not, and other information before warehouse entry test.

3.18 Thermal

Function

This function is used for Thermal debugging:

- Thermal Switch: Enable or disable thermal, and need to debug with the thermal.
- Thermal PA Switch: Control the function of limiting charging current, and need to debug with the underlying thermal.
- IPA: Control temperature, and need to debug with the underlying thermal.

Solution

- Both Thermal and Thermal PA switches send commands to thermald via sockets.
- IPA executes `/sys/class/thermal/thermal_zone0/thm_enable` node.

Behavior

Slider switch.

3.19 Jeita Control

Function

This function is used for limiting the current to lower the temperature during charging to avoid the damage to mobile.

Solution

Control node through property:

on property:persist.vendor.eng.jeita=0

write `/sys/class/power_supply/battery/charger.0/jeita_control` 0

on property:persist.vendor.eng.jeita=1

write `/sys/class/power_supply/battery/charger.0/jeita_control` 1

Behavior

Slider switch.

3.20 ThroughPut

Function

This function is used to execute SETH network card GRO aggregation function which allows tester to manually start the test during the subsequent data transmission case test.

Solution

The SETH network card GRO aggregation which reduces the pressure of core network subsystem, number of upstream TCP ACK and expense of mips of CP, belongs to the downstream datagram aggregation function of AP network card.

- Enable GRO, setprop ctl.start gro_on.
- Disable GRO, setprop ctl.start gro_off.

Query:

The value 1 and 0 of sys/module/seth/parameter/gro_enable, indicates enabling and disabling of GRO respectively.

Behavior

Slider switch.

3.21 LVDS Dump

Function

Currently RF issues are almost stable but one issue per week related to LVDS is there in V2 project, which is difficult to check if such issues are not reproduced in equipment environment. Dump register enables LVDS abnormal ASSERT function in NV if the LOG is not visible. However, R&D is required to modify the NV each time and add PAC corresponding to multiple NV as it cannot be done by testers.

In order to quickly provide DUMP file for analysis of issues, this function enables flag in NV in engineering mode.

Solution

There is one switch in engineering mode to reflect LVDS DUMP values as 0, 1, 4, and 5.

- AT command to disable or enable LVDS DUMP: AT^LVSDUMP=X.
 - X=0, means disabled LVDS DUMP.
 - X=1, means enabled LVDS DUMP upstream.
 - X=2, means enabled LVDS DUMP downstream.
 - X=3, means enabled LVDS DUMP up/down stream.

- AT command to query LVDS DUMP is: AT^LVDS DUMP?
Return value is X.
- AT command to test LVDS DUMP is: AT^LVDS DUMP=?
Return value is (0-3).

Behavior

Click to open one selection box with following options:

- LVDS DUMP.
- LVDS DUMP upstream.
- LVDS DUMP downstream.
- LVDS DUMP up/down stream

3.22 SMS center number

Function

This function is used to add editing option of the SMS center for lab tests which send SMS when there is no SMS center in white card.

Solution

Interface for showing SMS center number, even if two SIM cards are inserted it will be shown separately:

```
SmsManagerEx.getDefault().getSmscForSubscriber(subId)
```

- Interface for modifying SMS center number, even if two SIM cards are inserted it can be differentiated:

```
SmsManagerEx.getDefault().setSmscForSubscriber(smscAddr,subId)
```

NOTE

- Import SmsManagerEx file: import android.telephony.TelephonyManagerEx
- subId is the ID value of the SIM card in the mobile phone (1, 2, 3 ...).
- smscAddr is the SMS center number.

Behavior

Widget combination.

3.23 GCF Test

Function

This function is used to add menu option for GCF test. The messaging modules read the database value, and execute GCF authentication in case of TRUE.

Solution

System API.

```
Private final String SEND_RETRIE_TIME = "message_send_retries"
```

```
Settings.Global.getString(mContext.getContentResolver(),SEND_RETRIE_TIME)
```

Behavior

Slider switch.

3.24 AT Port Lock

Function

This function is used for R & D to analyze and disable the AT/Diag port to prevent the Sim lock cracking issue on True SC9820E, SC9832E, SC9850KL platforms in Thailand.

Solution

". gser" and "disable" attribute are to be set for enabling and disabling respectively, as given below:

- `SystemProperties.set ("persist.vendor.sys.modem.diag", ",gser").`
- `SystemProperties.set ("persist.vendor.sys.modem.diag", "disable").`

In order to make the setting effective, bottom layer to trigger re-enumeration each time after setting the attribute value, as given below:

```
UsbManager mUsbManager = (UsbManager)
AppSettingsPrefActivity.this.getSystemService(Context.USB_SERVICE);
mUsbManager.setCurrentFunctions(UsbManager.FUNCTION_NONE);
```

Behavior

Slider switch.

3.25 CABC Test

Description

Enable or disable cabc function in engineering mode to test cabc or eliminate cabc distractions.

Solution

Write 1 in `/sys/module/dpu_r4p0/parameters/cabc_disable` to disable, and 0 to enable.

Behavior

Slider switch.

