



> version 2.1 > 4. July 2003

### NetHawk 2G Probe

#### INTRODUCTION

NetHawk 2G Probe is an intelligent data acquisition tool with effective data pre-processing capabilities for capturing the network data in the GSM, GPRS, EDGE and other second-generation networks like SS7, ISDN and V5. The network data is rich of information giving an accurate view on what is going on in the network and the reasons for it. The data is based on established industry standards and provides a vendor-independent source of information. Decisions can be based on accurate and reliable information. Sophisticated network monitoring systems also save human resources as the work can be done more efficiently.

NetHawk 2G Probe solution with its leading edge technological approach is a long-term solution for effective data capture for further refinement into a value-added asset.

#### Typical application areas

- > Network performance monitoring,
- > Rollout of new network infrastructure,
- > Remote troubleshooting,
- > Network optimisation,
- > QoS measurement,
- > Implementation of new value-added services,
- > New revenue sources by selling the network data to 3<sup>rd</sup> parties.

With the NetHawk 2G Probes capturing the data, the network performance at the technical level can be monitored. When new network elements are added, their performance can be verified. In case errors in the network performance are noticed, with the NetHawk 2G Probes troubleshooting can be performed from a remote location. The radio network optimisation can be done effectively as the NetHawk 2G Probes can capture both the uplink and downlink data in the Abis interface.

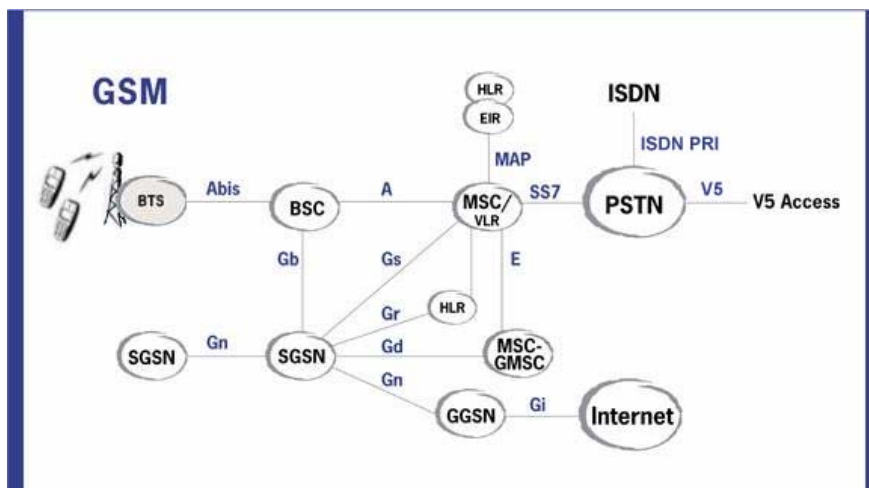


Figure 1: Real-time data capture supported from all E1/T1/JT1 PCM and Ethernet based interfaces.

The NetHawk 2G Probes can provide the essential information for following the newly launched services and for making service level QoS measurements.

One interesting aspect is to sell the network data to 3<sup>rd</sup> parties for new revenue sources. Road traffic monitoring based on the mobile network data is one proven method and is currently implemented at least in Finland by the Road Traffic Administration.

#### PRODUCT OVERVIEW

##### Effective real-time data capture

NetHawk 2G Probe captures and pre-processes in real-time the network data, both control and user plane, from the PCM and Ethernet based interfaces. NetHawk 2G Probe provides an extensive support for both standard and vendor-specific protocols. Therefore, all the data available in the networks can be captured with the NetHawk 2G Probe.

NetHawk 2G Probe records the data to the local hard drive and the recordings can be replayed as often as wanted. The recording can be continuous or periodic. The recordings can also be scheduled to allow regular data captures e.g. at a certain time of the day.

##### Several capture points in the network

The NetHawk 2G Probe can be connected to several PCM interfaces and to one Ethernet simultaneously. The Probe can easily be transported to different locations e.g. for optimising the network site by site.

With multiple Probes the network data can be collected from several sites or even network-wide. The NetHawk 2G Probes provide the basis for a scalable data capture system as new Probes can easily be added to cover more lines for monitoring purposes. In this type of situation synchronisation of the Probes becomes an issue. The NetHawk 2G Probes can be synchronised with NTP (Network Time Protocol).

