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	Service assurance in a mobile data network	<b>DOC. REF.: NI 1504-103</b>




## Service Assurance in a mobile data network.

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## 1. Abstract.

Mobile data Operators are under continuous pressure from market data services demand. It means Operators have to face a continuous and very fast evolution of its operations, affecting not only required network infrastructure deployments but also systems and processes, from commercial definition to on-line customer channel.

Fully and smooth integration of all the different elements and processes at any moment as the operation evolves is not easy to grant. There are occasions in which errors, problems or malfunctions arise, causing unexpected effects that may drive to users experiencing services different than the ones they have bought. Detecting these errors is a must to optimize operation ratios; doing it in a very early phase will allow the Operator to act before the error becomes a market problem affecting economics, image and customer satisfaction.

This paper refers to Service Assurance Monitoring, meaning a continuous surveillance service aimed to detect as soon as possible any difference between the expected service (the one defined in the commercial offer by the Operator) and the actual service experienced by the user, regardless its impact on the user data balance, invoice or satisfaction. The service will eventually become the basis for quantification of the effect, identification of its causes and remediation.


Telconomics Service Assurance Monitoring is constructed on Telconomic existing and market proven tools. It is a very simple non-intrusive way for achieving a strategic target for Operators: **“Deliver what you sell and get paid for it.”**

## 2. The issue of accurate service delivery: mobile data complexity.

In general terms, complexity is a quality of something integrated by many different elements that interact intricately to perform a given function.

This general definition of complexity is applicable to telecommunication networks in general and mobile data networks in particular. In fact, we could say a mobile data operation is complex not only in its topology (meaning the large amount of elements and technologies that configure the network) but also in its physiology (meaning all the logic and processes building up the operations upon those elements). We could even talk about a third level of complexity derived of the need of fast and continuous evolution, both in topology and physiology (meaning there is a continuous flow of new functionalities, some last long in the run while others are obsolete before they start running).

Then, is no surprise that, as a consequence of complexity, errors and malfunctions arise in the operation of mobile data networks in an unexpected time and shape, causing a number of unpredictable effects. Some of those effects will have an impact, either economical or on quality or both, on the service that is effectively delivered to the users, meaning the resultant service differs from the one defined in the commercial offer. Some of them will be easily identifiable, others won't. Some will be permanent or recurrent, others rather sporadic. Some will be quantifiable in economics terms; others will be reflected in churn ratios or customer satisfaction.

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The only thing they will have in common is that they are the unpredictable (and unavoidable) consequence of a complex operational system and will eventually drive to operational ratios erosion.

Maybe the most known of those complexity generated effect is revenue leakage, for which most operators have specific teams and tools in the so called Revenue Assurance services, trying to quantify and recover missing revenues corresponding to delivered services.

But there are many other unpredictable effects, some of them being suffered like a latent disease only noticed when the market penalizes the Operator on it. For example, according to Telconomics experience, mobile data networks unpredictably rejects a number of service requests from customers, the reason probably lying somewhere in the access network so the unattended traffic cannot be counted or identified in systems waters-up but can be detected and measured from outside the network; regardless the causes, this unavailability of service may or may not have economical impact but for sure it affects customer satisfaction.

**Telconomics Service Assurance monitoring will detect and quantify unattended demand, as well as many other unexpected problems that would remain hidden to other operational supervision and monitoring tools, but not for the market.**


### **3. The difference between Service Assurance and Revenue assurance.**

There is not a crystal clear definition for Revenue Assurance but a set of practices aimed to remedy the financial impact to the Operator of some operational issues. Again, there is not a clear model to state where to look at in the entire operation to identify those issues, but normally revenue assurance services focus on the chain from delivered services to money collection. As most reports state that the highest leakage is related to the flow of CDR's/EDR's, revenue assurance services *usually* concentrate in analyzing these flows from the Switch to the Billing engines.

There are a number of Revenue Assurance services and solutions in the market. In the case of voice services, there are well proven solutions while in the case of mobile data they are still a bit naïve. In any case, Revenue Assurance solutions are looking into a complex system in itself, which is the part of the operation that should convert certain registers following the delivering of a service into a rightful invoice. But still this is a small part of the entire operation and it is analyzed from the inside of the network. So, revenue assurance services are network intrusive services with a good reputation to recover non-invoiced services, mostly voice related, and detect certain levels of fraud.

