TravelHawk Pro

PORTABLE WIRELESS NETWORK TROUBLESHOOTING TOOL

A unique, portable live wireless network troubleshooting tool that captures over 30 Gbit/s of data on local storage with comprehensive end-to-end wireless and IP analytics guaranteed to reduce network and service problem resolution time from days to hours.

KEY FEATURES AND BENEFITS

Shorter mean time to repair thanks to easy-to-use, high-performance live network capturing and analysis, and comprehensive end-to-end analytics

Over 30 Gbit/s sustained data capturing to local storage

Real-time hardware filtering from 4 x 10 Gbit/s interfaces and real-time analysis support for live network troubleshooting

Analysis of millions of LTE and PS/CS core control-plane sessions per hour with correlated session and statistical analysis

Automatic IP application detection and flow analytics with statistics and detailed graphical presentation (e.g., for throughput and TCP packet-level KPIs)

Comprehensive VoLTE analysis, including correlation to LTE, IMS, PS and CS core interfaces, full end-to-end SRVCC and CSFB support, and SIP, RTP and QoS (MOS/Rfactor) analysis and voice playback

PORTABLE TROUBLESHOOTING

The TravelHawk Pro is a portable troubleshooting solution for mobile network operators that be applied within a live field network environment or in the lab. The TravelHawk Pro improves network analysis, optimization and troubleshooting time, and is designed for three main operations: long-term evolution (LTE)/IMS, and packet-switched (PS) core and circuit-switched (CS) core end-to-end network analysis, Internet protocol (IP) application data analysis and data capturing. The capacity to support all three operations in a portable form factor is what makes this tool so powerful. Plus, the TravelHawk Pro dramatically improves network quality and decreases the average mean time to repair (MTTR) from days to hours.

Mobile Network Signaling Analysis

The TravelHawk Pro brings together line-rate capturing and live analysis capabilities, where IMS, LTE and CS/PS core signaling is deciphered, analyzed and correlated over all interfaces. Millions of sessions can be processed in one hour. Every session is isolated and all major call parameters across the LTE network are displayed. At a glance, session behavior from S1-MME interfaces (e.g., attach procedures) can be correlated with any issues in S6a (e.g., authentications) or S11 (e.g., PDP bearer modifications), and others, like X2 (e.g., handover procedures). Control-plane data is also correlated to user-plane data (e.g., Iu-PS signaling to 3G user-plane data, and LTE signaling to LTE user-plane flows).

Timestamp	APN	IMSI	TAC	MSISDN	S1 Phase	S6a Phase	S11 Phase	S5 S8 Phase	ESM CAUSE	Latest GTPC Msg	Latest Dia...	Transaction Type	IMEI
2012.05.04 ...	voice-tel...	548011000...	256	49162123...	DEFAULT EPS BEARER SETUP	NOTIFIED	BEARER MODIFIED	SESSION CREATED	Requested service optio...	MODIFY BEARER RESPONSE	NOTIFY A...	Mobility Service	3567680400...
2012.05.04 ...	voice-sa...	548011000...	1024	1721234562	PDN ACTIVATION FAILED	LOCATION UPDATED	SESSION DELETED	SESSION DELETED	Requested service optio...	DELETE SESSION RESPONSE	UPDATE L...	Mobility Service	3567680400...
2012.05.04 ...	voice-sa...	548011000...	1024	1721234562	PDN ACTIVATION FAILED	LOCATION UPDATED	ACCESS BEARER R...	SESSION CREATED	Requested service optio...	RELEASE ACCESS BEARERS RESPON...	UPDATE L...	Mobility Service	3567680400...
2012.05.04 ...	voice-tel...	548011000...	256	49162123...	DEFAULT EPS BEARER SETUP	NOTIFIED	ACCESS BEARER R...	SESSION CREATED	Requested service optio...	RELEASE ACCESS BEARERS RESPON...	NOTIFY A...	Mobility Service	3567680400...

Figure 1. Correlated LTE session analysis over all LTE interfaces dramatically reduces time to find root cause and faulty elements.

Voice over LTE (VoLTE)

VoLTE is a good example of a service that requires comprehensive end-to-end support. For this reason, the TravelHawk Pro supports the full end-to-end correlation of VoLTE (SIP) signaling to LTE, IMS and CS core interfaces, including SRVCC (Sv/Rx) and CSFB (SGs) interfaces. It identifies the user identifications (IMSI/PSTN/IMEI), network locations (TAC/APN/etc.) and all signaling-related problems from S1-MME, S6a, S11, Sv and IMS interfaces correlated to SIP signaling over the tunneled and non-tunneled interfaces. Essentially, it ensures the very fast detection of VoLTE calls, specific users and erroneous calls.

