



# Intelligent Service Assurance in 3G

*It's a key differentiator!*

Intelligent Service Assurance in 3G: It's a key differentiator.

August 2001

©2002 Aran Technologies Limited.

All rights reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language, in any form or by any means, electronic, mechanical, xerographic, optical, magnetic, or otherwise, without prior written permission from Aldiscon.

Printed in Dublin, Ireland.

The information furnished herein is believed to be accurate and reliable. However, no responsibility is assumed by Aran Technologies for its use by any means whatsoever, nor for any infringements of patents or any other rights of third parties whatsoever resulting from its use. The information contained in this document is subject to change without notice.

All rights conferred by the law in relation to trademarks and copyrights and by the virtue of international trademarks and copyright conventions are secured to the owners of the trademarks used within this publication. Reproduction requires the prior written consent of the trademark owners.

---

Contact Details:

Gus Collins,  
Aran Technologies Ltd  
Blackrock Business Park,  
Carysfort Avenue, Blackrock,  
County Dublin, Ireland  
Tel. +353 1 210 0144  
Fax +353 1 210 0102  
Email: [gcollins@arantech.com](mailto:gcollins@arantech.com)

Scott Wilkinson,  
Aran Technologies Ltd.  
Blackrock Business Park,  
Carysfort Avenue, Blackrock,  
County Dublin, Ireland  
Tel. +44 7813 832 672  
Fax +353 1 210 0102  
Email: [swilkinson@arantech.com](mailto:swilkinson@arantech.com)

## Introduction

Never before has the telecommunications industry faced such an opportunity that is Third Generation Mobile Telephony. 3G is the convergence of mobile, telephony and information systems which promises to change people's lives by enabling them to access information when, where and how they want. This is the world of mobile multimedia. It will be a revolution in communications that has the potential to change all our lives. However there are huge challenges for the players in the mobile telecommunications field as they rollout and deploy 3G mobile networks and services, both from technological and economical point of view.

The key challenge operators face is the development of value added services for their customers. These services will create the communications revolution and complement the existing mobile communications experience we are all used to today. For the operator this will mean attracting large number of customers and securing Average Revenues per User, (ARPU), levels that deliver their 3G business cases.

Once these services have been created the key challenges are ensuring the customer experience is a quality one and ensuring that the services can be delivered to the market quickly and efficiently. How the operator builds its Service Assurance capability will be central to delivering on these challenges. Aran Technologies provide solutions for operators that deliver accelerated Time to Market and a Quality Customer Experience for 3G. These are delivered through our Intelligent Service Assurance products that complement partner offerings to provide an end to end solution. Aran's products can be integrated into an Application Integration Frameworks, (AIF), environment to allow management of the user experience based on defined business processes.

Adding Intelligence to 3G Service Assurance allows not only the customer experience to be measured but also when this is not satisfactory allows the cause of the problem to be determined and action taken in an efficient way. It is only with this kind of capability that the customer experience can be truly assured in 3G.

## 3G Service Assurance

3G service assurance must move away from the technology oriented and bottom up approach of 2G and focus on the customer experience, i.e. a customer centric approach. The starting point of this approach is a Quality Customer Experience. Everything else leads from this.

This Quality Customer Experience can be achieved through:

1. Measuring it, understanding what is acceptable quality
2. Identify Customer Experiences of poor Quality
3. Determine what parts of the network is causing this experience
4. Act in this part of the network to secure the quality
5. Over time take pro-active action to ensure poor customer experiences do not occur

Achieving this Quality Customer Experience is a huge challenge that has not been addressed in 2G. It requires an end to end solution that addresses not only the new customer centric business focus of 3G but also a technology environment of greatly increased complexity. Because of this complexity and today's multi-vendor strategy of operators no one supplier can provide a total solution for 3G Service Assurance. Aran Technologies have focused on the key areas of this solution not properly addressed in the market that when combined with partner and other supplier offerings can deliver on this total business need.

