3GPP TSG_CN#6   **NP-99432**

ETSI SMG3 Plenary Meeting #6,
Nice, France
13th – 15th December 1999

Agenda item: **5.3.3**

Source: **TSG_N WG3**

Title: **CRs to 3G Work Item GPRS Mobile Interworking**

<u>**Introduction**</u>**:**

This document contains **"1"** CR **on Work Item GPRS Mobile Interworking** agreed by **TSG_N WG3** and forwarded to **TSG_N Plenary** meeting #6 for approval.

Tdoc	Spec	CR	Rev	CAT	Rel.	Old Ver	New Ver	Subject
N3-99481	29.061	006		B	R99	3.1.0	3.2.0	MOBILE IP ISSUES

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

29.061	CR	**006**	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑   *↑ CR number as allocated by MCC support team*

For submission to:	CN#6	for approval	X	strategic		*(for SMG*
list expected approval meeting # here ↑		for information		non-strategic		*use only)*

Form: CR cover sheet, version 2 for 3GPP and SMG   *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM ☐   ME **X**   UTRAN / Radio ☐   Core Network **X**
(at least one should be marked with an X)

Source:	TSG_N3		**Date:**	1999-11-26

Subject:	Mobile IP

Work item:	GPRS Mobile IP interworking

Category: F Correction
                 A Corresponds to a correction in an earlier release
(only one category   B Addition of feature
shall be marked   C Functional modification of feature
with an X)   D Editorial modification

Release:
Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	**X**
Release 00	

Category B is marked with **X**.

Reason for change:	The definition of the APN has been enlarged in 23.060 to also include external PDN address allocation. This CR covers step 1 of a three phase implementation of Mobile IP as defined by S2.

Clauses affected:	2, 3, 11.new

Other specs affected:
Other 3G core specifications	☐	→ List of CRs:	
Other GSM core specifications	☐	→ List of CRs:	
MS test specifications	☐	→ List of CRs:	
BSS test specifications	☐	→ List of CRs:	
O&M specifications	☐	→ List of CRs:	

Other comments:	This CR is triggered by the approved CR 025 to 23.060 at the Bonn meeting.

help.doc

<--------- double-click here for help and instructions on how to create a CR.

2   References

[RFC2002]   IETF RFC 2002 (1996), C. Perkins: "IP Mobility Support"

[RFC2486]   IETF RFC 2486 (1999), B. Aboba and M. Beadles: "The Network Access Identifier", January 1999

[23]   Pat R. Calhoun and Charles E. Perkins, "Mobile IP Network Address Identifier Extension", October 1999. Work in progress (http://www.ietf.org/internet-drafts/draft-ietf-mobileip-mn-nai-05.txt).

3.2   Abbreviations

APN   Access Point Name

MIP   Mobile IP

NAI   Network Access Identifier

11.x.x   Access to Internet, Intranet or ISP with Mobile IPv4

General

A way to allow users to roam from one environment to another, between fixed and mobile, between public and private as well as between different public systems is to use Mobile IP [RFC2002]. Mobile IP (MIP) is a mobility management protocol developed by IETF. The Mobile IP Foreign Agent (FA) [RFC2002] is located in the Core Network in the GGSN. MIP also uses a Home Agent (HA) [RFC2002] which may or may not be located in a GPRS/UMTS network.

Interworking model for MIP

A FA is located in the GGSN. The interface between the GGSN and the FA will probably not be standardised as the GGSN/FA is considered being one integrated node. The mapping between these two is a matter of implementation. Each FA must be configured with at least one care-of address. In addition a FA must maintain a list that combines IP addresses with TEIDs of all the visiting MSs that have registered with the FA. IP packets destined for the MS are intercepted by the HA and tunneled to the MS's care-of address, i.e. the FA. The FA de-tunnels the packets and forwards the packets to the MS. Mobile IP related signalling between the MS and the FA is done in the user plane. MIP registration messages [RFC2002] are sent with UDP.
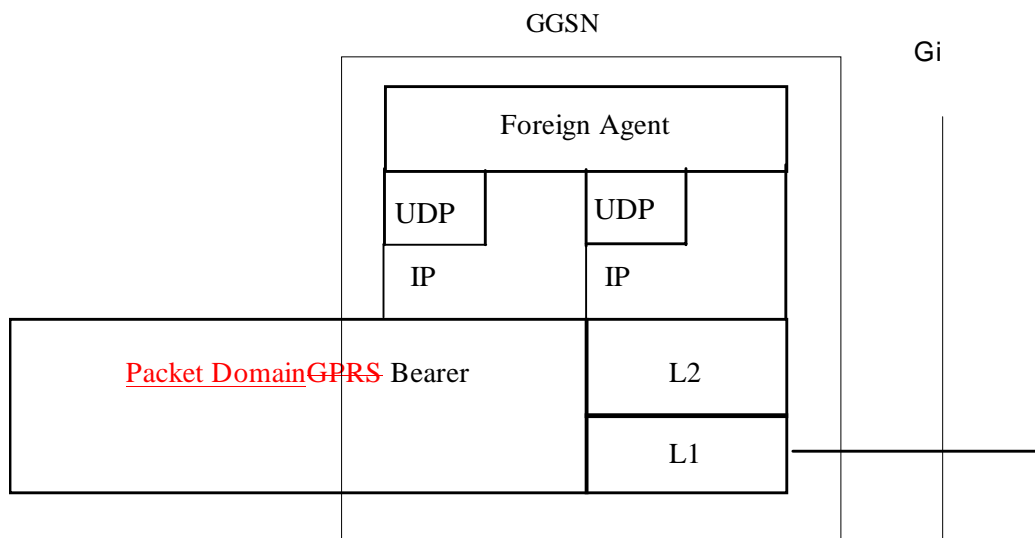
GGSN
Gi

