



# Enhancing the user experience, extending revenues and reducing operating expenditure:

The case for Service Quality Optimization in mobile networks



## **Executive summary**

An uncomfortable truth is emerging for mobile operators. Despite free offers to attract and retain customers, eye-catching promotions for advanced smart phones, SMS “for life”, and unlimited data packages, tariffs and service plans across mobile markets are broadly similar. Consequently, it’s increasingly difficult – and expensive – to establish clear competitive advantage.

With this in mind, service providers are refocusing attention on the subscriber experience. This recognizes that, in a crowded space, delivering stand-out service puts clear water between competitors. In response, vendors are pushing the case for a new Service Quality Management (SQM) methodology, designed to measure and improve the service experience. This paper reviews the trends behind SQM, outlining the core operational requirements that it must address. It moves on to set out Motorola’s approach, Service Quality Optimization (SQO), explaining how, by enabling service providers to “see” the service from customers’ perspectives, they can deliver unmatched service experiences; experiences that cultivate unquestioned customer loyalty, drive revenues, optimize network investments and reduce operating expenditure.

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## Definition of terms

Vendors are working on a range of SQM methodologies to provide more realistic insights into the performance of complex service environments. While several different definitions of SQM are circulating, which confuse debate, the compass of SQM in Motorola's view is quite simple. It's focused on understanding subscribers' experiences based on network, RAN and IP measurements, and simultaneously improving these experiences by using the data to tune the infrastructure and marketing processes. This leads to the following definition, which Motorola calls Service Quality Optimization (SQO):

"The process of determining the degree of customer satisfaction with the capability to interrogate groups, such as roamers and corporate customers, and even individual subscribers to prioritize problem resolution and make improvements across the OSS and RAN which improve quality of services."

This take on SQM underlines that subscriber dissatisfaction levels are independent of the technical cause of an issue: Customers don't care if a failed HTTP session is caused by an overloaded DNS server or poor RF conditions; while traditional network measurement tools would spot this particular issue, they would not uncover the scale of the impact on the customer. With Motorola's approach to SQM, benchmarking indicators reveal acceptable or unacceptable service conditions based on predefined measurements of the actual customer experience.

## Market overview: The customer service imperative

Exceptional customer service is more important now than ever because, as users seek deals, it's increasingly hard to establish leadership predicated on traditional strategies: be it altering tariffs, making handsets more affordable or extending the range of applications and services available. Conversely, by establishing best-in-market product performance, operators can differentiate their business by service quality.

Before service can be improved, it has to be measured. And as the industry reassesses the importance of the customer experience, it's clear that the "network-centric" way of understanding performance must be reappraised. The accepted FCAPS approach (whereby systems are monitored for faults, configuration, alarm, performance, and security) is focused on "health-checking" the network. The problem is that there are times when systems report that everything is working as it should while customers contact call centers with problems. At the heart of the limitations of network-centric monitoring are two interrelated issues: service diversity, and diagnosing and resolving problems.

### ***The killer customer experience***

With competition increasing and users becoming ever more reliant on mobile services that are indispensable in both personal and work environments, the industry's attention has turned to providing exceptional service assurance through remarkable levels of network quality. It's a drive predicated on a simple proposition: If pricing and products from competitors are similar, a great experience ensures customers have no motivation to look elsewhere. The "experience imperative" is a necessity succinctly articulated by T-Mobile's CEO, Hamid Akhavan. In an interview with Business Week<sup>1</sup>, he explained his company's drive to deliver ultra-reliable services which he termed "the killer experience" to customers with quality levels that are comparable to their landline broadband connection.

