
1 Title

2 Paging Concept for 44.060.

3 Source

4 Lucent

5 Abstract

6 This contribution proposes a paging concept for 44.060. It uses the following three-part template adopted in
7 GAHW-010241: identify requirements, recommend concept, identify impact on specifications.

8 The requirements section uses the model proposed by Alan Cooper in *The Inmates are Running the Asylum – Why*
9 *High-Tech Products Drive Us Crazy and How to Restore the Sanity*.

10 Due to the short time from the GERAN Ad Hoc meeting until document cutoff for the TSG GERAN WG2 meeting, this
11 contribution is a rough draft. It incorporates the paging sequences from GP-011200 [Nokia] and comments received
12 during an ad-hoc meeting held 29 May 01.

13 Comments appear within angled brackets, *e.g.*, <comment>.

14 This contribution is available in Acrobat and Word formats. The Acrobat format is smaller and has fewer display
15 artifacts.

16 Recommendation

17 For information.

1. Requirements

This document presents paging-related requirements. Based on these requirements, it develops concepts, and from the concepts, assesses the impact on new and existing standards. To focus requirements, it proposes persona, as suggested by Alan Cooper in *The Inmates are Running the Asylum* [1].

1.1 Persona

Lloyd sells specialty automotive parts for Merit, a multinational supplier. His customers include autobody shops, garages, trucking companies, fleet operators, and auto-parts retailers.

Lloyd's key objective is customer service: customers should be able to phone him at any time and get through to Lloyd or his voice mail. From 08:00 to 19:00, seven days a week, Lloyd returns calls within 2 hours.

Lloyd uses two wireless devices:

- A small handset exclusively used for voice.
The handset is on 24 hours a day, 7 days a week. It is Lloyd's key communication device. This handset complies with release-99 specifications for voice terminals. It does not support GPRS.
- A laptop computer for checking stock and processing orders.
This laptop contains a GPRS PC card that allows wireless data access to Merit's servers. The computer is only on when Lloyd is entering new orders or checking status of outstanding orders. Lloyd seldom uses e-mail: he prefers to talk to his customers by phone or meet with them in person.

In the future, Lloyd may want a single device that allows him to perform everything he does now. This document assumes the future is now.

1.2 User-based requirements

To increase battery life, paging shall support discontinuous reception.

Incoming voice calls shall be processed whether or not a data session is active.

Incoming data transfers shall be processed whether or not a voice call is active.

1.3 System-based requirements

<This section incorporates agreements documented in GP-010975. Each requirement in this section should indicate why the requirement exists.>

Any mobile station that supports *Iu mode* shall camp on a PCCCH if present.

If a PCCCH is present, the mobile station shall monitor it in *RRC Idle* and *RRC Connected* modes.

So the core network and GERAN can establish a signalling link with a mobile station, two types of paging shall be supported: GERAN-initiated and CN-initiated. The mobile station shall be able to determine which network (GERAN or CN) initiated the page.

A single PACKET PAGING REQUEST shall be able to contain pages for *A/Gb mode* and *Iu mode* mobile stations.

A mobile station may respond to a page via a dedicated control channel or via a TBF.

Iu mode paging shall comply with the concepts in this document.

A/Gb mode paging shall comply with the concepts in 43.064.

1.4 User-based scenarios

The following scenarios will be used to develop the paging concepts in § 2:

- Lloyd receives a voice call.
- Lloyd receives a voice call while checking the status of a customer's order.
- Lloyd receives an e-mail order confirmation.
- Lloyd receives an e-mail order confirmation while engaged in a voice call.

1.5 System-based scenarios

GERAN shall initiate a page for the following purposes:

- Locate a mobile station to its serving cell.
- Activate a radio bearer.

The CN shall initiate a page for the following purposes:

- Locate a mobile station to its serving BSS.
- Activate a radio access bearer.

2. Concept

<Describe each figure in this section. What key information appears in each message, *e.g.*, which mobile-station identifier does GERAN use in the *paging request*?>

2.1 User-based sequences

These sequences derive from the user-based requirements of § 1.2 and the scenarios of §1.4.

