



**Logos Solvo : Implementing S@T in a GSM Network**  
How S@T Technology Makes The Management Of Services Easy And Cost Effective



# Implementing S@T In A GSM Network

## How S@T Technology Makes The Management Of Services Easy And Cost Effective

Managing SIM card applications can be a challenge if a Mobile Network Operator doesn't have a clear strategy and a sound application management initiative. With several proprietary and open SIM platforms available, each with its advantages and disadvantages, a Mobile Network Operator can easily find itself in a position of having to manage the same application on several distinct platforms. The problem is compounded if several versions of an application exist in the field, which is bound to be the case. This translates into higher costs for the operator due to the following factors:

- Customer service personnel have to know the variations between different platforms and peculiarities of applications on those platforms. Additional and ongoing training may be required to enable these personnel to effectively deal with service problems.
- It may take longer to service a customer if the customer service agent has to establish the version of each application and the platform before continuing to assist the customer.
- Cards in the field with outdated applications may have to be replaced to update or remove the old applications.
- Ensuring that back end platforms are backward compatible with older applications places more emphasis on testing, and live cards with old applications have to be kept in a test centre to enable thorough testing of back end changes.
- In the event of older applications no longer being supported, customers with those SIM cards have to be contacted to inform them to upgrade their SIM card.

While the challenge is manageable, it can be simplified by using an open platform that also takes care of version control of applications. The S@T enabled card, with the accompanying server is ideally suited to this.

This white paper examines the challenges of managing applications on SIM cards, and looks at the role of S@T technology in simplifying application management.

## What is S@T ?

S@T is a combination of SIM card and gateway software that facilitates the implementation of applications to provide a specific business solution.

The SIM contains the S@T Browser that enables application execution

### The SIM

The SIM component of the technology implements a browser that enables applications on a server to be accessed by the user. The browser is typically implemented in native code for efficiency, and resides in the ROM section of the chip. The browser makes use of the SIM Application Toolkit (GSM 11.14) functionality to communicate with the handset and the GSM network.

The Gateway translates messages between the SIM and the application server

### The Gateway

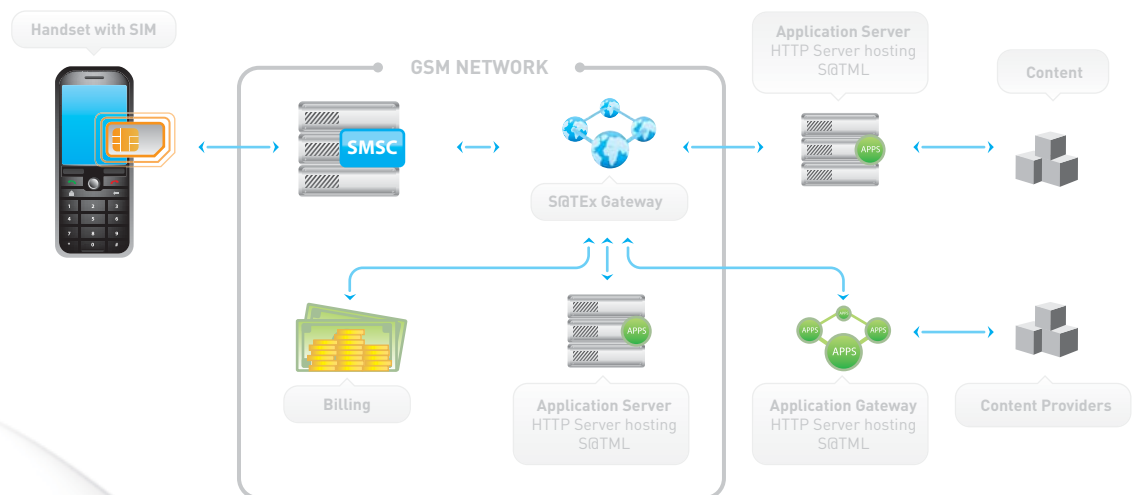
The S@T Gateway implements decoding and encoding functionality to translate communication between the SMS infrastructure and the Internet Protocol where the applications reside. The gateway is typically hosted at the GSM network.

