

*Anite*



**NEMO**  
COMPACT-i™

PRODUCT DESCRIPTION

**Nemo Compact-i™ 1.20** is the first handheld measurement device in the world with the performance and full functionality of a laptop computer - a truly pioneering solution that enables handheld HSDPA measurements using the world's most robust, full-powered, full-featured, dust and water resistant Windows XP Pro-enabled PC, the Panasonic Toughbook® U1 that is suitable for the toughest terrain.

True to its name, Nemo Compact-i is an intelligent and compact solution for optimizing the quality of wireless voice and data networks. Nemo Compact-i **records a complete set of GSM/WCDMA/HSDPA KPIs for post-processing and enables you to monitor measurement results in real time utilizing the best real-time data visualization on the handheld market.** The data views range from bar and line graphs to indoor maps, and L3 signaling and parameter grids. Nemo Compact-i introduces also the highly evolved Nemo application testing features onto the new, groundbreaking platform, the supported applications including voice call, FTP upload/download, HTTP, Iperf for TCP/UDP, and ICMP ping.

The comprehensive radio interface data recorded with Nemo Compact-i is optimal for network planning, roll-out, tuning, verification, optimization, and maintenance. On top of these, Nemo Compact-i is an ideal solution for indoor HSDPA measurements, being **the only existing HSDPA measurement solution that combines Windows XP Pro -capability and built-in 3G mobile broadband with small enough size to make the device easy to use also in spaces where laptops and other bulky equipment turn out to be highly impractical.**

All network parameters supported by the terminal's mobile trace interface, including signaling messages, are logged and made available for post-processing with Anite's Nemo Analyze™ and Nemo Outdoor™. However, Nemo file format's **full and proven compatibility with 3<sup>d</sup> party tools** also enables post-processing with any other tool supporting the Nemo file format.



## DEVICE SPECIFICATIONS

### PANASONIC TOUGHBOOK® U1

- **Novatel Expedit EU870D modem**
  - Tri-band HSDPA/UMTS 850/1900/2100 MHz
  - Quad-band EDGE/GPRS 850/900/1800/1900 MHz
  - HSDPA Category 8 (7.2Mbps)
  - 3GPP Rel 99 for GSM/GPRS; 3GPP Rel 5 for HSDPA
- **Operating system:** Windows® XP or Vista
- **CPU:** Intel® Atom™ Processor Z520 (1.33GHz, 512KB L2 cache); RAM: 1024MB, DDR2 SDRAM; VRAM: Max 256MB
- **Input:** Touchscreen LCD-zoom, scroll and 4 user programmable buttons, 61-key with dedicated Windows® key
- **Ports:** audio jack: 1 USB 2.0 compliant port (4-pin), optional serial and optional Ethernet (RJ-45) with expansion module
- **Wireless:** Optional integrated 3G mobile broadband (WWAN), Intel® Wireless Wi-Fi Link 5100 802.11a/b/g/draft-n, BT®v.2.0 + EDR (Class 1)
- **Power supply:** twin hot-swappable lithium ion battery packs (7.2V, 2900mAh each); battery operation 9h; AC Adapter: AC 100V-240V 50/60Hz
- **Display:** 5.6" widescreen 1024 x 600 WSVGA sunlight-viewable TFC active matrix LCD: anti-glare, anti-reflective screen treatments; LED backlighting
- **Durability features:** MIL-STD-810F and IP54-compliant, rugged magnesium alloy, removable solid state drive, 4-foot drop approved, rotating hand strap, sealed all-weather design, rain, vibration, spill and dust-resistant
- **Dimensions & Weight:** 5.9"(L) x 7.2"(W) x 2.2"(H); 2.3lbs (with strap and both batteries).



## NEMO COMPACT-i KEY BENEFITS

**Technological leader** – The trendsetter among Windows-based handheld measurement devices with laptop-level performance and functionality.

**Best real-time data visualization on the market** – The Windows® XP Pro/Vista PC platform enables Nemo Compact-i to take handheld measurement visualization to a whole new level.

**Comprehensive logging** – All network parameters supported by the device's trace interface, including signaling messages, are logged and made available for post-processing.

