3GPP TSG CN Plenary Meeting #14   **NP-010630**
Kyoto, JAPAN, 12th-14th December 2001

Source:	TSG CN WG4
Title:	CRs on Rel-5 Intra Domain Connection of RAN Nodes to multiple CN
Agenda item:	9.10
Document for:	APPROVAL

Introduction:

This document contains 2 CRs on Rel-5 Work Item "IuFLEX", that have been agreed by TSG CN WG4, and are forwarded to TSG CN Plenary meeting #14 for approval.

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
23.003	033		N4-011070	Rel-5	Rules for TMSI partitioning	C	5.1.0
29.060	259	1	N4-011194	Rel-5	Relay of Identification Request message and SGSN Context Request message	C	4.2.0

CR-Form-v4

CHANGE REQUEST

| | ⌘ | **23.003** CR **033** | ⌘ rev | **-** | ⌘ | 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 ☐   Radio Access Network ☐   Core Network **X**

Title: ⌘	Rules for TMSI partitioning	
Source: ⌘	CN4	
Work item code: ⌘	IUFLEX	***Date:*** ⌘ 8th October 2001
Category: ⌘	**C**	***Release:*** ⌘ REL-5

	Use one of the following categories:	*Use one of the following releases:*
	F (correction)	*2 (GSM Phase 2)*
	A (corresponds to a correction in an earlier release)	*R96 (Release 1996)*
	B (Addition of feature),	*R97 (Release 1997)*
	C (Functional modification of feature)	*R98 (Release 1998)*
	D (Editorial modification)	*R99 (Release 1999)*
	Detailed explanations of the above categories can	*REL-4 (Release 4)*
	be found in 3GPP TR 21.900.	*REL-5 (Release 5)*

Reason for change: ⌘	TSG-SA #13 approved the 3GPP TS 23.236 v5.0.0 "Intra Domain Connection of RAN Nodes to Multiple CN Nodes" for REL-5. In that TS there is a requirement for TIMSI partitioning. This contribution performs the necessary changes in 23.003 to align it with 23.236
Summary of change: ⌘	3GPP TS 23.236 reference included in chapter 1.1 Inclusion of new TMSI field: Network Ressource Identifier (NRI) for identification of a network node when having intra domain connection of RAN nodes to multiple nodes.
Consequences if not approved: ⌘	

Clauses affected: ⌘	1.1 and 2.4	
Other specs affected: ⌘	**X** Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications	21.905 (Introduction of Iu flex abbreviations)
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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

1.1 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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]   3GPP TS 21.905: "3G Vocabulary".

[2]   3GPP TS 23.008: "Organization of subscriber data".

[3]   Void.

[4]   3GPP TS 23.070: "Routeing of calls to/from Public Data Networks (PDN)".

[5]   3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[6]   3GPP TS 29.060: "GPRS Tunnelling protocol (GPT) across the Gn and Gp interface".

[7]   GSM 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions".

[8]   GSM 09.03: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".

[9]   GSM 11.11: "Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".

[10]   ITU-T Recommendation E.164: "Numbering plan for the ISDN era".

[11]   ITU-T Recommendation E.212: "Identification plan for land MSs".

[12]   ITU-T Recommendation E.213: "Telephone and ISDN numbering plan for land MSs in public land mobile networks (PLMN)".

[13]   ITU-T Recommendation X.121: "International numbering plan for public data networks".

[14]   RFC 791: "Internet Protocol".

[15]   RFC 1883: "Internet Protocol, Version 6 (IPv6) Specification".

[16]   3GPP TS 25.401: "UTRAN Overall Description".

[17]   3GPP TS 25.413: "UTRAN Iu Interface RANAP Signalling".

[18]   3GPP TS 23.236: "Intra Domain Connection of RAN Nodes to Multiple CN Nodes".

2.4 Structure of TMSI

Since the TMSI has only local significance (i.e. within a VLR and the area controlled by a VLR, or within an SGSN and the area controlled by an SGSN), the structure and coding of it can be chosen by agreement between operator and manufacturer in order to meet local needs.

The TMSI consists of 4 octets. It can be coded using a full hexadecimal representation.

In order to avoid double allocation of TMSIs after a restart of an allocating node, some part of the TMSI may be related to the time when it was allocated or contain a bit field which is changed when the allocating node has recovered from the restart.

In areas where both MSC-based services and SGSN-based services are provided, some discrimination is needed between the allocation of TMSIs for MSC-based services and the allocation of TMSIs for SGSN-based services. The discrimination shall be done on the 2 most significant bits, with values 00, 01, and 10 being used by the VLR, and 11 being used by the SGSN.

