

NetScan monitoring system enables real-time monitoring of all signalling messages transported over selected interfaces of the Mobile Telecommunication Network (PLMN). Monitored messages are captured, decoded, analysed and correlated with other messages at the various levels of signalling transactions. In addition, system generates a rich set of statistics based directly on these messages from all the completed transactions.

In order to maintain a first-class customer experience and proactively prevent network and quality degradation, advanced real-time monitoring and troubleshooting capabilities are crucial to any organization operating telecom networks.

NetScan is a powerful, flexible network monitoring system that extracts information directly from the control and user plane and makes it accessible in real-time. In addition to full, end-to-end capabilities, NetScan offers continuous monitoring of 100% of transactions in real-time, ensuring that no data is lost or information missed. All transactions in the network are captured, processed, consolidated and stored for real-time or historic reporting.

NetScan supports fixed and mobile (including GSM-R) voice and data networks, from SS7 to LTE – all in one system. The very unique feature is the support for shared-RAN networks (MOCN & MORAN), including secure data separation between mobile network operators involved.

The end-to-end view of service performance can be mapped to each and every subscriber, enabling the most accurate picture of experience and quality to be obtained both in real-time and historically

For operation and maintenance department NetScan offers network-wide call tracing with drill-down message decoding down to bit level and extensive set of pre-defined KPI's statistics per cell, project, region, BSC/RNC, cluster, etc.

For planning and radio department NetScan offers detailed analysis of radio-related problems, including unique full Abis coverage.

For technical and marketing department NetScan offers CEM, selected KPI's available for roaming partners, terminal types and terminal vendors and business applications such as HVA alarming module.



## System Architecture

NetScan monitoring system is based on a highly-distributed architecture to cope with high load and to provide high scalability.

Custom-made Smart TAP devices intercept IP traffic, filter it and distribute into dedicated local servers. In case of UP processing – they also perform load balancing.

Local servers process only selected data and then do the additional filtering, decoding and correlation at the level of sessions and transactions. Already processed and indexed messages are stored on local servers for easy and fast access.

Local servers maintain also low-level statistic counters used for higher-level KPI's calculation. KPI's are aggregated over various time-, geo- and infrastructure dimensions. Information about sessions, transactions and counters are stored into local databases.

Multi-interface correlation is supported, including inter-BSC and system HO's. If a given transaction need to be monitored by more than one local server, a central server is involved for assistance.

## Key Features

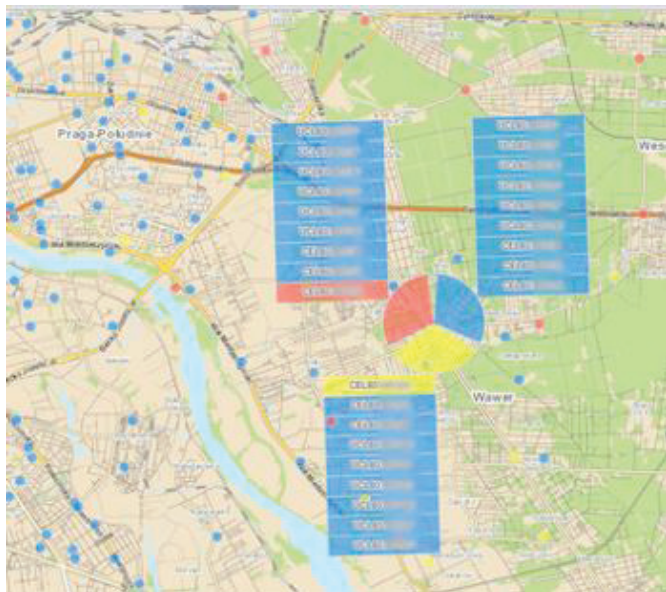
- real-time, 24/7 telco network monitoring, data processing and data analysis
- supports fixed and mobile (incl. GSM-R) from SS7 to LTE – all in one system
- shared-RAN (MOCN & MORAN) support, incl. secure data separation between MNO's involved.
- network-wide call tracing with drill-down message decoding down to bit level and extensive set of pre-defined KPI's
- detailed analysis of radio-related problems, incl. unique full Abis coverage.
- CEM and VIP's alarming module
- open architecture; powerful TAP



