Qtrun Technologies

Network Signal Guru
User Manual

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CONTENT

1 Introduction

Network Signal Guru (NSG) is an APP software for verification, maintenance, trouble-shooting and benchmarking of mobile networks as well as for basic cell planning tasks. Built into a commercial mobile phone or tablet, NSG collects measurements and events and presents them on the device display. The measurements can be stored for later analysis in other products such as Actix Analyzer, Qualcomm QCAT, and TEMS Investigation etc. The combination of small size and powerful testing features makes NSG a convenient tool for day-to-day monitoring of mobile networks, particularly in an indoor or pedestrian scenario. In addition, since the mobile device can function as the user's regular phone, NSG provides a powerful way to find errors without explicitly searching for them. NSG is designed as an integral part of the device's user interface. This promotes continuous use by engineers and technicians, which translates into more time for them to detect, document, and solve problems.

1.1 Fundamentals of Network Signal Guru

NSG is an air interface test tool for cellular networks, supporting all of the following technologies:

- *LTE (FDD and TDD), LTE-Advanced Technologies*
- *WCDMA/HSPA/HSPA+*
- *GSM/GPRS/EGPRS*
- *TD-SCDMA (including interaction with LTE and GSM)*
- *EV-DO Rev. B/EV-DO Rev. A/EV-DO Rel. 0/cdma2000/cdmaOne*

NSG enables monitoring of a wide variety of data services over packet-switched connections, as well as CS voice and video telephony. NSG is primarily a tool for data collection and real-time analysis. It interfaces with a wide range of user terminals, scanners, and positioning equipment, collecting data from these devices and recording it in logfiles. The application also boasts a vast array of windows for presentation of logfile data.

1.2 Key Features

- Supported radio technologies: LTE (FDD and TDD) , WCDMA/HSPA/HSPA+, GSM/GPRS/EGPRS, TD-SCDMA (including interaction with LTE and GSM), EV-DO Rev. B/EV-DO Rev. A/EV-DO Rel. 0/cdma2000/cdmaOne
- Supported Testing: PS, CS, VoLTE
- Signaling Tracing: L1/L2/L3 tracing

- Signaling decoding: full decoding of message decoding and presentation of different radio technologies
- Dual SIM card support and monitor 2 networks simultaneously within a single mobile phone.
- Forcing features for different technologies, including RAT locking, band locking and cell locking as well
- Different predefined monitors and charts of different technologies, such as cell information, radio configurations, channel information, packet performance and etc.
- Most front-edged technologies supports, such as LTE-A, 256-QAM DL, 64-QAM UL, 4xCC, 4x4MIMO, VoLTE EVS codec and so on…
- Inbuilding testing support since version 1.7
- Data and voice testing scripting support since ver 1.7.

1.3 Commercial Uses

NSG is designed for networking design, deployment and commissioning and it can be used for any kind of purposes, including training, researching, studying and commercial uses. User can access all of the features provided by this app and you can use it for testing, reporting, analyzing, training and even security decoding. Many worldwide write us that whether it can be used for commercial use and the answer is yes. If you have marketing resources, you can even work as distributor of NSG app. For more details, just write us.

2 What's New?

2.1 Version 1.7 (Aug. 2017)

- Indoor Testing Support;
- Testing Scripts for Voice and Data;
- Control Features for UMTS and LTE;
- Outdoor Map Settings for Cells and Test Routes;
- Premium Documentation;
- Reorder Table UI Page;

2.2 Version 1.6 (Jun. 2017)

- Qualcomm SD835 support
- SD835 cannot lock bands;
- Remove general mode of NSG

2.3 Version 1.5 (Apr. 2017)

- Cell file importing and presentations(paid version only)
- China payment support.
- China map support in general mode.
- Fixed known bugs (bandwidth, crashes, purchase errors and etc.)

2.4 Version 1.4 (Mar. 2017)

- Add more options to purchase;
- Add Chinese detailed map supports;
- Added online QUALCOMM dlf exportations for paid version;
- Re-arrange the data views of all RAT;
- Fixed mapping problems;
- Fixed other problems;

2.5 Version 1.3 (Feb. 2017)

Since 1.3, NSG provides a channel to buy some advanced features. We will add more features to paid version and some of the previous features will be removed from open version. Please understand.

- Log file logging and replaying(inapp buy needed);
- Dual SIM supports;

- LTE cell locking(inapp buying needed);
- Google buy;
- LTE Sessions
- Tencent app store.

2.5.1 Version 1.3.1 (Feb. 2017)

- Fixed crashes in purchasing process;
- Fixed errors in Eutra Sessions;
- Adjust some elements in LTE Configurations;

2.6 Version 1.2 (Dec. 2016)

Hotfix

- Crash in a few cases (1.2.3)

- Frequent random crash (1.2.2)

New

- Logging options;

- WCDMA Throughput;

- Enhanced Graphing.

Change

- Remove 3rd-party library to boost performance;

- Legal Fonts;

- Move wizard menu to overflow menu;

- No longer report IMEI to server;

Fix

- Some parameter decode wrong;

- Crash when try open browser;

- Sometimes auto check compatible failed;

2.7 Version 1.1 (Oct. 2016)

New

- New UI styles;

- Display LTE band frequency;

- Voice vocoder for new devices;

- CA adaptive screens (1cc or 2cc or 3cc);

- VoLTE adaptive view (only show when VoLTE);

- LTE uplink CA supports;

- New parameters for TD-SCDMA;
- FAQs and User Manuals;

Fix

- Crash on map or line chart when restart testing;
- Crash at general mode when don't grant location permission;
- Some 3GPP protocol decode errors

2.8 Version 1.0

New

- LTE 3xCA, 256QAM DL and 64QAM UL support (settings->carriers, choose 3xCA to enable 3CC watch);
- Support to Chinese language;
- LTE MIMO and eNB differences
- LTE network configurations (AMBR, APN, IP, in cell configurations)

Fix

- Compatible for in MSM895x (MiMax, Redmi Note3 etc)
- LTE bandwidth errors;
- LTE TM errors in old phones;
- LTE NAS signal decoding errors;
- LTE RRC some extension feature decoding errors;
- CDMA/EvDo decoding errors;

2.9 Version 0.9

New:

1. Map Improvements;
2. LTE CA Matrix;
3. VoLTE supports;
4. Graph Syncs;
5. TD-SCDMA decoding;
6. Scroll Supports to small size screens;
7. Battery Preferences settings.

Fix:

1. LTE MIMO antennas;

2. LTE RRC Decoding Crashes;

3. Wireless Attributes sampling by time(C/I, SINR, etc);

4. CDMA channel list errors;

5. Errors in LTE uplink attributes;

6. Display error in low density screens.

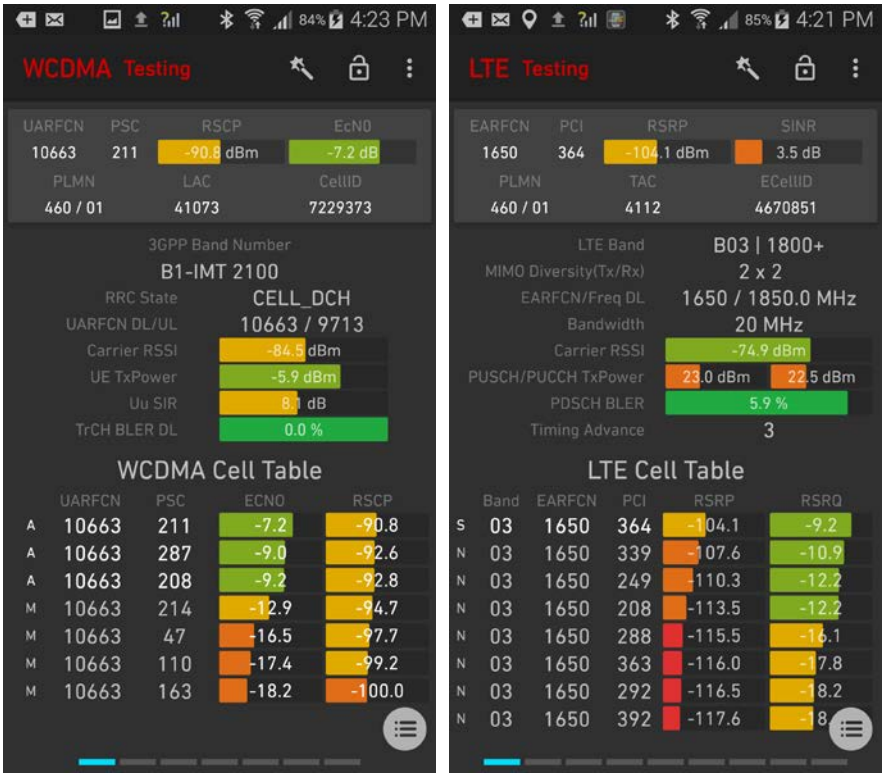
3 Quick Guide

3.1 Prerequisites for testing devices

Before NSG is starting, you have to make sure two things:

1. Be sure your phone is with a Qualcomm baseband or a Qualcomm processor
2. Your android system is rooted.

3.2 Testing Screen



NSG advanced mode is for professional users, which can present more detailed radio information as baseband can do. In this document we will show how it works. In testing mode, the menu and interface is different from that in general mode.

3.3 Supported Qualcomm basebands

NSG supports wide range of Qualcomm chipset cell phones. The following baseband or chipsets have been proved to access testing features.

- Qualcomm Snapdragon 200/400/600/800 series;
- APQ8064/8084;
- Qualcomm Modem-MDM9615/9625/9635/9645;
- MSM8226/MSM8610/MSM8660/MSM8228/MSM8212;

- MSM8952/8953/8960/8976/8974
- MSM8996/8992/8953/8939
- MSM8916/8909/8937/8994/8928/8929/8926;
- MSM8998 SD835
- Qualcomm SD660
- Some Samsung Exynos processors pairing with Qualcomm modems(Exynos + Qualcomm), these kind of phones are sold in mainland China, Japan, USA and some Indian regions. These phones can be enumerated in the listed countries.(i9305, SM-G9200, SM-G9250, SM-G9280, SM-G920V, SM-G9208, SM-G920P, SM-G925V, SM-G925P, SM-G928P, N920P, N920V, N9200);

Note: if you are not sure whether your phone is OK for testing. You can do one thing, run NSG in your devices firstly and then write us about your questions and our team will feedback you whether your device is ok. Please don't hesitate to contact our team.

3.4 Supported terminals

NSG supports wide range of commercially used cell phones, like Samsung, LG, XIAOMI, LeTV, Google Nexus, HTC, ZTE, Lenovo, Motorola, Asus, OnePlus, Sony, Panasonic and etc. Before you are rooting a commercial phone, please be noted that your phone is with a Qualcomm chipset or baseband. Please must be aware.

If you are not sure your phone is OK for testing, you can write us to make sure and we can check the databases. The email address is info@qtrun.com and please don't hesitate to write us.

As requested by many users worldwide, some supported devices are listed in this document. We would like you to be aware that the listed devices are not all the devices NSG supported but they are popular. NSG supported hundreds of different types of devices as far as now.

3.4.1 Samsung

- Samsung S3: i9305, i9300i;
- Samsung S4: i9505, i9506, i9295, i9205, i9507, i9195, i9192;
- Samsung S5: G900F, G900V, G900i, G900T, G900A, G900FD, G9009, G9008V, G9008W, G9006V, G9006W, G906K, G906L, G900M, G900P;
- Samsung S6: G9200, G9208, G9209, G920V, G920P, G920S;
- Samsung S6 EDGE: G9250, G925V, G925P;
- Samsung S6 EDGE Plus: G9280, G928V, G928P;
- Samsung S7: G9300, G9308, G930T, G930V, G930A, G930U, G930P;

- Samsung S7 EDGE: G9350, G935V, G935A, G935U, G935T, G935P;
- Samsung Note2: N7105, N7108D, N7108;
- Samsung Note3: N9005, N900V, N900P, N900T, N900A, N9008S, N9008V;
- Samsung Note4: N910G, N9100, N910F, N910T, N910A, N910P, N910W8, N915FY;
- Samsung Note5: N9200, N920V, N920P;
- Samsung Note7: N9300, N930V, N930A, N930T, N930P;
- Samsung Galaxy S8/S8+: G9500/G9550;
- Samsung A910F/A900/A300FU/A710F/A5000;
- Samsung C5000/G870A/404SC/G386W/J500FN

3.4.2 LG

LGE devices very well. Near all LGE devices with QUALCOMM are supported by NSG.

- LG G2/3/4/5;
- LG-D802/ LG-H830/ LG-K420/LG-D295
- LG-D618/ LG-D620 / LG-D855 / LG-H955 / LG-E988 / LG-H815
- LG-H962 / LG-D722 / LG-H810 / LG-H440n
- LG-H818 / LG-D390n / LG-P875 / LG-D838
- LG-F350S /VS986 / LG-H918 / LG-VS985
- LG-H850 / LG-D850 / LG-F350K / H858 /H950
- LG-D852 / LG-H955 / LGLS665 / LG-D800 / LG-LS980/ LGLS991/ LG-H812
- LG V20;
- Other LG cell phones with Qualcomm chipsets

3.4.3 HTC

- HTC One M7 APQ8084
- HTC One M8 MSM8974
- HTC One M9 MSM8994(Forcing disable by the vendor)
- HTC One M10 or HTC 10 MSM8996
- HTC One U11, MSM8998, SD835
- HTC U Ultra
- HTC Vive, MSM8996
- HTC One A9
- HTC Desire 826
- HTC E9 Qualcomm
- HTC One S
- HTC Sensation

- HTC Desire Eye
- Other HTC devices with Qualcomm

3.4.4 Google and Nexus

- Nexus 4 Mako
- Nexus 5 hammerhead
- Nexus 5X bullhead
- Nexus 6P angler(*See FAQ for forcing features*)
- Nexus 6 shamu
- Nexus 7 deb
- Nexus 9 flounder
- Pixel and Pixel XL(*No Forcing Features, Radio Locked*)

3.4.5 XIAOMI

NSG supports Xiaomi very well. Near all Xiaomi devices with QUALCOMM are supported by NSG.

- Xiaomi 2: Mi 2W/2S/2C;
- Xiaomi 3: Mi 3S/3W/3C;
- Xiaomi 4: 4i/4C/4C/4W/4LTE
- Xiaomi 5: Mi 5, Mi 5 Pro, Mi 5S, Mi 5S Plus
- Xiaomi Note 1/Pro
- Xiaomi Note 2
- Xiaomi Max/Mix
- Xiaomi Max2
- REDMI 1/Pro
- REDMI 3: REDMI 3/3x/3s
- REDMI 4: 4/4A
- REDMI NOTE 1: HM 1S
- REDMI NOTE 3: REDMI NOTE 3/Pro
- XIAOMI 6(*, lock band need more settings)

3.4.6 LeTV or LeMobile

- X520/X526
- X720/727
- X820/X821/820+/X822/X829

- X920
- X800+
- X900+
- Le1Pro MSM8994

3.4.7 Lenovo

NSG supports Lenovo devices very well. Near all Lenovo devices with QUALCOMM are supported by NSG.

- Lenovo Zuk Z1, MSM8974
- Lenovo Zuk Z2, MSM8996
- Lenovo Zuk EDGE
- Z90/A6010/A6000/S90/X3
- other Lenovo phones with Qualcomm chipset;

3.4.8 OnePlus

- OnePlus 1: A001, A003, A005
- OnePlus X: E1001, E1002, E1003, E1005, E1004
- OnePlus 2: A2001, A2002, A2003, A2005
- OnePlus 3: A3000, A3001, A3002, A3003
- OnePlus 3T: A3010, A3011, A3012, A3015
- OnePlus 5: A5000(*, lock band need more settings)

3.4.9 ZTE

NSG supports zte very well. Near all ZTE devices with QUALCOMM are supported by NSG.

- ZTE Axon A2015;
- ZTE Axon A2016;
- ZTE Axon A2017;
- Nubia N918ST/ X9180/ NX507J/ NX529J/ NX518J/ NX513J/ NX508J/ NX510J/ NX601J/ NX511J/ NX531J/ NX507J /N523J/NX549J;
- Nubia Z17, MSM8998
- Other ZTE mobile with Qualcomm modems;

3.4.10 Huawei

NSG supports Huawei mobile phones with a Qualcomm modem. But some Huawei phones cannot use band locking and RAT locking features.

3.4.11 Motorola

NSG supports Moto devices very well. Here are parts of supported devices with Qualcomm basebands.

- Moto G2
- Moto G3
- Moto G4
- Moto G5 & Plus
- Moto G Play
- Moto E/E2
- Moto Z;
- XT925/1575/1064/1039/1524/1096/1225/1562/1580/1058/ 1650/ 1042/ 1085 / 1570 / 1080;
- Droid Turbo/Mini;
- Other Moto cell phones with Qualcomm modem;

3.4.12 Sony

NSG supports Sony devices very well. Here are parts of supported devices with Qualcomm basebands.

- C6603/6903/6602/6833/6502/5303/6802
- D6502/6653/5803/2202/5103/6616/6503/2303/5503/6603
- E6833/5803/6853/5823/6553
- F8132/F5121/5122
- Xperia V/Z1
- Xperia Z2 (AOSP) (D6503)
- Xperia Acro S
- LT25i/M35t/LT30a
- Other Sony phones with Qualcomm modem;

3.4.13 OPPO & VIVO

NSG supports OPPO/ViVO devices very well. Here are parts of supported devices with Qualcomm basebands.

- OPPO X9079
- OPPO N5206
- OPPO R9Plus
- OPPO R9S

- OPPO Find7
- OPPO X9006
- OPPO F1f
- OPPO R8207/R8007
- OPPO R7sf/R7Plusf
- ViVo V3
- VIVO Y51A
- VIVO Y31L

3.4.14 China Mobile Brand (CMDC or CMCC)

NSG supports China Mobile branded devices very well. Here are parts of supported devices with Qualcomm basebands. Most of CMDC branded phone are with Qualcomm modems. This brand is widely in China for low-end users and its popular testing device in China. That's why we list this brand separately.

- M631Y
- M636/M636A
- M821/M823
- M812C

3.4.15 Misc. Brands

NSG supports many small brands of cell phones with Qualcomm modems. Here is the partly listed brands.

- CoolPad China
- Micromax India
- Smartisan China
- Amazon USA
- Asus Taiwan
- Pantech Korea
- TCL China
- Hisense China
- Hair China
- Konka China
- Acer Taiwan
- Vodafone UK
- Yota Devices Russia

- Panasonic Japan
- Kyocera Japan
- Sharp Japan
- Fujitsu Japan
- Foxcomm Taiwan
- Nextbit USA

4 Purchase & Upgrade

4.1 Fundamentals

NSG is free since it's launching in google play store. Since that time, NSG is widely accepted by worldwide users who are using NSG for training, studying, engineering and even security researches. Before version 1.3, NSG is free and user can access all features in NSG. Since version 1.3, some of features will not be free any more for its further development and ongoing efforts. NSG will be commercialized since this new version. Some of the free features will be moved to paid version and won't be free anymore. Paid version will provide all or part of features in NSG according to different version. User will pay for service for certain period and in this period you can use it. After that you have to pay again and then you can continue to use it. That will help the developers to go further. Thanks for your understanding.

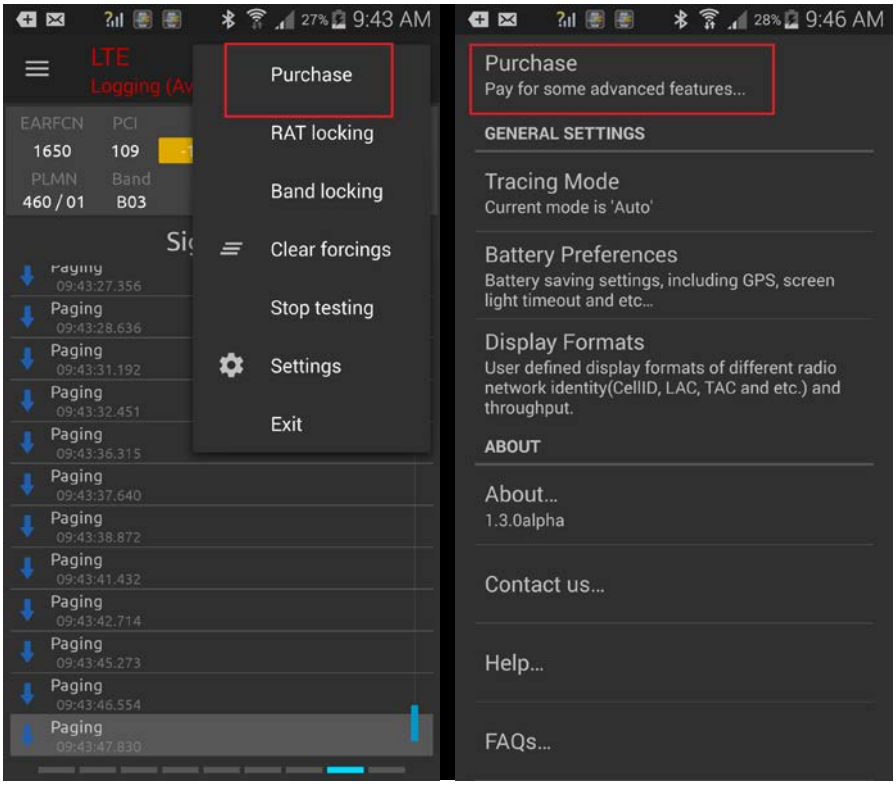
4.2 How to buy?

- User can purchase advanced features by the online payment channel. NSG can now support google pay and alipay for payments. Aliplay is for the Chinese.
- Google pay is available from newest google play services. Please update the google play services and then you can pay for NSG.
- Alipay can support QRCode as well…
- After the payment is successful, you can access the features said in the online manual. Some of the menu will be enabled.
- If you have any problems during payments, just write us info@qtrun.com.

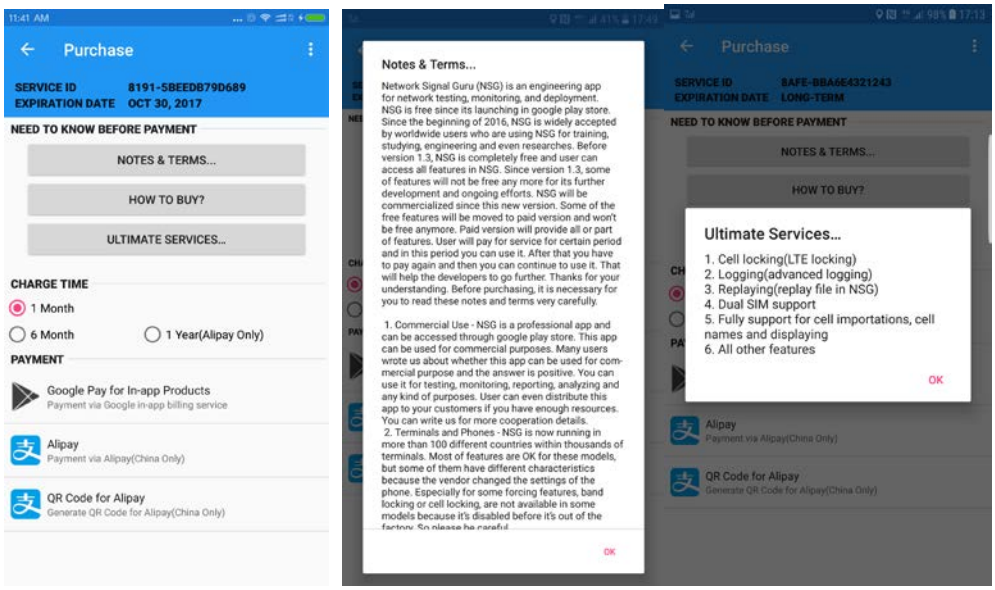
4.3 Purchasing Procedure

In NSG app, we provide 2 command channel to enable purchasing. First is in the options menu->Purchase. The second is located in settings->Purchase

These 2 command entry is the same you can choose anyone to perform paying process.