Foreign Agent

UDP   UDP

IP   IP

Packet DomainGPRS Bearer   L2

L1

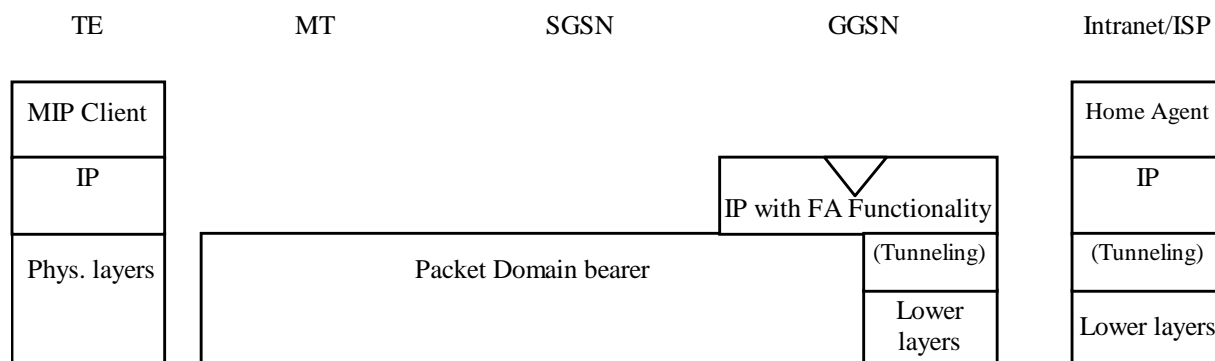**Figure A: The protocol stacks for the Gi IP reference point infor the MIP signalling plane**

Figure B: Protocol stacks for user access with MIP

In Figure B: "(Tunneling)" is intended to show asymmetric traffic flow. Tunneling (IP-in-IP) is only used in the direction from the ISP towards the MT.
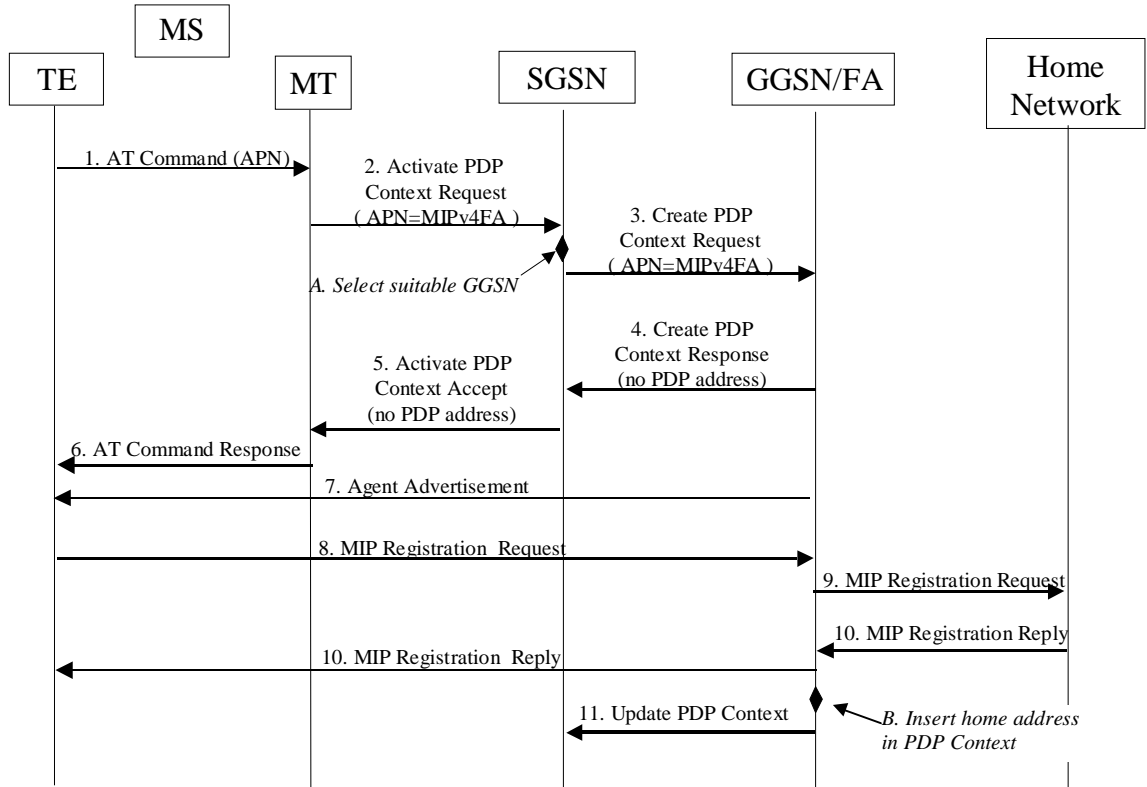
Authentication of the user is supported in Mobile IPv4. This authentication mechanism may involve communication with an authentication server (e.g. RADIUS), although this is not shown in Figure B.