**Ease of use** – Highly intuitive user interface and the possibility to transform the handheld device to a desktop computer with the uniquely designed docking station

**Vendor independence** – Full and proven compatibility with 3rd party tools.

## NEMO COMPACT-i KEY FEATURES

- Windows®-based application
- User-friendly graphical user interface
- Scripted and manual service testing: voice call, FTP, HTTP, Iperf for TDP/UCP, and ICMP ping
- Instant playback functionality – you can play back and view measurement files on the go through Nemo Compact-i's user-configurable data views for immediate onsite problem solving
- Supports measurements on GSM, WCDMA and HSDPA networks
- Data views include bar and line graphs, indoor maps (with markers), and L3 signaling and parameter grids
- Enables collecting geographical coordinates with a GPS receiver (Bluetooth)
- Scripts can be created and modified with Nemo Compact-i and Nemo Outdoor 5. Supported scripting features include loops, conditions and waits.



## REAL-TIME DATA VIEWS AND USER INTERFACE

Nemo Compact-i offers an advanced graphical user interface with a comprehensive range of real-time data views, featuring parameter and signaling grids, various parameter bar and line graphs, neighbor and inter-system graphs, and a GPS information view.

### SIGNALING GRIDS

Signaling grids display layer 2 and 3, RLC/MAC, and LLC messages in real time. The Nemo Compact-i signaling grids enable also the decoding of signaling events in real time, enabling you to access the decoded details of each signaling event with a simple double-click on the event in question.

Event name	Time	Subchannel	Message
RRC signaling message	14:21:06.552	BCCH	MASTER_INFORMATION_BLOCK
RRC signaling message	14:21:25.883	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:21:25.883	BCCH	MASTER_INFORMATION_BLOCK
RRC signaling message	14:21:53.228	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:21:53.305	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:21:53.305	BCCH	MASTER_INFORMATION_BLOCK
RRC signaling message	14:22:07.532	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:22:07.532	BCCH	MASTER_INFORMATION_BLOCK
RRC signaling message	14:22:13.119	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:22:13.119	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:22:13.119	BCCH	MASTER_INFORMATION_BLOCK
RRC signaling message	14:22:33.770	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:22:33.770	BCCH	MASTER_INFORMATION_BLOCK
RRC signaling message	14:23:01.095	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:23:01.095	BCCH_BCH	SYSTEM_INFORMATION_BCH
RRC signaling message	14:23:01.095	BCCH	MASTER_INFORMATION_BLOCK

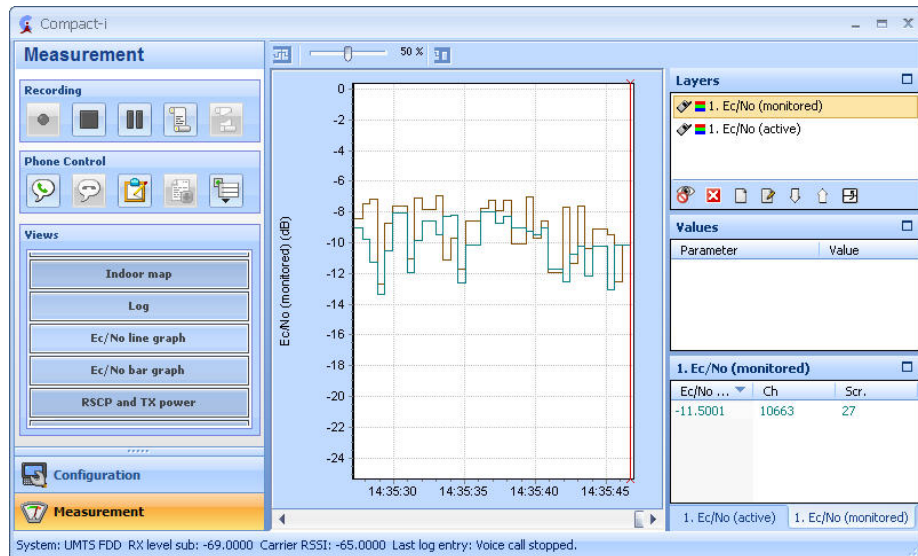
### PARAMETER GRIDS

Parameter grids display user-selected real-time parameter values in tabular format, with each row displaying the real-time value of a single parameter.

