GSM

The GSM System for Mobile Communications

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Data Services: a Summary

The *Specifications* define services in the same way as ISDN does. They distinguish "bearer services" which correspond to the transportation of user data between two "terminal-modem" interfaces, from "teleservices" which are complete end-to-end services, including terminal capabilities. The list of bearer services appearing in the *Specifications* in given in table 1.4.

Though identified as a separate bearer service, the basic "PAD access circuit asynchronous" service requires in fact nothing specific in the GSM networks compared to the "data circuit duplex asynchronous" service. The same sort of remark also applies to several teleservices, as can be derived from table 1.5. For instance, the specificity of a teleservice such as videotex, compared to the relevant bearer service, does not concern the GSM domain. Though videotex is identified as a separate teleservice in the *Specifications* (at least for phase 1), the GSM networks need not implement anything specific to offer their customers access to videotex, on top of the basic support of the "data circuit duplex asynchronous, 1200/75 bit/s" bearer service. Other examples are X.400 message handling systems and teletex. Conversely, some teleservices are supported by GSM in the same way, though not mentioned by the *Specifications*. Examples are group 4 facsimile or access to voice messaging centres.

Teleservice	Corresponding bearer service
Telephony	-
Emergency calls	-
Short message service MT/PP	-
Short message service MO/PP	-
Short message cell broadcast	-
Advanced MHS access (X.400)	Data circuit duplex synchronous
Videotex access (profiles 1, 2 or 3)	Data circuit duplex asynch. 1200/75 bit/s
Teletex	Data circuit duplex synchronous
Alternate speech/facsimile group 3	-
Automatic facsimile group 3	-

can offer a number of functions locally, without the help of a network. Examples include the dialling of abbreviated numbers, the storage of received short messages, the edition of short messages, the automatic repeat of failed calls, the automatic answering of calls, and so on. In some cases, like in the latter example, the same function can be fulfilled locally, if the terminal implements it, or by the infrastructure, if a voice messaging facility is provided.

The standard places few constraints on the local features. Mobile station manufacturers may or may not include them in their products. Some are specified by the standard simply because they are provided in fact by the SIM (see next section), and not by the part built by the mobile station manufacturer. In fact the only real imposed constraints pertain to the automatic repetition of call attempt, for which a number of restrictions are put, to diminish the risk of overloading the networks with useless attempts.

Another point worth noting is the existence of the '+' key, which is specified as a harmonised shortcut replacing the international prefix, whatever the convention of the network the user happens to get service from. For instance, when in Sweden, a GSM user can call somebody in Italy by dialling +39 followed by the national number, instead of dialling 09939... Another important advantage in so doing is that the stored "+39..." number will be recognised correctly by all GSM PLMNs (including in Italy), and therefore remains valid irrespective of roaming.

1.3.1.6. The Subscriber Identity Module

A mobile station in any cellular network must be personalised, i.e., associated with a given subscription. This is needed since the identity of the subscriber is not in a one-to-one correspondence with the physical medium used for access as in a wireline network. The usual approach is to store in a permanent memory of the machine the required information, such as a subscription identifier. This is what is done in most analogue cellular networks (an exception is the German C network). The approach in GSM is different.

A GSM mobile station is split in two parts, one of which contains the hardware and software specific to the radio interface, and another which contains the subscriber-specific data: the Subscriber Identity Module, or SIM. The SIM can be either a smart card, having the well-known size of credit cards, or alternatively it can be "cut" to a much

