

TELCORDIA TECHNOLOGIES  
ESRI 2003 USER CONFERENCE



# GIS: AN ACTIVE COMPONENT OF MOBILE OPERATORS OPERATIONS

---

## ENABLING TECHNOLOGY

MATTHEW HERDLEIN

TELCORDIA TECHNOLOGIES

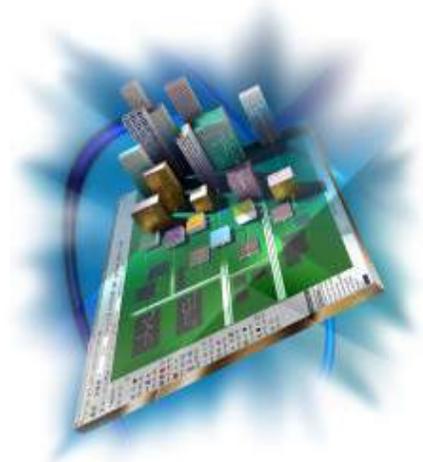
8:30 AM-10:00 AM, ROOM 32-B (SDCC)

---

## Introduction

The mobile communication over last five years has continued on a relentless path into the mainstream, causing operators to rapidly expand their network infrastructures. At the same time, mobile operators are being impacted by falling prices, growing traffic, emerging 2.5G and 3G technologies, packet networks, and new competitive pressures. This White Paper examines how GIS is being used in mobile network operation to assist with the management of networks that are growing in cost and complexity. The focus will be on how using GIS is an enabler to ensure profitability and commercial success.

Extensive technology upgrades and competitive trends in the communications industry are increasing service provider's reliance on Operational Support Systems (OSS), as a means to extend their competitive edge. The growth of mobile communication, Internet and the convergence toward IP-centric multi-service networks has driven Operators to pursue, extend and adapt OSS architecture. A new fundamental component to these architectures is GIS. GIS provides a valuable component for increase accuracy of planning, procuring and designing and maintaining services for the network. Operators are using GIS to thwart the ever-present threat of competition and deliver broad ranging customer-driven services efficiently and effectively. GIS will be used as an enabler to take aggressive control of their network management processes.



The management of multi-service networks represents the greatest challenge due to the flexibility in supporting the widest range of services, which can include high-speed Internet access, voice, and data services such as, video or other streaming services. The challenges have never been so dynamic or the opportunities so interdependent.

Solving many business challenges of the Operators requires a sound understanding of the network (planned, designed and provisioned) and the customer's requirements on facility utilization. GIS provides a valuable service to an Operator by providing exact location point of reference-which enhances the network data set. The improved data set enables a more accurate view of the network, which allows for

in-depth analysis, and management of network plans and operations, customer care, marketing and sales processes.

### **A GIS Start**

Operators begin the drive for service with the following functions : network planning, engineering, design, provisioning, and network maintenance, which together provide a revenue producing service. This is a significant effort to bring a service to their client base. If GIS is used as an active component in the operations, it will help automate and assist on the capitalization of the Operator's investment. Today's technology allows an Operator to maintain physical and logical network store in one database and offer enterprise-wide client/server-based access of that data. This fundamentally changes the work-order processes, allowing individual engineers to retrieve and review exact base station locations, configurations, leased line segments, switches, and access points. GIS enables the integration of market analysis, network planning, design, inventory management, auto-discovery, assignment, configuration and activation.

### **GIS for Decision Support and Operations Management**

Fierce competition forces companies to plan, build, and maintain their networks in a more cost-effective manner while still providing optimal quality to their potential and current subscribers. GIS will assist the mobile industry in meeting these seemingly conflicting goals. GIS makes design, development, and maintenance of the network significantly easier. GIS as a base can provide input, output, and visualization of proposed antennae, predicted signal strength, and summary statistics of coverage areas. This information is stored and distributed using a corporate, industry-standard database. GIS in the area of marketing and customer care applications are excellent examples of how GIS can enhance the quality of information throughout an organization. Both marketing and customer care combine up-to-date coverage data with demographics, trouble tickets, call history, and revenues using a GIS.

Traditionally, GIS data and modeling analyses has been used to plan wireless communication systems but never used as a mainstream OSS enabler. Today due to the increased complexity of the networks moving from second-generation mobile architecture to third generation, Operators have begun to experience the pain of having to manage multiple technologies and the equipment to support those technologies in a more aggressive manner.

