

CEPT/OCH/GSM

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Title : **BASIC REQUIREMENTS FOR A HARMONIZED MOBILE  
COMMUNICATION SYSTEM**

Abstract : This document defines the basic requirements to be met by the system under definition in CEPT/OCH/GSM. This text replaces the text in Section 3, GSM Doc 2/82 (Doc T/OCH(82)21R).

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## 1 SERVICES

- 1.1 The system shall be designed such that mobile stations can be used in all participating countries.

The system shall be designed for automatic roaming within each network. The degree to which the roaming facility between networks (or countries) shall be automatic has yet to be decided, but the system should be capable of providing fully automatic roaming between networks which so desire.

It must be kept in mind that there will be a need to bar calls to and from undesirable mobile stations, i e in the case of blackisted subscribers, stations from non-participating networks with systems built to the same specifications, etc.

The system should be designed in such a way that the fixed subscriber does not have to know the location of the mobile (it must also be kept in mind that many roaming subscribers do not want their location to be disclosed to a calling subscriber). However, where the distance of the mobile from the fixed subscriber would lead to a higher tariff than the minimum, the fixed subscriber should have the choice of whether to incur such a higher tariff.

- 1.2 In addition to telephone traffic, the system must allow maximum flexibility for other types of services, e g ISDN related services.

It is to be expected that in most countries, the dominating type of traffic will be speech traffic via the PSTN for a number of years after system start. However, other types of traffic will take on an increasing importance, in particular the ISDN related services. Hence, the system must be capable of, but not dependant on, interworking with the ISDN (within the limitations set by the mobile radio environment) by the time the ISDN is implemented in each particular country.

The ISDN-services which could be mapped to and from the GSM system will be subject to further study bearing in mind the differences in transmission data rates.

- 1.3 The services and facilities offered in the PSTN/ISDN and other public networks should as far as possible be available in the mobile system. The system shall also offer additional facilities, taking into account the special nature of mobile communications.

The services and facilities offered in the GSM system may not always be the same all over the system. This may be due to various causes, e.g. when a GSM service requires a certain, not yet achieved, degree of modernization of the PSTN in order to be offered. Another case may occur when an Administration wishes to offer its subscribers additional services, not offered by all Administrations. In the latter case, such additional functions and facilities should have no adverse influence on the operation of foreign mobile stations in that network.

The selection of a minimum set of services and facilities to be provided in all networks (including user procedures) is yet to be made. This set should include even services and facilities beyond those offered in the fixed networks, since there are a number of services that are particular to a mobile system and that have no meaning in a fixed network.

- 1.4 It should be possible for mobile stations belonging to the system to be used on board ships, as an extension of the land mobile service. Aeronautical use of GSM mobile stations should be prohibited.

The use of mobile stations in the GSM system should be permitted in coastal waters, inland waterways, etc., for public correspondence only. The system should not be confused with the maritime radio services, however.

- 1.5 In addition to vehicle-mounted stations, the system shall be capable of providing for hand-held stations and other categories of mobile stations.

With a view to the growing interest in the use of hand-held stations, it is necessary that the system is technically capable of handling low-power hand-held stations, facilitating battery economy and intrinsically not demanding battery consumption in excess of that for any hand-held stations associated with existing earlier public mobile telephone system working in the 900 MHz band. In addition, a number of other categories of mobile stations can be envisaged.

## 2 QUALITY OF SERVICE AND SECURITY

- 2.1 From the subscriber's point of view, the quality for voice telephony in the GSM system shall be at least as good as that achieved by the first generation 900 MHz analogue systems over the range of practical operating conditions.
- 2.2 The system shall be capable of offering encryption of user information but any such facility should not have a significant influence on the costs of those parts of the system used by mobile subscribers who do not require such facility.

The demand for special protection could be considerable among some users. When an Administration offers foreign subscribers an encryption facility, the means must be provided of conveying the key held in the home network of the subscriber to the network of that Administration. The consequences of this are for further study.

