NOKIA

NOKIA 22

PRODUCT GUIDE

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1   OVERVIEW

This document describes the main characteristics of the Nokia 22 PBX connectivity terminal. The Nokia 22 provides an analogue two-wire connection for PBX (Private Branch Exchange) trunk or extension connection. A standard landline telephone can also be connected directly to the terminal. The terminal supports high-speed GSM data transmission of up to 43.2 kbps (network dependent service).

The main purpose of Nokia 22 is to provide a direct GSM connection for companies using a fixed line PBX. Calls targeted to GSM network are diverted via the Nokia 22. Thus the company gets a direct connection to the GSM network from internal fixed line telephones without the expensive interconnection fee between fixed and GSM networks.

The Nokia 22 can be used for data, PC-fax, short message service (SMS) and speech over GSM network. HSCSD (High Speed Circuit Switched Data) enables landline modem speed in wireless environment. The Nokia 22 can be connected to a PC using a standard 9-pin RS232 cable (included in the Nokia 22 Data Packet, see section 5.1).

For more information about Nokia 22, see the Nokia 22 Operator's Guide or www.nokia.com.

2   BRIEF DESCRIPTION

The Nokia 22 is a GSM transceiver without a battery or an user interface of its own. The Nokia 22 always needs a host device. The host device can be a PBX, a landline telephone or any device using a standard RS232 connector.

2.1   Trunk connector

This interface is a standard analogue two-wire interface for an analogue PBX trunk or analogue landline telephone.

2.2   Extension connector

This interface is a standard analog two-wire interface for an analogue PBX extension.

2.3   Data connector

The Nokia 22 can be used as a wireless modem with normal communication applications. When inserted, the Nokia 22 is recognized automatically as a standard modem which uses Windows' own generic driver. Data services can also be used with other operating systems such as Mac OS.

To connect the Nokia 22 in to a computer, you need a standard 9-pin RS232 cable. The cable and an AT command list are available as the Nokia 22 Data Packet (See section 5.1).

3   PRODUCT CONCEPT
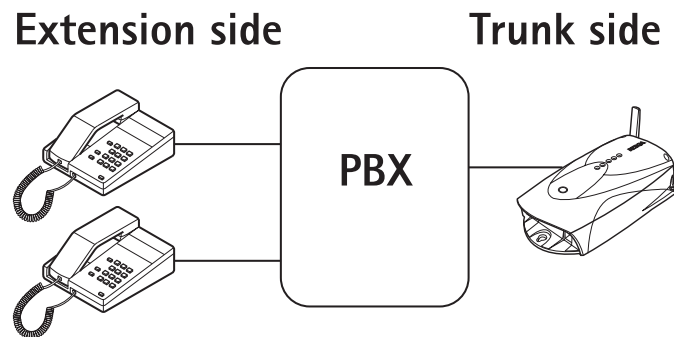
Picture 1. The Nokia 22 connected to an analogue trunk interface of a PBX
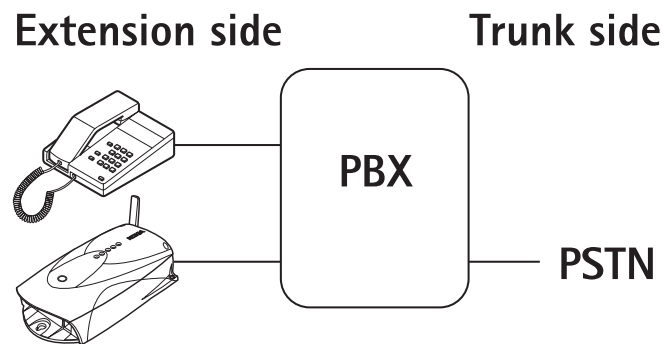
Picture 2. The Nokia 22 connected to an analogue extension interface of a PBX

The Nokia 22 is attached either to an analogue trunk (picture 1) or an analogue extension (picture 2) line of a PBX.