<sup>1</sup> <http://www.businessweek.com/mediacenter/video/innovation/738fbb4328c0b0bb77730d2639d22b2bbc874433.html>

- **Service diversity:**

The range of services available to subscribers is much more diverse. New services include instant messaging, MMS, mobile TV, and video conferencing, while enhanced data capabilities enable users to take every internet application mobile. Such is the breadth of data products available, there are many more opportunities for customers to raise issues about service delivery. Common complaints involve video download problems, slow internet access speeds, page load failures, and handset OS compatibility issues with certain content. Call agents must be trained in a broader array of skill sets. And service providers urgently require a more complete view of what's happening across their delivery platforms. This leads to the second problem – effective diagnosis and resolution of problems.

- **Effective diagnosis and resolution of problems:**

The integration of IP into mobile radio network infrastructure has simplified network development on the one hand but introduced challenge on the other. Service providers' equipment now interconnects with both partners and other telecoms companies' systems in a highly complex technical hierarchy. Many more points of failure have been introduced so it's much more difficult to pinpoint the source of problems and which team – e.g. RAN, IP, or core engineers – needs to make adjustments to successfully resolve the issue.

Other challenges have come to light too, which service providers desperately need visibility on. These include higher data usage, the need to optimize the roaming opportunity, ensuring that VIP customers receive a VIP service, and assessing service consumption and performance on shared networks:

- **Data-besity:**

The advent of generous data bundles has seen the emergence of “data-besity” individuals: customers hooked on seeing what “unlimited data” means. Their actions cause congestion and impair the experience for other users sharing the same cell. Greater visibility is therefore required on where and how data is being consumed. For instance, it's very useful for service providers to understand if a high data user is streaming media from legal sources such as TV playback systems or is abusing their connection by using peer-to-peer download sites. Equipped with such evidence, it's possible to downgrade the connection speed of peer-to-peer subscribers.

Data usage reports are also vital to effectively plan network capacity and review wider tariff and service agreements with data usage expected to rise sharply.

- **Roaming:**

Roaming is also a problem. While it's a great revenue source, accounting for an estimated 17 percent of income globally for service providers<sup>2</sup>, it's also a source of frustration. It's virtually impossible for many service providers to understand, diagnose and repair connection issues that may be stopping a high-value customer traveling abroad from accessing services – let alone being able to sort the problem very quickly. If the problem remains unresolved, due to the inability to diagnose the issue, revenue simply leaks away.

- **VIP customers:**

It's also vitally important to understand the service experience received by enterprises. VIP business customers are critical sources of revenue. As they embrace mobile data, many companies are demanding commercial performance agreements that promise similar performance to landlines. It follows that service providers must be able to trace and monitor categories of high-value customers to ensure they're receiving the expected level of service.

- **Network sharing:**

Increasingly too, companies are sharing and pooling network resources as evidenced by Vodafone and Telefonica's recent announcement they will share infrastructure across Spain, Germany, Ireland and the UK, extending an existing relationship beyond the Czech Republic. Where network sharing is in place, both service providers need to understand the quality of services received by their customers and whether network resources are being shared fairly.

<sup>2</sup><http://www.bharatbook.com/Market-Research-Reports/Mobile-Roaming-2006-2011-Increasing-Usage-And-Revenue-To-Counter-Regulatory-Burdens.html>

Across business and consumer markets, expectations of service quality are changing with users increasingly intolerant of experienced problems. It's important therefore for service providers to better understand the products valued by groups of subscribers and to invest in achieving superior performance to differentiate the business, and push for the goal of unquestioned loyalty that's so beneficial in a crowded and highly competitive arena. With these issues in mind, it's readily apparent that, in the multi-service, multi-network environment, a new approach to evaluating subscribers' true experiences is required.

## The industry responds: SQM

Service providers keen to assess how to deploy SQM can find guidance from the Telecommunications Management Forum (TMF).

The TMF recognizes that approaches to assessing service delivery must change. It states: "While some roll-up metrics related to networks are important, they are no longer enough for matching service quality to customer expectations.....To truly manage the customer experience, service providers have to build end-to-end views not only of the customer services consumed, but also of the procedures, behaviors, personal and social affiliations that define the consumer."

