Anite

NEMO HANDY™

PRODUCT DESCRIPTION

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Last Edited: June 2007

1 NEMO HANDY™ OVERVIEW

Nemo Handy™ is a Symbian-based light-weight and portable engineering tool for testing voice quality based on Mean Opinion Score, testing mobile application QoS and QoE, and measuring the air interface of EGSM/GPRS/EDGE/WCDMA/HSDPA/Wi-Fi 802.11b/g wireless networks. Nemo Handy supports application testing of voice quality, voice and video calls, WAP and HTML browsing, email, SMS and MMS messaging, FTP and HTTP connections and ping. Supported terminals include Nokia N95, N80 and N75.

As its name suggests, Nemo Handy is a handy tool for every network and quality engineer. It can be used both as a regular phone with Nemo Handy performing measurements in the background and as an active tester of mobile applications with configurable scripts. With Nemo Handy you can perform measurements in buildings and locations where big bulky measurement equipment is not a practical solution. Nemo Handy can be equipped with a Bluetooth GPS receiver to collect geographical coordinates, and with Nokia N95, Nemo Handy can also use the terminal's integrated GPS receiver.

Measurement results provide a full picture of the radio interface and the quality of the tested applications. The exact and detailed radio interface data recorded with Nemo Handy is optimal for network planning, roll-out, tuning, verification, optimization, and maintenance purposes. Recorded application performance metrics are useful in benchmarking and QoS/QoE evaluation of mobile services. Continuous recording of radio interface metrics ensures that the reasons behind bad service quality can always be found.

The measurement data can be easily converted to the standard Nemo File Format and viewed with Nemo Outdoor™ and Nemo Analyze™ developed by Anite Finland Ltd., as well as with any other tool supporting the Nemo File Format.

Nemo Handy is an extremely lightweight and portable Symbian-based measurement tool.

Nemo Handy can be equipped with a Bluetooth GPS receiver and the Nemo Handy measurement data can be exported to Nemo Outdoor and Nemo Analyze.

1.1 NEMO HANDY CONFIGURATIONS

There are three alternative configurations available for Nemo Handy.

Handy Field Test

Handy FT includes all available graphical displays, but does not provide the logging or GPS capabilities, nor is the scripting feature available in Handy FT. Handy FT is an optimal tool for site commissioning and for technicians.

Handy

In addition to the graphical UI, the standard version of Nemo Handy provides data logging and GPS support. However, scripting and other advanced features are not available in the standard version of Handy. Handy is an optimal tool for occasional troubleshooting and testing purposes.

Handy Professional

In addition to the graphical UI, GPS, and logging, Handy Professional provides the scripting feature, the automatic file transfer functionality, and the indoor map feature. Hence, Handy Pro is suitable for both troubleshooting and light drive testing.

1.2 KEY FEATURES OF NEMO HANDY 2.30

- Symbian-based application
- Supports Nokia N95, N80 and N75 terminals
- Standard 1 GB MiniSD card can store up to 100 hours of measurement data
- Extremely lightweight and portable
- Graphical, fully customizable and user-friendly user interface
- Possibility to view serving channel information on every page in a user-configurable form
- Can be equipped with a Bluetooth GPS receiver to collect geographical coordinates
- With Nokia N95 terminal, the integrated GPS receiver can be used in collecting geographical coordinates
- Supports measurements on EGSM/GPRS/EDGE/WCDMA/HSDPA/Wi-Fi 802.11b/g networks
- Voice quality measurements based on Mean Opinion Score
- Automated service testing with scripts: voice quality, voice call, video call, FTP, HTTP, HTML browsing, WAP browsing, send/receive email, MMS, SMS, and ping
- Scripts can be created and modified with Nemo Handy's built-in script editor
- Real-time statistics
- Log file auto-upload to email or FTP server
- Indoor map with markers
- Forcing commands for channel lock, scrambling code lock, system lock, and cell barring
- User-definable UI font size
- Textual markers
- Background light on/off
- Circular log file
- Display freeze
- Online help
- User-definable audio notifications with speech generator

1.3 HARDWARE AND SOFTWARE REQUIREMENTS

For Nemo Handy:

- Nemo Handy compatible Nokia N80/N75 mobile with free memory for FTP downloads
- MiniSD card for storing measurement files
- MiniSD memory card adapter
- MiniSD memory card reader

For post-processing (Nemo Outdoor, Nemo Analyze):

- PC (IBM or Dell recommended) with Windows® 2000 or Windows® XP Professional
- Pentium III processor, minimum 850 MHz, preferably 1 GHz
- 128 MB RAM minimum, 512 MB RAM recommended
- 100 MB of free hard disk space for installation and use; 1 GB recommended
- USB port for memory card reader
- Display resolution 1024 x 768 or higher with 256 colors

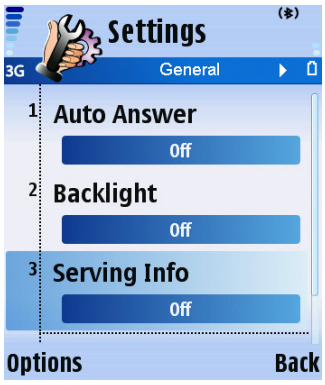
2 NEMO HANDY USER INTERFACE

Nemo Handy offers a fully configurable graphical user interface optimized for small screen devices. During measurement, users can easily monitor the results and the progress of the measurement process in real time. Application testing and RF parameter displays can be viewed simultaneously. The background light can be switched on and off. User can also define the UI font size.

Bar views display selected parameters in numerical and graphical format. Bars are colored according to threshold values.

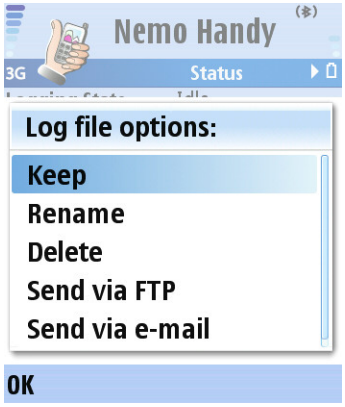
Line views display selected parameters in numerical and graphical format. The scales change according to the selected parameter and scales can be zoomed in and out with the auto-scaling function.

