

NEMO HANDY™

Nokia N95 Mobile Phone

Nemo Handy™ is a Symbian-based light-weight and portable engineering tool for testing voice quality based on MOS, testing mobile application QoS/QoE, and measuring the air interface of EGSM/GPRS/EDGE/WCDMA/HSDPA/Wi-Fi 802.11b/g wireless networks. True to its name, it is a handy accessory for every network and quality engineer, technician, and manager. In addition to being the perfect tool for network, application and indoor testing, Nemo Handy can be used as a regular mobile phone as well.



NETWORK TESTING

Measurement results contain in-depth network information, such as RX quality, BLER, RSCP, Ec/N0, full L3 signaling information, number of timeslots, and various application performance metrics. The exact and detailed radio interface data provided by Nemo Handy is optimal for network planning, roll-out, tuning, verification,

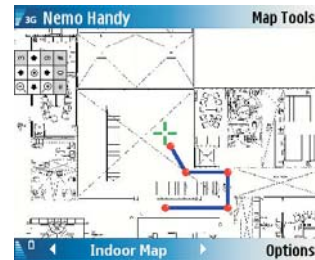
troubleshooting, and maintenance purposes. All measurement data supported by the Nokia N95 mobile handler is logged and available in open ASCII Nemo file format.

APPLICATION TESTING

Nemo Handy supports scripted QoS/QoE testing of voice and video calls, FTP/HTTP data transfers, HTML/WAP browsing, SMS/MMS messaging, email sending and receiving and ping. The voice quality testing option makes it also possible to evaluate the 'average' customer's perception of quality based on a Mean Opinion Score (MOS). Real-time results of both manual and script-aided testing can be monitored throughout the duration of the connection. Scripts can be created and edited with Nemo Handy's built-in script editor, or with PC software, Nemo Handy Script Editor. The application testing QoS/QoE KPIs logged by Nemo Handy include connection setup delay, download time, time-to-content delay, throughput, etc.

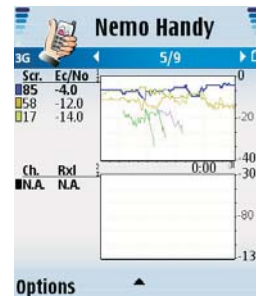
INDOOR MEASUREMENTS

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. 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.



CUSTOMIZABLE 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. All Nemo Handy measurement data displays are also fully user-configurable. The views can be edited with the Nemo Handy Configuration Editor tool that is included in the Nemo Handy package. Even font size is user-definable. All display settings are stored in an .xml file. The Nemo Handy user interface is complete with display freeze and screenshot functionalities.

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NOTIFICATIONS

Nemo Handy offers a set of audio notifications that can be used to notify the user of important measurement events. New notifications 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.

LOGGING

All network parameters supported by the Nokia N95 mobile handler, including signaling messages, are stored in the Nemo Handy log file and are available for post-processing, for example, with Nemo Outdoor and Nemo Analyze. The logging options of Nemo Handy include, for instance, automatic logging whenever a script is run, circular fixed-length log files overwritten from the beginning, user-defined textual markers that can be added to log files while running measurements at the same time, and auto-upload of log files to email or an FTP server. The parameters below are ones that are displayed in the Nemo Handy views.

Mobile Features

-HSDPA/WCDMA 2100,
GSM/EGSM/GPRS/EGPRS
850/900/1800/1900
-HSDPA(Category 6: PS UL/DL=
384/3.6MB, CS 64 (video calls))
EGPRS (Class B, Multislot class 32):
DL/UL= 296 / 177.6 kbits/s, Timeslots

5+3, max. 6)
GSM/EDGE (Simple class A, multislot class 11, DL/UL: 177.6/118.4 kbits/s)
DTM (Multislot class 11: DL/UL 118.4/118.4 kbps)
-HR,FR,EFR(GSM) and AMR(GSM) speech codecs
-Integrated GPS receiver
-Functionality support based on:Core Network (3GPP Rel 5 June-2006) Baseline, GERAN (3GPP R99 September-2006 Baseline including GERAN Feature Package 1, see Rel 4 versions of 3GPP TP's 44.060 and 24.008), WCDMA RAN (3GPP Rel 5 June-2006 Baseline)

Forcing Features

-Cell barring, band lock, system lock, channel lock, scrambling code lock

Serving Cell Information

-Cellular system, Channel number, Cell ID, MCC, MNC, LAC, Packet data technology

UMTS Parameters

Initial TX power, RACH TX power, Preamble count, AICH status, Ec/NO for active/monitored set, RSCP for active/monitored set, TX power, BLER (DL), SIR, Percentage of UL/DL power-up commands, Carrier RSSI, Scrambling code for active/neighbor set, Compressed mode indication, RRC state

HSDPA Parameters

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

GSM Serving Cell RF Parameters

-DL DTX, RX level (full/sub), RX quality (full/sub), C1 & C2, MS power level, Packet channel coding (UL/DL),

Timing advance, Used timeslots, FER, MAIO, HSN, RLT, C/I, AMR parameters, Link quality estimate

GSM Serving Channel Information

-BSIC, Number of timeslots (UL/DL), Channel number, Hopping channel list

Additional GSM Cell Information

-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

User Level Data Information

-Application data throughput 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

GPS Information

-Status, latitude and longitude, height, distance, velocity, number of satellites

WLAN Parameters

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

Full Application Level Metrics

-For GSM to UMTS and UMTS to GSM handover, voice call, video call, PDP context, FTP, HTTP, WAP/HTML, SMS/MMS, email, and ping.