Technical Specification Group Services and System Aspects**TSGS#14(01)0712**

Meeting #14, Kyoto, Japan, 17-20 December 2001

Source: TSG SA WG2
Title: CRs on 23.221 v.5.2.0
Agenda Item: 7.2.3

The following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #14.
Note: the source of all these CRs is now S2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.

Tdoc #	Title	Spec	CR #	cat	Rel	WI
S2-012615	Routing of MT call from PSTN to CS or IMS	23.221	002r6	C	Rel-5	IMS-CCR
S2-012990	Use of the terms Iu mode and A/Gb mode	23.221	014r1	F	Rel-5	GERAN
S2-012614	Editorial corrections	23.221	015r2	D	Rel-5	GERAN
S2-012256	Removal of Editor's notes	23.221	017	D	Rel-5	IMS-CCR
S2-012774	GGSN & P-CSCF in the HPLMN	23.221	020	F	Rel-5	IMS-CCR
S2-013042	Routing Calls from the IMS to the CS domain	23.221	021r1	F	Rel-5	IMS-CCR
S2-013502	IPv6 requirements for 3GPP UE(s)	23.221	025r1	F	Rel-5	IMS-CCR

7.2 Domain selection for mobile terminated calls from the PSTN /CS domain

7.2.1 Introduction

It is an operator's decision whether mobile terminated calls from the PSTN/CS domain are routed first to the CS domain, or to the IM subsystem. Both options may co-exist within one operator's network.

7.2.2 Calls directed to the CS domain

When the mobile terminated call set-up arrives at a G-MSC server or G-MSC, then the G-MSC Server or G-MSC interrogates the HSS for routing information. The HSS decides on the way the call shall be treated next (e.g. IM CN subsystem, CS domain (e.g. the subscriber is roaming in a legacy network), service platform involvement). According to the decision, the HSS returns information that will make the G-MSC progress the call towards an MGCF (for onward handling in the IMS), a VMSC or to provide further processing (e.g. invoke CAMEL G-MSC processing).

7.2.3 Calls directed to the IMS

When the mobile terminated call set-up arrives at a MGCF, then the MGCF passes the session to an I-CSCF which interrogates the HSS for routing information. The HSS returns information that will enable the I-CSCF to progress the call towards an S-CSCF. From the S-CSCF the session may be re-directed to the CS domain or may continue in the IMS.

CR-Form-v4

CHANGE REQUEST

| ⌘ | **23.221** CR **014** | ⌘ rev **1** | ⌘ Current version: **5.2.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network **X**   Core Network **X**

Title:	⌘	Alignment of section 6.3.3a with the use of the terms Iu mode and A/Gb mode
Source:	⌘	Lucent Technologies
Work item code:	⌘ GERAN	***Date:*** ⌘ 29-Oct-01

Category:	⌘ **F**	***Release:*** ⌘ REL-5

Use one of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	CR013 used the terminology of 2G and 3G. These terms are not defined in 21.905, rather the terms "Iu mode" and "A/Gb mode" should be used.
Summary of change:	⌘	Sentences in 6.3.3a have been reworded using the correct terminology
Consequences if not approved:	⌘	The text will be ambiguous as the terms used are not defined.

Clauses affected:	⌘	6.3.3a

Other specs affected:	⌘	☐ Other core specifications	⌘	
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6.3.3   Routing areas

For PS services, the CN uses RA. RA is used e.g. at CN initiated paging related to PS services. A PS service related temporary identity, PS-TMSI, may be allocated to the UE. This temporary identity is then unique within a RA.

6.3.3a   Support of Iu and A/Gb mode of operation in GERAN Cells

6.3.3a.1   Overview

A GERAN capable cell may belong to the same LA/RA for both modes of operation (figure 6.2a). In the case of a combined 2G/3G CN node supporting both Iu and A/Gb mode UeMSs, a single 2G/3G LA/RA identity for UeMSs in either mode shall be broadcasted in the cell since the same LAI and RAI will be used in both modes of operation.
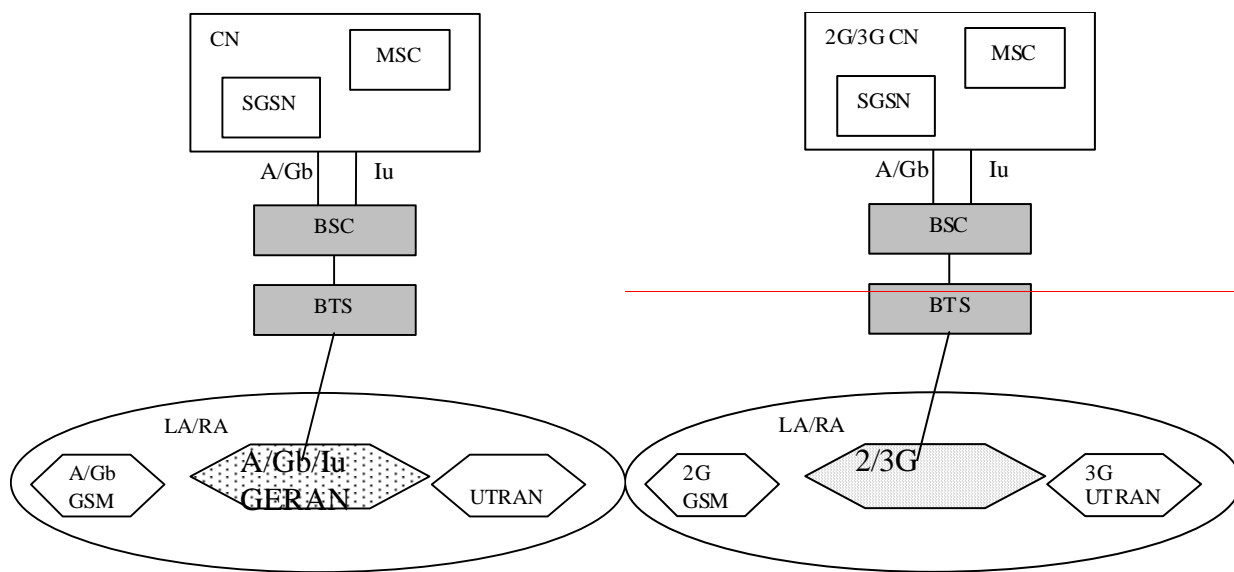

Figure 6.2a: Combined 2G/3Giu/A/Gb Cell with Combined 2G/3G CN nodes
Figure X: Combined 2G/3G Cell with Combined 2G/3G CN nodes