It is possible to display the serving channel information on every page. When this option is selected, the Nemo Handy logo is replaced with the information. The user can also configure what information is to be shown on the serving channel information display.



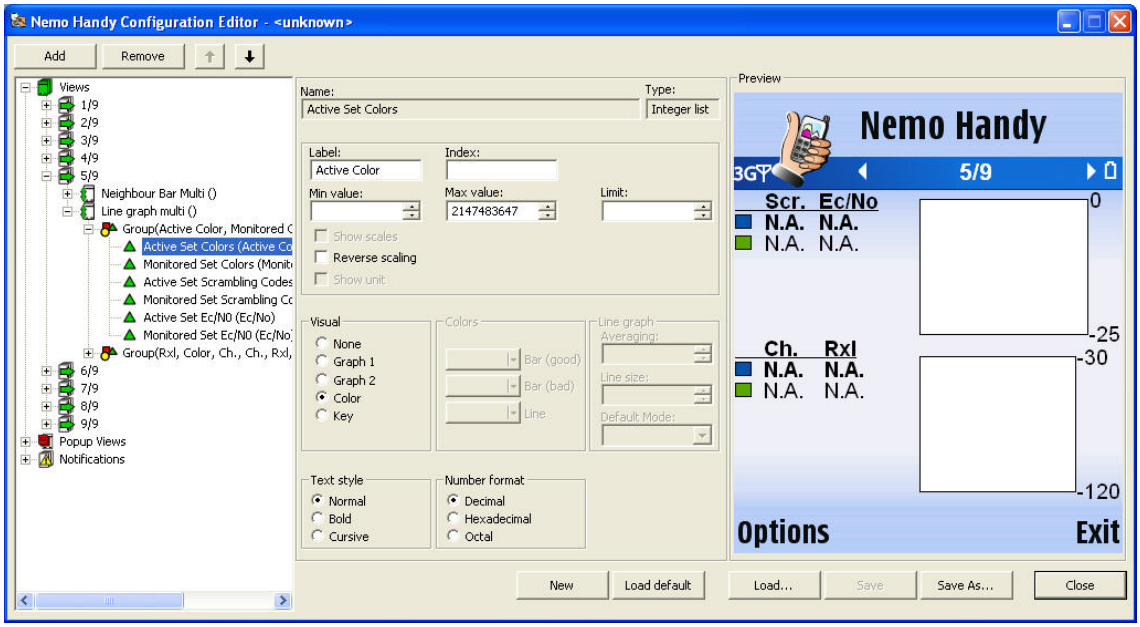
Measurement results can be displayed in different types of windows including text, bar and line graphs and neighbor graph (bar, line, and inter-system bar). It is also possible to stack bar and line graphs. Bar graph scales can be shown for each bar simultaneously. Integer parameters can be shown in decimal and in octal format. The Nemo Handy icon shows the current logging status.

When logging is stopped, the user can either save the file with the default name (**Keep**), save the file with a new name (**Rename**), delete the file (**Delete**), or send it to an FTP server (**Send**). Log file recording is automatically stopped when memory card is full and no more data can be recorded.



2.1 CUSTOMIZABLE USER INTERFACE

All Nemo Handy measurement data displays are fully user-configurable. The views can be edited with the Nemo Handy Configuration Editor tool that is included in the Nemo Handy package. All display settings are stored in an .xml file.



3 WORKING WITH NEMO HANDY

Nemo Handy 2.x measurement system consists of a Nokia N80 test mobile with the Nemo Handy SW, a Bluetooth GPS receiver, a PC with the Windows® operating system, and the Nemo Handy File Converter software which converts the log files to the Nemo File Format.

All network parameters supported by the Nemo Outdoor drive test tool, i.e., Nemo Outdoor and Nokia mobile handler, including signaling messages are stored in the Nemo Handy log file, and are available for post-processing in the Nemo File Format, for example, with Nemo Outdoor and Nemo Analyze. Post-processing can be done also with any other tool supporting the Nemo File Format. You can use the Nemo Handy mobile as a regular phone while Nemo Handy is logging in the background: you can make calls, send SMS/MMS messages, browse web pages, send and receive email etc. Nemo Handy makes all of these connections measurable. It provides real-time statistics on voice and video calls, PDP context, FTP/HTTP connections, SMS/MMS messaging, HTML/WAP browsing, email sending/receiving, ping, and inter-system cell reselections and handovers. It is also possible to add textual markers to log files while running measurements at the same time.

All necessary RF parameters are logged for a full set of KPI calculations. The parameters listed below are parameters that are displayed in the Nemo Handy views. However, the user can also modify the existing views to show other parameters, or create new views.

Note that Nemo Handy's support for some individual parameters varies according to terminal. For a detailed list of supported parameters for particular terminal models, please refer to the terminal-specific Nemo Handy datasheets.

General:

- Cellular system
- LAC
- MNC
- CI
- MCC
- Packet data technology
- Application data throughput UL/DL
- GPS information:
    - Status
    - Latitude and longitude
    - Height
    - Distance
    - Velocity
    - Number of satellites

GSM/GPRS/EDGE:

- Timing advance
- RX quality (full and sub)
- RX level (full and sub)

- MS power level
- MS in dBm
- Channel and BSIC for serving and neighbor channels
- Hopping channel list
- Number of timeslots UL/DL
- C1/C2
- BEP mean class 8-PSK
- BEP mean class GMSK
- C value
- Packet channel coding UL/DL
- Used timeslots (UL/DL)
- AMR parameters
    - Channel type
    - Link quality estimate (LQE)
    - AMR initial codec
    - AMR ICMI
    - AMR codecs
    - AMR codec UL/DL
    - AMR hysteresis 1-3
    - AMR threshold 1-3
    - Voice codec distribution
    - Coding scheme distribution
- C/I
- UL/DL DTX
- Link quality estimate
- FER
- MAIO
- HSN
- RLT
- GSM neighbors sorted by RXL
- GSM cell info:
    - Emergency call support
    - IMSI attach/detach procedure allowed
    - Half rate channels supported
    - C2 broadcast supported
    - SI 7&8 broadcast supported
    - Cell broadcast supported
    - Call re-establish supported
    - Early class mark sending supported
    - 2-ter messages supported
    - Multi band reporting
    - GPRS supported
    - EDGE supported

