INTERNATIONAL TELECOMMUNICATION UNION

# ITU-T Q.1031

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

## PUBLIC LAND MOBILE NETWORKS

# GENERAL SIGNALLING REQUIREMENTS ON INTERWORKING BETWEEN THE ISDN OR PSTN AND THE PLMN

## ITU-T Recommendation Q.1031

(Extract from the *Blue Book*)

**NOTES**

1 ITU-T Recommendation Q.1031 was published in Fascicle VI.12 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

**Recommendation Q.1031**

# GENERAL SIGNALLING REQUIREMENTS ON INTERWORKING BETWEEN THE ISDN OR PSTN AND THE PLMN

## 1 Introduction

The purpose of this Recommendation is to present the general requirements for the PSTN and the ISDN as well as for the mobile network to be met in order to ensure a correct integration of the mobile service in the fixed network.

This Recommendation covers only the signalling aspects of the interworking between the mobile service and fixed network.

## 2 General requirements

### 2.1 *Requirements for the mobile system*

In order to be integrated in the fixed network the PLMN must comply with the following requirements:

a) The MAP which supports information exchanges between the nodes of the mobile service uses the facilities of Transactions Capabilities of Signalling System No. 7. Therefore the equipment of the mobile network must comply with the specification of the interface between TCAP and the application user. If TCAP functions are integrated in the mobile network equipment, the latter must comply with the relevant specifications (Recommendations Q.771 to Q.774).

b) FOR MAP messages routing purpose, the mobile nodes must provide the SCCP via TCAP with an address complying with the relevant specifications (Recommendations Q.711 to Q.714).

c) For call set-up, the MSCs must interface with the fixed exchanges. In the detailed interworking Recommendations, the fixed network signalling considered are Signalling System No. 7 and its User Parts (TUP or ISUP). The MSCs must comply with the same signalling interface specifications as the fixed exchanges.

d) The PLMN and the signalling on the radio path must provide the information needed to ensure a correct interworking with the fixed network. The interworking in the MCSs must occur with a minimum loss of information.

e) The PLMN nodes must interface with the No. 7 signalling network. For that, they must comply with the MTP specifications (Recommendations Q.701 to Q.707).

### 2.2 *Requirements for the fixed network*

The adaptations of the fixed network needed for the integration of the mobile service have to be minimized. However, some facilities foreseen for other services will also facilitate the access to the mobile service or the operation of the PLMN.

a) The implementation of the No. 7 signalling network could be useful for the mobile service. Before the No. 7 Signalling System is implemented, a dedicated signalling network, using a subset of Signalling System No. 7, could be used as an interim solution for transporting the data between functional units of PLMNs.

b) It will be useful that, in addition to the signalling network, the SCCP facilities be available in order to avoid a specific implementation of such a service in the PLMN equipments.

c) The interrogation procedure based on TCAP prior to connection set up to a mobile would save circuits resources in the network and would increase the service quality provided to the fixed calling subscriber by e.g., reducing the post dialling delay in such kinds of calls. From a signalling point of view the best way is to introduce this procedure as near as possible to the local originating exchanges (see Recommendation Q.1032).

## 3 Interworking with the PSTN for call set-up

The interworking with the Telephone User Part of Signalling System No. 7 is the only case considered here.

*Particular aspects:*

a) The fixed telephone network provides an end-to-end transparent link at least for speech use. It is then possible to have a data transmission communication on a telephone call. This would not be the case with a mobile subscriber: the radio path would not be transparent. Therefore, if a calling subscriber wishes to have a data transmission call with a mobile it would be necessary to inform the network concerning the precise characteristics of this transmission: the mobile system will then be able to replace the speech coder by a data coder adapted to the type of transmission modem used. One solution could be that the mobile station has one telephone number per type of data transmission service it can use.

b) The usual routing of a call to a mobile includes a re-routing according to the roaming number allocated to that mobile. This number is temporarily allocated and difficulties could appear in some cases such as a failure of a register. It would then be useful that the number dialled by the calling subscriber appears in the Initial Address Message received by the VMSC. This transmission can be used as a solution to avoid the allocation of one roaming number for each telephone number in the case of data transmission to a mobile station.

## 4 Interworking with the ISDN for call set-up

Since the radio path cannot economically provide a transparent 64 kb/s channel to mobile subscribers all the time, all the ISDN services foreseen in the fixed network will not be available to the mobile subscribers. The Quality of Service in land mobile networks may also in some cases not meet the Quality of Service requirement for certain ISDN services. Therefore some service limitations need to be introduced in the access to mobile stations.

Different methods may be foreseen to implement this limitation:

a) The interrogation is used also to check the service capabilities of the mobile access. This procedure can also be used to perform a compatibility check between the parties. But this test is only possible if the HLR knows the relevant characteristics of the mobile station and cannot be used with card operated stations; in that case a mobile subscriber can use different stations.

b) The simplest solution is that normal mobile call set-up be processed and controlled by the incoming MSC. As such the incoming MSC can also provide a compatibility check for card operated stations.

c) The call setup is normally performed up to the mobile. The IAM contains the characteristics of the service requested and on the terminal needed by the calling party. The network, MSC included, is transparent in the compatibility check. This method is the same as that defined in the ISDN.

## 5 Impact of the off-air call set-up on the interworking

The use of the off-air call set-up in the PLMN has an impact on the interworking with the fixed network. Both outgoing and incoming calls have to be considered: the consequences are not the same.

As it was stated before, the use of the Off-Air Call Set-Up procedure is optional and must be limited to national telephone calls only (see Recommendation Q.1002).

### 5.1 *Definition of the off-air call set-up*

To save the radio resources the radio traffic channel may be allocated to the communication only when both calling and called parties are present i.e., at the answer instant. This method called "Off-Air Call Set-Up" (OACSU) has some implication on the interworking with the fixed network. The consequences are not the same whether the mobile subscriber is the calling or the called party.

5.2 *Outgoing call from a mobile station*

Upon initiation of an outgoing call, a traffic channel is allocated to the communication when the called subscriber answer is received in the MSC. In some cases, no idle traffic channel may be available when necessary. Therefore, an appropriate announcement must be given to the called party when no idle traffic channel is available within a certain interval upon receipt of the called party's answer.

Whenever the announcement is used, it must always be played through in its entirety, even if a traffic channel becomes available before it is completed.

If the ADDRESS COMPLETE message indicates that there will possibly be no ANSWER message upon the connection of the called party (e.g., ADC without any information), the radio path must be established immediately upon receipt of the ADC.

Due to interworking constraints coming from the characteristics of the different signalling systems used in countries, the OACSU technique should only be used for national calls.

5.3 *Incoming call to a mobile station*

For incoming calls, the impact is not so important, but some rules must be applied in order to limit the influence on the service quality.

Concerning the sending instant of the answer message, the normal operating rules apply. If the call is successfully set-up to the mobile station, the answer message must be sent to the originating exchange only when the traffic channel is established upon recognition of the called party connection.

## 6 Special arrangements

6.1 *Control of speech processing and echo control devices*

For further study.

6.2 *Interworking for non-voice calls*

For further study.