4 CONNECTIVITY

4.1 BT

4.1.1 RF Path

Function

This function is used for EVB and OTT modules to select bt path as RF path, which is only applicable in both Marlin3 and Marlin3e products, and RF Path should be ignored in other connectivity products.

Solution

Send the wcn command via socket to continue:

- Enable: Send the command “eng bt set_rf_path 1”
- Disable: Send the command “eng bt set_rf_path 2”

Behavior

Slider switch

4.1.2 BT CLASSIC BQB

Function

This function is off by default. After enabling, the transmitting power of BT can be set by the instrument in the non-signaling test.

Solution

Send the AT command via socket, and send the configuration of “eng bt dut_mode_configure”.

Behavior

Slider switch

4.1.3 BT Non-signaling TEST

4.1.3.1 Non-signaling TX

Function

This function is used to test the sending function of BT; you need to turn off BT EUT before testing.

Solution

Figure 4-1 Non-signaling TX interface

Non Signaling TX

TX Pattern

00000000

TX Channel

255 or 0~78

TX Pac Type

NULLpkt

TX Pac Len

MaxLen is 0

TX Power Value

0~7

TX Pac Cnt

0

TX Mode

CLASSIC

START

STOP

- TX Pattern drop-down selection widget

Table 4-1 TX Pattern drop-down selection widget

%s commands parameter	Options
1	00000000
2	11111111
3	10101010
4	PRBS9
9	11110000

- TX Channel edit control: An integer with up to 3 digits can be entered, the input range is 0-78 and 255, there is no reserved function for the setting items, and the setting content is the command parameters.
- TX Pac Type Drop-Down selection widget:

Table 4-2 TX Pac Type Drop-Down selection widget

%s comm and parameters	Options	Max Pac Len	%s comm and parameters	Options	Max Pac Len	%s comm and parameters	Options	Max Pac Len
0	NULLpkt	0	11	DH3	183	24	EDR_3DH1	83
1	POLLpkt	0	12	EV4	120	25	EDR_AUX1	29

%s comm and param eters	Options	Max Pac Len	%s comm and param eters	Options	Max Pac Len	%s comm and param eters	Options	Max Pac Len
2	FHSpkt	18	13	EV5	180	26	EDR_2DH3	367
3	DM1	17	14	DM5	224	27	EDR_3DH3	552
4	DH1	27	15	DH5	339	28	EDR_2EV5	360
5	DV1	10	16	IDpkt	0	29	EDR_3EV5	540
6	DV2	20	17	INVALlpkt	0	30	EDR_2DH5	679
7	HV3	30	20	EDR_LDH1	54	31	EDR_3DH5	1021
8	DV	9	21	EV3	30			
9	AUX1	29	22	EDR_2EH3	60			
10	DM3	121	23	EDR_3EV3	90			

- TX Pac Len edit control: An integer with up to 4 digits can be entered. The input range is related to TX Pac Type. The correlation is shown in the table above. At the same time, there is a Maxlen prompt at the bottom of TX Pac Len interface. Testers can input according to the prompt.
- TX Power Type drop-down selection widget:

Table 4-3 TX Power Type drop-down selection widget

%scommand parameters	Options
0	0
1	1

- TX Power Value edit control: An integer with up to 2 digits can be entered, the input range is 0-33, there is no reserved function for the setting items, and the input content is the issued command parameter.
- TX Pac Cnt edit control: An integer with up to 5 digits can be entered, input range 0-65536, there is no reserved function for the setting items, and the input content is the issued command parameter.
- TX Mode drop-down menu: You can choose between CW or CLASSIC mode.
- There are two buttons: Start and Stop.
 - Click Start to perform the following operations.

```
//Open bt
#eng bt bt on
//Set parameters and start
#eng bt set nosig tx testmode 1 0 %s(pattern) %s(channel) %s(pactype)
%s(paclen) %s(powertype) %s(powervalue) %s(paccnt)
```

- Click Stop to perform the following operations:

```
//Stop
#eng bt set nosig tx testmode 0 0 %s(pattern) %s(channel) %s(pactype)
%s(paclen) %s(powertype) %s(powervalue) %s(paccnt)
```

- To reduce the number of times to turn on and turn off BT. Turn bt on when the start button is pressed and off when you exit the sub test screen.

```
//Close bt
#eng bt bt_off
```

Behavior

Refer to the solution.

4.1.3.2 Non-signaling RX

Function

This function is used to test the receiving function of BT; you need to turn off BT EUT before testing.

Solution

Figure 4-2 Non-signaling RX interface



The screenshot shows the 'Non Signaling RX' interface. It features several input fields and a table at the bottom. The fields are: 'RX Pattern' with value '00000000', 'RX Channel' with value '0~78', 'RX Pac Type' with a dropdown menu showing 'NULLpkt', 'RX Gain' with value '0~32', and 'RX Addr' with value 'input 12 bits addr'. Below these fields is a table with three columns: 'RSSI', 'PER', and 'BER'. At the bottom of the interface are five buttons: 'START', 'READ', 'AUTO', 'CLEAR', and 'STOP'.

