PowerHawk Pro

MULTI-USER LIVE NETWORK ANALYZER

Enables effective network service optimization and live network troubleshooting to assure the subscriber's true quality of experience (QoE) in a multitechnology environment.

KEY FEATURES AND BENEFITS

Single, scalable tool to help equipment manufacturers and service providers optimize and troubleshoot live multitechnology 4G/LTE, 3G and 2G mobile networks.

Reduce customer churn with timely network testing; verify the functionality of new network elements, the interoperability of elements from different manufacturers and across multiple technologies/baselines.

Measure user- and application-level quality of service (QoS) to visualize the true quality of experience from a customer's perspective.

Flexible probe-based solution with massive storage and open interfaces to KPIs and data records. XDR analysis results for flows, calls, sessions and KPIs are provided via CSV files to facilitate integration into broader systems.

Save testing time with the fully automated data-capturing, real-time correlated-signaling and user-plane processing system at the XDR/KPI level over multiple LTE, 3G packet and circuit core, and IMS interfaces.

A high-performance system for line-rate IP packet capture, signaling and application analysis with interface support for both 1G and 10G Ethernet links.

Drill down from statistics to message level data—real-time statistics, KPIs and configurable QoS counters; IP and user-plane analysis for more than 1000 applications; real-time call and session tracing, and signaling processing for LTE, PS core, CS core and IMS interfaces. Network, element and subscriber-level analysis to minimize the mean time to repair.

The most detailed customer experience view, from signaling to user-plane data; support for over 400 mobile signaling protocols and IP application analysis for over 1000 protocols, including classification and metadata.

VoLTE (end-to-end, CSFB and SRVCC supported) analysis with voice playback capability, including user-specific protection. SIP analysis with line-rate analysis capability and KPI calculation.

EXFO

MUCH MORE THAN JUST A PROTOCOL ANALYZER

As mobile networks move to an all-Internet-protocol (IP) model to meet the increasing bandwidth demand and subscriber growth, gaining real-time, end-to-end insight into network performance is more important than ever. This insight is necessary to effectively manage the quality of service (QoS) throughout the entire network lifecycle. With the introduction of packet network troubleshooting, key performance metrics are more difficult to demonstrate. Instead of measuring transmission only, network service providers need to focus on subscriber- and application-based QoS measurements, in addition to QoE.

Optimizing the Network with PowerHawk Pro

The PowerHawk Pro enables network service optimization and troubleshooting through real-time key performance indicators (KPIs) and detailed user-plane analysis. Multiple probes remotely capture network traffic from the 1/10 Gigabit Ethernet interfaces creating ready analyzed data records in realtime. System processes the network traffic and stores it in a database to be analyzed by the diagnostics suite and optional M5 Analyzer client software. The PowerHawk Pro correlates both control- and user-plane traffic across all interfaces to show a full, end-to-end view of both signaling and user-plane data. All this empowers the user to troubleshoot both functionality and quality issues in a single view. All problems can be identified and located immediately.

UNIQUE SCALABILITY: GROWING THE SYSTEM AS NEEDED

The PowerHawk Pro system consists of probes, including session analysis and KPI engines, as well as the Diagnostics suite and optional M5 Analyzer client software. For a multi-user system, a client server is added, supporting up to 10 simultaneous users.

The Diagnostics suite and optional M5 Analyzer client software are equipped with the chosen technology package that includes all applications and other special functionalities required for full analysis. The multi-interface probes can vary in their procedure-processing capacity—from 100 000 LTE sessions per hour to tens of millions—and include the IP application analysis option for more detailed application-level analysis.

Scale from a Single Testing Instrument

The PowerHawk Pro system is scalable to grow seamlessly with your network. In a network trial phase, a single testing instrument such as the TravelHawk Pro may be used to verify network element functionality with real-time detailed analysis. After a successful trial, the tool can be scaled up to the PowerHawk Pro, which provides unique features ensuring the successful deployment and service optimization of full network clusters. The scale-up path provides maximum component reusability—all software licenses and hardware components can still be used, and none of the existing functionality is lost.