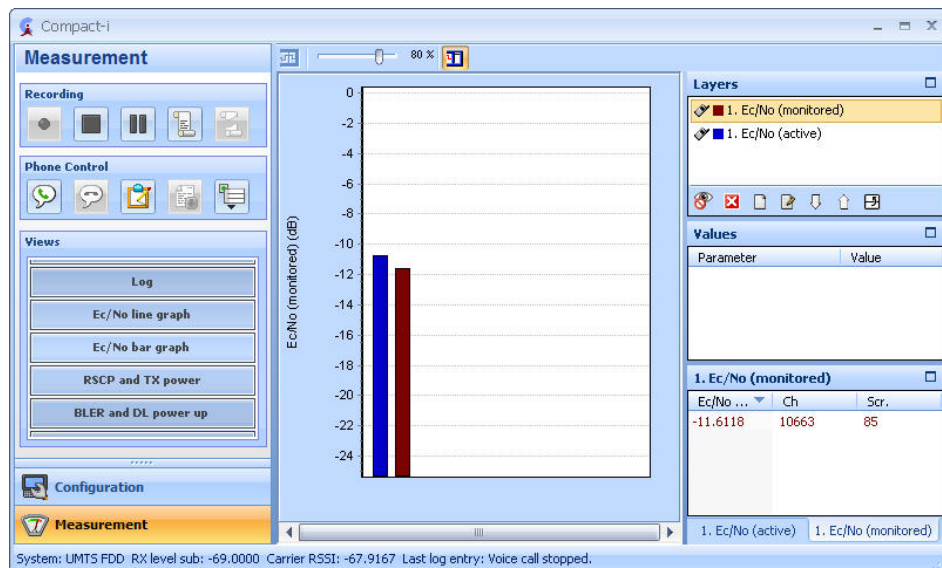
Parameter	Value
BCCH channel	1, TM6280 compat
BLER DL	n/a
BLER UL	n/a
Carrier RSSI	-68.0000
Ec/No (active)	-10.7244
Ec/No (monitored)	-10.8872
Frame error rate sub	n/a
GPS satellites	n/a
HSDPA MAC-hs throughput	n/a
HSDPA modulation	n/a
HSDPA number of used channelisation codes	n/a
HSDPA physical layer requested throughput	n/a
Latitude	n/a
Longitude	n/a
MS power level	n/a
Number of "DL power up" commands	n/a
Packet channel coding downlink	n/a
Packet channel coding uplink	n/a
RSCP (active)	-78.7244
RX level full (neighbor)	n/a
RX level full (serving)	n/a
RX level sub (serving)	n/a
RX quality sub	n/a
TX power	n/a

## BAR AND LINE GRAPHS

Bar and line graphs display parameters in both numerical and graphical format. Multiple parameters can be displayed in a single view. Line graph axes are by default re-scaled automatically according to the minimum and maximum parameter values.

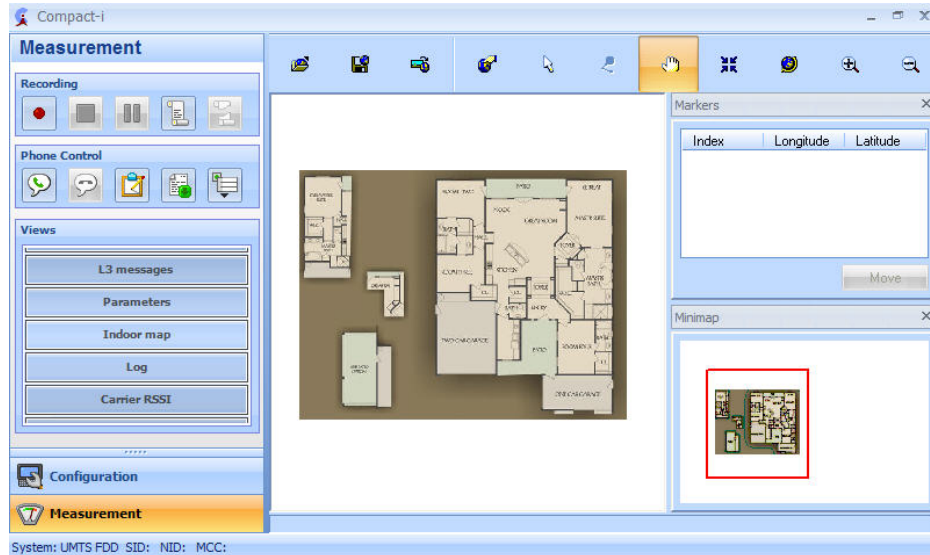


Bar graph scales can be displayed for each bar simultaneously. Integer parameters can be displayed either in decimal or in octal format. Bars are color-coded based on user-definable threshold values.