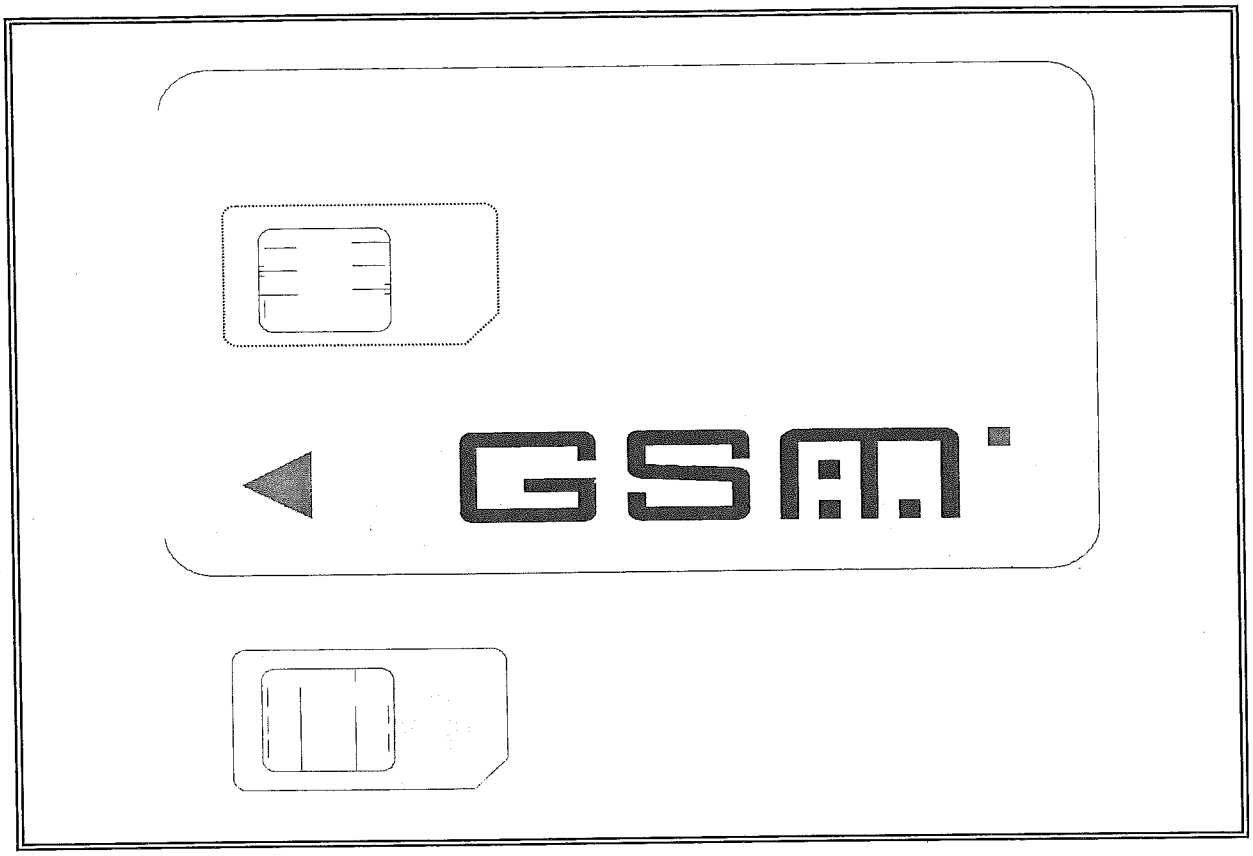

Figure 1.7 – The two types of SIMs

The plug-in SIM has been designed to enable smaller handhelds to be built, and will not be removed as often as the card-sized SIM.

smaller format, called "plug-in SIM" (see figure 1.7). This smaller format was introduced to put less constraints on the design of handhelds. The SIM is a kind of key. Once removed from the terminal, the latter cannot be used except for emergency calls (if the network permits), that is to say it cannot be used for any service which will impact the subscriber's bill.

This view must be somewhat qualified, because the insertion and removal of the SIM is not necessarily easy with all mobile stations. Since its small size does not make it easy to manipulate, it is not foreseen that plug-in SIMs will be easy to remove, and in some cases mobile manufacturers have even secured them in the handheld station by a screwed lid. But the possibility still remains for the user to change it.

The possibility to remove the SIM presents many advantages for the user beside its role as a key. For instance, if his mobile station fails and must be taken to repairs, another one can be used for the interim period. It suffices to remove the SIM from one equipment and to put it in the other. Another example is the case of urban users, which have only a handheld, for reasons of economy. When needed, they can borrow a more powerful station to be used in the countryside, or rent a car equipped with a vehicle-mounted station. In all cases, they can use their own SIM, in

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