

APM™ | GPRS and UMTS

Network Assurance for Mobile Networks



Proactive Network Management Yields Significant Cost Savings and Revenue Benefits

Through the continuous monitoring of the quality of network entities and management functions, APM for Mobile Networks provides real-time indications of GPRS and UMTS network service performance degradation.

In turn, this proactive notification facilitates immediate problem detection and localization to the network entity and associated causes. These capabilities reduce the number of incoming customer complaints and minimize the time and costs associated with troubleshooting and repair.

A part of Tektronix' Unified Assurance offering, APM (Advanced Performance Monitoring) for Mobile Networks helps carriers increase wireless data service revenues while reducing operating costs and capital expenditures.

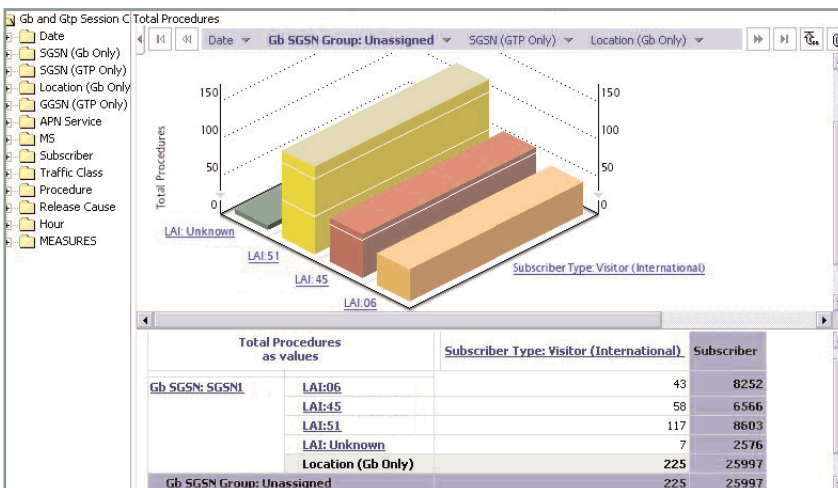
With Tektronix' GPRS and UMTS network assurance solution, carriers can proactively manage the quality and performance of specific network services and entities.

The same information used to increase network quality may also be used to prove superior performance both within a carrier's organization as well as with end customers.

Combining proactive network management with periodic quality reporting enables carriers to capture and retain more revenue from their customers.

Network Entities

- Handset, Cell, RAI, SAI, LAI, BSC, MSC, RNC, SGSN, GGSN, APN, Server, Interface



In this example of the Planning application, the distribution of SGSN and LAI Procedures for Visitors is presented in both tabular and graphical form.

In addition, UTRAN (Iub/Iur), GSM-A interface and UMA KPI packages are also available for comprehensive Mobile Network performance visibility.

UMTS IuCS KPI Package

- **RANAP:** RAB Establishment, Modification and Release; Iu Release; Relocation Preparation and Resource; SRNS Context Transfer; Data Volume Report; Security Mode; Reset; Reset Resource; Location Related Data; Information Transfer; Overload; Error Indication; Location Report Control; Paging
- **Mobility and Security:** Abort, Authentication, Detach, Identification, Location Update, MM Information and Status, MOCM Service and Service re-establishments, MTCM Service and Service re-establishments, TMSI Reallocation
- **Call Control:** Hold, Modify, Retrieve, DTMF, Status, Status Enquiry, Connect
- **ALCAP:** Establishment, Block, Unblock, Reset
- **Handover:** Directed Retry UMTS to GSM
- **Accessibility:** Call Establishment, Call Setup Success, Paging Success, Call Setup Time
- **Retainability:** Call Drop Rate, Call Release
- **SMS:** Mobile-originating and -terminating

Mobile Data Core KPI Package

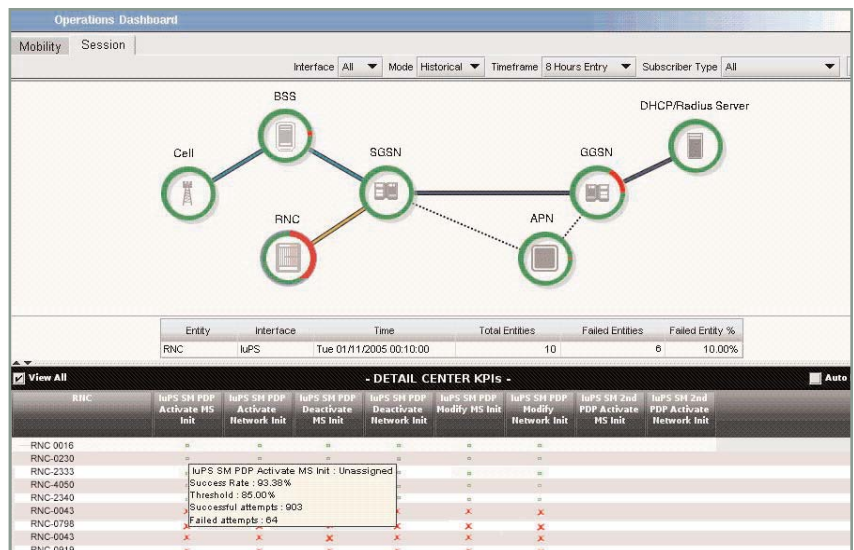
- **Mobility and Security:** (GTP) GPRS Context, Identification
- **Session:** (GTP) Create, Delete, Update, Session; (Gi) Radius Access, Radius Accounting, DHCP; (DNS) Total Queries, Latency Time

Real-Time, Actionable Path

Each management function (mobility and security, session, call control, sms, etc.) and protocol layer is individually monitored. All performance is compared to quality thresholds set by the carrier. When thresholds are exceeded, alarms and alerts are created for the function and the associated network entity is specifically identified. Advanced automated clearing options and variance thresholds further improve visibility and efficient alarm processing.