After the Nokia 22 has been connected to a PBX, the PBX may require reconfiguration to route mobile targeted calls via the Nokia 22. This configuration requires special know-how about PBXs. In order to perform successful installation, ask further information from the PBX supplier. In no conditions it is recommended to do the installation without adequate know-how and tools.

Warning! Incorrect installation may damage both the PBX and the Nokia 22. If you are not sure about the installation, contact the PBX supplier or the service point personnel.

4   SALES PACKAGE

1. Package carton
2. User's guide
3. Nokia 22 GSM terminal
4. Application module
5. Power supply, cables and wall rack
6. Installation screws
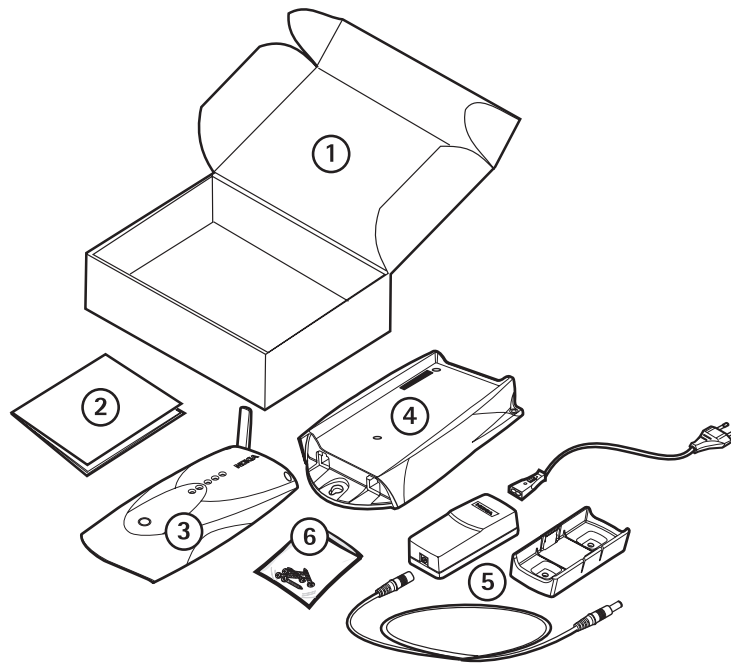
## 5   ACCESSORIES

A range of accessories is available for the Nokia 22. You can select these accessories according to your special communication needs. For availability of the accessories, consult your local dealer. When you disconnect the power cord of any accessory, grasp and pull the plug, not the cord.

5.1   Nokia 22 Data Packet

The Nokia 22 Data Packet supports sending and receiving of SMS, PC-fax, file transfer, e-mail and Internet access at data rates of up to 43.2 kbps. For more information, contact your local dealer, network service provider or Nokia Mobile Phones.

The Nokia 22 Data Packet includes:
-   RS232 data cable
-   The Nokia 22 AT command set CD
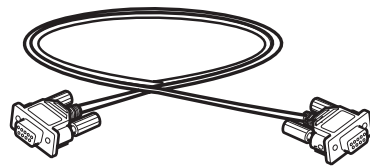
Picture 1: RS232 cable

5.2   The Nokia 22 Configurator Software

With this PC software the user can configure the Nokia 22 settings. The Nokia 22 Configurator Software supports Windows 95 / 98 / 2000 and Windows NT operating systems. Nokia 22 settings can be modified easy and fast by choosing among the alternatives.

