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NetHawk GSM Analyser

INTRODUCTION

The NetHawk GSM Analyser is an effective and easy-to-use PC-based protocol analyser for real-time monitoring and analysis of GSM, GPRS, EDGE and SS7 networks. It is a powerful tool for protocol monitoring and call and session analysis and has proven to be a crucial help for both network element manufacturers and mobile operators in different tasks in all stages of the network life cycle. Typical applications include:

- > R&D
- > System integration
- > Interoperability testing
- > Installation & commissioning
- > Network optimisation
- > Network monitoring
- > Troubleshooting

PRODUCT OVERVIEW

Portability or capacity – your choice of a product platform

The NetHawk Analysers are recognised as the most portable testing tools on the market as they can be used in standard laptops. A test engineer can easily take the NetHawk GSM Analyser into the field with him where its small size and light weight is an advantage. For the need to monitor a large number of interfaces concurrently, e.g. in the lab environment, the NetHawk Analysers can be used in desktop or industrial PCs. With the intelligence of the NetHawk GSM Analyser in software, you are able to choose the type of PC for the product platform that best suits you.

Real-time decoding of Release 99/4 and manufacturer-specific protocols

For efficient GSM, GPRS, EDGE and SS7 monitoring, the NetHawk GSM Analyser is capable of analysing in real-time all the control and user plane protocols at the Abis, A, Gb, SS7, Gn, Gp, Ga, Gs, Gi, PSTN, Location Services (LCS) and High Speed Signalling Link (HSL) interfaces.



Figure 1: The NetHawk GSM Analyser is an effective and easy-to-use PC-based protocol analyser for real-time monitoring and analysis of GSM, GPRS, EDGE and SS7 networks.

The NetHawk GSM Analyser decodes the GSM, GPRS, EDGE and SS7 protocols according to latest industry and manufacturer specifications and recommendations. The 3GPP protocols supported are based on Release 4, September 2002 specification. Release 99, March 2002, is supported as well and the baseline used for analysis can easily be changed.

The NetHawk GSM Analyser has a wide support for manufacturer-specific protocols – Nokia, Ericsson, Nortel and Siemens – to fully support the GSM, GPRS and EDGE protocols. For GSM and GPRS protocols also Lucent is supported; Motorola and Alcatel for GSM. The NetHawk GSM Analyser has also an extensive support for the SS7 protocols. Also the GSM-R (Global System for Mobile Communications for Railways) protocols can be decoded with the NetHawk GSM Analyser to test and analyse the railway communications networks.

Gb deciphering supported

The NetHawk GSM Analyser is capable of deciphering the encrypted calls with GEA confidentiality algorithm at the Gb interface. This way all the vital information from the Gb interface is available for network monitoring and troubleshooting.

Powerful and accurate multi-interface monitoring

The NetHawk GSM Analyser can be connected simultaneously to eight bi-directional E1/T1/JT1 links in the desktop solution. It is also possible to install several NetHawk GSM Analysers, e.g., to an industrial PC enabling powerful and accurate multi-interface monitoring. The portable solution has the capacity for two bi-directional E1/T1/JT1 links for effective troubleshooting in the field.

With the use of NetHawk C8 PCM Concentrators, the monitoring capacity of the NetHawk GSM Analyser can be increased in the desktop solution up to 14 bi-directional links and to eight in the laptop solution. The NetHawk C8 is a cost-efficient solution for increasing the monitoring capacity for the 64 kbit/s connections.

With the NetHawk GSM Analyser up to 128 connections with different protocol stacks can be monitored simultaneously. The NetHawk GSM Analyser supports PCM scanning from a line to produce a "ready-to-use" connection configuration. It can then be chosen which of the detected connections to monitor and, if necessary, modify the setup.

AutoEDGE support for effective Abis monitoring

The NetHawk GSM Analyser supports 'AutoEDGE' functionality for monitoring the Abis interfaces from Nokia, Ericsson, Nortel and Siemens. The AutoEDGE functionality reduces the need to manually configure the NetHawk GSM Analyser for monitoring the Abis interfaces.

Limit data capture with user plane pre-filtering

It is possible to filter out PCU frames to limit the amount of data captured from the Abis interface.