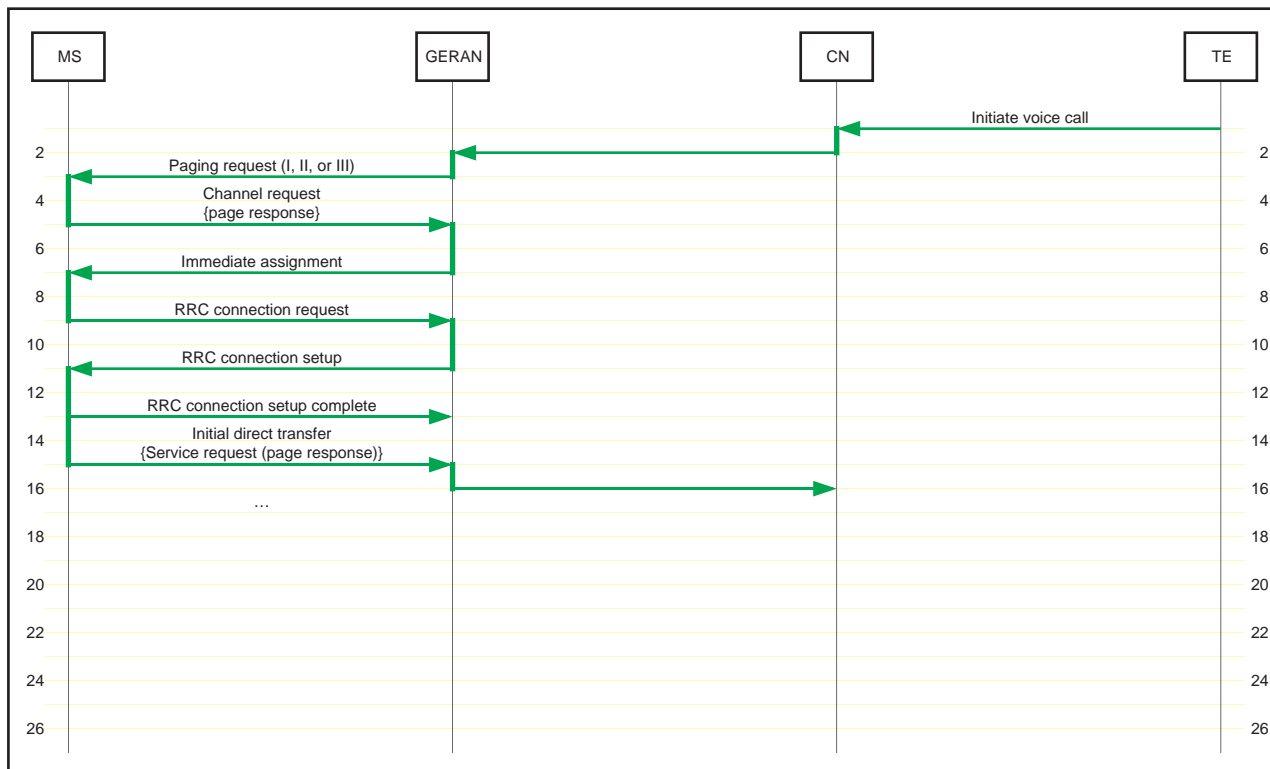
1 2.1.1 Incoming voice call – *RRC Idle*

2 These sequences correspond to the following user-based scenario: Lloyd receives a voice call.

3 Figure 1 shows the paging-related portion of an incoming voice call under the following conditions:

- 4 • RRC is in *RRC Idle* state.
- 5 • Mobile station is camped on a CCCH.
- 6 • GERAN will assign a dedicated channel.