- RX Channel edit control: An integer with up to 2 digits can be entered, the input range is 0-78, there is no reserved function for the setting items, and the input content is issued command parameter.
- RX Pac Type drop-down selection widget:

Table 4-4 RX Pac Type drop-down selection widget:

%s command parameters	Options	%s command parameters	Options	%s command parameters	Options
0	NULLpkt	11	DH3	EDR_3DH1	24
1	POLLpkt	12	EV4	EDR_AUX1	25
2	FHSpkt	13	EV5	EDR_2DH3	26
3	DM1	14	DM5	EDR_3DH3	27
4	DH1	15	DH5	EDR_2EV5	28
5	DV1	16	IDpkt	EDR_3EV5	29
6	DV2	17	INVALLpkt	EDR_2DH5	30
7	HV3	20	EDR_LDH1	EDR_3DH5	31
8	DV	21	EV3		
9	AUX1	22	EDR_2EH3		
10	DM3	23	EDR_3EV3		

- RX Gain edit control: An integer with up to 2 digits can be entered, the input range is 0-32, there is no reserved function for the setting items, and the input content is issued command parameter.
- RX Addr edit control: supports input 12-bit address, the input content is restricted to "0123456789abcdefABCDEF", the setting item has no reservation function, input content is in 2-bit unit, separated by ". For example, if the input content is 1234567890ab, the parameter carried in the instruction is 12: 34: 56: 7: 90: ab.
- The RX function is to test the reception function of the BT chip, and the reception result is reflected using RSSI/PER/BER.
 - RSSI: execute eng bt set_nosig_rx_rcv_data to return the negative number of rssi values in the result.
 - PER: pkt_err_cnt/ pkt_cnt results retain 6 significant digits after the decimal point, and then converted to a percentage display.
 - BER: bit_err_cnt/ bit_cnt result retains 6 significant digits after the decimal point, and then converted to a percentage display.
- There are five buttons: Start, Read, Auto, Clear, and Stop.
 - Click the Start button to perform the following operations:

```
//Turn on Bluetooth
#eng bt bt on
//Startsending the setting parameters
#eng bt set_nosig_rx_testmode 1 0 7 %s(channel) %s(pactype) %s(gain) %s(addr)
```

- Click the Read button to perform the following operations:

```
//Get bt rx capability
#eng bt set_nosig_rx_rcv_data
```

Return value format: Ok rssi:9, pkt_cnt:3, pkt_err_cnt:3, bit_cnt:4672, bit_err_cnt:2351

- Click the Auto button to perform the following operations:

This button realize sending circular instructions to obtain the bt rx capabilities. After pressing the Auto button, you can set the interval time for issuing circular instructions. You can enter 1000ms+.

- Click the Clear button to perform the following operations:
Pressing this button to start the Result. The AP side saves the test result in Arraylist. Click this button, AP clears the data in the Arraylist and notifies the interface to refresh.
- Click the Stop button to perform the following operations:

```
//Stop and try again
#eng bt set_nosig_rx_testmode 0 0 7 %s(channel) %s(pactype) %s(gain) %s(addr)
```

- To reduce the number of times to turn on and turn off bt, turn bt on when the Start button is pressed, and off when you exit the sub test screen.

```
//Close bt
#eng bt bt_off
```

4.1.3.3 Non-signaling BLE TX

Function

This function is used to test BLE TX function.

Solution

Figure 4-3 Non-signaling BLE TX interface

- TX Pattern drop-down selection widget:

Table 4-5 TX Pattern drop-down selection widget

%s command parameters	Options
1	00000000
2	11111111
3	10101010
4	PRBS9

%s command parameters	Options
9	11110000

- TX Channel edit control: An integer with up to 3 digits can be entered, the input range is 0-78 and 255, there is no reserved function for the setting items, and the input content is issued command parameter.
- BLE TX Data Length edit control: An integer with up to 3 digits can be entered, the input range is 0-192, there is no reserved function for the setting items, and the input content is issued command parameter.
- TX Pac Cnt edit control: An integer with up to 5 digits can be entered, the input range is 0-65536, there is no reserved function for the setting items, and the input content is issued command parameter.
- TX Mode drop-down menu: You can choose between CW or BLE mode.
- There are two buttons: Start and Stop.
 - Click Start to perform the following operations:

```
//Open bt
#eng bt bt on
//Set parameters and start
#eng bt set nosig tx testmode 1 0 %s(pattern) %s(channel) %s(pactype)
%s(paclen) %s(powertype) %s(powervalue) %s(paccnt)
```

- Click Stop to perform the following operations:

```
//Stop
#eng bt set_nosig_tx_testmode 0 0 %s(pattern) %s(channel) %s(pactype)
%s(paclen) %s(powertype) %s(powervalue) %s(paccnt)
```

- To reduce the number of times to turn on and turn off bt, turn bt on when you press the start button and off when you exit the sub test screen.

```
//Close bt
#eng bt bt_off
```

Behavior

Refer to the solution

4.1.3.4 Non-signaling BLE RX

Function

This function is used to test BLE RX function.

Solution

Figure 4-4 Non-Signaling BLE RX interface

The screenshot shows a software interface titled "Non Signaling BLE RX". It contains several configuration fields with dropdown menus and text inputs, followed by a set of control buttons at the bottom.