If intra domain connection of RAN nodes to multiple CN nodes as described in [18] is applied in the MSC/VLR or SGSN, then the NRI shall be part of the TMSI. The NRI has a configurable length between 0 to 10 bits. A configurable legth of 0 bits indicates that the NRI is not used and this feature is not applied in the MSC/VLR or SGSN. The NRI has to be coded within bits 14 to 23. Most significant bit of the NRI field is bit 23.

The TMSI shall only be allocated in ciphered form. See also GSM 03.20.

The network shall not allocate a TMSI with all 32 bits equal to 1 (this is because the TMSI must be stored in the SIM, and the SIM uses 4 octets with all bits equal to 1 for indicating that no valid TMSI is available).

To allow for eventual modifications of the management of the TMSI code space management, MSs shall not check if an allocated TMSI belongs to the range allocated to the allocating node. MSs shall use an allocated TMSI according to the specifications, whatever its value.

**** End Modified Sections ****

CR-Form-v4

CHANGE REQUEST

| ⌘ | **29.060** CR | **259** | ⌘ rev | **1** | ⌘ | Current version: | **4.2.0** | ⌘ |

*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:	⌘	Relay of Identification Request message and SGSN Context Request message
Source:	⌘	CN4
Work item code: ⌘	IUFLEX	***Date:*** ⌘ 3rd October 2001
Category:	⌘ **C**	***Release:*** ⌘ REL-5

Use one of the following categories:	*Use one of the following releases:*
F *(correction)*	*2* *(GSM Phase 2)*
A *(corresponds to a correction in an earlier release)*	*R96 (Release 1996)*
B *(Addition of feature),*	*R97 (Release 1997)*
C *(Functional modification of feature)*	*R98 (Release 1998)*
D *(Editorial modification)*	*R99 (Release 1999)*
Detailed explanations of the above categories can	*REL-4 (Release 4)*
be found in 3GPP TR 21.900.	*REL-5 (Release 5)*

Reason for change:	⌘	TSG-SA #13 approved the 3GPP TS 23.236 v5.0.0 "Intra Domain Connection of RAN Nodes to Multiple CN Nodes" for REL-5. This TS mention the traffic case when an MS initiates an Attach procedure or a RAU procedure towards a new SGSN, possibly not associated with any pool area, and the MS was previously attached to an old SGSN which is associated with a pool area. The new SGSN will in the general case not be able to send the Identification Request message and the SGSN Context Request message, respectively, to the correct old SGSN. The new SGSN will look at the old RA and send one of the above mentioned messages to a 'default SGSN'. This 'default SGSN' which is associated with the pool area where the MS previously was located, will look at the P-TMSI parameter to decide the old SGSN to which the MS previously was attached to, and subsequently send the request message to the old SGSN. This contribution suggests that the response message from the old SGSN should go directly to the new SGSN to avoid state handling etc in the 'default SGSN'. This also means that the 'default SGSN' should include the address of the new SGSN when forwarding the Identification Request message to the old SGSN.
Summary of change: ⌘		3GPP TS 23.236 reference is included in chapter 2.
		Inclusion of a new optional parameter containing the SGSN address in the Identification Request message, and added the possibility to relay this message to another SGSN. The Identification Response message shall be sent directly to the SGSN address contained in the new optional parameter.
		Inclusion of the possibility to relay the SGSN Context Request message unchanged to another SGSN.
		This means that the SGSN relaying any of these two messages shall not supervise the response message.
Consequences if not approved:	⌘	Unnecessary state- and supervision-handling in the 'default' SGSN

Clauses affected:	⌘	2, 7.5.1, 7.5.2, 7.5.3 and 7.6		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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**** First Modified Section ****

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2   References

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[1]   3GPP TR 21.905: "3G Vocabulary".

[2]   3GPP TS 23.003: "Numbering, addressing and identification".

[3]   3GPP TS 23.007: "Restoration Procedures".

[4]   3GPP TS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2".

[5]   3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".

[6]   3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[7]   3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".

[8]   3GPP TS 33.102: "Security Architecture".

[9]   GSM 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions".

[10]   GSM 03.64: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the GPRS Radio Interface; Stage 2".

[11]   GSM 04.64: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) Layer Specification".

[12]   STD 0005: "Internet Protocol", J. Postel.

[13]   STD 0006: "User Datagram Protocol", J. Postel.

[14]   RFC 1700: "Assigned Numbers", J. Reynolds and J. Postel.

[15]   RFC 2181: "Clarifications to the DNS Specification", R. Elz and R. Bush.

[16]   3GPP TS 23.007: "Restoration Procedures".

