G-NetTrack Manual

Introduction

   G-NetTrack is a wireless network monitor and drive test tool for Android OS devices. It allows monitoring and logging of mobile network parameters without using specialized equipment. It's a tool and it's a toy. It can be used by professionals to get better insight on the network or by radio enthusiasts to learn more about wireless networks. It can be used even if you want just to make easy representation of your traveled route.

   Using application you can easily pinpoint network problems like:
- bad coverage - low RXLEVEL
- low uplink and downlink data throughput
- lack of dominant server causing lot of cell reselections and frequent service interruptions - when the serving cell time is small
- weak 3G coverage - when you have a lot of reselections between cells on 3G and 2G
- blocked calls
- dropped calls

   The main features of G-NetTrack are:
- measuring of wireless network parameters
- logging of measured values in text and kml files

- displaying measured values on map view
- displaying base stations and serving cell line on map view

The measured data by G-NetTrack can be analyzed with the help of other tools available here on this site as G-NetDiag and G-NetEarth.

This manual describes the information available, the settings and the actions that can be done using G-NetTrack.

Tabs

There are five tabs with different information - CELL, NEI, MAP, INFO and DRIVE. The information displayed on each tab is

2.1 CELL Tab

CELL tab shows network and geographical information. It also shows history log of the serving cells. The shown information is:

- Operator - the name of your wireless provider
- MCC - Mobile Country Code - it is a 3 digit code specific for each country
- MNC - Mobile Network Code - it is 2 or 3 digits code and is specific for each operator in the country
- LAC - location area code - the network is split by location areas, in which the subscriber is paged in all cells simultaneously. LAC is the code of the current area
- RNC - Radio Network Controller - when on 3G it shows the ID of the RNC that controlls the current serving cell
- CELLID - the ID of the current serving cell
- Type - the network technology mode (like GPRS, EDGE on 2G or UMTS, HSPA etc... on 3G)
- LEVEL - the current signal strength in dBm. For different technologies the caption is different - RXLEV for 2G, RSCP for 3G and RSRP for 4G.
- QUAL - the signal quality of the network. For different technologies the caption is different - RXQUAL for 2G, ECNO for 3G and RSRQ for 4G. This value is not reported by most phones. Only several phones report ECNO and maybe no phone reports RXQUAL.
- SNR - signal to noise ratio. It is measured on LTE only.
- CQI - channel quality indicator. It is measured on 4G only.

- Longitude - current location longitude in decimal format
- Latitude - current location latitude in decimal format
- Speed - current speed in kmph.
- Accuracy - the accuracy with which the location is determined. Location determination could be based on GPS or Network (using Google location service - using serving and neighbor cells or WiFi networks)
- Height - the difference between Altitude and Ground values
- Altitude - the GPS measured altitude
- Height - the ground level height - this is ajustable in settings.

- UL - the current uplink data transfer speed in kbps

- DL - the current downlink data transfer speed in kbps
- Data - the used data network - Mobile Network or WiFi
- Phone State - IDLE, CALL, DATA - the current phone state - if it is idle or in active data transfer or in active voice call

- Serving Time - the current serving cell time in seconds. If cellfile is used this line also shows the serving cell name and cell layer.
- Serving cell history table - this table shows history log of serving cell changes with time of the change and level at which this change happened. The table also shows cell serving time which is useful for spotting frequent cell reselection and lack of dominant cells. Also here it is possible to see loss of network coverage - rows with level values equal to -201.

2.2 NEI Tab

NEI tab shows information about neighbor cells measurements. It consists of two tables:
- Serving cell table - shows information about current serving cell id and level. when on 3G CELLID column will show RNC-CELLID and PSC (Primary Scrambling Code) if the phone reports it.
- Neighbor cells table - shows information about the current neighbor cells and their levels. When on 2G the neighbors are shown as LAC and CELLID. When on 3G they are shown as PSC

The neighbor cells information is not reported by all phones. Check phone measurement capabilities for more information.

At the bottom of the NEI tab is area with links to other available tools on this site.

2.3 MAP tab

MAP tab shows geographical view of hte measurements and mobile network basestations.
In the first row there is information about current technology, cell layer, MCC-MNC-LAC-RNC-CELLID of the current serving cell, level and quality measurements.
On the second row there is information about the distance to serving cell and bearing to it. This information is available only if cellfile with networks cell information is loaded. On this row also is information about the GPS - if it has fix (green color) or not (red color).
The map shows the surrounding area view and thematic map of selected measurement (LEVEL, QUAL, CELL, DL bitrate, UL bitrate, SPEED).
There are four buttons available:
- first button is for changing the thematic map measurement
- "Export" button - exports the current thematic map of the selected measurements in kml format. This is useful for on the fly recording of measurement if the logging function has not been turned on.
- "Screenshot" button - saves the snapshot of the current view - useful for on the fly saving of image representation of the measurements.
- "Clear" button - clears the view - if there are a lot of points, it can slow the map view and then is good to clear the view.