Open Interfaces Probes: Third-Party-System Building Blocks

The PowerHawk Pro system is flexible, with open interfaces that can be used to integrate products into other solutions. The system offers XDR analysis results on flows, calls, sessions and KPIs via comma separated value (CSV) files that facilitate integration with external systems. The PowerHawk Pro probe can also be used independently of the PowerHawk Pro system (Diagnostics suite and optional M5 Analyzer) as a simple capture probe to record network traffic in packet-capture (PCAP) files, or with the advanced signaling analysis module and IP application analysis engines that provide preprocessed information in a timely manner. Signaling and application records are stored and indexed in a database.
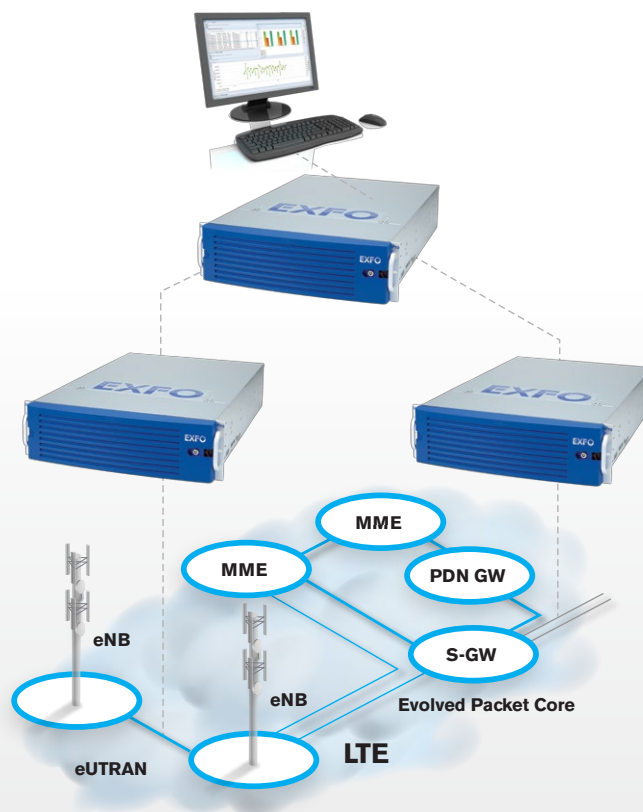
REAL-TIME KPIs AND DETAILED USER-PLANE ANALYSIS

With PowerHawk Pro you get the most comprehensive at-a-glance view of your network's performance and QoS. Control- and user-plane traffic are correlated across all interfaces to provide subscriber- and application-level KPIs and QoS analysis with drill-down capability into detailed message sequences and decoding. Analysis can be done in real time or with historical data. PowerHawk Pro offers two main easy-to-use analysis applications: the Diagnostics suite and M5 Analyzer.

Rich Statistics and High-Performance IP and User-Plane Analysis

The Diagnostics suite shows signaling KPIs, QoS for subscribers and applications, IP and user-plane analysis, and IP application analysis to determine true network QoE. In brief, it provides:

› Signaling KPIs (e.g., attach, PDN, TA) per a specific context, such as cell, TAC and cause values at LTE, CS core and PS core interfaces

› IP and session QoS (e.g., throughput, jitter, delay, round-trip delay) over time for subscribers and applications

› Ready charts and graphs for top talkers and applications, nodes under high load, DNS resolution times, top websites, etc.