Service Assurance Monitoring, as delivered by Telconomics, is not an auditing service of any specific part on the network, but a service delivering a holistic view on how efficient the operation is in delivering to the users the services that have been defined in the commercial offer (and sold accordingly) and how efficiently are they eventually invoiced.

Therefore, Service Assurance is not a substitution of Revenue Assurance but a tool to identify any deviation from the commercial offer to the corresponding invoice. Thus, Service

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Assurance is not about auditing information flow within the operation but about non intrusive auditing of the entire operation as it is experienced by a user.

This conceptual difference of service auditing from the user experience makes Service Assurance Monitoring a powerful tool for the Operator, not just to help recover non invoiced services but to increase the quality perceived by the user and consequently its satisfaction and its potential to generate new revenues.

**Telconomics Service Assurance Monitoring is a market proven service based on well proven Telconomics INTEF tools and services.**


#### **4. Implementing Service Assurance Monitoring.**

As commented, the innovative approach of Telconomics to Service Assurance Monitoring consists in auditing the entire network from the user perspective. The service is based on Telconomics SONEF tool which consists in a client-server application running on market available devices as well as collecting all the information that the operator generates related to the services running in those devices, like sms notifications and web based customer information. Processing all that structured and non structured information will result in a real “photo” of the extent to which the service experienced by the user matches the commercial offer and to which extent is correctly invoiced.

Then, the value of this innovative approach is that the assurance service is abstracted from the network, while it covers the whole customer experience chain, from service contracting to invoice reception, as experienced by end user devices and services. That is a relevant difference with traffic generators and other lab-test based tools often used by operators to check services.

Provided mobile data networks are complex in topology, services and processes, Service Assurance Monitoring has to be based necessarily on statistical processing. It means the widest the sample size monitored, the most reliable, significant and consistent the results will be. Sample size will be defined by the combination of network scope (how many and which locations or itineraries where to run the application), services scope (how many and which services to be monitored) and time scope (for how long the monitoring is to be run). Geographical scope is necessary to detect if services and errors behaves differently in different topology areas (different regions, different technologies, etc). Data services scope is necessary as the whole technical, commercial and process chain may be completely different for different services (prepaid, postpaid, etc.). Time scope is necessary as errors may appear randomly or periodically or at a given moment (at the end of the billing cycle, etc.).

Time scope for the service has another very important point to consider. The service can be run for a certain period of time, from days to a number of complete invoicing periods, depending on the statistical stability we want to have in the reports. That is a “one shot” service, “photo” like, reporting the revenue assurance status for the period considered. Eventually, the service is to be repeated, maybe focusing on certain aspects, so the effect of taken actions can be noticed. But as important or even more than getting a certain picture of the service assurance status is the ability of the service to issue “early warnings”, consisting in just in time alerts at the moment a certain deficiency is detected. That’s especially important for services updates or changes and for new services launch, as service assurance monitoring

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will generate a warning on an issue as soon as detected giving the Operator the opportunity to take actions before it grows up to become a relevant financial or quality problem.

In any case, once the whole scope of the service is defined, is a question of days to get the service up and running and then producing automatic periodical reporting, ad-hoc in time reporting and early warnings, all of it managed with no intrusion in operations and no need for operator's resources. Scope of the assurance service can be expanded at any moment so more places, services and processes are monitored. Again, this can easily be done, with no implication of the Operator; assurance monitoring will be producing the same type reports and early warnings.

Thus, running Service Assurance Monitoring by Telconomics will mean a unique tool for letting the Operator to know how good it is in the process of delivering and invoicing efficiently its commercial offer as well as in detecting (and eventually solving) unexpected inefficiencies in that process.

**Service Assurance Monitoring is a module within Telconomics INTEF services. Implementation, running and reporting are customized after operators specific needs.**


## **5. One step further: fault diagnosis and remediation.**

So far we have considered Service Assurance Monitoring as such, meaning a tool to identify inefficiencies in the entire process from commercial offering to revenue. That in itself is a very important output to audit operations and quantify those inefficiencies so they can be converted into financial and quality ratios.