Detailed decodings in real-time

The NetHawk GSM Analyser is able to show the analysed traffic in real-time with the most detailed level of decodings. The monitoring view can be customised to show each message with a desired level of detail, coding format and colour. Errors in the physical link can be seen in the NetHawk GSM Analyser's State Monitor window.

The NetHawk GSM Analyser can store recordings as trace files (.grc-file format) on the PC's hard disk for later analysis. The standard NetHawk GSM Analyser software without the NetHawk Adapters can be installed to any PC in the customer organisation free of charge for effective data post-processing.

Correlated, multi-interface Call Trace for efficient real-time troubleshooting

Call Trace provides an efficient and easy way to solve subscriber-related problems by providing the means to filter signalling of individual subscribers from traffic loads. With the Call Trace the status and phases of individual CS calls and GPRS sessions (Attach, Detach, PDP Context, Anonymous PDP Context, Routed PDP Context and SMS) can be followed at the Gb, Abis and A interfaces.

Traced transactions from Abis to Gb or Abis to A are correlated together, allowing the follow, e.g., of call proceedings over the BSC. One line represents a call in the Call Trace window and detailed decodings related to calls can be studied in the monitoring window.

The signalling of individual subscribers can be filtered according to IMSI, IMEI, TMSI, P-TMSI, calling number or a mobile station's IP address. You can also do the filtering according, e.g., to timing information, Layer 3 cause values, location area (LA) and routing area (RA) codes.

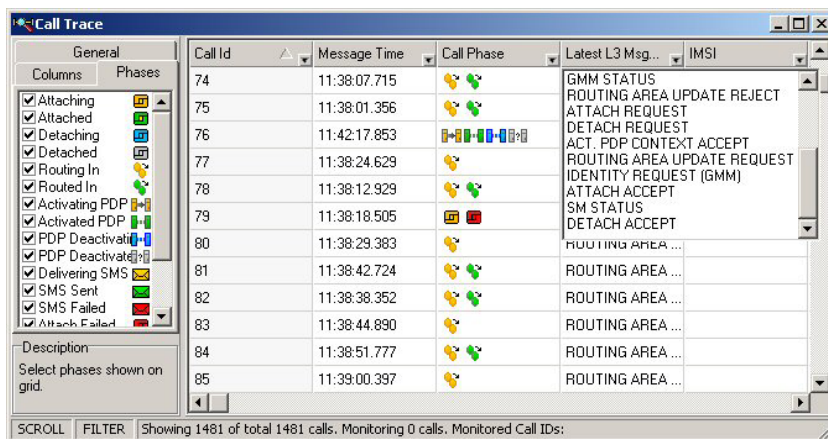


Figure 2: Effective troubleshooting with real-time Call Trace for Gb, Abis and A interfaces.

Extensive set of traps for real-time filtering of messages

The NetHawk GSM Analyser provides traps for filtering the protocol messages. They effectively reduce the data for analysis and help in solving the reported problems more quickly. There are hundreds of trap options for filtering as traps can be set by any protocol message, Information element (IE), connection number or timestamp value. In addition to filtering, traps can be used to trigger several other actions as well, such as starting or stopping the recording or configuring statistical counters. A trap can also be activated to perform several actions consecutively.

Remote and distributed analysis supported also in real-time

It is possible to do remote analysis in real-time by opening the file under recording with the NetHawk GSM Analyser software. In a distributed use, each user can acquire the trace file from the NetHawk GSM Analyser also by using some remote access software, such as pcAnywhere, and then analyse it at own desktop. The NetHawk Remote Control API (RCA) option provides the means to develop a remote control application for controlling the NetHawk GSM Analyser, e.g. starting or stopping the signalling recordings, from a remote location.

Guidance to your work

The NetHawk GSM Analyser features an online protocol help. The easily available protocol help assists in analysing recordings by explaining in detail the functions and contents of the protocols. Just a click of the mouse and the information on the protocol in question is shown on the screen.

The context-sensitive help is available for giving instructions on how to use the NetHawk GSM Analyser without the need for printed manuals.