Field	Value
BLE RX Mod_Index	Stable
BLE RX LE_PHY	LE1M
BLE RX Channel	0~39
BLE RX Gain	0~5
BLE RX Addr	input 12 bits addr
RSSI	PER

At the bottom of the interface are five buttons: START, READ, AUTO, CLEAR, and STOP.

Interface options sequence:

- BLE RX Mod_index (marlin2 deleted, marlin3/marlin3e, marlin3-L reserved)
- BLE RX LE_PHY (marlin2 deleted, marlin3/marlin3e, marlin3-L reserved)
- BLE RX Channel
- BLE RX Gain
- BLE RX Addr
- RSSI、PER

NOTE

- BLE RX Mod_index: marlin2 except, marlin3/marlin3e、marlin3-L reserved
- BLE RX LE_PHY: marlin2 except, marlin3/marlin3e、marlin3-L reserved

Behavior

NA.

4.1.4 BT LE BQB

Function

The function is a Bluetooth BQB authentication function.

Solution

The AT command is sent to `"/data/misc/bqb_ctrl"` through the socket:

- Send `SPBQBTEST=1`, open BQB MODE; return "ok", which means the setting is successful, and return `ALREADY`, which means that it has already been set, and no operation is performed.
- Send `SPBQBTEST=0`, close BQB MODE; return "ok", which means the setting is successful and return "Already" which means that it has already been set, and no operation is performed.

Behavior

There is a button, which displays the option of "enable" and "disable"

4.2 FM

Function

This function is used to test the playback path of FM (headset and external speakers). To test this, you can bootstrap the input frequency band to test the signal strength and obtain the RDS BLER value.

Solution

In engineering mode, the playback path is switched by calling the AudioManager `setAudioPath` function to monitor the insertion of the headset. If the headset is plugged out or not inserted, a prompt dialog box is forced to pop up.

RDS BLER: The chip directly calls `FmNative.getBler()` to obtain, or obtains the BLER value by calling the `onStatusEvent` method in `IFmReceiverEventHandler`.

Behavior

- `EditView` for input channels
- Set the two buttons for headset and external playback
- `TextView` showing BLER value

4.3 Wifi

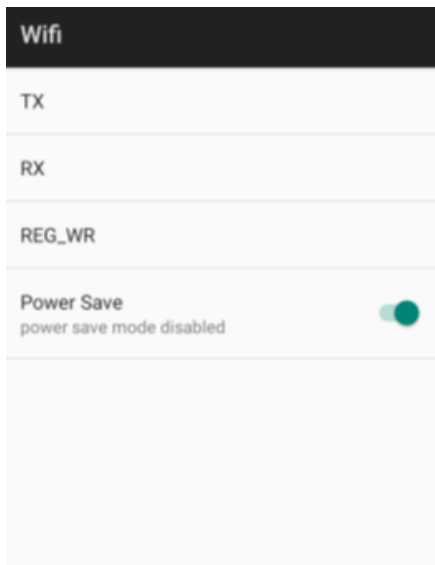
Function

This function is used to enter the Wifi test where you can test Wifi RX, TX, and `REG_WR` separately to check relevant Wifi functions. Wifi non-signaling test related commands are integrated in engineering mode.

Solution

Send related commands to `wcnd` via socket, and then `wcnd` will continue to send these commands to the bottom layer `wcn`, and the bottom layer `wcn` will complete these operations. Operations are as follows.

Figure 4-5 Wifi Interface



Enter the Wifi option, which currently includes:

- TX
- RX
- REG_WR
- Disabled Power Save Mode

To display the sub-menu as shown in Figure 4-5, you need to perform the following operations:

```
//Start cmdservice
# SystemProperties.set("persist.sys.cmdservice.enable", "enable");
//Load wifi driver.
# insmod /lib/modules/sprdwl.ko

//Communicate with wcmd and issue start instructions
# eng iwnpi wlan0 start
//Query theDisabled Power Save Mode disturbance and update the interface switch status
# eng iwnpi wlan0 lna status
To exit this interface, the following operations are required
//Send stop command with communication with wcmd
# iwnpi wlan0 stop
//Uninstall the driver
# rmmod system/lib/modules/sprdwl.ko
```

- TX option: TX tests the sending capability of the Wifi chip on device. Mobile phone and test equipment are connected by wire. Both CW and Go are used to send data, but with different sending parameters. Stop is used to stop sending data.

Figure 4-6 Wifi TX interface

Wifi TX

Pkt length

1000

Pkt cnt

0

Power level

0

Preamble

Normal

▼

RF Tx Path

Primary

▼

RF Standard

802.11b

▼

CBW

20MHz

▼

SBW

20MHz

▼

Channel

CH1[2412M]

▼

Offset

0MHz

▼

Rate

1Mbps

▼

Mode

Sin Wave

▼

Guard interval

400ns

▼

CW

GO

STOP

The “TX” sub-options includes the following:

- Channel drop-down selection widget:

Table 4-6 Channel drop-down selection widget.

