Technical Specification Group Services and System Aspects   ***TSGS#10(00)666***
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Source: **Blu S.p.A.**[(*)]

Title: **GPRS Attach/registration Reject causes**

Agenda item:

Document for: **Decision**

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Introduction

Analysing the GSM/GPRS specs, regarding the roaming scenarios it appears that the possibility of disabling only the GPRS roaming, without any impact on both the GSM roaming and the GPRS services in other networks, is not supported.

Roaming configurations

Several scenarios emerge according to the implementation of GSM and/or GPRS roaming between two operators.

No troubles occur in the following cases:

1. Roaming in a network equipped with GSM and GPRS when roaming agreement is defined for both GSM and GPRS
2. Roaming in a network or area where the GPRS is not supported.

Then, this document focuses its analysis only on the scenario when two operators have **no GPRS roaming agreements**. The following configurations can be envisaged:

Configuration 1:

Operator A has both GSM and GPRS technologies and Operator B has no Roaming agreement (neither for GSM nor for GPRS).

Configuration 2:

Operator A and Operator B have both GSM and GPRS technologies, but only GSM roaming agreement.

	GSM technology		GPRS Technology		GSM RA[1]	GPRS RA[1]
	OperatorA	OperatorB	OperatorA	OperatorB		
Configuration 1	Available	Available	Available	Available/ Not Available	No	No
Configuration 2	Available	Available	Available	Available	Yes	No

Table 1 - Roaming configurations.

The behaviour of a GSM/GPRS mobile station (MS) when roaming from its Home network A to a visited network B are the following:

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[1] RA = Roaming Agreement

Configuration 1

The MS starts a PLMN selection and, not finding its Home network, starts the standard GSM *IMSI attach* procedure onto network B. As there is no roaming agreement, the *IMSI Attach Reject* causes can be:

- *Cause #11 PLMN not allowed (international roaming)*
The MS shall store the Visited PLMN ID into the 'forbidden PLMN List'. *GPRS Attach* procedure is not performed on the network B.
It then search for another network available.

- *Cause #13 Roaming not allowed in this location are (national roaming)*
The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED, shall reset the routing area updating and the GPRS attach attempt counters and changes to state GMM-DEREGISTERED. The MS shall set the update status to U3 ROAMING NOT ALLOWED, reset the location update attempt counter. The new MM state is MM IDLE. The MS shall store the LAI in the list of "forbidden location areas for roaming". The MS shall perform a PLMN selection instead of a cell selection. [1], [2].

Configuration 2

If the MS starts a PLMN selection when the Home network is not available, then the MS starts the standard GSM *IMSI attach* procedure towards network B. Due to roaming agreement the procedure is successfully completed.
As the MS also detects the GPRS control channel, it will attempt a GPRS attach which is rejected by network B because there is no GPRS roaming agreement.
In this case, *GPRS Attach Reject* causes foreseen by the ETSI/3GPP specification [1], [2] are:

- *Cause #7 "GPRS Services not allowed"*
The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED. The new state is GMM-DEREGISTERED. The SIM shall be considered as invalid for GPRS services until switching off or the SIM is removed. **This implies that, when the MS returns to the Home Network, or roams to another GSM/GPRS network, it cannot attach to GPRS until it has been switched off and on.**

- *Cause #11 "PLMN not allowed"*
As for GSM roaming, this error cause implies that the network B ID is stored into 'the forbidden PLMN List' that is common for GPRS and GSM services. Therefore, the MS will not register onto the network B for GSM services until forced to by manual registration. **Roaming under network B is then forbidden for both GSM and GPRS until manual registration forces an override of the 'Forbidden PLMN List'.**

- *Cause #13 "Roaming not allowed in this location area"*
The MS shall set the GPRS update status to GU3 ROAMING NOT ALLOWED shall reset the GPRS attach attempt counter and shall change to state GMM-DEREGISTERED. The MS shall store the LAI in the list of 'forbidden location areas for roaming' and the terminal performs a new PLMN selection. If the MS is IMSI attached via MM procedures, the MS shall in addition set the update status to U3

ROAMING NOT ALLOWED. The new MM state is MM IDLE. **The Location Area (and its RAs) is not selected again for both GSM and GPRS services until the MS is switched off or when the SIM is removed.**

Conclusion

All the *GPRS Attach/Registration Reject* causes seem to have impacts on the GPRS service and/or the GSM service. It seems that the **ETSI/3GPP specs do not consider configuration 2, where both GSM and GPRS technologies are implemented in the visited network but only GSM roaming agreement is established.**

Configuration 2 will be a likely scenario for roaming that needs to be considered because of   the following considerations:

- The deployment of GPRS technology requires a huge test activity
- GPRS roaming agreement requires the definition of inter-operator tariffs, interconnection implementation, testing procedures for both GPRS and billing.

For these reasons the GPRS service can be available and supported on a GSM network well before roaming agreements have been established with all the operator's roaming partners. National roaming scenarios present the highest impact since the networks of the involved operators are deeply overlapped and the status of roaming can be quite normal for a high percentage of users.

Proposal
To deal with this issue, it is necessary that the specifications be updated to include a suitable error cause for configuration 2. Such error cause shall force the MS to enter into a GMM-DEREGISTERED state and disable GPRS services only until a new PLMN/LA is selected.

The 3GPP is asked to endorse the proposal and to establish an activity plan to find an agreeable solution in terms of Change Request to the relevant specifications 04.08/24.008 and 03.22/23.122 R97, R98, R99 and R4.

References:
[1] Spec. GSM 04.08 v. 6.11.0 release 1997
[2] TS 24.008 v3.5.0 (2000-06)
[3] 3 GPP TS 23.122 v. 3.4.2 Release 1999

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