Tdoc WHS-99006

3GPP Joint Meeting on GSM-UTRAN handover and SRNS relocation
Sophia Antipolis, France
23 August

Agenda item	**:**	**6.2.2** SRNS Relocation without RRC connection mobility
Source	**:**	**NTC** (NIPPON TELECOMMUNICATIONS CONSULTING)
Title	**:**	**Information Elements of Network initiated Routing Area update**
Document for	**:**	**Discussion**

1. Introduction

This contribution clarifies Network initiated RA update, and proposes Information Elements in the new messages.

2. Requirements and Backgrounds

Network Initiated Routing Area Update occurs in SRNS relocation procedure, when UE is in state PS-CONNECTED, and in RRC Connected mode. This time the sequence of case of inter-SGSN SRNC relocation is shown to ANNEX2 as the example. This procedure is the one that was in agreement with S2...

The purpose of NW initiated RA update is to update MM information stored in the UE. This procedure indicates completion of a series of updating procedures in the network side relevant to relocation, and triggers the update of MM information stored in UE.

There are two messages in this procedure. Network Initiated Routing Area Update Command is a message sent from SGSN*(after relocation) to UE including new RAI and possible also new P-TMSI. And Network Initiated Routing Area Update Complete is its responding message indicating that necessary update has been done in the UE.

*note: SGSN means SGSN2 shown in the Figure of Annex 2.

3. Impacts on N1 work

Due to an addition of new messages, NW initiated RA update Command/Complete, some items to be considered arise.

For example, it is considered that

- protocols of NW Initiated RA Update defined in S2 are to be supported,
- these protocols are to be added to TS24.008, because they are CN side information,
- modifications of TS23.060 may be needed.

At first, we studied message contents of Network Initiated Routing Area Update Command and Network Initiated Routing Area Update Complete, considering their requirements and backgrounds written in section 2 in this contribution.

For reference, procedure of SRNS Relocation in UMTS 23.121 is shown in Annex 2.

4. Proposal

Information Elements as proposal in these two messages are shown below. We propose to add them to TS24.008.

NETWORK INITIATED RA UPDATE COMMAND message content (proposal)

IEI	Information Element	Type	Presence	Format	Length
	Protocol discriminator	Protocol discriminator *1	M	V	1/2
	Skip indicator	Skip indicator *2	M	V	1/2
	Network initiated RA update command message identity	Message type *3	M	V	1
	Periodic RA update timer	GPRS Timer *4	M	V	1
20	Routing area identification	Routing area identification *5	M	V	6
19	P-TMSI signature	P-TMSI signature *6	O	TV	4
18	P-TMSI	Mobile station identity *7	O	TLV	7

NETWORK INITIATED RA UPDATE COMPLETE message content (proposal)

IEI	Information Element	Type	Presence	Format	Length
	Protocol discriminator	Protocol discriminator *1	M	V	1/2
	Skip indicator	Skip indicator *2	M	V	1/2
	Network initiated RA update complete message identity	Message type *3	M	V	1

*Note: *1-*7 of each **Type** correspond to descriptions in Annex 1.

ANNEX 1.

These descriptions are quotations from GSM0407-700 or 0408-701, explaining each type of IEs.

Protocol discriminator *1 (from GSM0407-700)

Bits 1 to 4 of the first octet of a standard L3 message contain the protocol discriminator (PD) information element. The PD identifies the L3 protocol to which the standard layer 3 message belongs. The correspondence between L3 protocols and PDs is one-to-one.

Skip indicator *2 (from GSM0408-701)

Bits 5 to 8 of the first octet of every Radio Resource management message and Mobility Management message and GPRS MobilityManagement message contains the skip indicator. A message received with skip indicator different from 0000 shall be ignored. A message received with skip indicator encoded as 0000 shall not be ignored (unless it is ignored for other reasons). A protocol entity sending a Radio Resource management message or a Mobility Management message or a GPRS Mobility Management message shall encode the skip indicator as 0000.

Message type octet *3 (from GSM0407-700)
The message type octet is the second in a standard L3 message.
When a standard L3 message is expected, and a message is received that is less than 16 bit long, that message shall be ignored.

GPRS Timer *4 (from GSM0408-701)
The purpose of the *GPRS timer* information element is to specify GPRS specific timer values, e.g. for the READY timer.
The *GPRS timer* is a type 3 information element with 2 octets length.

Routing area identification *5 (from GSM0408-701)
The purpose of the *routing area identification* information element is to provide an unambiguous identification of routing areas within the area covered by the GSM system.

P-TMSI signature *6 (from GSM0408-701)
The purpose of the *P-TMSI signature* information element is to identify a GMM context of an MS.

Mobile station identity *7 (from GSM0408-701)
The purpose of the *mobile station identity* information element is to provide either the international mobile subscriber identity, IMSI, the temporary mobile subscriber identity, TMSI, the Packet-TMSI, P-TMSI, the international mobile equipment identity, IMEI or the international mobile equipment identity together with the software version number, IMEISV.