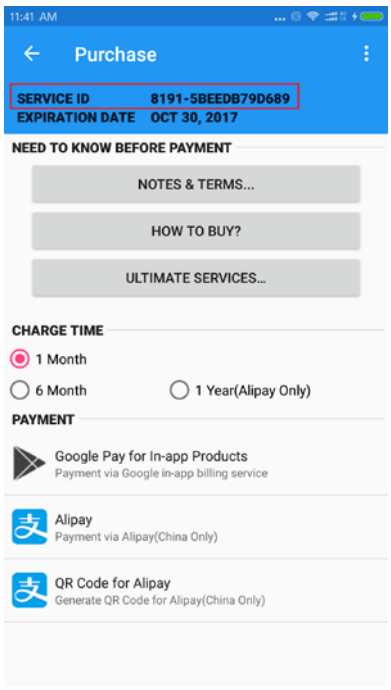


After the command is tapped, the main purchasing UI will show as follow.



4.4 Payment details

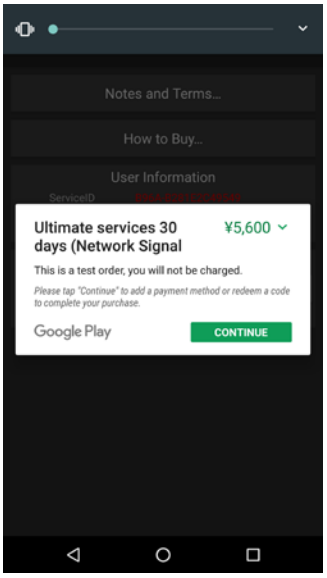
Before the money is transferred, please see the details for this process. We list all the details about payment screen which is very important to the payer. Please read it carefully, if possible, you can keep this screen of your phone and you can use it when unexpected errors happen. In the picture, **user information is very important** for you and that identifies the cell phone which you are paying for. We recommend user to keep this screen for later uses.



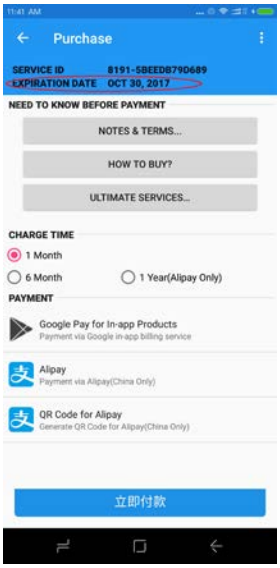
Right now NSG can support 2 ways of payment. Google pay and Alipay. In Google play, you can select 1 month and 6 month as options to pay. This is because that google pay limited the payment restraints (400USD once).

Alipay screen.

Google Payment Screen

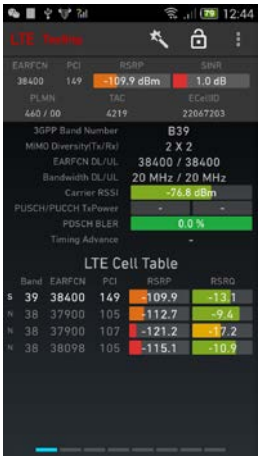


After the payment is successful, you need restart the app and will take effects. You can see the expiration date changed as the picture shown in the below.



5 Overview of NSG

5.1 Initial View



Once NSG has initialized, it will display the cell list data view for the radio access technology the device is connected to.

5.2 Action Bar

At the top of the screen, immediately below the Android status bar, is an action bar with a number of buttons. The set of buttons that appears is in part context-dependent.

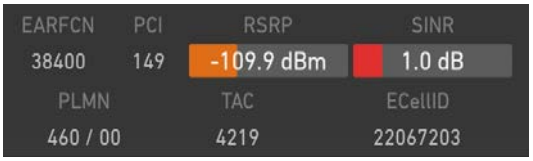
From here you can select what data view to show, inspect various other categories of data, and perform all of the actions and configuration tasks referred to in the whole of section.

Display the network serviced and test status Mark in the Action Bar

Network	Test status
LTE	Testing/halted
WCDMA	Testing/ halted
TD-SCDMA	Testing/ halted
1xEV-DO	Testing/ halted
CDMA	Testing/ halted
GSM	Testing/ halted
N/A	

5.3 Data View Header

In the most part of the data view is always shown a set of general data related to the cellular technology currently in use.



You also can swap to left or right to view more data.

5.4 Outdoor Map View

When testing in locations with GPS coverage, the Outdoor Map view can be used to display measurements, events and cell sites. This view allows you to easily locate network trouble spots and visualize network performance geographically.

 The legend can be display or no display.

 Keep the current point is in the central of the Graphing.

5.5 Log files

You can record data collected by NSG in logfiles and replay these files in NSG itself or load them in analysis tools such as Actix Analyzer, QUALCOMM QCAT and etc.

NSG log files(*.log) can be stored either on the internal memory card of the device (called "/sdcard/com.qtrun.QuickTest". to save more disk usage for NSG, log files will be compressed to .gz when next testing is started. So if you export log files, please include all of the log files(.log) and compressed files (.gz) together.

5.6 Control Functions

NSG as implemented on some of the supported devices has a number of control functions modifying the device's behavior in the cellular network. These include locking the device to a RAT, band, cell, or channel.

5.7 GPS Positioning

NSG supports positioning of data in logfiles using the device's built-in GPS

5.8 Language Support

The NSG devices support languages as follows: Simplified Chinese and US English.

Note: There is no support for inputting non-ASCII characters. When entering text strings, only use characters from the ASCII set.

5.9 Exiting NSG

Exit the application by tapping Exit.

6 Data Views

6.1 General Data View Properties

The presentation in data views combines textual and graphical elements.

Many data views in NSG are RAT-specific; there exist, for example, separate cell list data views for each supported RAT. Which views can appear is of course dependent on the range of technologies supported by the device; which view is shown at a given instant is governed by the RAT the device is currently using. The switching between views is automatic.

Whenever a parameter is currently not valid, this is indicated in the data view by a dash “–”.

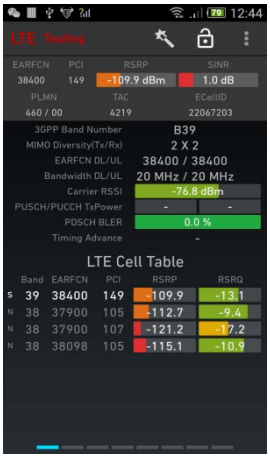
In all graphs containing a legend, you can tap anywhere in the graph to hide the legend. Tap once more to make the legend visible again. When you swipe to a graph view, the legend is always visible, even if you have previously hidden it.

6.2 Other Data View Actions

In some data views you can perform an action relating to a piece of data shown in the view. For example, in data views listing cells, you can lock on one of the cells.

Specifics on data view actions are found in the relevant sections of this document.

6.3 Survey of Data Views



On the data view, you can browse the data views by swiping left and right. The array of indicators along the down edge of the data view show the position of the current view, counting only views that belong to the cellular technology the device is currently using.

The list that follows covers all NSG data views that exist; please note that most NSG do not display all of these, since most devices do not support all of the technologies involved.

6.4 Data View Header

In the topmost part of the view is always shown a selection of data related to the cellular

technology and data bearer currently in use.

6.4.1 Indication of RAT and Data Mode

The leftmost part of the header displays two strings. On the right, in upright (non-italic) type, is a RAT indicator showing what radio access technology the device is currently using. On the left, written smaller and in italics, is shown the current data mode, meaning the type of bearer being used for data transfer. The latter can be either a mobile network bearer or Wi-Fi.

Here is the full list of RAT and data mode designations that can appear:

6.4.2 RATs

Technologies including GSM, WCDMA, LTE, CDMA, 1xEV and even TDSCDMA networking as well

6.4.3 Data Modes

Note that this data mode indication is much more fine-grained than the one given on the Android status bar.

- GSM data modes:

–GSM (shown when neither of the modes below is active)

- WCDMA data modes:

–WCDMA (shown when none of the modes below is active)

–HSPA

–HSPA DC (dual carrier)

–HSPA+

–HSPA+ MIMO

–HSPA+ DC

–HSPA+ DC MIMO

- LTE data modes:

–LTE

–LTE CA (carrier aggregation)

- CDMA/EV-DO data modes:

–CDMA (1xRTT)

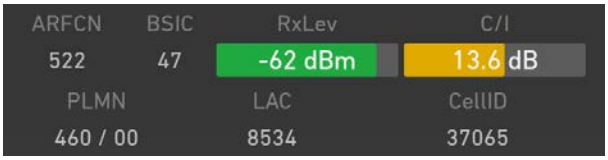
–1xEV (all 1xEV-DO varieties)

- TD-SCDMA data modes:

-TDSCDMA

6.5 GSM Views

6.5.1 Data view header for GSM

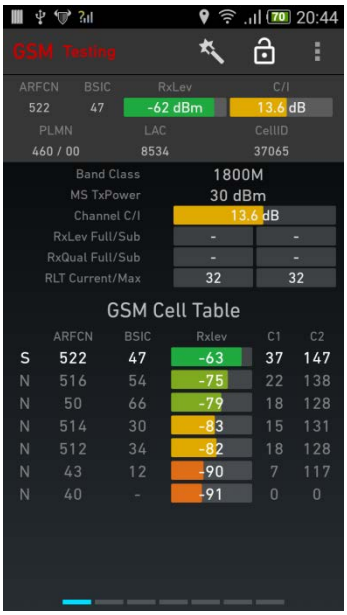


The GSM data view header will display the follow data:

(All data shown in the header pertains to the current serving cell.)

- ARFCN: Absolute Radio Frequency Channel Number
- BSIC: Base Station Identity Code
- RxLev: Received Signal Level (dBm)
- C/I: Carrier/Interference
- PLMN: Public Land Mobile Network，MCC and MNC (Serving cell Mobile Country Code and Serving cell Mobile Network Code)
- LAC: Serving cell Location Area Code
- CellID: Serving Cell Identity, 16 bits, decimal

6.5.2 GSM Cell Table & KPIs



The view displays the serving cell (always on top) and up to eight neighbors (in order of descending signal strength).

C/I: Carrier/Interference

PLMN: Public Land Mobile Network**,** MCC and MNC (Serving cell Mobile Country Code and Serving cell Mobile Network Code)

LAC: Serving cell Location Area Code

CellID: Serving Cell Identity, 16 bits, decimal

Band Class: GSM Serving band, GSM900, DCS1800, PCS1900, 450M, 700M etc.

MS TxPower: Transmit Power of Mobile Stations, Indicates the value of transmit power currently in use by the mobile active in call. This is expressed as either the power down from maximum in 2dB increments

RxLev Full/Sub: Serving Cell RxLev Full in dBm (for example, -78). This indicates the value of received signal strength (RxLev) measured by the mobile for the serving cell when in call. The full average comprises all of the samples taken over the SACCH period. The sub average comprises a subset of samples on the

mandatory bursts within the SACCH period.

RxQual Full/Sub: Received Signal Quality, Full/Sub. Serving Cell RxQual Full range 0...7 (for example, 2). This indicates the value of bit error rate class represented by RxQual measured by the mobile for the serving cell when in call and averaged for all the samples over the previous SACCH period. The sub average comprises of a subset of samples on the mandatory bursts within the SACCH period. The range of RxQualSub is 0-7.

RLT Current/Max: Radio Link Timeout, Current/Max ratio. Identifies the maximum value of the radio link timeout (in SACCH periods) used to determine if the message loss rate renders the downlink speech path unusable. Current is the actual value of timing out.

S: Serving cell

N: Neighbor cell.

ARFCN: Identifies the Absolute Radio Frequency Channel Number supporting the Broadcast Control Channel for the current serving cell.

BSIC: Base Station Identity Code, Identifies the Base Station Identity Code for the serving cell.

RxLev: Indicates the value of received signal strength (RxLev) measured by the mobile on the "camped" cell in the idle mode.

C1: Pathloss Criterion C1. Path loss criterion used for cell selection and reselection. It is defined by the following formula:

(A - Max(B, 0))

Where:

A = Received level average - RXLEV_ACCESS_MIN

B = MSTxPWR_MAXCCH – P

P = Maximum RF Output power of the MS.

RXLEV_ACCESS_MIN = Minimum received level at the MS required for access to the system.

MSTxPWR_MAXCCH = Maximum TX power level a MS may use when accessing the system until otherwise commanded. Except for the class 3 DCS 1800 mobile, where:

B = MSTxPWR_MAXCCH + POWER OFFSET - P

The path loss criterion is satisfied if C1 > 0.

For further information on criteria for cell selection and reselection, please consult the GSM specifications 05.08.

C2: Cell Reselection Criterion C2. Used only for cell reselection and defined by the following:

C2 (dB) = C1 (dB) + CellReselectOffset (dB) - TemporaryOffset(dB) * H(PenaltyTime (s) - T)

In cases when PenaltyTime = 11111:

C2 (dB) = C1 (dB) - CellReselectOffset (dB)

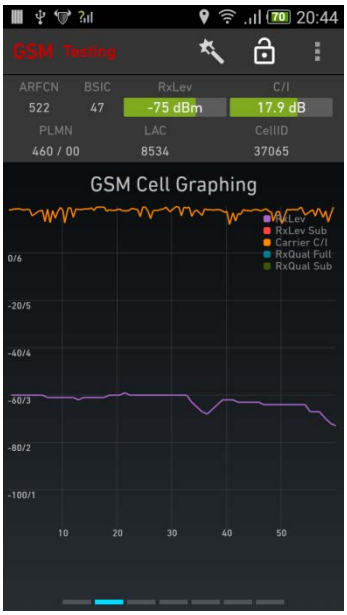
For non-serving cells:

H(x) = 0, when x < 0 and 1 when x >= 0

For serving cells:

H(x) = 0

6.5.3 GSM Cell Graphing



GSM Cell Graphing

The chart shows the latest 60 seconds. Each label “<n>” on the x-axis means “*n* seconds ago”.

The y-axis has both dBm and RxQual unit scale marks.

RxLev: Indicates the value of received signal strength (RxLev) measured by the mobile on the "camped" cell in the idle mode.

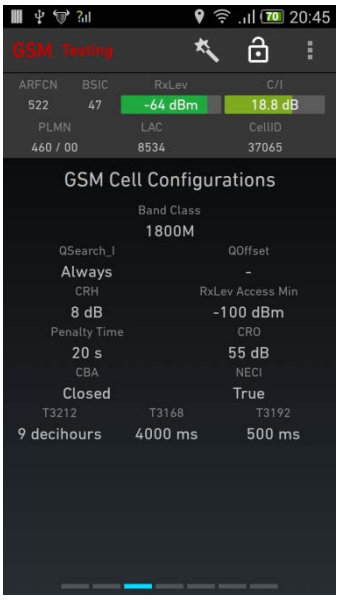
RxLev Sub: RxLev of strongest neighbor (dBm).

Carrier C/I: Carrier/Interference

RxQual Full: Serving Cell RxLev Full range 0..7 (for example, 2). This indicates the value of bit error rate class represented by RxQual measured by the mobile for the serving cell when in call and averaged for all the samples over the previous SACCH period.

RxQual Sub: Indicates the value bit error rate class represented by RxQual measured by the mobile for the serving cell when in call. The sub average comprises of a subset of samples on the mandatory bursts within the SACCH period. The range of RxQual Sub is 0-7.

6.5.4 GSM Cell Configurations



GSM Cell Configurations is as follow:

Band Class: GSM Serving band, GSM900, DCS1800, PCS1900, 450M, 700M etc.

QSearch_I: The value of rxlev for cell re-selection from GSM to UTRAN FDD.

QOffset: The value of Qoffset for cell re-selection from GSM to UTRAN FDD. This is valid for both WCDMA and TD-SCDMA networks.

CRH: Displays the setting of hysteresis which must be applied to the C1 criteria by the mobile in the idle mode to neighbor measurements for the purpose of cell re-selection (unit dB).

RxLev Access Min: Identifies the setting of the minimum RxLev value that must be exceeded for the cell to be considered a candidate for "camping" in the idle mode.

Penalty Time： Cell Reselect Penalty Time. Value range: 0~31, the corresponding time is 20~620s. 31 is to change the function direction of CRO on C2.

CRO: Cell Reselect Offset. It is a parameter in C2 calculation to give a manual modification in MS cell reselection. Value range: 0~63, the corresponding level value: 0~126dB, stepped every 2dB.

CBA: Cell Bar Access, worked together with CBQ to set the priority status of the cell in idle mode for cell selection and reselection. This is usually set to be active in the valid networks.

NECI: In a GSM network, the traffic channel (TCH) consists of full-speed TCH and half-speed TCH. When the network supports half-speed TCH, the MS is informed of whether the area supports half-speed TCH by NECI. Half-speed TCHs enable each carrier to support more traffic channel, but you must confirm whether the system support half-speed TCH.

T3212: It is Periodic Location Update Timer. It defines the period length of location updating. Recommendation: 30 (for urban area), 20 (for suburban area). Unit: 6 minutes. MS will make location update when detecting the change of location, besides, MS will make periodic location update controlled by parameter

T3212. Once MS read T3212 from system info. It will store it in SIM card. When the time exceeds T3212 value, the location update process will be triggered. The shorter the period the better the performance, but it will bring more signaling load for system. On setting of this parameter, the processing capabilities of MSC and BSC should be considered, also the flows of A interface, Abis interface, Um interface as well as those of HLR and VLR. Generally larger value for continuous covered urban area while smaller in the suburb, countryside or the place with poor coverage.

T3168: This field is the binary representation of the timeout value of timer T3168. Range: 0 to 7. The timeout value is given as the binary value plus one, in units of 500 milliseconds. This timer is used on the mobile station side to define when to stop waiting for a Packet Uplink Assignment message after sending a Packet Resource request message.

T3192: This timer is used on the mobile station side when the mobile station has received all of the RLC data blocks. When the timer T3192 expires, the mobile station releases the resources associated with the TBF (e.g. TFI) and begins to monitor its paging channel. This field is the binary representation of the timeout value of timer T3192.

6.5.5 GSM Dedicated Mode

Channel Mode: GSM channel mode, one of:

- FR = Voice, Full Rate
- EFR = Voice, Enhanced Full Rate
- HR = Voice, Half Rate
- AFR = Voice, AMR Full Rate
- AHR = Voice, AMR Half Rate
- CSD = Circuit-switched data
- SIG = Signaling only

TCH ARFCN: Traffic Channel (TCH ARFCN) or Stand-alone Dedicated Control Channel (SDCCH ARFCN) or Packet Dedicated Traffic Channel (PDTCH ARFCN). Hopping channels are shown one at a time.

RLT: Radio Link Timeout, ratio of current value to maximum (= start) value, expressed in percent.

RxQual: Receive Bit Error Rate, RxQual.

Timeslots: List of timeslots in use,

Timing Adv: Timing Advance.

MS TxPower: UE Transmit Power (dBm).

Channel Type: Channel type, one of {BCCH, PBCCH, PDTCH, SDCCH, TCH/F, TCH/H}.

Subchannel: Sub channel Number {0 ... 7}.

Ciphering: Ciphering Mode, one of {A5/1, A5/2, A5/3, GEA/1, GEA/2}.

Hopping: Identifies whether the current traffic channel has a hopping (1) or non-hopping (0) frequency set.

HSN: Hopping Sequence Number {0 ... 63}. Identifies the hopping sequence number to be used by the mobile when assigned to a hopping traffic channel on the serving cell.

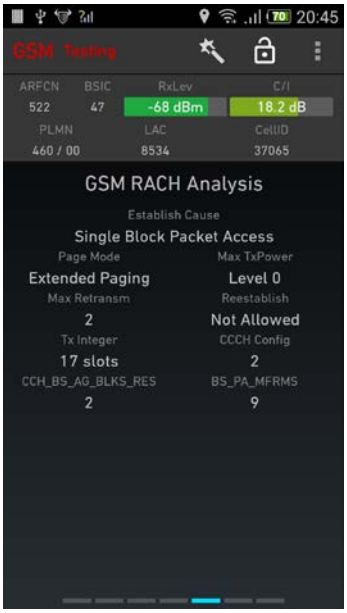
MAIO: MAIO, Mobile Allocation Index Offset {0 ... 63}.

Identifies the mobile allocation index number to be used by the mobile when assigned to a hopping traffic channel on the serving cell.

Speech Codec DL/UL: Voice codec and codec rate of downlink and up link.

Speech Quality DL/UL: AMR Speech Quality Indicator {Speech Good, Speech Degraded, Onset, SID First, SID Update, SID bad, Null Data.}

6.5.6 GSM RACH Analysis



The view displays parameters and data related to RACH signaling and paging in GSM.

Establish Cause: Establishment cause in Channel Request message.

Random Reference: Random Reference in Channel Request message.

Max TxPower: The maximum TX power level an MS may use when accessing on a Control Channel, CCH.

Max Retransm: Maximum number of retrans-missions.

Reestablish: Call reestablishment allowed/not allowed in the cell.

Tx Integer: Number of slots used to spread the transmission.

CCCH Group / PCCCH Group: The former of these appears for CS and the latter for PS data.

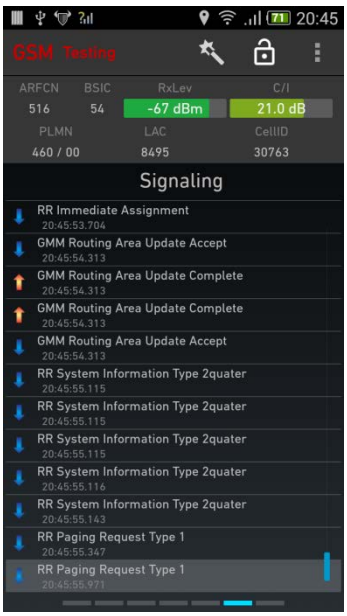
Paging Group: The mobile's paging group. 3GPP 45.002, sections 6.5.2, 6.5.6, PAGING_GROUP.

Paging Multiframe: Paging multiframe: 3GPP 45.002, section 6.5.3

Paging Blk Idx: Paging block index: 3GPP 45.002, section 6.5.3

BS_PA_MFRMS: Number of 51-multiframes between transmission of paging messages to mobiles of the same paging group {2 ... 9}.

6.5.7 GSM Signaling



The GSM Signaling will display the layer 3's signaling information.

6.6 WCDMA Views

6.6.1 Data View Header for WCDMA

All data shown in the header pertains to the current serving cell (idle mode) or the strongest cell from the primary carrier in the active set (connected mode). No cell from the secondary carrier in an HSPA dual carrier configuration ever appears in the header.

UARFCN: This attribute gives the Downlink UMTS Absolute Radio Frequency Channel Number of the transmitting Node B.

PSC: Scrambling Code of serving cell (idle mode) or strongest active set member (connected mode).