It is also possible for GERAN capable cell to support both A/Gb and Iu mode of operation without any restriction on combined 2G/3G CN nodes (figure 6.2b). In order to support this GERAN capable cells need to support the possibility to broadcast both 2G and 3G separateboth LA/RA identities for UeMSs in Iu mode and for UeMSs in A/Gb mode. The existing 2G LAI/RAI will be used for legacy mobiles and mobiles operating in A/Gb mode while the 3G LAI/RAI for Iu mode will be used for mobiles operating in Iu mode. The reason for this is that the LA and RA can not in this case overlap the both CNs.
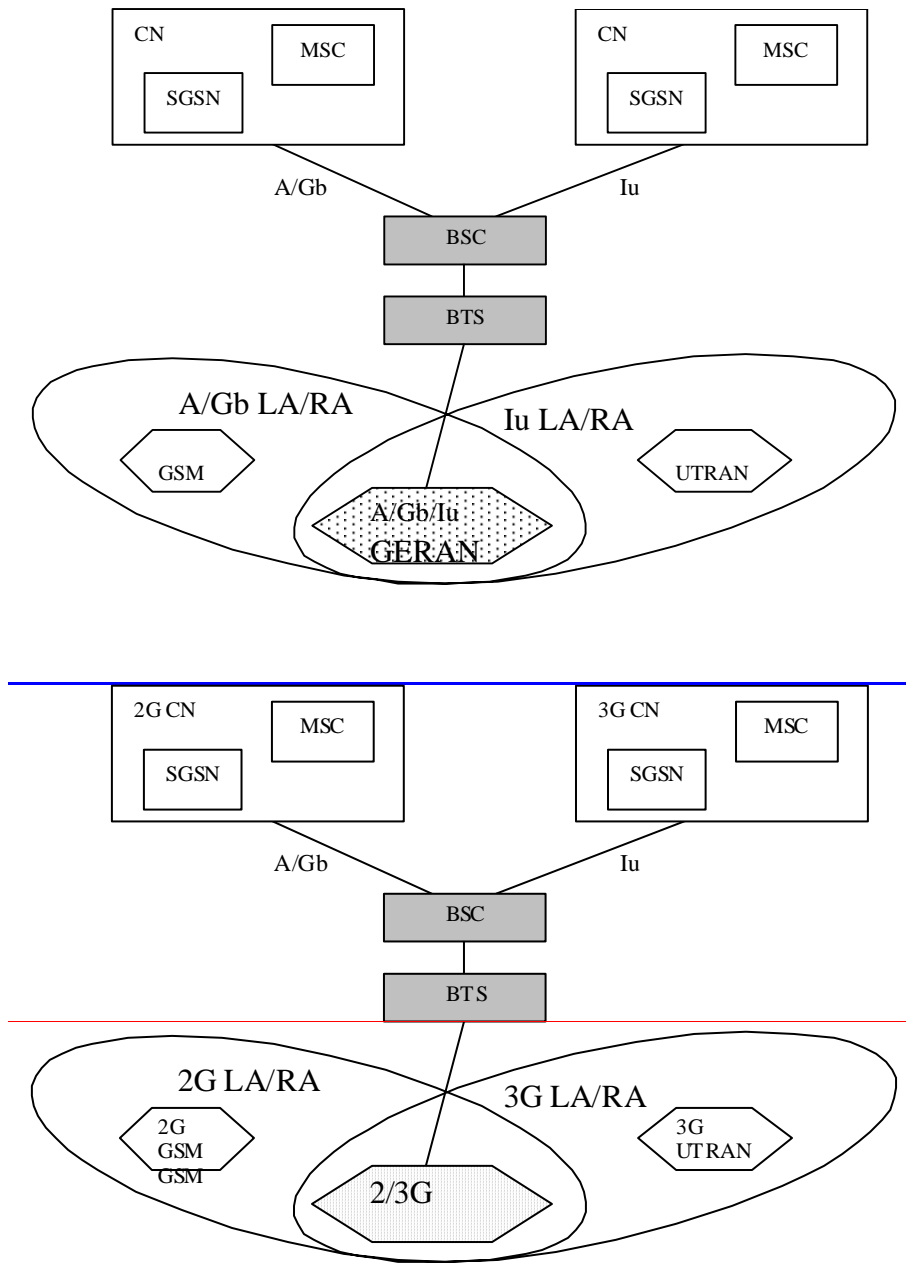
Figure 6.2b: Combined 2G/3GA/Gb/Iu Cell with Separate CN

6.3.3a.2 Interface selection in GERAN Cells

The MS shall be able to derive the mode supported in cell from the information broadcasted.

The support of different modes of operation in the MS shall be indicated in the MS Classmark and/or the MS Radio Access Capabilities.

6.3.3a.2.1 Basic principles for MS controlled Cell/Mode selection/re-selection

The procedures for MS controlled cell selection/re-selection are done according to UMTS/GSM principles and procedures outlined in TS 25.304 and 45.008. This means that a GERAN cell will be selected regardless which mode it supports. The cell selection is based on radio criteria and not service.

If a GERAN cell is selected and it is both Iu and A/Gb capable, an Iu and A/Gb capable mobile station shall select Iu mode of operation by default.

Note: The above text outlines the default mechanism of mode of operation selection and does not prohibit the introduction of a more flexible solution, which avoids unecessary mode of operation changes, at a later stage

6.3.3a.2.2 Basic principles for network controlled Mode selection/re-selection

The procedures for network-controlled cell selection/re-selection are done according to UMTS/GSM principles. When a cell/mode change is ordered by the network, the mode of operation to apply will be indicated by the network.

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CHANGE REQUEST

| ⌘ | **23.221** CR **015** | ⌘ rev | **2** | ⌘ | Current version: | **5.1.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network **X**   Core Network **X**

Title: ⌘	Editorial corrections	
Source: ⌘	Lucent Technologies	
Work item code: ⌘	GERAN	***Date:*** ⌘ 27-Aug-01
Category: ⌘ **D**		***Release:*** ⌘ REL-5

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
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Use <u>one</u> of the following releases:
2   (GSM Phase 2)
R96   (Release 1996)
R97   (Release 1997)
R98   (Release 1998)
R99   (Release 1999)
REL-4   (Release 4)
REL-5   (Release 5)

Reason for change: ⌘	Add missing references and correct a definition
Summary of change: ⌘	CR013 did not include the changes to the reference section to include two new references. The definition of IMSI was incorrect
Consequences if ***not approved:*** ⌘	References will be missing

Clauses affected: ⌘	2, 3.3

Other specs ***affected:*** ⌘	☐ Other core specifications ⌘	
	☐ Test specifications	
	☐ O&M Specifications	

| ***Other comments:*** ⌘ | |

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

1 Scope

This document covers details the architectural requirements for the GSM in Iu mode and UMTS systems. In particular it details the high level requirements for the Circuit Switched (CS) Domain and the stage 2 procedures that span more than one domain/subsystem within UMTS and GSM. The reference model to which these procedures apply can be found within 3G TS 23.002 [1]. In addition, A mode to Iu mode handover for CS services is addressed. Detailed architectural requirements within the subsystems are contained within the remainder of the 23 series of specifications e.g. the requirements for the Packet Switched (PS) domain are contained within 3G TS 23.060 [2] and the requirements for the Bearer Independent CS Core Network are contained in 3G TS 23.205[14].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

This specification may contain references to pre-Release-4 GSM specifications. These references shall be taken to refer to the **Error! No text of specified style in document.** version where that version exists. Conversion from the pre-Release-4 number to the Release 4 (onwards) number is given in subclause 6.1 of 3GPP TR 41.001.

[1]   3GPP TS 23.002: "Network Architecture".

[2]   3GPP TS 23.060: "General Packet Radio Service (GPRS) Service description; Stage 2".

[3]   3GPP TS 23.012: " Location management procedures"

[5]   3GPP TS 25.331: " Radio Resource Control (RRC) Protocol Specification"

[6]   3G TS 25.301: "Radio interface protocol architecture"

[7]   3G TS 25.303: "UE functions and inter-layer procedures in connected mode"

[8]   3GPP TR 21.905: "3G Vocabulary".

[9]   3GPP TS 25.413: " UTRAN Iu interface RANAP signalling"

[10]   3GPP TS 25.410: " UTRAN Iu Interface: General Aspects and Principles"

[11]   3G TS 23.228 "IP Multimedia Subsystem – Stage 2"

[12]   3G TS 43.051 "GERAN Overall Description"

[13]   3G TS 23.153 ,"Out of Band Transcoder Control - Stage 2".