%s command parameter	Options
1	channel 1 (2412MHz) default
2	channel 2 (2417MHz)
3	channel 3 (2422MHz)
4	channel 4 (2427MHz)
5	channel 5 (2432MHz)
6	channel 6 (2437MHz)
7	channel 7 (2442MHz)
8	channel 8 (2447MHz)
9	channel 9 (2452MHz)
10	channel 10 (2457MHz)
11	channel 11 (2462MHz)
12	channel 12 (2467MHz)

%s command parameter	Options
13	channel 13 (2472MHz)
14	channel 14 (2484MHz)

- Pkt length edit control: An integer with up to 5 digits can be entered, the input range is 1-4095, the setting data can be retained, that is, exit the interface and enter again, the setting data remains unchanged, and the input content is issued command parameter.
- Pkt cnt edit control: An integer with up to 5 digits can be entered, the input range is 0-65535, the setting data can be retained, that is, exit the interface and enter again, the setting data remains unchanged, the input content is issued command parameter.
- Power level edit control: An integer with up to 4 digits can be entered, the input range is 0-2127, the setting data can be retained, that is, exit the interface and enter again, the setting data remains unchanged, the input content is issued command parameter.
- Rate drop-down selection widget: The rate can be selected as shown in the table below. The options are not distinguished by mode and are all provided. This function is provided for professionals to use, and personnel can judge the data settings by themselves.

Table 4-7 Rate drop-down selection widget.

%s command parameter	Rate value	Mode
1	1Mbps default	B rate
2	2Mbps	
5	5.5Mbps	
11	11Mbps	
6	6Mbps	G rate
9	9Mbps	
12	12Mbps	
18	18Mbps	
24	24Mbps	
36	36Mbps	
48	48Mbps	
54	54Mbps	
7	6.5Mbps	N rate
13	13Mbps	
19	19.5Mbps	
26	26Mbps	

%s command parameter	Rate value	Mode
39	39Mbps	
52	52Mbps	
58	58.5Mbps	
65	65Mbps	

- Mode drop-down selection widget:

Table 4-8 Mode drop-down selection widget

%s command parameter	Options
0	802.11 pkt default
1	Sin Wave

- Preamble drop-down selection widget:

Table 4-9 Preamble drop-down selection widget

%s command parameters	Options
0	Normal default
1	CCK Short
2	802.11n Mixed Mode
3	802.11n Green Field

- Band width drop-down selection widget:

Table 4-10 Band width drop-down selection widget.

%s command parameters	Options
0	20MHz
1	40MHz
3	160MHz

- Guard interval drop-down selection widget:

Table 4-11 Guard interval drop-down selection widget.

%s command parameters	Options
400	400ns
800	800ns

- There are three buttons, namely CW, Go, and Stop.
 - Press CW to perform the following operations:

```
//Set channel parameters
# eng iwnpi wlan0 set channel %s (channel)
# eng iwnpi wlan0 tx_start
```

- Press Go to perform the following operations:

```
//Set the channel parameters.
# eng iwnpi wlan0 set channel %s (channel)
//Set the pktlength parameter
# eng iwnpi wlan0 set pkt length %s (pktlength)
//Set the pktcnt parameter
# eng iwnpi wlan0 set tx count %s (pktcnt)
//Set powerlevel parameters
# eng iwnpi wlan0 set tx power %s (powerlevel)
//Set the rate parameter
# eng iwnpi wlan0 set rate %s (rate)
//Set the preamble parameters
# eng iwnpi wlan0 set preamble %s (preamble)
//Set the bandwidth parameter
# eng iwnpi wlan0 set bandwidth %s (bandwidth)
//Set the guardinterval parameter
# eng iwnpi wlan0 set guard interval %s (guardinterval)
    if (mode == 802.11pkt) {
        # eng iwnpi wlan0 tx_start
    } else if (mode == Sin Wave) {
        # eng iwnpi wlan0 sin_wave
    }
```

- Press Stop to perform the following operations:

```
#eng iwnpi wlan0 tx_stop
```

- RX option: RX tests the receiving capability of the Wifi chip on device. Mobile phone and transmitting equipment are connected by wire and calculates the amount of data received and bit error rate.

Figure 4-7 Wifi RX interface



The “RX” sub-options includes the following:

- The Channel drop-down optional widget: same as Tx, default channel1.
- Test Rx Num edit control: An integer with up to 8 digits can be entered, no input range limitation, setting data can be retained, that is, exit the interface and enter again, setting data remains unchanged, input content is issued command parameters.
- Two output control: 1) RX OK: 2) PER:
- There are two button controls: Start and Stop
 - Press the Start button to perform the following operations:

```
//Set the channel parameters
# eng iwnpi wlan0 set channel %s (channel)
# eng iwnpi wlan0 rx_start
```

- Press the Stop button to perform the following operations:

```
# eng iwnpi wlan0 get rx ok
The return value of this instructcion include rx end cnt, which is displayed in the RX OK field, and
the value displayed in the PER field.
(Test Rx Num-RxOK)/ Test Rx Num * 100%
# eng iwnpi wlan0 rx_stop
```

- **REG_WR:** REG_WR is to execute read and write operations of fixed address registers which help the wifi hardware engineers to troubleshoot address issues. For example, some addresses are abnormally read or written, and failed or error messages popup. Functional testers can skip this section.
 - Type drop-down selection widget:

Table 4-12 Type drop-down selection widget.