© NetHawk 2003 Oyj. All rights reserved. Technical specifications and characteristics are subject to change without further notice.

Business Id. 0631056-0

> version 2.1 > 4. July 2003

**Limiting capture to the essential**

With the NetHawk 2G Probe being able to pre-process the data, you can limit the capture only to the relevant data. You can flexibly configure what data from each interface and protocol stack is being captured by the Probe.

**The traps for filtering**

The basic filtering is done with connection settings. The most efficient way to do filtering is to use the traps. With traps the filtering is based on the contents of data like protocol messages, information elements or on contents of the information element. The pre-processing feature makes NetHawk 2G Probe unique – being able to handle the protocol data decoding and analysis in real-time and to efficiently filter the data based on the contents of it.

**Extracting information out of the signalling**

Post-processing tools offer the means to extract the information out of the signalling data, to make it more understandable and useful. To provide the best-in-class solution, the NetHawk 2G Probes are compatible with the leading post-processing tools in the market currently (e.g. from Actix).

Post-processing tools analyse the recorded trace files. The file format of these files is NetHawk proprietary trace file format (.grc). The Data Interface allows the use of online applications.

**Investigating to the last byte to track down the errors**

Sometimes it is necessary to view the data in the protocol level for detailed investigation to solve the problems that are causing failures in the service performance. To effectively pinpoint the problems, extensive support for both standard and vendor specific protocols in all layers is needed. NetHawk 2G Probe is delivered with the NetHawk GSM Analyser software, which offers the most powerful decoding capabilities and protocol support for the GSM, GPRS and EDGE networks. With the NetHawk Analyser software the possible errors are not left unnoticed.

The NetHawk Analyser shows the protocol decodings in various levels of detail and coding formats. It also shows statistical information from each layer. Traps are also in use for filtering the data shown on the screen.

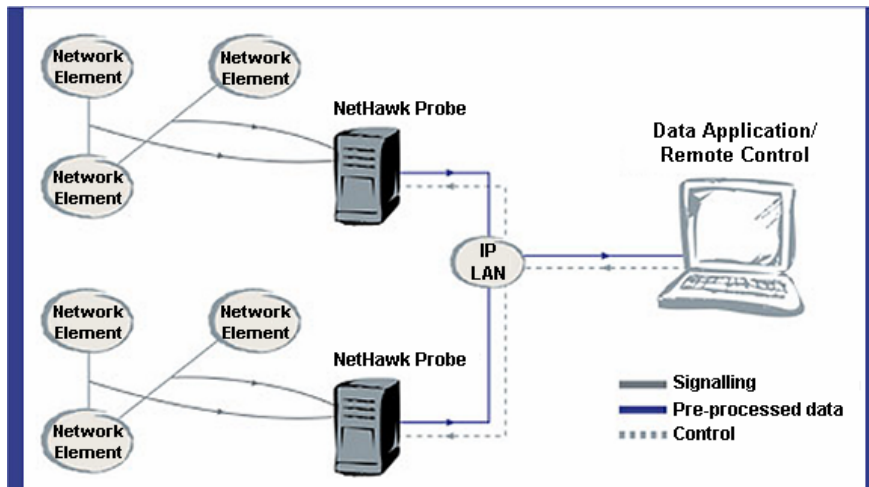


Figure 2: The data capture system.

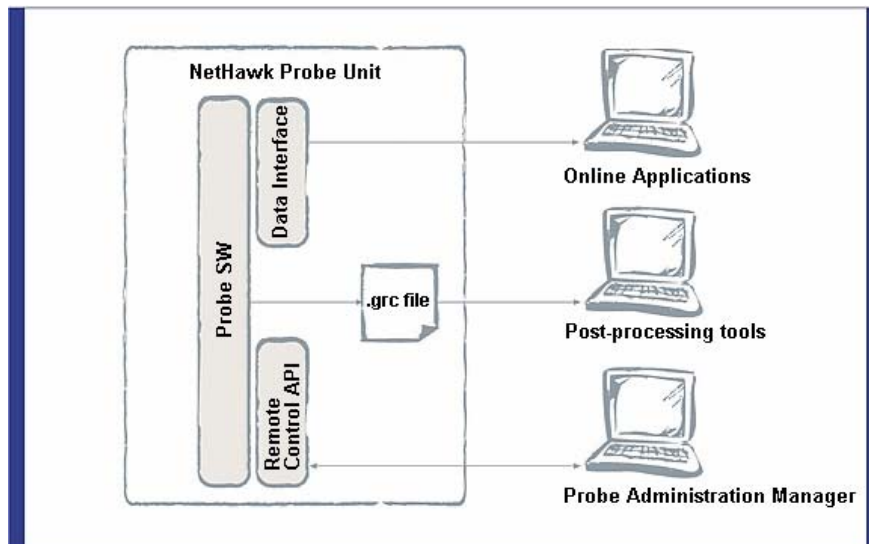


Figure 3: The interfaces of the NetHawk 2G Probe Unit.