[14]   3G TS 23.205, "Bearer Independent CS Core Network – Stage 2"

[15]   3G TR 25.931: " UTRAN Functions, examples on signalling procedures"

[16]   RFC2766 "Network Address Translation - Protocol Translation (NAT-PT)", G. Tsirtsis, P. Srisuresh. February 2000.

[17]   RFC2893 "Transition Mechanisms for IPv6 Hosts and Routers", R. Gilligan, E. Nordmark, August 2000.

[18]   3G TS 25.401 "UTRAN Overall Description"

[19]   3G TS 25.304: "UE Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode"

[20]   3G TS 45.008: "Radio subsystem link control"

3   Definitions, symbols and abbreviations

3.1   Definitions

For the purposes of the present document, the terms defined in 3GPP TR 21.905 [8] apply:

In Iu mode: see 3GPP TR 21.905[8]

 In A/Gb mode: see 3GPP TR 21.905[8]

RAN: within this document, the term RAN (Radio Access Network) is used to refer to both the UTRAN and GERAN in Iu mode. RAN specific abbreviations such as URA when used with the term RAN, apply to both UTRAN and GERAN in Iu mode, unless otherwise stated.

3.2   Symbols

For the purposes of the present document, the following symbols apply:

3.3   Abbreviations

For the purposes of the present document, the following abbreviations apply:

ATM	Aysnchronous Transfer Mode
CM	Connection Management
CN	Core Network
CS	Circuit Switched
CSCF	Call/Session Control Function
CS-MGW	Circuit Switched Media Gateway
DHCP	Dynamic Host Configuration Protocol
GERAN	GSM/EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GTP	GPRS Tunnelling Protocol
HLR	Home Location Register
IM	IP Multimedia
IMSI	International Mobile ~~Station~~ Subscriber ~~Identifier~~Identity
IP	Internet Protocol
IPSec	IP Security protocol
LA	Location Area
LAC	Location Area Code
LAN	Local Area Network
LLC	Logical Link Control
LM	Location Management
MAP	Mobile Application Part
MGCF	Media Gateway Control Function
MGW	Media Gateway
MM	Mobility Management
MRF	Media Resource Function
MSC	Mobile Switching Centre
NAT	Network Address Translator
NGN	Next Generation Networks
OoBTC	Out of Band Transcoder Control
PDA	Personal Digital Assistant

CR-Form-v4

CHANGE REQUEST

⌘   **23.221** CR **017**   ⌘ ev **-** ⌘   Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network ☐   Core Network **X**

Title:	⌘	Removal of Editor's notes

Source:	⌘	Lucent Technologies

Work item code:	⌘	IMS-CCR	***Date:*** ⌘	27-Aug-01

Category:	⌘	**D**

Release: ⌘   REL-5

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   A *(corresponds to a correction in an earlier release)*
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Detailed explanations of the above categories can
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   R96   *(Release 1996)*
   R97   *(Release 1997)*
   R98   *(Release 1998)*
   R99   *(Release 1999)*
   REL-4   *(Release 4)*
   REL-5   *(Release 5)*

Reason for change:	⌘	The final issues covered in the Editor's notes need to be finalised for Release 5.

Summary of change:	⌘	The Editor's notes have now been handled, many of them within other specifications.

Section 5.1: The editor's note is deleted as other specifications, e.g. 23.228 define which IPv6 protocols will be used.

Section 5:3 The Editor's note is deleted as this note should have been deleted when the draft specification was split into Release 4 and Release 5 versions.

Section 5.4: The first editor's note is deleted as it should have been removed when the specification was split into Release versions. The second editor's note is deleted as no consideration to the support of other access networks is made in Release 5.

Section 5.5: The editor's note is deleted as this should have been removed when the specification was split.

Section 8.1: The all four notes are deleted as the issues is covered in TS 23.228.

Consequences if not approved:	⌘	23.221 will not be consistent with other specifications in the release

Clauses affected:	⌘	5.1, 5.3, 5.4, 5.5, 8.1

Other specs affected:	⌘	☐ Other core specifications	⌘	
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	

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4.5 Cross Core Network Domain Requirements

The specifications shall support the option of IP transport for the MAP and CAP based interfaces

4.6 UTRAN

The requirements for the UTRAN are in the 25-series. An overview can be found in 3G TS 25.401 [18].

4.7 GERAN

The requirements for the GERAN are in 3G TS 43.051 [12]

5 IP addressing

5.1 IP version issues

The UMTS/GSM architecture shall support IPv4 / IPv6 based on the statements below.

- IP transport between network elements of the IP Connectivity services (between RNC, SGSN and GGSN) and IP transport for the CS Domain: both IPv4 / IPv6 are options for IP Connectivity

- IM CN subsystem elements (UE to CSCF and the other elements e.g. MRF):

  - The architecture shall make optimum use of IPv6.

  - The IM CN subsystem shall exclusively support IPv6.

  - The UE shall exclusively support IPv6 for the connection to services provided by the IM CN subsystem.

  Editor's note: The exact set of the functionality available in the whole Ipv6 protocol suite (such as IPSec, IP multicast etc.) that will be mandated in R5 is FFS.

- Access to existing data services (Intranet, Internet,…):

- The UE can access IPv4 and IPv6 based services.

5.2 Interoperability between IPv4 and IPv6 networks

Since the UE can access both IPv4 and IPv6 based services, situations may arise where interworking is needed to interoperate with IPv4 and IPv6 networks. This section describes three different interworking scenarios: UE is IPv4 and IPv6 capable, IPv6 only UE, and IPv6 UE connected via IPv4 network to an IPv6 device. These scenarios are examples of IPv6 and IPv4 interworking. The scenarios presented below only considered cases of a Transition Gateway (TrGW) for generic services and specialist services may require additional functionally at the application level.

5.2.1 IPv4/IPv6 Mobile connecting to IPv4 and IPv6 networks

An installation where the UE has both IPv4 and IPv6 stacks is shown in Figure 5-1. As depicted, the terminal connects to the IPv4 device directly using an IPv4 PDP Context. Hence, the UE appears to be a standard IPv4 node to the external IPv4 network. This scenario does not need any specific transition support from the network. However, it requires both versions of IP at the UE. The GGSN in this scenario may be different for the IPv6 and the IPv4 connections.
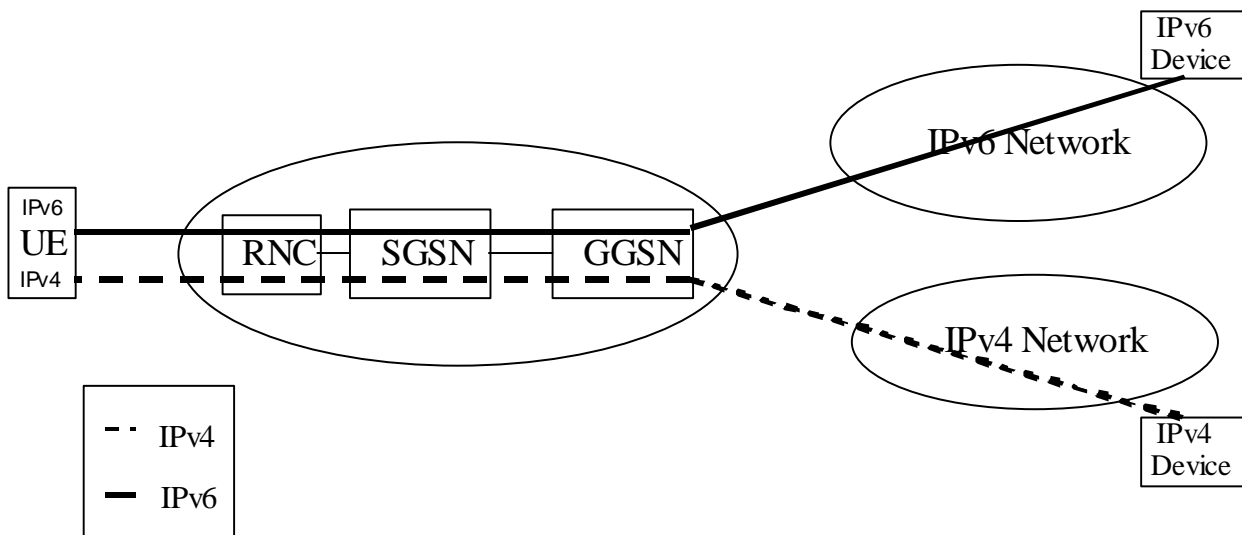
Figure 5-1 UE with IPv4 and IPv6 capability connecting to IPv4 and IPv6 networks

