

[ TEMS™ PRODUCTS ]

# TEMS™ VISUALIZATION PROFESSIONAL BRIDGING THE OPTIMIZATION GAP



## SEE YOUR NETWORK IN A WHOLE NEW WAY

TEMS Visualization is revolutionizing the optimization of wireless networks. It post-processes event-based data generated by the network infrastructure, analyzing and organizing the information for radio network troubleshooting, optimization, and functionality verification.

TEMS Visualization Professional, the desktop version of Ascom Network Testing's wireless network troubleshooting and optimization tool, analyzes event-based data generated by the infrastructure to enable network operators to find problems that were impossible to pinpoint before.

TEMS Visualization also comes in an Enterprise Edition, which utilizes dedicated servers for automated data processing, with multiple clients accessing the centralized database. The release of TEMS Visualization 9.0 Professional incorporates many Enterprise edition features, including support of LTE and NSN Megamon.

For mobile operators that are serious about delivering ubiquitous quality and availability, traditional network performance management tools simply aren't enough. To home in on problems that were impossible to pinpoint before (those in difficult-to-drive-test spots or related to individual subscriber or phone model issues), operators must complement their network performance management and drive-testing tools with advanced network visualization and optimization capabilities.

Breakthrough network optimization tools such as TEMS Visualization use event-based data from the infrastructure side to bridge the critical gap between performance management systems and drive testing. While performance management tools provide high-level key performance indicators (KPIs) from counter data, and drive-testing tools capture thin slices of network traffic, TEMS Visualization derives detailed information from large volumes of live network traffic.

TEMS Visualization comes in a desktop version (Professional) and a client/server version (Enterprise). With the release of TEMS Visualization 9.0 Professional, Ascom has fortified the desktop version of the tool with many of the same rich features found in TEMS Visualization Enterprise.