But there is much more to be based on Service Assurance Monitoring. Following an error identification, next step has to be identifying source(s) and cause(s) and then taking actions to prevent it to happen again.

Service Assurance Monitoring reports can drive almost immediate actions to take in those cases in which the error points out a clear source in itself; for example, if invoices reflects consistently an error in rounding numbers. But in most occasions, errors and malfunctions will have not so clear sources and causes, therefore a deeper analysis, we call Fault Diagnosis, has to be done. Following the complexity of the network, the source of error can be any element or entity within its topology and physiology, therefore, Fault Diagnosis should be looking at the entire thing. It means collecting information from a huge number of system entities and a huge number of customers, in the very extreme, the whole operation and the whole installed base. That can be done, though two new conditions have to be taken into account. Collecting information from the network entities is necessarily intrusive and processing massive information from many different sources will require specific data processing capabilities. Once it is done, rightful interpretation will help to take the corrective actions for Remediation.

Telconomics Service Assurance Monitoring is ready to get integrated into a Fault Diagnosis and Remediation Service, though description is out of the scope of this paper.

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## 6. Conclusion.

Mobile data are complex systems. As a consequence of it, errors and inefficiencies will unpredictably and unavoidably appear all along operations. Those errors affecting the customer chain from service contracting to invoice will have a financial or quality impact or both in operator's business ratios. Detecting them as soon as possible, and eventually solving them, is a must for operators.

Telconomics has developed a number of tools and processes aimed to take the most out of the Operator's network. Among them, Service assurance Monitoring will let operator know to which extent its operations responds efficiently to what its customers expects according to the commercial offer. And this is done under the customer perspective, abstracting from the network, with no intrusion on operators assets or activities and no consumption on its resources.

Thus, Telconomics Service assurance monitoring will eventually become a unique instrument for achieving a strategic target for Operators: **"Deliver what you sell and get paid for it."**

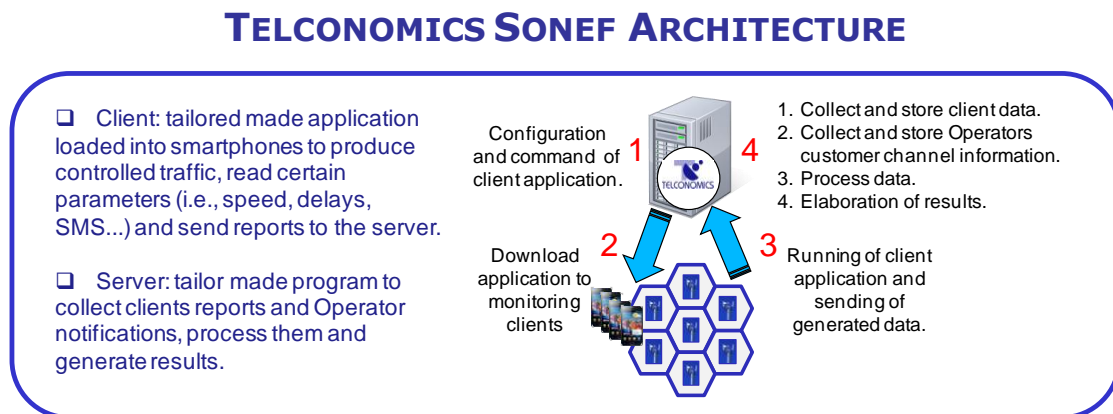
More info at: [www.telconomics.com](http://www.telconomics.com)

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## 7. Annex: Implementation of Telconomics's Service Assurance Monitoring.

The following figures show a typical implementation of Telconomics Service Assurance Monitoring. Implementation is customized to operator's preferences.

Figure 1: Telconomics SONEF (a module of INTEF) layout.



- SONEF is a proven tool consisting on a client-server architecture for remote and unattended management of an unlimited number of smartphones running a tailor made application.
- SONEF can be run to obtain many end user like experiences, i.e., quality of service, fault reporting, **service assurance** and others.

Figure 2: Telconomics Service Assurance Monitoring layout