Address allocation

At PDP context activation no IP address is allocated to the MS indicated by 0.0.0.0. in the "Requested PDP Address" field. If the MS does not have a static IP address which it could register with the HA, it will acquire a dynamic IP address from the HA [23]. After completion of the PDP activation the SGSN is informed of the assigned IP address by means of the GGSN initiated PDP Context Modification Procedure.

A signalling scheme, shown in figure C, is described below. The PS attach procedures have been omitted for clarity.

IPv4 - Registration UMTS/GPRS + MIP , FA care-of address

MS

| TE | MT | SGSN | GGSN/FA | Home Network |

1. AT Command (APN)

2. Activate PDP Context Request (APN=MIPv4FA)

3. Create PDP Context Request (APN=MIPv4FA)

A. Select suitable GGSN

4. Create PDP Context Response (no PDP address)

5. Activate PDP Context Accept (no PDP address)

6. AT Command Response

7. Agent Advertisement

8. MIP Registration Request

9. MIP Registration Request

10. MIP Registration Reply

10. MIP Registration Reply

11. Update PDP Context

B. Insert home address in PDP Context

IPv4 - Registration UMTS/GPRS + MIP , FA care-of address

| TE | MT | SGSN | GGSN/FA | Home Network |

1. AT Command (APN)

2. Activate PDP Context Request (APN=MIPv4FA)

3. Create PDP Context Request (APN=MIPv4FA)

A. Select suitable GGSN

4. Create PDP Context Response (no PDP address)

5. Activate PDP Context Accept (no PDP address)

6. Agent Advertisement

7. MIP Registration Request

8. MIP Registration Request

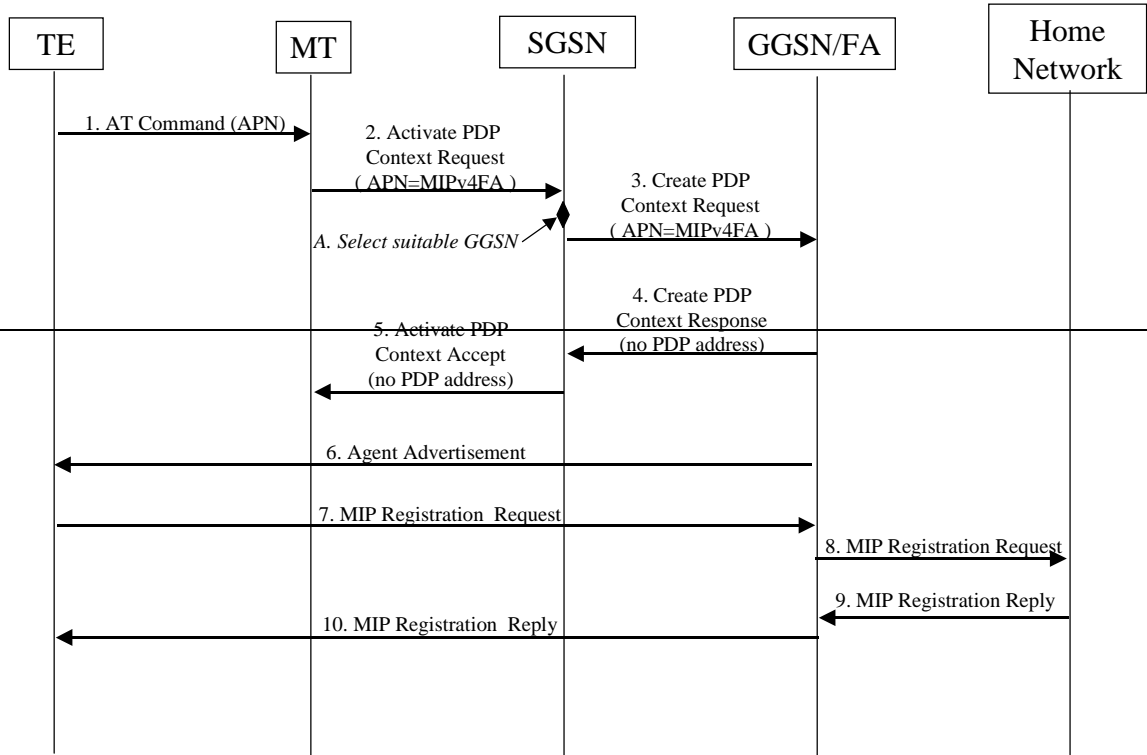9. MIP Registration Reply

10. MIP Registration Reply

Figure C: PDP Context activation with Mobile IP registration (the PS attach procedure not included)

1. The AT command carries parameters that the MT needs to request the PDP Context Activation. The important parameter here, is the APN (Access Point Name), see section A below. The AT command is followed by a setup of the PPP connection between the MT and the TE, which are not included in the figure.

2. The MT sends the "Activate PDP Context Request" to the SGSN. The message includes various parameters of which the "APN" (Access Point Name) and the "Requested PDP Address" are of interest here. The TE/MT may use APN to select a reference point to a certain external network or to select a service. APN is a logical name referring to the external packet data network or to a service that the subscriber wishes to connect to. The "Requested PDP Address" should be omitted for all MS's using Mobile IP. This is done irrespective of if the MT has a permanently assigned Mobile IP address from its Mobile IP home network, a previously assigned dynamic home address from its Mobile IP home network or if it wishes the Mobile IP home network to allocate a "new" dynamic home address.