APM for Mobile Networks provides a real-time, actionable path from the alarming and alerting process to the facilitation of immediate problem detection and further localization to the network entity.

Additional advanced troubleshooting tools are accessible through web-based integration with the GeoProbe® System for session tracing and problem resolution. This unique interworking of Unified Assurance products enables carriers to run their business in a real-time and unified fashion across all relevant organizations and network technologies.



The Operations application provides real-time or historical notification of network service degradation through the Operations Dashboard



Flexible Historical Analysis

Network Planning and Optimization organizations benefit from APM for Mobile Networks' Planning application.

Through this application, analysis and trending efforts may be performed. Using the Online Analytical Processing (OLAP) tool, complex queries are easily performed with rapid response times.

Unified Assurance Architecture

Tektronix' Unified Assurance solution is based on real-time, network-level data collection from hardware probes.

- Data is collected from the control plane, not from the network elements.
- Allows the solution to present actual subscriber experiences.

Data Collection and Processing

The data collection and processing functions enable the monitoring of individual network entities and the creation of one record for each correlated network transaction occurring on a link. A correlated network transaction is defined as a query and its associated response.

These records are received, aggregated, processed and stored by the system to fuel a variety of real-time and historical applications.

Key Performance Indicators Indices

Network Element:

- | | |
|-----------|---------------------------|
| ■ Handset | ■ GGSN |
| ■ Cell | ■ APN |
| ■ LAI | ■ Gb Link |
| ■ SAI | ■ GTP Link |
| ■ RNC | ■ Gi Link |
| ■ MSC | ■ Radius Server |
| ■ BSC | ■ DHCP Server |
| ■ SGSN | ■ Core Network DNS Server |

Network Release Cause Category and Release Cause

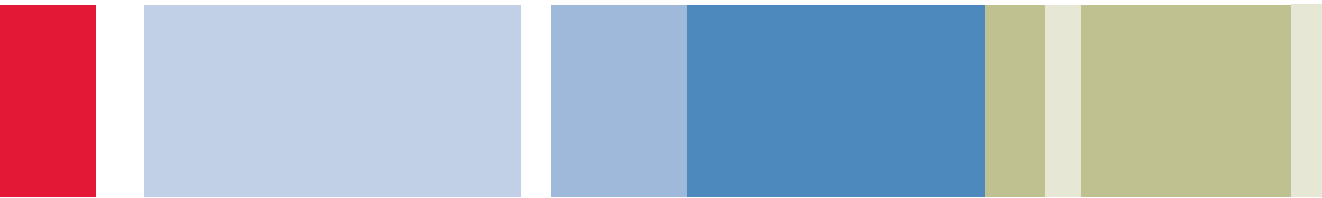
Extent of KPI Indices is dependent on network services and network entity

UMTS IuPS KPI Package

- **RANAP:** RAB Establishment, Modification and Release; Iu Release; Relocation Preparation and Resource; SRNS Context Transfer; Data Volume Report; Security Mode; Reset; Reset Resource; Location Related Data; Information Transfer; Overload; Error Indication; Location Report Control; Paging
- **Mobility and Security:** Attach, Detach, Authentication, Paging, PTMSI Reallocation, Identification, Service Request
- **Handover:** Intra- and Inter-SGSN RAU; Intra- and Inter-SGSN RAU 2G-3G; Directed Retry UMTS to GSM
- **Accessibility:** Call Setup Success, Call Setup Time
- **Retainability:** Call Drop Rate, PDP Retainability
- **SMS:** Mobile-originating and -terminating
- **Session:** Activation, Deactivation, Modification, Secondary Activation

GPRS KPI Package

- **Mobility and Security:** (Gb) Attach, Detach, Authentication, Paging, Paging Retries, Identification, PTMSI Reallocation
- **Handover:** Intra- and Inter-SGSN RAU, Intra- and Inter-SGSN RAU 3G-2G
- **SMS:** Mobile-originating and -terminating
- **Session:** (Gb) Primary and Secondary Activation; Deactivation; Modification; Session



Network Assurance for Mobile Networks

Tektronix' GPRS and UMTS solution provides the following information:

- How well mobility and security are being managed by the Gb, IuPS, IuCS, GTP and Gi interfaces in the network with respect to keeping handsets enabled for usage
- How well each session is being managed by the Gb/IuPS and GTP interfaces in the network with respect to the connectivity of handsets to the network when the customer or network initiates and is in the process of having a session
- How well session functions are being managed by the network with respect to Radius and DHCP transactions by Gi interfaces
- How well call control functions are being managed by the network with respect to IuCS interfaces
- How well SMS functions are being managed by the network with respect to UMTS interfaces
- How well ALCAP and RANAP protocol layer procedures are being managed by IuCS and IuPS interfaces

Network Assurance Packaging

Operations Application

Enables real-time and historical troubleshooting to the root cause.

- Real-time (5-minute), Hourly, Daily or Weekly Updates with Alarming and Alerting

Planning Application

Long-term OLAP Analysis and Reporting Tools

Management Reporting Application

- Top N (APN)
- Service Summary
- KPI Fault
- Release Cause Category Fault
- Release Cause Fault

About Tektronix:

Tektronix Communications provides network operators and equipment manufacturers around the world an unparalleled suite of network diagnostics and management solutions for fixed, mobile, IP and converged multi-service networks.

This comprehensive set of solutions support a range of architectures and applications such as LTE, fixed mobile convergence, IMS, broadband wireless access, WiMAX, VoIP and triple play, including IPTV.

For Further Information:

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology.

Please visit www.tektronixcommunications.com

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