SUPPORTED PROTOCOLS

GSM protocols

- > GSM L3 CN: 3GPP TS 24.008 v.4.8.0
- > GSM L3 RR layer: 3GPP TS 44.018 v.4.11.0
- > BSSMAP analysis on A-interface: 3GPP TS 48.008 v.4.8.0
- > 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 TS 08.59 v.3.1.0
- > SMS point-to-point (CP, RL, TL):
 - 3GPP TS 23.038 v.4.4.0
 - 3GPP TS 23.040 v.4.7.0
 - 3GPP TS 24.011 v.4.1.1
- > SMS Cell Broadcast (SMSCB):
 - 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
 - 3GPP TS 44.012 v.4.0.0
- > GSM supplementary services: 3GPP 29.002 v.4.3.0
- > Location Services (LCS):
 - SMLCPP: 3GPP TS 48.031 v.4.1.0
 - RRLP: 3GPP TS 44.031 v.4.6.0
 - LLP: 3GPP TS 44.071 v.4.2.0
 - BSSLAP: 3GPP TS 48.071 v.4.1.0
 - BSSAP-LE: 3GPP TS 49.031 v.4.3.0
- > GSM-R according to:
 - GCC: 3GPP TS 44.068 v.5.01
 - BCC: 3GPP TS 44.069 v.5.00

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- > MAP protocols:
 - Mobile Application Part (MAP) version 3: 3GPP TS 29.002 v.4.9.0 and v.3.10.0
 - Transaction Capabilities (TC): ITU-T, White Book, 1997 (MAP)
- > Traffic (TRAU):
 - Full-rate and enhanced full-rate: GSM TS 08.60 v.4.3.0 (TRAU)
 - Half-rate: GSM TS 08.61 v.4.0.0 (TRAU)
 - AMR at Abis TRAU:
 - 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: ETS 300 583 (GSM 07.02) L2RBOP: ETS 300 584 (GSM 07.03) Facsimile group 3 transparent: ETS 300 538 (GSM 03.45)
 - CCITT Recommendation T.30
- > Manufacturer-specific protocols:
 - Nokia O&M
 - Ericsson O&M
 - Ericsson INAP
 - Motorola Mobis
 - Lucent O&M
 - Siemens O&M
 - Siemens BTSM
 - Siemens INAP
 - Nortel Abis O&M
 - Nortel Abis RSL
 - Nortel AGPRS GSL
 - Nortel AGPRS OAM

GPRS and EDGE protocols

- > Abis protocols:
 - RLC/MAC on Abis: 3GPP TS 44.060 v.4.8.0
 - LLC: 3GPP TS 44.064 v.4.3.0
 - GMM and SM: GSM TS 04.18 v.4.8.0
 - GSM SMS (PP) – TP:
 - 3GPP TS 23.038 v.4.4.0
 - 3GPP TS 23.040 v.4.7.0
 - 3GPP TS 24.011 v.4.1.1
 - SNDCP: 3GPP TS 44.065 v.4.1.0
 - IP, IPv4: RFC 791 (9/1981)
 - RLP version 1 and V.42 bis decompression of L2RCOP SDUs
- > Manufacturer-specific protocols:
 - Ericsson PCU frame analysis
 - Nokia PCU frame analysis
 - Lucent PCU frame analysis
 - Nortel PCU frame analysis
 - Siemens PCU frame analysis
- > GPRS – Gb-Frame Relay based protocols:
 - Frame Relay decoding:
 - GSM TS 08.14 v.6.0.0
 - ANSI T1.607-1998

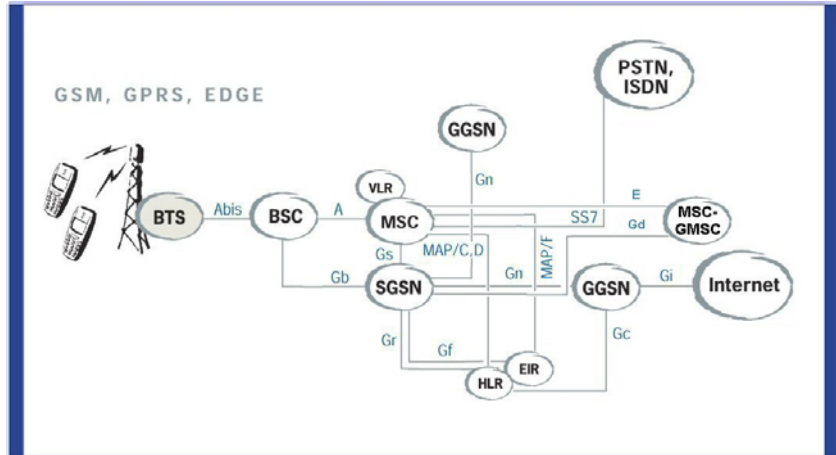


Figure 3: Real-time monitoring of the GERAN, core network, LCS and HSL interfaces supported.