%s command parameters	Options
mac	mac (default)

%s command parameters	Options
phy0	phy0
phy1	phy1
rf	rf

- Addr edit control: The default is 0. Supports input of integer numbers and abcdef, the set value can be retained. The correspondence between Addr input range and type is as follow:

Table 4-13 Addr edit widget

Type	Addr input range
mac	0-800
phy0	0-ff
phy1	0-ff
rf	0-6ff

- Length edit control: The default is 1, and currently does not support input settings.
- Value edit control: The default is 0, which supports the input of integer numbers without restrictions on the input range.
- Two button controls: Read and Write

- Press the Read button to perform the following operations

```
# iwnpi wlan0 get_reg %s(type) %s(Addr) %s(Length) // The hexadecimal value does not need 0x prefix,
```

- Press the Write button to perform the following operations.

```
# iwnpi wlan0 set_reg %s(type) %s(Addr) %s(Vlaue)
```

The setting result is displayed through the dialog box

- Power Save settings:

```
//close
#eng iwnpi wlan0 lna on
//open
#eng iwnpi wlan0 lna_off
```

Behavior

Refer to the Solution

4.4 Wifi Certification

Function

- No sleep function
- Wifi Scan Off function

Solution

- Max Power:
Send commands to "WCND" through socket:
Open command: " iwnpi wlan0 set_tx_power"
- No sleep:
Send commands to "WCND" through socket:
 - Open command: " iwnpi wlan0 lna_on"
 - Close command: " iwnpi wlan0 lna_off"
 - Query command: " iwnpi wlan0 lna_status"
- Wifi Adaptive:
Send commands to "WCND" through socket:
 - Open command: " iwnpi wlan0 set_eng_mode 1 1"
 - Close command: " iwnpi wlan0 set_eng_mode 1 0"
 - Query command: " iwnpi wlan0 set_eng_mode 2"
- Wifi Scan Off:
Send commands to "WCND" through socket.
 - Open command: " iwnpi wlan0 set_eng_mode 3 1"
 - Close command: " iwnpi wlan0 set_eng_mode 3 0"
 - Query command: " iwnpi wlan0 set_eng_mode 4"
- Beamforming:
Send command to "WCND" through socket:
 - Open command: " iwnpi wlan0 set_beamf_status 1"
 - Close command: " iwnpi wlan0 set_beamf_status 0"
 - Query command: " iwnpi wlan0 get_beamf_status "
- STBC RX:
Send commands to "WCND" through socket:
 - Open command: " iwnpi wlan0 set_rxstbc_status 1";
 - Close command: " iwnpi wlan0 set_rxstbc_status 0";
 - Query command: " iwnpi wlan0 get_rxstbc_status ";

Behavior

Slide switch

4.5 Wifi Noise Scan Auto-Test

Function

- This function is used to ensure that the platform quickly evaluate the internal interference level of the PCB of each channel without relying on the instrument.
- In the absence of instruments, customer can quickly determine the approximate source of Wifi TX/RX problems
- Improve the overall debugging efficiency of platform customers.

Solution

- Detect the noise level of all Wifi channels and optional channels.
- Able to specify the length of the test time/specified number of tests.
- The average value of the selected channel can be displayed.

Behavior

Control combination

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5

HARDWARE

5.1 De Sense PLL

Function

This function is used for the modification of the PLL register in the engineering mode, similar to the read and write function of the arm register under the mobile tester. Can read and write whether there is frequency hopping, etc.

Solution

Call lookat tool to modify the register:

```
lookat [-l nword] [-s value] [-h] phy_addr_in_hex
```

EXAMPLES:

- Print single register (@0x82000004) value:

```
$ ./lookat 0x82000004
0x00000004
```

- print values of 8 continuous registers start from 0x82000030 in a formatted way:

```
$ ./lookat -l 8 0x82000030
ADDRESS | VALUE
-----+-----
0x82000030 | 0x00000002
0x82000034 | 0x00000000
0x82000038 | 0x00000000
0x8200003c | 0x00000000
0x82000040 | 0x0000
0x82000044 | 0x0000
0x82000048 | 0x0000
0x8200004c | 0x0000
```

- set register (@0x820004c0) 's value to 0xa072:

```
$ ./lookat -s 0xa072 0x820004c0
```

Behavior

There is an address input box, a data input box, a number input box, a result display window, and two buttons which execute read and write operations of the PLL register by calling lookat functions.

NOTE

After 7.0, the same problem is caused by the sub-authority. Only when the user debug version supports the normal use of the function and the relevant permission is required to be checked.

5.2 Control the charging interval

Function

This function is used to control the charging interval while displaying the mobile phone in the business hall. Charging is turned on when it is less than 30%, and charging is stopped when it is 90%.

Solution

Kernel driver provides interface:

- Sys/class/power_supply/battery/capacity to obtain power.
- Sys/class/power_supply/battery/stop_charge turn on/off charging

Behavior

Slider switch; switch ON means to turn ON the function, switch OFF means to turn OFF the function.

5.3 Camera Idle Sleep

Function

If this function is enabled, the camera application will exit if it is idle for some time.

Solution

This function is achieved by setting the value of ". persist.sys.camera.idlesleep" which is true by default.