RSCP: This gives the calculated CPICH Received Signal Code Power received by the UE for each cell in the active set based on Rssi and the respective SC's EcN0. The unit is dBm.

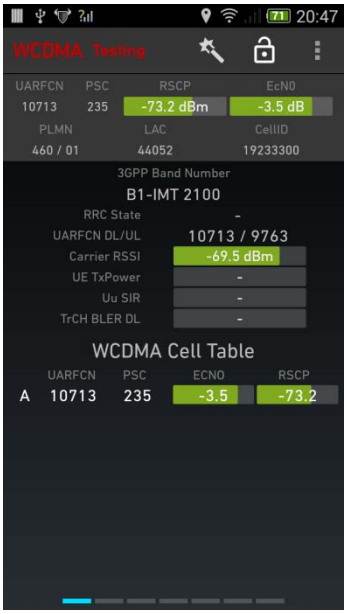
Ec/No: Carrier-to-noise ratio. This attribute gives the value of difference between the sum of the CPICH_RSCP in dBm and RSSI in dBm. The unit is dB. Note: for calculation, CPICH_EcN0 is used instead of CPICH_RSCP.

PLMN: Serving cell Mobile Country Code and Serving cell Mobile Network Code. This is a combination of MCC and MNC.

LAC: Serving cell Location Area Code, Indicates the location area code (paging area) of the current serving cell.

CellID: Serving Cell Identity, 28 bits, decimal. This code can be displayed as a combination of RNC/Sector by using the setting items of display formats.

6.6.2 WCDMA Cell Table



Up to eight cells are displayed, each belonging to one of the following categories:

A: Active set member (connected mode). In case of dual carrier HSPA, cells from both primary and secondary carriers appear here with equal priority.

M: Monitored neighbor

D: Detected neighbor.

The categories are prioritized as listed above, cells from lower-ranking categories being displayed as far as space allows. Within each category, cells are sorted by descending E_c/N_0.

UARFCN: UARFCN, UMTS Absolute Radio Frequency Channel Number.

PSC: Scrambling Code.

Ec/No: E_c/N_0 (dB), signal-to-noise ratio measured.

RSCP: Received Signal Code Power (dBm).

3GPP Band Number: UMTS Band identity, shows different band with different definitions.

RRC State: Display RRC connection state of the UE.{DCH, FACH, Disconnected, connecting and etc}

UARFCN DL/UL: Downlink and Uplink of UARFCN

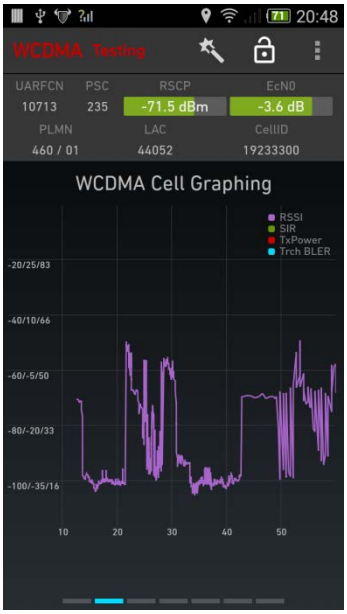
Carrier RSSI: This attribute gives the average value of Received Signal Strength Indicator over a certain sampling period. The unit is dBm.

UE TxPower: This attribute gives value of the transmitted power by the UE, averaged over a certain time. The unit is dBm.

Uu SIR: Signal-to-Interference Ratio (dB).

TrCH BLER DL: Block Error Rate in percent, this attribute gives the overall Block Error Rate percentage measured by the UE. (DCH only)

6.6.3 WCDMA Cell Graphing



The chart shows the latest 60 seconds. Each label “<n>” on the x-axis means “*n* seconds ago”.
The y-axis has both dBm and percent scale marks.
RSSI: Received Signal Strength, equal to UTRA Carrier RSSI.
SIR: Signal-to-Interference Ratio (dB).
TxPower: UE Transmit Power (dBm).
TrCH BLER: Block Error Rate in percent, average taken over all downlink transport channels (DCH only).

6.6.4 WCDMA Dedicated Mode

The chart shows the data as below:

RRC State: RRC State, one of {CELL_DCH, CELL_FACH, CELL_PCH, URA_PCH, Idle}.

SIR: Signal-to-Interference Ratio. This attribute gives the DPCH Signal to Interference Ratio value, as measured by the UE. The unit is dB.

UE TxPower: UE Transmit Power. This attribute gives value of the transmitted power by the UE, averaged over a certain time. The unit is dBm.

Power Ctrl Alg: Power Control Algorithm: 3GPP 25.331

Tx Command UL: Transmit Power Control on uplink over the last 0.5 seconds: percentage of power control commands that were “increase”commands. This attribute gives the ratio between "up" and "down" TPC commands sent by the NB to the UE. If the attribute is more than 50%, it means that the UE received more "ups" than "downs".

Tx Command DL: Transmit Power Control on downlink over the last 0.5 seconds: percentage of power control commands that

were “increase”commands. This attribute gives the ratio between "up" and "down" TPC commands sent by the UE to the NB. If the attribute is more than 50%, it means that the UE sent more "ups" than "downs".

Speech Codec DL/UL: Voice codec and codec rate.{4.75kb, 5.15kb, 5.90kb, 6.70kb, 7.40kb, 7.95kb, 10.2kb, 12.2kb, 6.60kb, 8.85kb, 12.65kb, 14.25kb, 15.85kb, 18.25kb, 19.85kb, 23.05kb, 23.85kb}

Speech Quality DL/UL: AMR Speech Quality Indicator {Speech Good, Speech Degraded, Onset, SID First, SID Update, SID bad, Null Data.}

6.6.5 WCDMA RACH Analysis

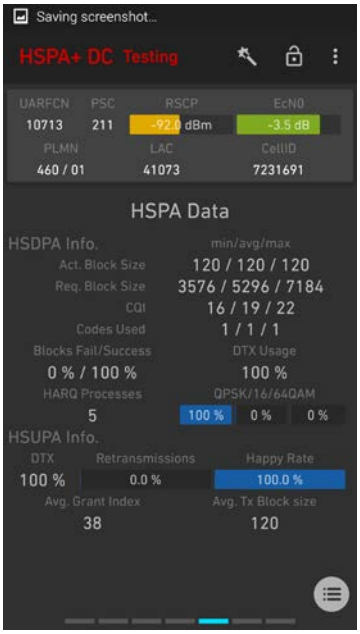
The view displays parameters and data related to RACH signaling in WCDMA.

Establishment Cause: this attributes identifies RRC connection requests. The list is following

originatingConversationalCall
originatingStreamingCall
originatingInteractiveCall
originatingBackgroundCall
originatingSubscribedTrafficCall
terminatingConversationalCall
terminatingStreamingCall
terminatingInteractiveCall
terminatingBackgroundCall
emergencyCall
interRAT_CellReselection
interRAT_CellChangeOrder
registration
detach
originatingHighPrioritySignalling
originatingLowPrioritySignalling
callReestablishment
terminatingHighPrioritySignalling
terminatingLowPrioritySignalling
terminatingCauseUnknown
mbms_Reception
mbms_PTP_RB_Request

Preamble Count: Number of preambles used in this preamble ramping cycle.
Max Preamble: Preamble Retrans Max, maximum number of preambles in one preamble ramping cycle.
Preamble Offset: Power Ramp Step, power increase between consecutive preambles (dB).
Tx Power: Preamble_Initial_Power, transmit power of first RACH preamble (dBm).
Message Length: This attribute gives the RACH message length. The unit is milliseconds.
Max Tx Power: Maximum allowed transmit power of RACH preamble (as well as overall; dBm).
AICH Status: Acknowledgement of RACH preamble sent on Acquisition Indicator Channel (AICH). One of: {No ACK, Positive ACK, Negative ACK}.

6.6.6 WCDMA HSPA Data



All data shown here pertains to the device's latest reporting period, unless otherwise noted.

HSDPA Info: display the min.avg/max

Act. Block Size: Actual HS-DSCH transport block size in bits: minimum/average/ maximum.

Req. Block Size: Requested transport block size in bits (corresponding to minimum CQI): minimum/average/maximum.

CQI: Minimum/average/maximum value of CQI (Channel Quality Indicator).

Codes Used: Number of channelization codes used.

Blocks Fail/Success: Block error rate on HS-DSCH for first retransmission/Average transport block size in bits on E-DCH. Updated once every second.

DTX Usage: DTX Usage of the last seconds, percent. DTX means empty transportations in the transmitted blocks

HARQ Process: Number of active HARQ (Hybrid Automatic Repeat Request) processes on the HS-DSCH.

QPSK/16/64QAM: Percentage distribution of downlink modulation scheme usage: QPSK (left), 16-QAM (center), 64-QAM (right) /Percentage of blocks on HS-DSCH that were transmitted success-fully on first attempt (zero retransmissions). Updated

once every second.

HSUPA Info.

DTX: DTX rate (%) on uplink.

Retransmissions: Number of retransmissions on E-DPCCH/E-DPDCH divided by the number of TTIs.

Happy Rate: This attribute is the ratio of the number of transmission time intervals where the UE is Happy, excluding DTXed TTIs, to the total number of non-DTXed TTIs. The unit is percent.

Avg. Grant Index: Average value of Serving Grant Index. This attribute gives the average Grant to the total number of frames reported in the message, including DTX'ed frames.

Avg Tx Block Size: Average transport block size in bits on E-DCH.

6.6.7 WCDMA Signaling

6.7 TD-SCDMA Views

6.7.1 Data View Header for TD-SCDMA

All data shown in the header pertains to the current serving cell (idle mode) or the strongest cell from the primary carrier in the active set (connected mode). No cell from the secondary carrier in an HSPA dual carrier configuration ever appears in the header.

UARFCN: UMTS Absolute Radio Frequency Channel Number

CPI: Cell Parameter ID, this attributes identifies the logical serving cell id of basestation sector.

RSCP: Received Signal Coded Power.

C/I: Carrier to interference in dB.

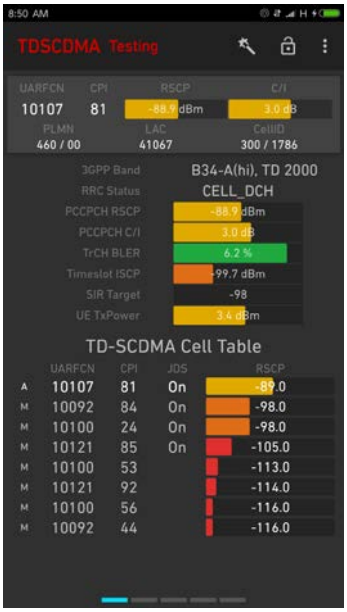
PLMN: Serving cell Mobile Country Code and Serving cell Mobile Network Code

LAC: Serving cell Location Area Code.

CellID: Serving Cell Identity, 28 bits, decimal.

TxPower: Transmitted power in dBm in dedicated mode.

6.7.2 TD-SCDMA Cell Table



Up to eight cells are displayed, each belonging to one of the following categories:

A: Active set member (connected mode). In case of dual carrier HSPA, cells from both primary and secondary carriers appear here with equal priority.

M: Monitored neighbor

D: Detected neighbor

JDS: this attributes identifies whether the cell joint detection setting is open or not.

The categories are prioritized as listed above, cells from lower-ranking categories being displayed as far as space allows. Within each category

UARFCN: UARFCN, UMTS Absolute Radio Frequency Channel Number.

CPI: Cell Parameter ID, this attributes identifies the logical serving cell id of basestation sector.

RSCP: Received Signal Code Power (dBm).

CI: Cell identity according to cell file.

This view also show the data as follow:

3GPP Band Number: TD-SCDMA bands defined in 3GPP documents

RRC State: Display RRC connection state of the UE.{DCH, FACH, Disconnected, connecting and etc}

PCCPCH RSCP: Received Signal Code Power (dBm) of PCCPCH Channel.

PCCPCH C/I: Carrier to Interference of PCCPCH Channel in dB

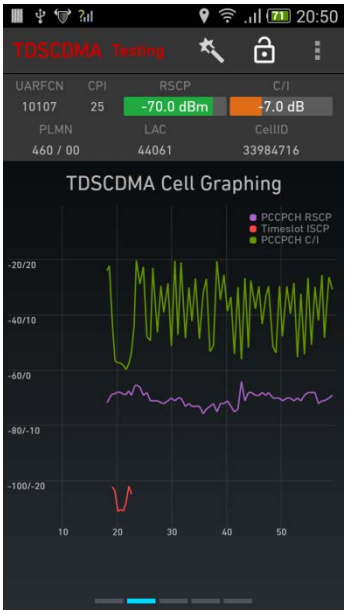
TrCH BLER: Aggregated block error rate of transport channels in percentage.

Timeslot ISCP: aggregated interference signal channel of all timeslots in dedicated mode.

SIR Target: signal to interference ratio in dedicated mode.

TxPower: Transmitted power in dBm in dedicated mode.

6.7.3 TD-SCDMA Cell Graphing



The chart shows the latest 60 seconds. Each label “<n>” on the x-axis means “*n* seconds ago”.

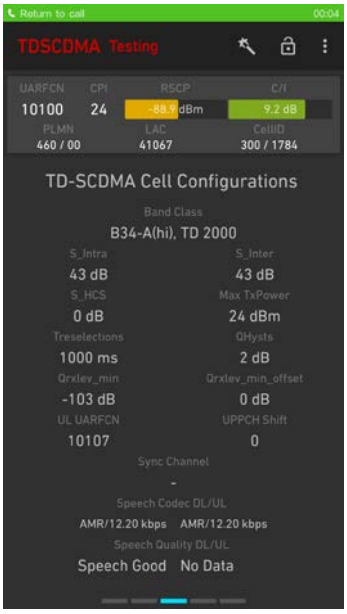
The y-axis has both dBm and percent scale marks.

PCCPCH RSCP: same as previous

Timeslot ISCP: same as previous

PCCPCH C/I: same as previous

6.7.4 TD-SCDMA Cell Configurations



The TD-SCDMA Cell Configuration is as follow:

Band Class: TD-SCDMA bands defined in 3GPP documents.

S_Intra: intra-frequency cell reselection threshod in dB.

S_Inter: inter-frequency cell reselection threshold in dB.

S_HCS: Threshold for HCS (Hierarchy Class Structure) in dB.

Max TxPower: maximum allowed transmitted power of UE

Tresections: time delay for a cell reselection

QHysts: Hysteresis thresh for every single cell reselection**.**

QrxLev_min: minimum accessible RxLev for every single mobile stations.

Qrxlev_min off: offset of minimum rxLev in dB.

UL_UARFCN: uplink UARFCN in use

UPPCH_shift: shifts for UPPCH channel

Speech Codec DL/UL: Voice codec and codec rate.{4.75kb, 5.15kb, 5.90kb, 6.70kb, 7.40kb, 7.95kb, 10.2kb, 12.2kb, 6.60kb, 8.85kb, 12.65kb, 14.25kb, 15.85kb, 18.25kb, 19.85kb, 23.05kb, 23.85kb}

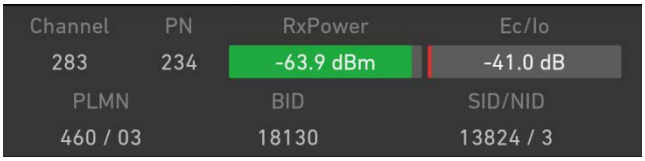
Speech Quality DL/UL: AMR Speech Quality Indicator {Speech Good, Speech Degraded, Onset, SID First, SID Update, SID bad, Null Data.}

Note: TD-SCDMA, GSM, WCDMA and even VoLTE are using the compatible speech codecs in voice related services, including video and voice. NSG will deal with it as one attributes in related radio technologies.

6.7.5 TD-SCDMA Signaling

6.8 CDMA Views

6.8.1 Data View Header for CDMA



All data shown in the header pertains to the current serving cell (idle mode) or the strongest cell from the primary carrier in the active set (connected mode). No cell from the secondary carrier in an HSPA dual carrier configuration ever appears in the header.

Channel: Indicates the channel number of the RF carrier frequency as specific in IS-95 or J-STD-008.

PN: PN Offset of serving cell (idle mode) or strongest active set member (active mode)

RxPower： Received power (dBm) of mobile station, defined from -130-20 dBm

Ec/Io: Signal-to-notification noise ratio for strongest active set. Indicates the combined Ec/Io(energy to interference) for all locked PNs

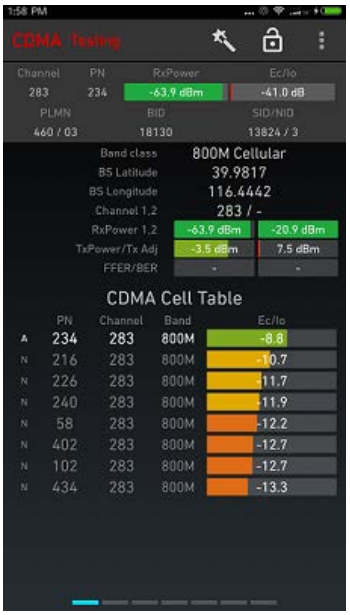
PLMN: Public Land mobile network, Serving cell Mobile Country Code and Serving cell Mobile Network Code

BID: Base Station Identification

SID/NID: System Identification (SID). A unique identification code for cellular/PCS systems. Please see IS-95 section 7.7.1.3 for more information.

Network Identification (NID): Indicates the network identification code that uniquely identifies a network in a cellular/PCS system. Please see IS-95 section 7.7.1.3 for more information.

6.8.2 CDMA Cell Table



Band class: CDMA Band Class Description, 0x0 North American Cellular

North American PCS
TACS
JTACS
Korean PCS
NMT-450
IMT-2000
North American 700 MHz Cellular
1800 MHz
900 MHz
Secondary 800 MHz
400 MHz European PAMR band
800 MHz European PAMR band

BS Latitude: The base station shall set this field to its latitude in units of degree, expressed as a two′ s complement signed number with positive numbers signifying North latitudes. The base station shall set this field to a value in the range of -90° to +90°.

BS Longitude: The base station shall set this field to its longitude in units degree, expressed as a two′ s complement signed number with positive numbers signifying East longitude. The base station shall set this field to a value in the range of -180° to +180°.

Channel 1, 2: Indicates the channel number of the RF carrier frequency as specific in IS-95 or J-STD-008.

RxPower 1, 2: received power of mobile station; 1, 2 means different antennas.

TxPower/TxAdj: This attribute gives the estimated mobile transmit power. Txadj is the power control value of mobile stations.

For Qualcomm-based handsets, MobileTransmitPower is the estimate of actual TX power based on receive power (RxPwr) and transmit gain adjust (TxAdj), calculated using the following formulae:

For PCS: MsTxPwr = -76 - RxPwr + TxAdj

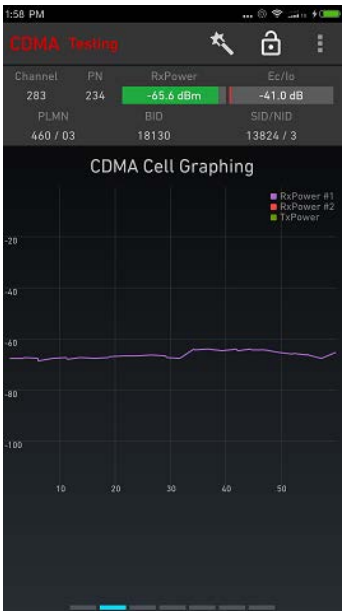
For Cellular: MsTxPwr = -73 - RxPwr + TxAdj

FFER/BER: The forward link frame error rate for voice averaged over 100 frames. No Markov algorithms are used in this calculation of FER. For Qualcomm-based handsets, Voice FER is provided in the Markov Statistics message.

BER: The forward link frame burst error rate, which is calculated

on full rate Markov call frames. Frame burst errors are defined as x consecutive full rate frame errors, where x is user defined in the CDMA tab of the Options window under the Tools menu.

6.8.3 CDMA Cell Graphing

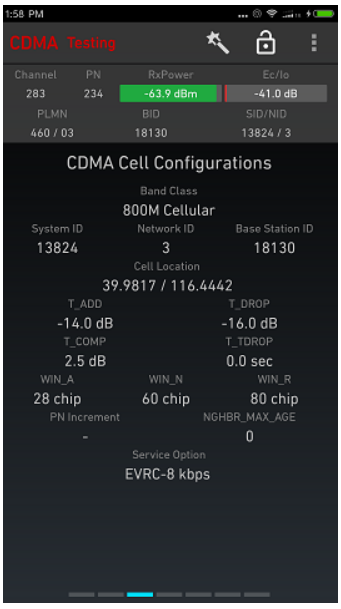


RxPower #1:Receive Power #1

RxPower #2:Receive Power #2

TxPower: Transmit Power

6.8.4 CDMA Cell Configurations



Band Class: as described in CDMA KPIs

System ID: A unique identification code for cellular/PCS systems. Please see IS-95 section 7.7.1.3 for more information.

Network ID: Indicates the network identification code that uniquely identifies a network in a cellular/PCS system. Please see IS-95 section 7.7.1.3 for more information.

Base Station ID: Base Station ID for single cell;

Cell Location: see BS longitude and latitude;

T_ADD：Indicates the value for the T_ADD handoff setting in dB.

T_DROP: Indicates the value for the T_DROP handoff setting in dB.

T_COMP: Indicates the value for the T_COMP handoff setting in

dB.

T_TDROP: Indicates the value for the T_TDROP handoff setting in seconds.

WIN_A: indicates the size of the active set search window in chips.

WIN_N: Indicates the size of the neighbor set search window in chips.

WIN_R: Indicates the size of the remaining set search window in chips.

PN Increment: CDMA pilot increment(0-20)

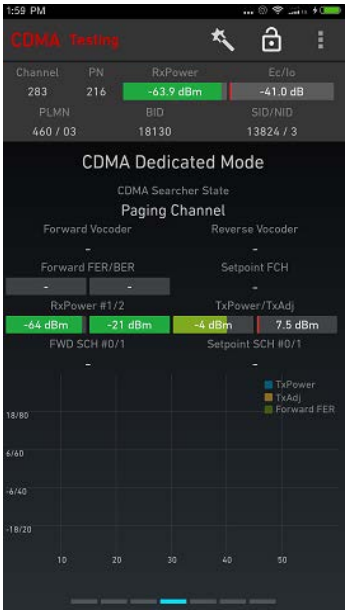
NGHBR_MAX_AGE: CDMA Neighbour setting in seconds;

Service Option: A service capability of the system. Service options may be applications such as voice, data, or facsimile, etc.