It will be possible for the subscribers themselves to provide some kind of end-to-end encryption, subject to the technical limitations of the network.

### 3 RADIO FREQUENCY UTILIZATION

- 3.1 The 900 MHz CEPT Mobile communications system must co-exist with earlier systems in the same frequency band.**

CEPT recommends the frequency bands 890-915/935-960 MHz to be used for public mobile services.

Furthermore, CEPT recommends the use of 890-905/935-950 MHz for earlier (1st generation) public, mobile systems, and that the bands 905-915/950-960 MHz are reserved for the 900 MHz CEPT mobile communications system. The attention is drawn to the fact that several countries use 914-915/959-960 MHz for cordless telephones according to CEPT recommendations.

It shall be possible for each individual country to choose the point of time for transition from earlier systems to the new system and also to have these systems operating simultaneously, on the same base station sites.

- 3.2 The system shall allow for operation in the entire frequency band 890-915 MHz and 935-960 MHz.**

Although the system shall be designed for the entire frequency band, use of only parts of the band shall also be possible e g for frequency management purposes.

- 3.3 The system concept to be chosen shall permit a high level of spectrum efficiency and state-of-the-art subscriber facilities at a reasonable cost, taking into account both urban and rural areas and also development of new services.**

A suitable measure of the spectrum efficiency should be decided. One approach could be to set figures for the characteristic system parameters, such as the traffic handling capability, expressed in Erlangs or information transfer rate per square kilometer.

It must also be kept in mind that the spectrum efficiency question is likely to be the most important limit to growth in large cities. In sparsely populated areas, the cost per Erlang of carried traffic will probably be a more important problem than spectrum efficiency. It is necessary for the success of the system that both applications are considered when choosing system concept.

#### 4 NETWORK ASPECTS

- 4.1 The identification plan shall be based on the relevant CCITT Recommendation.**

CCITT Rec. E.212 concerns an international identification plan for mobile stations of public land mobile networks in different countries. According to the Recommendation, even countries not participating in the GSM system may be included in the identification plan, thus enabling participation at a later stage.

The implications for the system to accommodate a personal user identity which is independent of terminals is under study.

- 4.2 The numbering plan shall be based on the relevant CCITT Recommendation.**

CCITT Rec. E.213 concerns a numbering plan for land mobile stations in public land mobile networks. The numbering plan for GSM mobile stations shall be independent of the identification plan. It shall also allow for national differences in numbering and routing.

- 4.3 The system design must permit different charging structures and rates to be used in different networks.**

The charging structures, as well as the rates used in the present telecommunication networks in Europe are very different, and this must be accepted even when the GSM system is introduced. It is therefore necessary to design the system in such a way that each Administration is free to choose its own tariff and charging policy.

- 4.4 For the interconnection of the mobile switching centres and location registers, an internationally standardized signalling system shall be used.**

The only internationally standardized signalling system with an information transfer capacity suitable for the GSM system, is the CCITT signalling system N° 7. The necessary adaptation for use in mobile communication systems must be done in co-operation with the relevant CEPT groups.

- 4.5 No significant modification of the fixed public networks must be required.**

Because of the immense size of the fixed public networks, it is not economically possible to modify them in order to introduce the GSM system, except for minor modifications such as reprogramming of registers, etc.

- 4.6 The GSM system shall enable implementation of common coverage PLAN's.**

- 4.7 Protection of signalling information and network control information must be provided for in the system.**

## 5 COST ASPECTS

- 5.1 The system parameters shall be chosen with a view to limiting the cost of the complete system, in particular the mobile units.

The cost of the system needs to be considered in terms of the cost of the fixed infrastructure to be met by the telecommunication operators, and the mobile equipment, usually met by the mobile subscribers. Both need to be within affordable limits, which may be stated as not in excess of that for existing earlier public mobile telephone systems working in the 900 MHz band. Since the cost of the mobile will constitute the main portion of the total system cost, it is preferable for the mobile equipment cost to be lower than that for existing earlier public mobile telephone systems working in the 900 MHz band.