A definitive advantage is that the number of Analyser softwares for offline use is unlimited when delivered with the Probe. Troubleshooting becomes very efficient, when several users can simultaneously analyse the recorded files with their own tool.

**Remote control and management**

The control and management of the NetHawk 2G Probes become easy with the NetHawk Probe Administration Manager (PAM) remote control software. Frequent journeys to monitoring sites are not needed anymore. A standard IP connection enables you to control the operation of all the Probes from a centralised location.

PAM can be used to perform the most common operations such as:

- > Adding/removing Probes to/from data acquisition,
- > Checking the PCM line status,
- > Start/stop recording,
- > Setting PCM and Ethernet connections,
- > Trap management.

**Scanning PCM lines**

The NetHawk 2G Probe supports the scanner function to facilitate the connections configurations by searching the active PCM lines.

> version 2.1 > 4. July 2003

**Easy to use and always up-to-date**

When the NetHawk 2G Probe is delivered, no hardware or software installations are needed for the data capture unit. Only the remote control and protocol analyser softwares are installed to the user PCs.

The NetHawk 2G Probes are easy to use. The user-friendly graphical user interface of the PAM software and familiar Windows PC platform makes it easy for the users to perform the basic operations on the Probe – set it to record with desired configurations and then retrieve the file for analysis with a post-processing tool.

With the intelligence of the product in the software, the product is kept up-to-date with software updates. The new software can be downloaded directly from the NetHawk web site once it is available.

**SUPPORTED PROTOCOLS**

NetHawk 2G Probe is capable of capturing all the data in the monitored interfaces. The following protocols are supported for filtering the data in the Probe and for offline protocol analysis with the NetHawk GSM Analyser.

**GSM network:**

- > GSM L3 MM and CC layers: 3GPP TS 24.008 v.3.4.1
- > GSM L3 RR layer: GSM TS 04.18, GSM L3/RR v.8.13.0 Release 1999 (2002-03)
- > Mobile Application Part (MAP) version 3: 3GPP TS 29.002 v.3.10.0
- > Transaction Capabilities (TC): ITU-T, White Book, 1993 (MAP)
- > BSSMAP analysis on A-interface: GSM TS 08.08, BSSMAP v.8.10.0 Release 1999
- > SCCP: Q.713 (07/96), CCITT (ITU-T) Blue Book / ANSI T1.112-1996
- > MTP3: Q.704, CCITT (ITU-T) Blue Book / ANSI T1.111-1996
- > MTP2: Q.703, CCITT (ITU-T) Blue Book / ANSI T1.111-1996
- > LAPD: Q.921, CCITT (ITU-T)
- > BTSM: GSM 08.58 v.8.6.0
- > Abis O&M transport layer: GSM 08.59 v.3.1.0
- > Nokia O&M protocol
- > Ericsson O&M protocol
- > Motorola Mobis protocol
- > Lucent O&M protocol
- > Siemens O&M protocol
- > Nortel Abis O&M protocol