The Forum recommends that service providers move beyond measuring KPIs, which are network centric, to encompass Key Quality Indicators (KQIs). It defines these measurements as follows:

- **KPI:** "A measure of quality performance of network resources, e.g. a GPRS PDP context Activation Success Rate in areas where subscribers don't have direct visibility."
- **KQI:** "The measure of a specific aspect of the performance of a product, product components or service elements and is drawn from data from a number of resources."

While the TMF has not designed a standard, it has refined a set of advisory policies to define the scope of SQM, a framework for deployment and what to look for in vendors' approaches (the guidelines can be viewed at <http://www.tmforum.org/browse.aspx>). Even with the TMF's guidelines for SQM are to be welcomed, vendors are approaching SQM in slightly different ways, as discussed in section 5.

The explanation of KQIs emphasizes the importance of gaining a comprehensive view of the subscriber experience. In Motorola's view this is best achieved by integrating KPI and KQI measurements, which provide a complete understanding of the accessibility, retainability and quality of the customer service from users' perspectives.

| Subscriber Group | Date        | Time  | POP3 Downlink Goodput | POP3 Service Setup Time | POP3 Email Retrieval Time | POP3 Email Preview Time | POP3 Server Negative Response Ratio | POP3 Server Timeout Ratio | POP3 Success Polling Sessions | POP3 Success Retrieving Sessions |
|------------------|-------------|-------|-----------------------|-------------------------|---------------------------|-------------------------|-------------------------------------|---------------------------|-------------------------------|----------------------------------|
| Roaming          | 23 Oct 2009 | 10:00 | 175.023               | 1254.386                | 653.091                   | 64.412                  | 0.133                               | 0.024                     | 0.941                         | 0.841                            |
| Roaming          | 23 Oct 2009 | 10:15 | 174.583               | 1227.176                | 678.250                   | 65.000                  | 0.106                               | 0.024                     | 0.870                         | 0.300                            |
| Roaming          | 23 Oct 2009 | 10:30 | 174.100               | 1540.819                | 679.000                   | 65.690                  | 0.084                               | 0.048                     | 0.947                         | 0.870                            |
| Roaming          | 23 Oct 2009 | 10:45 | 175.570               | 1613.200                | 689.909                   | 52.059                  | 0.089                               | 0.067                     | 1.000                         | 0.830                            |
| Roaming          | 23 Oct 2009 | 11:00 | 173.236               | 1317.755                | 698.500                   | 66.290                  | 0.112                               | 0.020                     | 0.963                         | 0.850                            |
| Roaming          | 23 Oct 2009 | 11:15 | 173.898               | 1389.261                | 685.000                   | 65.526                  | 0.065                               | 0.033                     | 0.955                         | 0.900                            |
| Roaming          | 23 Oct 2009 | 11:30 | 173.552               | 1314.075                | 706.857                   | 63.000                  | 0.088                               | 0.025                     | 1.000                         | 0.850                            |
| Roaming          | 23 Oct 2009 | 11:45 | 174.821               | 1495.525                | 671.500                   | 63.750                  | 0.100                               | 0.050                     | 0.950                         | 0.860                            |
| Roaming          | 23 Oct 2009 | 12:00 | 175.125               | 1367.206                | 671.500                   | 61.957                  | 0.078                               | 0.039                     | 0.870                         | 0.890                            |
| Roaming          | 23 Oct 2009 | 12:15 | 174.532               | 1068.275                | 689.263                   | 60.484                  | 0.050                               | 0.013                     | 0.963                         | 0.840                            |
| Roaming          | 23 Oct 2009 | 12:30 | 173.870               | 1846.337                | 697.913                   | 61.000                  | 0.120                               | 0.072                     | 0.895                         | 0.830                            |
| Roaming          | 23 Oct 2009 | 12:45 | 176.263               | 1012.264                | 658.000                   | 58.636                  | 0.075                               | 0.019                     | 0.941                         | 0.800                            |

Figure 1: Traditional KPI analysis shows an overflow of network statistics

Traditional KPI analysis provides vast amounts of data points. While capturing the data has the potential to provide insight into network performance, its value is limited as it fails to show how KPS combine from different parts of the network to provide an overall subscriber experience. As a result, the network may appear to be functioning correctly while customers are reporting problems. For example, the KPIs shown just for email in Figure 1 are comprehensive but complex, and behind them are further lower level KPIs.