2.4 INFO tab

The INFO tab provides following information:
- Log Status - shows if the log recording has been started or not
- IMSI - SIM card Inernational Mobile Subscriber Identity - this is useful for providing information in order different traces to be performed by Network Operator.
- IMEI - this is hardware ID of the mobile phone
- Current Operator - name of the current serving operator
- Current Country - the country of the used mobile provider
- Home Operator - name of your operator
- Home Country - country of the Home Operator
- Is Roaming - if the mobile is in roaming or not
- MSISDN - your phone number
- SD Card - if sd card storage is available
- App folder - the used root folder for exported files - the folder where G-NetTracl_Logs folder stays
- G-NetTrack version - current version of the app
- G-NetTrack code - number representation of the current app verson
- Android SDK - the Android OS version number
- Device - device name
- Brand - device brand
- Device Manufacturer - manufacturer of the device
- Build Number - device software build
- Network Type Num - network type number - determines the current network mode (GSM, HSDPA, CDMA etc...). If your phone shows 0 (unknown) in idle or connected mode, check [Discard Network Type 0] in Settings in order to report correctly the level

- Sequence Status - status of voice/data sequence
- Voice Calls - number of voice calls performed in Voice Sequence
- Successfull Calls - number of successfully started and finished calls made in Voice Sequence
- Blocked Calls - number of blocked calls in voice sequence
- Dropped Calls - number of dropped calls that occur in Voice Sequence

2.5 DRIVE tab

DRIVE tab represent the main serving cells information in comfortable format with big font letters

Settings

Settings are activated via Menu - Settings. There are several group of settings, which are related to different app features:

MAP VIEW Settings

- Map Satellite View - switches satellite/street view of the map
- Map in background - when active the GPS stays on while the app is in the background when the log is not started
- Map Center - switches on/off automatic centering of the map around current location
- Point Size - size of the point on map view

- Serving Cell Font Size - font size of the serving cell on Map view
- Cells Font Size - font size of the cells on Map view
- Serving Cell Thickness - thickness of the serving cell on Map view
- Cells Thickness - thickness of the cells on Map view
- Ground Level - sets the ground level altitude. When set different than 0 Height in CELL tab shows the height above this ground/street level

VOICE SEQUENCE Settings

VOICE SEQUENCE allows automatic generation of voice calls to specified number with specified duration and pause between the calls. When Voice Sequence is active the number of successful, blocked and dropped calls are shown in INFO tab
- Called Nmber - the number to be dialed
- Number of Calls - number of calls to be made
- Call Duration - duration of a single call
- Pause Between Calls - pause between the calls
- Start calls only on - allows starting of calls only on specific technology (2G, 3G, 4G) - useful for example when you want to test 3G coverage only. If the call has been handovered to 2G the sequence will wait until 3G is reselected again and then will continue

DATA SEQUENCE Settings

DATA SEQUENCE allows test of data transfer.
- Ping URL - the URL for ping test. The format should start with http:// and is like www.xxxxxxxxxxxxxx.com or 10.100.1.101
- Upload URL - the URL for upload test. The format is like http://www.xxxxxxxxxxx.com/uploadfile.php. You can use also the same URL as Download URL in order upload and download tests to be done with the same server.
- Download URL - the URL for ping test. The format should start with http:// and is like http://www.xxxxxxxxxxx.com/downloadedfile.mp3. It is recommended to set bigger file in order to achieve bigger download speed.
- Pause between tests - pause between test cycles

KML EXPORT Settings

Here are the settings for enabling different measurements export while log is started. When activated a kml for specified measurement will be generated in the export file folder for each log in the G-NetTrack_Logs folder on your main storage.
The following measurement exports are available:
- CELLID
- LEVEL
- QUAL
- TECHNOLOGY - 2G/3G/4G
- TECHNOLOGY MODE - GPRS/EDGE/HSPA etc...
- EVENTS - cell reselections and voice sequence events like call start, call end, blocked call and dropped call (CR - Cell Reselection, HV - Voice handover, HD - Data handover)
- DL_BITRATE - downlink data transfer bitrate
- UL_BITRATE - uplink data transfer bitrate
- LAC
- RNC