WCDMA:

- Channel
- RRC state

- Scrambling code, RSCP and Ec/N0 for active and monitored sets
- Carrier RSSI
- TX power
- BLER DL
- SIR target/SIR
- Percentage of UL/DL power up commands
- Compressed mode indication
- Initial TX power
- RACH TX power
- Preamble count
- AICH status

HSDPA:

- MAC BLER
- CQI
- Modulation
- 16QAM/QPSK ratio %
- Coding
- Number of codes
- HS-DSCH activity rate
- MAC throughput DL
- Transport block size (average)

WLAN:

- SSID
- Channel number
- RSSI
- Access point MAC address
- Application throughput

STATISTICS:

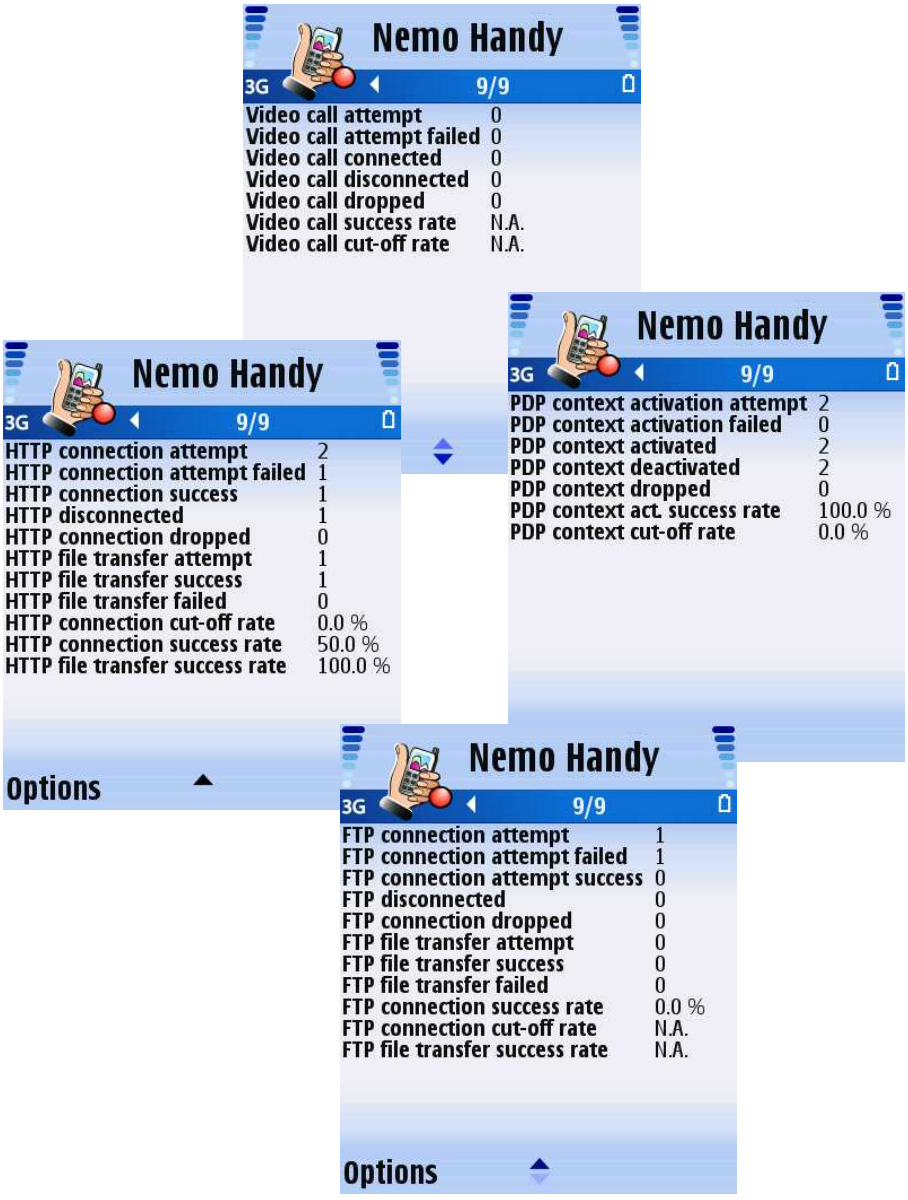
- GSM to UMTS:
  - Handover
  - CREL during data
- UMTS to GSM:
  - Handover
  - CREL during data
- Voice call:
  - Attempt
  - Failed
  - Connected
  - Disconnected
  - Dropped
  - Success rate
  - Cut-off rate
  - Setup time avg.

- Video call:
  - Attempt
  - Failed
  - Connected
  - Disconnected
  - Dropped
  - Success rate
  - Cut-off rate
  - Setup time avg.
- PDP context:
  - Activation attempt
  - Activation failed
  - Activated
  - Deactivated
  - Dropped
  - Activation success rate
  - Cut-off rate
  - Activation time avg.
- FTP:
  - Connection attempt
  - Connection attempt failed
  - Connection attempt success
  - Disconnected
  - Connection dropped
  - File transfer attempt
  - File transfer success
  - File transfer failed
  - Connection success rate
  - Connection cut-off rate
  - File transfer success rate
- HTTP:
  - Connection attempt
  - Connection attempt failed
  - Connection success
  - Disconnected
  - Connection dropped
  - File transfer attempt
  - File transfer success
  - File transfer failed
  - Connection cut-off rate
  - Connection success rate
  - File transfer success rate
- SMTP:
  - Connection attempt
  - Connection failed
  - Connection connected