[17]   3GPP TS 23.121: "Architectural Requirements for Release 1999".

[18]   3GPP TS 23.236: "Intra Domain Connection of RAN Nodes to Multiple CN Nodes".

**** Next Modified Section ****

7.5.1   Identification Request

If the MS, at GPRS Attach, identifies itself with P-TMSI and it has changed SGSN since detach, the new SGSN shall send an Identification Request message to the old SGSN to request the IMSI.

For Intra Domain Connection of RAN Nodes to Multiple CN Nodes, where the old SGSN belongs to an SGSN pool, the new SGSN cannot in the general case determine the old SGSN. The new SGSN shall in this case send the Identification Request message to an SGSN based on the old RAI, as usual. If an SGSN within an SGSN pool receives an Identification Request message for an MS that has been attached to another SGSN of the same SGSN pool, the SGSN shall include the source IP address of the received Identification Request message in the optional parameter SGSN Address for Control Plane. The Identification Request message is then relayed to the old SGSN, keeping the other parts of the message unchanged. The SGSN within an SGSN pool can determine if the received Identification Request message was meant for itself or for another SGSN of the SGSN pool by looking at the Network Resource Identifier contained in the P-TMSI parameter. See 3GPP TS 23.003 [2] for details on the coding of the P-TMSI and see 3GPP TS 23.236 [18] for details on SGSN pool.

Note that an SGSN relaying the Identification Request message shall not supervise the Identification Response message.

The P-TMSI and RAI is a P-TMSI and an RAI in the old SGSN. The P-TMSI Signature is conditionally provided by the MS to the new SGSN for identification checking purposes as defined in GSM 3GPP TS 23.060and 3GPP TS 24.008. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the Identification Request message.

The optional Private Extension contains vendor or operator specific information.

Table 24: Information Elements in an Identification Request

Information element	Presence requirement	Reference
Routeing Area Identity (RAI)	Mandatory	7.7.3
Packet TMSI	Mandatory	7.7.5
P-TMSI Signature	Conditional	7.7.9
SGSN Address for Control Plane	Optional	7.7.32
Private Extension	Optional	7.7.44

7.5.2   Identification Response

The old SGSN shall send an Identification Response to the new SGSN as a response to a previous Identification Request.

For Intra Domain Connection of RAN Nodes to Multiple CN Nodes, iIf an old SGSN within an SGSN pool receives an Identification Request message that contains the optional parameter SGSN Address for Control Plane, the old SGSN shall use this address as destination IP address of the Identification Response message.

Possible Cause values are:

-    'Request Accepted'.

-    'IMSI not known'.

-    'System failure'.

-    'Mandatory IE incorrect'.

-    'Mandatory IE missing'.

-    'Optional IE incorrect'.

-    'Invalid message format'.

-    'P-TMSI Signature mismatch'.

Only the Cause information element shall be included in the response if the Cause contains another value than 'Request accepted'.

The IMSI information element is mandatory if the Cause contains the value 'Request accepted'.

One or several Authentication Triplet information elements or up to 5 Authentication Quintuplet information elements may be included in the message if the Cause contains the value 'Request accepted'.

The optional Private Extension contains vendor or operator specific information.

Table 25: Information Elements in an Identification Response

Information element	Presence requirement	Reference
Cause	Mandatory	7.7.1
IMSI	Conditional	7.7.2
Authentication Triplet	Conditional	7.7.7
Authentication Quintuplet	Conditional	7.7.35
Private Extension	Optional	7.7.44

7.5.3   SGSN Context Request

The new SGSN shall send an SGSN Context Request to the old SGSN to get the MM and PDP Contexts for the MS.

For Intra Domain Connection of RAN Nodes to Multiple CN Nodes, ~~In the case~~ where the old SGSN belongs to an SGSN pool, the new SGSN cannot in the general case determine the old SGSN. The new SGSN shall in this case send the SGSN Context Request message to an SGSN based on the old RAI, as usual. If an SGSN within an SGSN pool receives an SGSN Context Request message for an MS that has been attached to another SGSN of the same SGSN pool, the SGSN shall relay the SGSN Context Request message unchanged to the old SGSN. The SGSN within an SGSN pool can determine if the received SGSN Context Request message was meant for itself or for another SGSN of the SGSN pool by looking at the Network Resource Identifier contained in the P-TMSI parameter, or alternatively in the TLLI parameter. See 3GPP TS 23.003 [2] for details on the coding of the P-TMSI and see 3GPP TS 23.236 [18] for details on SGSN pool.

Note that an SGSN relaying the SGSN Context Request message shall not supervise the SGSN Context Response message.