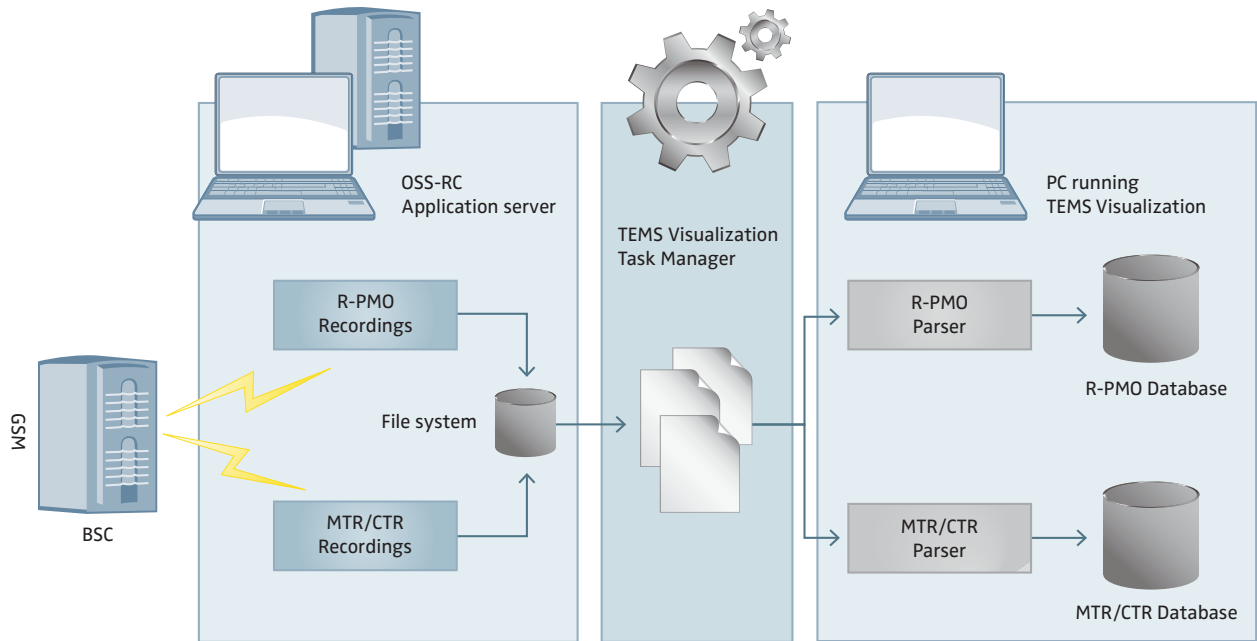
### MULTIVENDOR SUPPORT FOR TODAY'S HETEROGENEOUS NETWORKS

More often than not, mobile operator networks consist of equipment from multiple vendors. To report, analyze and help optimize network performance from end to end, TEMS Visualization has extended its support for not only Ericsson LTE equipment and the UETR file format but for WCDMA technology for the Nokia Siemens Networks (NSN) Megamon GEO interface format. The product will support additional vendors for WCDMA and LTE in the future.

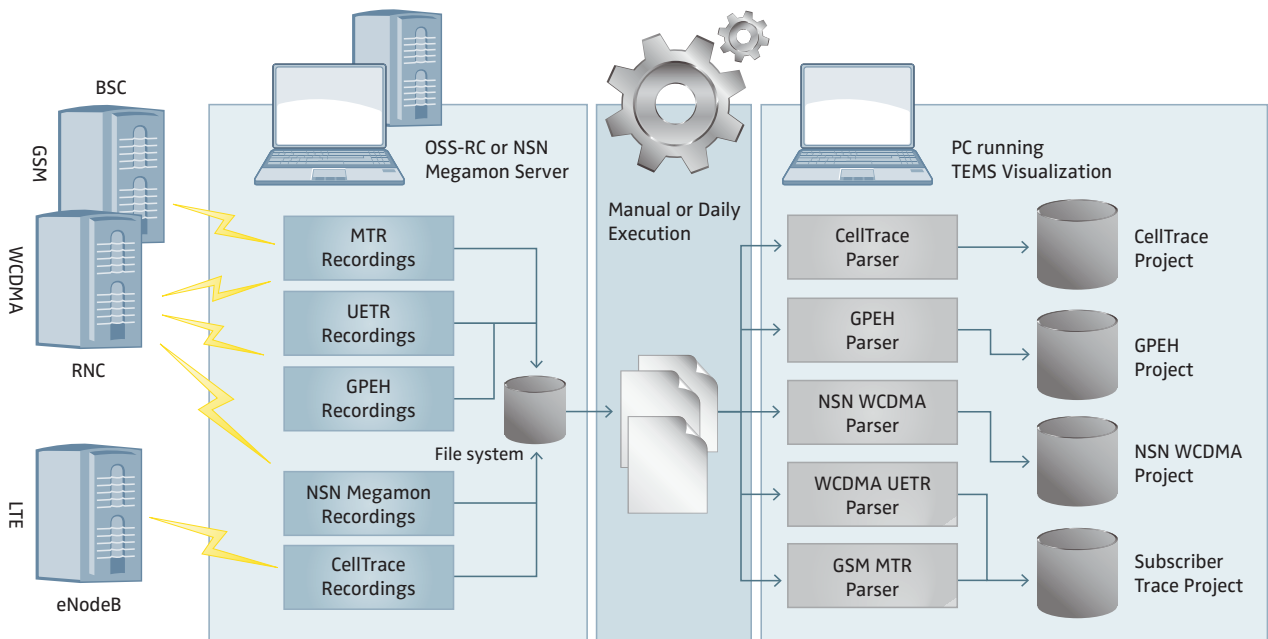
Ericsson's GSM R-PMO and CTR, General Performance Event Handling (GPEH) for WCDMA, and CellTrace for LTE (all available in Ericsson networks), and the Megamon GEO interface for NSN WCDMA, enable TEMS Visualization to collect, retrieve, store, and analyze event data from large areas of the network in greater volume and detail, and more cost-effectively, than is possible using external probes or traditional optimization methods. Event data logfiles are generated in the radio network elements and collected in the OSS file storage for post-processing by TEMS Visualization.