- When persist.sys.camera.idlesleep is true, the camera application will exit after 2 minutes of inactivity.
- When persist.sys.camera.idlesleep is false, the camera application does not exit camera after being idle for 2 minutes.

Behavior

Slider switch; switch on means "Camera idle exit" is on, switch off means "camera idle" exit is off.

5.4 Camera Power Test Mode

Function

This function is used to test the power consumption in the user version without affecting the normal function as presently the default Camera power consumption test requires manual adb to set various modes for testing,

Solution

The upper layer is switched by setting the value of the system property "persist.sys.isp.af.bypass". Set to "1" to turn on Camera Power Test Mode, and set to "0" to turn off

Behavior

Slider switch; switch on means “Camera Power Test Mode” is on, switch off means “Camera Power Test Mode” is off.

5.5 Reset Setting

Function

This function is used to set the restart method, including soft reset and hard reset:

- If it is set to soft reset, it is in incomplete power down mode, and systemdump will occur by pressing the power button for 7 seconds in power-off status.
- If it is set to hard reset, it is in complete power-down mode, and systemdump will not occur by pressing the power button for 7 seconds in power-off status.

Solution

The upper layer is set by writing the node “/sys/class/misc/sprd_7sreset/hard_mode”, writing “0” is set to soft reset, and “1” is set to hard reset.

Behavior

Design a selectable list view on the UI, with soft reset and hard reset as the options.

5.6 Antenna Settings

Function

This function is used to set the main and auxiliary antennas to assist RF debugging.

Solution

AT+SPDUALRFSEL

Behavior

There are 4 ListViews on the interface. After entering the menu interface, an AT command will be triggered to query the current status. The tester can select the corresponding options according to the function needs. After confirming the selection, the phone will be restarted.

- LTE: Primary and Diversity, Primary only, Diversity only
- WCDMA: Primary and Diversity, Primary only, Diversity only
- GSM div: Primary and Diversity, Primary only, Diversity only
- CDMA 2000: Primary and Diversity, Primary only, Diversity only, Primary and Diversity Dynamic

5.7 ASDIV Settings

Function

- This function is used to test the upper antenna and lower antenna OTA.
- Single main single auxiliary function

Solution

- At+SPDPDTENABLE
- At+SPWASDUMMY

Behavior

Listview, after entering the menu interface, will issue AT commands to query the current status, testers can choose the corresponding options according to functional needs:

- LTE DPDT switch to ANT1
- LTE DPDT switch to ANT2
- GSM DPDT switch to ANT1
- GSM DPDT switch to ANT2
- WCDMA DPDT switch to ANT1
- WCDMA DPDT switch to ANT2
- C2K DPDT switch to ANT1
- C2K DPDT switch to ANT2

5.8 Coulomb meter test power consumption function

Function

This function is used to see the approximate power consumption of a scene when using a mobile phone.

Solution

After finishing, draw a simple graph with all the saved data every 10 minutes, with time in horizontal axis and power consumption in vertical axis. Record the current data every 10 minutes, because Android has a healthy mechanism that data are synchronized every 10 minutes. If you are testing long standby power consumption, such as 24 or 48 hours, collect data every one or two hours, and then plot each data as a point. If the test time of a simple scene is less than 20 minutes, no chart is required.

Method for obtaining power consumption data:

1. Click the “Start” button to echo 1 > /sys/class/power_supply/sprdfgu/cc_test_cmd to this node.
2. Click “end” button when echo 0 > /sys/class/power_supply/sprdfgu/cc_test_cmd to this node.
3. Read the cat /sys/class/power_supply/sprdfgu/cc_test_result node value is displayed.
4. The power consumption test is divided into a long-time standby test and a single scene power consumption test. In either case, after the test time is reached, you need to go to this node with echo 0s > /sys/class/power_supply/sprdfgu/cc_test_cmd every time.

Behavior

The functional interface consists of three time periods, and each time period includes the following:

- Start time: the time when the test starts, and the power consumption test function will be started regularly after the time is up.
- Test duration: how long after the start of the test to end.
- “Start” button: used to start the scheduled power consumption test.
- “View result” button: used to jump to the result display interface to view the result and the graph.
- “Display icon” check box: After checking, you can view the power consumption data curve.
- “Clear” button: used to clear test data.

5.9 Camera FPS

Function

This function is used to test the power consumption in the user version without affecting the normal function as Camera power consumption test require manual adb to set various modes for testing

Solution

Control is achieved by the values of properties persist.sys.camera.idlesleep and persist.sys.isp.ae.manual

Behavior

There are three input box, namely Preview, Recording and Restore Defaults and buttons.

5.10 FM play by DSP

Function

This function is to play FM through DSP to solve the noise caused by FM clock out of synchronization.

Solution

FM playback mode is added to engineering mode: through DSP and not through DSP.