    - Connection disconnected
    - Connection dropped
    - File transfer attempt
    - File transfer success
    - File transfer failed
    - Connection cut-off rate
    - Connection success rate
    - File transfer success rate
- POP3:
    - Connection attempt
    - Connection failed
    - Connection connected
    - Connection disconnected
    - Connection dropped
    - File transfer attempt
    - File transfer success
    - File transfer failed
    - Connection cut-off rate
    - Connection success rate
    - File transfer success rate
- Ping:
    - Ping attempts
    - Ping failed
    - Ping succeeded
    - Ping success rate
    - Round trip time avg.
- SMS:
    - SMS attempts
    - SMS failed
    - SMS succeeded
    - SMS success rate
- MMS:
    - MMS attempts
    - MMS failed
    - MMS succeeded
    - MMS success rate

3.1 REAL-TIME STATISTICS

Nemo Handy provides a real-time view of statistics on voice/video calls, PDP context, FTP/HTTP connections, SMS/MMS messaging, HTML/WAP browsing, email sending/receiving, and ping. The real-time results of both manual and script-aided testing can be monitored throughout the duration of the connection.



3.2 APPLICATION TESTING

Nemo Handy supports several built-in application testing options. It is possible to test voice quality, voice and video calls, FTP/HTTP data transfers, HTML/WAP browsing, SMS/MMS messaging, email sending and receiving, and ping. The QoS/QoE KPIs logged by Nemo Handy include connection setup delay, download time, time-to-content delay, throughput, etc.

3.2.1 VOICE QUALITY

Nemo Handy supports both manual and scripted voice quality measurements.

Background

With the new Voice Quality feature in Nemo Handy, provided by Psytechnics´ PSM Mobile module, it is possible to measure the voice quality of a live network as evaluated by customer perception, based on the ´average´ listener´s perception of speech quality. This is frequently referred to by the term MOS (Mean Opinion Score).

Speech quality can be measured via two complementary means: subjective and objective tests. In subjective testing of voice quality, a panel of users rate a given quality on a limited scale of 1-5, after which a MOS is calculated by averaging the votes of all the subjects. To improve time and cost efficiency, objective testing techniques have been developed through extensive work to replace a large amount of subjective testing to provide an automated prediction of speech quality. PSM Mobile by Psytechnics is an objective, non-intrusive (passive) testing technique, and this model has made use of the Psytechnics database which contains over 220,000 subjective votes.

How PSM Voice Quality Works

PSM Mobile is a port of Psytechnics NiQA-DSP-LQ algorithm. At its core, NiQA-DSP-LQ has a sophisticated identification system which has been designed to cover a wide variety of speech distortion and degradation classes, and to predict their impact on the subjective quality of the speech stream as perceived by human perception. PSM Mobile is a lighter and faster version of ITU P.563, predicting a Listening Quality MOS in a similar way to P.563.

PSM Mobile is embedded in Nemo Handy Voice Quality, and it is activated whenever a signal is received. Nemo Handy Voice Quality measures the MOS of the Listening Quality of a received signal based on human perception.

The signal can be obtained by calling a test server (such as Nemo Server) or another Nemo Handy 1.90 or 2.30 that automatically starts sending an audio sample (provided by Anite Finland Ltd) to the caller. The first MOS score is delivered to the measuring phone after a 20 second delay from the outset of the phone call, and after that the samples will be delivered every 6 seconds.

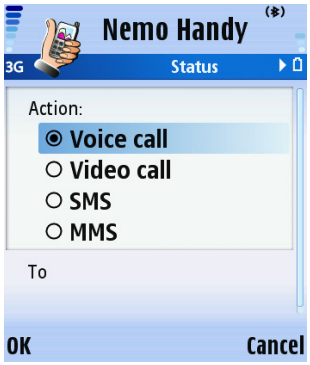
Accuracy

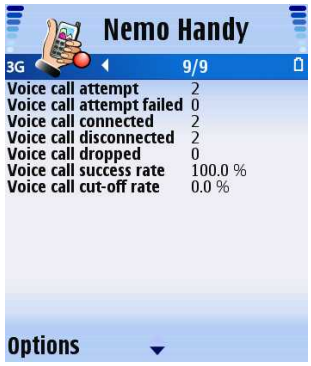
As regards accuracy, NiQA-DSP-LQ has been tested over a wide range of network architectures, conditions and languages in accordance with current ITU practice. The model has a good correlation with subjective material with 20, 000 speech files.

It is worth noting here that although the passive testing of voice quality is highly reliable due to its correlation to a host of subjective testings, the accuracy and confidence of single point MOS measures are still improving as more calls are being analyzed and averaged over time. Consequently, it is not advisable to make any decisions on network routing or configuration based on a single call MOS.

3.2.2 VOICE CALLS

Nemo Handy offers support for voice call testing. Voice calls can be started manually from a menu or by pressing a shortcut button. Scripts can be used to make multiple voice calls.

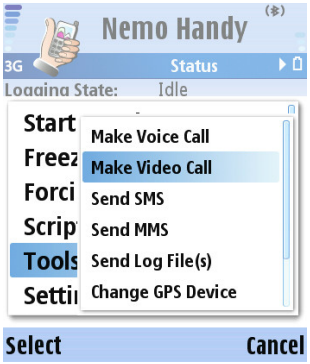


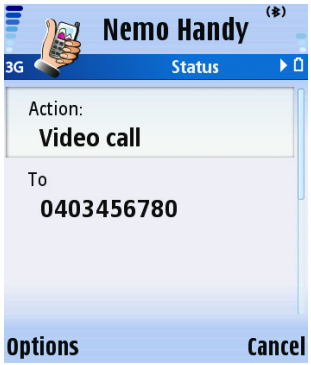


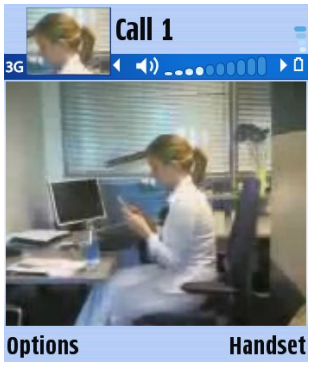
Voice call related measurement events stored in the Nemo Handy log file include call attempt, call connect success, call disconnect, and call failed.