The WCDMA UETR and GSM MTR formats, meanwhile, allow the monitoring and analysis of individual subscriber issues (statistics per IMSI, message drilldown, call search, histogram, exception analysis, mapping, and more). This capability comes in handy for monitoring VIP subscriber issues and in helping engineers to prioritize and resolve these issues.

# TROUBLESHOOT ACROSS A RANGE OF TECHNOLOGIES: GSM, WCDMA, LTE



TEMS Visualization Professional: GSM Application



TEMS Visualization Professional: WCDMA, LTE, and Trace Application

## MULTITECHNOLOGY NETWORK TROUBLESHOOTING AND OPTIMIZATION BENEFITS

TEMS Visualization gives RF engineers the most effective way to troubleshoot and optimize GSM, WCDMA HSPA+ and LTE networks.

### BENEFITS INCLUDE:

**Faster troubleshooting and mean time to repair (MTTR)** – TEMS Visualization's diagnostics features help engineers more quickly find root causes for RF and network capacity problems, enabling them to enhance quality of service.

**Reduced churn** – The ability to track performance over large areas of the network or by specific cell, cluster, subscriber groups, individuals, or phone models enables the operator to better ensure QoS for the majority of subscribers as well as to protect high-value VIP accounts.

**Improved decision making** – The large volumes of decoded event data and smaller volumes of calculated statistical data are stored separately. Thus, statistical data can be stored and analyzed over longer time periods – giving operators actionable information that fosters better decisions.

**Reduced OPEX** – Ensure that your OSS tools can evolve to meet the needs of your complex infrastructure by exploiting TEMS Visualization's support for GSM, WCDMA, HSPA/HSPA+, and LTE technologies.

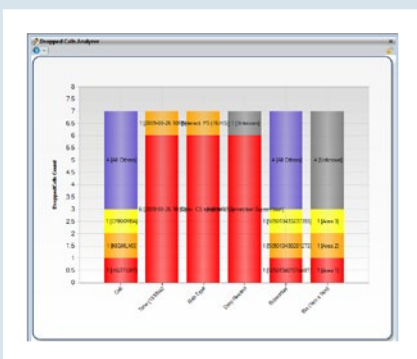
### RF TROUBLESHOOTING – QUICKLY PINPOINT THE ROOT OF NETWORK PERFORMANCE DEGRADATIONS

To troubleshoot performance degradations in today's complex networks, RF engineers often need more information than is available from basic KPI counter data, alarms and trouble-tickets. To help them get to the root causes of problems efficiently, TEMS Visualization processes, organizes and visualizes large volumes of calls generated by real subscribers and allows:

- Performance problems such as dropped and blocked calls to be attributed to specific cells, subscribers or phone types – with KPIs aggregated from the event data
- Approximate locations of performance problems to be identified with geo-location features for GSM and WCDMA
- Basic RF and capacity issues, which are causing performance degradations, to be easily identified using the automated diagnostics features for WCDMA
- Direct drilldown from all features, enabling engineers to analyze in detail the data from individual calls and messages so they can trap, track, and eradicate problems based on message sequences and specific phone models



