

From: GSM Association – IREG GPRS Working Party
To: 3GPP SA
3GPP CN
3GPP Terminals
Subject: Liaison statement – GPRS Roaming problem

As a result of the preliminary roaming testing carried out between operators, it has been found that GPRS services were disabled until the phone was switched off and on again as a result from roaming onto a visited network with which the Home network had GSM roaming agreement but no GPRS roaming agreement.

The analysis of the standards resulted in there not being any GPRS Reject cause for the scenario where there is GSM roaming and no GPRS roaming.

However it is believed that this is a critical issue for operators for 2 main reasons:

1. GPRS roaming is not automatic between 2 operators that have GSM roaming, and will take some time to implement. In fact, a GPRS roaming agreement must be signed, inter-operator tariffs have to be agreed, interconnection must be set-up, IREG and TADIG testing must be carried out. It is unacceptable that before GPRS roaming is sorted out, GSM service on that network or GPRS service on other networks be disabled;
2. Operators that have commercial GPRS within their networks may, for security, services or other reasons, not want to offer GPRS roaming either inbound or outbound. It is not acceptable that GSM roaming for inbound roamers be affected, and/or that GPRS service be disabled

Following is our analysis of the problem.

0 Scenarios for GPRS roaming

As operators start deploying GPRS within their networks and start implementing GPRS roaming, several scenarios emerge according to the implementation of GSM and/or GPRS roaming between any 2 operators.

For simplicity of reasoning, in this document Operator H (Home) refers to an operator that has GSM and GPRS technology, Operator V a generic roaming partner. The following scenarios apply according to the implementation of GPRS technology in V network and to the type of roaming agreement between H and V:

- 1) Operator H and Operator V have no roaming agreement
- 2) Operator V has only GSM technology (no GPRS) and has a GSM roaming agreement with Operator H
- 3) Operator V has GSM and GPRS technologies and has a GSM and GPRS roaming agreement with Operator H
- 4) Operator V has GSM and GPRS technologies and has a only a GSM roaming agreement with Operator H

The following table summarizes the scenarios described.

	GSM technology		GPRS Technology		GSM RA ¹	GPRS RA
	OperatorH	OperatorV	OperatorH	OperatorV		
Scenario 1	Yes	-	Yes	-	No	No
Scenario 2	Yes	Yes	Yes	No	Yes	No
Scenario 3	Yes	Yes	Yes	Yes	Yes	Yes
Scenario 4	Yes	Yes	Yes	Yes	Yes	No

1 GPRS Terminal behaviour in roaming

In this chapter we analyse the behaviour of a GSM/GPRS mobile station (MS) when roaming from its Home network H to a visited network V in each one of the above mentioned scenarios.

1.1 Scenario 1

The MS starts a PLMN selection and, not finding its Home network, starts the standard GSM IMSI attach procedure onto network V. As there is no roaming agreement, the IMSI Attach Reject cause is

#11 PLMN not allowed

and the MS writes the Visited PLMN ID into the forbidden PLMN List. GPRS Attach is not performed on the V network.

It then tries to see if there is another network available.

1.2 Scenario 2

The MS starts a PLMN selection and, not finding its Home network, starts the standard GSM IMSI attach procedure onto network V which completes successfully.

GPRS attach is not attempted by the MS as there is no GPRS Control channel in V's access network.

1.3 Scenario 3

The MS starts a PLMN selection and, not finding its Home network, starts the standard GSM IMSI attach procedure onto network V which completes successfully. As the MS also detect the GPRS control channel it will attempt a GPRS attach which also completes successfully.

1.4 Scenario 4

The MS starts a PLMN selection and, not finding its Home network, starts the standard GSM IMSI attach procedure onto network V which completes successfully.

As the MS also detect the GPRS control channel it will attempt a GPRS attach which is refused by V network because there is no roaming agreement. In this case, normal GPRS Location Registration Reject causes foreseen by the standards are:

- Cause #7 "GPRS Services not allowed": the MS passes into a state of GPRS Mobility Management Deregistered and GPRS services are disabled until the phone is switched off. ➔ **No GPRS services under any network are allowed until MS is switched off and on again.**
- Cause #11 "PLMN not allowed": as for GSM roaming, this error cause implies that the V PLMN is registered into the forbidden PLMN List which is common for GPRS and GSM services. Therefore, the MS will not register onto the V PLMN for GSM services until forced to by manual registration. ➔ **Roaming under network V is forbidden both for GSM and GPRS until manual registration forces override of Forbidden PLMN List.**

¹ RA = Roaming Agreement

- Cause #13 "Roaming not allowed in this location area": the terminal passes into a state of GPRS Mobility Management Deregistered and the Location Area is registered as forbidden Location Area and, according to the standards, the terminal performs a new PLMN selection. → **Network V is never selected neither for GSM nor for GPRS.**

Therefore, all the GPRS Registration Reject causes seem to suffer from consequences on the GPRS service and/or on the GSM service. In other words, it seems that the standards do not contemplate the scenario number 4, in which both GSM and GPRS technologies are implemented in the visited network but only GSM roaming is open.

2 Action requested

It is requested from 3GPP to

1. inform us if there is an error cause for GPRS release '97 for scenario number 4, that enables GSM roaming in the visited network and disables GPRS service only as long as the MS is roaming in that specific visited network. When the MS registers on a new PLMN, it is expected that GPRS attach is attempted automatically.
2. if the above error cause is not included in GPRS release '97, we request you to introduce it with a matter of urgency. In fact if the change requests an update on terminals (for instance: new error cause) it is important that it be standardized before mass availability of terminals on the market foreseen for spring 2001.