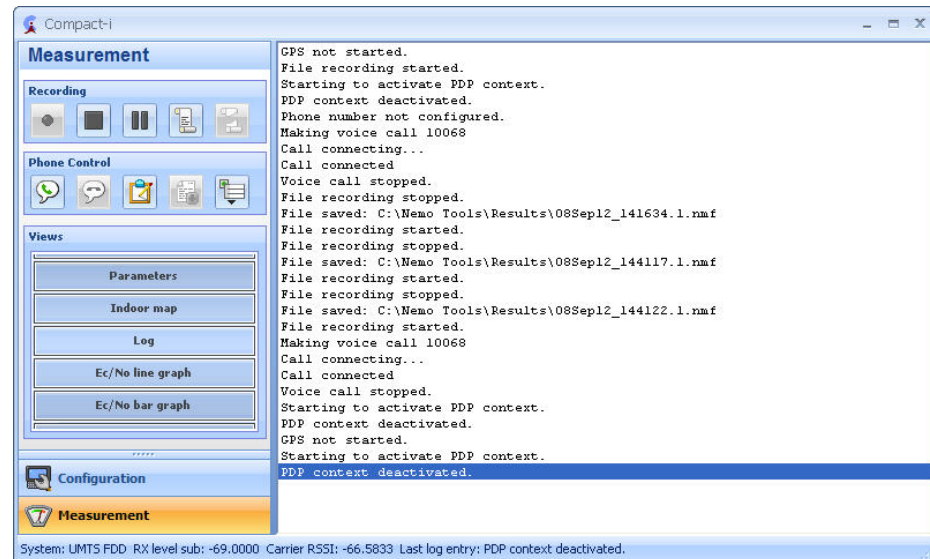
## INDOOR MAPS

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



## LOG VIEW

The log view displays application log events in real time.



## GPS VIEW

The GPS view displays the current geographical position in latitudes and longitudes, the current elevation in meters, the distance traveled, the fix status, the number of available satellites, and the current velocity of the test unit in kilometers per hour.

## **NEMO COMPACT-I PLAYBACK**

The Nemo Compact-i playback functionality is a clever and time-effective way to view Nemo Compact-i measurement files in the various Nemo Compact-i views. The feature offers a quick and easy possibility for immediate onsite analysis on, for example, a specific problem in a given area, or enables the analysis to be performed later on.

## **SCRIPTS**

It is possible to use script files to run measurements with Nemo Compact-i. Scripts can be created and modified with Nemo Compact-I and Nemo Outdoor 5. When a script is used, Nemo Compact-i makes voice calls and data transfers, e.g., FTP uploads/downloads, automatically. Supported scripting features include loops, conditions and waits. Conditions can be used, for instance, to create scripts where the type of the detected packet technology determines how the script proceeds. Loops enable scripts where a portion of the script is repeated a number of times before proceeding with the rest of the script. With the Wait script command, the user can create scripts that are not activated before a certain system or bandwidth is active.

## **APPLICATION TESTING**

Nemo Compact-i supports built-in application testing options for voice call and FTP testing. The QoS/QoE KPIs logged by Nemo Compact-i include connection setup delay, download time, time-to-content delay, throughput, etc.

## **VOICE CALLS**

Nemo Compact-i offers support for manual and scripted voice call testing. Voice call related measurement events stored in the Nemo Handy log file include call attempt, call connect success, call disconnect, and call failed.

## **FTP CONNECTIONS**

Nemo Compact-i offers support for scripted testing of FTP uploads and downloads. FTP transfer related measurement events stored in the Nemo Compact-i log file include data connection attempt, data connection success, data disconnect, and data connection failed.

## **PING**

Nemo Compact-i 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 Compact-i log file include ping attempts, ping failed/succeeded, and ping success rate.

## **HTTP TESTING**

The HTTP testing functionality offers the possibility to test how data is transferred through the HTTP protocol. The HTTP protocol is used in web browsing. In the HTTP testing, the user selects one file that will be downloaded through the HTTP protocol and this data transfer is measured. Currently HTTP testing can be performed in scripted measurements.



## **IPERF FOR TCP/UDP TESTING**

With Iperf it is possible to measure network maximum performance. Iperf was developed as a modern alternative for measuring TCP and UDP bandwidth performance. With Nemo Compact-i Iperf with TCP/UDP can be performed through scripts.