7 **Figure 1: Incoming voice call – *RRC Idle*, CCCH, assign dedicated channel**

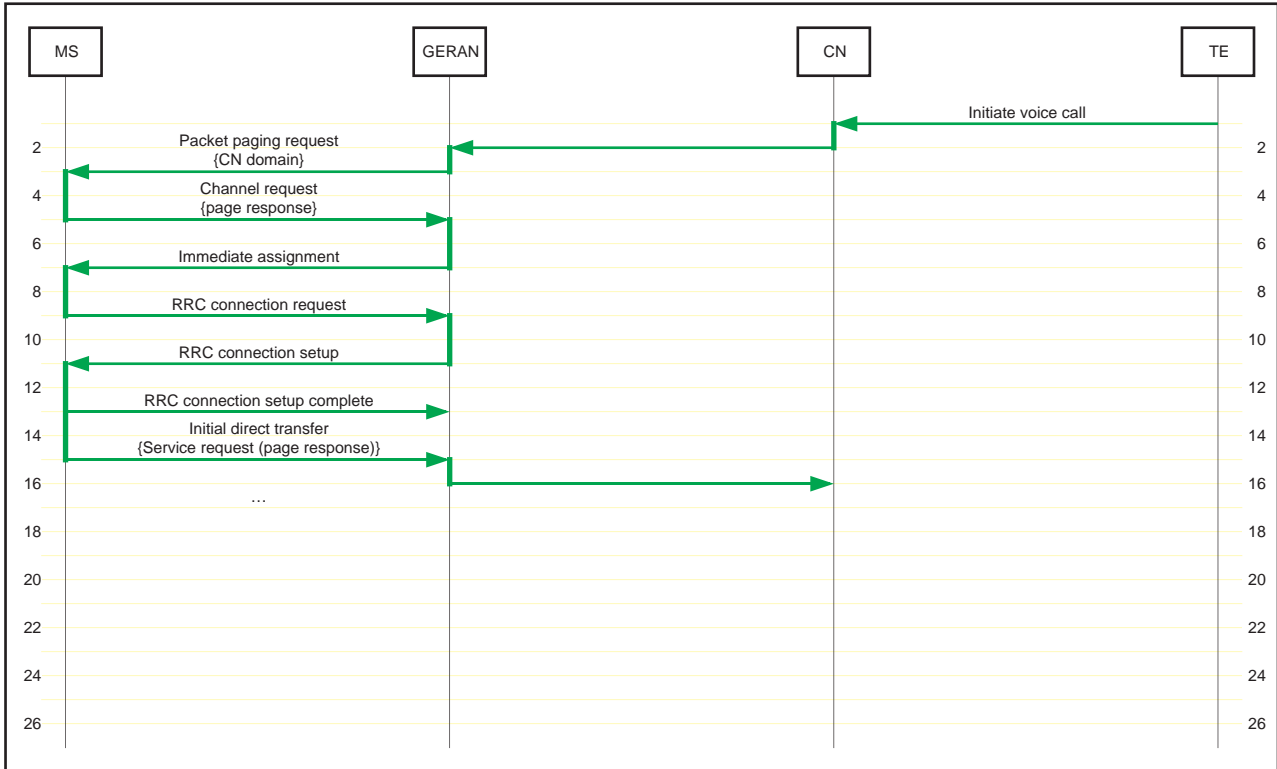


8
9 <How does the network know what channel to allocate? Why do we need to allocate an SDCCH?>

1 Figure 2 shows the paging-related portion of an incoming voice call under the following conditions:

- 2
- RRC is in *RRC Idle* state.
 - 3
 - Mobile station is camped on a PCCCH.
 - 4
 - GERAN will assign a dedicated channel.

5 **Figure 2: Incoming voice call – *RRC Idle*, PCCCH, assign dedicated channel**



