SCCP Signalling Aspects for Roaming
Version 3.2.1
10 October 2005

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1 Introduction

1.1 Scope

The scope of this document is to describe and clarify signalling related matters in connection with international roaming.

1.2 Abbreviations

Term	Description
CC	Country Code
GT	Global Title
HLR	Home Location Register
IMSI	International Mobile Subscriber Identity
ISDN	Integrated Services Digital Network
MAP	Mobile Application Part
MCC	Mobile Country Code
MGT	Mobile Global Title
MNC	Mobile Network Code
MSIN	Mobile Station Identification Number
MSISDN	Mobile Statoin ISDN Number
MSRN	Mobile Station Roaming Number
MTP	Message Transfer Part
NC	Network Code
PLMN	Public Land Mobile Network
RPOA	Recognised Private Operating Agency
SCCP	Signalling Connection Control Part
SPC	Signalling Point Code
SS7	Signalling System No. 7
STP	Signalling Transfer Point
VLR	Visitor Location Register

2 Numbering Plan Indicator of Global Title

In the case (location updating: VLR -> HLR) of a MAP message with a global title derived from IMSI (Mobile Global Title), the numbering plan indicator to be used is:

0111 ISDN/Mobile Number Plan (E.214\0

The following scheme shows the manner of obtaining the Global Title by translation from IMSI, described in CCITT Rec. E214.

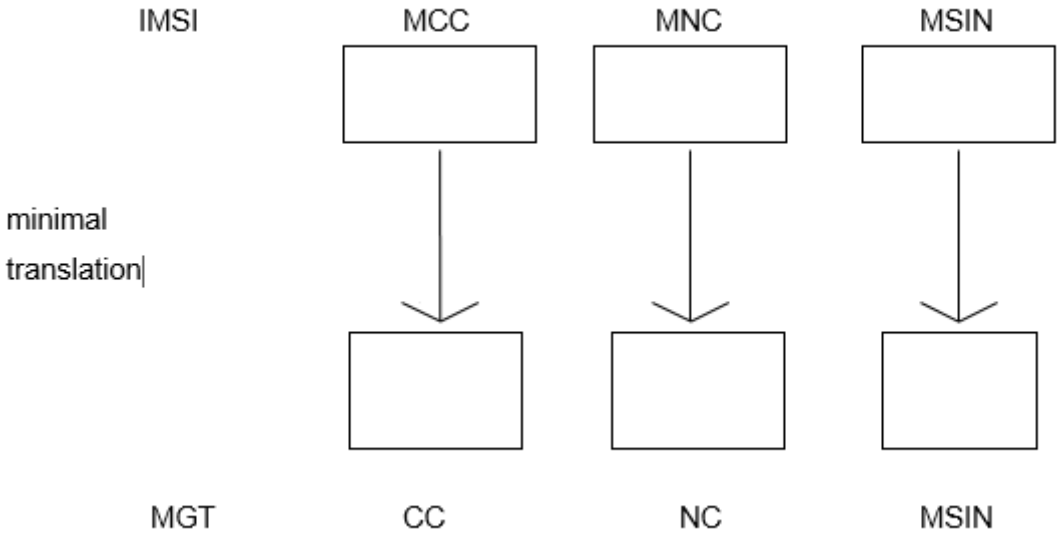

Figure 1: **Mobile Global Title by Translation from IMSI**

In the other cases the following numbering plan indicator is used:

0001 ISDN/Telephony number plan (E.163, E.164)

MSISDN, HLR number, VLR number = Global Title

The direst use of IMSI as global title is not foreseen in GSM

There will be no problem for intenational ISDN to handle both numbering plan indicators. The reason is that the only part of GT used by the originating and international ISDN networks for routing purposes is CC + NC, which constitutes the E.164 part of GT. In fact, the E.214 number plan indicator shows only that the GT was derived from an IMSI.

The SCCP E.164 Global Title shall not be truncated. The SCCP Mobile Global Title may be truncated only in accordance with E.24 Section 3.3 [Blue Book].