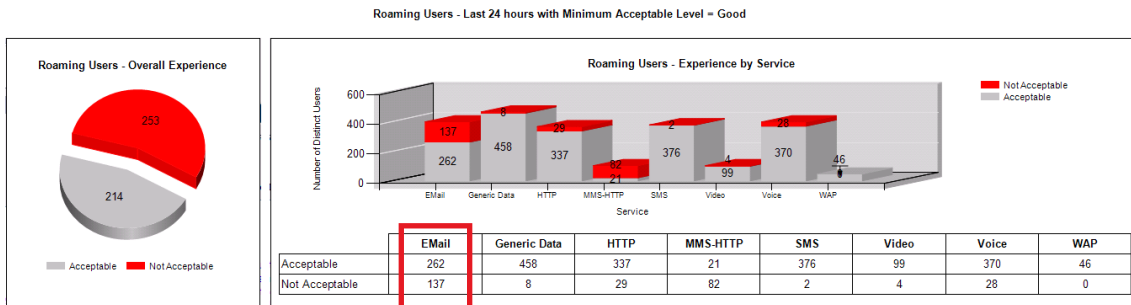


Figure 2: The SQO dashboard's KQI analysis shows subscriber impact

Motorola's SQO, with its KQI-focused analysis, provides insights into the actual service experience received by customers. Take for example a roaming customer. The KQI analysis reveals how many roamers are suffering unacceptable quality – both overall and for each individual service. So at a glance, it's easy to identify the service impacting the highest number of users. The analysis can be refined to pinpoint the aspect of the service and parts of the network causing the most problems to enable appropriate steps to be taken.

## Defining the optimum approach to SQM

Vendors with an IT or professional services heritage are applying their in-depth knowledge of OSS systems to detect faults. It can be argued that this version of SQM is simply a more advanced approach to current network analysis tools. Indeed, with Motorola, SQO has a wider remit, including in-depth analysis of both the OSS and the RAN to provide a comprehensive impression of where problems are occurring. The analysis is continuous. It ensures providers can proactively identify issues often before they become apparent to customers. Also, problems can be prioritized (e.g. faults impacting large numbers of customers are tackled first) and the root causes of issues are found faster so limiting customer impact. Motorola's SQO takes network optimization to the next level by combining best in class SQM practices with network optimization expertise.

## Motorola's SQM methodology - Service Quality Optimization

Motorola's SQO system is built around two tightly integrated components that work together simultaneously: data collection and data analysis.

- ### Measuring service quality – probe data:

Motorola's SQO data is collected by probe equipment which sits between the RAN and core systems. It surveys the network from the handset to the IP core, MSC, BSC, PDSN and GGSN, IP transport / backbone, and applications servers such as voice, email, and content servers. The probe is vendor and technology agnostic. Covering all 2G, 3G, 3G plus and 4G service layers, analysis is quickly tailored to the needs of each service provider. The SQM methodology applied by Motorola also covers partners' content systems and other networks involved in service delivery to build a complete picture of the subscriber's experience. In a typical network a huge amount of in-depth data is collated daily.