- LAYER - Cell layer information - if available in cellfile
- SNR
- CQI
- LTE RSSI
- SPEED - the speed of movement
- PSC - UMTS primary scrambling code of the serving cell
- NEIGHBOR CELLS - separate file for cellid and level for each of the first 6 neighbor cells measured
- CELLFIND - when active this will activate a CELLFIND feature which shows the serving cell location determined by Google location service, based on the cellid measurements. In order this feature to be available you must have mobile network data connection on. Turn your WiFi off in order to prevent location determination based on WiFi networks. In kml file there is information about the cell location and accuracy. It can help to gain insight on cell size (bigger when accuracy is greater number) and location.
- DATA TEST - 4 kml files for DATA SEQUENCE statistics - average ping, ping loss, upload bitrate and download bitrate
- Use height in kml - when this is on, the points in the kml file will show above ground level as Height in CELL tab shows.
- Use short kml format - reduces the kml size showing only the respective measurement in the information baloon.
- KML Point Size - size of kml dot in kml export file.
- Application folder - set the root folder for export files. The folder must exist, otherwise the default folder is used. Check the [App folder] in INFO tab in order to see if the correct folder was chosen. If you want to use external SD card you have to put "/sdcardname" - check with some file manager the name of your external SD card.

CELLHUNTER Settings

- CELLHUNTER Mode - this switches on/off CELLHUNTER mode. Cellfile is required for this feature. When it is on only unknown cells (that are missing in cellfile) will be written in the text and kml log files. This feature is useful for Cell Hunters when they search for new cells in th area.
- CELLFILTER Mode - this switches on/off CELLFILTER mode. Cellfile is required for this feature. When it is on only known cells (that are in cellfile) will be written in the text and kml log files. This feature is useful for logging only data for specific cell.

SITE VIEW Settings

- Show Sites - requires cellfile. When it is on the list of cells from cellfile will be loaded at the program start. Requires restart of the app.
- Show Serving Line - shows a line between current location and srving cell location
- Show Cell Names - shows cell names in map view
- Load only sites in range - load only closest sites within specified range - usefull when the cellfile is big and the map view is slowed down because the big number of cells
- Range of loaded sites - range in meters around current location of sites to be loaded
- Add unknown cells - when this option is on the new cells are automatically added to cellfile. If you have no cellfile and both [Show Sites] and [Add unknown cells] are on, the app will create new cellfile and when the log is on it will start filling it with new cells.

LEVEL Thresholds Settings

Specifies the level thresholds settings for LEVEL kml export.

LEVEL Colors Settings

Specifies the level colors settings for LEVEL kml export.

G-NETWORLD Settings

- Send Measurements Online - allows sending of measurements in real time to [G-NetWorld](#) service. When activated the phone will send data when logging is started to G-NetWorld where you can share your measurement with other users around the world.

LOG PARAMETERS Settings

- Time Interval - the interval in seconds between writing record in the log if the location is not changed or cellid is not changed - default 300s, lower values will allow more frequent recording of fluctuations, higher values will make log files smaller and save battery
- Distance Interval - the distance interval in meters between writing record in the log when the position is changed - default value 15m, lower values will increase point density, but will use more battery

AUTOMATION Settings

- Auto log on app start - auto start logging when the app is started
- Auto VOICE SEQUENCE - auto start VOICE SEQUENCE on app start
- Auto DATA SEQUENCE - auto start DATA SEQUENCE on app start
- Auto start app on boot - auto start app on phone boot

OTHER Settings

- Show PSC/PCI on DRIVE tab - shows PSC (3G) and PCI (LTE) on DRIVE tab.
- Filter NODE-CELLID - filters out specific NODE-CELLID combination from the log - useful when some phone reports sporadic fake cellids.
- Discard Network Type 0 - Check this if your phone reports network type 0 and as a result the level is -200. Check current network type number on bottom of INFO tab.
- Auto screen on - while the log is active if the screen is turned off incidentally (with POWER button) it will be turned automatically on again.

Actions

Start Log

Starts the logging. During this the text and kml export files are created in G-NetTrack_Logs folder on main phone storage. The measurements kml files that are created can be selected in Settings. A record is put in log on change of position with specified distance interval, change of cellid or each specified time interval if there is no change of position or celld. Time and distance intervals can be set in Settings.
When the logging is activated the app will lock your GPS and screen on and the screen will remain lit during the logging. In order not to interrupt logging you have to not switch the device screen off. The phone could be locked, but the screen should be on.

Pause Log

Pauses the log.

Resume Log

Resumes the log.

End Log

Finishes the log.

Add Filemark

Adds the filemark (note) to the file. The filemarks are visible in text logfile and filemarkers.kml file.

Settings

Opens the settings page.

Exit

Exits the app.

Start Voice Sequence

Starts the Voice Sequence with which you can make automatic voice calls with specified duration and pause. During this sequence the number of successful, blocked and dopped calls are dispalyed in INFO tab.

Start Data Sequence

Starts automatic data transfer sequence. It includes:
- 10 seconds ping
- 10 seconds upload
- 10 seconds download
- pause (specified in Settings)

Note: If your Android version is 2.2 or earlier then the upload is until at least 128kB file is uploaded.