3 SCCP Requirement for a Node in the International ISDN

The international roaming capability provided by GSM allows Mobile Stations of one operator also to work aborad by connecting to the local PLMN(s). In order to accomplish this, the transfer of Mobile Application Part messages on SS7 international links is required. The technical requirements for PLMN-PLMN signalling relationships consist of:

a) Initial Requirements (for MAP Version 1)

1. MTP according to ETSI prETS 300 008 - CCITT SIGNALLING SYSTEM NO.7: MESSAGE TRANSFER PART (MTP) TO SUUPORT INTERNATIONAL INTERCONNECTION (T/S 43-01).
2. SCCP according to ETSI prETS 300 009 (Version 1) - CCITT SIGNALLING SYSTEM NO.7: SIGNALLING CONNECTION CONTROL PART (SCCP) (CONNECTIONLESS SERVICE) TO SUPPORT INTERNATIONAL INTERCONNECTIONS (T/S 43-03).
3. Unavailability of the service to be less than 1 hour per year, as observed between two PLMNs.
4. Probability of lost message < or = 10^{-6}.
5. Probability of undetected corrupted message < or = 10^{-9}.
6. Finite Time Delay for message transfer between PLMN/International Operator interfaces < or = half a second one-way for 95% of messages during busy hour within Europe. Outside Europe the delay shall be < or = one second one-way for 95% of messages during busy hour.

b) Future Requirements (for MAP Version 2)

[FFS]

4 Process for the Establishment of PLMN Signalling Relationships

This chapter outlines the process for the introduction and establishment of signalling relationships between Public Land Mobile Network (PLMN) operators for the transport of MAP messages. The content highlights the agreements, the information flows and actions necessary to allow signalling relations to be introduced in a smooth, efficient and co-ordinated manner.

The aim of such a process is to ensure uniformity of message transportation, efficient establishment and testing, and ability to react quickly to introduction requests.

4.1 Message Routing

It is considered that the routing of signalling messages per PLMN signalling relationship will largely be as shown below. In such scenarios the PTT/Recognised Private Operating Agency (RPOA) providing the SCCP relay point may be a PLMN operator.

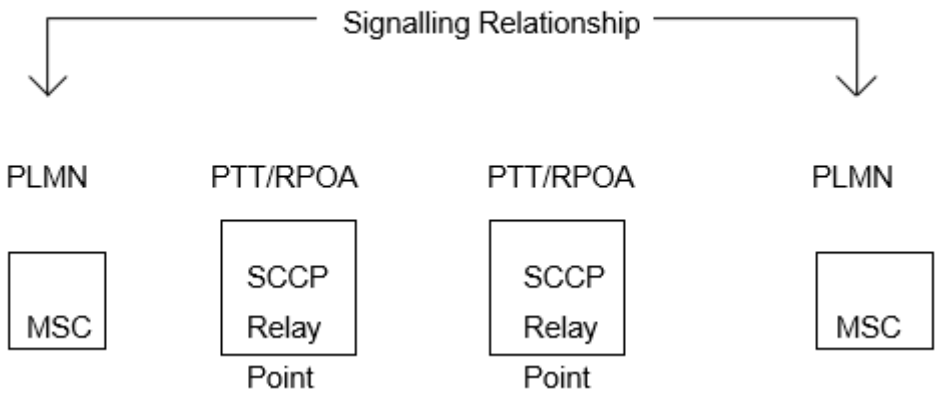

Figure 2: Signalling messages per PLMN signaling

4.2 Establishment Process

The proposed process for the establishment and introduction of PLMN-PLMN signalling relationships should comprise the following steps.

Step 1 PLMN Agreements

Initial agreement between PLMNs will be required for the following:

- Requirement for the PLMN-PLMN signalling relationship
- Date of introduction
- Global Title numbering
- Forecast signalling traffic volumes
- PTT/RPOA to be approached to provide the message transportation
- PLMN-PLMN pre-service testing requirements

Step 2 Contact with PTT/RPOAs

Following PLMN-PLMN agreement in Step 1, it will be necessary to contact the chosen PTT/RPOA to ensure that the SCCP relay point capability will exist within the PTT/RPOA prior to the required PLMN signalling relationship introduction date. Once confirmation of this is received, the PLMNs will need to approach their relevant PTT/RPOA for agreement to act as a SCCP relay point. National signalling connections should exist or be provided between the PLMN and the chosen PTT/RPOA.