## **BTS FILE SUPPORT**

Nemo Compact-i supports BTS files. BTS information such as active and detected cell names and IDs can be logged and displayed on Nemo Compact-i's various data views.

## **LOGGING AND PARAMETERS**

The Nemo Compact-i log file contains the following network parameters.

### **APPLICATION TESTING PROTOCOLS:**

- *Voice call*
- *ICMP ping*
- *FTP protocol*
- *HTTP*
- *Iperf for TCP/UDP*

### **GENERAL FEATURES**

- *GSM/GPRS/EGPRS*
  - *Timeslots 4+1, 3+2*
- *WCDMA*
  - *PS 384/384*
  - *Functionality support based on 3GPP Rel 99 specification*
  - *Functionality support based on 3GPP Rel 5 specification*
  - *External antenna connection*

### **SERVING CELL INFORMATION**

- *Cellular system*
- *Channel number*
- *Service information*
- *Cell ID*
- *RAC, MCC*
- *MNC, LAC*

### **WCDMA SIGNALING MESSAGES**

- *Layer 3*
- *RRC messages*
- *RLC messages*
- *Logical subchannels for all messages*

### **RACH PARAMETERS**

- *Random access maximum preamble count*
- *Random access preamble count*
- *Random access preamble step*
- *Random access message TX power*
- *UL interference level*

## HSDPA PARAMETERS

- *HSDPA UE category*
- *Current HSDPA serving scrambling code*
- *Number of allocated HS-SCCH channelization codes*
- *Distribution of used modulation scheme, effective coding, TB size, and HS-DSCH allocation*
- *Distribution of reported CQIs*
- *MAC-hs bit and block throughput*
- *MAC-hs BLER*
- *MAC-hs retransmission rate (for first, second, and third attempts separately)*
- *HSDPA measurement power offset*
- *HARQ process usage*
- *HS-SCCH usage*
- *ACK/NACK and CQI reporting configuration*
- *HS-PDSCH throughput*
- *Retransmission rate per TB size*

## PHYSICAL LAYER PARAMETERS

- *BLER, RSSI, RSCP*
- *Physical channel UL throughput*
- *TX power*
- *Ec/No for active/neighbor/ detected set*
- *S and R criterion for active and monitored set*
- *RAKE finger allocation*
- *FER (voice)*

## POWER CONTROL PARAMETERS

- *BLER*
- *SIR*
- *TX power control algorithm*
- *TX power control step size*
- *Number of increase/decrease UL/DL power commands*

## SOFT HANDOVER PARAMETERS

- *Ec/No for active/neighbor/detected set*
- *Soft handover status*
- *Soft handover event*
- *Addition window*
- *Drop window*
- *Replacement window*
- *Time to trigger 1A*
- *Time to trigger 1B*
- *Time to trigger 1C*
- *Added scrambling code nr.*
- *Removed scrambling code nr.*
- *Cell count active*
- *Cell count monitored*

## ADDITIONAL 3G INFORMATION

- *Compressed mode indication*
- *RRC state*
- *WCDMA neighbor list with GSM neighbors*
- *Inter-system GSM neighbor measurement results*
- *Results of inter-frequency neighbor measurements*
- *Measurement events*
- *Used AMR codec*

## GSM SIGNALING MESSAGES

- *Layer 3*
- *Layer 2*
- *RLC/MAC control messages*
- *Logical subchannels for all messages*

## GSM SERVING CELL RF PARAMETERS

- *RXLEV (full & sub)*
- *RXQUAL (full & sub)*
- *DTX UL*
- *C1 & C2*
- *TXPOWER*
- *RLT*
- *Timing advance*
- *C value*
- *Signal variance*
- *I levels*
- *Packet RXQUAL*
- *Mean BEP (8-PSK & GMSK)*
- *Mean BEP coefficient variance (8-PSK & GMSK)*

## GSM SERVING CHANNEL INFORMATION

- *HSN, BSIC*
- *MAIO, TCH (HR, FR, EFR)*
- *Timeslot number*
- *Channel number*
- *Hopping status*

## GSM NEIGHBOR INFORMATION

- *BCCH, BSIC, RXLEV*
- *C1 & C2*
- *GSM neighbor list with WCDMA neighbors*
- *Inter-system WCDMA neighbor measurement results*