The application server hosts the S@TML application

### The Application Server

The application server hosts the S@T Markup Language (S@TML) code that implements the applications. Application servers can reside at the GSM network, or can be hosted by third parties outside the network.

The figure below shows the interfaces from the S@T Gateway to the application servers.



## The Architecture of a SQT Application

The SQT application is split into two main parts, the static on-SIM code and the dynamic off-SIM code. When developing a SQT application the developer has to take care to split the application into static and dynamic components to ensure flexibility, but also to minimise network traffic.

### On-SIM Component

The on-SIM component of the SQT application remains static for the most part, and is associated with a menu item. Upon activation of the menu item the SQT browser is started and the associated SQT byte code (SBC) is executed. This SBC might refer to off-SIM code that is fetched by the browser from the application server referenced in the relevant URL.

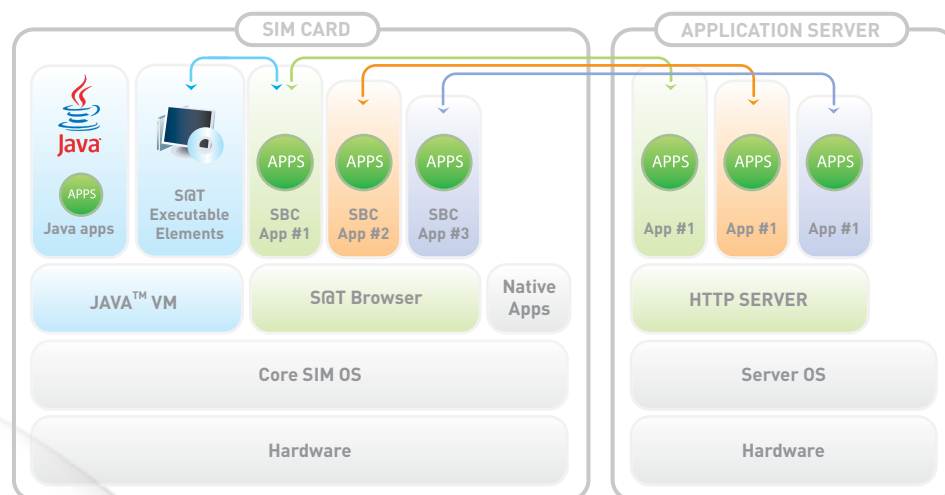
### Off-SIM Component

The off-SIM component is hosted on an application server, and can implement further functionality that changes on a regular basis. As an example, this code can generate a new menu based on input from the subscriber, or on other external data, and present this menu to the subscriber.

### Executable Elements

Executable Elements (or plug-ins) implement functionality that is not available in the SQT browser. This functionality can be implemented in Java™ and can be accessed by SQT applications on the SIM.

The diagram below shows the distributed application architecture across the SIM and application server.



SIM application requirements evolve over time, and Mobile Network Operators are constantly looking for new applications to differentiate their service and create new revenue generating services. The result is that existing applications change and new applications are added over time. The challenges of managing these applications differ between the different platform types and it is necessary to look at the different platform types to understand the challenges in each.

Applications on proprietary platforms are difficult to manage due to portability and effective version control constraints

### Proprietary Platforms

There are several proprietary SIM application platforms available, and these usually have advantages of enabling fast application execution, concise application byte code minimizing the SIM space requirements, and short implementation timescales. However, applications on these platforms are notoriously difficult to manage due to the proprietary nature of the application byte code. Applications cannot be ported to platforms from other vendors without a new development cycle, which introduces issues of testing and differences in application interfaces amongst others. While these issues can be managed, they require a greater commitment in resources from the Mobile Network Operator to successfully manage.

A further challenge related to proprietary platforms is the management of different versions of applications. While it is technically possible to delete an application on a SIM card in the field by using Over-The-Air (OTA) configuration technology, it is in many instances not practical or commercially viable to update a large subscriber base with a new application that might be several kilobytes in size. The inevitable result is that there will be cards in the field with different versions of essentially the same application. This results in issues of backward compatibility of back-end solutions to accommodate older SIM applications in the field.