ANNEX 2.

This is a quotation from 4.3.12.2.3 of 3G TS 23.121 V3.0.0 (1999-07). A Circle shown in Figure 37 is added to indicate Network Initiated RA Update Command/Complete.

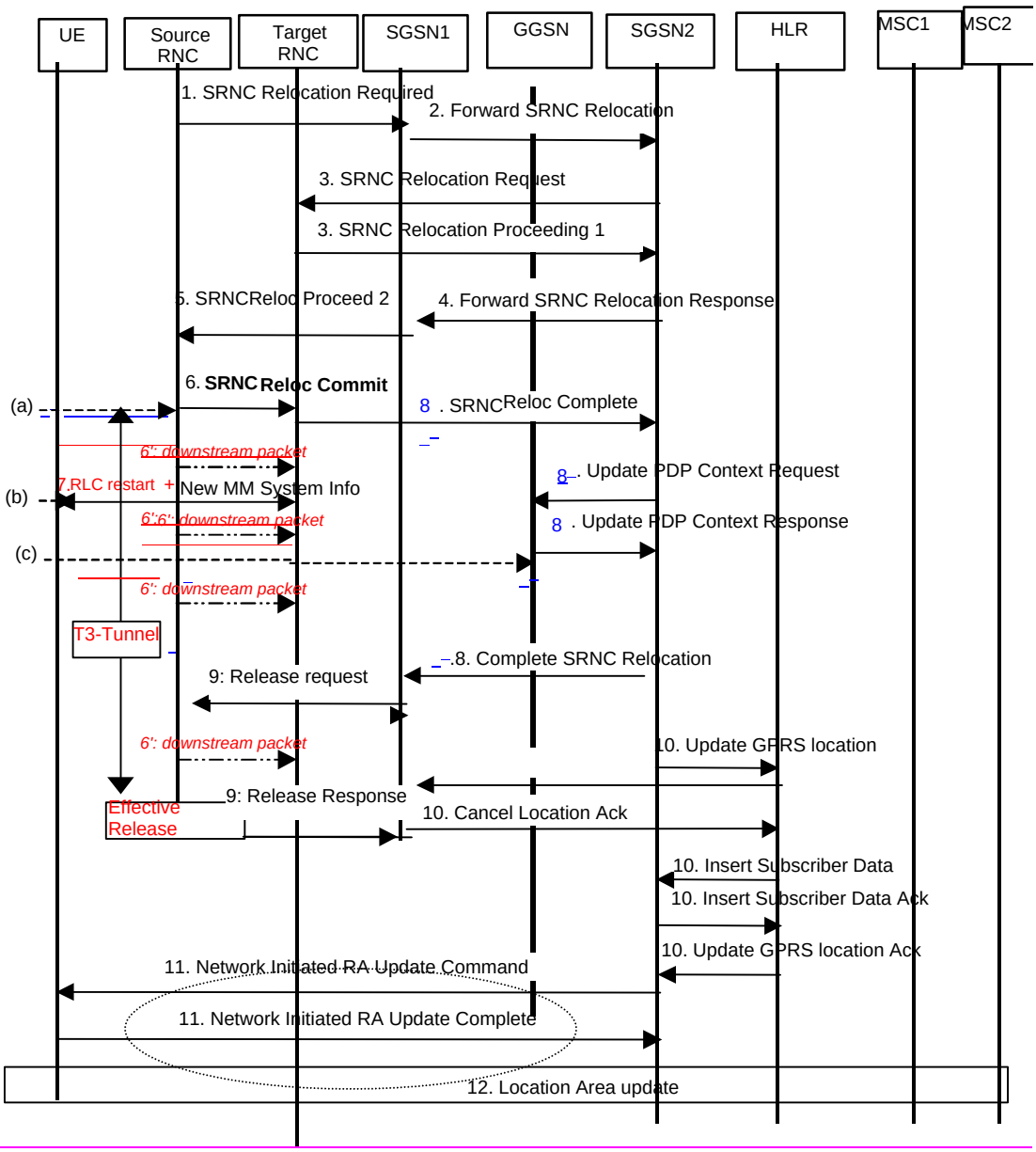

Figure 37 Interface information transfer for SRNS relocation update when changing SGSN area resulting in a change of registered location and followed by location registration in new Location Area.

"Resource reservation" Phase

During this phase, the transmission of packets between GGSN and UE through the source SRNC goes on.

1) UTRAN (source SRNC) makes the decision to perform the Serving RNC relocation procedure. This includes decision on into which RNC (Target RNC) the Serving RNC functionality is to be relocated. The source SRNC sends SRNC Relocation required messages to the SGSN1. This message includes parameters such as target RNC identifier and an information field that shall be passed transparently to the target RNC.

2) Upon reception of SRNC Relocation required message the SGSN1 determines from the received information that the SRNC relocation will (in this case) result in change of SGSN.