The information required from the PLMN by its respective PTT/RPOA will be as follows:

- Date of introduction
- Global Title numbering
- Forecast signalling traffic volumes
- Distant PTT/RPOA providing the message transportation

Step 3 PTT/RPOA Liaison and Agreement

Once agreement is given by each PTT/RPOA to provide the signalling relationship, the PTT/RPOAs representing each PLMN will need to liaise with each other in order to plan the signalling network and routings necessary for support of the signalling relationship. This will involve the following:

- Determination of whether the existing international signalling network can be used to support the signalling relationship.
- Provision of new signalling links if required.
- Agreement on the signalling network elements to be used to support the signalling relationship, taking into account the normal planning rules and factors e.g. number of alternative signalling paths, security of signalling, etc
- Agreement with any other PTT/RPOAs involved in the routing of messages at MTP level e.g. STP usage.
- Agreement on the data requirements at the SCCP relay points necessary to support the PLMN-PLMN signalling relationship, taking into account the number flow requirements of the PLMNs.
- Agreement on any testing considered necessary between the PTT/RPOAs to ensure that the PLMN-PLMN signalling relationship can be supported. It is believed that in the majority of cases where use is made of the existing signalling network, such testing will not be necessary.
- Agreement on the date when PLMN-PLMN signalling relationship will be available to the PLMNs for testing prior to service introduction.

Step 4 PLMN-PLMN Signalling Relationship Implementation

The implementation of the PLMN-PLMN signalling relationship then proceeds and is completed in two phases:

- Introduction of signalling relationship data at SCCP relay points and any Signal Transfer Points (STP) for which routes do not exist within the signalling network

.This would include such testing as considered necessary by the PTT/RPOAs.

- PLMN-PLMN pre-service testing.

The following information/data are to be agreed between PLMNs:

- MSISDN Format
- MSRN Format
- IMSI Format
- Translation IMSI to Global Title

- Global Title for entities MSC/VLR, HLR
- SCCP Translation GT to International SPC.

5. Access Solutions to the Interntional SS7 Network

Different solutions for a GSM operator to get access to the international SS7 network have been identified. The choice depends on:

- the capabilities provided in the international nodes
- the agreements between PLMN operator and international node operator.

Five basic solutions that allow international transport of MAP messages for the support of GSM roaming are shown in fig. 3. Each of the five solutions may nationally be implemented in different ways. What is shown in the figure is the resulting service offered from the international point of view.

Solution (a) shows that the MSC has SCCP capabilities with an international SPC and is directly connected to the international SS7 network, without intervention of the ISC (without SCCP and STP capabilities).

In solution (b) the MSC is connected internationally through a stand alone SCCP gateway with an international SPC.

Solution (c) foresees the connection through an ISC with STP but not SCCP capabilities; therefore the MSC needs to have SCCP capabilities with an international SPC.

Solution (d) is possible only in countries where the ISC foresees SCCP capabilities. In this case the MSC does not require an international SPC.

In Solution (e) the SCCP functions are performed by a different node than the ISC. In this case the MSC does not require an international SPC.