## SUBSCRIBER-CENTRIC TROUBLESHOOTING



Dropped Calls Analyzer

### Cell, Phone Model, and Subscriber KPIs

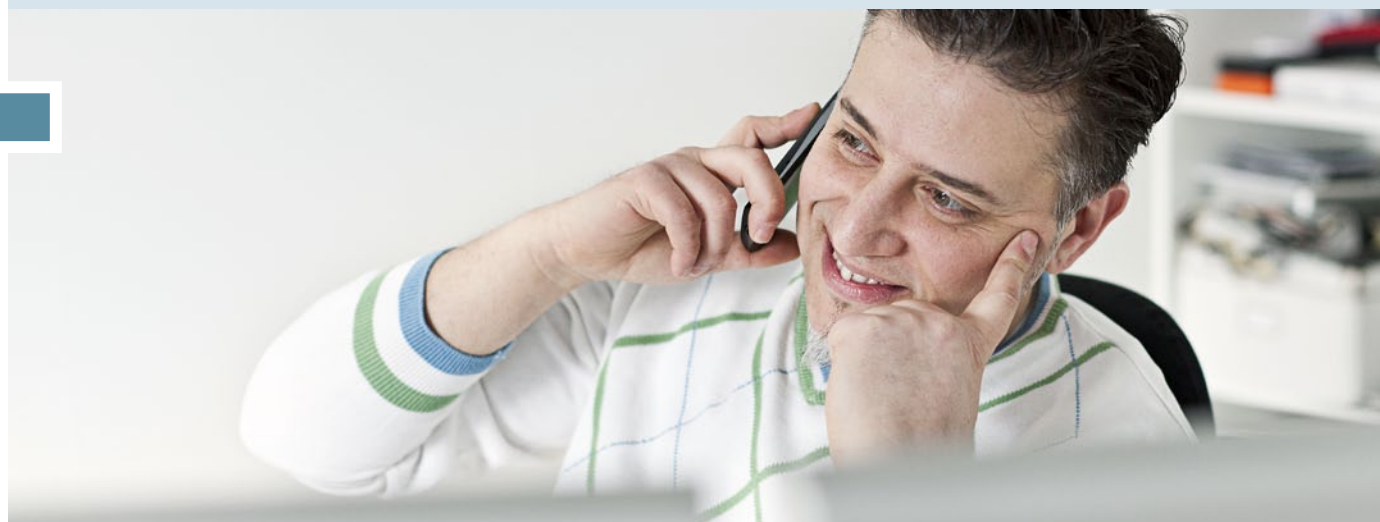
TEMS Visualization enables quick identification and troubleshooting of poorly performing cells and clusters, as well as poorly performing WCDMA phone models and individual subscribers. In addition, groups of subscribers can be created to allow engineers to investigate performance problems uncovered by TEMS Automatic units, or affecting important corporate customer groups, or VIPs. Statistics for accessibility, retainability, mobility, and packet-switched data performance are aggregated from WCDMA GPEH/UETR, GSM R-PMO/MTR, and LTE CellTrace data with direct drilldown to detailed call analysis for problem calls.

**High-speed packet data analysis** provides average throughput statistics in all KPI views and throughput to be tracked for an individual call. In addition, channel switching statistics are provided for WCDMA.

**WCDMA dropped call analyzer** efficiently identifies common components in dropped calls: For example, if all of the dropped calls in one call are caused by the same subscriber or at the same geographic location, or if all of the dropped calls for one phone model are on the same cell or are the same radio access bearer (RAB) type.

**WCDMA cell capacity analysis** identifies cells with resource issues by using peak usage statistics for key resource types. Problem cells can then be examined in detail with charts showing the usage of resources such as channel elements, power, and active high-speed users in high resolution.

**WCDMA RF diagnostics** automatically highlight cells with RF issues. Analysis of measurement reports identifies cells with problems such as out of coverage, high DL interference, high UL interference, or UL/DL imbalance. Further analysis identifies the potential causes of these issues, such as missing IRAT/IFHO handovers, UL path losses, overshooting cells, or pilot pollution. The MRR-W feature in the Ericsson OSS-RC is required.



## OPTIMIZE YOUR NETWORK

**GSM and WCDMA event geo-location** enables dropped calls to be geo-located, with the number of dropped calls in each geographical bin displayed on the map. Clicking on a bin presents details for the drops in that bin and allows further drilldown. Engineers can draw a polygon around a road and analyze the dropped calls from real subscribers as “virtual drive tests.”