The new equipment being put into the network is more complex and requires tighter management to receive the benefits. This coupled with the demands of subscriber growth; churn and new service offering are moving Operators to adjust their processes and look for new operational support systems to cope with the new business demands. An example is the push in the 90s in mobile industry around location-based services, GIS was brought to the forefront. Because of the early exposure, Mobile Operators are much more mature with GIS commercial use and value. The focus was initially on the subscriber, now GIS is poised to move to the back office.

### **Business Value**

The following operational scenarios illustrate GIS being used as an enabler to streamline operations, reduce churn and increase revenues.

Within a mobile operator their call center activity is mainly contained into two areas 1) Handset related enquiries 2) Call activity problems (i.e. dropped or interrupted calls related to coverage). While only a minimal set of the call center calls are call activity problems it equates to largest amount of churn based on customer satisfaction.

Very often there is a significant delay between the issuance of a trouble ticket and the time the network operation center picks it up for resolution. In addition, since the information captured by the call center is insufficient in-terms of exact location of the customers experienced problems, it will be hard to determine if this problem was caused by poor coverage or was related to any network events. Hence most of such trouble tickets are discarded.

Many operators have realized that the inability to proactively resolve customer trouble is regarded as 'poor customer service' and is one of major contributor to churn.

Using GIS enabled network management; the scenario would work as follows:

When the customer calls, Customer Service Representatives (CSRs) can use the GIS tool to pinpoint exact location of the caller. In this example customer is calling to complain lack of coverage. By identifying the location of the caller, GIS based inventory tool can provide list of equipment (BTS and transmission) serving that area. The trouble ticket system can use this information to correlate with network related trouble tickets. With this information, CSRs can determine if the coverage problem is

---

because of equipment failure or blind spots. If it is due to equipment failure, correlated trouble ticket will have information regarding the time required to fix that equipment. If it is a problem because of blind spots, CSR can open up a trouble ticket for radio engineers to attend to it.

In the second scenario a fault management system reports a problem at a base station location. In today's environment faults are recorded and investigated in a sequential fashion. Typically with fault resolution the site configuration is reviewed via records from multiple sources. Next a determination on the equipment or skill set needs to resolve the fault. This process is not only time intensive but it may account for multiple visit to the base station for fault resolution. Due to the morass of data sources resolution decisions are often based on inaccurate data lowering the chance for success.

With a GIS enabled inventory data set the fault can be pinpointed and the inventory can be queried for like equipment or spare parts in the area to aide in the resolution of the problem. Having GIS as a base for the asset inventory, an Operator can quickly identify specific plug-ins, cards, software revisions, etc. This provides quick audit clarification based on geography.

One can see from the two scenarios that adding GIS to an asset management data set a mobile operator improves the network audit capability reduces multiple data sources and can provide an enterprise data. The data store can be utilized for sales, marketing, network management and field operation teams to enhance their customer response capabilities.

### **Strategy Concerns**

In making any decision regarding infrastructure management an Operator must understand how this decision will affect competition. Asking questions such as how will the implementations of GIS help the mobile operator sustain their competitive advantage? What are the tangible (i.e. financials) and intangible benefits?

Using a track record from the wire line world an Operator could correlate like deployments and see the effects of a GIS based solution when rolling out a new technology such as 3G. GIS based asset management can deliver significant additional operational value add. GIS enables the asset management applications to track mobile and wire line infrastructures and now IT/data equipment and the underlying civil infrastructures in a single consistent manner. The resulting accurate records coupled engineering and work order management functions can lead to dramatic operational productivity improvements.

---

Based on the process and current software management vehicle in place, an Operator could see up to a 70% overall productivity improvement with key benefits arising in areas such as:

- Reductions in work order rework @ 12%
- Improvements in speed of fault isolation @ 50%
- Reduction in process and system management @50%

The updated process improvement coupled with clean, clear and consistent data set of the network allows for accurate capital planning and management, which will result in a more efficient use of capital expenditures.

## **Conclusions**

Is GIS the wonder drug for Mobile Operator's Operations? The answer is no. However, GIS can be used as an enabler to bridge disparate systems and processes together to see real business benefits. There have been real qualitative and quantitative results in the telecommunications space with the use of GIS as base to manage physical network. It is only a matter of time when you will see GIS as an active component throughout a Mobile Operators operation. The GIS component of the mobility data set will be used to manage the mobile network and subscriber base.