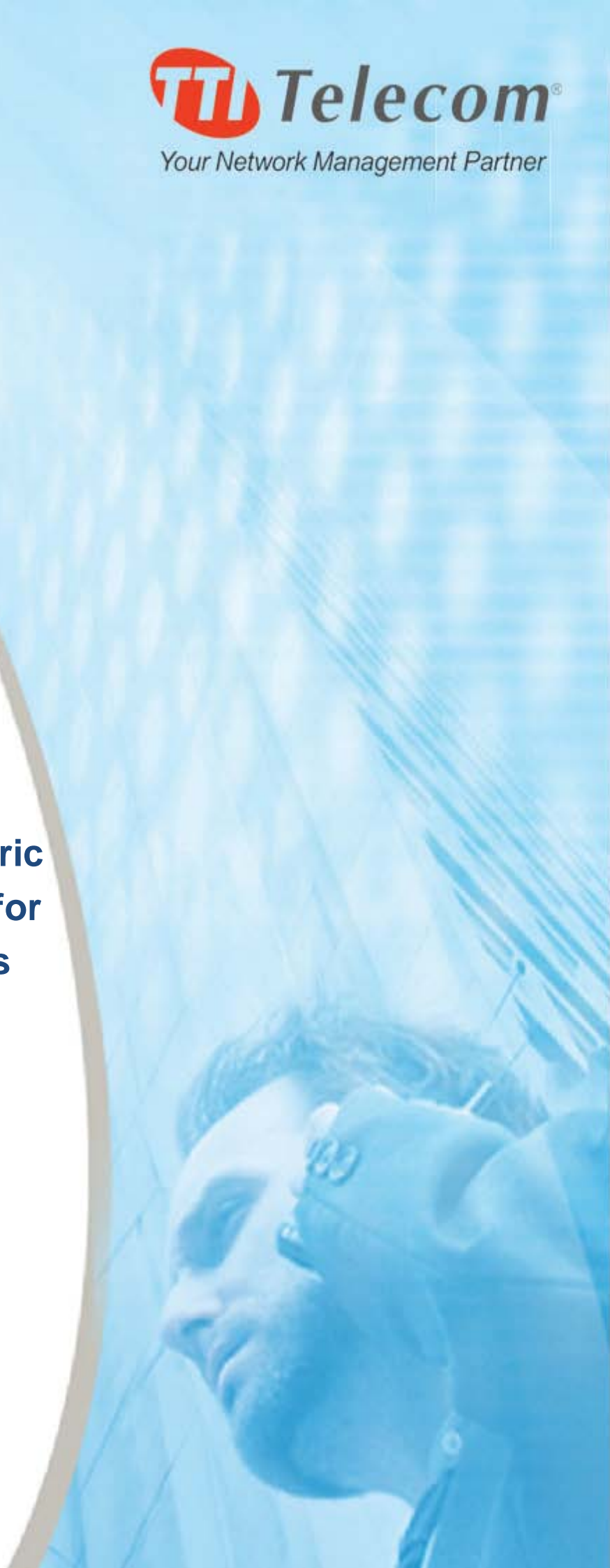


Proactive and Service-Centric Performance Management for GSM/GPRS/UMTS Networks

White Paper



The Challenge – Assuring Quality of Service (QoS) With Intelligent and Proactive Performance Management

Consolidation, technology challenges and competition create strategic challenges for wireless service providers of all sizes. These service providers are operating in an increasingly saturated and competitive market place where service differentiation, customer retention, and operational efficiency are key factors in reducing churn and increasing their revenue.

Mobile customers are increasingly demanding service availability, continuity, and consistency. They expect to have access to a wide variety of services all the time (24x7) and they expect their services to be stable and reliable.

Demanding customers, coupled with persistent competition puts pressure on wireless operators to deliver existing services such as voice reliably while they roll-out sophisticated and complex mobile services quickly to increase customer satisfaction in order to retain and grow a loyal customer base.

“Network quality is a major determinant in subscriber churn. Coverage, voice quality, call continuity, call blocking, and data transfer rates are metrics CSPs measure because consumer perception of each contribute to churn.”

OSS Observer

"One of the only ways customers can differentiate between providers right now is on pricing and on quality of service and that extends to voice, data and customer service. That's a big piece of the churn puzzle.