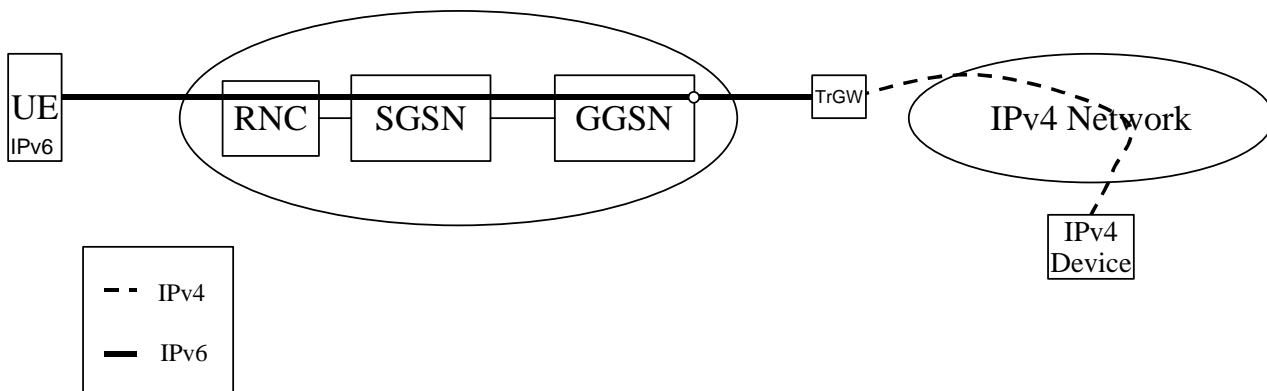## 5.2.2 IPv6 only Mobile connecting to IPv4 network

Figure 5-2 IPv6 only mobile connecting to IPv4 data services

Figure 5-2 shows an IPv6 only terminal connected to an IPv4 device. The UE us using an IPv6 PDP Context for access to a Transition Gateway (TrGW) that translates the IPv6 packets to IPv4 and vice versa. The TrGW may be implemented as a Network Address Translation – Protocol Translation (NAT-PT) [16] to convert IPv6 traffic coming from the UE to IPv4 traffic and vice versa.

NAT-PT is a combination of NAT-like address translation and IP header conversion as described in [16]. NAT-PT uses a pool of IPv4 addresses for assignment to IPv6 nodes on a dynamic basis as sessions are initiated across v4-v6 boundaries. NAT-PT binds addresses in the v6 network with addresses in the v4 network to provide transparent routing of packets traversing address realms. This requires no changes to end nodes and IP packet routing is completely transparent to them. It does, however, require NAT-PT to track the sessions it supports and mandates that inbound and outbound packets pertaining to a session traverse the same NAT-PT device.

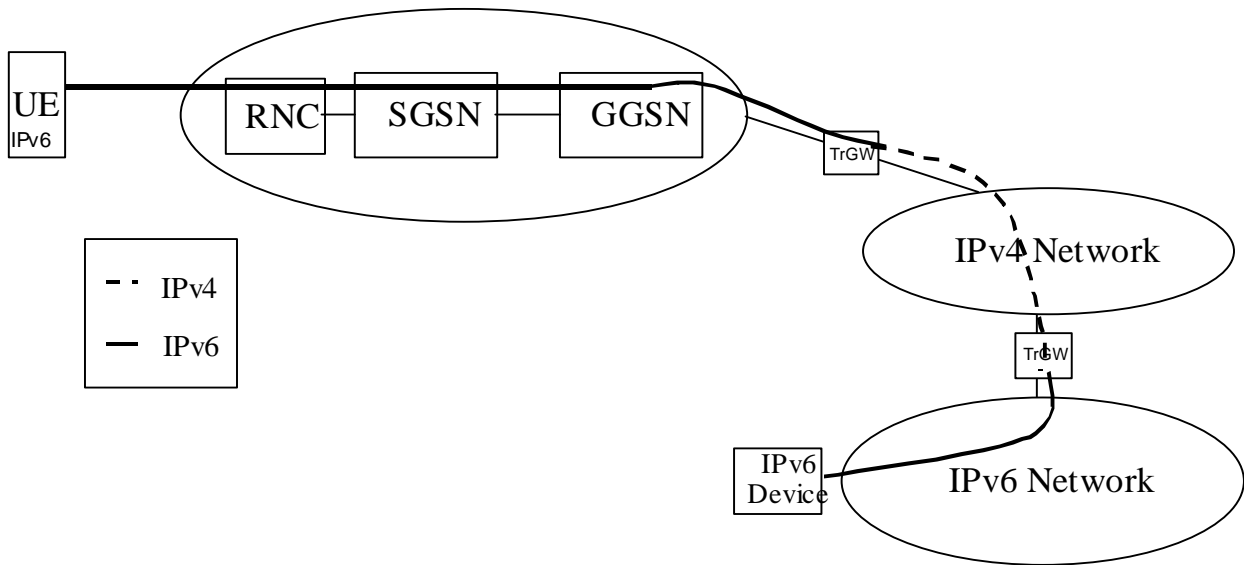## 5.2.3 IPv6 Mobile connected to an IPv6 Device via an IPv4 network

Figure 5-3 IPv6 mobile connected to an IPv6 device via an IPv4 network

Figure 5-3 shows a case where an IPv4 network lies between two IPv6 domains. The IPv6 domains can be interconnected using IETF standard mechanisms such as automatic or configured tunneling of IPv6 over IPv4 [17].

5.3 Address management

Editor's Note: The following text (as worded) is for Release 5 onwards. Should some of this not apply for Release 4?

The UMTS network may be implemented as a number logically separate IP networks which contain different parts of the overall system. In this discussion each of these elements is referred to as an "IP Addressing Domain". Within an "IP Addressing Domain" it is required that the nodes within the domain are part of a consistent non-overlapping IP-address space. It is also required that IP packets may be routed from any node in the domain to any other node in the domain using conventional IP routing. In a real implementation an IP Addressing Domain may be a physically separate IP network or an IP VPN.

IP Addressing Domains may be interconnected at various points. At these points of interconnect gateways, firewalls or NATs may be present. It is not guaranteed that IP packets from one IP Addressing Domain can be directly routed to any interconnected IP Addressing Domain. Rather inter-Domain traffic may be handled via firewalls or tunnels. This implies that different IP Addressing Domains can have different (and possibly overlapping) address spaces.