3.2.3 VIDEO CALLS

Nemo Handy offers full 3G video call support. Video calls can be started manually from a menu or by pressing a shortcut button. Scripts can be used to make multiple video calls, just like normal voice calls. Automatic video calls between two mobiles can be made by setting one of the Handy mobiles to auto answer mode.



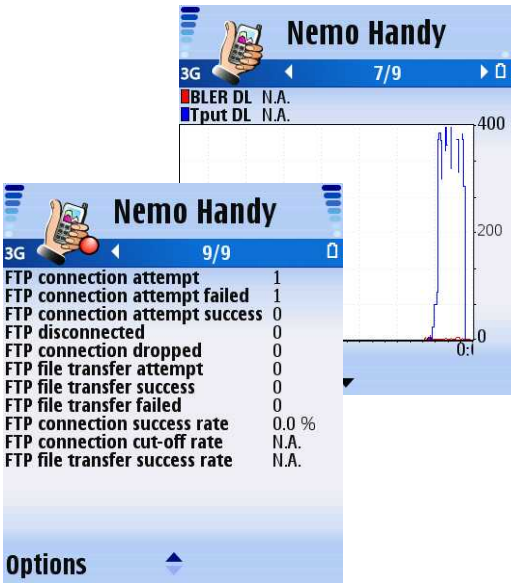




Video call related measurement events stored in the Nemo Handy log file include call attempt, call connect success, call disconnect, and call failed.

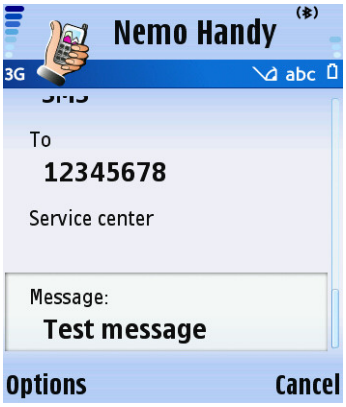
3.2.4 HTTP/FTP CONNECTIONS

Nemo Handy offers support for testing HTTP/FTP downloads and uploads using scripts. HTTP/FTP transfer related measurement events stored in the Nemo Handy log file include data connection attempt, data connection success, data disconnect, and data connection failed.



3.2.5 SMS/MMS MESSAGES

Nemo Handy offers support for testing SMS/MMS sending. SMS/MMS messages can be sent either manually or using scripts.



SMS/MMS related measurement events stored in the Nemo Handy log file include SMS/MMS send attempts, SMS/MMS send succeeded/failed, and SMS/MMS success rate.

3.2.6 HTML/WAP BROWSING

Nemo Handy offers support for testing HTML/WAP browsing using scripts. The browser window is embedded in the Nemo Handy user interface. This enables real-time monitoring of browsing performance while monitoring radio interface parameters.

HTML/WAP browsing related measurement events stored in the Nemo Handy log file include HTML/WAP browsing attempt, HTML/WAP browsing success, and HTML/WAP browsing failed.

3.2.7 EMAIL

Nemo Handy offers support for testing email sending and receiving using scripts.

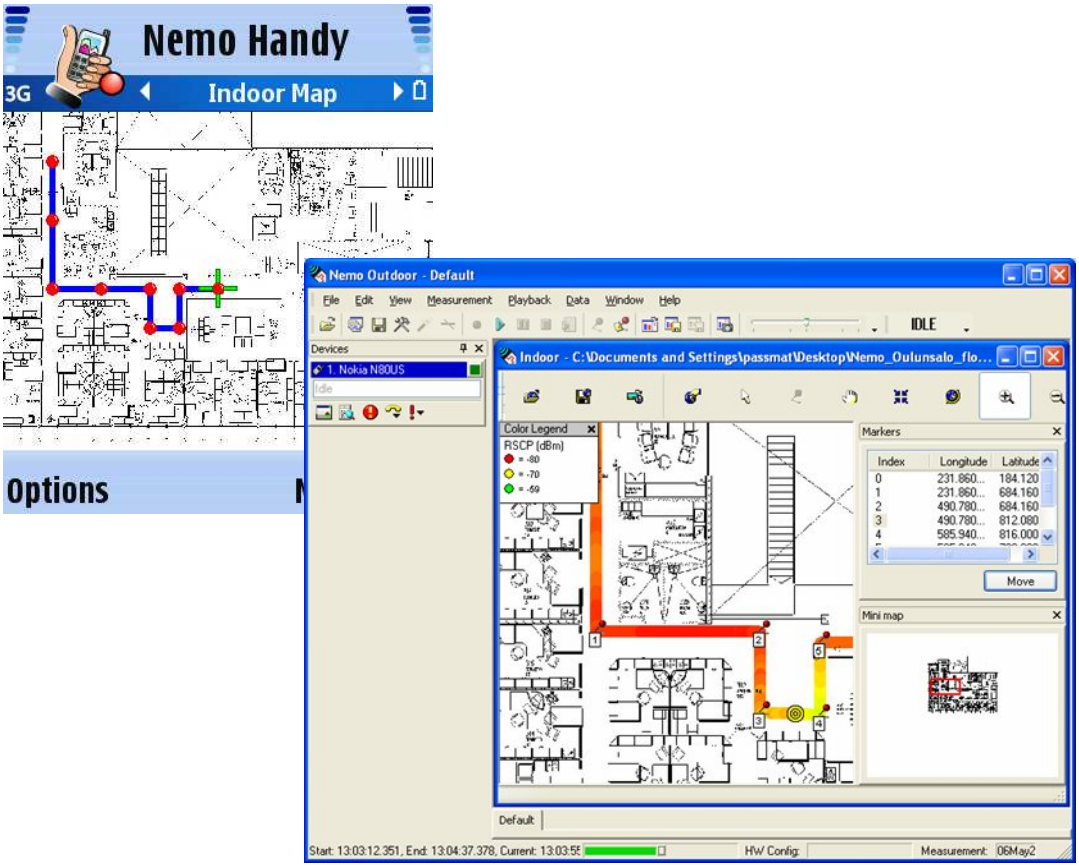
Email related measurement events stored in the Nemo Handy log file include SMTP/POP3 send/receive attempt, SMTP/POP3 send/receive success, and SMTP/POP3 send/receive failed.