The TravelHawk Pro includes one-line correlation of LTE, IMS and CS core control-plane sessions to SIP/VoLTE sessions, combining fully analyzed SIP session signaling from S1-U and S5 to LTE bearer session data from S1-MME, X2, S6a, S11, S5, etc. Additionally, one click drill-down from session initiation protocol (SIP) sessions to real-time transport protocol (RTP) flow data shows quality-of-experience (QoE) information such as voice quality: RTP mean-opinion-score (MOS) and throughput/jitter measurements. Finally, the voice playback option makes it possible to listen to phone conversations.
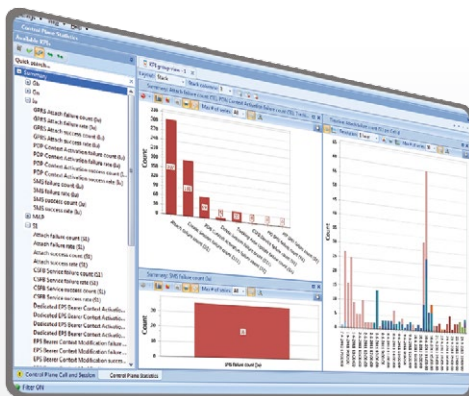
Figure 2. Easy-to-use GUI presents the system load and network statistics.

LTE: Statistics to Details

Network-level issues from the user plane and LTE signaling interfaces can be seen in statistical views, making failed sessions easy to troubleshoot, or even filter according to failure type or network element. From any key-performance-indicator (KPI) level, the user can drill right down to the failed sessions to discover whether they were caused by the same subscriber or, for example, by mobile type. A detailed network analysis of the session can be activated in one click in the message sequence chart view, providing the technician with the detailed information needed to identify the root cause.

Data Capturing

The TravelHawk Pro is the ideal tool for telecom and IT professionals requiring a high-performance data-capture and processing unit for 1 Gbit/s and 10 Gbit/s Ethernet networks. Data is captured in a nanosecond packet capture (PCAP) format, which is an open standard that any tool can use. Full line-rate packet filtering and processing is supported for multiple 10 Gbit/s Ethernet interfaces, regardless of packet size. The TravelHawk Pro offers a line-rate data-analysis capability with hardware filters and up to 30 Gbit/s sustained capturing to local storage.

EXFO

IP Application Data Analysis

The TravelHawk Pro can post-process all-IP, transmission-level or tunneled-level (mobile IP) flows thanks to its powerful IP application analysis engines. The analyzer displays all basic TCP/IP level problems in flow level, and allows one-click TCP packet-level graph analysis with five reports and over 20 KPIs. In addition, its comprehensive automatic detection and analysis of almost any application (Skype, Facebook, e-mails, etc.) and detailed results provide full visibility of the user experience at the application level. Combined with the industry's leading LTE/evolved packet core (EPC) analysis support, the TravelHawk Pro makes troubleshooting subscriber QoE easier than ever. Find subscribers in seconds using IMSI/GUTI or any other indicator, and observe the signaling experience. Plus, one click is all it takes to see the throughput of every application and other QoS values from the subscriber's LTE packet connection.

The TravelHawk Pro provides graphical views that make it easy to pinpoint network flows, sessions and conversations. All data is displayed in different tables where flows can be filtered, grouped or sorted. With the Diagnostics Suite, users can analyze individual IP flows to obtain information such as source and destination IP addresses, ports, protocols, locations, origins, throughput and the amount of transferred data values. Users can also view information such as virtual-local-area-network (VLAN) tags, Q-in-Q, multiprotocol label switching (MPLS), GPRS tunneling protocol-tunnel endpoint identifier (GTP-TEID), as well as the flow data for tunneled IP connections, which are mainly used in mobile networks such as PS core and LTE.

