3GPP TSG CN WG4 Meeting #19   *N4-030721*
San Diego, CA, USA, 19th – 23rd May 2003

Title:	LS on Charging Requirements on MNP for Pre-paid Subscribers
Response to:	LS (S1-030572) on Clarification on MNP for Pre-paid Subscribers from SA1.
Release:	Release 5 and 6
Work Item:	MNP

Source:	CN4
To:	SA1, SA
Cc:	CN2

Contact Person:
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Attachments: N4-030448, N4-030449, N4-030450, N4-030451, N4-030710

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1. Overall Description:

CN4 thank SA1 for their response liaison statement (S1-030572) on "Clarification on MNP for Pre-paid Subscribers" which details different levels of operator's needs and their relative importance.

CN4 have reviewed SA1s' response and the stage 1 CRs attached to it and understand from the response that the most important requirement is

for operators to be able to apply different tariffs to calls / short messages established / sent by their own subscribers while roaming in the operator's PLMN, directed to a subscriber subscribing to
- a) the operator's PLMN (calling subscriber's Home PLMN)
- b) a PLMN different from the operator's PLMN (i.e. different from the calling subscriber's HPLMN), but within the same country (i.e. within the calling subscriber's HPLMN country)
- c) a PLMN within a country different from the calling subscriber's HPLMN country.

CN4 have revised CRs 22.115-012, 22.115-013, 22.066-005, and 22.066-006 to clarify the requirement to be limited to the above mentioned case.

Furthermore CN4 like to comment on the feasibility of additional requirements which also take into account
- the roaming status of the calling subscriber (own subscriber, national inbound roamer, international inbound roamer)
- the existence of business agreements between the calling subscriber's VPLMN operator and the called subscriber's HPLMN operator

as follows:

CN4 have identified three different levels of complexity / feasibility.

A) The NPDB/SRF holds records for own numbers ported out and for foreign numbers ported in, and the interface between the gsmSCF and the NPDB or SRF is intra PLMN.
B) The NPDB/SRF holds records for own numbers ported out, for foreign numbers ported in, and for foreign national numbers ported to a foreign network, or the interface between gsmSCF and NPDB or SRF is inter PLMN and intra MNP cluster.
C) The NPDB/SRF holds records for world wide all ported numbers, or the interface between gsmSCF and NPDB or SRF is inter MNP cluster.

Note that the term "foreign" is used in the sense of 23.066, i.e. "in a different PLMN" rather than "in a different country".

Level A) allows to distinguishing between
- Calls directed to the calling party's HPLMN
- Calls not directed to the calling party's HPLMN but directed to a PLMN in the calling party's HPLMN country
- Calls directed to a PLMN outside the calling party's HPLMN country

Level B) is more complex than Level A) and allows to distinguishing between
- Calls directed to the calling party's HPLMN
- Calls not directed to the calling party's HPLMN but directed to a PLMN in the calling party's HPLMN country whereof the operator has business agreements with the calling party's VPLMN operator
- Calls not directed to the calling party's HPLMN but directed to a PLMN in the calling party's HPLMN country whereof the operator does not have business agreements with the calling party's VPLMN operator
- Calls directed to a PLMN outside the calling party's HPLMN country

Level C) is more complex than Level B) and allows to distinguishing between
- Calls directed to the calling party's HPLMN
- Calls not directed to the calling party's HPLMN but directed to a PLMN in the calling party's HPLMN country whereof the operator has business agreements with the calling party's VPLMN operator
- Calls not directed to the calling party's HPLMN but directed to a PLMN in the calling party's HPLMN country whereof the operator does not have business agreements with the calling party's VPLMN operator
- Calls directed to a PLMN outside the calling party's HPLMN country whereof the operator has business agreements with the calling party's VPLMN operator
- Calls directed to a PLMN outside the calling party's HPLMN country whereof the operator does not have business agreements with the calling party's VPLMN operator

Note that the different levels as phrased above are independent from the roaming status of the calling subscriber.

CN4's recommendation is to concentrate on Level A) which covers the most important requirement from SA1 outlined in S1-030572 and in the attached revised stage 1 CRs, and postpone requirements with Level B) and Level C) complexity to later releases.

Since 23.066 specifies an IN-based solution and an SRF-based solution for MNP, CN4 have decided to extend both solutions in order to cover the new requirement. The extension to the IN-based solution is covered in CR 23.066-023 (N4-030710) which was approved at CN4 and which is attached.