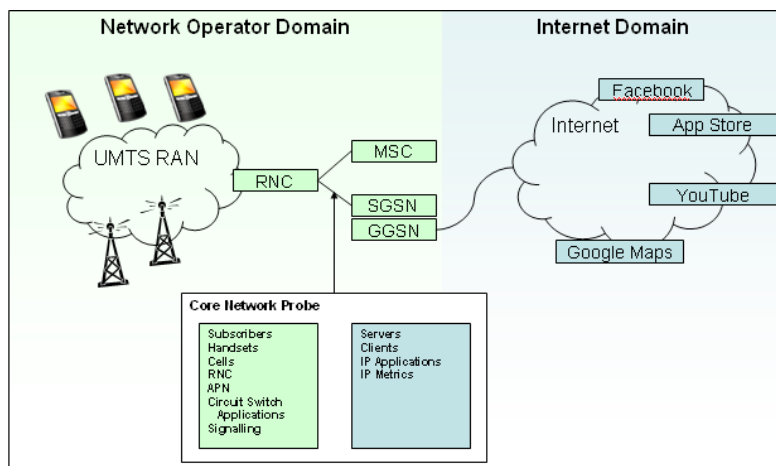


Figure 3: Motorola Probe Data Solution

Motorola uses probe data based on both the operator's domain (including handsets, RAN, core, etc.) and applications across the internet domain for the complete end-to-end customer service view.

- **Optimizing service quality – turning data into value:**

KQIs are applied to “wash” the constant stream of data. And, Motorola’s expert teams, schooled in radio access, core, IP and transmission arenas, recommend fixes to improve the customer experience. While other SQM products can detect network problems, companies whose skill sets emanate from IT networks or OSS monitoring lack comparable knowledge of the radio network to propose optimum RAN solutions.

Motorola’s SQO technology has been refined through detailed discussions with service providers and delivers several critical advantages.

## The business advantages of measuring and improving service quality

The volumes of data collated by Motorola’s SQO methodology are translated into intelligence to identify service issues, prioritize resolution, and make continuous improvements to the business. It can be applied by service providers at any stage of the life cycle: from new market entrants seeking to discover if the network is provisioned and performing as expected; to companies in high-growth regions wanting to understand the subscriber experience and validate that service quality expectations are being met; to operators with dominant market position in mature markets to protect their position through excellent QoS. The methodology can also be applied by service providers with network-sharing agreements in place to ensure resources are used fairly, and that customers are receiving the expected quality of service.

Insights into how to protect revenues, enhance the service experience, and reduce OPEX are best described through examples of how Motorola’s SQO Service is applied day-to-day:

- **Enhancing business performance:**

SQO delivers performance enhancements across the business. For marketing, it’s possible to trace data usage by handset so it’s easy to see which model is the most popular, develop and test new services for adventurous customers, track service spikes to campaigns, and prepare tariffs based on subscriber usage. Planning and optimization teams can understand true service quality, identify cells which require capacity increases, dive into the root causes of problems, and understand if a particular handset might increase demands on the network. Customer care teams can tie user complaints in to network performance, respond to service degradation before it impacts users, and direct resources to high-impact issues. And Chief Technology Officers can reduce mean time to repair, increase efficiency by focusing resources on high-impact customer issues, and differentiate the business by QoS. Put simply, with Motorola’s SQO, planning and network improvements are based on user evidence. This results in networks that are better designed, investment is optimized, and the customer experience subject to relentless improvement.

- **Foresight reduces OPEX costs and protects revenues:**

While Motorola can drill down to individual subscribers, a critical advantage of its SQM approach is the ability to shine a light on issues at the macro level. Analysis is presented on a dashboard measured against KQIs to indicate where problems are occurring, so raw SQM information is transformed into foresight which demonstrably improves commercial performance. For instance, a worrying trend – such as congestion building on a particular cell – can be resolved proactively before customers see a problem. Moreover, using the KQI data, it’s possible to prioritize service resolution on problems that impact large numbers of users or prime revenue channels. Motorola’s analysis reveals that using the predictive data of SQO will enable service providers to remove significant – up to 15 percent – traffic to call centers.