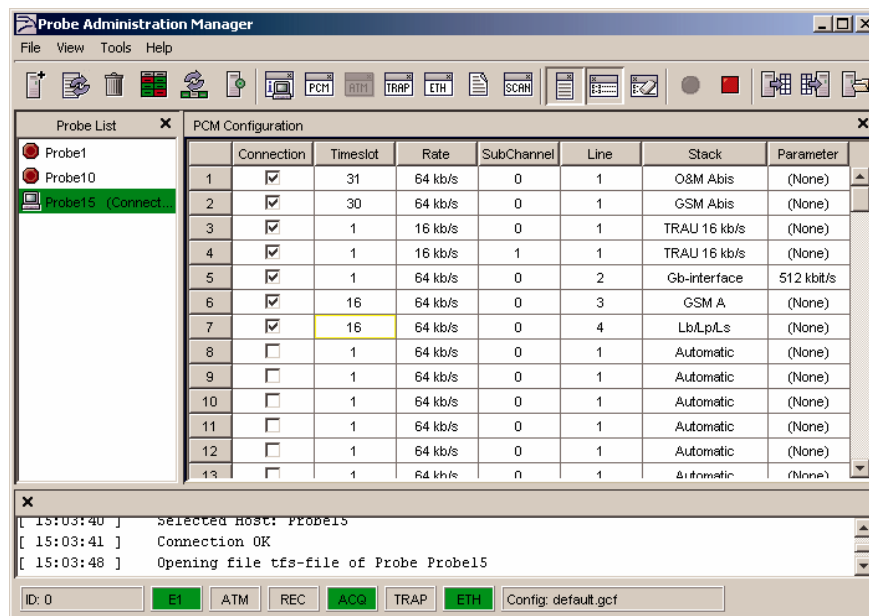


Figure 4: A view from the NetHawk Probe Administration Manager.

- > SMS point-to-point decoding (CP, RL, TL) according to:
  - GSM TS 03.38 (ETS 300 900), v.6.0.1
  - GSM TS 03.40 (ETS 300 901), v.6.1.0
  - GSM TS 04.11 (ETS 300 942), v.6.0.1
- > SMS Cell Broadcast (SMSCB) decoding according to:
  - GSM TS 03.38 (ETS 300 900), v.5.4.1, April 1997
  - GSM TS 03.41 (ETS 300 902), v.5.4.1, April 1997
  - GSM TS 04.12 (ETS 300 943), v.5.0.2, April 1997
- > GSM supplementary services according to:
  - GSM TS 04.10 (ETS 300 941), v.5.0.1, May 1997
  - GSM TS 04.80 (ETS 300 950), v.5.0.2, May 1997
- > Location Services (LCS) according to:
  - SMLCPP - GSM TS 08.31 v.8.1.0
  - RRLP - GSM TS 04.31 v.8.7.0
  - LLP - GSM TS 04.71 v.8.2.0
  - BSSLAP - GSM TS 08.71 v.8.2.0
  - BSSAP-LE - GSM TS 09.31 v.8.3.0
- > Full rate and enhanced full rate: GSM 08.60 v.4.3.0 (TRAU)
- > Half rate: GSM 08.61 v.4.0.0 (TRAU)
- > AMR in Abis-interface TRAU analysis according to:
  - GSM TS 08.60 v.8.1.0
  - GSM TS 08.61 v.7.2.1
- > GSM data and fax protocols (TRAU):
  - ITU-T V.110
  - Rate adaptation on BSC-MSC interface - ETS 300 591 (GSM 08.20)
  - Radio Link Protocol (RLP) - ETS 300 563 (GSM 04.22)
  - L2RCOP according to ETS 300 583 (GSM 07.02)
  - L2RBOP according to ETS 300 584 (GSM 07.03)
  - Facsimile group 3 transparent, ETS 300 538 (GSM 03.45)
  - CCITT Recommendation T.30
- > GPRS network:
  - > Abis protocols:
    - RLC/MAC analysis on Abis-interface: GSM TS 04.60 v.8.12.1 (2002-02)
    - LLC analysis: GSM TS 04.64 v.8.6.0
    - GMM and SM: GSM 04.18 v.8.4.0
    - SMS
    - SNDCP: GSM TS 04.65 v.8.2.0
    - IP, IPv4 RFC 791 (9/1981)
    - Ericsson proprietary PCU Frame analysis
    - Nokia proprietary PCU Frame analysis
    - Lucent proprietary PCU Frame analysis
    - Nortel proprietary PCU Frame analysis
    - RLP version 1 and V.42 bis decompression of L2RCOP SDUs
  - > Gb-Frame Relay (GSM 08.14) based protocols:
    - Frame relay decoding according to GSM TS 08.14 v.6.0.0.