**NetQPro**  
A Systemics Group Company

## User-friendly interface

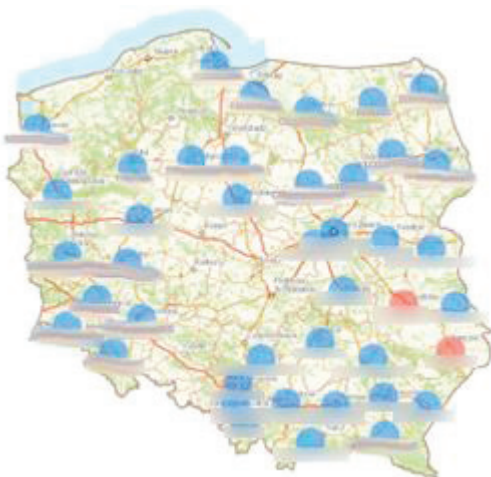
NetScan monitoring system provides access to user through WEB-based graphical user interface. Therefore – all system user needs to access NetScan GUI is a WEB browser. GUI is highly intuitive and truly easy-to-use. Yet, it provides an essential level of security.



Information available for a given user depends on particular access rights. Access-policy is controlled by a system administrator and allows for geographical- and (in case of SRAN/MOCN) MNO- data isolation. Complete end-user activity is logged and can be audited. Audit data also includes all potentially sensitive data used, for example, for search operations (like IMSI, MSISDN etc.). Such functionality helps to detect potential frauds or misuse of the system.

## Network status indication

The Network-status Screen displays status of Key Performance Indicators KPI's with colours marking violation of defined thresholds.



All elements on screen are active – with a single mouse-click one can see statistical details, detailed cell analysis or related signalling transactions (calls, sessions)

## Statistics

NetScan provides rich set of KPI's and counters for analysis of the network status and service quality. KPI's and counter are provided for a specified period of time and specified geographical and infrastructural aggregation, in hourly or daily aggregations. Other periods can be added on demand. Results are presented as minimum, average and maximum value.



At statistic level user can individually select warning/error thresholds for each statistics. If those thresholds are violated – respective statistic graph will be marked on yellow/red colour.

## Roaming and handset statistics

NetScan provides statistics for roaming- and handset-related analysis:

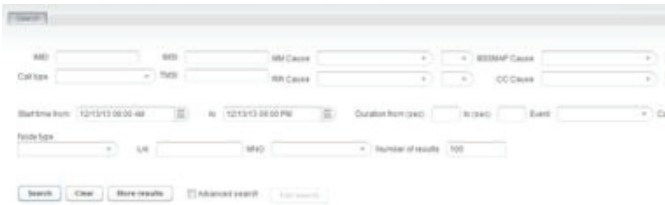
- roaming statistics are calculated per each Home Network of the mobile user and can be narrowed into specific area of monitored network or particular BSC/RNC,
- handset statistics are calculated per terminal model and vendor based on IMEI-TAC