› Subscriber analysis view and ready reports on sessions, and VoLTE and over-the-top (OTT) statistics per subscriber

› IP flow records with full IP session details:

  › Transport (Ethernet, VLAN, MPLS), IP, application protocol, GTP-U support

  › Session parameters such as throughput, type of service (ToS), session length, packets and bytes transferred

  › Easy sorting and aggregation of sessions based on any parameter in the flow table view

  › Drilldown into any specific flow using the Protocol Monitor application for detailed signaling-level analysis

› SIP signaling analysis over IMS and tunneled (EPC/PS core) interfaces

› Maximum analysis accuracy of applications with deep packet inspection:

  › Additional information for IP sessions all the way to layer 7

  › Over 1000 protocols with thousands of parameters

  › Identification and classification of network applications

  › Key parameters provided for each application

  › Application quality measurements (subscriber's QoE, top websites, web traffic QoS, audio/video analysis)
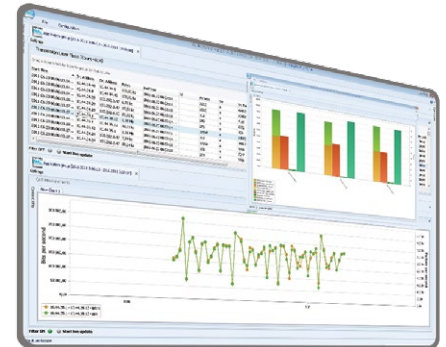
Correlated Multi-Interface Signaling Processing and Call Tracing

All the main call details (XDRs) such as phase information and cause values are included in the database. You can trace real-time calls and sessions over the correlated interfaces in the network using the diagnostics suite's high-capacity call and session view that supports:
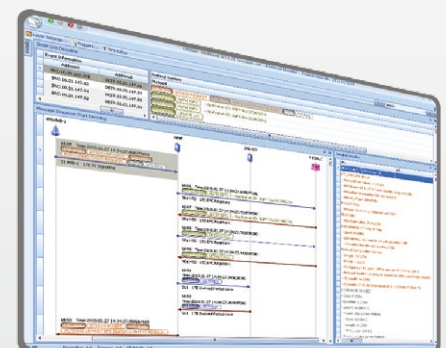
› High-performance call and session tracing for all LTE, PS core, CS core and IMS interfaces

› Correlated call and session information with main parameters

› SIP sessions correlated with RTP and RTCP sessions on LTE and IMS

› Extensive filtering capabilities to quickly identify problems

› Full signaling details and related user-plane QoS values or IP flows with a single click

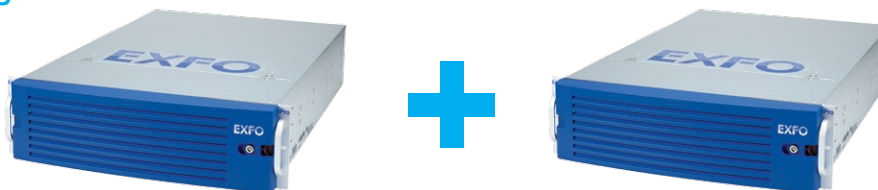› Long period history data from database
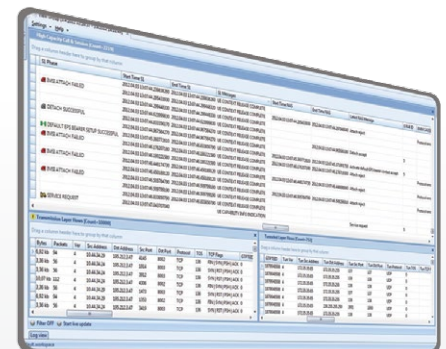
Detailed Message Decoding and Sequences

With the M5 Analyzer, transactions can be analyzed in different analysis views, from message sequence charts to detailed decoding:

› Full decoding support, including all standards-based (e.g., GTP-C, NAS) protocols