*Francis Sideco, Senior Analyst
Wireless Services, iSupply*

At the same time, wireless operators must also optimize their network and run their operations efficiently and seamlessly to deliver and maintain these services over complex multi-vendor and multi-technology networks that consists of legacy and Next Generation (NGN) wireless technologies (e.g. 2G, 2.5G, 3G, etc).

Service providers must focus on proactively improving their customers' service quality and availability and optimizing network performance to meet their bottom line goals - reducing churn, increasing customer retention, reducing the Time-To-Market (TTM) new services, and significantly improving cost savings. These are the key drivers and competitive weapons for acquiring the highest-bandwidth customers for voice and data services while retaining current customers and optimizing constantly changing network investments.

The traditional legacy network management systems, which focus primarily on internal network engineering and operations driven needs, are no longer sufficient to achieve these bottom line goals with the required customer satisfaction focus. The dynamics of today's telecommunications industry - deregulation, voice and data convergence, the internet effect, the multi-domain nature of networks, Service Level Agreements (SLA), and the drive to prevent customers from switching - have created new service quality issues and a much stronger need for network performance management and QoS.

Wireless service providers need a cost-effective, scalable, and proactive service-focused solution to manage and optimize their legacy and NGN wireless networks, to monitor network performance levels and guarantees related to QoS, and to set their customers' expectations. They need clear insights into the health of their network by evaluating network and service performance metrics. They need a solution which helps increase service availability, improve QoS and enables them to minimize any SLA (Service Level Agreement) violations.

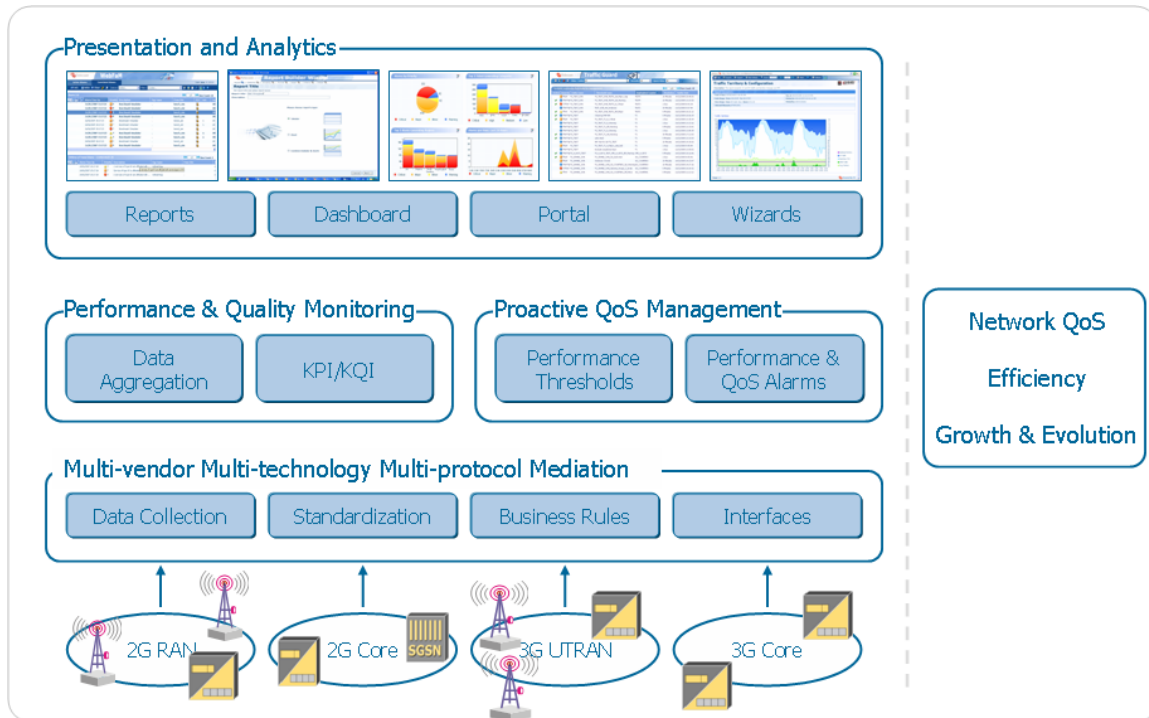


Figure 1: TTI Telecom's Service-centric Performance Solution Architecture

Solution – Benefits

- Reduce churn and increase revenue by improving service availability and QoS.
- Reduce cost by optimizing the network and minimizing customer service impact.
- Minimize SLA violations by proactively detecting and resolving service degradations.
- Integrate easily with existing OSS environments.
- Enhance operational effectiveness by focusing on key actionable information.