- **High-quality services for high-value customers:**

High-paying subscribers are high-value priorities – especially large business customers who expect the same highly reliable data performance from their mobile service provider that they receive from their landline connections. Service degradation must be identified fast and resolved. Applying SQO, KQIs of high-value customers can be measured to ensure targets are met. Any problems will be identified and adjustment schemes recommended to rectify the problem. For instance, where a company has a large number of employees in an office in an urban area, the SQO will show if local cells are providing optimum service and if capacity should be increased.

- **Tracing service issues:**

While the end-to-end service infrastructure is much more complex, SQO data can trace problems across the delivery chain ensuring that service quality remains consistently high. Take, for instance, an MMS service. Performance data is mapped onto service quality so if a group of high-value customers is experiencing issues, the KQI measures the success of the service and flags connectivity problems. The smart piece of the process comes through the capability of Motorola to recommend schemes that resolve the MMS problems.

- **Optimizing roaming revenues:**

Motorola SQO data transforms supposition about roaming problems into fact. With a complete picture of the service delivery chain, it's possible to diagnose and quickly resolve connection problems. For instance if a business user has a problem trying to access their email, SQO will trace the source of the issue – perhaps a DNS connection failure to the home network – enabling the DNS set-up to be reconfigured and the customer to pick up their mail. Motorola believes that SQO will transform the roaming experience to drive revenues.

### ***Driving revenues and enhancing service with Middle East service provider***

Motorola's SQO methodology has been trialed across a cross-section of subscribers by a Middle East service provider. The benefits being delivered are typical of the type of improvements seen when the methodology is employed. Customers who were monitored by the SQO system called the contact center around 40 percent less than their counterparts outside of the trial, call set-up success rate increased by 34 percent across the group, packet-switched radio access bearer set-up failure dropped by 50 percent, and the company projected "major" increases in its roaming revenues as 90 percent of roaming problems across the trial base were resolved.

These scenarios highlight just some of the many ways Motorola SQO enhances business performance through optimizing the subscriber experience. As service providers consider SQM deployment scenarios, the following section of this paper explains Motorola's perspective on the best way to implement the technology.

## Deploying SQO

Every service provider's environment, business objectives, customer profiles, and service footprints are of course different. With this in mind, while the service might be offered as a stand-alone product in future, Motorola expects to remain involved on a managed service level in overseeing SQO delivery.

The key reason behind this expectation is that SQO requires broad skill sets. Some of the core requirements demand that project teams tailor the solution to meet the needs of each network operator, have a detailed knowledge of IP the core and the RAN, develop KQIs that map to business need, test the SQM system, and ensure that probe data works with every device and across the network architecture. The relatively complex deployment forms the basis of the view that using Motorola, who is involved in SQM deployments day-to-day, will minimize risk during introduction while providing cost-effective access to analytical expertise. Furthermore, its team's capabilities in optimizing the RAN in particular are a core value-added element of the product, ensuring that schemes to resolve issues and improve the customer experience deliver improvements efficiently and quickly to provide the best return on investment.

## Summarizing the case for SQO

The customer has always been the key consideration for service providers – as aggressive price plans and free offers accentuate. However, standing apart based on price and the service portfolio is increasingly difficult. So with evidence consistently showing that customers who are happy with their mobile service will not jump ship if prices are comparable elsewhere, attention is focused on driving brand affiliation and loyalty through quality of service.

SQO is central to this drive. While “revolution,” “transformation,” and “new paradigms” are overused words within the mobile industry, SQO can rightly contend to be talked of in these terms. Applying simultaneous real-time analysis of the IP environment, RF and core networks, service providers “see” services from the customer’s eyes. The forensic level of intelligence provides the basis for mapping system improvements which deliver a range of advantages: from proactively resolving issues before they become problems, to ensuring enterprise and VIP users receive promised service levels, to lowering call center traffic by resolving issues which impact a large number of users, and ensuring that the drain from roaming revenues is turned around. In short, in the “new” world of customer experience management, SQO is set to play a key role in driving loyalty and extending revenues.





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