The Nokia 22 Configurator Software package includes:

-   Nokia 22 Configurator cable
-   Nokia 22 Configurator Software CD
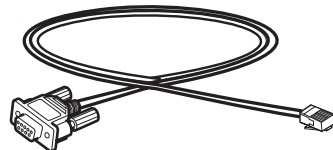
Picture 2: Nokia 22 Configurator Cable

5.3   External antenna adaptor

A special adapter cable for use between the Nokia 22 and a standard FME antenna connector.
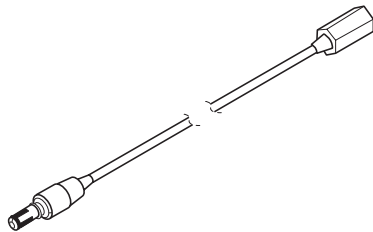
Picture 3: Nokia 22 adapter cable

5.4   Backup battery

An external backup battery BBW-4 with power supply ACW-4 can be connected to the Nokia 22 to provide terminal functionality for example during a power cut.
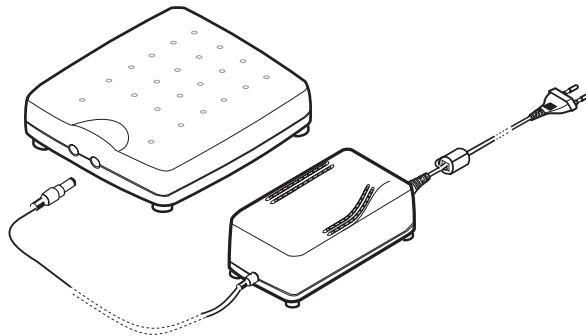
6   FEATURES

6.1   Intensity of Field Strength indication (IOF)

Intensity of field strength indication enables easy and fast installation of the Nokia 22. The Installation can be done without any extra installation equipment. Only a landline telephone is needed. The end-user can install the terminal without help from the service personnel. The Installation is done by observing the light indicators on the terminal's cover.

6.1.1   How is IOF activated?

The IOF can be activated with a landline telephone connected to the Nokia 22 Trunk connector by dialing 777**# after lifting the telephone receiver. Deactivation is done by replacing the receiver on hook.

6.1.2   How to interpret IOF?

Use of light indicators
All five light indicators (LEDs) are located on the terminal's cover. Use of LEDs in the IOF state is described in the Table 1.

Table 1: Use of LEDs in Intensity of Field indication

BLINK					No network coverage
ON					Approx. –105 dBm
ON	BLINK				Approx. –100 dBm
ON	ON				Approx. – 95 dBm
ON	ON	BLINK			Approx. – 90 dBm
ON	ON	ON			Approx. – 85 dBm
ON	ON	ON	BLINK		Approx. – 80 dBm
ON	ON	ON	ON		Approx. – 75 dBm
ON	ON	ON	ON	BLINK	Approx. – 70 dBm
ON	ON	ON	ON	ON	Approx. – 65 dBm

If the user cannot find a place where the signal is stronger than -95 dBm, that is the light indicators 1 and 2 are lit, installation of an external antenna is recommended for proper signalling.

6.2   Volume Setup

In some cases it might be necessary to adjust the volume of the telephone receiver. During a phone call enter 0**x, the x representing a value between 1 (lowest volume value) and 10 (highest volume value). The default value is 5.

6.3   Faster Call Setup

When a number is dialed the Nokia 22 starts a call setup procedure. After four seconds of the last dialed digit the terminal assumes the telephone number is fully dialed and sends the call request to the network.

Faster call setup allows a faster call establishment procedure. The last 10 dialed different numbers are stored in the terminal's memory. If the dialed number matches

one of the stored numbers, there is no delay before the terminal sends the call request to the network. Thus the call is established immediately. This feature is very useful because normally users call to certain numbers frequently.

6.4   Calling Line Identification (CLI)

Calling Line Identification allows the subscriber to see who is calling by showing the number of the caller in an external display device. The CLI gives a possibility for the subscriber to control incoming calls. Two different types of signalling methods are selectable: ETSI FSK and DTMF. The signalling method varies depending on the operator and country and may be changed either by telephone set connected to the Nokia 22 trunk connector or by using the Nokia 22 Configurator Software. More advanced CLI method configuration can be done using the Nokia 22 Configurator Software.

Frequency Shift Keying (FSK) - a digital binary modulation of the carrier frequency which uses two separate audio frequencies to transmit binary ones and zeros.