Basic Variable Rate Voice Service (8 kbps)
Mobile Station Loopback (8 kbps)
Enhanced Variable Rate Voice Service (8 kbps)
Asynchronous Data Service (9.6 kbps)
Group 3 Facsimile (9.6 kbps)
Short Message Services (Rate Set 1)
Packet Data Service: Internet or ISO Protocol Stack
Packet Data Service: CDPD Protocol Stack
Mobile Station Loopback (13 kbps)
STU-III Transparent Service
STU-III Non-Transparent Service
Asynchronous Data Service (14.4 or 9.6 kbps)
Group 3 Facsimile (14.4 or 9.6 kbps)
Short Message Services (Rate Set 2)
Packet Data Service: Internet or ISO Protocol Stack (14.4 kbps)
Packet Data Service: CDPD Protocol Stack (14.4 kbps)
High Rate Voice Service (13 kbps)
Over-the-Air Parameter Administration (Rate Set 1)
Over-the-Air Parameter Administration (Rate Set 2)
Group 3 Analog Facsimile (Rate Set 1)
Group 3 Analog Facsimile (Rate Set 2)
High Speed Packet Data Service: Internet or ISO Protocol Stack (RS1 forward
High Speed Packet Data Service: Internet or ISO Protocol Stack (RS1 forward
High Speed Packet Data Service: Internet or ISO Protocol Stack (RS2 forward
High Speed Packet Data Service: Internet or ISO Protocol Stack (RS2 forward
High Speed Packet Data Service: CDPD Protocol Stack (RS1 forward
High Speed Packet Data Service: CDPD Protocol Stack (RS1 forward
High Speed Packet Data Service: CDPD Protocol Stack (RS2 forward
High Speed Packet Data Service: CDPD Protocol Stack (RS2 forward
Supplemental Channel Loopback Test for Rate Set 1
Supplemental Channel Loopback Test for Rate Set 2
Test Data Service Option (TDSO)
144 kbps Packet Data Service
144 kbps Packet Data Service
Location Services
Location Services
ISDN Interworking Service (64 kbps)

GSM Voice
GSM Circuit Data
GSM Packet Data
GSM Short Message Service

6.8.5 CDMA Dedicated Mode



CDMA Searcher State: CDMA searcher state, paging, sync, traffic and etc…

Forward Vocoder: Indicates the data rate of the mobile station vocoder on the forward link. CDMA networks will use Different EVRC codec in voice vocoder. And also reverse of vocoder:

Blank
1/8
1/4
1/2
Full
Frame erasure
Invalid vocoder data

Forwrd FER/BER: same as described in Primary fragment

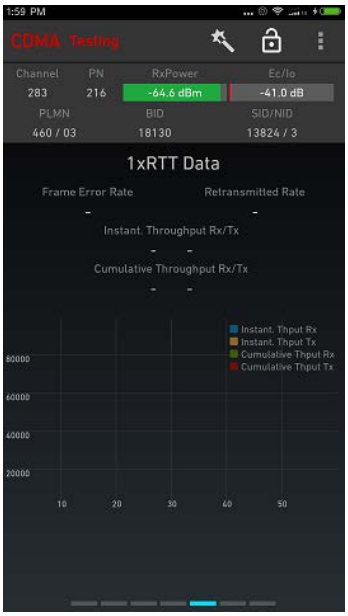
RxPower #1/2: same as described in Primary fragment

Setpoint FCH: The average forward link Supplemental channel (SCH) outer loop setpoint. For Qualcomm-based handsets, SCH setpoint information is provided in the following messages: Fast Forward Power Control

TxPower/TxAdj: TxPwr: UE Transmit Power, this attribute gives the estimated mobile transmit power. for Qualcomm-based handsets, MobileTransmitPower is the estimate of actual TX power based on receive power (RxPwr) and transmit gain adjust (TxAdj)

FWD SCH#0/1: The first forward link Supplemental channel (SCH0) transmission rate. For Qualcomm-based handsets, SCH Rate is provided in the following messages: Active Set and Channel Configuration. This configurations should be 1x, 2x, 4x, 8x or 16x.

6.8.6 CDMA 1xRTT Data



Frame Error Rate: LTE Frame Error Rate in every RLP frames, includes error transmitted frames

Retransmitted Rate: percentage of Tx Retransmitted Frames amony all the transmitted blocks during certain sampling period. The total number of retransmitted frames received by the mobile since the RLP counters were last reset. For Qualcomm-based handsets, frame counts are provided by the following messages: RLP Statistics.

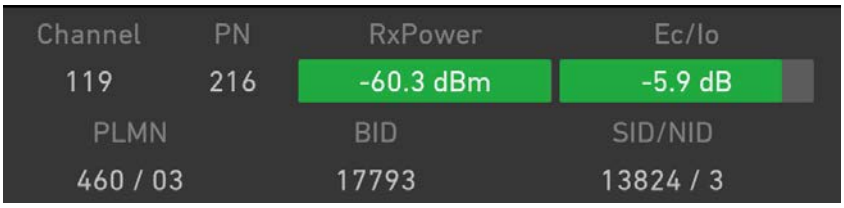
Instant Throughput Rx/Tx: The forward link throughput measured over the time period since that last RLP report (approximately 0.5 sec.):

Cumulative Throughput Rx/Tx: The forward link throughput measured over the time period since the RLP counters were last reset: For Qualcomm-based handsets, RLP throughput information is provided in the following messages: RLP Statistics

6.8.7 CDMA Signaling

6.9 CDMA 2000 Views

6.9.1 Data View Header for CDMA2000



All data shown in the header pertains to the current serving cell (idle mode) or the strongest cell from the primary carrier in the active set (connected mode). No cell from the secondary carrier in an HSPA dual carrier configuration ever appears in the header.

Channel: RF Channel Number

PN: PN Offset of serving cell (idle mode) or strongest active set member (active mode)

RxPower：Receive Power (dBm)

Ec/Io: Signal-to-notification noise ratio for strongest active set

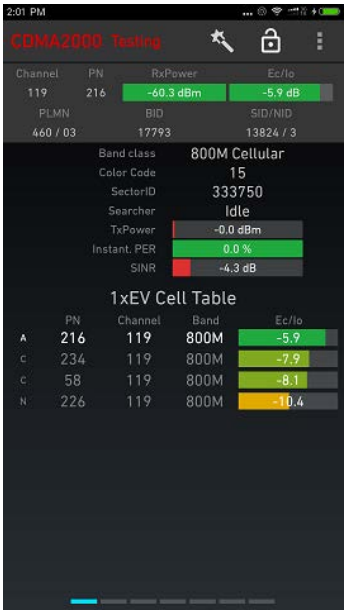
PLMN: Public Land mobile network, Serving cell Mobile Country Code and Serving cell Mobile Network Code

BID: Base Station Identification

SID/NID: System Identification (SID)/Network Identification (NID)

Ec/Io: Signal-to-noise ratio for strongest active set

6.9.2 CDMA2000 1xEV Cell Table



Band Class: same as in CDMA documents.

Color Code: The color code corresponding to the serving sector. For Qualcomm-based handsets, this information is provided in the 1xEV-DO Sector Info message.

SectorID:

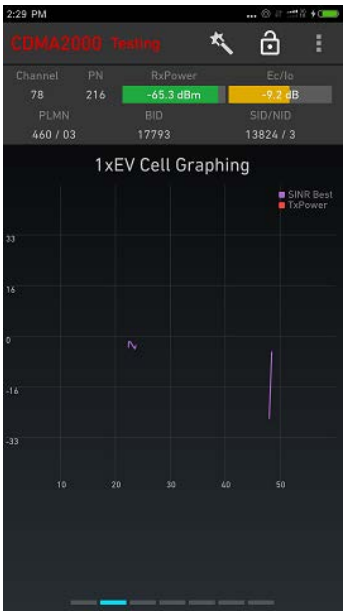
Searcher: this defined the 1xEV searcher working state, one of Paging, Sync, Traffic, HDR or other status.

TxPower: this attributes identifies the transmitted power of mobile station when EV networks are using.

Instant PER: The average instantaneous packet error rate of the air link for both PN rolls in Air Link Summary message: (PER decoded from Air Link Summary msg) / (16384 x 100). For Qualcomm-based handsets, this information is calculated from the 1xEV-DO Air Link Summary message.

SINR: Signal Interference of Radio.

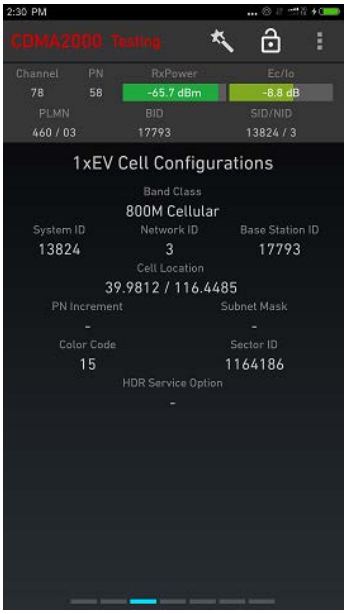
6.9.3 CDMA2000 1xEV Cell Graphing



SINR Best: the best SINR among different sector

TxPower: Transmitted Power of the mobile station.

6.9.4 CDMA2000 1xEV Cell Configurations



Band Class: as described in CDMA KPIs

System ID: A unique identification code for cellular/PCS systems. Please see IS-95 section 7.7.1.3 for more information.

Network ID: Indicates the network identification code that uniquely identifies a network in a cellular/PCS system. Please see IS-95 section 7.7.1.3 for more information.

Base Station ID: Base Station ID for single cell;

Cell Location: see BS longitude and latitude;

PN Increment: The number by which each pilot PN is offset ranging from 0 to 512. For Qualcomm-based handsets, this information is provided in the 1xEV-DO Pilot Sets message.

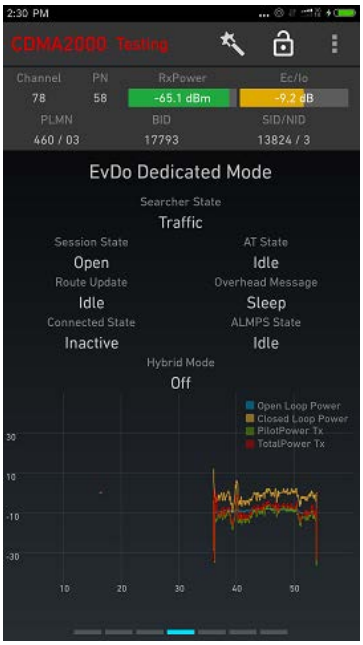
Subnet Mask: The subnet identifier of the serving sector. For Qualcomm-based handsets, this information is provided in the 1xEV-DO Sector Info message.

Color Code: The color code corresponding to the serving sector. For Qualcomm-based handsets, this information is provided in the 1xEV-DO Sector Info message.

Sector ID: General Identity code of a serving sector.

HDR Option: A service capability of the system broadcast on paging channel. Service options may be applications such as voice, data, or facsimile, etc.

6.9.5 CDMA2000 EvDo Dedicated Mode



Searcher State: same as before

Session State: this attributes defined the session state of an EV connection state, one of closed, open, setup, or an initial setup process.

AT State: this defines access terminal state, one of active, inactive, sync, idle, access or connected.

Route Update: route update status, includes inactive, idle, connection setup, and connected.

Overhead Message: this attributes defines state air interface message, include inactive, sleep, process all message, handoff and others

Connected State: defines the connections state of mobile station, one of inactive, close, and active.

ALMPS State: air link management protocol state, this defines the airlink state during one connection setup process, includes inactive, initialization, idle, or connected.

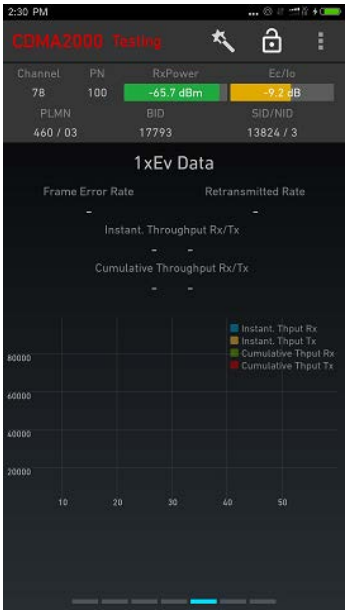
Hybrid Mode: this attribute identifies the Hybrid combination mode, open or closed

Closed Loop Power: The total sector power allocated to the user over the reverse link. For Qualcomm-based handsets, this information is provided in the 1xEV-DO Power message.

PilotPower Tx: The total power allocated to the pilot channel over the reverse link. For Qualcomm-based handsets, this information is provided in the 1xEV-DO Power message.

TotalPower TX: the total transmitted power of a mobile station when the reverse link is connected. For Qualcomm-based handsets, this information is provided in the 1xEV-DO Power message.

6.9.6 CDMA2000 1xEv Data



Frame Error Rate: LTE Frame Error Rate in every RLP frames, includes error transmitted frames

Retransmitted Rate: percentage of Tx Retransmitted Frames among all the transmitted blocks during certain sampling period. The total number of retransmitted frames received by the mobile since the RLP counters were last reset. For Qualcomm-based handsets, frame counts are provided by the following messages: RLP Statistics.

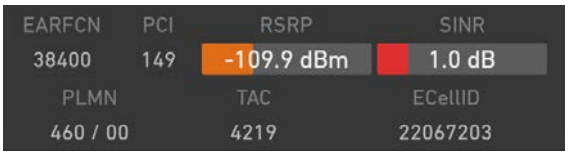
Instant Throughput Rx/Tx: The forward link throughput measured over the time period since that last RLP report (approximately 0.5 sec.):

Cumulative Throughput Rx/Tx: The forward link throughput measured over the time period since the RLP counters were last reset: For Qualcomm-based handsets, RLP throughput information is provided in the following messages: RLP Statistics

6.9.7 CDMA2000 Signaling

6.10 LTE Views

6.10.1 Data View Header for LTE



All data shown in the header pertains to the current serving cell.

EARFCN: E-UTRA ARFCN (Absolute Radio Frequency Channel Number). This attribute gives the downlink E-UTRA Absolute Radio Frequency Channel Number of the cell the UE is camping on. Carrier Aggregation (LTE Advanced): In CA mode, this attribute gives the downlink E-UTRA Absolute Radio Frequency Channel Number of Primary Cell (PCC).

PCI: Physical Cell Identity, this attribute gives the Physical Cell Identity of the cell the UE is camping on. Carrier Aggregation (LTE Advanced): In CA mode, this attribute gives the Physical Cell Identity of Primary Cell (PCC).

RSRP: Reference Signal Received Power. This attribute gives the Received Power of the Reference Signal for the cell the UE is camping on. The unit is dBm. Carrier Aggregation (LTE Advanced): In CA mode, this attribute gives the Received Power of the Reference Signal of the Primary Carrier (PCC).

SINR: This attribute gives the Signal to Interference + Noise ratio measured by the UE. The unit is dB. Carrier Aggregation (LTE Advanced): In CA mode, this attribute gives the Signal to Interference + Noise ratio of the Primary Carrier (PCC).

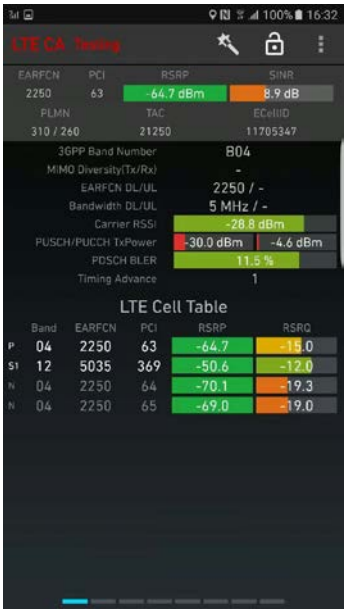
PLMN: as defined above, see before

T**AC:** TAC: Serving cell Tracking Area Code

ECellID: ECI, E-UTRAN Cell Identifier. Used to identify a cell uniquely within a PLMN. Length: 28 bits.

 3GPP 36.300, section 8.2

6.10.2 LTE Cell Table



The LTE Cell Table will display the data as follow:

3GPP Band Number: LTE band definitions.

MIMO Diversity (Tx/Rx): this attributes shows eNB antennas number of Tx and Rx.

EARFAN DL/UL: EARFCN of Downlink and Uplink

Carrier RSSI: RSSI of E-UTRAN

Bandwidth DL/UL: This attribute gives the downlink bandwidth of the cell the UE is camping on. Carrier Aggregation (LTE Advanced): In CA mode, this attribute gives the downlink bandwidth of Primary Cell (PCC).

PUSCH/PUCCH Tx Power: This attribute is the geometric average (average in the dB domain) of the UE transmit power, only considering the transmission time intervals where the UE transmitted. The contributions of PUSCH, PUCCH and SRS are included in this attribute. The unit is dBm.

PDSCH BLER: This attribute gives the Block Error Rate defined as the ratio of the number of transport blocks successfully received to the total number of transport blocks received by the UE.

Timing advance: LTE Timing Advance Information. The range for this attribute is 0 to 1282 in units of 16xTs (LTE time units).

LTE Cell table

Up to eight cells are displayed, each belonging

to one of the following categories:

• S: Serving cell (non-CA)

• P: Primary serving cell (CA)

• S1: Secondary serving cell (CA)

• N: Measured neighbor (always used).

Serving cells are prioritized above neighbors, the latter being displayed as far as space allows. Within each category, cells are sorted by descending RSRP.

RSRQ: This attribute gives the Received Quality of the Reference Signal for the cell the UE is camping on. The unit is dB. Carrier Aggregation (LTE Advanced): In CA mode, this attribute gives the

Received Quality of the Reference Signal of the Primary Carrier (PCC).

6.10.3 LTE CA Matrix

LTE CA Matrix shows different carrier information as a matrix when CA is enabled. The matrix is configured to carrier and different items. For carriers, differed as PCC, SCC. Then shows different items of PCC and SCC, or SCC1.

EARFCN/PCI: same as previous

Band/Width: same as previous

SINR: This attribute gives the Signal to Interference + Noise ratio measured by the UE. The unit is dB.

MIMO Tx/Rx: this display the eNB Tx and Rx antenna number of PCC and SCC. Such as 2x2, 4x2, 4x4 and etc, according to your NodeB configurations.

Trans.Mode: Transmission Mode for MIMOs, from TM1 to TM10;

PDSCH BLER: This attribute gives the Block Error Rate defined as the ratio of the number of transport blocks successfully received to the total number of transport blocks received by the UE.

Rank: This attribute gives the Spatial Rank indicated by eNodeB. eNodeB informs the Spatial Rank to indicate how many streams of data are transmitted to a UE per transmission time interval. This is less than or equal to Rank Index (RI) reported by UE according to the radio conditions and antenna configurations.

Stream output0/1 throughput: the throughput of different stream are used. This is valid when a Rank 2 is available.

PDSCH RB: This attribute gives the average number of resource blocks the UE was allocated in the downlink over the sampling period. The attribute is calculated only considering the downlink transmission time intervals for which the UE received PDSCH data (TBs with RNTI-Type as C-RNTI).

CQI: This attribute gives the average value of the wideband

Channel Quality Information measured by the UE. The CQI measurement reported by the UE depends on the radio conditions experienced by the UE in the downlink, and it is used by the eNode B to determine what Modulation and Coding Scheme (MCS) to use for the downlink transmissions.

PDSCH MCS: This attribute gives the average Modulation and Coding Scheme value (rounded to the nearest integer) measured across the transmission time intervals for which the UE received PDSCH data.

PDSCH Tput: This attribute gives the average downlink physical throughput of different cell averaged over the sampling period.

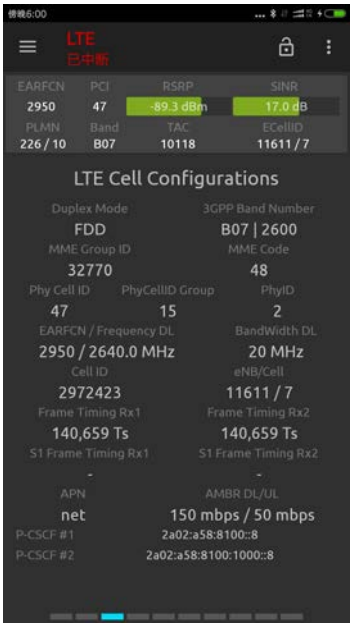
PDSCH Agg. Tput: This attribute gives the average downlink physical throughput averaged over the sampling period.

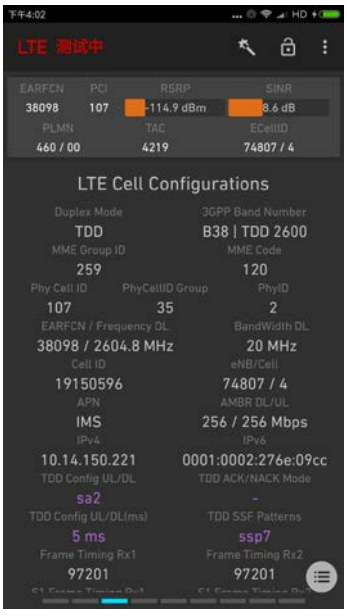
PUSCH MCS: This attribute gives the average Modulation and Coding Scheme value (rounded to the nearest integer) measured across the transmission time intervals for which the UE was recommended for PUSCH data transmission.

PUSCH RB: This attribute gives the average number of resource blocks the UE was allocated in the uplink over the sampling period. The attribute is calculated only considering the uplink transmission time intervals for which the UE transmitted PUSCH data.

PUSCH Tput: This attribute gives the average uplink physical throughput averaged over the sampling period.

6.10.4 LTE Cell Configurations





The LTE Cell Configurations will display the data as follow:

Duplex Node: FDD or TDD

3GPP Band Number：Number of E-UTRA band as laid down in 3GPP 36.101, table 5.5-1 “E-UTRA Operating Bands”.

MME Group ID: Mobility Management Entity Group ID. Part of the Globally Unique Temporary UE Identity (GUTI), it uniquely identifies the MME which allocated the GUTI. 3GPP 23.003, section 2.8.1

MME Code: Mobility Management Entity Code. Part of the GUTI, it temporarily and uniquely identifies the UE within the MME that allocated the GUTI. 3GPP 23.003, section 2.8.1

Phy Cell ID: Physical layer Cell Identity, PCI = 3 × PCIG + PI. Value range: {0 ... 503}. 3GPP 36.211, section 6.11

Phy Cell ID Group：Physical layer Cell Identity Group, PCIG. Value range: {0 ... 167}.

Phy ID: Physical layer Identity, PI. Value range = {0, 1, 2}.

Cell ID: ECI, E-UTRAN Cell Identifier. Used to identify a cell uniquely within a PLMN. Length: 28 bits. 3GPP 36.300, section 8.2

eNB/Cell: ECI divided into an eNodeB part (eNB-ID, 20 bits) and a cell part (8 bits).

Frame Timing Rx1: Cell frame timing of serving cell relative to the network’s absolute time reference, as received on antenna Rx1. In the CA case, this is the primary serving cell. Given in LTE Ts units; range {0 ... 307199}.

Frame Timing Rx2: Same as preceding, but as received on antenna Rx2.

APN: Access Point Name, defined by operators.

AMBR: Aggregate Maximum Bit Rate, this attribute identifies the max rate for every APN connections, defined by the operators.

P-CSCF #1, 2: these 2 attributes define the SIP proxy IP address of IMS services, primary and secondary.

TDD Config UL/DL: TDD downlink-to uplink switch-point periodicity. 3GPP 36.211, table 4.2-2

TDD ACK/NACK Mode: ACK/NACK feedback mode for TDD. 3GPP 36.212, section 5.2.2.6 0: Multiplexing 1: Bundling

TDD Config UL/DL (ms): TDD downlink-to uplink switch-point periodicity. 3GPP 36.211, table 4.2-2. Unit milliseconds

TDD SSF Patterns：TDD special subframe configuration. 3GPP 36.211, table 4.2-1

6.10.5 LTE Dedicated Mode

Left-hand column: Downlink

The LTE Dedicated Mode will display the data as follow:

Norm/Ext DL CP：Percentage distribution of downlink cyclic prefix usage: Normal (left) vs. Extended (right). Updated once every second.