Figure 5-4 below shows an example of the IP Addressing Domains involved in PS-domain and IP-subsystem services.
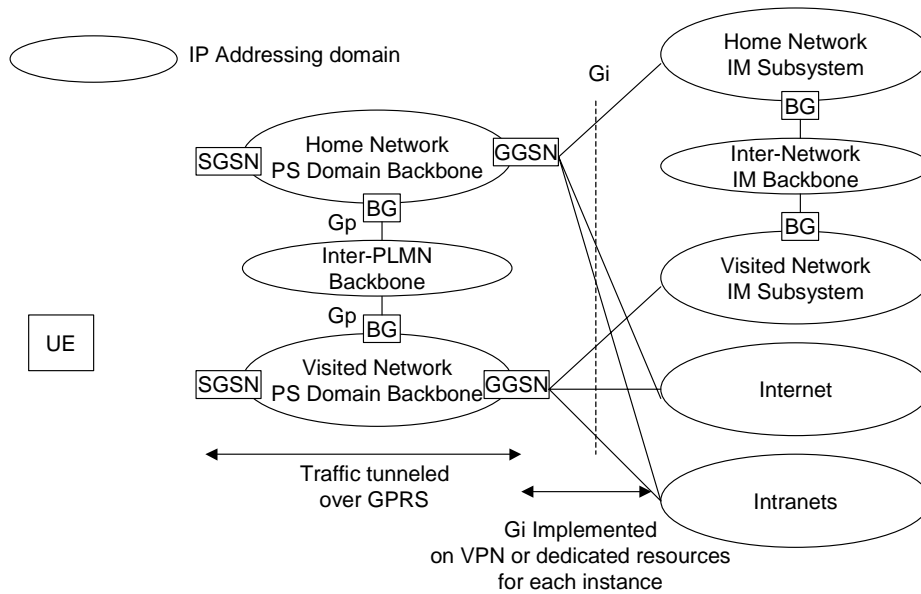
Figure 5-4 – IP Addressing Domains Involved In PS-Domain and IM Services

Though UMTS permits the possibility of using different IP Addressing Domains as shown above it is possible that several different IP Addressing Domains fall under a common co-operative management regime. In this case the different IP Addressing Domains may be implemented as a single administrative domain at the operator's discretion, thus using a common IP-address space.

A UE accessing services in either an IM subsystem, the Internet, or an external Intranet requires an IP address that is part of the target network's IP Addressing Domain. For each of these IP networks, the IP address is linked to a specific PDP context, or set of PDP contexts sharing this IP address.

When the UE establishes the PDP context to access an IP network, it may use an existing PDP context if it has an active context with a compatible IP addressing domain and quality of service profile.

5.4 IP addressing and routing for access to IM-subsystem services

Editor's Note: The following text is for Release 5 onwards.

This section deals with a UE making access to IM-subsystem services only and via UMTS.

Editors Note: How a UE can access IM subsystem services via other access types, or make simultaneous access to services in other IP networks is FFS.

A UE accessing IM-Subsystem services requires an IP address which is logically part of the Serving Network IM Subsystem IP Addressing Domain. This is established using an appropriate PDP-context. For routing efficiency this context should be connected through an GGSN in the visited network An example of the connection between the UE and the Visited Network IM Subsystem is shown below in figure 5-5:
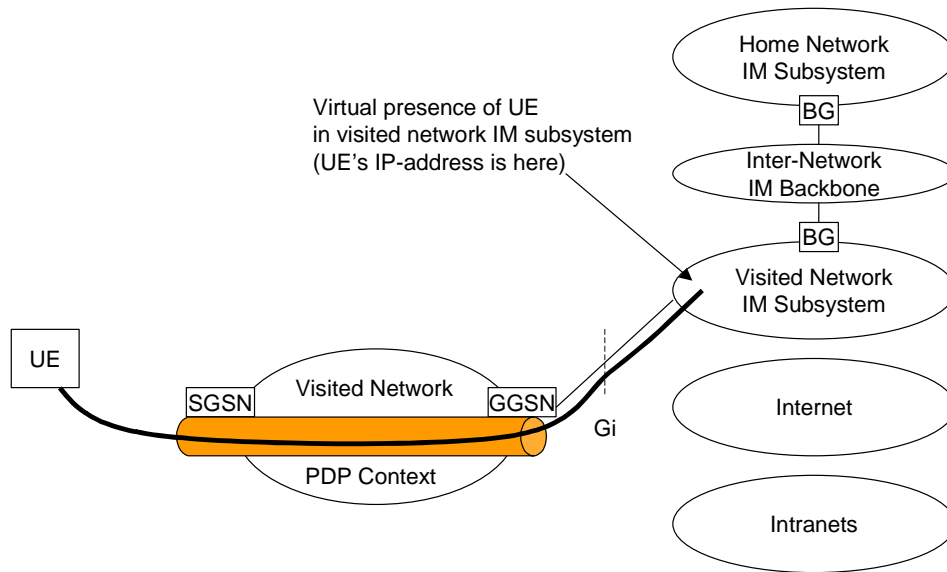
Figure 5-5 UE Accessing IM Subsystem Services in the visited network

5.5 Simultaneous access to multiple services

~~Editor's Note: The following text (as worded) is for Release 5 onwards. Should some of this not apply for release 4.~~

A UE can have multiple services active simultaneously.   When the services are part of different IP addressing domains, separate PDP contexts and IP addresses are required. The UE shall support multiple IP addresses when simultaneous PDP contexts are activated that require separate IP addresses for different addressing domains.

Figure 5-6 shows an example of a connection between a UE and an Internet/Intranet service that is not available in the Visited Network with a simultaneous connection to the Visited Network's IM Subsystem. In this example, there may be two IPv6 addresses allocated, or one IPv4 address allocated for internet/Intranet access and oneIPv6 address for IM subsystem access..
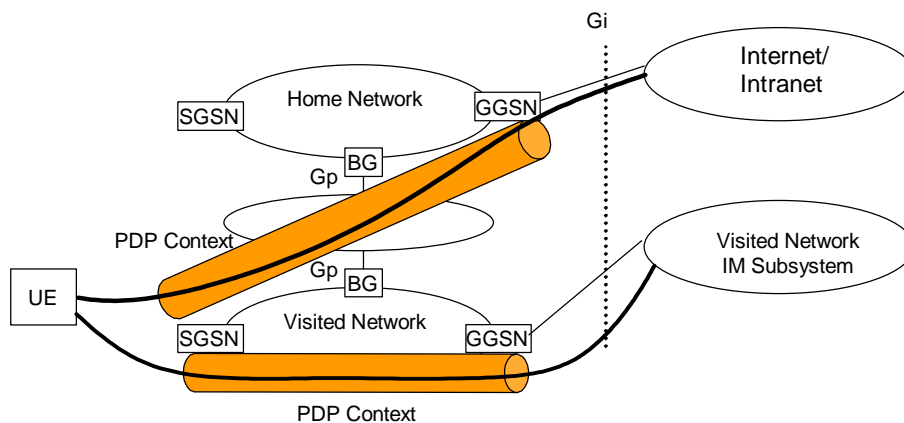

Figure 5-6 UE Accessing Home Internet/Intranet Services and Visited Network IM

6 Mobility management

6.1 Introduction

From a logical point of view, the CN encompasses two domains, a CS domain and a PS domain. The RAN can be connected either to both these CN domains or to one of the CN domains.

A single RRC connection (between RAN and UE) shall carry all user plane and signalling flows to/from a UE. This is regardless of where in the CN they originate/terminate.