› Support for the latest 3GPP baseline up to release 11

› NAS and IPSec deciphering

EXFO

TECHNICAL DETAILS

COMPONENTS

Items	3500 Series – Master Unit	3500 Series – Slave Unit
Capacity	Line-rate filtering (up to 40 Gbit/s) 10 Gbit/s capture to disk Up to 500 Mbit/s, 600k messages per second, 30k signaling sessions per second* Up to 7 Gbit/s, 1 million packets per second, 20k IP application sessions per second*	Enables 20 Gbit/s capture to disk
Interface options	Four to eight 1 Gbit/s Ethernet (SFP) or Two to four 10 Gbit/s Ethernet (SFP+) or Four 1 Gbit/s and two 10 Gbit/s Ethernet	Connected to master unit
Memory	128 GB (default), 256 GB with upgrade*	
Processor	Dual Intel® Xeon® processor E5-2600 (12 core basic; 20 core with upgrade*)	
Local Storage Options	16, 32 or 64 TB	Additional 28, 56 or 112 TB
Size	3U	3U
Software Options	Capture engine IP application analysis (real time) Signaling analysis for LTE, CS core, PS core and SIM/IMS (real time)	
Other	10 ns timestamp resolution NTP, PTP and GPS synchronization (optional GPS antennas) Hardware-accelerated-analysis performance upgrade (optional)*	

COMPONENTS

Items	PowerHawk Client Server v3.2
System	PowerHawk Client Server
Storage	6 TB
Memory	64 GB
Processor	Two Intel® Xeon® Six-Core E5-2630V2 2.6 GHz
Operating System	Windows Server 2008 Enterprise R2
Size	3U
Software Options	Up to ten software clients: M5 Analyzer Diagnostics suite

EXFO

PowerHawk PRO OPTIONS

PowerHawk PRO PROBE INTERFACE OPTIONS

Two 10 Gbit/s Ethernet Interface Support (max. 2 adapters)	Card provides 10 ns timestamp accuracy with built-in hardware filtering capable of going through full-line-rate (20 Gbit/s) data.
Four 1 Gbit/s Ethernet Interface Support (max. 2 adapters)	Card provides 10 ns timestamp accuracy with built-in hardware filtering capable of going through full-line-rate (4 Gbit/s) data.

PowerHawk PRO DATA PROCESSING PACKAGES

LTE/EPC Signaling Analysis Module (SAM)	Complete LTE technology session analysis, where signaling messages are analyzed in real time and stored to the local database. Full correlation and deciphering support.
LTE/EPC Signaling Statistics	Brings preprocessed LTE KPIs. [a] Calculated in same post-processing job as the LTE sessions. Provides a full network-level view for signaling issues.
IP Application Analysis	Detailed IP transmission and application analysis, QoS calculations and user-plane KPIs. Comprehensive subscriber application analysis (e.g., Skype, YouTube, e-mails).
PS Core Signaling Analysis Module (SAM)	Complete PS core technology session analysis, where signaling messages are analyzed in real time and stored to the local database. Full correlation and deciphering support.
PS Core Signaling Statistics	Brings preprocessed PS core KPIs. [a] Calculated in same post-processing job as the PS core sessions. Provides a full network-level view to signaling issues.
CS Core Signaling Analysis Module	Iu-CS, Mc and MAP interface session analysis with correlation to all other existing technology.
CS Core Signaling Statistics	Preprocessed KPIs for Iu-CS, MAP and Mc interfaces. Provides a full network-level view to signaling issues.
SIP/IMS Signaling Analysis Module	SIP-over-tunneled-layer (VoLTE) and SIP-in-IMS interface session analysis. Correlation to LTE/SRVCC/CSFB calls when other technology packages are available.
SIP/IMS Signaling Statistics	Preprocessed SIP KPIs for SIP related signaling from S1-U, S5/8 and IMS interfaces
IPSec Deciphering	Real-time deciphering of IPSec packets over IPv4 and IPv6.
Voice Playback Support for Codecs over RTP	Voice playback for Voice over RTP. Enables listening or export of voice for any RTP speech codec, including G.711 (μ-law/A-law), G.729 (+Annexes A, B, AB), AMR-NB, AMR-WB, EVRC, EVRC-B with the Diagnostics Suite.

PowerHawk PRO USER INTERFACE SOFTWARE

M5 Analyzer Application	Graphical user interface for deep signaling protocol analysis, includes applications such as call and session analysis, three-level protocol monitor view and network topology.
Diagnostics Suite	The Diagnostics suite offers tens of graphical views for viewing the results of TravelHawk Pro data-processing packages. For IP application only, or if the detailed protocol analysis is not needed. Optional client server is required.
PowerHawk Client Server	Optional client server in which multiple application clients can be installed (up to 10) and run independently, simultaneously. Enables the end user to run applications remotely using a remote desktop connection to the client server.