Browser platforms solve portability problems and alleviate version control concerns

### Browser Platforms

The use of a browser on the front end (SIM card), moves the application functionality to the back end (Mobile Network). As is the case in the business IT solutions environment, the move to “thin” clients makes the deployment and management of applications much simpler. New applications are simply hosted on a server at the network, and any SIM in the field which is enabled with a browser can instantly access the new application.

Clearly, apart from simplified application management, there are several advantages to this methodology. A much shorter time to market for new applications is a significant advantage.

Apart from platform related concerns, the traditional issues of application management still have to be taken into account

### Platform Independent Challenges Remain

Apart from the items mentioned in the previous paragraphs, there are the usual challenges in managing distributed applications, and these are not necessarily dependent on any specific platform, but apply in general as a consequence of the highly distributed nature of the applications.

Issues such as application version management and handset platform testing will remain irrespective of the SIM platform used.

## The Role of S@T In Application Management

S@T enables rapid deployment of new applications

### Application Rollout

S@T, as a browser technology, has all the advantages of application management mentioned above. Significant among these are the ease and speed with which new applications can be rolled out. Since applications are hosted on a network based application server, only a small static portion of the application is loaded over the air onto the SIM card, and the SIM menu is updated with a new entry.

This doesn't eliminate the need for application management altogether, and a sound strategy in this regard is still advisable, but it certainly simplifies application management.

Applications still have to be tested on various handsets to ensure compatibility and a comprehensive application test environment which is separate from the production environment is suggested.

Applications can easily be unloaded and new version loaded

### Updating the Application

Updating the application involves unloading of the old version, which is a simple command from the S@T Gateway, and loading the new version. In some cases unloading the application might not be required, and the S@TML code on the application server can be updated to the new version while the SIM component of the old application remains current.

Browser plug-ins still have to be carefully managed to ensure portability and backward compatibility

### Plug-in Management

Browser technologies make use of on-SIM plug-ins to implement functionality that falls outside the ambit of the browser itself. This introduces a complexity that has to be kept in mind. As plug-ins are on the SIM, and are not necessarily standard in all S@T browser implementations, these have to be managed in the same way as traditional on-SIM applications.

Plug-ins can on some platforms be implemented using an open environment such as Java, and these can typically also be managed using the OTA technology.

As a plug-in typically implements relatively static functionality, the likelihood of changes is reduced, and version control becomes a more manageable task.

### Interoperability

The latest version of the S@T specifications solve most of the interoperability issues that may have existed in the past, and a standardized browser makes hosted applications accessible from S@T enabled SIM cards from any vendor.

It should be noted that there may still be differences in the way that different mobile handsets execute the SIM Application Toolkit commands. It is therefore essential that all applications be tested on as many different handsets as possible to ensure the correct functioning in all cases.

Self provisioning gives more power to the subscriber to decide which application to load

### Self Provisioning of Applications

With the increased management tools provided in the S@T Gateway it is possible to leave the provisioning of applications to the subscriber. In this scenario the subscriber is presented with a web based interface to view their current SIM profile and decide which applications to load or unload. This gives the subscriber the power to decide to upgrade to a new version of an application, or to remove an application to make space for new one.

S@T technology is available at extremely attractive prices and the total cost of ownership of the solution can be kept low

## A Cost Effective Solution

The SIMalliance specification for S@T is freely available from their web site, with the result that there are several options in the market for S@T enabled SIM cards as well as S@T gateways. With innovative pricing models from vendors pricing is no longer a hurdle, and even the smallest Mobile Network Operator can afford to deploy S@T technology and gain the associated advantages.

## The Next Step

Logos Solvo supplies a fully featured S@T Gateway as well as a suite of S@T based applications implementing innovative services. Logos Solvo can assist in all aspects of the implementation of the gateway and the implementation of applications. This white paper and more information on Logos Solvo and its services can be obtained from its web site:

[www.logossolvo.com](http://www.logossolvo.com).

Contact Logos Solvo on [info@logossolvo.com](mailto:info@logossolvo.com) for a meeting or a workshop on the company's S@T products.