RS SINR: Received Signal SINR in dB

QPSK/16/64QAM DL: Percentage distribution of downlink modulation scheme usage: QPSK (left), 16-QAM (center), 64-QAM (right). Updated once every second.

Right-hand column: Uplink

Current UL CP：Type of cyclic prefix currently used on uplink: Normal or Extended.

PUSCH/PUCCH Tx Power: Transmit powers on PUSCH and PUCCH respectively: maximum value during the past second.

QPSK/16/64QAM UL: Percentage distribution of uplink modulation scheme usage: QPSK (left), 16-QAM (center), 64-QAM (right). Updated once every second.

Legend:

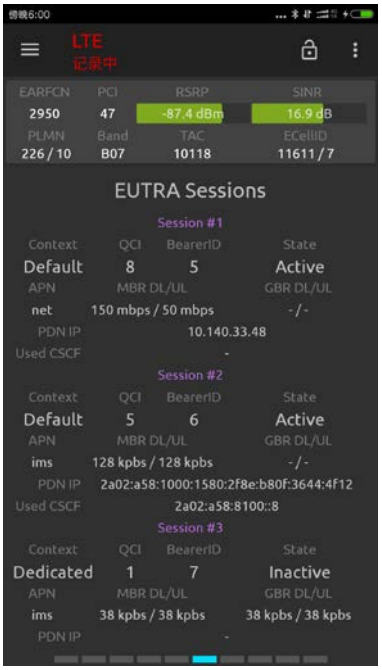
The line chart shows the latest 60 seconds. Each label “<n>” on the x-axis means “n seconds ago”. The y-axis has two sets of scale marks: “number of” (left) and “percent” (right).

Resource Blocks: PDSCH resource block allocation, also presented numerically in the “LTE CA Matrix” view.

DL 64 QAM, UL 64 QAM: 64-QAM usage rate, 64-QAM usage rate (in %) on downlink and uplink, respectively.

CP Normal: “Normal” cyclic prefix usage rate (in %) on downlink.

6.10.6 EUTRA Sessions



EUTRA Sessions display the EPS Sessions used in LTE networks. In NSG, maximum 3 sessions are shown in this fragments.

Context: this attribute identifies the context type of this session, default or dedicated.

QCI: Quality Class Identifier, which shows the quality control information in different class.

Bearer ID, shows the bearer identity of the session.

Bearer State: current radio bearer status when session is launching, one of inactive, active pending, active, modify.

APN: current apn channel in current session, APN(access point name)

MBR GBR DL/UL: this 2 attributes identify the QoS of the session. MBR stands for maximum bit rate and GBR is guaranteed Bit Rate. GBR and MBR is different according different services.

PDN: requested PDN address in the current IP sessions, IPv4 or IPv6. Generally an IMS session will define multiple CSCF proxies for the connections, this attributes define the active proxy when connected.

Used P-CSCF: used P-CSCF server address of a dedicated session, this is an ip address of SIP Proxy, such as IMS server, video server and etc.

6.10.7 LTE MIMO

The LTE MIMO fragment display as two parts

The first part is radio matrix of different carriers, PCC and SCC(Primary and secondary) of different antennas.

MIMO Tx/Rx: this display the eNB Tx and Rx antenna number of PCC and SCC. Such as 2x2, 4x2, 4x4, according to your NodeB configurations.

RSSI 0/1: this identifies RSSI info of different antenna in different carriers, primary or secondary.

SINR 0/1: this identifies SINR info of different antenna in different carriers, primary or secondary.

RSRP 0/1: this identifies RSRP info of different antenna in different carriers, primary or secondary.

RSRQ 0/1: this identifies RSRQ info of different antenna in different carriers, primary or secondary.

The second part shows the NodeB Tx Differences

The view shows the difference in transmit power between the eNodeB's Tx1 and Tx2 antennas (average taken over Rx1 and Rx2 receiver antennas). Each presented value is further averaged over samples in the time domain. Given for each carrier separately in case of carrier aggregation.

EARFCN means the carriers of NodeB, Frame timing shows arrived timing of NodeB to different antenna. The difference shows the signal strength differences between two antennas received from NodeB (RSRP Rx1 –RSRP Rx2).

6.10.8 LTE RACH and VoLTE Analysis

The LTE RACH Analysis will show differently as RACH only or RACH with VoLTE.

RACH analysis only

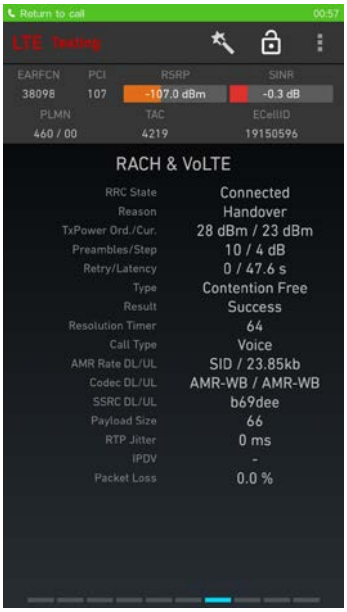
RRC State: "Idle" or "Connected", "Camped", "Suspended", "Connecting", "IRAT To LTE Started", "Closing"

Reason: Reason for RACH signaling. This is indicated for each RACH attempt. One of: {Connection Request, Radio Link Failure, UL

Data Arrival, DL Data Arrival, Handover}.

Tx Power Ord/Cur.: transmit power of first RACH preamble (dBm).Current means Transmit power of current RACH preamble (dBm).

Max Preambles: Maximum number of preambles in one preamble ramping cycle. Taken from LTE Layer 3 message System Information Block 2.



Preamble Step: Power ramping step size, power increase between consecutive preambles (dB). Taken from LTE Layer 3 message system Information Block 2.

Retry Counter: retried counters of RACH attempts

Type: RACH procedure type: "Contention Free" or "Contention Based".

Result: RACH procedure result. One of: {Success, Failure at MSG2, Failure at MSG4 due to CT timer expired, Failure at MSG4 due to CT resolution not passed, Aborted}

Resolution Timer: MAC contention resolution timer expressed as a number of subframes. Taken from LTE Layer 3 message System Information Block 2.

When VOLTE call is made, the fragment shown like the second picture

Call Type: Voice or Video

AMR RATE DL/UL: AMR Rate of downlink and uplink

Codec DL/UL: differently used AMR codec, WB or NB

SSRC DL/UL: Source of the destined IMS sources for downlink and uplink.

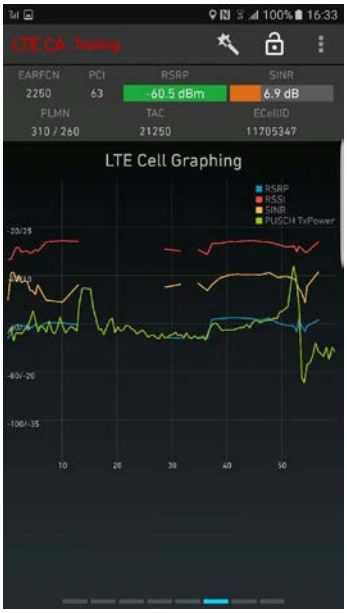
Payload Size: the average Payload size of total transmitted IMS packets.

RTP Jitter: Inter-Packet Delay Variation. The difference between the one-way-delay of two packets, calculated according to RFC 3393.

IPDV: The variance in the inter-arrival time of the RTP packets calculated according to RFC 3550 (Section 6.4.1)

Packet Loss: percent of RTP packets are lost, calculated by looking for discontinuity in the RTP Sequence Number

6.10.9 LTE Cell Graphing



The LTE Cell Graphing will display the graphing as follow:

RSRP:

Legend:

RSSI:

Legend:

SINR:

Legend:

PUSCH Tx Power:

Legend:

6.10.10 LTE Signaling

The LTE Signaling will display the Data as follow.

7 Testing Scripts

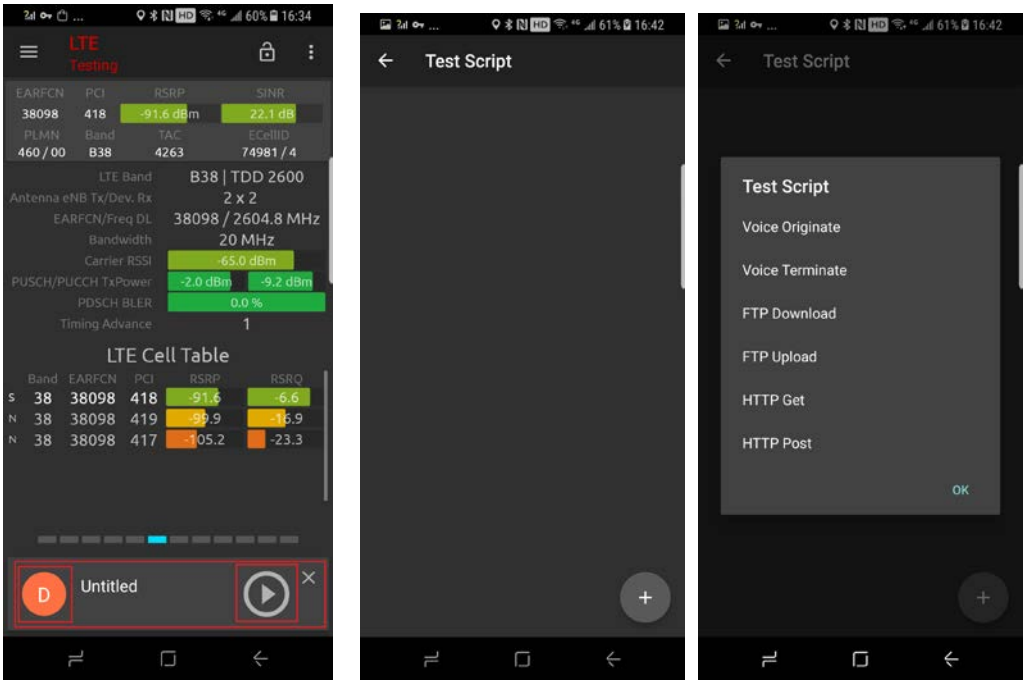
7.1 Introduction to Scripts

Scripts are used to automate testing of services. The following services and tasks are supported by the script function:

- Voice Originate
- Voice Terminate
- FTP Download
- FTP Upload
- HTTP Get
- HTTP Post

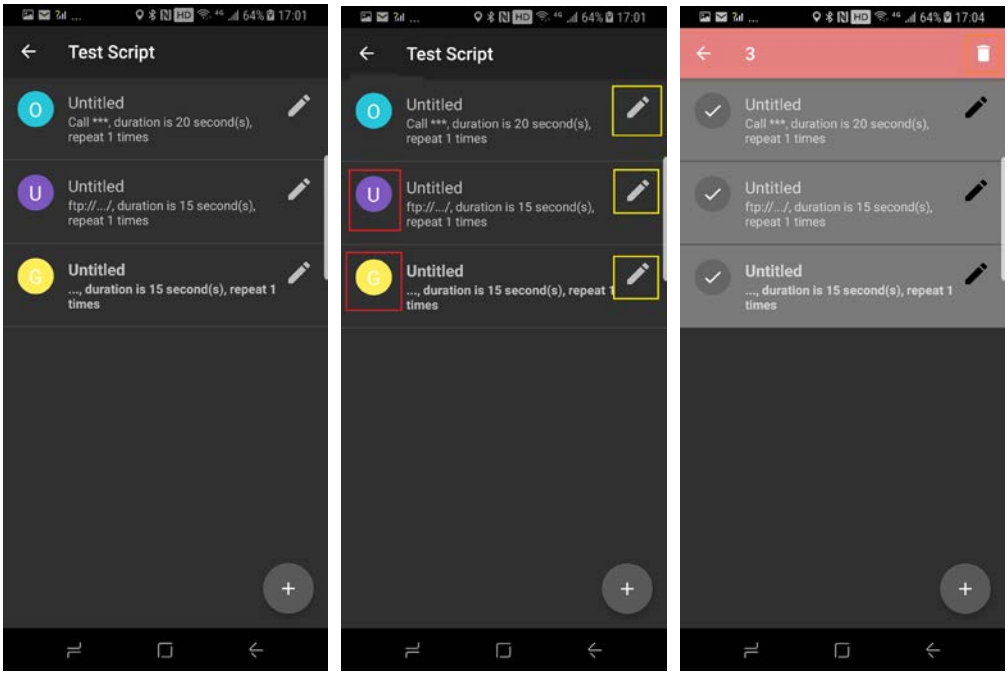
7.2 Basics of Composing Scripts

To access the script editing function, tap the left Menu button, and under **testing scripts.** Then the testing script screen will be in the bottom of the screen.



NSG now can setup six different test scenarios which includes Voice MO and MT, FTP upload and download, HTTP get and posts… user can only run one test scenario once. For instance, if you'd like to run ftp and voice, you need two scripts separately. Please be aware.

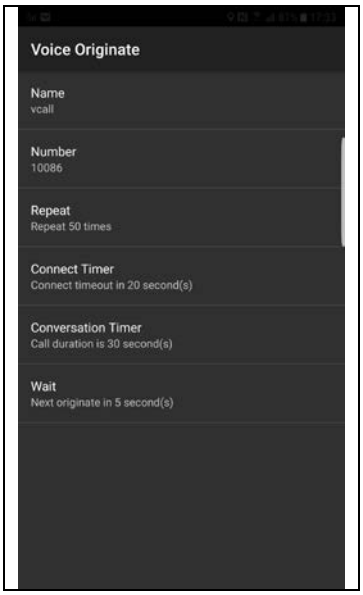
After multiple scripts are created, you can choose one to run, the active one will be highlighted and bold-texted.



Each scripts are tagged with two buttons (left and right), left button (in red rectangle, with a letter) are the selection button. After this button is pressed, the script will be selected and you can delete the selected. See the right pic of the up three pictures.

The right button (edit pen) will start to edit the script. This will be described in the following parts.

7.3 Voice Originate Settings



This action is used to dial mobile-originated voice calls.

Name: the name of the script….

Number: The phone number to be dialed. Any characters available in the device interface can be used.

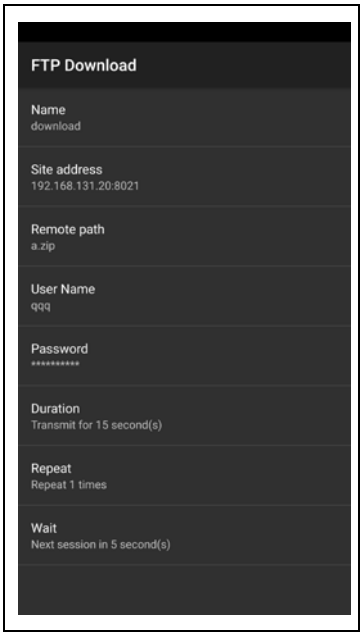
Conversation Timer: Duration of the voice call in seconds.

Connect Timer: timeout the call, after this timer is expired. NSG will end this call…

Repeat: Total number of times to execute the action before the script proceeds to the next action.

The device will automatically redial the call if it is dropped. A maximum of three redials are made on each occasion; that is, if the call is successfully redialed and then dropped again, up to three new retries are made.

7.4 FTP Download and upload



This action is used to download and upload from ftp servers

Name: the name of the scripts

Site address: FTP server to download from or upload to. The server is given as <host>[:<port>], where <host> is an IP address or a plain-text string. A port number can optionally be specified; otherwise, the default port 21 is used. For instance, 192.168.190.88:21

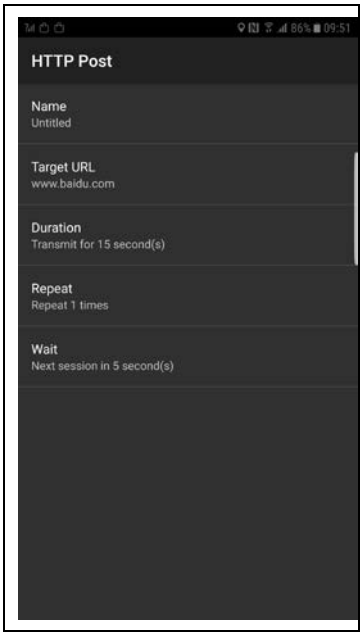
Remote Path: FTP server directory to read from or write to.

User Name, Password: User name and password on the FTP server.

Repeat action: Total number of times to execute the action before the script proceeds to the next action.

Duration: the max timer for this download…

7.5 "HTTP" Action Settings



This action is used to download and upload for web servers.

Name: the name of the scripts

Target URL: URL to download from or upload to.

Repeat action: Total number of times to execute the action before the script proceeds to the next action.

Duration: the max timer for this download or upload

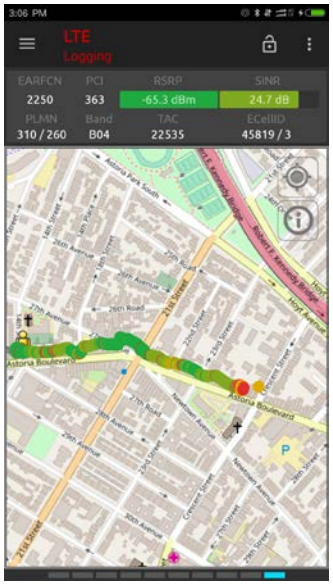
Wait: same as before

8 Mapping

8.1 Mapping introductions

Before NSG version 1.4, it can only provide OSM (open street map) mapping method for users. But OSM is not working very well in China because of different standards in location definitions. So NSG introduces China Mapping components in version 1.4. Chinese users can enable this feature in settings menu. Please restart NSG after this option is taken effects. In other regions, OSM is working well and it is not necessary to change this option.

8.2 OSM Map



8.3 China Map

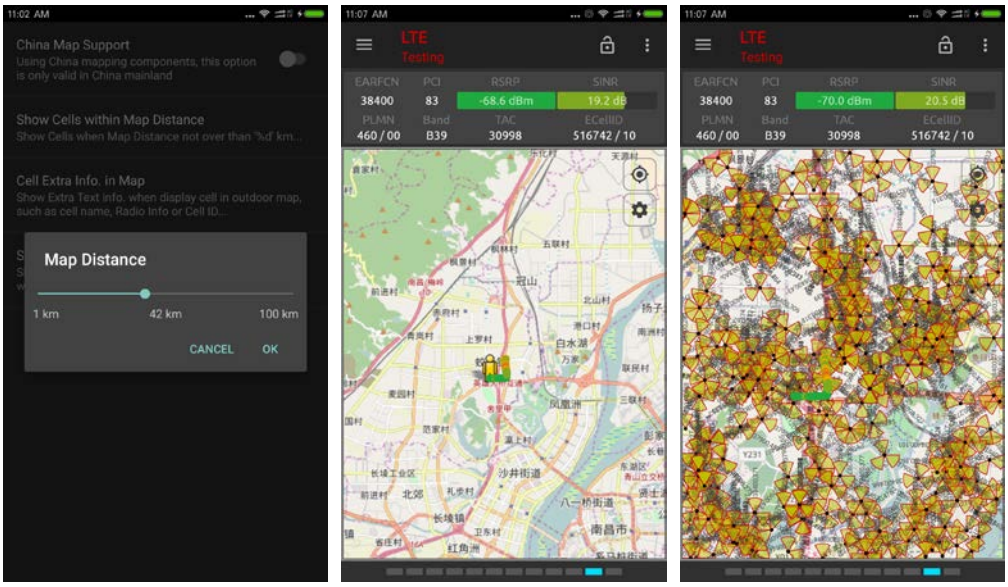
Detailed China map is ok for China mainland. It can provide some other regional maps but it's not accurate. So in regions other than China, we would like user not to enable China map but OSM. It would be better. Please be aware.

8.4 Map Settings

The new NSG app add some settings to outdoor and indoor map, this section will present how to change settings in outdoor map.

8.4.1 Cell Display Range

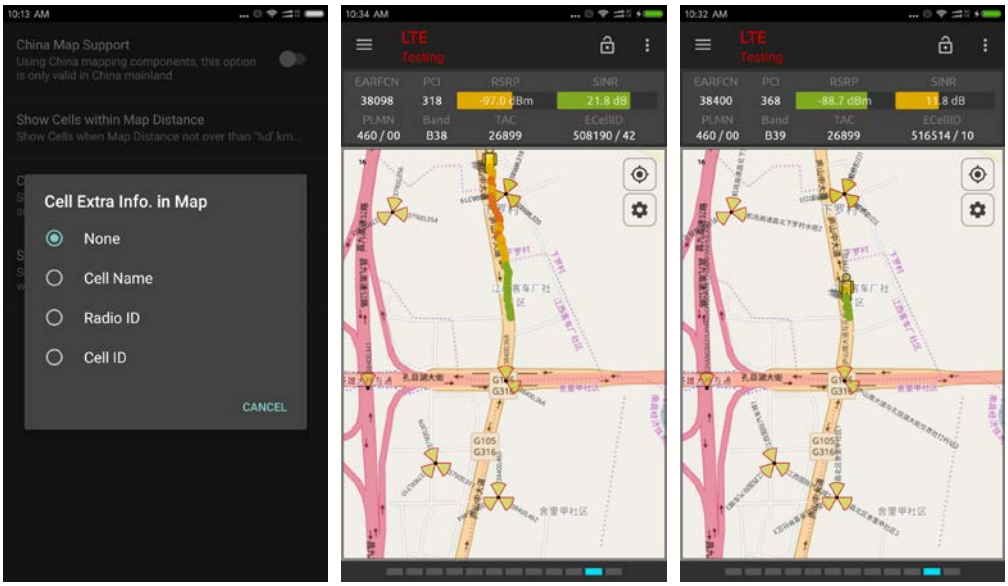
When mass cells are in map, the map display will be in low performance. So we add an option when displaying mass cells. This will improve the performance of map. Just like the picture in the below. When the map range is out of the settings, cells will be not displayed. The default range is 10 km.



8.4.2 Additional Info in Cell Display

in the settings->general settings->mapping->cell extra info. In Map, you can change the setting more info when map display. You can change the it to none, cell name, or radio ID and cell ID options.

Please note for Radio ID, for GSM it will be ARFCN and BSIC, LTE is EARFCN and PCI, WCDMA is UARFCN and PSC, TD-SCDMA will be UARFCN and CPI, CDMA is Channel and PN…



9 Indoor Testing

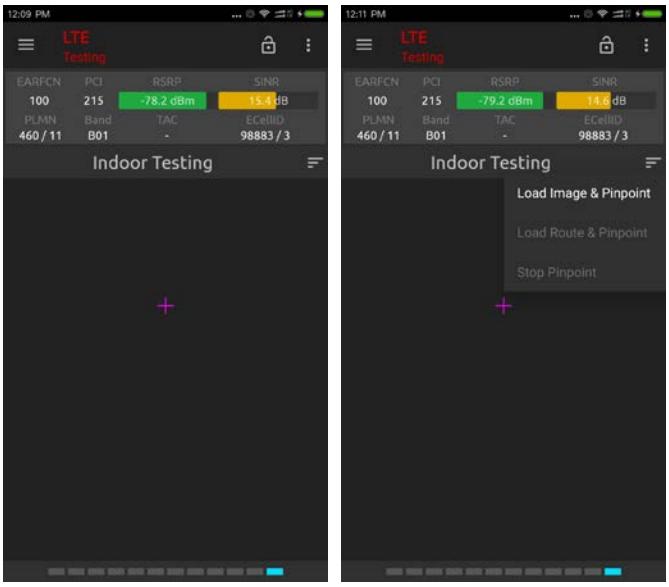
The Indoor Map function enables import of maps and positioning of measurements in indoor locations and other places where GPS coverage is lacking. The positioning is done by pinpointing the test route in the Indoor Map view on a georeferenced floor plan or other map image.