The 3GPP specifications for UMTS and GSM in Iu mode shall support compatibility with GSM network in A/Gb mode from the point of view of roaming and handover. For the LM/MM functionality point of view this implies among other things the following:

a) IMSI shall be used as the common user identity in the two CN domains;

b) common MAP signalling is applied to networks supporting either Iu or A/Gb mode or both.

c) radio network parameters and radio resource management should be isolated in the RAN.

The LM/MM techniques used should minimise radio resource usage of the RAN.

6.2 Location management and mobility management concept overview

6.2.1 Non-combined procedures

From a logical point of view, the CN consists of two domains, a CS domain and a PS domain or one of these domains.

Each domain has its own service state machine. An UE, that is supporting both CS services and PS services, has a CS service state machine and a PS service state machine. The two peers of the service state machine are working independently to each other, although associated to the same UE. The UE-CN signalling aims to keep the peer entities

8 Support of IM CN Subsystem services

8.1 Context activation and registration

The IP address is allocated to UE either by GPRS or some other means e.g. by DHCP The UE shall use IP addresses assigned to it for, but not limited to, the following:

- the exchange application level signalling (e.g., registration, CC) with the serving CSCF from the access network currently used,

- application level registration to IM CN subsystem as an address used to reach the UE

Editor's Note: The use of DNS names, NAI (Network Access Identifier RFC2486) and SIP URL instead of IP address for application level registration is FFS.

- an address used to reach the UE for multimedia calls.

In GPRS, the terminal is associated with an IP address when the primary PDP context is activated. The IP address used for the purpose described above can be:

- the IP address obtained by the UE during the activation of a primary PDP context (e.g. if the UE does not have any existing PDP context active or desires to use a different IP address)

- the IP address of one of the already active PDP contexts.

In the following, a description of the order in which the registration procedure is executed need and how the IP address is allocated is shown. Figure 8.1 shows what procedures and in which order they are performed during the registration.
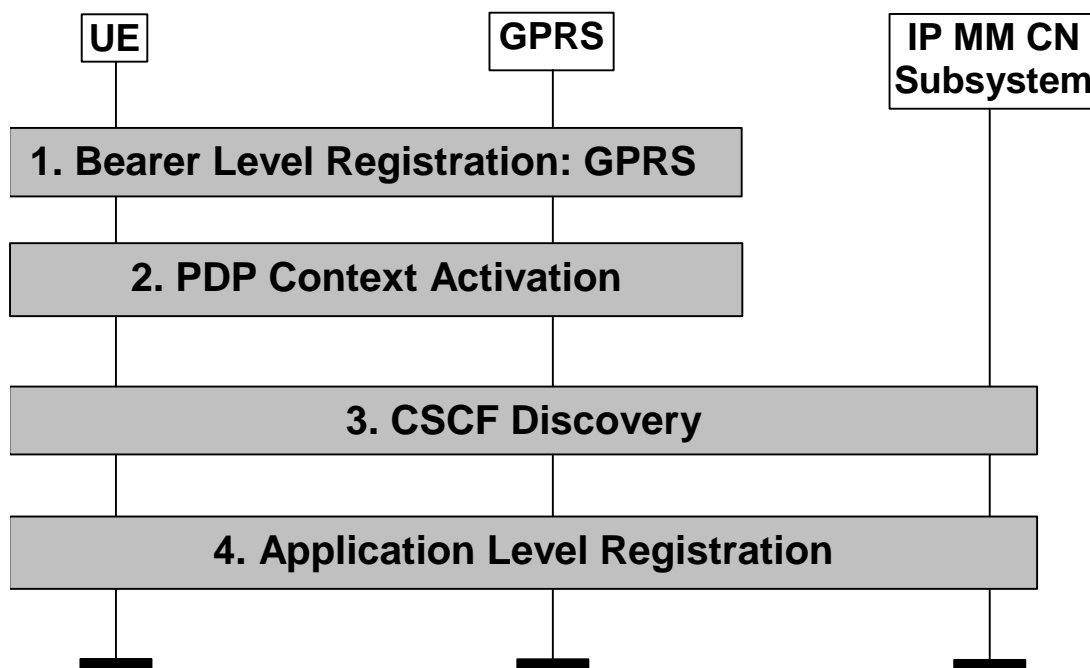

Figure 8.1: Registration

The following steps are performed:

1. the bearer level registration is performed (e.g. when the terminal is switched on or upon explicit indication from the user).

2. the PDP context activation is done. The UE has two options:

- activate a primary PDP context and obtain a new IP address (e.g. if the UE does not have any existing PDP context active or desires to use a different IP address)

- activate a secondary PDP context and re-use the IP address of one of the already active PDP contexts.

3. UE performs the CSCF discovery procedure, where the UE performs a CSCF discovery to select the CSCF to register with.

Editor's note: Details regarding the CSCF discovery procedure are FFS.

There can be time gaps between these procedures and the following one. For instance, the UE may perform PDP context activation and the CSCF discovery, but not the application level registration. The UE may use the activated PDP context for other types of signalling, e.g. for CSCF discovery.

4. UE performs application level registration by providing the IP address obtained at step 2 to the CSCF selected at step 3. The IP address used for signalling purposes is allocated in association with PDP context activation and not on an incoming call basis.

Editor's note: When and how often the UE should update application level registration is FFS.

The selected CSCF becomes the serving-CSCF.

NOTE: The S-CSCF can be either in the home or visited network.

Editor's note: Where the association of the IP address used by the UE and application level identifier is held in the network is FFS.

From the S-CSCF point of view, the IP address provided by the UE is the address where the UE is reachable for mobile-terminated call control signalling and any other type of mobile terminated signaling.

Whether the procedures are activated individually by the UE or some of them are performed automatically depends on implementation of the terminal and on the UE's configuration. For instance, the multimedia application in the UE could start the application level registration and steps 2-4 would have to be executed in response to support the operation initiated by the application. Interaction with the UE may happen during these steps.

8.2 Location management

8.2.1 Registration concepts for a subscriber roaming into CS domain

Figure 8.2 shows the registration concept for a subscriber, who access IM services in the home network, roaming into a CS domain.

CR-Form-v3

CHANGE REQUEST

⌘　　　**23.221** CR **020**　　⌘ rev **-** ⌘　Current version: **5.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘　　(U)SIM ☐　　ME/UE ☐　Radio Access Network ☐　Core Network **X**

Title: ⌘	GGSN & P-CSCF in the HPLMN	
Source: ⌘	Vodafone, Ericsson	
Work item code: ⌘	IMS-CCR	***Date:*** ⌘ 29/10/2001
Category: ⌘ **F**		***Release:*** ⌘ REL-5

Use <u>one</u> of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2　*(GSM Phase 2)*
R96　*(Release 1996)*
R97　*(Release 1997)*
R98　*(Release 1998)*
R99　*(Release 1999)*
REL-4　*(Release 4)*
REL-5　*(Release 5)*

Reason for change: ⌘	Several sections in 23.228 currently state that the P-CSCF is in the same network as the UE. However, the VPLMN only has very limited control over the choice of GGSN and, in fact, the GGSN might be in a different network to the VPLMN. When the GGSN is in a different network to the VPLMN it may be impossible for the GGSN to know the address of P-CSCFs in all the different VPLMNs. Hence having a P-CSCF in a different network to the GGSN does not seem to be practical. 23.221 IP addressing for IMS also relies on the fact that GGSN is in the VPLMN only. Hence it is proposed to correct 23.221 to reflect the changes already agreed in 23.228 and allow possibility of GGSN & as such, P-CSCF in the HPLMN.