PowerHawk PRO TECHNOLOGY PACKAGES FOR M5 ANALYZER

LTE/EPC Technology Package	Full LTE decoding package and correlated off-line call tracing for M5 Analyzer.
Core Technology Package	Full core decoding package and correlated off-line call tracing for M5 Analyzer.
UMTS (3G) Technology Package	Full 3G decoding package and correlated off-line call tracing for M5 Analyzer.
GSM (2G) Technology Package	Full 2G decoding package and correlated off-line call tracing for M5 Analyzer.
IMS Technology Package with session initiation protocol (SIP)	Full IMS decoding package and correlated off-line call tracing for M5 Analyzer, including SIP.
NSN CS and PS Core SiMO Technology Packages	Full NSN CS and PS core decoding package and correlated off-line call tracing for M5 Analyzer using SiMO.
3GPP LTE R8, R9, R10 and R11 Packages	3GPP release baselines available for different technologies.
Vendor Proprietary Protocols	NSN-, Ericsson-, ALU- and NTT DoComo-specific protocol packages for different technologies.
NSN eNB Tracing	Correlated LTE Uu interface analysis for NSN eNB.

Note

a. For details, please refer to the Analyzer Technology Coverage product note.

EXFO

SYSTEM PERFORMANCE [a]

› Up to 40 Gbit/s IP packet inspection and filtering rate per probe [b]

› Up to 20 Gbit/s sustained and 30 Gbit/s peak IP packet recording rate to disk (PCAP) per probe [b]

› Up to a sustained 500 Mbit/s signaling load with 800 Mbit/s busy-hour call attempts (BHCA) peak values analyzed in real time and stored in the database by a single probe (equals approximately 30 000 LTE signaling sessions and 600 000 signaling messages per second) [c]

› Up to 7 Gbit/s L7 IP session and LTE user-plane analysis and QoS measurements with real-time database storage per probe (equals approximately 1 million packets per second with 870 byte average packet size and 20 000 flows per second) [c]

› If more is required, an additional probe can do the rest; traffic can be split between multiple probes [c]

Notes

a. Figures vary according to the PowerHawk Pro probe. Above figures are measured with the 3000 and 3500 Series.

b. Measured with 3500 Series.

c. Measured with 3000 Series.

TECHNICAL SPECIFICATIONS

HARDWARE AND SYSTEM

3U rackmount server

Four to eight small form-factor pluggable (SFP) or RJ45 interfaces
- IEEE 802.3-compliant RJ45 ports for 10/100/1000 Mbit/s Ethernet
- MSA-compliant SFP modules: 1000BASE-SX (LC), 1000BASE-LX (LC), 1000BASE-T (RJ45)

Two to four 10 Gbit/s SFP+ interfaces

16 TB to 176 TB local storage for packet capture

Separate system disk for system and applications

Dual fail-safe power supply

Ubuntu 64-bit Server Edition Linux operating system for probes and KPIs

Win 2008 Server EE R2 64-bit operating system for PowerHawk Client Server

Watchdog functionality for hardware

Full system recovery

PACKET CAPTURE TO DISK

10-ns timestamp resolution

NTP time synchronization

PCAP file format

Ingress NetFlow collection (NetFlow v9)

Real-time deciphering of IPSec packets over IPv4 and IPv6
- IPSec AES decryption does not limit capture performance (over 30 Gbit/s). Maximum performance of IPSec 3DES decryption is 3.5 Gbit/s.
- Deciphering modes supported:
  • IPSec tunnel and transport mode with AES-CBC encryption (RFC 4303)
  • UDP encapsulation of IPSec ESP packets in tunnel and transport mode with AES-CBC encryption (RFC 3948)
  • IPSec tunnel mode with 3DES encryption (RFC 4303)
  • IPSec tunnel mode over GTP tunneling protocol with NULL encryption (RFC 4303)
- Supported authentication algorithms: HMAC-SHA1-96, AESXCBC-MAC-96, HMAC-MD5-96, NULL