For the SRF-based solution two competing proposals have been discussed at CN4. Unfortunately no agreement could be reached on which of these proposals to follow, and so CN4 could not complete their work in time for CN#20.

2. Actions:

To SA and SA1

ACTION: CN4 ask SA and SA1

- to consider approval of the revised CRs
  22.115-012r1,
  22.115-013r1,
  22.066-005r1, and
  22.066-006r1

To SA1

ACTION: CN4 ask SA1

- to note the different levels of complexity / feasibility for the additional requirements.

To SA

ACTION: CN4 ask SA

- to decide on the applicability of the new requirement for Rel-5.

3. Date of Next CN4 Meetings:

CN4 #20   25th August – 29th August 2003   Sophia Antipolis, FRANCE

CN4 #21   27th October – 31st October 2003 CHINA

CR-Form-v7

CHANGE REQUEST

⌘   **22.115** CR **012**   ⌘ **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: UICC apps⌘ ☐   ME ☐   Radio Access Network ☐   Core Network **X**

Title: ⌘	Charging Requirements in an MNP environment	
Source: ⌘	Siemens	
Work item code: ⌘	TEI5	**Date:** ⌘ 13/03/2003
Category: ⌘ **F**	*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.	**Release:** ⌘ Rel-5 *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)* Rel-6 *(Release 6)*

Reason for change: ⌘	Add explicit charging requirements for MNP
Summary of change: ⌘	Operators shall be able to apply different tariffs to calls and short messages established/sent by their subscribers while roaming in their Home PLMN depending on the national called subscriber's Home PLMN rather than on the national called subscriber's MSISDN. This differentiation is needed in the case, where the called subscriber's MSISDN may have been ported by Mobile Number Portability. Also a reference to TS 22.066 (MNP) is added.
Consequences if not approved: ⌘	Operators cannot apply different tariffs to calls and short messages established/sent by their subscribers depending on the called subscriber's Home PLMN.

Clauses affected: ⌘	2, 4

	Y	N		
Other specs affected: ⌘	X		Other core specifications ⌘	22.066, 23.066
		X	Test specifications	
		X	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.

2 References

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[1] 3GPP TS 22.101: "Service aspects; Service Principles".

[2] 3GPP TS 22.066: " Support of Mobile Number Portability (MNP)".

*** Next modified part ***

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4 Main Requirements and High Level Principles

The main new requirements for 3GPP system charging and accounting are:

- to provide a call detail record for all charges incurred and requiring settlement between the different commercial roles;

- to allow fraud control by the Home Environment and the Serving network;

- to allow cost control by the charged party;

- to provide at the beginning of a chargeable event an indication to the charged party (if involved in the chargeable event) of the charges to be levied for this event;

- to allow itemised billing for all services charged to each subscription, including voice and data calls, and services offered by home environments.

- to enable the Home environment to provide a Prepay Service and to enable the serving network to support that Prepay Service for the Home environment's subscribers.

- to allow interconnect (inter-operator) charging including mobile operator to mobile operator and mobile operator to fixed operator (circuit switched & IP) and mobile operator to IP network provider;

- to allow Network operator to 3rd party supplier (eg Value Added Service Provider) charging;

- to provide details required for Customer Care purposes

The high level principles that will guide the charging requirements are summarised as follows:

- It must be possible to charge separately for each type of medium used (eg voice, video, data) in a session and for each service used (eg voice call, streaming video, file download);

- It must be possible to charge for different levels of QoS applied for and/or allocated during a session for each type of medium or service used;

- It must be possible to charge each "leg" of a session separately. This includes the incoming and outgoing legs and any forwarded/redirected legs. (Note: The legs mentioned here are logical legs, i.e. not necessarily identical to actual signal and traffic flow. Even though tromboning may be avoided by optimal routing, the operator should still be able to charge for the 'virtual legs' of the call)

- The user can be charged according to the service used irrespective of the technology used to deliver it. (That is, the charge is not derived from whether 2G or 3G is used);

- The user can be charged according to the technology used to deliver a service. (That is, different charges can be applied on 2G and 3G);

- It must be possible to charge a user according to the network resources used. For example, if a large bandwidth is required to use high quality video, the user could be charged accordingly. This is related to charging by QoS;

- It must be possible to charge users flexibly for the use of extra resources (in at least the same network) for all legs of the call. For example, if a video component is added to a voice call the use of extra radio resource at both ends of the call could be paid for by each user in the call or totally by the initiating user.

