Product Description

For GPRS Measurements
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1 NEMO OUTDOOR GPRS SYSTEM OVERVIEW

Nemo Outdoor GPRS is a portable engineering tool for measuring and monitoring the air interface of wireless networks. The supported network standards are:

- GSM 900 MHz wireless networks
- GSM 1800 MHz wireless networks
- GSM 1900 MHz wireless networks
- GSM Dual Band 900/1800 MHz wireless networks
- GPRS Features of GSM 900/1800/1900 wireless networks

Nemo Outdoor is an effective tool for tracing wireless networks. It collects measurement results and geographical coordinates (when used with a GPS receiver) and stores them on a PC’s hard disk. Measurement results provide useful information for network tuning, verification, and maintenance purposes. The results can be transferred for analysis to other post processing tools, such as Nemo Technologies' analysis tool Nemo Analyze. The open file format allows results to be exported to other third party software applications. In addition, Nemo Outdoor offers instant measurement data playback possibilities.

Nemo Outdoor offers various measurement options. When these different measurement options and hardware are combined, different kinds of measurements can be performed depending on the user’s needs. One of these options provides for fast frequency scanning receivers.

Nemo Outdoor GPRS uses licensed technology from Nokia, Motorola, and SAGEM.

- SAGEM OT 190  GSM/GPRS 900/1800
- SAGEM OT 199  GSM/GPRS 1900
- SAGEM OT 290  GSM/GPRS 900/1800/1900
- Motorola T260  GSM/GPRS 900/1800/1900
- Nokia 6310i  GSM/GPRS 900/1800/1900
2 MEASUREMENT WITH NEMO OUTDOOR GPRS

With a GPRS mobile, you can perform voice, circuit-switched data, and packet-switched data measurements.

2.1 VOICE TESTING WITH NEMO OUTDOOR

The voice testing environment consists of a Nemo Outdoor compatible Nokia, SAGEM, or Motorola mobile and an IBM compatible computer (user provided or Nemo Technologies provided at an extra cost) with the Windows® operating system. The package also includes the connecting cable, a PCMCIA serial port adapter card, GPS receiver, and an (optional) fast frequency scanner.
2.2 CIRCUIT-SWITCHED DATA TESTING WITH NEMO OUTDOOR

The CS data testing environment consists of three parts: a measurement unit (Nemo Outdoor), an application server (Packet Data Tester, FTP server, HTTP server, POP3 server, or an SMTP server), and a dial-up server. The dial-up server is used to establish a data connection between the measurement unit and the Internet. The application server is connected to the Internet.

The data measurement system has two modes: Send and Receive. In the Send mode, the measurement unit sends data packets to the application server; in the Receive mode vice versa. If you are using a FTP server, the measurement unit uploads (Send mode) or downloads (Receive mode) test files to or from the FTP server. If you are using an HTTP server, the measurement unit can only receive files.

The user can define the number of timeslots and the coding schemes, which in turn define the desired transfer rate. During the measurement, the user will be able to monitor data throughputs and error rates on different network layers, as well as certain parameters, such as, coding scheme and number of timeslots.
2.3 PACKET-SWITCHED DATA TESTING WITH NEMO OUTDOOR

The PS data testing environments consist of two ends: the measurement unit and an application server (Packet Data Tester, FTP server, HTTP server, POP3 server, or an SMTP server).

The data measurement system has two modes: Send and Receive. In the Send mode, the measurement unit sends data packets to the application server; in the Receive mode vice versa. If you are using a FTP server, the measurement unit uploads (Send mode) or downloads (Receive mode) test files to or from the FTP server. If you are using an HTTP server, the measurement unit can only receive files.

During the measurement, the user will be able to monitor data throughputs and error rates on different network layers, as well as certain parameters such as coding scheme and number of timeslots.
2.4 NEMO OUTDOOR MULTI

Nemo Outdoor Multi is a multiple test mobile holder and a general measurement device adapter to be used with Nemo Outdoor. It allows simultaneous connection and the use of up to four test mobiles, multiple scanners, and a GPS device. The test mobiles can be from different technologies. It is delivered in a heavy-duty case or with a car mounting kit that allows the unit to be semi-permanently mounted into a test car.

Multi-Data allows up to four concurrent data measurements with a single laptop. It is the first truly portable multi data measurement solution. It supports circuit-switched and packet data connections, as well as simultaneous voice measurements and any combinations of technologies, such as, GPRS, EDGE, and WCDMA. Nemo Datatest Server is an administration-free server with fixed and user-definable test files and pages. In addition, it supports all common test protocols, such as, FTP, HTTP, SMTP, and ICMP. Combined with Nemo Datatest Server, Nemo Outdoor Multi-Data makes it easy to carry out, not only casual data benchmarking test cases that can be used to compare the performance of different technologies or operators, but also long-term network performance measurements.
3 HARDWARE AND SOFTWARE REQUIREMENTS

- IBM-PC compatible computer Windows® 2000 and Windows® XP
- 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
- Display resolution 1024 x 768 or higher with 256 colors
- Internet Explorer 4.0 or higher for viewing the help file
- One RS232 serial port, if an external GPS receiver utilizing a serial port is used
- One USB port
4 NEMO OUTDOOR USER INTERFACE

The Nemo Outdoor user interface is compatible with common Windows® standards. During measurement, you can easily monitor the results and the progress of the measurement process.