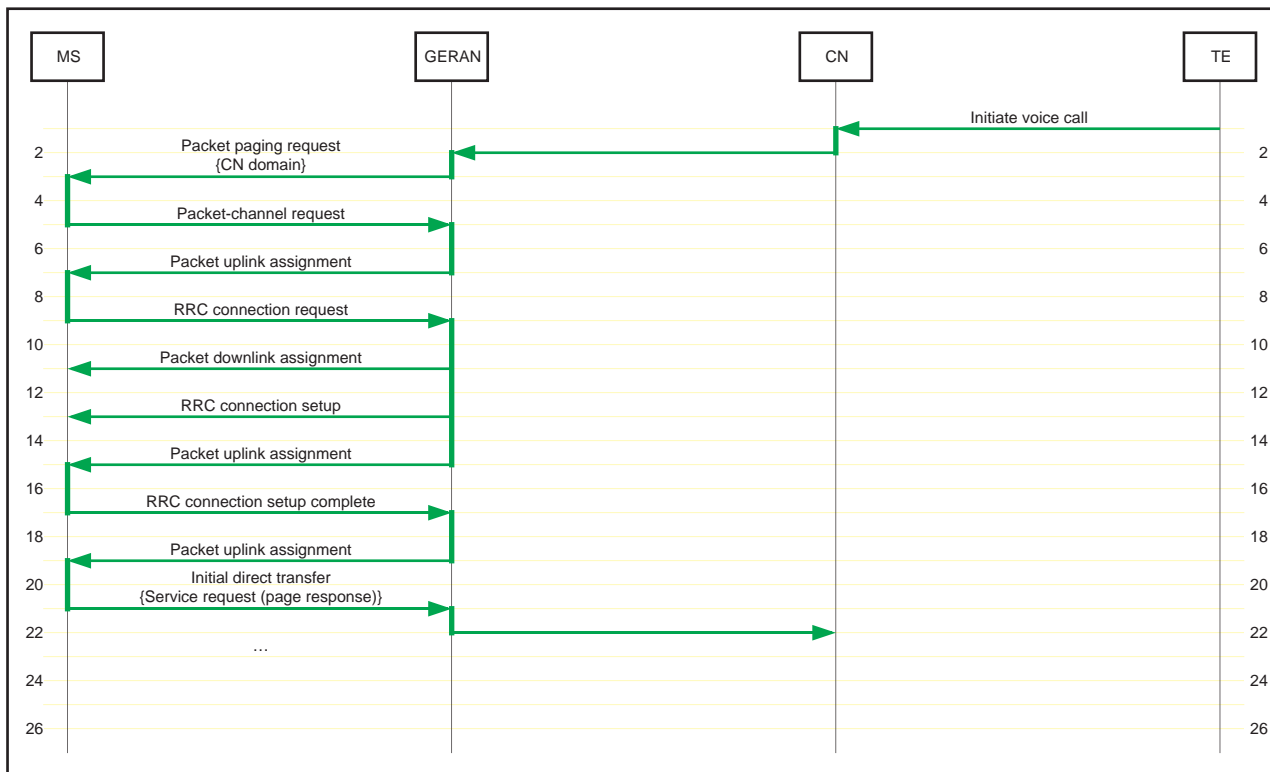
6

7 <How does the mobile station know what channel to request, i.e., *Channel Request* or *Packet Channel Request*? Should
8 the mobile station be able to decide?>

1 Figure 3 shows the paging-related portion of an incoming voice call under the following conditions:

- 2
- RRC is in *RRC Idle* state.
 - 3
 - Mobile station is camped on a PCCCH.
 - 4
 - GERAN will assign a temporary block flow.

5 **Figure 3: Incoming voice call – *RRC Idle*, PCCCH, assign TBF**



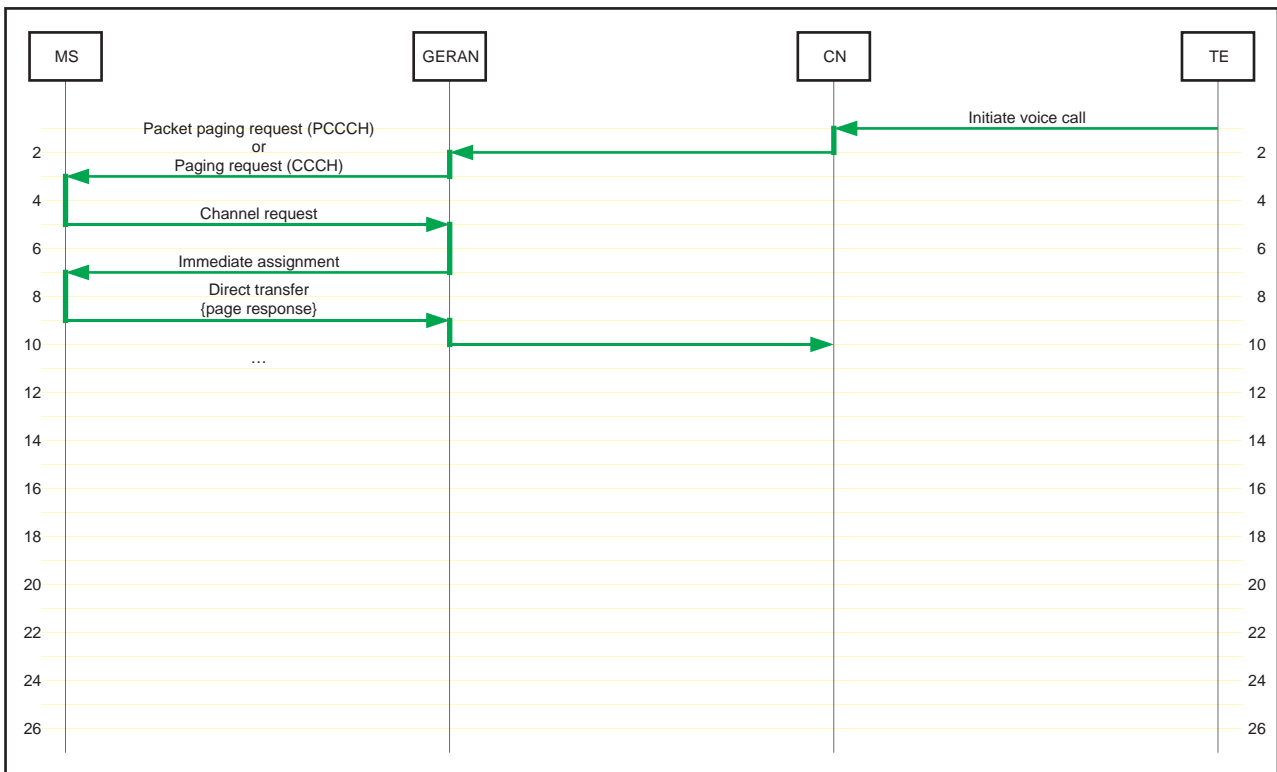
2.1.2 Incoming voice call – *RRC Cell Shared*

