

Agenda Item: 10 Iu signalling (RANAP) (25.413)
Source: NEC
Title: Paging procedure (Revision of R3-99357)
Document for: Discussion and Decision

References

- [1] UMTS 23.20 version 1.7.0
- [2] 25.413 RANAP specification version 1.0.1
- [3] S2.31 RRC Protocol Specification version 0.1.0

1. Abstract

This contribution is a proposal to add a new paging procedure into the 25.413: RANAP specification. The aim of this proposal is to reduce the amount of processing load occurring in the RNC, while searching for common IDs, during the paging procedure.

The second page message for a UE is sent on a DCCH and forms the basis of this proposal.

2. Introduction

In the last RAN-WG3 meeting held in Kawasaki, NEC proposed a contribution for having a new paging procedure in order to reduce the processing load in the RNC. The processing load will be reduced by eliminating the need to perform common ID searching in some cases. The proposal was not accepted for the reason that there is no requirement in the UMTS23.20[1] showing that the paging co-ordination can be executed over Gs interface.

However after having a detailed look at the UMTS23.20, there is a requirement in UMTS23.20[1] chapter 7.3.7 (last bullet item) which describes:

“In case of a single CN element, paging may be (but not mandatory) co-ordinated at the CN.”

This is interpreted as, when an incoming call is detected, the paging co-ordination may be done in the single CN. This requirement can help RNC to reduce the common ID searching and thus reduce the processing load while receiving the paging message from CN. However, in the current paging procedure, it is assumed that the RNC that receives the paging message will always search the common ID (e.g. IMSI) in its memory in order to judge whether the paging message shall be sent in PCCH or DCCH over air.

So despite there being paging co-ordination in the single CN, the RNC still must search the common ID in every paging message. We do not consider this to be a very efficient method.

We would therefore propose to have a mechanism in order to prevent the RNC searching the Common IDs in those page messages in which the CN has already performed paging Co-ordination.

3. Discussion

According to [1], the RNC can be connected to two type of CN:

- (1) Separated CN
- (2) Combined CN

When the RNC receives the Paging message, the RNC can decide if it wants to start searching the common ID. If the Paging message is coming from a combined CN which has paging co-ordination function, then the RNC will not have to search the common ID. However for the separate CN or combine CN that does not has the functionality of paging co-ordination, then the RNC should carry out the common ID searching process. A mechanism is required to indicate to the RNC these situations.

3.1 Procedure

The solution we are proposing is to have separate paging message i.e. PAGING1 message using CONNECTION-LESS and PAGING2 message using CONNECTION-ORIENTED, and also an indicator in the PAGING1 message.

Base on this solution, the paging procedure is shown as below.

First Page for a particular UE

	with Paging co-ordination function	without Paging co-ordination function
Combined CN	PAGING1(Connection-less) procedure description 1	PAGING1 (Connection-less) procedure description 2
Separated CN		PAGING1 (Connection-less) procedure description 2

Second or further Page for a particular UE

	with Paging co-ordination function	without Paging co-ordination function
Combined CN	PAGING2 (Connection-oriented) procedure description3	PAGING1 (Connection-less) procedure description 4
Separated CN		PAGING1 (Connection-less) procedure description 4

Procedure description 1	<u>The CN sends RANAP: PAGING1 (CONNECTION-LESS) to the RNC with the indicator indicates there is a co-ordination function in CN.</u> The RNC can judge that this is the first page for the UE, then the RNC will not search the common ID and just send the RRC:PAGING1 message on the PCCH.
Procedure description 2	<u>The CN sends RANAP: PAGING1 (CONNECTION-LESS) to the RNC with the indicator indicates there is no co-ordination function in CN.</u> The RNC will not know whether this is the first page of second page for the UE because the CN does not have the paging co-ordination function, the RNC shall search the common ID. (This is the first page in this case), the RNC will not find the common ID and the RRC:PAGING1 message is sent on PCCH.