## RLC/MAC INFORMATION

- *RLC/MAC data throughput UL/DL*
- *Number of timeslots UL / DL*
- *TLLI*
- *TFI UL/DL*

- *EDGE modulation and coding scheme UL/DL*
- *GPRS/EDGE indication*
- *RLC window size*

#### **CALL INFORMATION**

- *Call type*
- *Number of calls*
- *Call connecting status*
- *Call attempt time*
- *Call failure time*
- *Call failure cause*
- *Call duration*
- *Call disconnect cause*

#### **PACKET DATA INFORMATION**

- *PDP activation attempt time*
- *PDP active duration*
- *PDP activation failure time*
- *PDP activation failure cause*
- *PDP context deactivation time*
- *PDP context deactivation cause*
- *Packet state*
- *Packet protocol address*
- *Attach failure time*
- *Attach failure cause*
- *Attach attempt time*
- *Attach attempt time*
- *Attach duration*
- *Detach time*
- *GMM/SM state*
- *QoS settings*

#### **USER LEVEL DATA INFORMATION**

- *Data transfer protocol*
- *Data transfer direction*
- *Data transfer attempt number*
- *Data transfer host address*
- *Data transfer host port*
- *Application data throughput UL/DL*
- *Application packet error rate*
- *Transferred bytes UL/DL*
- *PPP layer data throughput*
- *Data connection establishment time*
- *Data connection rate UL/DL*
- *Data connection duration*
- *Data connection failure time*
- *Data connection failure cause*
- *Data transfer failure cause*
- *Data size UL/DL*

- *Data disconnect cause*
- *Ping rate*
- *Ping timeout*
- *Ping time (application data round trip travel time)*

#### STATISTICS

- *Call statistics*
- *Handover/handoff statistics*
- *Soft handover statistics*
- *Intersystem handover statistics*
- *Intersystem cell reselections*
- *Location area statistics*
- *Attach statistics*
- *PDP context statistics*
- *SMS & MMS statistics*
- *Routing area statistics*
- *User level data statistics*



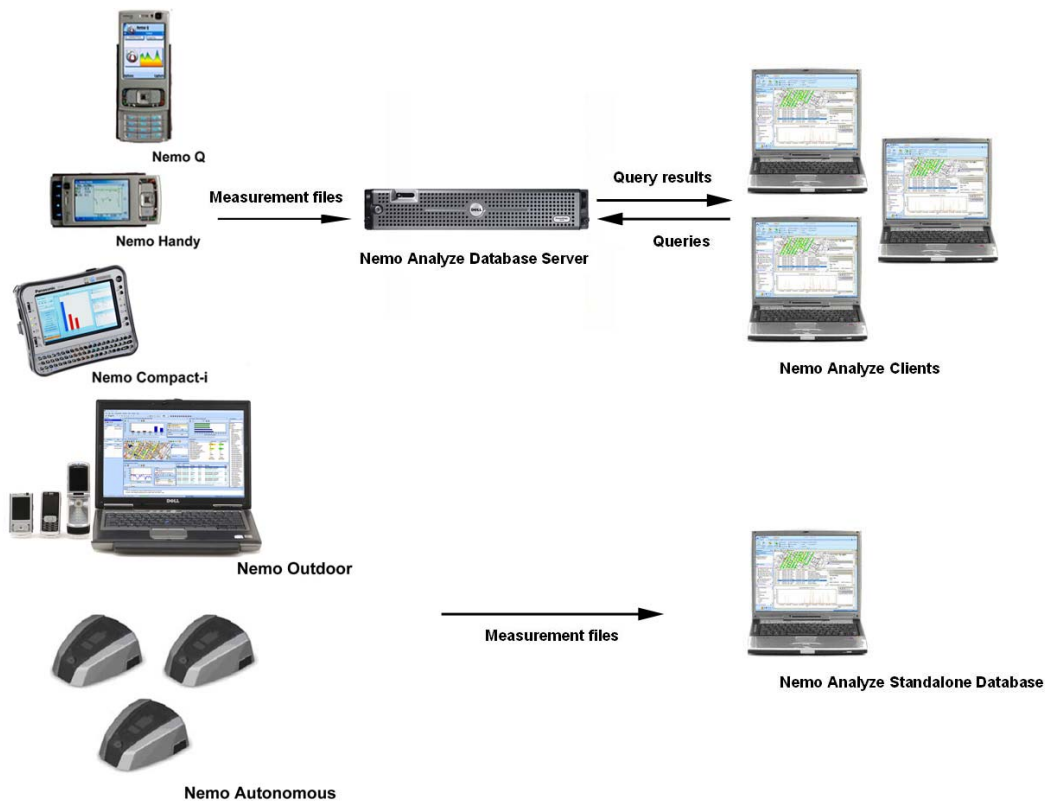
## POST-PROCESSING

Nemo Compact-i produces measurement files in Nemo file format version 2.02 (.nmf). 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.