3.2.8 PING

Nemo Handy offers support for scripted ICMP (Internet Control Message Protocol) ping testing. Ping testing can be performed simultaneously with other PS data applications. Ping round-trip time is measured in milliseconds and displayed as a graph. Ping related measurement events stored in the Nemo Handy log file include ping attempts, ping failed/succeeded, and ping success rate.

3.3 INDOOR MEASUREMENTS

Nemo Handy provides indoor map support with an easy-to-use interface that includes zoom and pan tools. Digital images can be imported to Nemo Handy and converted into map files (.tab). The measurement route is drawn on the map with markers. When post- processing with Nemo Outdoor or Nemo Analyze, the results can be displayed as a color-coded route.

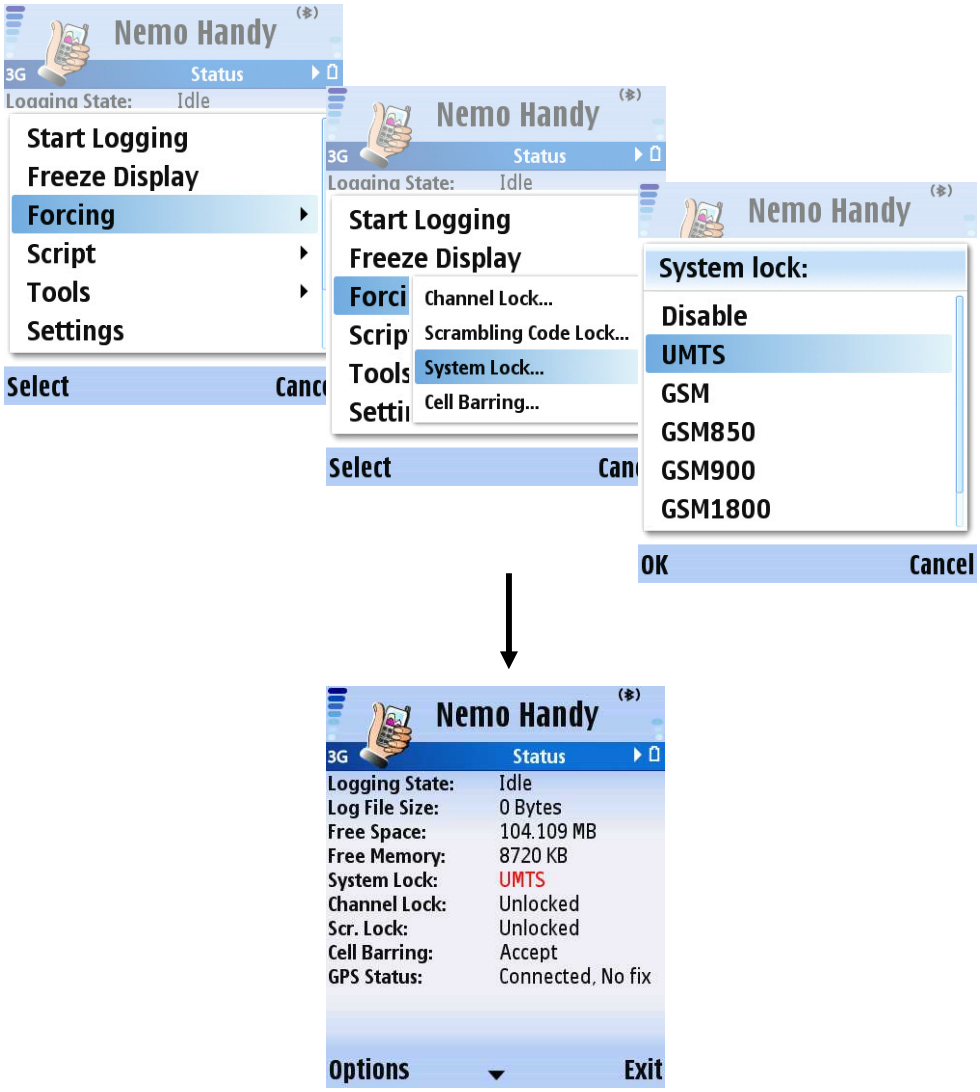


3.4 FORCING FEATURES IN NEMO HANDY

Nemo Handy supports the following forcing features:

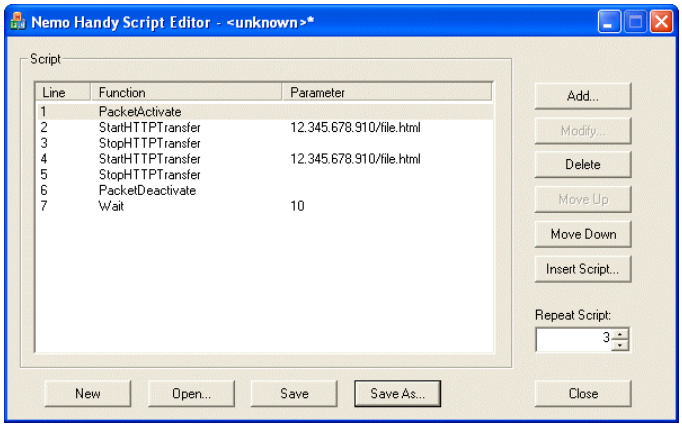
- Channel lock
- Scrambling code lock
- System lock
- Cell barring

Note that the selection depends on the technology that the mobile is connected to. With *Channel Lock* the Handy mobile can be locked on a GSM channel. With the *Scrambling Code Lock* the mobile can be locked on a carrier and a scrambling code. With the *System Lock* feature, the mobile can be locked on one of the systems: UMTS, GSM, GSM 900, GSM 1800, and GSM 1900. In *Cell Barring* the options are accept, reverse, and ignore. The Status view will display the status for each forcing feature.