Country	Company	SEC Filings	SEC Filings	SEC Filings	SEC Filings	SEC Filings	SEC Filings
Algeria (Republic of)	ALGERIA GROUP P.TY LTD (ALGERIA GROUP)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Angola (Republic of)	THE EDITING CO. FOR MOBILE SERVICES S.A.P.A.	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
China (People's Rep.)	CHINA MOBILE COMMUNICATIONS CORP. (CHINA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Indonesia (Republic of)	PT TELKOM SELINDIA (TELKOM)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Kazakhstan (Republic of)	KAZAKHTELECOM JSC (KAZAKHTELECOM)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Malaysia (Federal)	TELKOM SELINDIA (TELKOM)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Moldova (Republic of)	ORANGE MOLDOVA S.A. (MOLDOVA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Spain	IPERCOM S.A. (IPERCOM)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Algeria (People's Rep.)	ALGERIA GROUP P.TY LTD (ALGERIA GROUP)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Ukraine	UKRAINE RADIO SYSTEMS (UKRAINE)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
United Kingdom of Great Britain and Northern Ireland	CABLE AND WIRELESS GROUP LTD (GUERNSEY)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Switzerland (Confederation)	ORANGE COMMUNICATIONS S.A. (SWITZERLAND)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Bulgaria (Republic of)	MOBILTEL BULGARIA (BULGARIA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Israel (State of)	PARTEK COMMUNICATIONS CO. LTD (ISRAEL)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Yugoslavia (Federal Republic of)	TELKOM SRIJEMSKA (SRIJEMSKA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Austria	TELEKOM AUSTRIA GROUP (AUSTRIA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Germany	TELKOM (GERMANY) (GERMANY)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Portugal	OPTECOM TELECOMUNICACOES S.A. (PORTUGAL)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Switzerland (Confederation)	ORANGE MOBILE LTD (SWITZERLAND)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Romania	MOBILTEL (ROMANIA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Greece	STET HELLAS S.A. (GREECE)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Australia	TELSTRA (AUSTRALIA) (AUSTRALIA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Croatia (Republic of)	TELEKOM CROATIA (CROATIA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Bulgaria (Republic of)	ETC MOBILE BULGARIA (BULGARIA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
United Kingdom of Great Britain and Northern Ireland	MOBILTEL (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Estonia (Republic of)	TELIS ESTONIA (ESTONIA)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Algeria (People's Rep.)	ALGERIA GROUP P.TY LTD (ALGERIA GROUP)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Tunisia	MOBILTEL TUNISIE (TUNISIE)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Greece	MOBILTEL GREECE (GREECE)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000
Greece	IPERCOM S.A. (GREECE)	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000	100,000,000

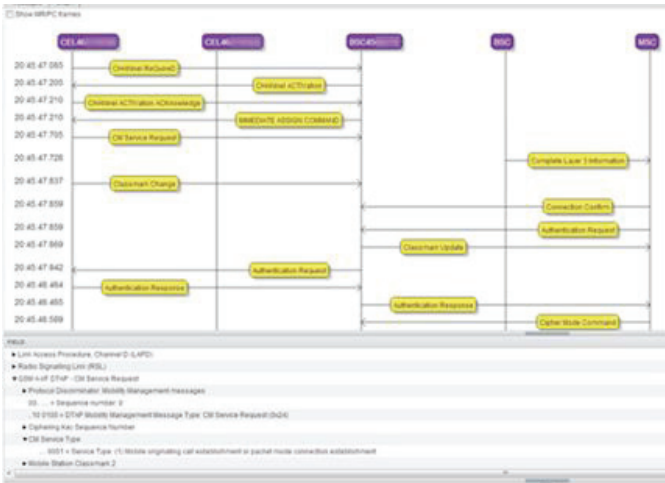
NetScan monitoring system can export collected data into external systems. Both statistical information and event- or transaction- based information can be exported.

Call trace

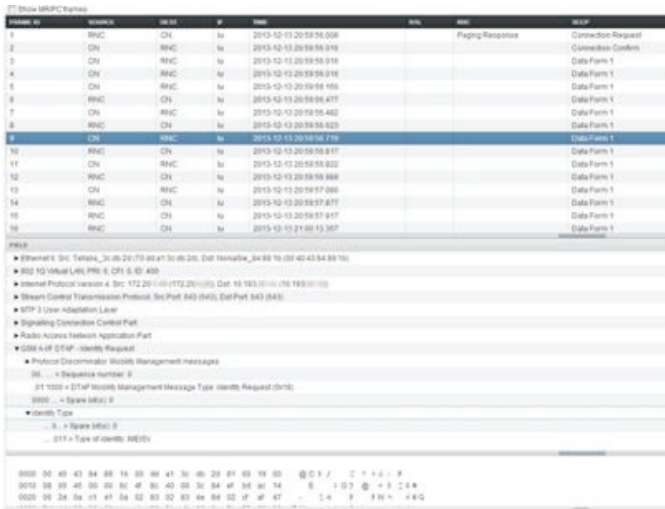
NetScan monitoring system offers call & transaction tracing with in-depth drill-down analysis functionality. User can search for a specific call based on various criteria, using advanced search tools and select it for detailed analysis.