- It must be possible to suppress charging for certain types of connection e.g. when a customer receives tones or network announcements or during sessions such as automated pre-pay top-up.

- It must be possible for the home network to charge its customers while roaming in the same ways as when they are at home. For example, if duration based charging is used for charging for streaming music in the home network, then it must be possible to apply the same principle when the user is roaming.

- It must be possible for operators to have the option to apply charging mechanisms that are used in GSM/GPRS. For example for duration of a voice call, for the amount of data transmitted (eg for streaming, file download, browsing) and for an event (one-off charge).

- It must be possible for charging to be applied based on location, presence, push services etc

- It must be possible to charge using pre-pay, post-pay, advice of charge, 3rd party charging techniques.

- It must be possible for the home network to apply different tariffs to national calls and short messages established/sent by their subscribers while roaming in their Home PLMN depending on whether or not the called subscriber's Home PLMN equals the calling subscriber's Home PLMN, rather than on the called subscriber's MSISDN.
  Note: This distinction is necessary only in the case, where the called subscriber's MSISDN may have been ported by Mobile Number Portability.

These new requirements and principles will allow users more freedom to obtain service when roaming, whilst providing effective cost and credit control for the Home Environment and User.

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CHANGE REQUEST

⌘ **22.115 CR 013** ⌘ rev **1** ⌘ Current version: **6.0.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐   ME ☐   Radio Access Network ☐   Core Network **X**

Title: ⌘	Charging Requirements in an MNP environment
Source: ⌘	Siemens
Work item code: ⌘ TEI	**Date:** ⌘ 13/03/2003
Category: ⌘ **A**	**Release:** ⌘ Rel-6

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)*
   Rel-6 *(Release 6)*

Reason for change: ⌘	Add explicit charging requirements for MNP
Summary of change: ⌘	Operators shall be able to apply different tariffs to calls and short messages established/sent by their subscribers while roaming in their Home PLMN depending on the national called subscriber's Home PLMN rather than on the national called subscriber's MSISDN. This differentiation is needed in the case, where the called subscriber's MSISDN may have been ported by Mobile Number Portability. Also a reference to TS 22.066 (MNP) is added.
Consequences if not approved: ⌘	Operators cannot apply different tariffs to calls and short messages established/sent by their subscribers depending on the called subscriber's Home PLMN.

Clauses affected: ⌘	2, 4

	Y	N		
Other specs affected: ⌘	X		Other core specifications ⌘	22.066, 23.066
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘	

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[1]   3GPP TS 22.101: "Service aspects; Service Principles".

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*** Next modified part ***

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4   Main Requirements and High Level Principles

The main new requirements for 3GPP system charging and accounting are:

- to provide a call detail record for all charges incurred and requiring settlement between the different commercial roles;

- to allow fraud control by the Home Environment and the Serving network;

- to allow cost control by the charged party;

- to provide at the beginning of a chargeable event an indication to the charged party (if involved in the chargeable event) of the charges to be levied for this event;

- to allow itemised billing for all services charged to each subscription, including voice and data calls, and services offered by home environments.

- to enable the Home environment to provide a Prepay Service and to enable the serving network to support that Prepay Service for the Home environment's subscribers.

- to allow interconnect (inter-operator) charging including mobile operator to mobile operator, and mobile operator to fixed operator (circuit switched & IP), and mobile operator to IP network provider; and mobile operator to I-WLAN operator.

- to allow Network operator to 3rd party supplier (eg Value Added Service Provider) charging;

- to provide details required for Customer Care purposes

- to support the shared network architecture so that end users can be appropriately charged for their usage of the shared network, and network sharing partners can be allocated their share of the costs of the shared network resources.