**Detailed event analysis** allows engineers to search for specific exceptional events and to send calls containing those events to call analysis. In WCDMA and LTE, they can analyze time delays between pairs of messages and send outliers, which indicate network performance issues, for detailed investigation. NAS signaling between user equipment and the core network is also possible. This is the most effective way to find the root causes of network problems.

**Call analysis, available for all WCDMA and LTE modules,** sends calls highlighted in any feature to call analysis for in-depth examination. Sequences of signaling messages are shown, and the reasons behind problems such as blocked and dropped calls can be investigated in great detail. Engineers can follow radio measurements per call, view detailed content for individual messages, retrieve distance and quality information, and analyze large groups of calls for patterns.



### RF OPTIMIZATION – PROACTIVE KPI MAINTENANCE AND IMPROVEMENT

TEMS Visualization also includes features that increase efficiency in the most important day-to-day RF optimization tasks. Utilizing the live subscriber traffic, engineers can make the most well informed optimization decisions and positively impact subscriber perceived network quality.

WCDMA neighbor optimization makes it possible to easily optimize the neighbor plans, which are crucial for network performance. Missing neighbors and non-utilized existing neighbors are identified for both intra-frequency, inter-frequency and IRAT (GSM) relations. Per-IMSI statistics allow the exclusion of individual subscriber specific issues – and the engineer to focus on true network issues. All of this information is linked to the map view for easy analysis. Changes can be made and saved to a Bulk CM format file for import into the OSS-RC.

WCDMA coverage area optimization allows overshooting cells to be quickly identified and down-tilts adjusted. An algorithm calculates an overshooting distance for each cell. During processing, statistics are calculated for the number of overshooting calls and the number of calls established in poor quality. Detailed investigation of the calls established in each distance band and the quality of those calls can also be shown in charts and on the map.

WCDMA geo-location of pilot pollution allows areas where several cells are involved in overlapping coverage to be geo-located on the map, enabling engineers to determine if:

- Cells are providing coverage in unwanted areas and causing pilot pollution
- Wanted cell coverage will still be good if, for example, the polluting cells are down-tilted
- The reason behind pilot pollution is simply poor coverage

## FEATURES

### ADDITIONAL GSM OPTIMIZATION FEATURES

#### Cell Timeslot Monitor

The cell timeslot monitor allows the operator to view all of the timeslots of all of the channels allocated to a cell or sector in a pictorial view. Users can browse through each state (i.e., change in the slot usage for any channel) for the selected cell and monitor the content of each event; for example, signal strength of user equipment. Among the many other benefits, this allows the operator to dynamically show what actually happened when FR channels started to load the cell and dynamic HR adaptation stepped in, and provide input for multiband cell optimization. The cell timeslot monitor also includes a load factor, which makes it easy to identify when the cell had a heavy load.

#### Estimated Positioning

TEMS Visualization Professional makes it possible to display estimated positions of measurement results and events. This information can be used to identify where cells are covering too far and also gaps in WCDMA coverage (from positioning of incoming intersystem handover events).

#### Binned Maps

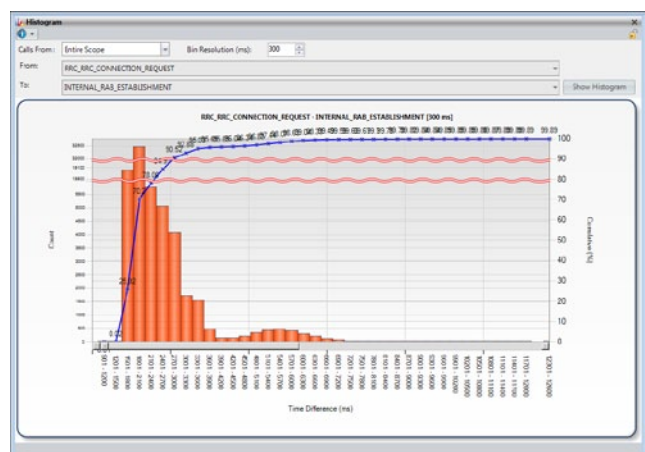
When estimated positions have been calculated, one or more databases can be loaded into the tool and binned maps created. These present the actual RF conditions and events as experienced by the live traffic in the network. Binned maps can be created for signal strength, interference, speech quality, traffic density, and traffic channel (TCH) dropped calls. A typical use case is employing the traffic density map to determine the suitability of investing in a new site in areas of poor signal strength.