The files in Nemo file format can be post-processed and played back with Nemo Analyze and Nemo Outdoor, or with one of the many third party post-processing/analysis tools supporting the Nemo file format. The most optimal approach to the post-processing of Nemo measurement data is Nemo Analyze. As an analysis tool, ***Nemo Analyze represents the cutting edge of drive test data visualization***, and offers a powerful and versatile approach to performing benchmarking, troubleshooting, and statistical reporting based on drive test data. The system ***scales from a standalone tool to an enterprise-level client/server solution and incorporates an innovative, low-maintenance database engine that has been designed and optimized specifically for high-performance post-processing of drive test data.***

Nemo Analyze ***offers a comprehensive set of technology-specific Key Performance Indicators for the latest wireless technologies and a wide range of data views that are known to offer the best visualization of drive test data on the market - and yet it is highly cost effective, easy to install and use, and it scales to meet the needs of organizations of any size.***

***All major wireless technologies***, namely TDMA, AMPS, cdmaOne, GSM, HSCSD, GPRS, EDGE, WCDMA, HSDPA, CDMA2000, TETRA, DVB-H, UMA, HSUPA, TD-SCDMA, and WiMAX, ***are supported.***



## NEMO TOOLS

In addition to Nemo Compact-i, Anite Finland Ltd. offers a comprehensive range of tools and software for measuring and analyzing wireless networks.

- Nemo Analyze™** Nemo Analyze is a powerful and versatile, cutting-edge analysis tool for performing benchmarking, troubleshooting and statistical reporting based on drive test data. The system scales from a standalone tool to an enterprise-level client/server solution and incorporates an innovative, low-maintenance database engine that has been designed and optimized specifically for high-performance post-processing of drive test data.
- Nemo Autonomous™** Nemo Autonomous is the first practical light-weight solution to performing fully automated large-scale measurements on the air interface of EGSM/GPRS/EDGE/WCDMA/HSDPA wireless networks. Nemo Autonomous streamlines your network measurement, troubleshooting, statistical reporting, and benchmarking processes, maximizes your awareness of what is happening in the network, and makes achieving all this considerably easier and more cost efficient.
- Nemo Outdoor™** A portable engineering tool for measuring and monitoring the air interface of LTE, TETRA, GSM (HSCSD, GPRS, EDGE), WCDMA (UMTS), TDMA (IS-136), AMPS, cdmaOne, CDMA 2000, UMA, HSDPA, HSDPA 16QAM, HSUPA, HSPA+. TD-SCDMA and WiMAX 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 floor plan 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 five simultaneous packet/circuit-switched data connections from test terminals.
- Nemo Handy™** Nemo Handy is a state-of-the-art handheld tool for testing mobile application QoS/QoE and measuring the air interface of EGSM/GPRS/EDGE/WCDMA/HSDPA/Wi-Fi 802b/g wireless networks. Nemo Handy not only provides you with the best real-time measurement visualization on the handheld market, it also enables you to build your own custom real-time views for all the relevant network parameters supported by the terminal's mobile trace interface.
- Nemo Q™** Nemo Q is an easy-to-use troubleshooting tool for customer-assisted network problem solving. Nemo Q supports GSM, GPRS, EDGE, WCDMA, and HSDPA wireless networks and is available for Nokia N85, N85 US, N95, N95 US, N96, N96 US, 6120, and 6121 terminals. The unique concept of Nemo Q, where the end-customer is able to send a log file to the service provider each time a network problem is encountered, represents the future of the service provider business.

## CONTACT INFORMATION

For additional information on our company and products, please visit our website at [www.anite.com/nemo](http://www.anite.com/nemo).

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For information on other local representatives near you, please check the updated contact information list at [www.anite.com/nemo](http://www.anite.com/nemo).

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