Dual Tone Multi Frequency (DTMF) is commonly known as 'touch-tone'. This in-band signalling is made up of two tones (out of a group of 8) and is used to translate dialed digits.

Note: When using the CLI feature an external display device is needed. The display device is only for the CLI function, the SMS messages cannot be read using the CLI display. External display devices are not provided by Nokia.

6.5   Short Message Service (SMS)

Short Message Service is a feature that allows the user to send and receive text messages of up to 160 characters. The service can deliver messages to Nokia 22 whenever it is connected to the network. The Nokia 22 provides methods for users to send, receive, read, write, clear and save the messages with AT commands. The SMS is a convenient way to pass information quick and easy. When the Nokia 22 receives a short message, a light indicator indicates it.

Note! To take advantage of the SMS feature a personal computer and either the Nokia 22 Data Packet or suitable 9-PIN RS232 data cable is needed.

6.6   Automatic Area Code (AAC)

Automatic Area Code (AAC) enables calling to a local number without dialing an area prefix code. This feature makes call creation more convenient; without area codes the

phone numbers are easier to remember and faster to dial. The area code is automatically added to the dialed number if user specified criteria are fulfilled. The AAC settings can be modified with the Nokia 22 Configurator Software.

6.6.1   How does AAC work?

Area code is programmed to the Nokia 22 with the Nokia 22 Configurator Software. The code can be any valid number of up to six digits, for example:

1) **08**
2) **003588**

Area code rules determine the situations when area code is not automatically added to dialed number. The rules are a set of prefixes that are searched from the beginning of the dialed number. If any of the prefixes is found, the area code is not added. Examples of valid area code rules are:

1) **0 1**
2) **0 990**
For example in case 2 the area code is not added if **0** or **990** is found at the beginning of the dialed number. Note that the area code to be added is also searched from the beginning of the dialed number. If it is found the area code is not automatically added.

Note! Automatic area code should **never** be added to an emergency number. The emergency numbers should always be added to the exception table.

6.7   Call Routing (Least Cost Routing)

Call Routing is a very sophisticated feature of the Nokia 22. It enables the operator to modify the prefix of the number the caller has keyed in. The Nokia 22 detects the entered prefix and swaps it to the predefined one.

For example:

The user has programmed the Nokia 22 to change prefix (area code) 064 to 0640. The User enters a number 064 123456. The Nokia 22 detects the prefix 064 and changes it so that the number sent to the network is 0640 123456.

6.8   Supplementary Services

Supplementary services are special cellular services provided by network service providers and, therefore differ from the network to another. Supplementary services give better opportunity for the subscriber to control incoming and outgoing phone calls. The Nokia 22 supports GSM phase 2+ supplementary services such as:

- Number identification
- Call offering
- Call completion
- In call handling
- Call restriction
- Security options
- Call transfer

Note: Call offering supplementary service and call restriction supplementary service cannot be deactivated at the same time.

6.9   User data and fax

User data feature enables GSM data services for the user. This is an ideal feature for small offices and families with Internet connections. Data installation and use is fast and easy. The Nokia 22 includes High-Speed Circuit Switched Data (HSCSD) functionality, which enables multislot GSM data connection with data speed of up to 43.2 kbps.
The terminal functions like a normal landline modem and can be used with a standard 9-PIN RS232 data cable and normal communications applications. Also PC-fax applications can be used.

Note: Landline modems cannot be connected to the Nokia 22.
**Note:** High Speed Circuit Switched Data is a network dependable service.

7   CONNECTIONS

There are two alternative ways to connect the Nokia 22 to a PBX. Which option is preferable depends on the type of the PBX. Consider the following:

- Are there free analogue trunk lines available in the PBX?

- Is it possible to reconfigure the PBX to route calls via the trunk-connected Nokia 22 when a mobile number is dialled?

If the answer to both of these questions is yes, it is advisable to connect the Nokia 22 to an available trunk line of the PBX and configure the PBX. This type of connection is more convenient for the end user.