The diagnostics suite offers advanced quality-of-service (QoS) and KPI graphs, including charts and diagrams for per-individual statistics, traffic distribution and throughput, as well as aggregated flows and sessions. Moreover, administrators can easily monitor bandwidth usage for specific connections. As for QoS and service-level agreement (SLA) measurements, graphs are available for the most important KPIs, such as throughput and jitter. The Diagnostics Suite also enables high-accuracy analysis of applications, ensuring identification and classification with key parameters. Application quality measurements are also easily performed in predefined QoS analysis views (e.g., subscriber's QoE, top websites, web traffic QoS and audio/video analysis). For example, SIP sessions, RTP, voice and MOS are analyzed for every call.

Finally, IP application analysis supports automatic, over-the-top (OTT) detection, making it easier than ever to troubleshoot Skype, YouTube, Facebook and other applications. In fact, over 1000 applications are detected, with specific details provided for each.
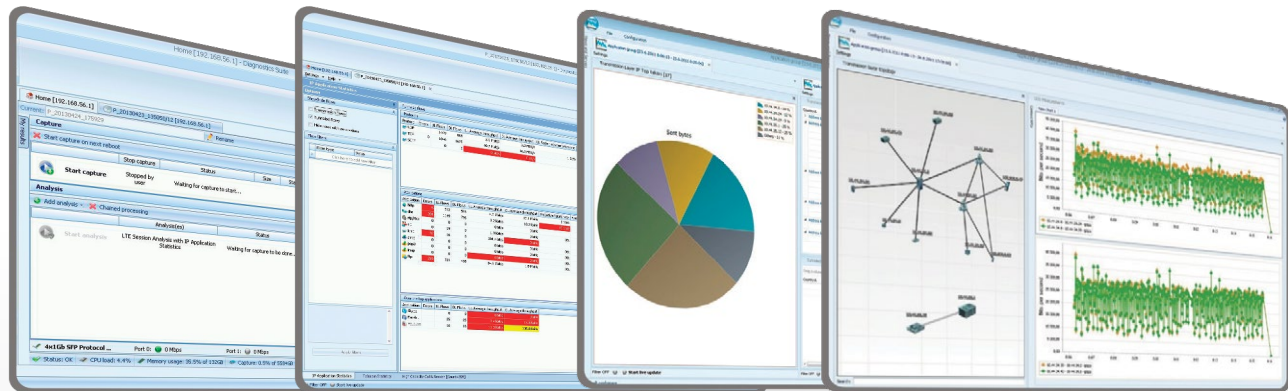

Figure 3. Visualizing network traffic with the Diagnostics Suite application.

TRAVELHAWK PRO OPTIONS

INTERFACE ADAPTERS

Two 10 Gbit/s Ethernet interface support	10 ns timestamp accuracy with built-in hardware filtering capable of going through full line-rate (20 Gbit/s) data. Maximum of two adapters per TravelHawk Pro (if no other adapter is added).
Four 1 Gbit/s Ethernet interface support	10 ns timestamp accuracy with built-in hardware filtering capable of going through full line-rate (4 Gbit/s) of data. Maximum of four adapters per TravelHawk Pro (if no other adapter is added).

HARDWARE OPTIONS

High-capacity stream to disk	This option increases the streaming to disk capability up to 30 Gbit/s, and also increases raw data-capturing storage up to 6 TB, with one included spare SSD drive.
DC power option (−48 VDC)	Additional DC power supply. Module can be installed simultaneously with the AC Power.

DATA PROCESSING PACKAGES

LTE/EPC signaling analysis for post-processing	LTE signaling processing, session analysis and statistics with Cx, S1-MME, X2, S6a, S6b, S10, S11, S13, S5/8, Sh, SGs, Sv, SWm, SWx, Gx, Gy and Zh interfaces supported. [a]
SIP/IMS signaling analysis	SIP signaling session analysis and statistics over GTP tunnels, as well as from IMS interfaces. Diameter analysis for Rx interface.
PS core signaling analysis	PS core (Iu-PS, Gn, Gb, MAP) signaling processing, session analysis and statistics.
CS core signaling analysis	Iu-CS, Mc and MAP interface session analysis and statistics and KPIs with correlation to all other existing technology.
IP application analysis (post-processing) with basic protocol support	IP application analysis engine with statistics. Includes protocol packs for network services, routing, tunneling, audio and video, web and e-mail. Requires Diagnostic Suite option. [a]
IP application analysis (post-processing) with advanced protocol support	IP application analysis engine with statistics. Includes protocol packs for network services, routing, tunneling, audio and video, web and e-mail and additional enterprise, finance, security, instant messaging and P2P protocols. Requires Diagnostic Suite option. [a]
Voice playback support for codecs over RTP	Listen or export .wav files of any RTP codec speech, including G.711 (μ-law/A-law), G.729 (+Annexes A, B, AB), AMR-NB, AMR-WB, EVRC, EVRC-B.
IPSec deciphering	High-capacity real-time or post-processing deciphering of IPSec packets over IPv4 and IPv6. Manual key addition method only. IPSec AES decryption does not limit capture performance (over 30 Gbit/s). IPSec 3DES decryption maximum performance 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) Authentication algorithms supported: HMAC-SHA1-96, AES-XCBC-MAC-96, HMAC-MD5-96, NULL
Throughput and delay measurement	Enables calculation of throughput, jitter and delay measurements from control-plane sessions or user-plane flows. Provides graphical presentation per IP addresses found from selected flows or sessions.
TCP packet analytics	Graphical representation for TCP packet-level statistics. Statistics support time sequence graph, throughput, round-trip time, outstanding data graph and segment-size graph.