Selected calls can be easily viewed both in tabular and graphical format:



All messages are fully decoded up to the field level. In addition messages are also shown in hex format:



Calls can be traced based on localization (network area → BSC/RNC → cell), handset or user identity (IMEI, IMSI, TMSI, MSISDN), transaction-specific parameters (termination cause, type of transaction) or events – such as an unsuccessful HO.

Radio analysis

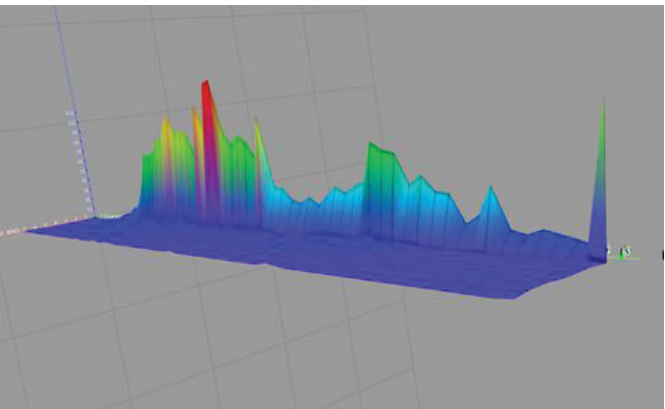
Netscan provides radio call analysis based on all parameters reported in MR (measurement report) messages and all important RAN events. Measurements are correlated with particular cells.



NetScan also provides analysis of cell radio conditions. 3-dimensional graphs illustrate correlation between specific measurements reported in MR messages for the selected cell and time.

Graphs are available for:

- down-link Rx level vs quality,
- up-link Rx level vs quality,
- timing advance vs up-link quality,
- timing advance vs down-link quality.



Data export

NetScan monitoring system can export collected data into external systems. Both statistical information and event- or transaction- based information can be exported. Communication with external system can be configured based with on-demand push or pull mechanism, or alternatively, real-time streaming. Format of external data can be modified for hassle-less integration.



Questions?

- Please email us [info@netscan.pl](mailto:info@netscan.pl)
- Visit us at [www.netscan.pl](http://www.netscan.pl)



Systemics-PAB is a leading company in Quality of Experience benchmarking services. We are also a full active member of ETSI, the European Telecommunications Standards Institute. The company headquarter is in Poland, with offices in Russia, Germany, Ireland, Austria and Jordan. We provide our services to mobile operators globally.

Our customers are predominantly mobile operators including Vodafone, T-Mobile, Orange, MTS. We also work for equipment vendors such as Nokia and Huawei and telecommunications markets regulators.

**Systemics-PAB and NetScan** are part of the Systemics Group which delivers independent auditing and optimization services. Our aim is to help mobile operators to improve the quality of services in their networks. Our services and monitoring system are especially appreciated by customer with multiple RAN equipment vendors.

**Our auditing and optimization services include:**

- Active drive and indoor QoE benchmarking tests
- E2E monitoring and analysis of Voice, Data and Video - from RAN up to IP Core Network
- Carrier Aggregation/VoLTE testing
- Complete QoS & QoE Analysis
- Roaming monitoring
- Diagnostics & Optimization of MNO
- Quality Problems Investigations
- Software Tools Development
- Network Strategy Consulting
- Audits and trainings in mobile technologies (LTE-A/LTE/3G/2G).