> version 2.1 > 4. July 2003

- Frame relay decoding according to ANSI T1.607-1998
- NS (GSM 08.16)
- BSSGP analysis on Gb interface according to GSM TS 08.18 v.8.9.0
- BSSGP analysis on ANSI Gb interface according to GSM 08.18 T1P1.5/98-227R1
- LLC analysis: GSM TS 04.64 v.8.6.0
- GMM and SM: GSM 04.18 v.8.4.0
- SMS
- SNDSCP: GSM TS 04.65 v.8.2.0
- IP, IPv4 RFC 791 (9/1981)
- > Gs interface protocols:
  - BSSAP+ analysis on Gs interface according to GSM 09.18 TS v.6.5.0
  - BSSAP+ analysis on ANSI Gs interface according to GSM 09.18 T1P1.5/98-230R1
- > Gn/Gp/Ga, Gi-Ethernet based protocols:
  - Physical layer (MAC) of 10/100 Mbit/s Ethernet
  - IP, Internet Protocol, IPv4: RFC 791 (9/1981)
  - TCP, Transport Control Protocol: RFC 793 (9/1981)
  - UDP, User Datagram Protocol: IETF RFC 768 (8/1980)
  - GPRS Tunnelling Protocol (GTP) version 0 and 1 analysis on Gn/Gp interface according to:
    - GSM TS 09.60 v.6.6.0
    - 3G TS 29.060 v.3.10.0
  - GTP' charging protocol on Ga interface according to:
    - 3GPP TS 32.015 v.3.4.0
    - 3GPP TS 29.060 v.3.7.0
  - Support for WAP over GPRS (Gi interface) according to WAP WSP (05 November 1999 V 1.2), WAP WTP (11 June 1999 V 1.2) and WAP WTLS (Version 05-Nov-1999)

**PRODUCT COMPONENTS**

- > NetHawk 2G Probe Unit:
  - E1 PCM interfaces:
    - Timeslot based (HDLC / non-HDLC) 64 kbps, subchannels 8, 16 and 32 kbps.
  - T1/JT1 PCM interfaces:
    - Timeslot based in HDLC mode.
  - Frame Relay based interfaces (Gb).
  - Ethernet interfaces:
    - 10/100/1000 BaseT.

- > NetHawk 2G Probe Client:
  - NetHawk Probe Administration Manager SW,
  - NetHawk GSM Analyser SW,
  - Symantec pcAnywhere® SW.
- > User's documentation.
- > A cable set.
- > Options:
  - Gb deciphering,
  - Vendor-specific protocols.

The customer is responsible for acquiring the NTP client for synchronising the Probes.



Figure 5: NetHawk 2G Probe Unit with the support for eight E1/T1/JT1 PCM and one Ethernet interface.

**HARDWARE DIMENSIONS**  
*Nethawk 2G Probe Unit*



- > Dimensions: 110 (W) x 221.5 (H) x 440.4 (D) mm, (5U).

It is possible to install four NetHawk 2G Probes into a 19" rack carrier side by side.

**NETHAWK 2G PROBE IN BRIEF**

NetHawk 2G Probe is an intelligent data acquisition tool with effective data pre-processing capabilities for refining the mobile network data into a value-added asset:

- > Real-time data capture of both control and user plane data in the GSM, GPRS, EDGE, SS7, ISDN and V5 networks:
  - E1/T1/JT1 PCM and Ethernet based interfaces. Extensive support for standard and vendor-specific protocols in all layers.
  - Continuous or periodic/scheduled recordings.
  - Accurate timestamps, ±1 ms in E1/T1 interfaces.
  - Support for synchronisation with NTP.
- > Filters for limiting the data capture with:
  - Connection settings,
  - Traps set by any protocol, protocol layer, protocol message, information element inside a message or any particular parameter inside the information element.
- > Post-processing applications for KPIs, call trace etc. supported from the leading vendors (e.g. from Actix).
- > NetHawk GSM Analyser software included for offline protocol analysis allowing the most efficient troubleshooting in the GSM, GPRS and EDGE networks.
- > Remote control and management with NetHawk Probe Administration Manager SW over a TCP/IP network.
- > Physical capacity:
  - Up to eight bidirectional or sixteen unidirectional physical PCM links (E1/T1/JT1),
  - Two Ethernet interfaces; one for data capture and one for remote control.
  - Concurrently 128 PCM connections (timeslot) + Ethernet.

**REQUIREMENTS FOR CLIENT SOFTWARE**

- > NetHawk Probe Administration Manager SW:
  - 500 MHz Pentium III or faster CPU with 128 MB of memory,
  - Microsoft Windows® 2000 Professional/XP operating system,
  - Ethernet interface.
- > NetHawk Analyser SW:
  - Microsoft Windows® 2000 Professional/NT/XP operating system.