The MS is identified in the old SGSN by its old RAI and old TLLI/old P-TMSI values. The TLLI/P-TMSI and RAI is a TLLI/P-TMSI and an RAI in the old SGSN. One of the TLLI or P-TMSI information fields must be present unless IMSI is present.

The old SGSN responds with an SGSN Context Response.

The new SGSN shall include a SGSN Address for control plane. The old SGSN shall store this SGSN Address and use it when sending control plane messages for the MS to the new SGSN in the SGSN context transfer procedure.

The Tunnel Endpoint Identifier Control Plane field specifies a Tunnel Endpoint Identifier for control plane messages, which is chosen by the new SGSN. The old SGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent control plane messages that are sent from the old SGSN to the new SGSN and related to the PDP context(s) requested.

The MS Validated indicates that the new SGSN has successfully authenticated the MS. IMSI shall be included if MS Validated indicates 'Yes'.

The P-TMSI Signature is conditionally provided by the MS to the new SGSN for identification checking purposes as defined in GSM 3GPP TS 23.060 and 3GPP TS 24.008. If the MS has provided the P-TMSI Signature, the new SGSN shall include this parameter in the SGSN Context Request message.

The optional Private Extension contains vendor or operator specific information.

Table 26: Information Elements in a SGSN Context Request

Information element	Presence requirement	Reference
IMSI	Conditional	7.7.2
Routeing Area Identity (RAI)	Mandatory	7.7.3
Temporary Logical Link Identifier (TLLI)	Conditional	7.7.4
Packet TMSI (P-TMSI)	Conditional	7.7.5
P-TMSI Signature	Conditional	7.7.9
MS Validated	Optional	7.7.10
Tunnel Endpoint Identifier Control Plane	Mandatory	7.7.14
SGSN Address for Control Plane	Mandatory	7.7.32
Private Extension	Optional	7.7.44

****** Next Modified Section ******

7.6   Reliable Delivery of Signalling Messages

Each path maintains a queue with- signalling messages to be sent to the peer. The message at the front of the queue, if it is a request for which a response has been defined, shall be sent with a Sequence Number, and shall be held in a path list until a response is received. Each path has its own list. The Sequence Number shall be unique for each outstanding request message sourced from the same IP/UDP endpoint. A GSN or RNC may have several outstanding requests while waiting for responses.

The T3-RESPONSE timer shall be started when a signalling request message (for which a response has been defined) is sent. A- signalling message request or response has probably been lost if a response has not been received before the T3-RESPONSE timer expires. The request is then retransmitted if the total number of request attempts is less than N3-REQUESTS times. The timer shall be implemented in the control plane application as well as user plane application for Echo Request / Echo Response. The wait time for a response (T3-RESPONSE timer value) and the number of retries (N3-REQUESTS) shall be configurable per procedure. The total wait time shall be shorter than the MS wait time between retries of Attach and RA Update messages.

For Intra Domain Connection of RAN Nodes to Multiple CN Nodes, aAn SGSN relaying a received Identification Request message or a received SGSN Context Request message to another SGSN shall not supervise the Identification Response message or the SGSN Context Response message respectively, i.e. the T3-RESPONSE timer shall not be started in the SGSN relaying any of these two messages. Also, such an SGSN shall not modify the Sequence Number when relaying the Identification Request message or the SGSN Context Request message.

All received request messages shall be responded to and all response messages associated with a certain request shall always include the same information. Duplicated response messages shall be discarded, and, for the SGSN Context Response case, the SGSN Context Acknowledge message shall be sent depending on the content of the received response message. A response message without a matching outstanding request should be considered as a duplicate.

The Forward Relocation Complete and Forward SRNS Context messages shall be treated as signalling request messages. The SGSN Context Acknowledge, Forward Relocation Complete Acknowledge and Forward SRNS Context Acknowledge messages shall be treated as response messages.

The SGSN Context Response message needs special treatment by the old SGSN and New SGSN:

The New SGSN must consider this as a regular response to the outstanding SGSN Context Request message, but also copy the sequence number in the header of the SGSN Context Acknowledge it shall send back to the old SGSN depending on the content of the received response message. The Old SGSN, when it expects the new SGSN to send back a SGSN Context Acknowledge in response to a SGSN Context Response, shall keep track of the SGSN Context Response message sequence number and apply to this message the rules valid for a Request message too. If a GSN or RNC is not successful with the transfer of a- signalling message, e.g. a Create PDP Context Request message, it shall inform the upper layer of the unsuccessful transfer so that the controlling upper entity may take the necessary measures.

**** End Modified Sections ****

**** End Modified Sections ****