The Nemo Outdoor menus offer, for example, the following features:

- Setting the configuration to suit your environment
- Playing back files
- Placing markers in the file
- Customizing audio, text, and graphical alerts
- Opening desired measurement windows
- Making calls/packet transfers either manually or according to a script
- Establishing data transfer sessions
- Arranging windows and adjusting window settings
4.1 NEMO OUTDOOR MEASUREMENT WINDOWS

The measurement windows in Nemo Outdoor can be monitored during the measurement process. They are easy to open and close and can be adjusted and arranged to suit the user’s working environment. Nemo Outdoor permits the user to display measurement results (limited number) in any one of five methods. Results can be displayed in text, on a map, in line graphs (single or multiple lines), in bar graphs (single or multiple), and in scatter graphs.

4.1.1 VIEW GROUPS

View Groups is a function that allows you to organize measurement windows into different tabs for easier viewing. This is especially useful if you have several graphs and maps open at the same time and you have to overlap them to fit them all in the Nemo Outdoor main window. Now you can create view groups and organize the measurement windows into several groups. Each view group appears at the bottom of the main window as a tab that you can view by clicking the tab.
4.1.2 LINE GRAPHS

Measurement results from Nemo Outdoor can be displayed in a Line Graph in a variety of ways to allow the user to accurately observe the measurement information. It is possible for the user to display results on single and multiple line graphs. Multiple line graphs are useful in displaying results, such as Neighbor RX Level, because the results from each neighbor can be closely compared in one graph. The user can also select the parameters that are displayed in the numerical data table.

The zoom buttons can be used to view the results in more detail. The threshold function can be used to set a threshold level. When the values exceed that level, the line will be drawn in a different, user-defined, color. Furthermore, the scales are fully user-configurable.
4.1.3 BAR GRAPHS

Bar graphs are equally as useful for displaying measurement results as line graphs with the same possibilities for displaying results as single and multiple bars. Multiple measurement results can be displayed in the same graph window to allow for monitoring of more than one key parameter without the need to observe results from many windows at the same time. The user can also select the parameters that are displayed in the numerical data table.

The zoom buttons can be used to view the results in more detail. The threshold function can be used to set a threshold level. When the values exceed that level, the line will be drawn in a different, user-defined, color. Furthermore, the scales are fully user-configurable.
4.1.4 SCATTER GRAPHS

Scatter graphs further enhance the power to interpret measurement results to the levels required by a wireless network engineer. Parameter relationships and dependencies can easily be analyzed from the results plotted in the scatter graph to further increase the understanding of the wireless network.

The zoom buttons can be used to view the results in more detail. The threshold function can be used to set a threshold level. When the values exceed that level, the dots will be drawn in a different, user-defined, color. Furthermore, the scales are fully user-configurable.
4.1.5 MAPS

Nemo Outdoor supports MapInfo® raster and vector maps. It also supports MapX Geoset files (.gst) which enable the user to open several layers on a map and then save them all in a .gst file to be opened later on. All user-defined map settings, such as, the order of the different map layers and the zoom factor are stored in the .gst file.

When Nemo Outdoor is used with a GPS receiver (positioning coordinates are collected) the user can easily correlate events to positioning coordinates. Thus, it is easy to see the positions at which key events have occurred.

The latest Nemo Outdoor version offers, as a new feature, parameter-based route coloring. This means that you can observe the values of certain network parameters from the route coloring on the map. You can define which color refers to which parameter value. This way it is easy to spot the problem areas on a map.
4.1.6 GRID (TEXT) DISPLAY

The user can easily select the events, parameters, and statistics to be displayed in the grid table. You can also highlight certain events with color to improve the clarity of the results presented. Double-click on an event to view more information about that particular event.
5 NEMO OUTDOOR CONFIGURATION

Configuring Nemo Outdoor for your environment can be accomplished in the easy-to-use **Configuration Manager** dialog box. The Configuration Manager dialog box offers the Autodetect function, which can be used to detect measurement devices connected to the Nemo Outdoor system.
6 WORKING WITH NEMO OUTDOOR

6.1 MEASUREMENT MODES

Nemo Outdoor can be used in several different measurement modes and for different network monitoring purposes, including network troubleshooting and general quality measurement purposes.

The user does not need to start a measurement in order to view results in the measurement windows. Nemo Outdoor starts to display results as soon as the measurement device (phone) has been detected, but the user needs to start the measurement in order to store the data in the measurement file.

