

# Integrating GSM Networks and Internet: New Unstructured Services

by Rita Arrighi, Maurizio A. Bonuccelli, Francesca Lonetti and Francesca Martelli

---

**A project at PisaTel, a laboratory located at ISTI-CNR in a joint collaboration between ISTI, Ericsson Lab Italy, Pisa University and the "Scuola S. Anna", aims at integrating wireless, wireline and Internet networks.**

Three communication networks, namely the emerging 'mobile' wireless, the classical 'fixed' wireline, and the alternative 'computer-centric' internet, are evolving in a relatively independent way. However, their interactions increase day by day. It is of paramount importance to investigate how these three systems could be integrated in order to form a common communication space, in which the users of any one of the networks can easily and 'transparently' access the other two.

The main purpose of a project currently under way at PisaTel is to investigate the feasibility of such an integration. The work is being carried out within the java JAIN MAP API international project.

## JAIN MAP

The aim of the JAIN (Java APIs for Integrated Networks) initiative [1] is to integrate wireline (PSTN), wireless (PLMN) and packet based (IP and ATM) networks, in order to modify the actual proprietary market into an open one. The novelty of JAIN lies substantially in two fundamental aspects: the service portability obtained by inserting Java interfaces over the protocols, and the network convergence ensuring the technology independently of the services.

We are interested in the JAIN MAP API. MAP (Mobile Application Part) is a protocol in the GSM stack, for mobility management and other services. JAIN MAP API provides an abstraction level over the complicated MAP interface. In this way, a MAP service developer does not have to be aware of the specific MAP implementation features. At present, four MAP capabilities are specified in JAIN MAP: transaction (corresponding to the SMS service), session (USSD service), position (MAP location service) and information. We have focused on session capability, realizing the USSD (Unstructured Supplementary Service Data) service, which allows information exchange between a mobile station and a GSM network application.

The USSD service is very similar to the SMS service. The main difference consists in the session-oriented nature of the USSD service which makes it necessary to establish a session each time a customer (a mobile station) or a network application approaches a USSD service. As the USSD service is not a store-and-forward one, it is faster than SMS. A USSD session can be network initiated or mobile initiated: in the first case, the session is started by a network application; in the second one, the session is started by a mobile station.

## Applications

We concentrated on integrating GSM networks and Internet. In particular, we designed and tested two new mobile initiated USSD services for GSM customers allowing them to easily interact with a server connected to Internet. The assumption on the customer side is minimal: customers only need a simple mobile station (eg cellular telephone handset) able to communicate on GSM cellular networks, and the network operator must be able to support the new services. This second assumption is not cumbersome, since the software for these two new services is not large and is quite fast to run.

The first service is e-mail related. The GSM customer first invokes the new service by inserting an appropriate code, followed by an internet ID, the password, and the address of a mail server. These data are delivered to an entity inside the GSM network, called GSMscf, which is also connected to Internet. The GSMscf opens a session with the mail server and, after being authorized by entering the user ID and password, requests the number of unread emails that are in the target mailbox. The answer received by GSMscf is then propagated to the GSM customer that asked for the service, and is shown on the display of the cellular phone.

The second service is designed for more sophisticated customers. It enables the activation of a secure Telnet session with a specified computer connected to Internet. The data exchanged during this session must be reproducible on the display of the available handset. The data exchange is performed similarly to the previous service, with more rounds between the handset and the remote computer, and with a particular emphasis on the security aspects in the Internet part of the data path (security in the GSM part should be guaranteed by the network operator).

In this research we showed that GSM customers can effectively interact with Internet-connected devices by easily developing new simple software applications, without changes in the system architecture. We shall continue in the production of new services for larger integration of Internet and GSM systems.

## Links:

JAIN: [http://java.sun.com/products/jain/api\\_specs.html](http://java.sun.com/products/jain/api_specs.html)

USSD: <http://www.mobileussd.com/whatis.asp>

## Please contact:

Francesca Martelli, ISTI-CNR

Tel: +39 050 315 3468

E-mail: [f.martelli@isti.cnr.it](mailto:f.martelli@isti.cnr.it)