A. The SGSN will base the choice of GGSN based on the APN that is given by the MS.

3. The SGSN requests the selected GGSN to set up a PDP Context for the MS. The PDP address and APN fields are the same as in the "Activate PDP Context Request" message.

4. A Create PDP Context Response is sent from the GGSN/FA to the SGSN. If the creation of PDP Context was successful, some parameters will be returned to the SGSN, if not, an error code will be returned. If the GGSN has been configured, by the operator, to use a Foreign Agent for the requested APN, the PDP address returned by the GGSN shall be set to 0.0.0.0. indicating that the PDP address shall be reset by the MS with a Home Agent after the PDP context activation procedure.

5. The Activate PDP Context Accept message is sent by the SGSN to the MS and contains similar information as the Create PDP Context Response message.

6. The MT sends an AT response back to the TE to confirm that the PDP context activation has been done.

7. The Agent Advertisement [RFC2002] is an ICMP (Internet Control Message Protocol) Router Advertisement message with a mobility agent advertisement extension. The latter part contains parameters of the FA that the mobile node needs, among those are one or more care-of addresses that the FA offers. This message should be sent, in the UMTS/GPRS user plane, as an IP limited broadcast message, i.e. destination address 255.255.255.255, however only on the TEID for the requesting MS to avoid broadcast over the radio interface.

8. The Mobile IP Registration Request is sent from the mobile node to the GGSN/FA across the GPRS/UMTS backbone as user traffic. The mobile node includes its (permanent) home address as a parameter [RFC2002]. Alternatively, it can request a temporary address assigned by the home network by sending 0.0.0.0 as its home address, and include the Network Access Identifier (NAI) in a Mobile-Node-NAI Extension [23][RFC2486].

9. The FA forwards the Mobile IP Registration Request to the home network of the mobile node, where a home agent (HA) processes it. Meanwhile, the GGSN/FA needs to store the home address of the mobile node or the NAI and the local link address of the MS, i.e. the TEID (Tunnel Endpoint ID).

10. The Registration Reply is sent from the home network to the FA, which extracts the information it needs and forwards the message to the mobile node in the UMTS/GPRS user plane. As the FA/GGSN knows the TEID and the NAI or home address, it can pass it on to the correct MS.

B. The GGSN/FA extracts the home address from the Mobile IP Registration Reply message and updates its GGSN PDP Context.

11. The GGSN triggers a "GGSN initiated PDP Context modification procedure" in order to update the PDP address in the SGSN.