### *Measuring the Quality Customer Experience*

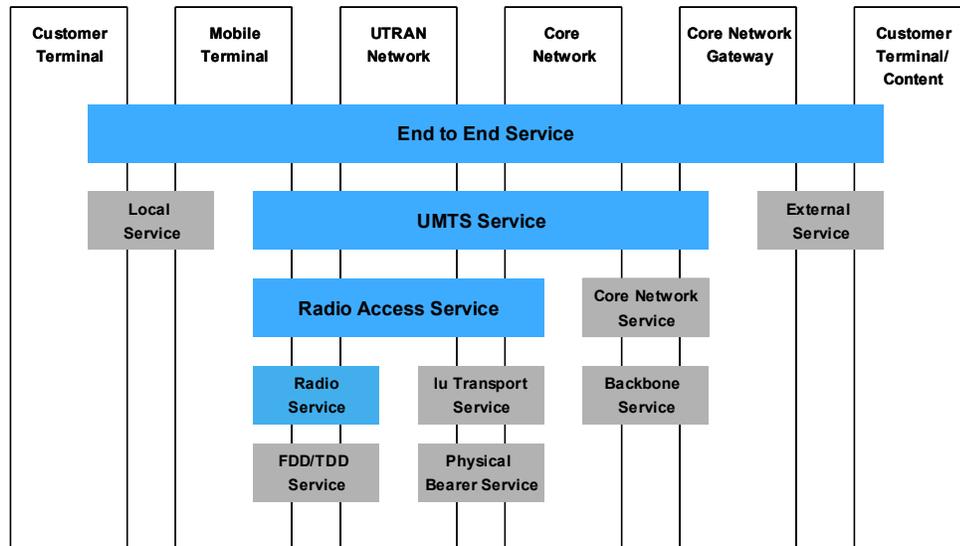
The Quality Customer Experience is a measure of perception not technology. It is how happy the customer is with the quality of service they experience. To be a practical tool for managing a network this must be translated into measurements that capture this experience. These measurements can be broken into two categories and might be as follows.

1. Information Integrity
  - a. Relevance
  - b. Currency
2. Quality of Service
  - a. Speed
  - b. Service Availability
  - c. Robustness of Service
  - d. Voice Quality (for Voice Service)

The information integrity part of the measurement is implemented at the content source through personalisation and content auditing processes. The Quality of Service measurements are end to end and involve combining measurements of the different bearer services used in the delivery of content to or between customer terminals.

Figure 1. shows the QoS architecture as defined by the 3<sup>rd</sup> Generation Partnership Project, 3GPP. The end to end service is divided into the UMTS service, External Service and the Local Service. In most cases the local service will not exist as the Customer terminal equipment will be combined with the Mobile terminal. The External Service may be using several networks like dedicated data networks or other UMTS networks.

The UMTS service is in turn broken down into the Radio Access Service and Core Network Service. The Radio Access Service is then further broken down into the Radio and lu Transport Services.



**Figure 1. UMTS QoS Architecture**

The end to end QoS measurements can be established by combining the underlying service statistics for the different service classes. A major focus of standardisation work today is to establish mechanisms for negotiating QoS levels across the different domains. Providing observability of end to end QoS involves monitoring how successful this negotiation is and if the QoS negotiated can be consistently delivered, particularly over the Radio Access Network. Aran Technologies provides end to end observability of QoS Measurements and provides detailed observability into the multi-vendor Radio Access Network. These are combined with the Core and other service statistics at the Business Management level of the Management System architecture. Aran provides detailed support for the Radio Service, as this is the main unique component of 3G UMTS and by far the most complex.

***Identify Customer Experiences of poor Quality***

Once the measurements of Information Integrity and Quality of Service are established then it is necessary to set QoS thresholds for the measurements. These thresholds will differ greatly depending on the Service class the customer is using.

The Quality of Service classes in 3G are:

1. Conversational Class, (Voice calls)
2. Streaming Class, (Streaming Video)
3. Interactive Class, (e.g. Web Browsing)
4. Background Class, (e.g. background email download)

A product a network operator might offer to their customers may use one or more of these classes. Therefore the QoS measurements must be done for each of the QoS classes and may have to be combined to give the QoS for a subscriber product. Once the thresholds are defined then poor quality can be identified for individual customers, customer groups or locations for each or all of the Quality of Service classes or subscriber products.

To determine QoS measurements for customers or customer groups then customer usage data must be combined with the bearer service statistics shown in Figure 1.

Aran Technologies achieve this through analysis and correlation of customer usage data accessed through Call Data Records and Billing Records with Bearer Service statistics. These can be correlated using location/ and time, which are common to both data sources and the subscriber number for detailed correlation through traces.