CLIENT SOFTWARE OPTIONS

Diagnostic Suite for TravelHawk Pro	Data-processing results presented in tens of graphical views.
M5 Analyzer for TravelHawk Pro	M5 Analyzer client and technology options are used for detailed root-cause analysis, as well as to decode messages and details from PCAP files that were captured and extracted using the TravelHawk Pro diagnostics suite. All functions are for the post-processing of raw data files only. The graphical user interface offers deep signaling protocol analysis, as well as applications like such as call and session analysis, three-level protocol monitor view, network topology view, and more. Features: › LTE-EPC Detailed Analysis Decoding package for M5 Analyzer client. › SIP/IMS Detailed Analysis Decoding package for detailed decoding support. [a] › UMTS (3G) detailed analysis (post-processing) › GSM (2G) detailed analysis (post-processing) › CS core detailed analysis (post-processing)

Note

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

EXFO

TECHNICAL SPECIFICATIONS

HARDWARE AND SYSTEM

Supported interfaces (depending on configuration)	Up to eight IEEE 802.3 1 Gbit/s Ethernet interfaces SFP modules: multimode SR (850 nm), singlemode LR (1310 nm), 1000 Base-T or 10/100/1000 Base-T Up to four IEEE 802.3 10 Gbit/s Ethernet interfaces SFP modules: multimode SR (850 nm), singlemode LR (1310 nm)
Up to 6.9 TB of local storage	
Separate system disk for system and applications	
Ubuntu 64-bit Server Edition Linux operating system	
Win 2008 server, R2 64 B	
Watchdog functionality for hardware	
Display resolution (pixels): 1920 x 1200	
Input power	$\sim$ 100 - 240 V; 50/60 Hz; 8 - 4 A (default) --- −48 V; 20 A (optional)

PACKET CAPTURE TO DISK

10-ns timestamp resolution	
NTP time synchronization	
PCAP file format	
Performance	With basic package › 10 Gbit/s sustained capture to disk With high-capacity stream-to-disk option › Over to 30 Gbit/s sustained capture to disk with mixed packet size (LTE/Internet data) › Over to 25 Gbit/s sustained capture to disk with smallest (64 B) packet size

PACKET FILTERING

Line-rate packet filtering
IP header filtering
Packet payload filtering
Packet stripping
Logical expressions
Control- and user-plane filtering
Frame decoding of VLAN, ISL, MPLS, Ethernet, IPv4, IPv6, GTP, GRE, SCTP

SUPPORTED CONFIGURATIONS

1 Gbit/s Ethernet ports	10 Gbit/s Ethernet ports
4	0
8	0
0	2
4	2
0	4

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	5 °C to 35 °C
Operating relative humidity	20 % to 80 %
Certifications	RoHS, UL, CE (EU), FCC (USA), CSA (Canada), VCCI (Japan), C-TICK (Australia)

PHYSICAL MEASUREMENTS

Size (W x H x D)	44.1 cm x 42.5 cm x 14.7 cm (17.37 in x 16.75 in x 5.8 in)
Weight	12.2 kg to 14.3 kg (25.3 lb to 31.5 lb) (depending on configuration)

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 **www.EXFO.com/specs**. In case of discrepancy, the web version takes precedence over any printed literature.

Sales: sales.wireless@EXFO.com
Customer support: support.wireless@EXFO.com

EXFO