Summary of change: ⌘	.Add changes to reflect GGSN in HPLMN and remove Rel 4 editorial notes

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Consequences if not approved: ⌘	The system will be unmanageable and/or fail in cases where the user or subscriber or HPLMN selects a GGSN which is not in the VPLMN and cause inconsistent specifications.

Clauses affected: ⌘	5.3, 5.4

Other specs Affected: ⌘ ☐	Other core specifications ⌘	23.228
	Test specifications	
	O&M Specifications	

Other comments: ⌘	

**********First Change***********

5.3   Address management

The UMTS network may be implemented as a number logically separate IP networks which contain different parts of the overall system. In this discussion each of these elements is referred to as an "IP Addressing Domain". Within an "IP Addressing Domain" it is required that the nodes within the domain are part of a consistent non-overlapping IP-address space. It is also required that IP packets may be routed from any node in the domain to any other node in the domain using conventional IP routing. In a real implementation an IP Addressing Domain may be a physically separate IP network or an IP VPN.

IP Addressing Domains may be interconnected at various points. At these points of interconnect gateways, firewalls or NATs may be present. It is not guaranteed that IP packets from one IP Addressing Domain can be directly routed to any interconnected IP Addressing Domain. Rather inter-Domain traffic may be handled via firewalls or tunnels. This implies that different IP Addressing Domains can have different (and possibly overlapping) address spaces.

Figure 5-4 below shows an example of the IP Addressing Domains involved in PS-domain and IP-subsystem services.
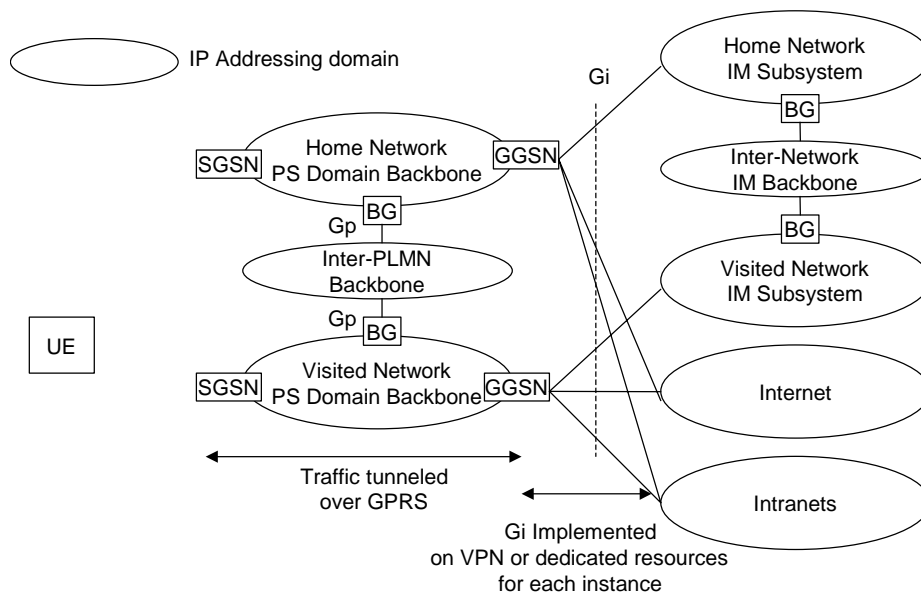

Figure 5-4 – IP Addressing Domains Involved In PS-Domain and IM Services

Though UMTS permits the possibility of using different IP Addressing Domains as shown above it is possible that several different IP Addressing Domains fall under a common co-operative management regime. In this case the different IP Addressing Domains may be implemented as a single administrative domain at the operator's discretion, thus using a common IP-address space.

A UE accessing services in either an IM subsystem, the Internet, or an external Intranet requires an IP address that is part of the target network's IP Addressing Domain. For each of these IP networks, the IP address is linked to a specific PDP context, or set of PDP contexts sharing this IP address.

When the UE establishes the PDP context to access an IP network, it may use an existing PDP context if it has an active context with a compatible IP addressing domain and quality of service profile.

**********Second Change************

5.4 IP addressing and routing for access to IM-subsystem services

Editor's Note: The following text is for Release 5 onwards.

This section deals with a UE making access to IM-subsystem services only and via UMTS.

Editors Note: How a UE can access IM subsystem services via other access types, or make simultaneous access to services in other IP networks is FFS.

A UE accessing IM-Subsystem services requires an IP address, which is logically part of the Serving Network IM Subsystem IP Addressing Domain. This is established using an appropriate PDP-context. It is possible to connect to a GGSN either in the VPLMN or the HPLMN. For routing efficiency this context may benefit from should being connected through an GGSN in the visited network EAn examples of the connection between the UE and the IM Subsystem or the Home network IM Subsystem are is shown below in figure 5-5 (GGSN in VPLMN) and 5.x (GGSN in HPLMN):
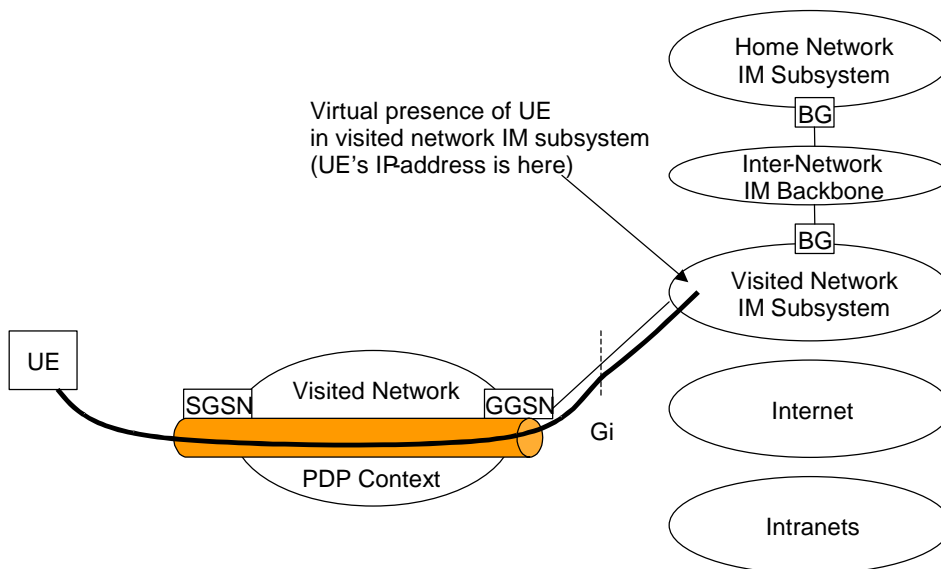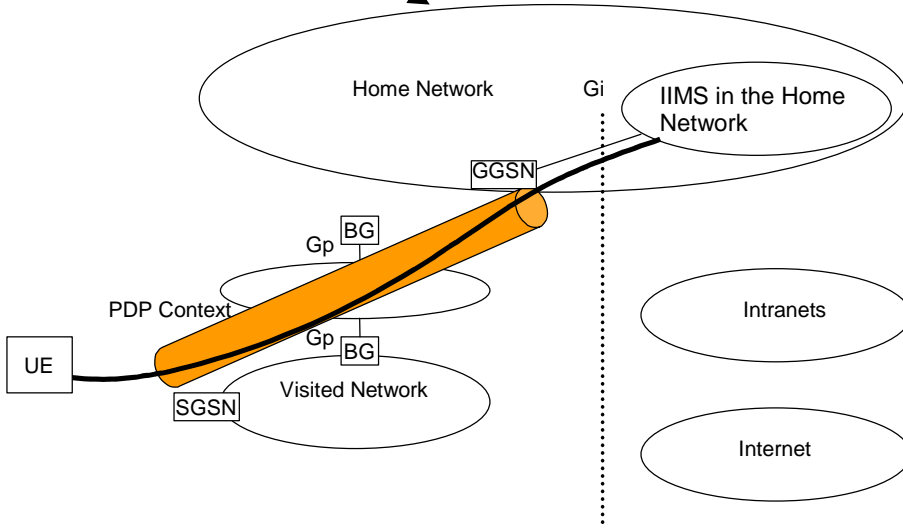
Figure 5-5 UE Accessing IM Subsystem Services with GGSN in the visited network