EXFO

TECHNICAL SPECIFICATIONS (CONT'D)

PACKET FILTERING

Berkely packet filter (BPF) syntax for filter rules

Control- and user-plane filtering for LTE, Iub or Gb interfaces

IP header filtering

Packet payload filtering

Packet stripping

Logical expressions

Alarms and traps (bandwidth detection or BPF filters)

IP APPLICATION ANALYSIS

Full IP flow analysis with transmission and application-level protocols

Support for GTP-U, GRE and L2TP tunnels

IPv4 and IPv6

MPLS and VLAN support

Application-specific metadata available per configuration
- Typically 50+ parameters per application, such as URL, voice-over-IP (VoIP) parameters and codec information

KPIs and statistics for application-specific QoS (throughput, delay, jitter), as well as for transmission control protocol (TCP) roundtrip, retransmission ratio and packet loss

Application-specific KPIs available, such as mean opinion score (MOS) and R-factor for real-time transport protocol (RTP)

LTE/EPC SIGNALING ANALYSIS MODULE (SAM)

Full correlated LTE call tracing at the probe level

Signaling records (xDR) stored to local database

Supported interfaces
- 3GPP R10: Cx, S1, X2, S6a, S6b, S13, S11, S10, S3, S4, S5/S8, SGs, Sh, Sv, SWm, SWx, Gx, Gy, Zh

SIP/IMS SIGNALING ANALYSIS MODULE (SAM)

SIP signaling analysis

S1-U and S5 interfaces for LTE/EPC

Mn, SGi, Gm, Mw and ISC for IMS

Diameter on Rx

CS CORE SIGNALING ANALYSIS MODULE (SAM)

Iu-CS, MAP and Mc interfaces

PS CORE SIGNALING ANALYSIS MODULE (SAM)

Full, correlated PS Core call tracing at the probe level

Signaling records (xDR) stored to local database

Supported interfaces
- 3GPP R8: Iu-PS, Gb, MAP, Gn

CONFIGURATION

Web-based GUI:
- Multi-user authentication and management
- HTTPS

Secure shell (SSH) terminal connection

Configurable simple network management protocol (SNMP) traps and alarms

Remote server management and updates:
- IPMI v2.0 interface (only for 2U/3U)
- Wake-up on LAN

CAPTURE FILE PROCESSING

Web graphical user interface (GUI) file manager

Samba file share

Automatic file transfer using secure copy protocol (SCP) and file tranfer protocol (FTP)

Capture file online reading with M5 Analyzer software (RPCAP)

CAPTURE FILE PLAYBACK

Adjustable PCAP file transmission

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	10 °C to 50 °C
Operating relative humidity	20 % to 80 %
Certifications	RoHS, UL, CE (EU), FCC (USA), CSA (Canada), VCCI (Japan), C-TICK (Australia)

PHYSICAL MEASUREMENTS

3U

Size (H x W x D)	132 mm x 437 mm x 648 mm (5.2 in x 17.2 in x 25.5 in)
Weight	32.7 kg (72 lb)

POWER CONSUMPTION

PowerHawk Pro Probe 3500 Master Series: max. 440 W

PowerHawk Pro Probe 3500 Slave Series: max. 300 W

EXFO Headquarters > Tel.: +1 418 683-0211 | Toll-free: +1 800 663-3936 (USA and Canada) | Fax: +1 418 683-2170 | info@EXFO.com | **www.EXFO.com**

EXFO serves over 2000 customers in more than 100 countries. To find your local office contact details, please go to **www.EXFO.com/contact**.

For the most recent version of this spec sheet, please go to **www.EXFO.com/specs**.

In case of discrepancy, the web version takes precedence over any printed literature.

EXFO