Extension side   Trunk side
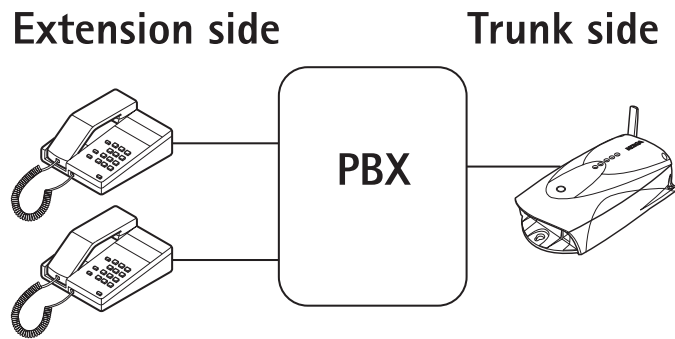
Nokia 22 connected to the trunk side of a PBX

7.1   Extension mode

If the PBX has only digital trunk lines or has no available analogue trunk lines, the Nokia 22 may be connected to the PBX extension connection. In this mode the Nokia 22 is connected to the analogue extension interface of the PBX instead of an analogue desk phone.

If this connection method is used, first the user calls to the extension number in to where the Nokia 22 has been connected and then enters the outgoing telephone number.

For example: the Nokia 22 has been connected to the extension number 7. An User is going to call to the mobile number 064 123456. The user enters the extension number 7 and waits until the Nokia 22 answers and gives a new dial tone. Then she/he enters the targeted GSM number. Note that some PBXs can be programmed to do this automatically.

In case of an incoming call there are two alternative configuration modes. The preferred mode is that the Nokia 22 is configured to route incoming GSM calls automatically to a predefined extension number or to the PBX switchboard.

For example: the Nokia 22 terminal is connected to an extension line of the PBX. The terminal has been configured to route incoming GSM calls to the PBX switchboard number 0. When the Nokia 22 receives a call from the GSM network, it sends a ring tone to the PBX switchboard. The switchboard answers the call and forwards it to the desired number.

The second and more flexible mode is that the Nokia 22 is configured to answer the incoming GSM call and to provide a new dial tone, so that the caller can enter the

desired extension number by himself. Notice that it is advisable to deny calls to all trunk lines from the extension line the Nokia 22 is connected.

For example: the Nokia 22 is connected to an extension line of the PBX. The terminal has been configured to answer the incoming GSM calls and to provide a new dial tone. When the Nokia 22 receives a call from the GSM network, it answers and provides a PBX extension dial tone. The GSM caller may now enter the desired extension / switchboard number, and the PBX connects the call.

8   TECHNICAL SPECIFICATION

Nokia 22 is a Class 4/5 (GSM900) and Class 1/2 (GSM1800) dual band GSM terminal.

Size:	100 x 180 x 45 mm
Weight:	420 g without power supply
Operating temperature:	−10 C° to +55 C°
Storage temperature:	− 40 C° to +85 C°
Humidity range, operation:	20 – 75 % non condensing
Humidity range, storage:	5 – 95 % non condensing

Input voltage:	Nominal 7.2 V
	Absolute min 6.5 V
	Absolute max 15.6 V

Small size SIM cards supported
RF Power 2W /1W (900/1800Mhz)

Telephone interface /PBX Trunk interface:

Line voltage:	High impedance mode 50 V
	Active mode 40 V

Ringing voltage:	48 Vrms
Line impedance:	600 Ω

Power supply ACW–3:

Operating voltage range:	90 – 264 VAC
Frequency range:	47 – 63 Hz
Weight:	75g + cables
Volume:	< 115 cm3

Data Standard RS232. All applicable with ITU–T V.25ter, ETS GSM 07.07 and ETS GSM 07.05 commands are supported. HSCSD max 43.2kbits/s (Depending on the operator services).

Backup battery BBW–4 (optional)

Nominal voltage:	12 V
Stand-by time:	20 h
Talk time:	8 h

Antenna

Integrated, use of external antenna supported