How to use:
1. Input the ping, upload and download URL in Settings.
2. Check DATA TEST in kml export settings to export statistics in kml
3. Start Data Sequence from Menu.
4. Observe the stats on INFO tab

The statistics are:
- average ping

- min ping
- max ping
- ping standard deviation
- ping loss
- upload bitrate
- download bitrate

The statistics are exported in text logfile and in kml files if option DATA TEST is selected in kml export settings.

Start Data Test

Starts data test. It includes:
- 10 seconds ping
- 10 seconds upload
- 10 seconds download

Note: If your Android version is 2.2 or earlier then the upload is until at least 128kB file is uploaded.

How to use:
1. Input the ping, upload and download URL in Settings.
2. Select Menu - More - Data Test

Disable Map and GPS

Disables the map view. Then the map view won't be updated

Enable Map and GPS

Enables the map view. This allows zooming and moving the map view.

G-NetDiag

Opens G-NetDiag page where you can analyze your text log files.

G-NetWorld

Opens G-NetWorld page, where you can share and view measurements made by other G-NetTrack users around the world.

Upload file to G-NetWorld

Opens G-NetWorld file upload page, where you can upload text log files to G-NetWorld service.

Measurement Capabilities

Opens Phone Measurements Capabilities page, where you can view different phone brands and models reporting capabilities.

facebook page

Opens G-NetTrack [facebook](#) page, where you can communicate with other G-NetTrack users.

About

Opens [G-NetTrack](#) web page

Cellfile

If you have cell information you can create a cellfile and view the sites on the map. In order to do this create cellfile and put it into folder G_NetTrack_Logs/cellfile. Two types of cellfiles can be used:
The cellfile format is tab delimited text file with following columns:
- tab delimited text cellfile
- clf file
Recommended format is tab delimited text cellfile since it suppports more features (azimuth, layers, height etc...)

Tab delimited text cellfile

CELLNAME - name of the cell - you can put anything here
LAT - latitude in decimal format
LONG - longitude in decimal format
LAC - LAC of the cell - number
CELLID - CELLID of the cell - number
AZIMUTH - azimuth of the antenna - number. If you put 360, the cell will be shown as circle. If you want to change the size of the circle put values > 360. Then the circle radius will be value-360.
TECH - technology - 2G, 3G or 4G
NODE - for GSM is empty, for 3G is RNC and for 4G is eNodeB ID - this column is mandatory only for 4G. For 3G you can skip it if "LAC-CELLID" is unique

Optionally you can add the following columns. If you add them you can use this cellfile also with other tools on the site like G-NetTrack and G-NetEarth:
- HEIGHT - antenna height in meters
- TILT - antenna tilt in degrees - positive values are for downtilt and negative for uptilt
- HORIZBEAM - horizontal beamwidth of the antenna
- VERTBEAM - vertical beamwidth of the antenna
- PSC - primary scrambling code - for 3G only
- LAYER - up to 4 (1,2,3,4) layers per technology (2G/3G/4G) - with layer information you can make your map view show different cell layers with different colors. Use 1 for lower layer and 4 for higher layer. For example for operator with GSM900/1800, 4 UMTS frequencies and 2 LTE frequencies it will be: GSM900 - 1, GSM1800 - 2, UMTS F1 - 1, UMTS F2 - 2, UMTS F3 - 3, UMTS F4 - 4, LTE F1 - 1, LTE F2 - 2
- INFO - Whatever is written there will be displayed in NEI tab when the cell is serving cell. Use semicolon ";" for new row.

Here is a sample [cellfile](#).

CLF cellfile

CLF cellfile is a format used with some network monitoring tools. It is a semicolon (;) delimited text file without headers. The cellfile should be named cellfile.clf or [MCC][MNC].clf like 28401.clf
1. MCCMNC
2. CELLID - 5 digits with leading 0 like (04221)
3. LAC - 5 digits with leading 0 like (01100)
4. RNC - RNC for 3G or eNBID for LTE
5. LAT
6. LON
7. LOCATION ACCURACY
8. CELL DESCRIPTION - you can write anything and in order to get the cell technology correct put (2G), (3G) or (4G) in the description
9. 0 for end of the row

Here is a sample clf cellfile

Known issues

Not all the phones are capable of reporting the measurements:
- CELLID and LEVEL - if you see that LEVEL is less than -200 that means that your phone does not report anything and can not be used for measurement purposes.
- RXQUAL, ECNO, PSC is not reported by all phones
- Neighbor cells are not reported by all phones
Check Phone Measurement Capabilities for list of phones and measurements that they report. If your phone does not report some measurements the only thing you can do is to search for software update from device manufacturer. There is no possibility a change in app to make your phone to report properly.

Contacts

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