- NS: 3GPP 48.016 v.4.2.0
- BSSGP on Gb: 3GPP TS 48.018 v.4.5.0
- BSSGP analysis at ANSI Gb interface: GSM 08.18 T1P1.5/98-227R1
- LLC: 3GPP TS 44.064 v.4.3.0
- GMM and SM: 3GPP 44.008 v.4.8.0
- GSM SMS (PP) – TP:
 - 3GPP TS 23.038 v.4.4.0
 - 3GPP TS 23.040 v.4.7.0
 - 3GPP TS 24.011 v.4.1.1
- SNDCP: 3GPP TS 44.065 v.4.1.0
- IP, IPv4: RFC 791 (9/1981)
- > Gs interface protocols:
 - BSSAP+ on Gs: 3GPP TS 29.018 v.4.2.0
 - BSSAP+ analysis on ANSI Gs interface: GSM 09.18 T1P1.5/98-230R1
- > Gn/Gp/Ga, Gi-Ethernet based protocols:
 - Physical layer (MAC) of 10/100 Mbit/s Ethernet
 - IP, IPv4: RFC 791 (9/1981)
 - TCP: RFC 793 (9/1981)
 - UDP: IETF RFC 768 (8/1980)
 - GPRS Tunnelling Protocol (GTP) version 0 and 1:
 - GSM TS 09.60 v.6.6.0
 - 3GPP TS 29.060 v.4.5.0
 - GTP' charging protocol on Ga:
 - 3GPP TS 32.015 v.4.3.0
 - 3GPP TS 29.060 v.4.5.0
 - Support for WAP over GPRS at Gi interface:
 - WAP WSP (05 November 1999 v.1.2)
 - WAP WTP (11 June 1999 v.1.2)
 - WAP WTLS (Version 05-Nov-1999)

SS7 protocols

- > CAMEL (CAP):
 - 3GPP TS 29.078 v.3.11.0 (2002-03)
 - 3GPP TS 23.078 v.3.12.0 (2002-03)
- > INAP:
 - ETSI, ETS 300 374, 1994
- > I-ISUP:
 - ACIF G500: 2000
- > ISUP:
 - ANSI: ANSI, T1.113, 1995
 - Blue Book: ITU-T, Q.763, 1988
 - Chinese: YDN 038-1997
 - ITU-T –97: ITU-T, Q.763, 1997
 - Finnish: THK, ISUP, 1996
 - Russian: National ISUP, 1994
 - UK: PNO-ISC/SPEC/007, Issue 2, 1997
- > MAP:
 - ITU-T MAP, 3GPP 29.002 12-2000 v.3.7.2
 - IS-41.5-C:
 - ANSI, TIA/EIA/IS-41.5-C, Feb 1996
 - MTP2:
 - ANSI: ANSI, T1.111, 1996
 - Blue Book: ITU-T, Q.703, 1988
 - ITU-T –97: ITU-T, Q.703, 1996
 - MTP3:
 - ANSI: ANSI, T1.111, 1996
 - Blue Book: ITU-T, Q.704, 1988
 - ITU-T –97: ITU-T, Q.704, 1996
- > SCCP:
 - ANSI: ANSI, T1.112, 1996
 - ITU-T, Q.713, 07/96
 - ITU-T –97: ITU-T, Q.713, 1997
- > TC:
 - ANSI: ANSI, T1.114, 1996
 - ITU-T –97: ITU-T, Q.771-Q.775, 1997
- > TUP:
 - Blue Book: ITU-T, Q.723, 1988
 - ITU-T –97: ITU-T, Q.723, 1988
 - Chinese: GF 001-9001, 1994
- > UK NUP:
 - BT, BTNR 167, 1992

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> SigTran:

- Ethernet: RFC 826 A Standard for the Transmission of IP Datagrams over Ethernet Networks, Blue Book: ITU-T, Q.763, 1988
- IP: RFC 791 Internet Protocol
- SCTP: RFC 2960
- M3UA: M3UA INTERNET-DRAFT July 2001
- SCCP, E1: ITU-T Q.713, 07/96
- SCCP, T1: ANSI T1.112, 1996
- TC-97: ITU-T White Book, 1997
- MAP: 3GPP TS 29.002 v.3.7.2
- 3GPP CAMEL/CAP:
 - CAP: 3GPP TS 29.078 v.3.11.0 (2002-03)
 - CAMEL: 3GPP TS 23.078 v.3.12.0 (2002-03)

PRODUCT COMPONENTS

- > NetHawk GSM Analyser SW
- > NetHawk Adapter(s)
- > User's documentation
- > A cable set
- > Options:
 - Manufacturer-specific protocols
 - Gb protocols and Gb Call Trace
 - Gb deciphering
 - Abis Call Trace
 - Ethernet: Gn/Gi, Gb over IP and SigTran protocols
 - SS7 protocols
 - Remote Control API (RCA)
- > Optional HW:
 - NetHawk C8 PCM Concentrator

NetHawk Adapter for a laptop PC



NetHawk N2 for E1/T1/JT1 interfaces. Capacity for one bi-directional link.

NetHawk Adapter for a desktop PC



NetHawk NAP for E1/T1/JT1 interfaces. Capacity for two bi-directional links.

NetHawk C8 PCM Concentrator



NetHawk C8 PCM Concentrator to increase the line capacity for monitoring the 64 kbit/s connections. Configurable to have either eight E1 or seven T1 input ports.

Supported NetHawk Adapter configurations

Laptop configurations

- > 1-2 x NetHawk N2
- > 1-2 x NetHawk N2 + 1-2 x NetHawk C8

Desktop configurations

- > 1-4 x NetHawk NAP
- > 1-4 x NetHawk NAP + 1-2 NetHawk C8

PC RECOMMENDATIONS

- > The minimum PC configuration:
 - Pentium® 1 GHz CP
 - 350 MB of RAM and 50 MB of free disk space
- > The recommended PC configuration:
 - Pentium® 2.4 GHz CP
 - 512 MB of RAM and 50 MB of free disk space
- > Operating system:
 - Windows® XP Professional:
 - Windows® 2000 Professional (Service Pack 1 or later)



Figure 4: It only takes a few moments to install the NetHawk GSM Analyser software and plug-in the NetHawk Adapter(s) to the PC. Then your NetHawk GSM Analyser is ready for use.

NETHAWK GSM ANALYSER IN BRIEF

The NetHawk GSM Analyser is an effective and easy-to-use PC-based protocol analyser for real-time monitoring of GSM, GPRS, EDGE and SS7 networks. The NetHawk GSM Analyser is available for both laptop and desktop installations with different configuration options.

> Real-time monitoring and analysis of all signalling and traffic at the Abis, A, Gb, SS7, Gn, Gp, Ga, Gs, Gi, PSTN, Location Services (LCS) and High Speed Signalling Link (HSL) interfaces:

- Selectable baseline for 3GPP protocols: Release 4 (2002-09) and Release 99 (2002-03) supported.
- Extensive support for manufacturer-specific protocols for Nokia, Ericsson, Nortel, Siemens, Lucent, Motorola and Alcatel.
- Gb deciphering supported.
- GSM-R decoding supported.

> AutoEDGE supported for Nokia, Ericsson, Nortel and Siemens to reduce the manual work for configuring the NetHawk GSM Analyser for Abis monitoring.

> Detailed decodings are shown in the monitoring window in real-time. The view can be customised to show each message with a desired level of detail, coding format and colour. Errors at the physical link are displayed in the State Monitor.

> Real-time Call Trace for efficient troubleshooting at the Gb, Abis and A interfaces.

> Extensive set of traps for real-time filtering of messages or activating other actions based on the signalling contents.

> Recordings can be stored to PC's hard disk and post-processed later with the NetHawk GSM Analyser software. In offline use, the standard NetHawk GSM Analyser can be used free of charge. Also remote file reading in real-time is supported.

- > Physical capacity:
 - Up to eight (desktop) or two (laptop) bi-directional E1/T1/JT1 links.
 - The capacity can be increased to 14 / 8 bi-directional links with the use of NetHawk C8 PCM Concentrators.
 - 128 connections simultaneously:
 - 64 kbit/s time-slot, 32 kbit/s, 16 kbit/s or 8kbit/s sub-channels.
 - Two Ethernet interfaces.