The high level principles that will guide the charging requirements are summarised as follows:

- It must be possible to charge separately for each type of medium used (eg voice, video, data) in a session and for each service used (eg voice call, streaming video, file download);

- It must be possible to charge for different levels of QoS applied for and/or allocated during a session for each type of medium or service used;

- It must be possible to charge each "leg" of a session separately. This includes the incoming and outgoing legs and any forwarded/redirected legs. (Note: The legs mentioned here are logical legs, i.e. not necessarily identical to actual signal and traffic flow. Even though tromboning may be avoided by optimal routing, the operator should still be able to charge for the 'virtual legs' of the call)

- The user can be charged according to the service used irrespective of the technology used to deliver it. (That is, the charge is not derived from whether 2G or 3G is used);

- The user can be charged according to the technology used to deliver a service. (That is, different charges can be applied on 2G and 3G);

- It must be possible to charge a user according to the network resources used. For example, if a large bandwidth is required to use high quality video, the user could be charged accordingly. This is related to charging by QoS;

- It must be possible to charge users flexibly for the use of extra resources (in at least the same network) for all legs of the call. For example, if a video component is added to a voice call the use of extra radio resource at both ends of the call could be paid for by each user in the call or totally by the initiating user.

- It must be possible to suppress charging for certain types of connection e.g. when a customer receives tones or network announcements or during sessions such as automated pre-pay top-up.

- It must be possible for the home network to charge its customers while roaming in the same ways as when they are at home. For example, if duration based charging is used for charging for streaming music in the home network, then it must be possible to apply the same principle when the user is roaming.

- It must be possible for operators to have the option to apply charging mechanisms that are used in GSM/GPRS. For example for duration of a voice call, for the amount of data transmitted (eg for streaming, file download, browsing) and for an event (one-off charge).

- It must be possible for a network operator to charge its users for activities while roaming so that the home network will get the capability to raise service charges depending on the roamed to network, e.g. because of inter operator charges for the use of service capabilities within the visited network which will in general depend on the serving network. The ability to supply all the necessary information for all the charging options will depend on the capability of the visited network. For service capabilities which are provided by the home network, however, it is required that the call data records created allow to identify the serving network of the served subscriber.

- It must be possible for charging to be applied based on location, presence, push services etc

- It must be possible to charge using pre-pay, post-pay, advice of charge, 3rd party charging techniques.

- It must be possible for the home network to apply different tariffs to national calls and short messages established/sent by their subscribers while roaming in their Home PLMN depending on whether or not the called subscriber's Home PLMN equals the calling subscriber's Home PLMN, rather than on the called subscriber's MSISDN.
  Note: This distinction is necessary only in the case, where the called subscriber's MSISDN may have been ported by Mobile Number Portability.

These new requirements and principles will allow users more freedom to obtain service when roaming, whilst providing effective cost and credit control for the Home Environment and User.

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CHANGE REQUEST

⌘   **22.066** CR **005**   ⌘rev **1** ⌘ Current version: **5.0.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐   ME ☐ Radio Access Network ☐ Core Network **X**

Title: ⌘	Charging Requirements in an MNP environment	
Source: ⌘	Siemens	
Work item code: ⌘	TEI5	***Date:*** ⌘ 13/03/2003
Category: ⌘ **F**		***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),*
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)
Rel-6   (Release 6)

Reason for change: ⌘	Add explicit charging requirements for MNP
Summary of change: ⌘	This change adds the requirement for operators to be able to apply different tariffs to calls and short messages established/sent by their subscribers while roaming in their Home PLMN depending on the called subscriber's subscription network rather than on the called subscriber's MSISDN.
Consequences if not approved: ⌘	Operators cannot apply different tariffs to calls and short messages established/sent by their subscribers depending on the called subscriber's subscription network.

Clauses affected: ⌘	12

	Y	N			
Other specs affected: ⌘	X		Other core specifications	⌘	22.115, 23.066
		X	Test specifications		
		X	O&M Specifications		

Other comments: ⌘	

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12 Charging aspects

No additional charging mechanisms relating to the calling party are to be standardised.

Enough information shall be collected to allow different tariffs to be applied to calls and short messages in the following case:

- The calling subscriber is roaming in her home PLMN

and

- The called subscriber is a subscriber of any of the PLMNs in the country of the calling subscriber's home PLMN

In this case the collected information shall allow to distinguish between

- Calls and short messages directed to a called subscriber who subscribes to the calling subscriber's home PLMN

- Calls and short messages directed to a called subscriber who does not subscribe to the calling subscriber's home PLMN.

Enough information should be collected to allow the involved networks to workout inter-network charging.