#### Task Manager

Handling of OSS data is automated to improve efficiency when working with TEMS Visualization Professional. Tasks include connecting to different OSS or other FTP servers, downloading of OSS data such as recordings and configuration files, parsing of data into databases and cell files, archiving of old records for ease of use and storage, scheduling of all these tasks to automate the otherwise manual work, cleaning up old file download history and error messages, and deleting or saving old data.

### GENERAL FEATURES

- TEMS Visualization can take in the Bulk CM format directly from the Ericsson OSS-RC and store the required information in the project database. This includes neighbor cell relations and selection priorities and other cell parameters that the features require
- Any missing information, such as latitude, longitude and antenna direction, and beam-width, can be taken from a reference file
- TEMS Visualization includes the most widely used map engine in the world, MapInfo's MapXtreme®. This makes it possible to reuse all of the maps currently used in TEMS™ Investigation and MapInfo
- The functionality in the map view includes thematic mapping display from all of the advanced TEMS Visualization features
- TEMS Visualization makes it easy to differentiate on the map cells between different WCDMA carriers (UARFCN), LTE carriers (EARFCN), or GSM bands at the same site location. Separate display filters are automatically created.
- TEMS Visualization Professional uses the Microsoft® SQL Server 2008 R2 Standard database solution



All information is graphically displayed for easy analysis

TEMS Visualization is ideal for both troubleshooting of network problems and for regional optimization. The tool enables operators to achieve optimal performance from their network in the most effective manner possible, allowing them to improve network KPIs and reduce subscriber churn.

#### A REVOLUTIONARY SOLUTION

##### TEMS Visualization is:

- **Powerful** – Large volumes of data can be processed, and the application can be utilized remotely through the license checkout capability.
- **Efficient** – Data processing can be automated so that information is always ready to be analyzed when needed.
- **Intelligent** – Statistical data can be stored and analyzed over long periods, giving operators more confidence in their decisions.

#### NETWORK REQUIREMENTS

##### Ericsson GSM data source

- Ericsson GSM R-PMO 07A-G11B
- Ericsson GSM MTR 07A-G11B
- Ericsson GSM CTR 07A-G11B

##### Ericsson WCDMA data source

- Ericsson WCDMA GPEH P7FP-W11B
- Ericsson WCDMA UETR P7FP-W11B
- MRR-W in OSS-RC is also required for the RF diagnostics feature

##### Ericsson LTE CellTrace data source

- Ericsson LTE CellTrace L11B

##### NSN Megamon data source

- NSN Megamon GEO interface for WCDMA

#### NEW IN RELEASE 9.0

##### Ericsson LTE CellTrace Module (new support)

- Cell and cell group KPIs
- Call-by-call analysis, call drilldown and call search
- Exception analysis and overview analysis
- Sequence delay histograms
- RF analysis charts

##### Ericsson WCDMA GPEH Module (new or enhanced features listed)

- Cell and cell cluster KPIs
- Subscriber and subscriber group KPIs
- Phone model and phone model group KPIs
- Geo-location of dropped calls and pilot pollution events
- Dropped call analyzer
- Cell coverage optimization (overshooting cells and pilot pollution)
- Intra/inter-frequency neighbor and IRAT optimization
- HS data performance analysis
- RF diagnostics
- Capacity analysis
- User-defined queries
- Cell Performance Overview Report for GPEH

##### NSN Megamon Interface for WCDMA (new support)

- Call analysis and call-level drilldown
- Phone model KPI
- Exception analysis

##### General

- Reporting module for all data sources
- Soft key licensing and checkout