Procedure description 3	<p><u>The CN sends RANAP: PAGING2 (CONNECTION-ORIENTED) to the RNC.</u> This CONNECTION-ORIENTED is the SCCP signalling connection on Iu which has been associated to the UE.</p> <p>The RNC can judge that this is the second or further page to the US, the RNC will then just extract the RRC connection instance by means of this SCCP connection, and send the RRC:PAGING2 message on the DCCH.</p> <p>By using SCCP connection to extract the RRC connection instance in the application, would eliminate the need to perform common ID searching</p>
Procedure description 4	<p><u>The CN sends the PAGING1:CONNECTION-LESS to the RNC with the indicator indicates there is no co-ordination function in CN.</u></p> <p>The RNC will not know whether this is the first page of second page for the UE because the CN does not have the paging co-ordination function, the RNC will search the common ID. (This is the second page in this case), the RNC will hit the common ID and the RRC:PAGING2 message is sent on DCCH.</p>

3.2 PAGING1 Message and PAGING2 message content

As already described above, the PAGING1 message (Connection-less) must have an indicator to indicate that whether there is a co-ordination function in the CN or not, then the RNC will decide whether to execute the Common ID searching process or not. Other parameters includes Common ID (IMSI), TMSI, Cell list.

PAGING2 message (Connection-oriented) is sent on the SCCP connection, which has been associated to the UE, therefore the RNC may not understand the PAGING2 is from which domain. Therefore a parameter "CN Identifier" could be introduced. The RNC can utilize this parameter to indicate to the UE in RRC:PAGING2 (send on DCCH) message.

4. Proposal

In order to prevent the RNC searching the Common IDs in those page messages in which the CN has already performed paging Co-ordination, and also considering that the RNC which can be connected to several types of CN, we propose to define two paging messages in the RANAP Specification 25.413. The mechanism of these two paging messages is described in section 3 above.

PAGING1: Connection-less

Content:

- (1) Common ID: This can be IMSI, a subscriber identifier
- (2) TMSI : Temporary Mobile Subscriber Identity
- (3) CELL list : this parameter indicates the location of the UE
- (4) Co-ordination Indicator: this parameter shows whether there is co-ordination function in the CN or not.

Note: Current PAGING message has the parameter (1)(2) and (3), the parameter of (4) is newly proposed.

PAGING2: Connection-oriented

Content:

(1)CN Identifier: this parameter shows the CN domain (PS or CS).

8.7 Paging1

PAGING1 messages for all UEs shall be sent via the RANAP as a connectionless message. These will include some information to allow derivation of the paging population number, the IMSI of the user to be used as the Common Id of the user in the RNC, the Id of the User to be used in the paging channel (e.g. TMSI); they may also include information on the subsequent transaction related to the paging. A corresponding radio interface paging message transmitted over the radio interface at the appropriate time. The issue of storing the RANAP PAGING message for future paging repetition is FFS.

It should be noted that each RANAP PAGING1 message on the CN-UTRAN interface relates to only one UE and therefore the UTRAN has to pack the pages into the relevant radio interface paging message.

A single RANAP PAGING1 message across the CN to UTRAN interface contains information on the area in which the page shall be broadcast. This is indicated with UE location parameter (content FFS, e.g. LA or RA).

The signalling flow of the paging procedure is illustrated in Figure 1.

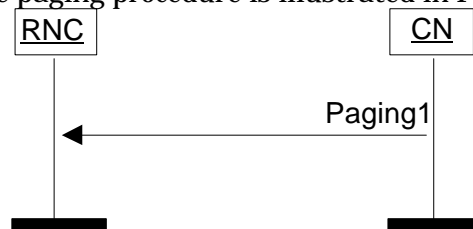


Figure 1. Paging procedure.

8.x Paging2

PAGING2 message shall be sent via the RANAP as a connection-oriented message. The connection-oriented is the connection that has been associated to the Paged UE. This PAGING2 message includes information of the CN domain Identifier.

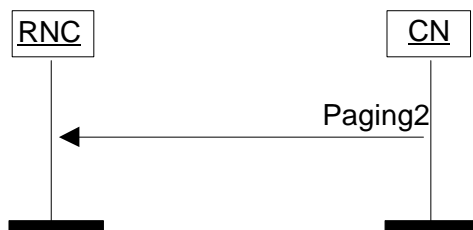


Figure XX Paging procedure.