The Solution - TTI Telecom's Service-Centric Performance Management Solution

TTI Telecom's service-centric performance management solution is a competitive, cost effective, and a proactive service quality assurance and performance management solution which helps service providers in lowering churn and cost, increasing service availability, and includes pre-packaged (off-the-shelf) interfaces for key vendors and equipment types.

The solution is available for the following technologies:

- Global System for Mobile (GSM)
- General Packet Radio Services (GPRS)
- Universal Mobile Telecommunication Systems (UMTS)

The solution provides comprehensive support for radio, core, transport, messaging systems and other key components of the wireless network. The solution is tailored to meet the needs of operators of all sizes as well as those

that are migrating from other wireless technologies (e.g. CDMA) to GSM based technology.

Additionally, the solution's dashboards, reports, and custom alerts allow for detailed reporting and diagnostics. By utilizing the solution, service providers see a significant reduction in service impacting outages and an overall increase on service availability.

TTI Telecom's service-centric performance solution is flexible, scalable, reliable, and integrates six powerful components:

- Mediation Engine – A scalable and convergent, bi-directional mediation platform providing connectivity to the network.
- Netrac PMM – A performance management system.
- TrafficGuard - Thresholding tool for generating and managing Threshold Crossing Alerts (TCA) from performance measurements.
- PMM Reporter – A web based reporting tool for pre-defined and ad-hoc reports.
- WebFaM – A web based tool for displaying and managing performance alarms.
- Netrac Dashboard – A web based integrated tool which provides at-a-glance network health status.

Combining these pre-integrated products with a set of pre-defined technology packs for counters, Key Performance Indicators (KPI), Key Quality Indicators (KQI), reports and thresholds creates an unparalleled Quality of Service (QoS) monitoring and performance management solution.

The solution allows service providers to have 24x7 visibility and a "clear window" into their customers' service quality issues and related experiences. As a result, service providers can effectively track service quality which enables them to attract and retain individual subscribers as well as high-value business customers.

Overall, the solution helps optimize the customer experience, helps improve customer satisfaction, and enables operators to meet their bottom line goals - reducing churn, increasing customer retention, reducing the Time-To-Market (TTM) new services, and significantly improving cost savings.

Collect Comprehensive Multi-Vendor Performance Data

TTI Telecom's service-centric performance solution helps service providers in minimizing their operational costs by offering a robust and comprehensive way to collect and manage heterogeneous information.

The solution is distributable and has a scalable, multi-threaded and highly flexible mediation engine which enables operators to collect data from a wide variety of network elements and quickly adapt to frequently changing network environments. The mediation engine enables the implementation of business process intelligence at the network level and easily adapts to specific data structures.

The mediation engine uses pre-packaged (off-the-shelf) interfaces to collect, parse, and enrich network data and counters to prepare it for network and service performance needs.

The pre-defined content is based on industry standards and best practices, equipment vendors' recommendations, and leverages several years of TTI Telecom's experience and expertise in deploying Operational Support Systems (OSS) solutions for GSM, GPRS, and UMTS networks worldwide.

While TTI makes every effort to support new network equipment releases, the solution can be extended to help service providers adopt and integrate new technologies based on their own needs and priorities.

Standardize, Normalize and Aggregate Performance Data

TTI Telecom's service-centric performance solution intelligently normalizes and standardizes the data from the entire network into one generic format which can then be used by the system regardless of the original vendor equipment format. The data is also

automatically aggregated into hourly, daily, weekly, monthly and yearly categories to enable efficient storage and cost savings for longer periods of time without utilizing large amounts of disk space. These are critical functions which allow for the creation of cross-vendor performance reports for summarizing network information irrespective of the equipment vendor and type.