NSG map sets are created in picture format, which is one of JPG, PNG and BMP. Before you are starting the indoor testing, please prepare images of the indoor building.

Please note, Indoor testing is not free. User needs to pay for this feature.

9.1 Fundamentals of Pinpointing

Before you start an indoor testing session. You need switch your view to “Indoor Testing”. In this view , you can pinpoint the indoor testing route and record the information. You can perform pinpointing in marking the waypoints freely on the map. Your route will be recorded in a logfile when you start pinpointing and is ended when you stop pinpointing.



In the indoor testing screen, press button , the menu item will be shown. You can load the image and start the pinpoint…

9.2 Manual Pinpointing

Tap the Menu button (in the right of Indoor testing View), and under Start select load Image and Pinpoint.

- After the image is loaded and the button "add" will be in the bottom of screen. You can add points with this interface.
- Pan the map to position the crosshairs correctly. It may also be helpful to use the zoom function; pinch and spread to zoom the map image in and out. Alternatively, you can double-tap to zoom out to normal. The current magnification is indicated numerically in the top left corner.
- Tap **Add** pinpoint to place a waypoint at the spot marked by the crosshairs. The waypoint is marked by a circle symbol and labeled with a sequence number.
- Pan the map to position it for the next waypoint, then tap Add pinpoint again. A new pin is drawn and joined to the previous one by a connecting line.

Route markers are drawn along each route segment as soon as it has been completed, that is, when you mark a new waypoint ending the segment. A maximum of 10 route markers are drawn between two waypoints.

- Continue pinpointing at regular intervals along the route, and whenever you change direction. If you stop along the way, pinpoint when you stop and again when you resume your walk.
- When you have completed your route, tap the Tap the Menu button, and select Stop Pinpoint.

10 Cell Database and Identifications

10.1 Cell File Basics

Cell file is an engineering data file which can be processed by NSG and used for a better understanding of network. The file is text formatted data and there's no restrictions for the number of cells in the file. The default file extension is .csv (Comma-Separated Values, CSV). User can edit this kind of file in Microsoft Excel and then export to csv file format. Besides, please save the csv as UTF-8 formatted encodings (use windows notepad to save).

There are five different file format for different networks, which are one of GSM, WCDMA, TD-SCDMA, CDMA/EVDO, and LTE technology. NSG can import different file for different technology.

10.2 Generic Data Types

This part will introduce the column headers in csv file.

Column Header	Data Content and Format
CellName	Cell name. Text string. Less than 128 characters
Longitude	Longitude. Float String, which is between –180.0 ... 180.0
Latitude	Latitude. Float String, which is between -90.0 … 90
Azimuth	Azimuth of a cell. Integer string, which is between 0…360
CellID	GSM, WCDMA&TDSCDMA: Cell Identity. Integer String, Equal to the 16-bit C-Id in 3GPP 25.401, section 6.1.5. The 28-bit Cell Identity ("UC-Id" in 3GPP) is a concatenation of RNC_ID and CI.
ECellID	LTE: ECI, E-UTRAN Cell Identifier. Integer String, Used to identify a cell uniquely within a PLMN. Length: 28 bits. Contains the eNodeB Identifier (eNB-ID) and can address from 1 up to 256 cells per eNodeB, depending on the length of the eNB-ID. 3GPP 36.300, section 8.2
CPI	TDSCDMA, Cell Parameter ID. Integer String, 0 …511
PCI	LTE PCI, Physical Channel Identity, Integer String, 0…511
PSC	Primary downlink scrambling code to be used in the cell. Integer(0 … 511), Integer String,
UARFCN	WCDMA and TD-SCDMA, UARFCN, downlink. Integer String, Integer 0 … 65536
ARFCN	Absolute Radio Frequency Channel Number. Integer String, Integer 0…1023

EARFCN	EUTRA-ARFCN, downlink. Integer String, Integer 0 … 70000
Channel	The CDMA RF channel number. Integer String, Integer 0…1023
PN	Pilot Number. Integer String, Integer 0…511

Note: the csv file should be in utf-8 formats for some South East Asian double byte languages. Please use the notepad or other word tools to save the .csv file into UTF-8 formats.

10.3 Cell File Formats

10.3.1 LTE Cell Format

Samples in excel

ECellID	CellName	Longitude	Latitude	PCI	EARFCN	Azimuth
130023434	SampleCell1	115.90801	28.67221	13	38400	0
130023444	SampleCell2	115.90801	28.67221	12	38400	90
130023454	SampleCell3	115.90801	28.67221	14	38400	210
130023690	SampleCell4	115.88645	28.68774	38	38400	30
130023700	SampleCell5	115.88645	28.68774	36	38400	115
130023710	SampleCell6	115.88645	28.68774	37	38400	190
130023946	SampleCell7	115.89969	28.68162	18	38400	30
130023956	SampleCell8	115.89969	28.68162	20	38400	130
130023966	SampleCell9	115.89969	28.68162	19	38400	280
130024202	SampleCell10	115.89785	28.68687	28	38400	90
130024212	SampleCell11	115.89785	28.68687	29	38400	150
130024222	SampleCell12	115.89785	28.68687	27	38400	320
130024458	SampleCell13	115.89812	28.68031	15	38400	50
130024468	SampleCell14	115.89812	28.68031	17	38400	110
130024478	SampleCell15	115.89812	28.68031	16	38400	160
130024459	SampleCell16	115.89812	28.68031	292	37900	290
130024469	SampleCell17	115.89812	28.68031	293	38098	270
130024479	SampleCell18	115.89812	28.68031	291	37900	90

Samples in csv file

ECellID,CellName,Longitude,Latitude,PCI,EARFCN,Azimuth

130023434,SampleCell1,115.90801,28.67221,13,38400,0

130023444,SampleCell2,115.90801,28.67221,12,38400,90

130023454,SampleCell3,115.90801,28.67221,14,38400,210

130023690,SampleCell4,115.88645,28.68774,38,38400,30

130023700,SampleCell5,115.88645,28.68774,36,38400,115

130023710,SampleCell6,115.88645,28.68774,37,38400,190

130023946,SampleCell7,115.89969,28.68162,18,38400,30

130023956,SampleCell8,115.89969,28.68162,20,38400,130

130023966,SampleCell9,115.89969,28.68162,19,38400,280

130024202,SampleCell10,115.89785,28.68687,28,38400,90

130024212,SampleCell11,115.89785,28.68687,29,38400,150

130024222,SampleCell12,115.89785,28.68687,27,38400,320

130024458,SampleCell13,115.89812,28.68031,15,38400,50

130024468,SampleCell14,115.89812,28.68031,17,38400,110

130024478,SampleCell15,115.89812,28.68031,16,38400,160

130024459,SampleCell16,115.89812,28.68031,292,37900,290

130024469,SampleCell17,115.89812,28.68031,293,38098,270

130024479,SampleCell18,115.89812,28.68031,291,37900,90

10.3.2 WCDMA Cell Format

Samples in Excel.

Longitude	Latitude	CellName	CellID	UARFCN	PSC	Azimuth
116.463575	39.974739	SampleCell1	20231	10713	243	0
116.464895	39.973986	SampleCell2	20235	10713	7	120
116.465336	39.973426	SampleCell3	20239	10713	55	240
116.461751	39.972486	SampleCell4	20243	10713	308	0
116.462057	39.973695	SampleCell5	20247	10713	286	120
116.466234	39.972603	SampleCell6	20251	10713	22	240
116.466405	39.974504	SampleCell7	20255	10713	142	0

Samples in .csv file

Longitude,Latitude,CellName,CellID,UARFCN,PSC,Azimuth

116.463575,39.974739,SampleCell1,20231,10713,243,0

116.464895,39.973986,SampleCell2,20235,10713,7,120

116.465336,39.973426,SampleCell3,20239,10713,55,240

116.461751,39.972486,SampleCell4,20243,10713,308,0

116.462057,39.973695,SampleCell5,20247,10713,286,120

116.466234,39.972603,SampleCell6,20251,10713,22,240

116.466405,39.974504,SampleCell7,20255,10713,142,0

116.465246,39.971809,SampleCell8,20259,10713,115,120

116.462964,39.971912,SampleCell9,20263,10688,243,240

116.462533,39.971891,SampleCell10,20267,10688,7,0

116.459649,39.975285,SampleCell11,20271,10688,55,120

10.3.3 TDSCDMA Cell Format

Samples in excel

Longitude	Latitude	CellName	CellID	UARFCN	CPI	Azimuth
116.463575	39.974739	SampleCell1	20231	10114	4	0
116.464895	39.973986	SampleCell2	20235	10114	68	120
116.465336	39.973426	SampleCell3	20239	10114	12	240
116.461751	39.972486	SampleCell4	20243	10114	79	0
116.462057	39.973695	SampleCell5	20247	10114	99	120
116.466234	39.972603	SampleCell6	20251	10114	24	240
116.466405	39.974504	SampleCell7	20255	10114	55	0

Samples in .csv file

Longitude,Latitude,CellName,CellID,UARFCN,CPI,Azimuth

116.463575,39.974739,SampleCell1,20231,10114,4,0

116.464895,39.973986,SampleCell2,20235,10114,68,120

116.465336,39.973426,SampleCell3,20239,10114,12,240

116.461751,39.972486,SampleCell4,20243,10114,79,0

116.462057,39.973695,SampleCell5,20247,10114,99,120

116.466234,39.972603,SampleCell6,20251,10114,24,240

116.466405,39.974504,SampleCell7,20255,10114,55,0

116.465246,39.971809,SampleCell8,20259,10114,38,120

116.462964,39.971912,SampleCell9,20263,10114,35,240

116.462533,39.971891,SampleCell10,20267,10114,7,0

116.459649,39.975285,SampleCell11,20271,10114,55,120

10.3.4 GSM Cell Format

Samples in excel

Longitude	Latitude	CellName	CellID	ARFCN	BSIC	Azimuth
116.463575	39.974739	SampleCell1	20231	642	13	0
116.464895	39.973986	SampleCell2	20235	639	51	120
116.465336	39.973426	SampleCell3	20239	648	11	240
116.461751	39.972486	SampleCell4	20243	654	17	0
116.462057	39.973695	SampleCell5	20247	96	2	120
116.466234	39.972603	SampleCell6	20251	124	16	240
116.466405	39.974504	SampleCell7	20255	645	33	0

116.465246	39.971809	SampleCell8	20259	658	60	120
116.462964	39.971912	SampleCell9	20263	653	17	240
116.462533	39.971891	SampleCell10	20267	651	23	0

Samples in .csv file

Longitude,Latitude,CellName,CellID,ARFCN,BSIC,Azimuth

116.463575,39.974739,SampleCell1,20231,642,13,0

116.464895,39.973986,SampleCell2,20235,639,51,120

116.465336,39.973426,SampleCell3,20239,648,11,240

116.461751,39.972486,SampleCell4,20243,654,17,0

116.462057,39.973695,SampleCell5,20247,96,2,120

116.466234,39.972603,SampleCell6,20251,124,16,240

116.466405,39.974504,SampleCell7,20255,645,33,0

116.465246,39.971809,SampleCell8,20259,658,60,120

116.462964,39.971912,SampleCell9,20263,653,17,240

10.3.5 CDMA/1xEVDO Cell Format

Samples in excel

Longitude	Latitude	CellName	Channel	PN	Azimuth
116.463575	39.974739	SampleCell1	283	274	0
116.464895	39.973986	SampleCell2	283	442	120
116.465336	39.973426	SampleCell3	283	106	240
116.461751	39.972486	SampleCell4	283	338	0
116.462057	39.973695	SampleCell5	283	294	120
116.466234	39.972603	SampleCell6	283	434	240
116.466405	39.974504	SampleCell7	283	356	0
116.465246	39.971809	SampleCell8	283	18	120
116.462964	39.971912	SampleCell9	283	328	240
116.462533	39.971891	SampleCell10	283	118	0
116.459649	39.975285	SampleCell11	283	175	120

Samples in .csv file

Longitude,Latitude,CellName,Channel,PN,Azimuth

116.463575,39.974739,SampleCell1,283,274,0

116.464895,39.973986,SampleCell2,283,442,120

116.465336,39.973426,SampleCell3,283,106,240

116.461751,39.972486,SampleCell4,283,338,0

116.462057,39.973695,SampleCell5,283,294,120

116.466234,39.972603,SampleCell6,283,434,240

116.466405,39.974504,SampleCell7,283,356,0

116.465246,39.971809,SampleCell8,283,18,120

116.462964,39.971912,SampleCell9,283,328,240

116.462533,39.971891,SampleCell10,283,118,0

116.459649,39.975285,SampleCell11,283,175,120

116.459649,39.975285,SampleCell12,283,274,240

10.4 Cell Identification

This part describes the algorithms used by Network Signal Guru to identify network cells with entries in a NSG cell file.

The following procedure is used to find a matching cell:

• Try to match cell parameters in the cell file, also considering the geographical position of the sample. Specifically:

– For a GSM cell, ARFCN and BSIC.

– For a WCDMA cell, UARFCN and SC.

– For a TDSCDMA cell, UARFCN and CPI.

– For an LTE cell, EARFCN and PCI.

– For a CDMA or EVDO cell, RF channel and PN offset.

• A position is considered valid if the distance to the cell is less than 100 km.

• If multiple matches are found within a 100 km radius, the closest cell is picked.

• If the position is invalid, no result is returned unless a unique match is found in the cell file.

10.5 Cell Importing

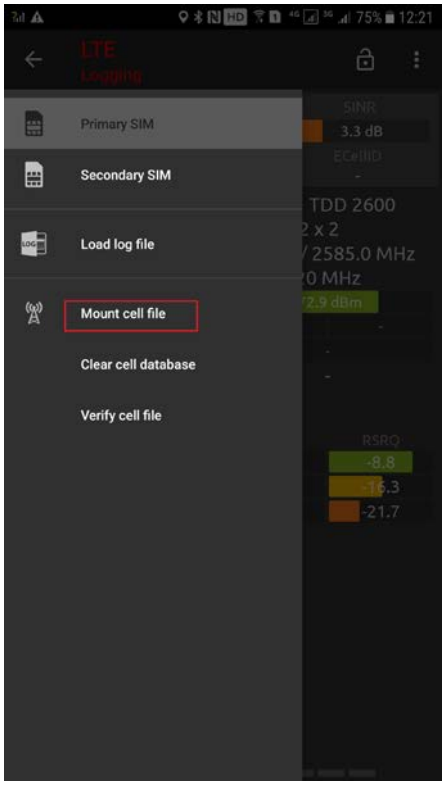
10.5.1 Before starting

Before starting to import cells from a csv file, you should be sure your .csv files are ready for importing. Different files for different technologies. NSG only can store one database for one network. If you are importing a database that existed in your old database, the old cell database will be removed and will be replaced by the new database. Please be aware. If you'd like to merge all the database together, you can do that in the csv files.

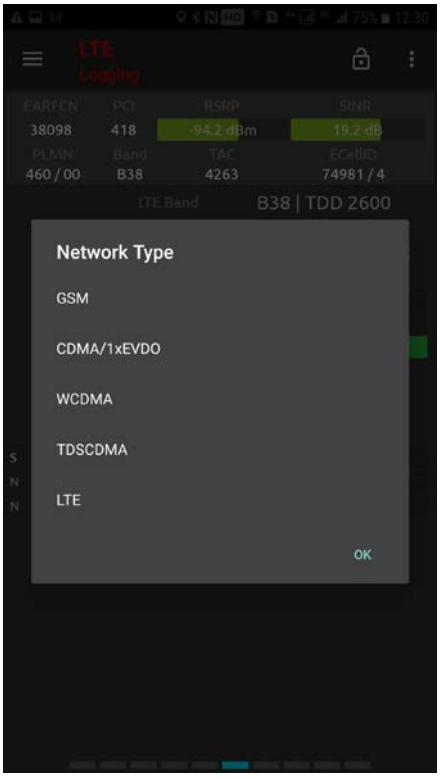
Besides, cell database importing is supported in a paid version. In free version, cell can be imported, but it cannot be shown in cell table and map.

10.5.2 How to import

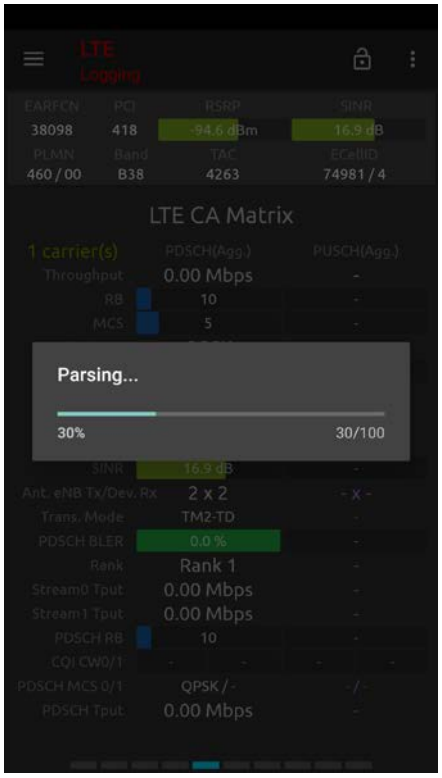
First go to menu in the left side, select *mount cell file,*



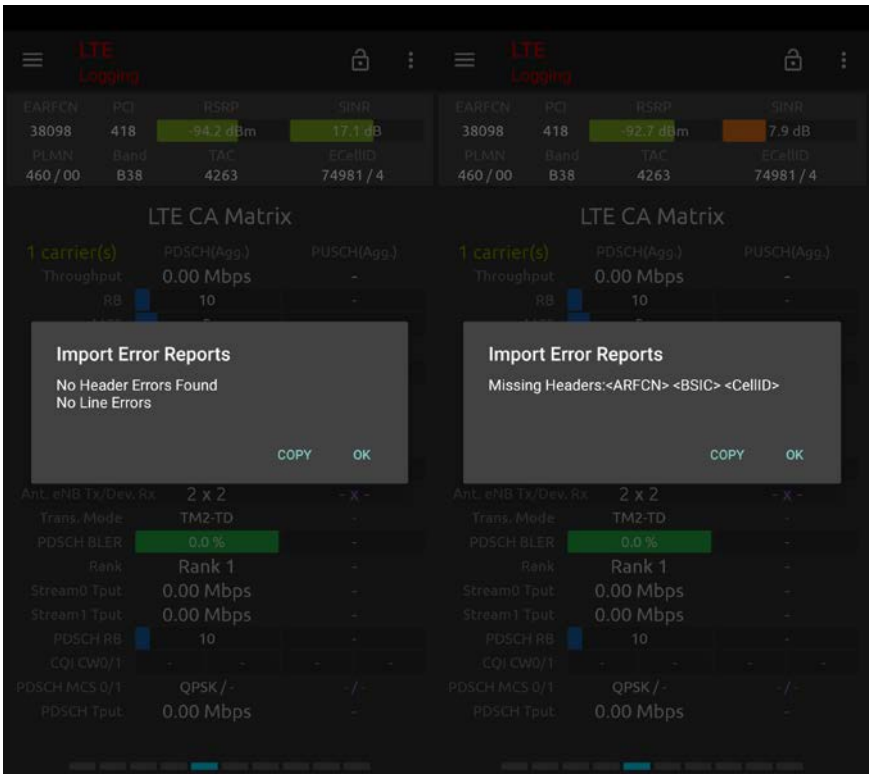
After the file is picked then specify the network type of the csv file, just like this.



Then a importing progress bar will be shown as below.



After the process is done, NSG will show the importing report for the process. When there are errors in the parsing, NSG will present the error details.



10.5.3 Cell tools

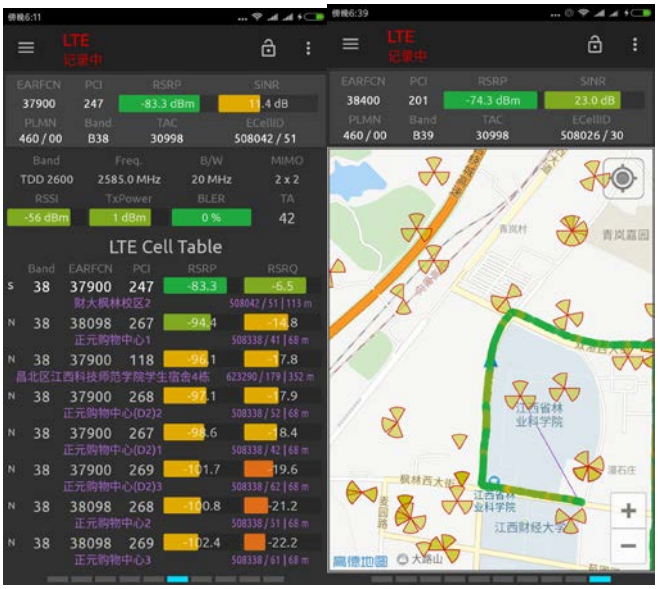
Clear the cell database. User can clear all the database in NSG. This action will removed cells in

different technologies and user can import again.

Verify cell file. User can verify a cell file whether is ok for reporting. This action doesn't save the imported data into database, just verify the file is ok in the formats. That's the only difference with command Mount cell file.

10.5.4 Cell Database presentations

NSG provides some different ways to present cell stations. Cell table and map. Just like this



In the cell table, there's an addition line for cell details, cell name, cellid and distance between cell and current location(meter). When no cell is detected, the additional line will be empty.

In the map, there will be a line between the serving cell and current location. When no cells are detected, this line will disappear.

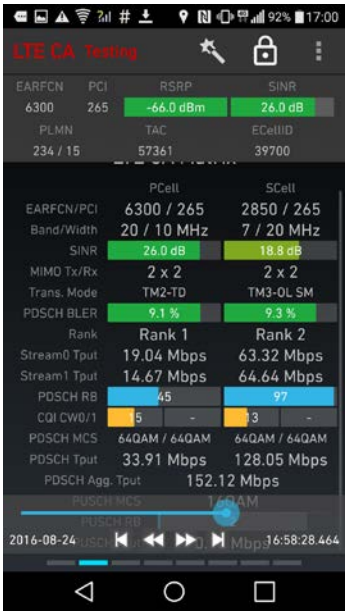
10.6 How to make a cell file?

NSG team made a presentation on how to import and make a cell file, just write us to have this presentation.

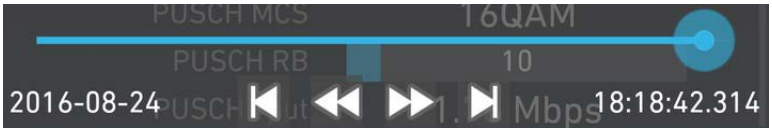
11 Data View Synchronization

11.1 Real Time

NSG provided a Synchronization between different data views. This features can help engineer to look back testing information.