- The interface is as follows:

```
private AudioManager mAudioManager;
mAudioManager = (AudioManager) getSystemService(Context.AUDIO_SERVICE);
```

- Whether to support this function:

```
mAudioManager.getParameters("isAudioDspExist");
```

- FM initial state:

```
mAudioManager.getParameters ("FM_WITH_DSP=1");
```


- Play FM through DSP:

```
mAudioManager.setParameters ("FM_WITH_DSP=1");
```

- Play FM not through DSP:

```
mAudioManager.setParameters ("FM_WITH_DSP=0");
```

- Native layer interference:

```
AudioSystem::SetParameters(0, " FM_WITH_DSP =1");
```

Behavior

Add a switch to engineering mode

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6 LOCATION

6.1 Clock Quality Auto-Test

Function

This function is used to turn on each heat source to automatically test the clock frequency of different heat sources.

Solution

- Test Items
 - 5 items are supported currently
 - Each can be tested
- Clk Type
 - Support two schemes: TCXO and TSX.
 - If the TSX scheme is not calibrated, there will be a red reminder.
 - The scheme currently supported by the phone is automatically selected, and cannot be manually switched.
- Test Modes
 - Only supports Signal
- Time setting
 - Heating time

It is the duration when the heat source is on, that is the execution time of each scene. During this time, it will perform data collection.
 - Cool time

It is the duration for cooling after testing each heat source, and then proceed to the test in another scene. However, data collection is still taking place during this time.

Behavior

Widget combination.

6.2 GNSS De-sense Auto Test

Function

This function is used to turn on different interference source modules to test the impact on GPS CNO.

Solution

- Test Items
 - 5 items are currently supported
 - Items can be tested separately
- GNSS Band
 - GPS: 1~32
 - B1C (Beidou): 151~187
 - BD2 (Beidou): 201~237
 - GLN (Glonass): 65~92
 - GAL (Galileo): 301~336
- Test Modes
 - Only support Signal
- Test Result
 - Test Item
 - Result
 - Successful positioning, sampling once in 1s
 - Two 30s samples are taken for each case: once before the scene runs (Cool time) and once during the scene running (Heating time)
 - During the test, testing is displayed.
 - If the absolute value of Cool Data Mean minus Heating Data Mean is less than or equals to 3 ($| \text{Cool Data Mean} - \text{Heating Data Mean} | \leq 3$), it is PASS, otherwise it is FAIL.
 - De-sense (dB)
 - The data is displayed as the absolute value of Cool Data Mean minus Heating Data Mean.
- Extended Information
 - There are two cases of failure: first, the data is unqualified; second, the item ends abnormally during the test.
 - Click on each result: if it ends abnormally, an error message will be displayed, otherwise, a graph of the data will pop up.
 - The span size of the vertical axis (value) and the horizontal axis (time) in the graph depends on the peak value of a single sample and the total sampling time.

Behavior

Widget combination.

6.3 GNSS Noise Scan Auto Test

Function

This function is used to turn on different interferences source modules and test the impact on the in-band ground noise.

Solution

- Test Items
 - 9 items are currently supported.
 - Items can be tested separately
- Test Setting
 - Repeat times: Test times for each case (Considering the testing period is long, the maximum number of times is limited to 3).
 - Period per test case: The test time of each case.
 - First delay: The time interval between the moment you press the Start button and the moment the first test case starts.
- Test Result
 - Test Item
 - Result
 - After the conditions are met (such as successful positioning), a sampling is performed in 1s.
 - The sampling times and periods of each case are determined by Repeat times and period per test case.
 - No abnormality in every test is PASS, otherwise it is FAIL.
 - RSSI(dB)

The format of each result is: [Dry average of current sampling, maximum value of current sampling values]. The final result is displayed side by side in the format.
- Warning

There are three main categories:

 - The preset conditions are not met.

If the preset conditions are not met, you will be prompted when touching the Start button, and then it will automatically jump to the specified system page, for example, GPS is not turned on. If it does not jump, you will be prompted, for example, to use 3D third party tools for testing.
 - An exception occurred during operation

If the test is abnormal, FAIL will be displayed in the results with no test data but "--" displayed in the data area.
 - Suggestive reminder

One situation is to touch the Stop button during test, and it prompts "testing" which indicates the current item is being tested. If you stop testing the current item, the text items in the next if any will all fail.

Behavior

Widget combination.

7

Description of FAQs

1. Design scheme of network mode switching in engineering mode
 - WCDMA system products use AT+SYSCONFIG
 - TD-SCDMA products use AT+SNVM
 - LTE products: There are many LTE network modes which are divided into four categories with many sub-categories. Network mode switch is mainly done is Ril. You only need to set relevant property values through System Properties and it will take effect after modem reset. After the modem is restarted, the modem will sense the change and configure network mode according to the configuration in systemProperties.
2. If switching network mode in engineering mode fails, you need to provide a complete YLog including Android log and modem log
3. If in the engineering mode, UI shows that the application stops running or there is no response, you need to grab the complete YLog, record the time point the issue occurs and take a screenshot.
4. Description of gray items in engineering mode.
 - The version itself does not support the function or the project does not need to support the project.
 - Missing related affiliate apk etc.
 - The reserved project has not been realized yet
 - Related services are not started.

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Reference Documents

1. 3GPP TS 27.007 V4.6.0 (2003-3)
2. AT Command User Guide
3. Instruction for using Log manager in engineering mode
4. VoLTE engineering mode setting parameter table.

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