Another way in which the solution works with incoming data is to correct for missing data that may be caused, for example, due to an outage. In such cases, the solution can interpolate and populate the missing data when calculating KPIs and generating reports.

Without any inherent data volume limits and with the ability to scale simply by adding computing power as needed, the solution enables high performance data loading and scales and supports some of the largest networks in the world.

Gain Insights from KPIs and Reports

TTI Telecom's service-centric performance solution is a robust performance management system that uses advanced technology to calculate Key Performance Indicators (KPI) in order to provide clear insights into network and service behaviors. A wide variety of KPIs are provided with the solution covering busy hours, traffic trends analysis, and much more.

Comprehensive pre-defined tabular and graphical reports provide valuable decision making information. These insights are particularly powerful for small to mid-size wireless service providers because they can help avoid the need to invest in resources to generate these reports.

Wireless service providers can also use these pre-defined KPIs and reports to help reduce their capital investment costs in the network by improving the efficiency of underutilized network capacity and identifying unused or lost network resources.

In addition to predefined reports, the solution also has a report builder wizard which guides users to create new reports using any combination of grouping, summary, and criteria

on performance data. These reports can be generated once and reused.

Proactively Detect Service Quality Degradation Using Smart Thresholds

TTI Telecom's service-centric performance solution enables wireless operators to receive proactive alerts on potential service affecting network problems or service degradations so that they can resolve them before services are affected.

Wireless operators can define smart performance thresholds for Key Performance Indicators (KPI) such as network availability, error performance, call completion ratio and more. Based on these thresholds, they can measure network performance to targeted QoS levels. This is particularly important when targeting specific service level objectives tied to Service Level Agreements (SLA). As a result, the solution helps wireless service providers increase service availability, optimize revenue, and increase customer satisfaction and customer loyalty.

The solution comes with a set of pre-defined thresholds based on industry best practices. It also comes with an intuitive web-based Graphical User Interface (GUI) that allows users to easily create and administer the definition of thresholds.

Conclusion

Service providers face great challenges in the market place. As they introduce new technologies and services more frequently than ever, they need to respond quickly to evolving market requirements to keep up with their competition. Their key objective is to gain customer loyalty and preserve their existing customer base while creating new revenue streams and increasing their Average Revenue Per User (ARPU). It is, therefore, essential for wireless service providers to differentiate themselves from their competitors and continuously improve and add value in order to be rewarded with additional revenue streams. At the same time, they also need to cut their operating cost and increase their efficiency.

To meet these challenges, service providers need an effective and powerful service and performance management system.

TTI Telecom's service-centric performance solution is competitive, cost effective, and a proactive service quality assurance solution which helps in lowering churn and cost, increasing service availability, and includes off-the-shelf interfaces for key vendors and equipment types.

The solution also supports the flexibility and scalability needed to support customers' evolving requirements and enables future expansion as service providers penetrate new markets and add new subscribers.

About TTI Telecom

TTI Team Telecom International Ltd. ("TTI Telecom") (NASDAQ: TTIL) is a leading provider of next generation Operations Support Systems (OSS) to communications service providers worldwide. The Company's Netrac portfolio delivers an automated, proactive and customer-centric approach to service assurance and network management.

Anchored by market-leading service assurance solutions – Fault Management (FaM) and Performance Management (PMM) – that give customers an end-to-end view of their network, TTI Telecom's Netrac enables service providers to reduce operating costs, enhance profitability and launch new, revenue-generating services more rapidly. Netrac is compatible with multiple technologies and industry standards, and is uniquely positioned to bridge legacy, next-generation, convergent, and IMS Networks. TTI Telecom's customer base consists of tier-one and tier-two service providers globally, including large incumbents in the Americas, Europe and Asia-Pacific.

Contact Information

For more information about TTI Telecom products and solutions, visit www.tti-telecom.com or contact: info@tti-telecom.com.

All rights reserved by TTI Team Telecom International Ltd. (including its affiliates and licensors). The information, specifications and other materials contained in this document are general and subject to change without notice.

International Headquarters
Rosh Ha'ayin, Israel
Tel: +972-3-926-9700
Fax: +972-3-922-1249

North America Headquarters
New Jersey, USA
Tel: +1-201-795-3883
Fax: +1-201-795-3920