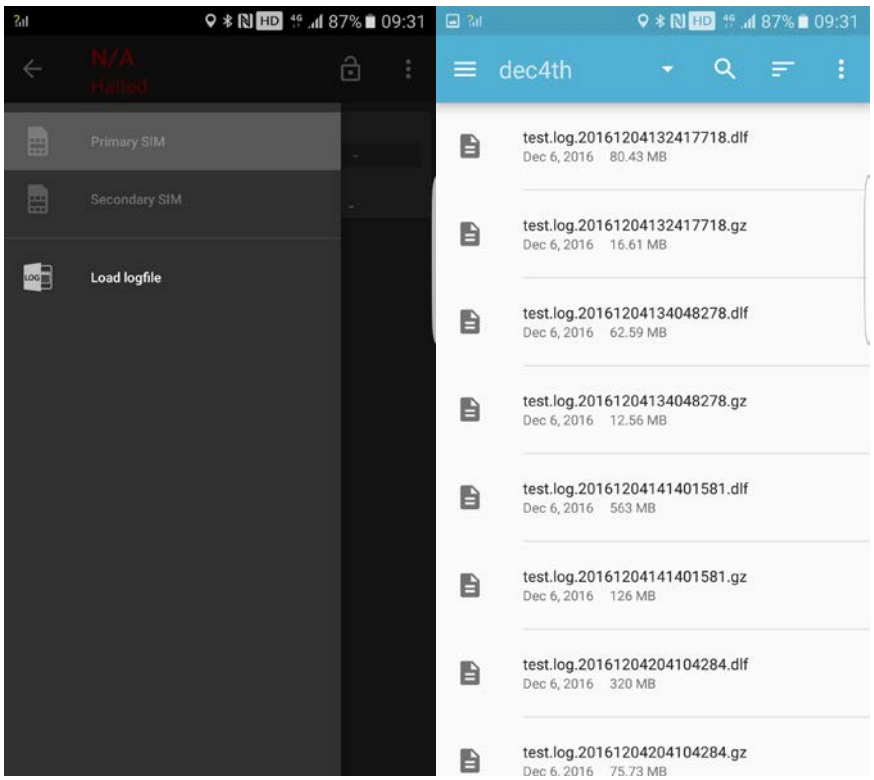
User can activate this feature by tapping the button “lock”  . When this button is tapped, a control panel will be presented in the below.

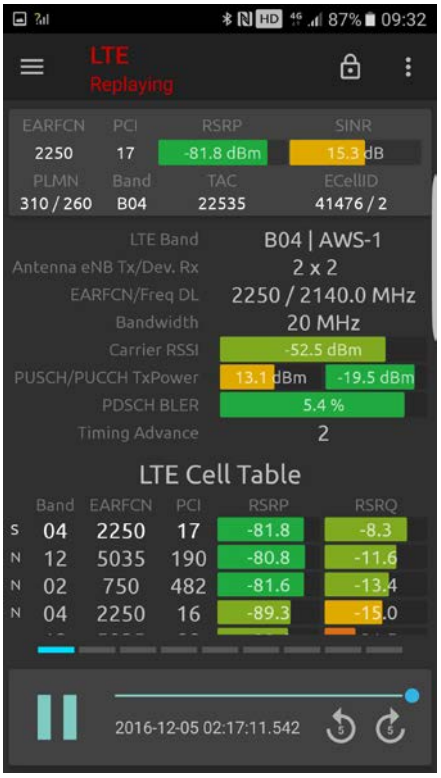


It’s something like a replay function. With it, user can discover what is happening in the past testing time. You can step forward, step backward and time seeking. When the time is change and the corresponding view will change to the corresponding position.

11.2 Logfile replay

Logfile can now be replayed in NSG. To use this function, just swipe from the left screen and bring out the conext menu. Or tap the button in top-left cornner ( ). Load logfile will be the command to replay target files in phone.





Select one file and waiting the replay screen will show up. When it’s in replaying mode. The action bar shows current status as a replaying one. In replaying mode, every views can be synchronized by the slider in the bottom.

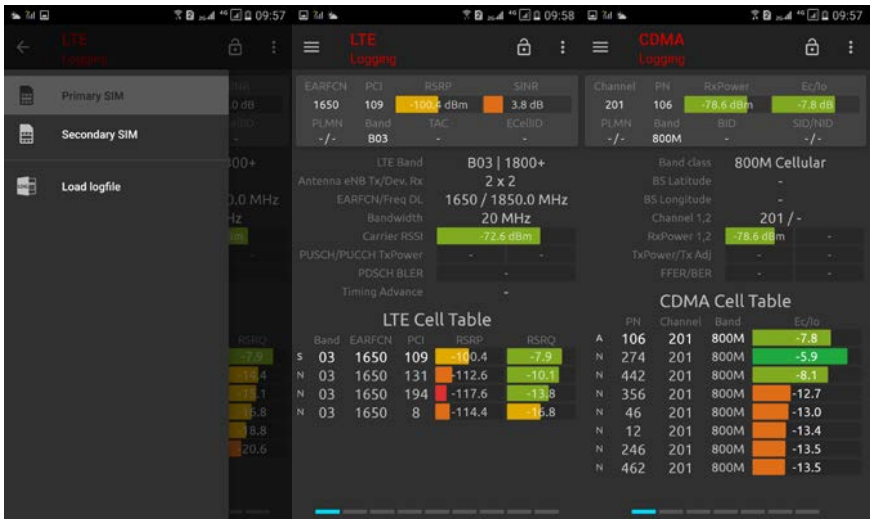
12 Dual SIM card support

12.1 Dual SIM basics

Dual SIM card phone (knows as DSDS, Dual SIM Dual Standby) is popular in some developing countries and many users request this feature us. Since version 1.3, NSG introduces this feature to support DSDS phones. User can investigate 2 mobile networks in one single phone.

12.2 How to do

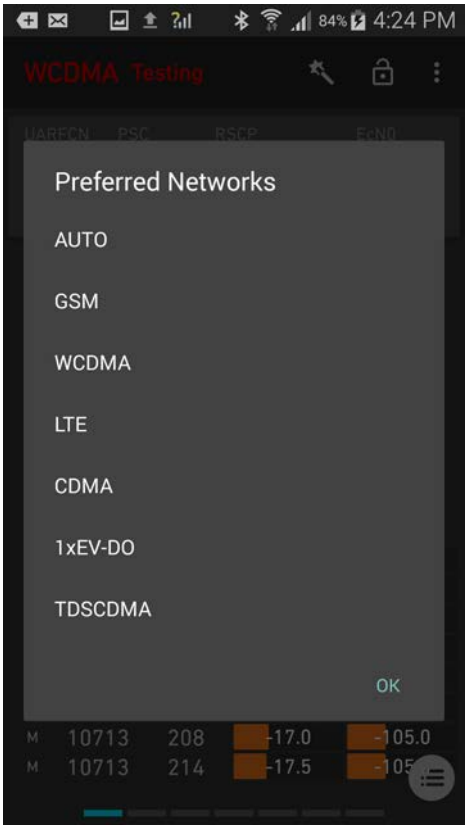
To use this function, just swipe from the left screen and bring out the context menu. Or tap the button in top-left corner (). Primary SIM and Secondary SIM will be the command to switch the view from 2 different serving networks. This 2 menu will be greyed out when your phone is with one single SIM inside.



From the pictures, we have 2 SIM in one phone, in the previous version, the views are switching constantly from 1st SIM to 2nd SIM. But from version 1.3, it will be no longer performing like this. The data view of 2 different SIM will show up separately.

13 Forcing Features

13.1 RAT Locking



This function locks the device to a subset of its supported radio access technologies when in idle mode. The function does not have any effect on RAT selection in dedicated mode.

When a RAT lock is applied, and this results in the device being forced away from the network it is currently attached to, the device will detach from that network and subsequently try to attach to some other network that is allowed by the RAT lock. If this fails, the device will go into no service mode.

Off: This means that NSG does not influence the device's network selection. Bear in mind, though, that the device can also be RAT locked from the device's regular user interface; see note below.

GSM, etc.: What RATs appear here depends on what the device supports. Another possible subset is {LTE, CDMA, EV-DO and TD-SCDMA}.

If you check a (permitted) subset of RATs, the device is forced to camp on a network belonging to one of the selected technologies, whenever such a network is available. Checking all technologies, of course, is equivalent to AUTO and is automatically converted to that setting.

Please note that certain RAT subsets are disallowed; you will be notified in the user interface if you attempt to select such a subset. A similar effect can be obtained by combining suitable band locks instead.

For example, to lock the device to WCDMA and LTE, allow the available bands for these technologies but deselect the available bands for GSM.

If a cell file is loaded, then for each RAT the number of bands and cells in the cell file that the device supports is indicated below the RAT name. That is, the counts include only bands and cells that are in fact available to the device.

In the regular user interface of Sony and Samsung devices, under Settings Connections More networks Mobile networks Network mode, it is possible to make a choice between "LTE/GSM/WCDMA", "GSM only", "WCDMA only", and "LTE only" (or similar). It is recommended not to use this function in conjunction with NSG.

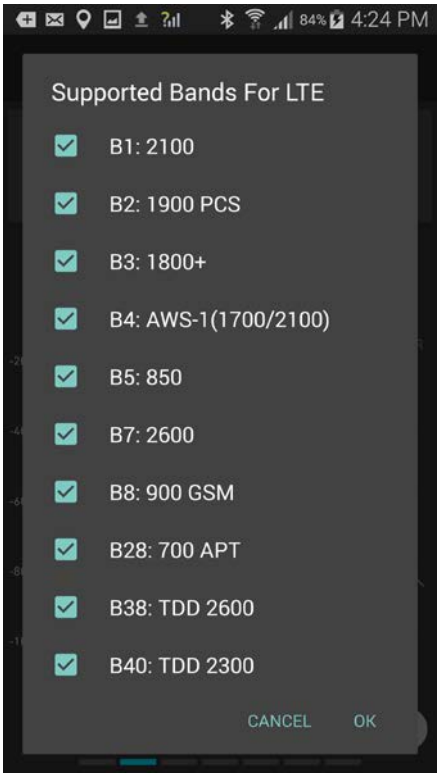
13.2 Band Locking

You can lock the device to a subset of its supported frequency bands on LTE, WCDMA, or GSM. Note that this operation will result in no service if you prevent the use of all bands that are available at the current location. Conversely, checking all bands is equivalent to No Locking features (that is, no lock applied) and is automatically converted to that setting.

If a cell file is loaded, then for each band, the number of cells on that band listed in the cell file is indicated beneath the band name.

The device cannot be band-locked while a voice call is in progress.

13.2.1 LTE band lock



B1: 2100 etc. the device will be locked to the indicated subset of LTE bands.

13.2.2 LTE Band Lock for Qualcomm Snapdragon 835

In Settings->Experiment->LTE Band Append, Input the band support list and press ok

Restart app and then band list shows up in list box.

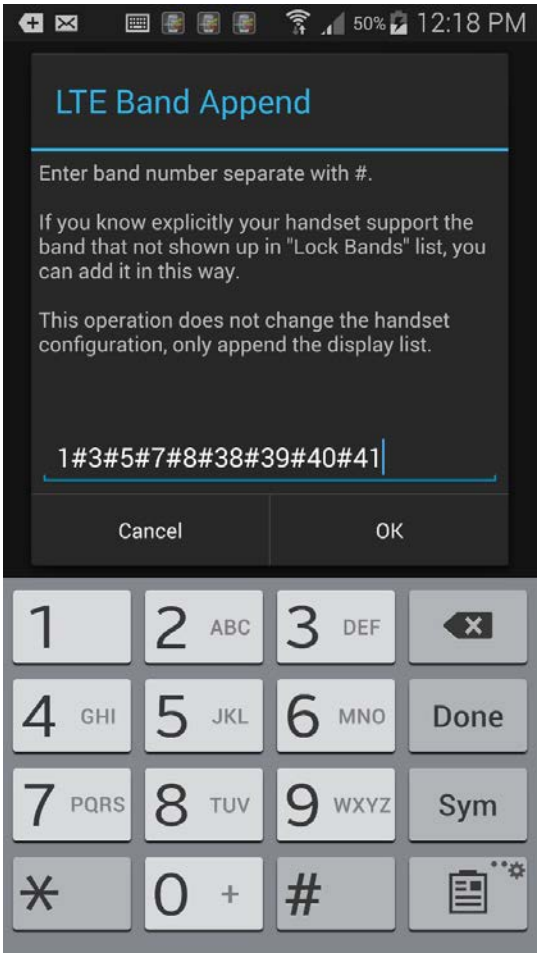
For Xiaomi 6, just as picture(1#3#5#7#8#38#39#40#41)…

For Oneplus 5, input 1#2#3#4#5#7#8#12#17#18#19#20#25#26#28#29#30#38#39#40#41#66.

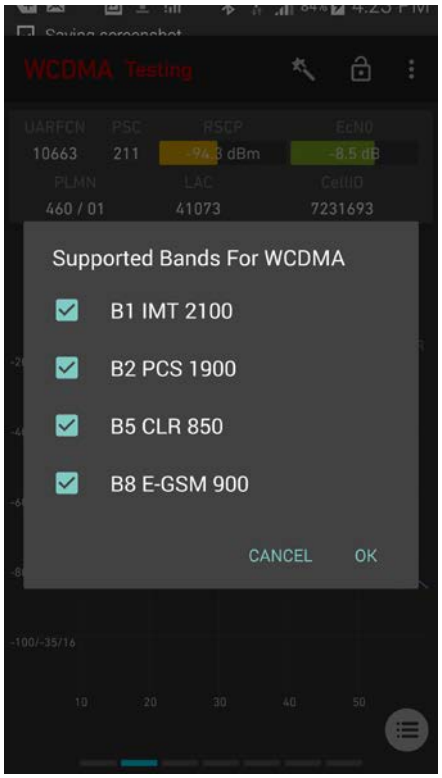
In Snapdragon 835 models, Qualcomm will not initialize the band capability in the ROM, so we have to input that manually.

Please input the band capability of your phone in the settings. And link them with a “#”, such as 1#3#5#7#20#38#39#40#41#66#67#252…

This is a little bit more complicated. We will make it easy in the future version.

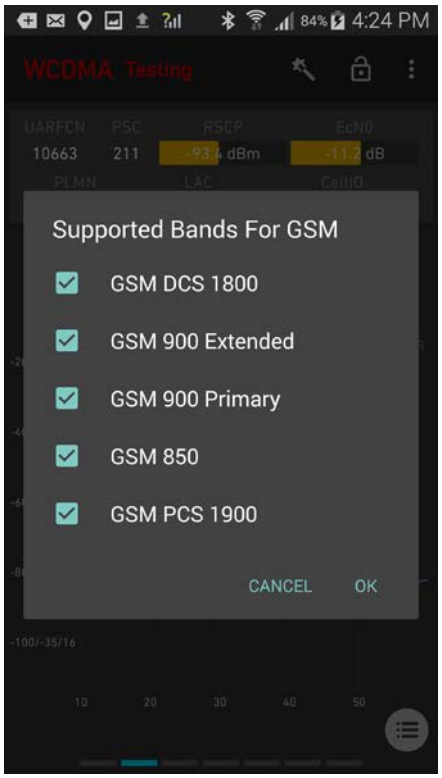


13.2.3 WCDMA band lock



B1 IMT 2100 etc.: The device will be locked to the indicated subset of WCDMA bands.

13.2.4 GSM Band lock



GSM 850, etc.: The device will be locked to the indicated subset of GSM bands.

13.2.5 CDMA band lock

CDMA bands are listed

13.3 Cell and Frequency Locking

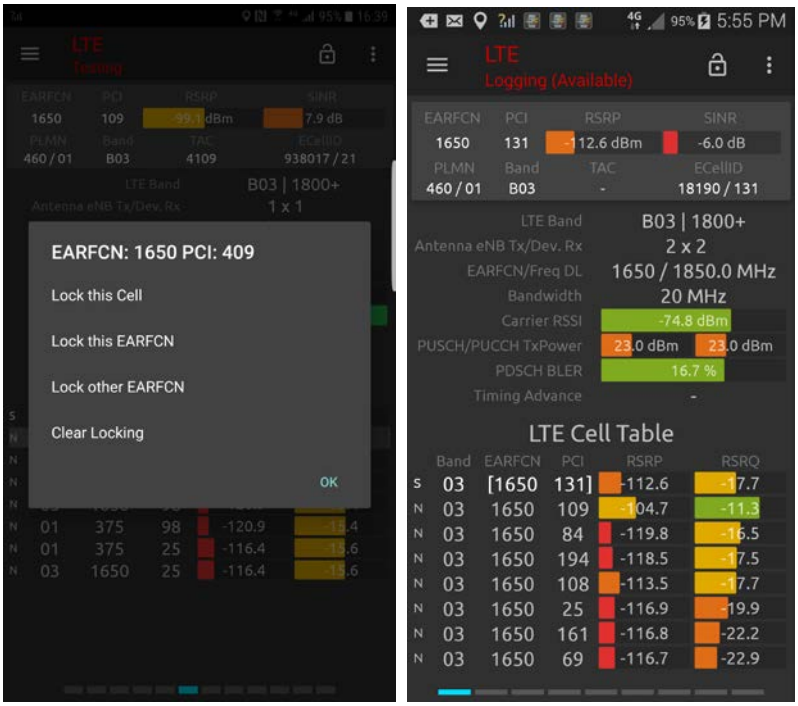
Since version 1.3, NSG introduced cell locking features into market.

13.3.1 LTE Cell Locking

This function locks the device to one Physical Layer Cell Identity (PCI) on one EARFCN. Please be noted this function works differently on different Qualcomm devices. In some devices, the PCI lock is optional; if it is not applied, the function reduces to an EARFCN lock. In some devices, the PCI lock is mandatory – both an EARFCN and a PCI must be indicated. In some devices, The LTE cell lock is released on device reboot. But some will be not. So you must be noted that.

You can lock on a cell that is listed in the cell table. The phone is then restricted to camping on that cell. Tap and hold a cell to bring up a context menu with data view actions. Tap Cell lock to apply a lock to this cell (i.e. this EARFCN + PCI combination).

You can also lock the cell phone to a specified EARFCN. Use command lock the EARFCN in the cell table. Or you can input a specified EARFCN in an edit box.

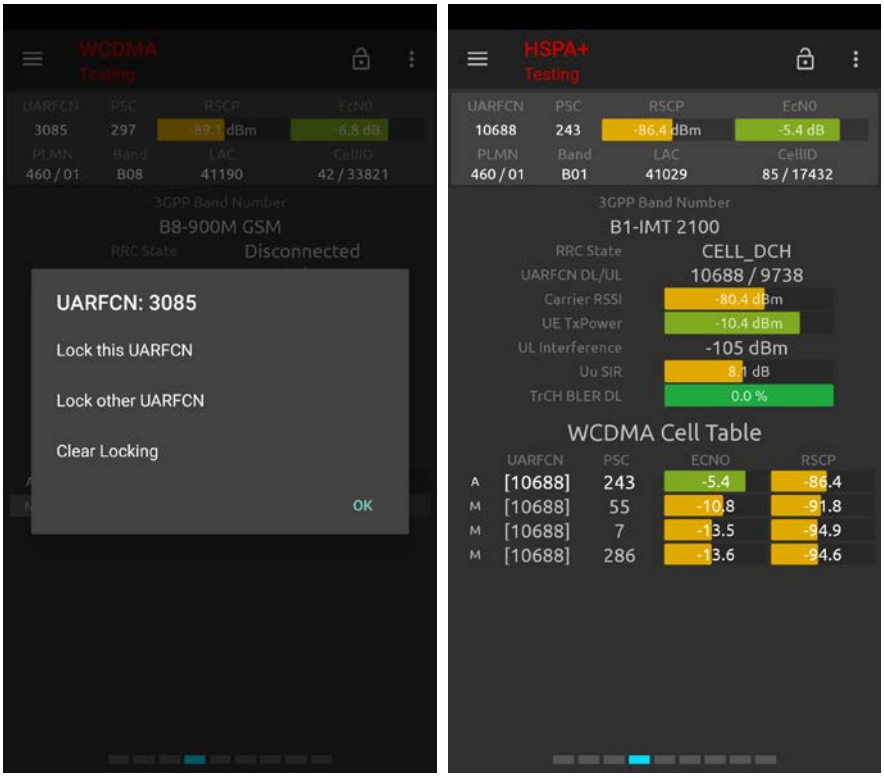


The entity locked on is highlighted in [] in the list. To undo a lock action, long-tap and choose Clear locking.

Note: *Cell locking is not always successful in some old devices. As far as we know, cell locking is more likely to be successful on Qualcomm MSM8994, MSM8992, MSM8996 devices. But for some old MSM8974 or APQ series, cell locking likely failed and user must try more times. Besides, when the signal is strong, cell locking will be more likely to manage.*

13.3.2 WCDMA Cell Locking

WCDMA Cell Locking is introduced to NSG in 1.7. user can lock phone to specified UARFCN



User can hold the cell table of UMTS and bring up the menu of this action. Pick the selected command and then take into effects. To clear all of the locking, tap clear locking and all of the locking will be disabled.

13.4 Clear Forcing Features

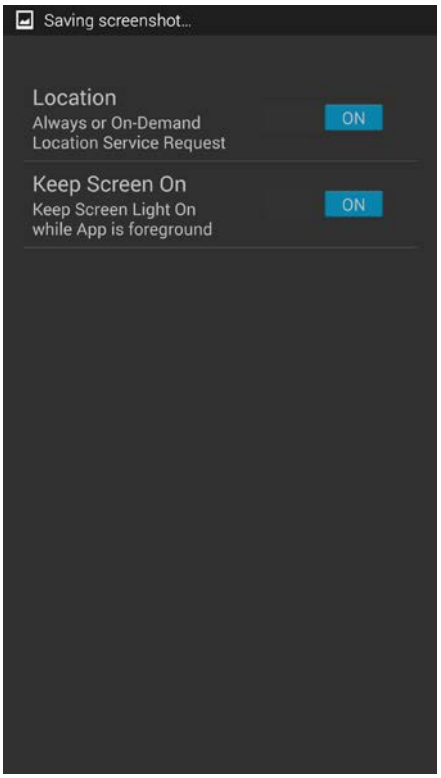
Clear all command in the menu will disable all the forcing features (RAT locking and band locking). After this menu is tapped, the devices will go into no service mode and search network service again. In some old devices, the phone will enter into a reboot process.

14 Settings Menu

From the Settings menu, a number of aspects of NSG behavior are configured. A number of subcategories are found, as detailed in this chapter.

All of these settings are saved in the phone storage, and you don't have to set it when start next time. For conveniences, NSG don't provide many setting items for general users. It's very easy to know how to use it.

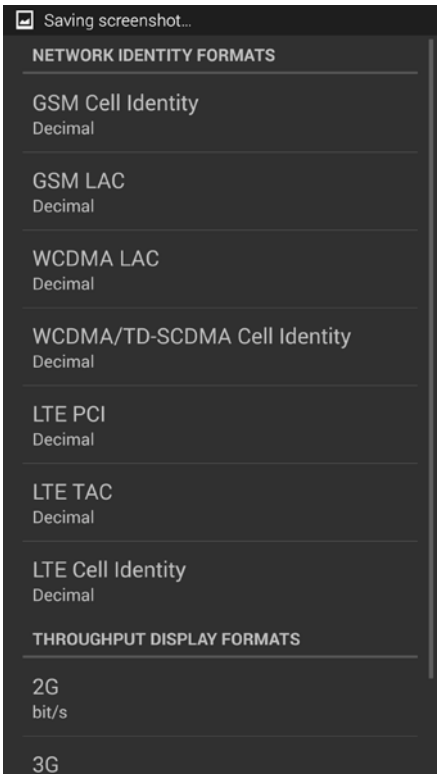
14.1 Battery Preferences



Location Settings: when this option is set, NSG will always request a GPS info from system which increase battery consumption. When it's off, NSG only request GPS when the map is open.