If the Nemo Outdoor measurement system is equipped with a GPS receiver, then also the position information is stored by the system.

6.1.1 MANUAL MODE

Manual mode is based on the user establishing data transfer connection or making voice calls.

6.1.1.1 GPRS DATA TRANSFER

A user can manually select the GPRS Attach/Detach commands as well as the PDP Context Activate/Deactivate and the Start/Stop data transfer commands. This mode is useful, for example, when the user wants to make a single continuous data transfer session to monitor the resource allocation and cell reselection performance.

6.1.1.2 VOICE CALLS

As the SAGEM, Motorola, and Nokia mobiles can be used for normal voice calls as well, a Nemo Outdoor user can perform normal trace measurements with Nemo Outdoor for tuning purposes. The results can be used, for instance, for determining the optimum handover and power control parameters.
6.1.2 AUTOMATED MODE

Automated mode is based on scripts that establish data transfer connections or voice calls on behalf of the user and can repeat the same or different sessions for a defined period of time. Scripts can be saved and edited. Script files can be quickly and easily built with the Script Editor.

The user can insert a series of phone numbers and the duration for each call. Nemo Outdoor will cycle through the different numbers while testing. Each configuration can be saved as a separate file and loaded when needed. If a call is dropped, Nemo Outdoor will wait for the duration set by the user, then automatically regenerate the call.
6.1.2.1 GPRS DATA TRANSFER SCRIPT

GPRS Data Transfer Script can be used for simulating different traffic models, such as HTTP, FTP, wap, and e-mail. The user can combine GPRS Attach/Detach, PDP Context Activate/Deactivate, and Send/Receive/Idle commands. Some examples below:

<table>
<thead>
<tr>
<th>Run 20 times</th>
<th>GPRS Attach</th>
<th>PDP Context Activation</th>
<th>Idle 10s</th>
<th>Send 10kB</th>
<th>Idle 1s</th>
<th>Receive 100kB</th>
<th>Send 20kB</th>
<th>Idle 10s</th>
<th>Receive 200kB</th>
<th>PDP Context Deactivation</th>
<th>GPRS Detach</th>
<th>Idle 10s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 200 times</td>
<td>GPRS Attach</td>
<td>Idle 5s</td>
<td>GPRS Detach</td>
<td>Idle 5s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run once</td>
<td>GPRS Attach</td>
<td>Idle 5s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run 50 times</td>
<td>PDP Context Activation</td>
<td>Idle 10s</td>
<td>PDP Context Deactivation</td>
<td>Idle 5s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run once</td>
<td>GPRS Detach</td>
<td>Idle 5s</td>
<td></td>
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</tr>
</tbody>
</table>

6.1.2.2 VOICE CALL SCRIPT

Nemo Outdoor can generate voice calls according to a user defined script file. This way a user can collect measurement data for statistical purposes. In the script file, the user can define the number of calls, call durations, delays between calls, as well as the numbers to be called to.

6.2 FREQUENCY SCANNING

Nemo Outdoor Frequency Scan mode is designed for frequency planning of an existing digital network, for example, for tuning and interference measurement purposes. Frequency scanning is available by using the SAGEM OT 190 test mobile or by using a separate fast frequency scanner.

By using the test mobile, the selected carrier frequencies of the current wireless system (GSM900, 1800, or 900/1800 only) and their field strength values in the geographical region concerned can be observed. In addition, if the Nemo Outdoor measurement system is equipped with a GPS receiver, the position information will also be stored by the system.

Frequency scanning results contain the field strength values for all carriers. The results can be used, for instance, for frequency planning and interference measurement.

When using a fast frequency scanner, the specified channels (BCCHs) are scanned. In addition, if the Nemo Outdoor measurement system is equipped with a GPS receiver, the position information will also be stored by the system. The scanning made with a fast frequency scanner is more accurate than the scanning made with a test mobile.

Frequency scanning results contain the field strength values for the selected carriers and the decoded BSIC values. The results can be used, for instance, for frequency planning and interference measurement.
7 OTHER NEMO TECHNOLOGIES PRODUCTS

In addition to the previously described product, Nemo Technologies 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 GSM (HSCSD, GPRS, EDGE), WCDMA (UMTS), and CDMA 2000 wireless networks. Based on the Nemo Prime platform.

Nemo Indoor
A portable engineering tool for measuring and monitoring the air interface of GSM (HSCSD, GPRS, EDGE), WCDMA (UMTS), and CDMA 2000 wireless networks. Especially designed for indoor measurements. Based on the Nemo Prime platform.

Nemo Analyze
A software for analyzing measurements. Based on the Nemo Prime platform.

Nemo TETRA
A drive test tool for TETRA networks (1G and 2G).

Nemo TETRA Playback
Tool for playing back and analyzing TETRA network measurement files.
8 CONTACT INFORMATION

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