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CHANGE REQUEST

⌘ **22.066** CR **006** ⌘rev **1** ⌘ Current version: **6.0.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title: ⌘	Charging Requirements in an MNP environment
Source: ⌘	Siemens
Work item code: ⌘ TEI	**Date:** ⌘ 13/03/2003
Category: ⌘ **A**	**Release:** ⌘ Rel-6

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Clauses affected: ⌘	12

	Y	N		
Other specs affected: ⌘	X		Other core specifications ⌘	22.115, 23.066
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘	

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- The called subscriber is a subscriber of any of the PLMNs in the country of the calling subscriber's home PLMN

In this case the collected information shall allow to distinguish between

- o   Calls and short messages directed to a called subscriber who subscribes to the calling subscriber's home PLMN

- o   Calls and short messages directed to a called subscriber who does not subscribe to the calling subscriber's home PLMN.

Enough information should be collected to allow the involved networks to workout inter-network charging.

A.1.1 Network Options

There are two IN-based solutions for querying the NPDB :-

    i.   ETSI Core INAP

    ii.   ANSI IN Query.

The following network operator options are defined for the MT calls in the GMSC:

- Terminating call Query on Digit Analysis (TQoD);

- Query on HLR Release (QoHR).

In a GSM network that supports the IN-based approach for call related MNP, each GMSC shall support at least one of these options.

The following network operator option is defined for MO calls in VMSCA and for forwarded calls in the GMSC and VMSCB:

- Originating call Query on Digit Analysis (OQoD).

In a GSM network which supports the IN-based approach for call related MNP, it is a network operator decision, taking into account the regulatory and architectural constraints that may prevail, whether or not VMSCs and GMSCs support this option.

The use of OQoD in transit switches in a PLMN while avoiding multiple database interrogations is for further study.

The interworking between the CCF and the SSF for MNP is for further study.

Note that for different number ranges different options may be chosen.

An IN-based solution for querying the NPDB may also be used by the gsmSCF in order to be able to apply different charging tariffs for CAMEL pre-paid subscribers' calls or short messages established/sent when roaming in their home PLMN and directed to ported and non-ported mobile subscribers, depending on whether or not the called and the calling subscriber subscribe to the same PLMN.

……

A.1.4.3 IN-Query for CAMEL pre-paid service

Figure A.1.4.3 shows the architecture for a call or MO-Short-Message originated by a CAMEL pre-paid subscriber while roaming in the Home PLMN where the gsmSCF needs to know whether or not calling and called subscriber subscribe to the same PLMN in order to apply the correct charging tariff.
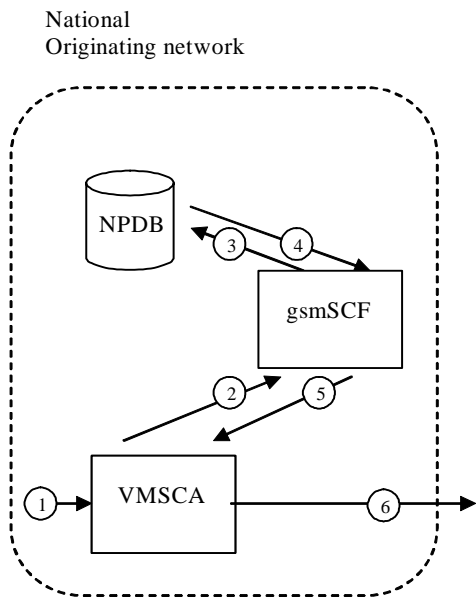
National
Originating network

Figure A.1.4.3: IN-Query for pre-paid service

1   A call or short message is initiated by Mobile Subscriber A towards Mobile Subscriber B, using the MSISDN of the called subscriber.

2   When VMSCA receives the call setup indication, it will send a CAP IDP message to the gsmSCF. The IDP contains the called party's MSISDN.

3   If the calling subscriber roams in her Home PLMN and the called subscriber's MSISDN indicates that the called subscriber subscribes to a PLMN within the calling subscriber's Home Country, the gsmSCF queries the NPDB based on the called party's MSISDN.
Otherwise the tariff to be applied does not depend on the called subscriber's porting status and enough information to apply the correct tariff is available; go to 5.

4   The NPDB returns a routing number to the gsmSCF pointing out the called subscriber's subscription network. Based on this information the gsmSCF applies the appropriate tariff for pre-paid subscriber A.

5   The gsmSCF returns CAP AC and CAP CUE messages to the VMSCA.

 6   The call or short message is set up.

Note that the NPDB and gsmSCF may be integrated within one physical entity.