Screen On: if this is turned on, the screen light will be on until you turned it off and will not go out itself. Otherwise, the screen will be off as the system do.

14.2 Display Formats



A number of value elements in NSG can be displayed in either decimal or hexadecimal format. In some cases, parameter-specific formats are also selectable (for example, Group ID/Phy ID for LTE PCI). Display format settings take effect when NSG is restarted, both in live mode and during log file replay. They also persist after NSG is restarted.

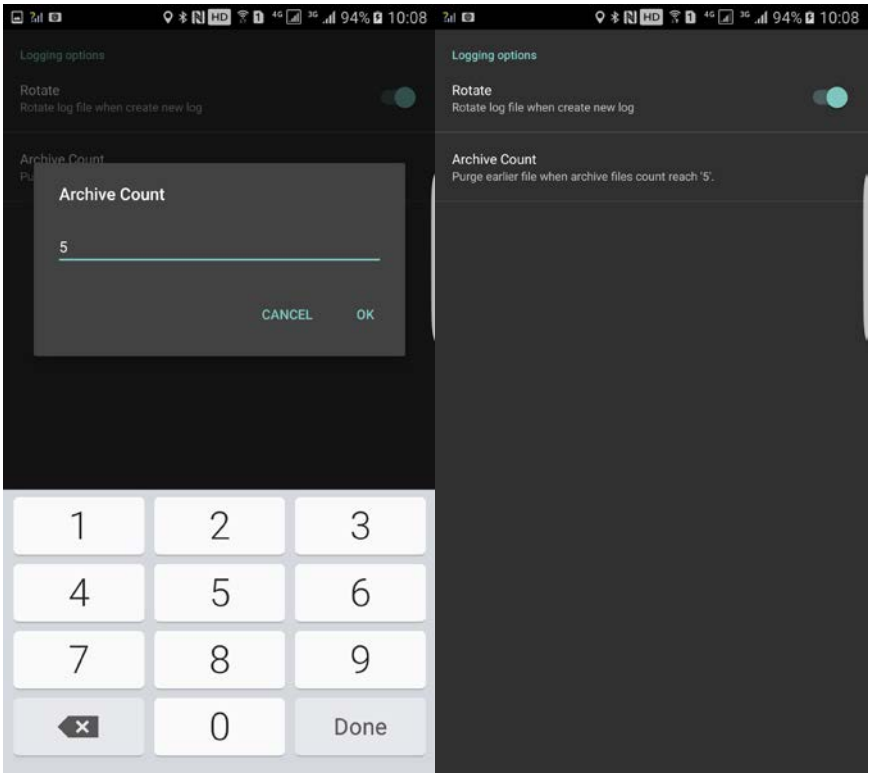
14.3 Purchase Options

NSG integrate a purchase channel in the settings. Please see purchase & upgrade in chapter 4.

14.4 Logging Options

This is only available when you have purchased the features of NSG.

When NSG is logging, there's some basic for users to know. Handheld cell phones are small and it's not convenient to input file names for every single testing. So NSG would log file automatically with auto generate file name. When a logging is started, NSG will start a new file with a name of test.log. If you choose rotate option, this test.log will compressed as a .gz file with time stamped names. If it's false, only one test.log will be saved and will be deleted in next session.



14.5 Mapping Options

Please refer to section 8.4, map settings.

15 Post Processing

15.1 File formats

15.1.1 NSG Raw format

Reserved.

15.1.2 Qualcomm Format

There are different QUALCOMM formats and mainly used one is diagnostics log file for cell phone air interface, which is known as .dlf. dlf files can be processed by Actix, QCAT, TEMS Investigation and DINGLI Pioneer.

15.1.3 Json format

Reserved for enterprise partners.

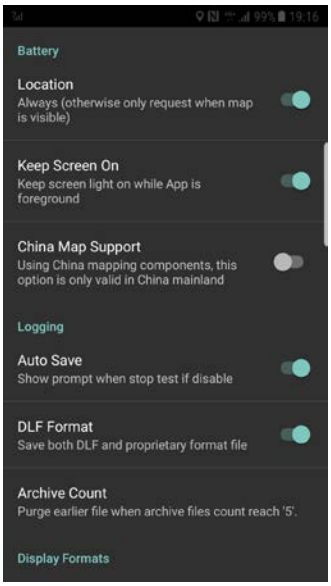
15.1.4 Text Format

Reserved only for enterprise partners.

15.2 Qualcomm diagnostics log file

NSG collects information from Qualcomm diagnostic library and logfile can be stored in a Qualcomm defined formats. There are different Qualcomm file formats for diagnostics, which are, isf, dlf, mdm and qmdl. NSG choose dlf as one of formats. Dlf is a standard file format which can be processed by Actix, TEMS Investigation, Qualcomm CAT (QCAT) and some other 3rd party post processing software.

Since version 1.5, NSG provides an option to save the logfile into Qualcomm dlf. Just like this.

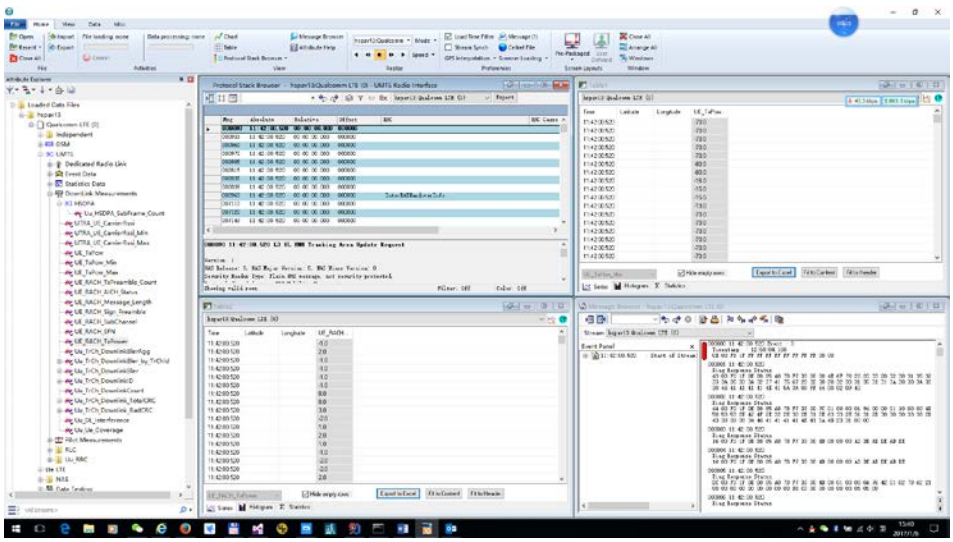


Set the DLF format option on and then will save the log file into dlf and NSG private files together.

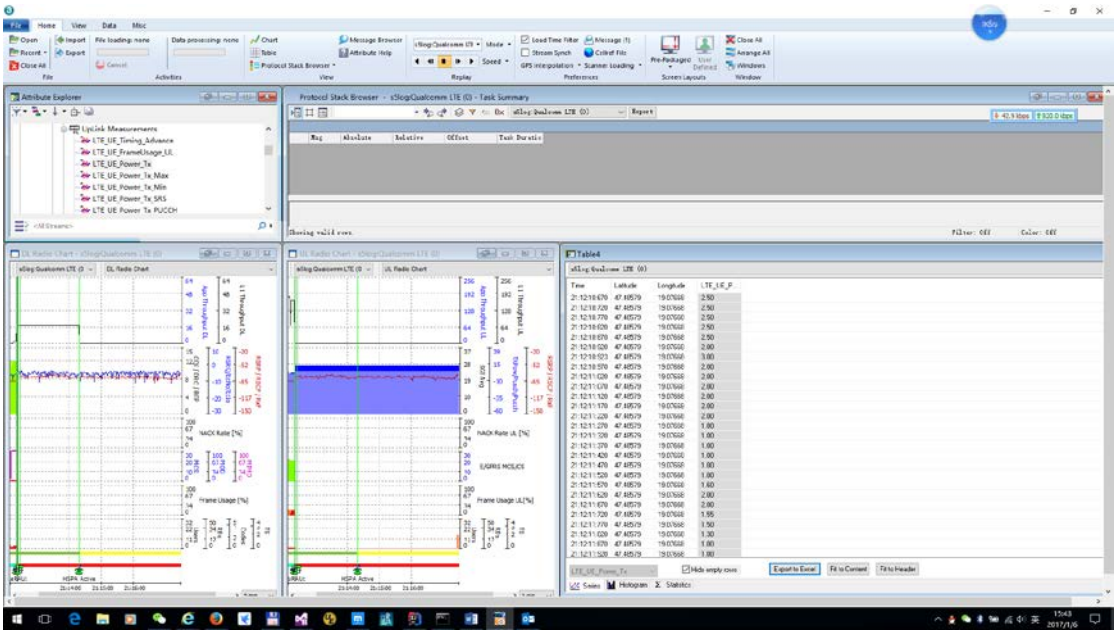
15.3 Actix Analysis

Right now NSG file cannot be opened by Actix Analyzer. But Qualcomm dlf can be open by Actix. The following pictures shows dlf files exported by NSG in Actix Analyzer.

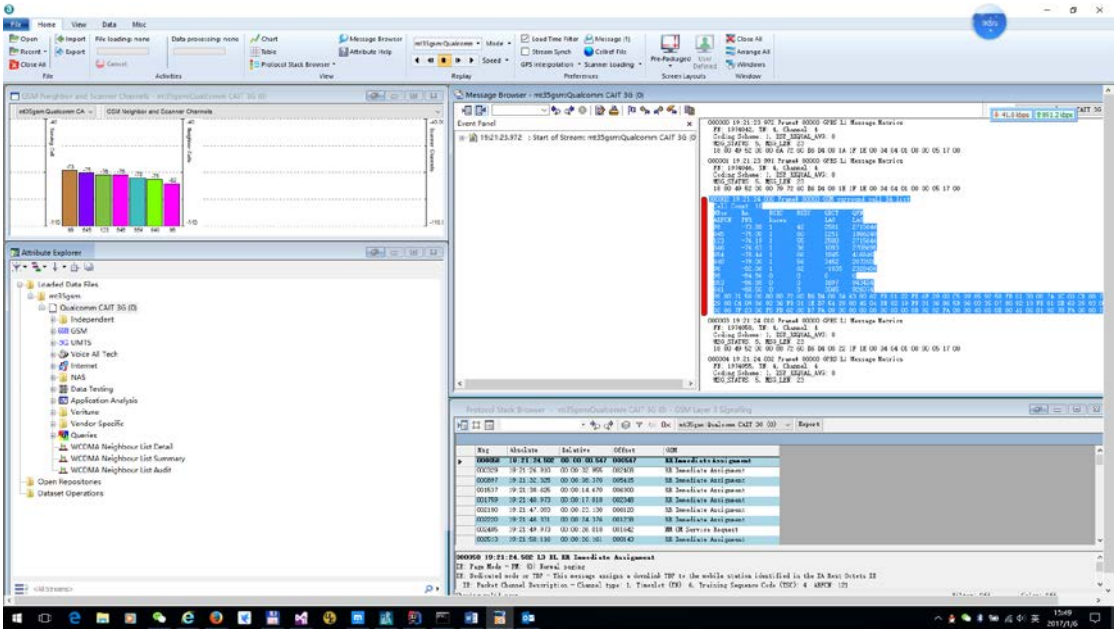
WCDMA



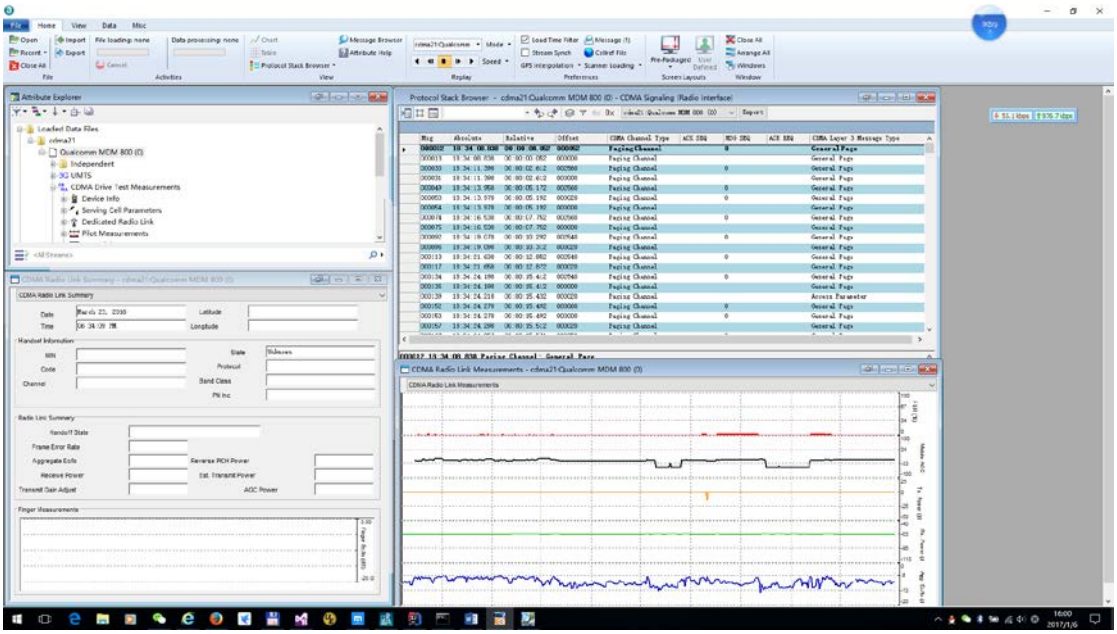
LTE



GSM

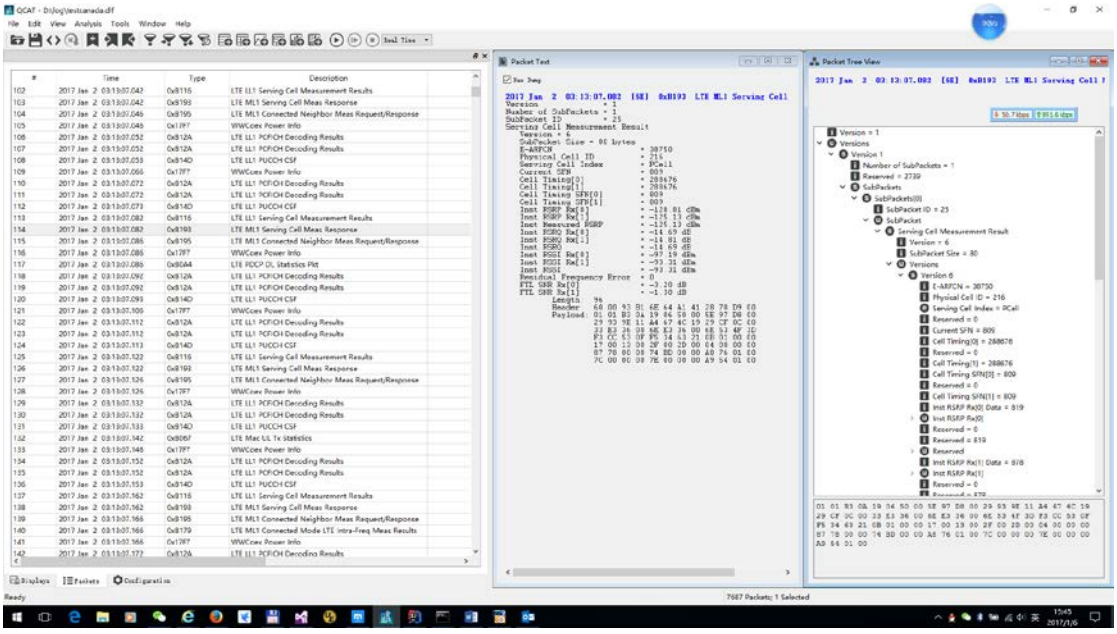


CDMA



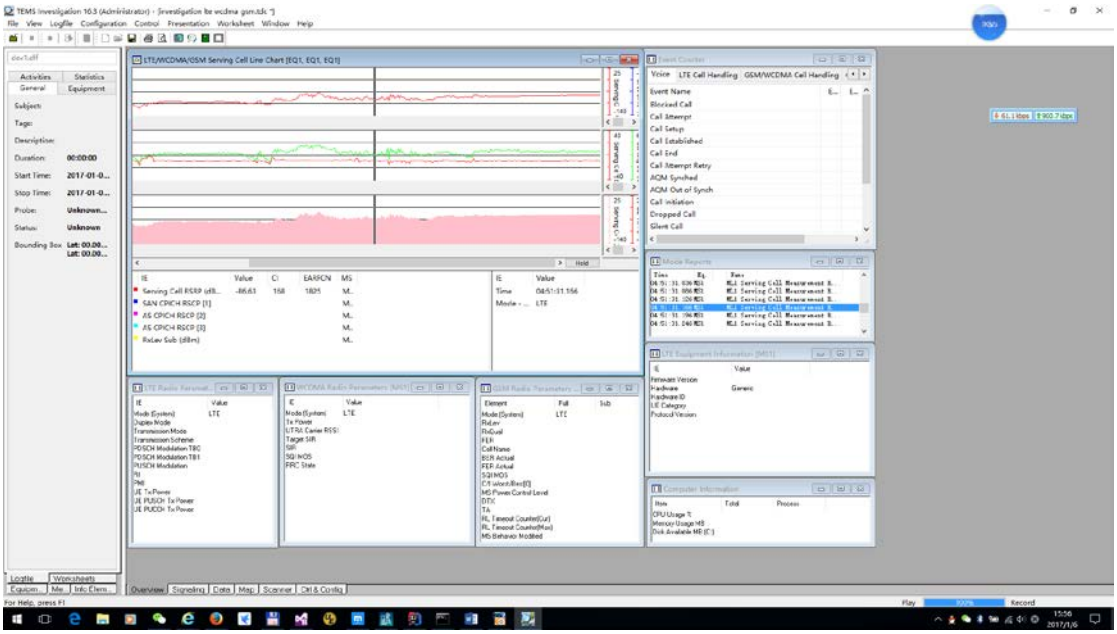
15.4 Qualcomm CAT Analysis

Dlf file opened in QCAT



15.5 TEMS Investigation Analysis

TEMS Investigation supports Qualcomm dlf, just open dlf files in TEMS Investigation, then you can see all the information of collected data.



16 Support

16.1 FAQs about NSG

Q: In some Samsung and HTC phones, for example, the phone is with a Qualcomm baseband, but NSG testing mode cannot be achieved, why? This happens in Samsung i9505, i9506, G920V, N900x, HTC One, HTC M8, etc, most of them come with an android 5.0.

A: in some Samsung, HTC and Sony phones, the manufacturer removed NSG needed drivers for diagnostic interface. So NSG cannot detect it as a testing phone. There are some possible ways to fix this problem.

Firstly you can upgrade or downgrade OS provided by your phone supplier. In Samsumg i9505, SCH-i545 4.x or 6.0 is ok for testing, but with 5.0, it's not OK.

Besides, for Samsung phones, user can try some other ways. In stock recovery mode, and enable CP logging option and testing screen mode will be achieved. It's from some European users. Thanks for their advices.

There's another way. Some 3rd parties are providing ROM for Samsung, HTC, and Sony and etc. user can find the correspondent ROM to your own cell phone. Some NSG users shared us with that information. These organizations are:

Cyanogenmod (http://www.cyanogenmod.org/),

AICP (Android Ice Cold Project, http://www.aicp-rom.com/),

Xiaomi MIUI (www.miui.com).

Q: I am a Nexus 6P user and it's using a Qualcomm MSM8994. The testing mode is achieved but I cannot lock band? But RAT locking is OK. Why is that?

A: This is something like the problem above. Since Android 6.0, Google locked the radio of Nexus 6P and NSG can't manage locking bands within it. But Google provided a way to unlock the radio with an engineering firmware. The firmware is available for downloading in this URL: http://forum.xda-developers.com/nexus-6p/general/guide-biref-guide-to-connect-to-diag-t3354938.

Please refer to the article and only do step 3 (flash the radio firmware), and it works on Nexus 6P with an android 6.x and N as well. Please do it very carefully. This has been proved to be ok for band locking and RAT locking in US and international version of Nexus 6P. NSG team tested it with a Nexus 6P US edition and some UK guys tested with an international firmware. Both US and international edition are working greatly in band locking and RAT locking. One user from USA posted a wonderful article about how to manage band locking on Nexus 6P

(http://www.trona-tech.net/network-signal-guru-on-nexus-6p/). Thanks for their efforts.

Q: Can you changed the band capacities of my cell phone. My cell phones are from other countries and the band capabilities are not so good, and I want more band support. Could NSG do that?

A: NSG cannot provide this kind of feature and we need to write some NV items to change the band capabilities. But it's different among different phones. So it's very dangerous and once failed, you will lose all of the band capabilities of certain radio technology. And it's very difficult to recover.

Q: In some countries, dual SIM card is widely used. The NSG UI is switching time to time. Is it a bug? When will NSG support to Dual SIM?

A: Dual SIM is supported since 1.3 before that, not supported.

Q: how to lock LTE band in MI6?

A: XIAOMI 6 is using Qualcomm SD835, In Settings->Experiment->LTE Band Append, Input the band support list (1#3#5#7#8#38#39#40#41) and press ok. Restart app and then band list shows up in locking.

Q: How to root an android phone in an easy way?

A: In some android 4.x devices, it's very easy to root. User can find some apps online (king root, rootmaster, 360 root and etc) and you can root device easily. But with 5.0 or above, it's not easy. Some phones needed to unlock bootloader. For Samsung devices, you can root it with ODIN tools and unlock bootloader with a CMROM Service App. If you are not so professional at rooting devices, we would like you to buy some popular phones, such as XIAOMI, OnePlus, LeTV, Samsung and etc. These devices are very easy to root because the manufacturer provides the way to root their devices. After that, remember to use SuperSU to grant super user to the APP.

Q: I cannot get the configurations. But internet connections are OK, the app exit.

A: NSG needs to download some online configurations. This downloading process is through a security internet connections. To make sure you can download, you must be sure two things. **First is setting the time of the phone to the current time. Second is to make sure that you don't block the certificate for our website. You can try this https://m.qtrun.com. Just visit this URL. If you can visit, second step is ok.** If these 2 steps are done and you still cannot download the configurations, you have to contact us with email. Thanks for your corporations.

Q: How can I move the license to a new phone, or sometime the phone is lost, can I resume the

license?

A: Yes, just keep the information in your purchase screen, which includes your serviceID, InstallationID and we will move your old license to the new testing models. Send us your information and we will do it for you.

16.2 Communicate with NSG Team

If you encounter any problems while you are using NSG, please feel free to communicate with us. The email address is info@qtrun.com.

For users in China mainland, you can join our QQ group with a simplified Chinese. The number is 559756272 and you can talk to the developer directly.

16.3 Report a bug

NSG is an online app used for wireless network trouble shooting and it's still in the development. If you encounter problems or find some bugs, please help us to fix it. Please attach all the screenshots that containing bugs. In the meanwhile, please pack us all the files under the folder sdcard/com.qtrun.QuickTest/. Please send an email attached with the log files and screenshots to our supporting desk. Email: info@qtrun.com. Your coming assistances will be greatly appreciated.