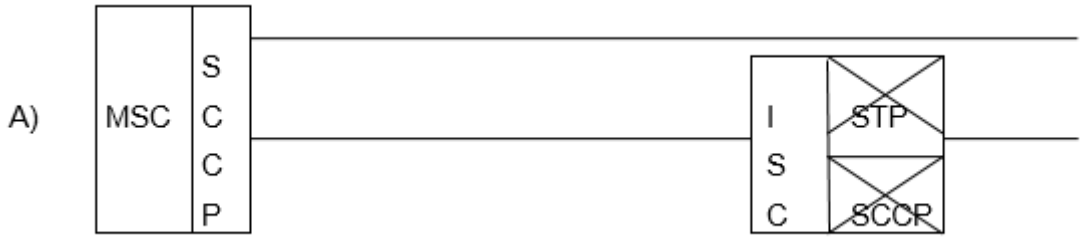

Figure 3: MSC with International SPC

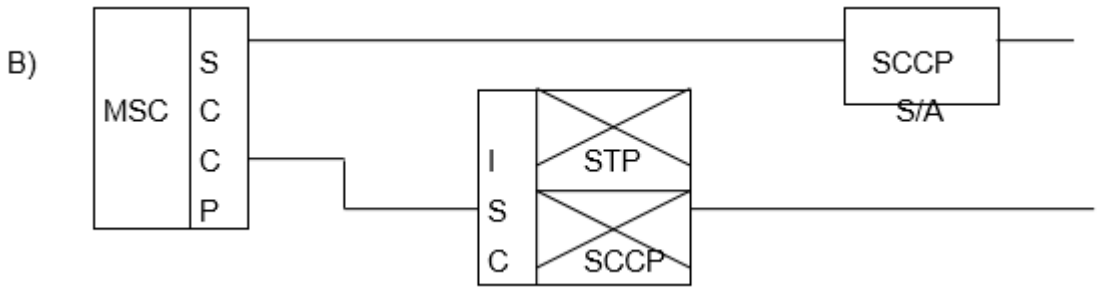

Figure 4: MSC with International SPC

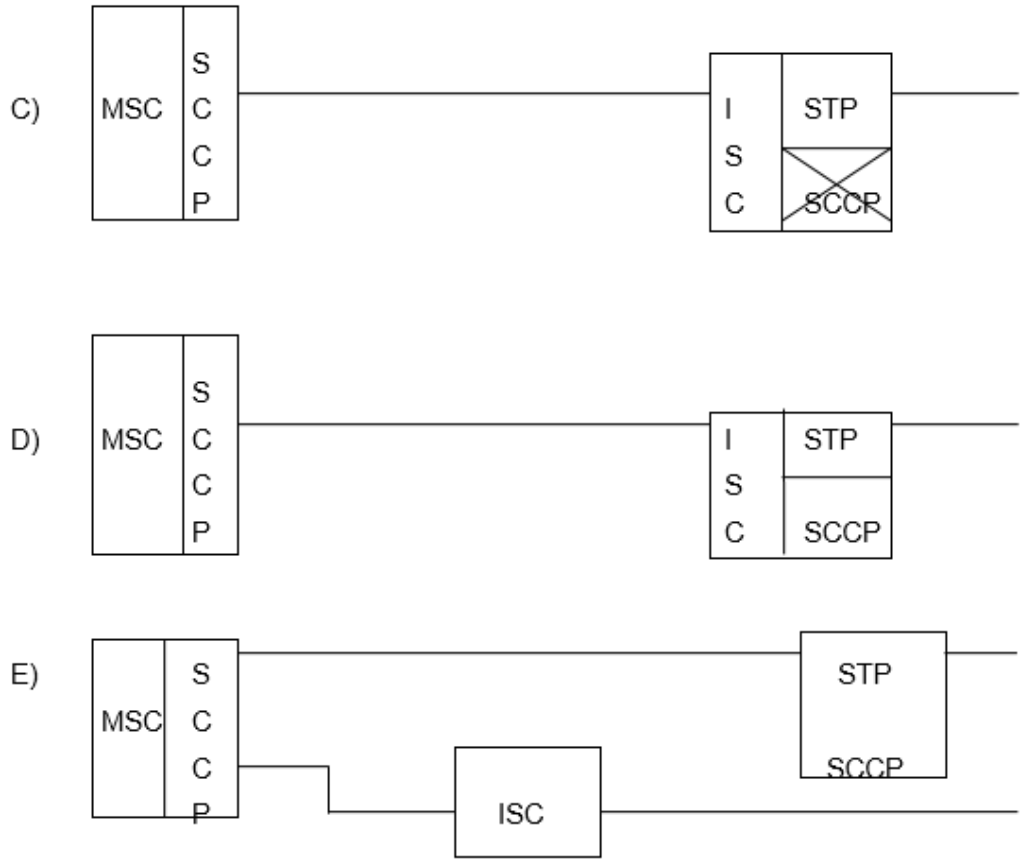

Figure 5: MSC with International SPC

Annex A Document Management

A.1 Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
3.2.1	10 October 2005	Describe and clarify signalling related matters in connection with international roaming.	Networks Group	Javier Sendin (GSMA)

A.2 Other Information

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Document Owner	Networks Group-SIGNAL
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