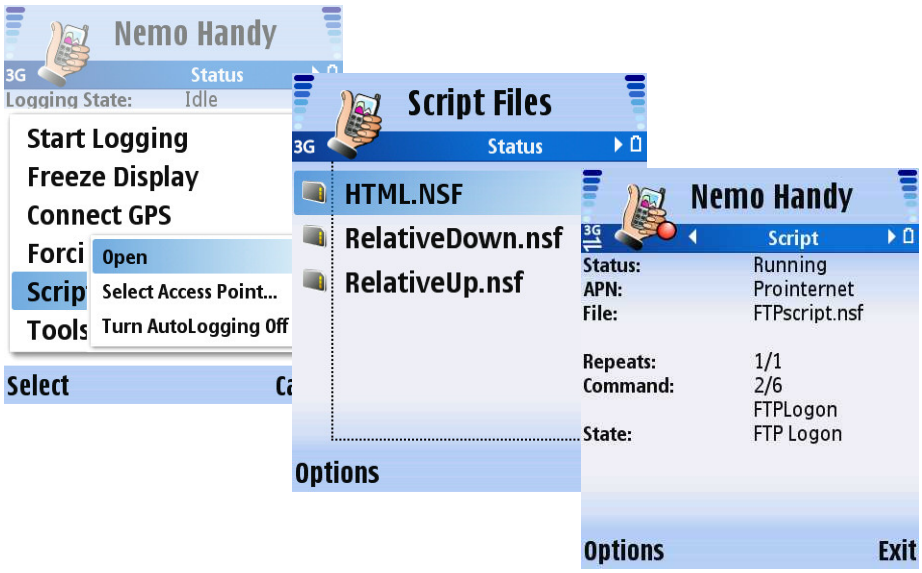


3.4 SCRIPTS

It is possible to use script files to run measurements with Nemo Handy. When a script is used, Nemo Handy makes voice/video calls, data transfers etc. automatically. You can use scripts for voice and video calls, HTTP/FTP packet data uploads/downloads, HTML/WAP browsing, SMS/MMS messages, emails, and ping. Scripts can be created and edited with Nemo Handy's built-in script editor, or with PC software, Nemo Handy Script Editor.

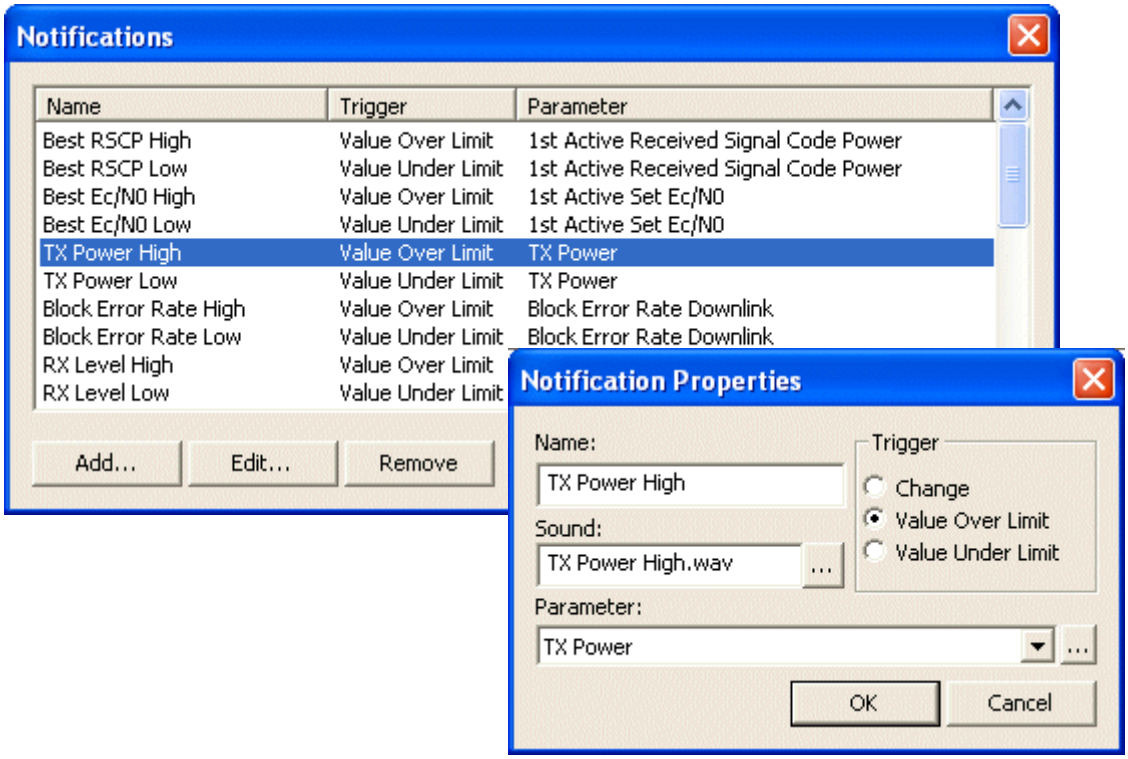


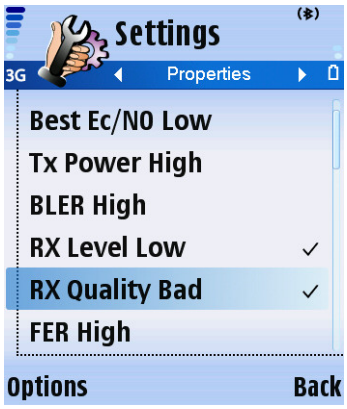
When the Autologging option is activated, Nemo Handy will start logging automatically when a script is started.