The SGSN will then send a Forward SRNC relocation request to the applicable SGSN, SGSN2, including the information received from the Source SRNC and necessary information for the change of SGSN (e.g. MM context, PDP context). The PDP context information contains the list of the PDP context (including PDP type, requested / negotiated QoS) currently established by the UE along with the address of the associated GGSN. It does not contain any information linked with packet transmission (sequence numbers) because such information is under the responsibility of the UTRAN

3) The SGSN2 sends a SRNC Relocation Request message to the target RNC. This message includes information for building up the SRNC context, transparently sent from Source SRNC (e.g. UE id., no of connected CN nodes, UE capability information), and directives for setting up Iu user plane transport bearers.
When the Iu user plane transport bearers have been established, and target RNC completed its preparation phase, SRNC Relocation Proceeding 1 message is sent to the SGSN2.

4) When the traffic resources between target RNC and SGSN2 has been allocated and the SGSN2 is ready for the SRNC move, then the Forward SRNC Relocation Response is sent from SGSN2 to SGSN1. This message indicates that necessary resources have been allocated for the SRNC relocation: SGSN2 / target RNC are ready to receive from source SRNC the downstream packets not yet acknowledged by UE. *The Forward SRNC Relocation Response message* contains the IP address(es) (possibly one address per PDP context) on which SGSN2 is willing to receive these packets.

5) When the Forward SRNC Relocation Response has been received in the SGSN1, the SGSN1 indicates the completion of preparation phase at the CN PS domain side for the SRNC relocation by sending the SRNC Relocation Proceeding 2 message to the Source RNC. . This message contains the IP address(es) (possibly one address per PDP context) on which to send the downstream packets not yet acknowledged by UE.

"Actual hand-over of Serving RNC" Phase

6) When the source RNC has received the SRNC Relocation Proceeding 2 message, the source RNC sends a SRNC Relocation Commit message to the target RNC(list of (SNU, UP_RLC_ack, SND)). SND is the GTP sequence number for the next downlink packet received from the GGSN. SNU is the GTP sequence number for the next uplink packet to be tunnelled to the GGSN. UP_RLC_Ack contains the acknowledgements for upstream PDU received by the source SRNC on each RLC connection used by the UE (i.e. the Receive State Variable V(R) for all RLC SAPI in acknowledged mode). The source SRNC starts a timer T3-TUNNEL , stops the exchange of the packets with the UE (point (a)), and starts tunnelling the buffered downstream packets towards the target SRNC. The target RNC executes switch for all bearers at the earliest suitable time instance.

7) The target RNC starts acting as SRNC. The target SRNC :

- Restarts the RLC connections. This includes the exchange between the target SRNC and the UE of the UP_RLC_Ack and DOWN_RLC_ACK. DOWN_RLC_ACK confirms all mobile-terminated packets successfully transferred before the start of the relocation procedure. If DOWN_RLC_ACK confirms reception of packets that were forwarded from the source SRNC, then these packets shall be discarded by the target SRNC. UP_RLC Ack confirms all mobile-originated packets successfully transferred before the start of the relocation procedure. From now on the exchange of the packets with the UE can restart (point (b)).

- Sends New MM System Information to the UE indicating e.g. relevant Routing Area and Location Area. Additional RRC information may then also be sent to the UE, e.g. new RNTI identity. This may trigger a location update procedure (see 12)

8) Immediately after a successful switch at RNC, target RNC (=SRNC) sends SRNC Relocation Complete message to the SGSN2. Upon reception of this message, the SGSN2 updates the

GGSN(s) with a Update PDP Context Request including the new SGSN address. The GGSN(s) then update the PDP context and return Update PDP Context Response. The SGSN sends a Complete SRNC Relocation towards the SGSN1.

9) At reception of the Complete SRNC Relocation, SGSN1 will send a release indication towards the Source RNC. All resources allocated to this UE by the source RNC are released only when this message has been received and timer T3-TUNNEL has expired. Before timer T3-TUNNEL expires, all downstream packets received from the GGSN are sent towards the target SRNC..

10) The SGSN2 informs the HLR of the change of SGSN by sending Update GPRS location (IMSI, new SGSN address etc.) to the HLR. The HLR cancels the context in the old SGSN, SGSN1, by sending Cancel Location (IMSI). The SGSN1 removes the context and acknowledges with Cancel Location Ack. The HLR sends Insert subscriber data (IMSI, subscription data) to the SGSN2. The SGSN2 acknowledges with Insert Subscriber Data Ack. The HLR acknowledges the Update GPRS location by sending Update GPRS Location Ack to the SGSN2.

11) At reception of Insert subscriber data from HLR, the SGSN2 will initiate the update of MM information stored in the UE. This is done by sending Network Initiated Routing Area Update Command to the UE. This message will include new RAI, and possible also new P-TMSI. When the UE has made necessary updates it answers with Network Initiated Routing Area Update Complete.

12) When receiving new MM system information indicating a new Location Area, the UE will, in this case, initiate a Location Area update procedure towards the MSC2. This implies that the Location Area update will be performed in parallel to the above indicated activities related to the SGSN side of the Core Network.