Virtual presence of UE
in Home network IM subsystem
UE's IP address is here

Home Network   Gi

IIMS in the Home Network

GGSN

Gp BG

PDP Context

Gp BG

UE

Visited Network

SGSN

Intranets

Internet

Figure 5.x UE Accessing IM CN subsystem Services with GGSN in the Home network

********End Change*********

CR-Form-v4

CHANGE REQUEST

⌘ **23.221** CR **021** ⌘ Rev. **1** ⌘ Current version: **5.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title: ⌘	Routing Sessions from the IMS to the CS Domain	
Source: ⌘	Ericsson, Nokia, Siemens	
Work item code: ⌘	IMS-CCR	***Date:*** ⌘ 24 October 2001
Category: ⌘	**C**	***Release:*** ⌘ REL-5

Use one of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change: ⌘	For subscribers subscribed to both the CS domain and the IMS, there may arise the need to route sessions from the IMS to the CS domain. Some basic mechanisms for this purpose should be captured in 23.221.
Summary of change: ⌘	Subclause 7.3 is added, which identifies principles for routing of sessions from the IMS to the CS domain.
Consequences if not approved: ⌘	

Clauses affected: ⌘	7.3 (new)
Other specs affected: ⌘	☐ Other core specifications ⌘
	☐ Test specifications
	☐ O&M Specifications
Other comments: ⌘	

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

7.3   Routing sessions from the IMS to the CS Domain

If a subscriber is subscribed to both the CS domain and the IMS, then there may arise the need to route sessions that arrived in the IMS to the CS domain using a number related to the subscriber's MS-ISDN. All sessions which are forwarded from the IMS to the CS domain shall enter the CS domain through a G-MSC or G-MSC Server. The G-MSC or G-MSC Server will handle the session as a mobile terminating call.

CR-Form-v4

CHANGE REQUEST

| ⌘ | **23.221** CR **025** | ⌘ | ev | **1-** | ⌘ | Current version: | **5.2.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title: ⌘	IPv6 requirements for 3GPP UE(s)	
Source: ⌘	Ericsson, Nokia	
Work item code: ⌘	IMS-CCR	***Date:*** ⌘ 2821.11.2001
Category: ⌘	**F**	***Release:*** ⌘ REL-5

Use *one* of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use *one* of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
REL-4 *(Release 4)*
REL-5 *(Release 5)*

Reason for change: ⌘	The concept of IPv6 covers many aspects, numerous IETF RFCs, a number of different situations, and is also partly still evolving. That is the reason why it is necessary to get an understanding on what parts of IPv6 functionality that are needed in a 3GPP terminal. This CR proposes a reference to an IETF document where IPv6 requirements for hosts are stated. It is important that the work to set the needed IPv6 functionality is done within IETF for 3GPP to stay interoperable with the rest of the IPv6 community.
Summary of change: ⌘	Requirements on which parts of IPv6 a 3GPP UE shall support are added in a new subchapter. Also, a reference to an IETF document is added.
Consequences if not approved: ⌘	Could lead to an increased risk of deployment of non-interoperable IPv6 stacks in mobile terminals.

Clauses affected: ⌘	2 and 5.1
Other specs affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments: ⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

************** First change ********************

2   References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

This specification may contain references to pre-Release-4 GSM specifications. These references shall be taken to refer to the **Error! No text of specified style in document.** version where that version exists. Conversion from the pre-Release-4 number to the Release 4 (onwards) number is given in subclause 6.1 of 3GPP TR 41.001.

[1]   3GPP TS 23.002: "Network Architecture".

[2]   3GPP TS 23.060: "General Packet Radio Service (GPRS) Service description; Stage 2".

[3]   3GPP TS 23.012: " Location management procedures"

[5]   3GPP TS 25.331: " Radio Resource Control (RRC) Protocol Specification"

[6]   3G TS 25.301: "Radio interface protocol architecture"

[7]   3G TS 25.303: "UE functions and inter-layer procedures in connected mode"

[8]   3GPP TR 21.905: "3G Vocabulary".

[9]   3GPP TS 25.413: " UTRAN Iu interface RANAP signalling"

[10]   3GPP TS 25.410: " UTRAN Iu Interface: General Aspects and Principles"

[11]   3G TS 23.228 "IP Multimedia Subsystem – Stage 2"

[12]   3G TS 43.051 "GERAN Overall Description"

[13]   3G TS 23.153 ,"Out of Band Transcoder Control - Stage 2".

[14]   3G TS 23.205, "Bearer Independent CS Core Network – Stage 2"

[15]   3G TR 25.931: " UTRAN Functions, examples on signalling procedures"

[16]   RFC2766 "Network Address Translation - Protocol Translation (NAT-PT)", G. Tsirtsis, P. Srisuresh. February 2000.

[17]   RFC2893 "Transition Mechanisms for IPv6 Hosts and Routers", R. Gilligan, E. Nordmark, August 2000.

[18]   3G TS 25.401 "UTRAN Overall Description"

[19]   draft-manyfolks-ipv6-cellular-host-02.txt: "Minimum IPv6 Functionality for a Cellular Host", Work in progress

Editors Note: The above reference will need to be updated to reference the assigned RFC number, once the draft achieves RFC status within the IETF.

3   Definitions, symbols and abbreviations

********** Second change *************

5   IP addressing

5.1   IP version issues

The UMTS/GSM architecture shall support IPv4 / IPv6 based on the statements below.

- IP transport between network elements of the IP Connectivity services (between RNC, SGSN and GGSN) and IP transport for the CS Domain: both IPv4 / IPv6 are options for IP Connectivity

- IM CN subsystem elements (UE to CSCF and the other elements e.g. MRF):

    - The architecture shall make optimum use of IPv6.

    - The IM CN subsystem shall exclusively support IPv6.

    - The UE shall exclusively support IPv6 for the connection to services provided by the IM CN subsystem.

    Editor's note: The exact set of the functionality available in the whole Ipv6 protocol suite (such as IPSec, IP multicast etc.) that will be mandated in R5 is FFS.

- Access to existing data services (Intranet, Internet,…):

- The UE can access IPv4 and IPv6 based services.

5.X UE support of IPv6

The set of IPv6 functionality a 3GPP UE will require is dependent on the services (IMS, Packet Streaming etc.) it will use.

As a minimum, a 3GPP UE shall follow the guidelines for implementing IPv6 functionality as specified in the Core IPv6 group of specifications as defined in [19]. This Core IPv6 functionality is sufficient to provide IPv6 for IMS as well as compatibility towards IPv6 entities external to 3GPP.

A 3GPP UE shall follow the recommendations for the Security and the Mobility set of functions in [19] when a specific service requires such functions.

    Editors Note: [19] do not make any recommendations on preferred transition and interoperability mechanisms between IPv4 and IPv6. Any supports of such mechanisms needed by 3GPP UE(s) are FFS.