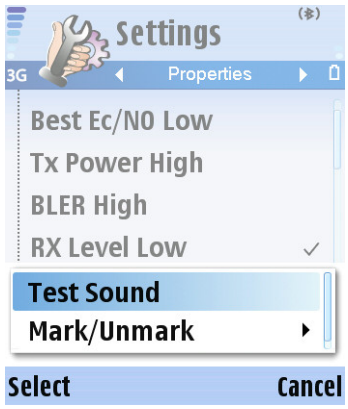


3.5 NOTIFICATIONS

Nemo Handy offers a set of audio notifications that can be used to notify the user of important measurement events. The notifications are fully configurable. They are created and edited in textual format in the Nemo Handy Configuration Editor, stored in a configuration file (.xml), and converted automatically into speech in Nemo Handy. Other notification features include individual notification activation/deactivation through the Nemo Handy UI and a user-definable hysteresis timer for controlling and silencing repeating notifications.

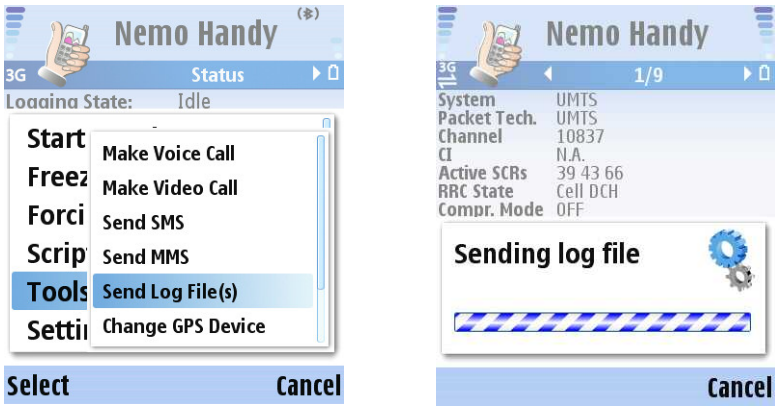




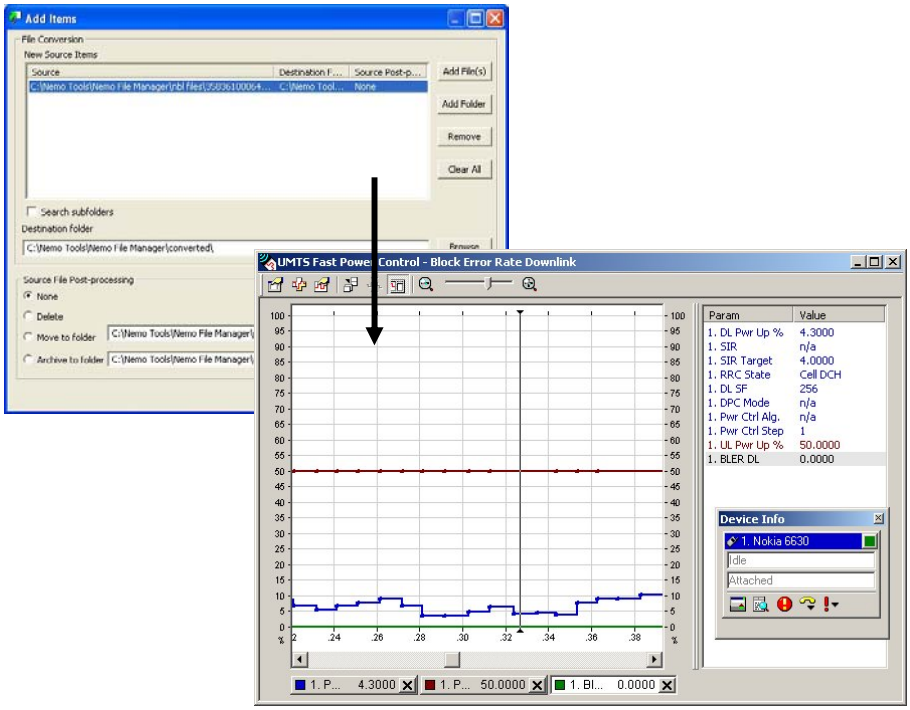


4 POST-PROCESSING

Data from Nemo Handy can be exported manually using a memory card or automatically by downloading files to an FTP server or sending them to an email address where they are easily available for analysis. The data can be sent via GPRS/EDGE/WCDMA packet data.



Nemo Handy produces measurement files in a binary file format (.nbl). The files can be converted to the standard Nemo File Format and imported to Nemo tools Nemo Outdoor and Nemo Analyze, as well as to various third-party post-processing/analysis tools which support the Nemo File Format. The conversion is made with the Nemo Handy File Manager – an easy-to-use Windows® software.



A detailed description of the Nemo file format is included on the product CD. The file format description contains all recorded events and their parameters.

5 NEMO PRODUCTS

In addition to the previously described product, Anite Ltd. has a range of tools and software that can be used for measuring and analyzing wireless networks.

Nemo Outdoor	A portable engineering tool for measuring and monitoring the air interface of TETRA, TDMA, AMPS, cdmaOne, GSM, GPRS, EDGE, WCDMA, CDMA2000, HSDPA, HSDPA 16QAM, HSUPA, TD-SCDMA, and UMA wireless networks.
- with Indoor Option	Nemo Outdoor is ideal for indoor measurements. Lightweight Tablet PC makes it is easy to carry and allows the user to plot the measurement route on a floorplan with a click of a pen.
- with Multi Option	Nemo Outdoor Multi enables benchmarking measurements on multiple networks and even on multiple technologies at the same time. Possibility to establish up to four simultaneous packet / circuit-switched data connections from test terminals.
Nemo Analyze	A first-class post-processing tool for analyzing measurements. Powerful built-in search facilities enable the easy locating of specific events, trends, or problems.
Nemo Q	Nemo Q is a Symbian -based extremely lightweight and portable engineering tool for customer-assisted network problem solving in the air interface of wireless networks. Nemo Q supports measurements on GSM, GPRS, EDGE, and WCDMA networks.

6 CONTACT INFORMATION

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For information on other local representatives near you, please check the updated contact information list at www.anite.com/nemo.