***Determine what parts of the network is causing poor Customer perception***

Once poor Quality of Service is identified then it is necessary to identify the network domain that is causing the poor quality. This is largely achieved through fault management systems. Faults in the network however must be associated with the QoS problem. This can only be achieved by correlating the performance statistics with the faults in the network. In some cases faults are generated by statistical Key Performance Indicators, (KPI), limits being exceeded whereby these faults can relatively easily be correlated to the customer experience. However in many cases this is not so straightforward as the faults might represent equipment failure in some part of the network that has an indirect influence on QoS.

Aran Technologies provide an advanced analysis capability that allows faults to be correlated to the end user QoS experience. This allows the domain of the network that is causing poor end customer experiences to be identified.

***Act in this part of the network to secure the quality.***

Once the domain of the network is identified that is causing the problem then it is a specialised task to identify the detailed cause and correct it. Within a network operator there will be resources concentrating on different aspects of the network and it is their role to ensure that any contributions of poor Customer Experience of QoS caused by their part of the network is quickly corrected. These resources will have specialised tools to support them in this task and will rely of experience of similar domains used in 2G.

However a major new domain is introduced in 3G, which is the Radio Access Network. This access network is based on W-CDMA, a new radio communications technology that to date is un-proven but has outstanding potential in terms of the capacity it can achieve and the flexibility in terms of QoS levels and bandwidth combinations that can be offered. Because on the high complexity of this new network domain, it represents the biggest challenge for network operators to diagnose and correct problems. Also because this network is distributed geographically and based on an unpredictable radio environment it will be the most likely contributor to QoS problems.

Aran Technologies provide a multi-vendor solution for W-CDMA RAN Diagnosis and optimisation. This solution is focused on allowing the end user experience as controlled by the RAN to be modelled through Key Performance Indicators, KPI's. It also incorporated a configuration management capability that tracks historical configuration changes. Our analysis toolkit allows accelerated learning of W-CDMA networks behaviour as it relates to delivering Customer QoS. A key challenge in the RAN is managing the vast amounts of information available from it. The product allows the Operator to focus on the end user rather than the technology of the network by automating the information collection and management process.

***Over time take pro-active action to ensure poor customer experiences do not occur.***

Effective management of a network to deliver a Quality Customer Experience involves more than monitoring and reacting to performance problems and faults. To really meet and exceed customer expectations it is necessary to be proactive in ensuring QoS levels are consistently maintained. This means capturing and using historical experience to ensure that past problems don't re-occur and new ones are prevented. This is particularly relevant in the 3G W-CDMA RAN where this technology has never been deployed previously.

Aran Technologies W-CDMA Diagnosis and Optimisation solution captures historical performance and configuration of the W-CDMA RAN. This is used to build a knowledge center of W-CDMA behavior that allows Network Operators to use this knowledge and learning, captured in software, to proactively prevent problems in the network that might affect a Quality Customer Experience.

## **Conclusion**

3G Service Assurance will be driven by business needs rather than the technology approach of 2G. Fundamentally 3G service assurance is about ensuring the customer has a quality experience when accessing 3G services. This is particularly important initially where the Network Operators brand and the reputation of 3G are at stake.

For 3G service assurance to be successful it must be more than just monitoring the network. The solution must combine this monitoring with capability to allow the operator to understand not only what has gone wrong but why and how to fix it. It also must allow the operator to be pro-active in ensuring problems do not occur. Aran Technologies address this 3G need by adding Intelligence to 3G networks through its analysis based product suite. This product suite is specifically focused on the new problems of 3G and the challenges of the new technologies that are being introduced.

## **Aran Technologies offerings: Adding Intelligence to your Network**

- Address the needs of an end-to-end Service Assurance solution provider or Network Operator
- Concentrates initially on a multi-vendor W-CDMA RAN
- Includes full Performance and Configuration Management
- Includes capability for accelerated Learning and Analysis Toolkit
- Correlates the subscriber's perception with fault and performance information
- Allows diagnosis and debug of QoS problems
- Allows the effect and revenue impacts of new and existing products and services to be tracked
- Allows the revenue and capacity impacts of new products and services to be predicted and modelled
- Mediates and manages 3G Performance and Configuration data within an Application Integration Framework 'Manager of Managers' architecture
- Supports Enterprise Application Integration (EIA) messaging bus technologies such as Vitria, Tibco and BEA