These sequences correspond to the following user-based scenario: Lloyd receives a voice call while checking the status of a customer's order.

Figure 4 shows the paging-related portion of an incoming voice call under the following conditions:

- RRC is in *RRC Cell Shared* state.
- Mobile station is camped on a CCCH or a PCCCH.
- GERAN will assign a dedicated channel.

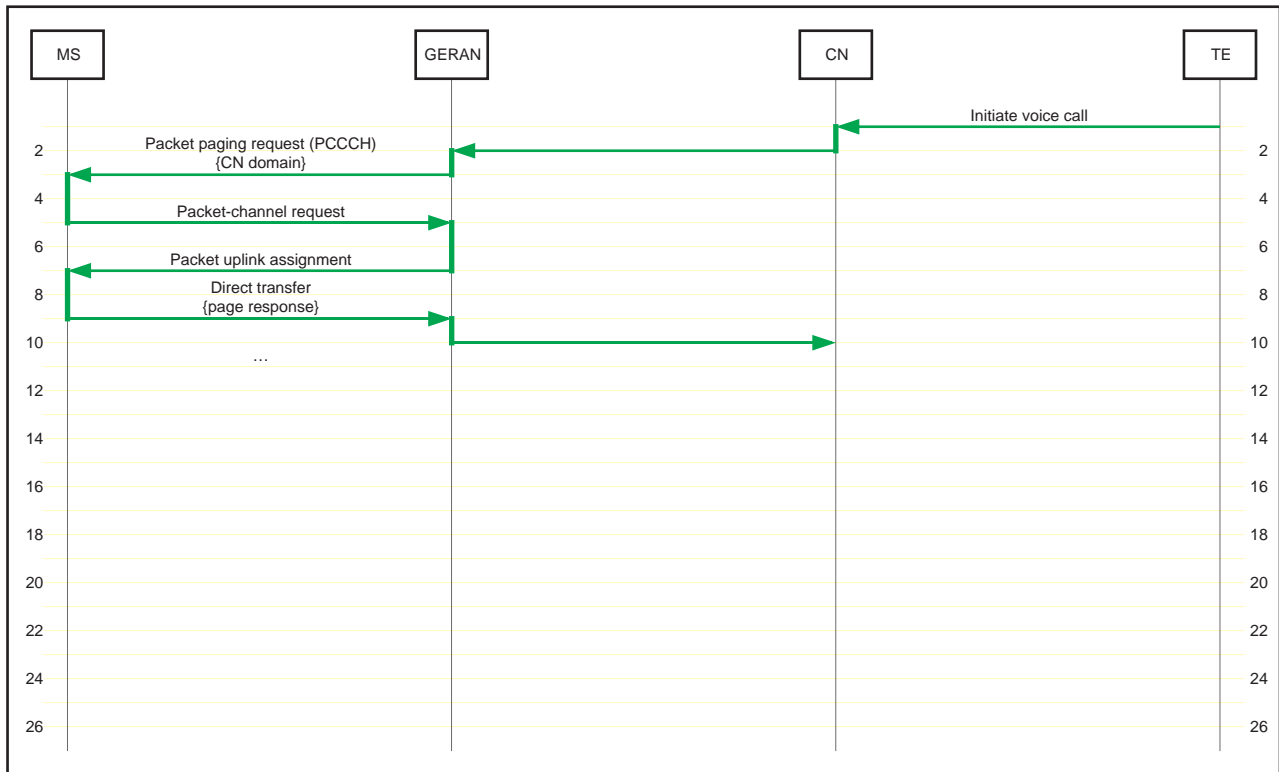
Figure 4: Incoming voice call – *RRC Cell Shared*, assign dedicated channel



1 Figure 5 shows the paging-related portion of an incoming voice call under the following conditions:

- 2
- RRC is in *RRC Cell Shared* state.
 - 3
 - Mobile station is camped on a PCCCH.
 - 4
 - GERAN will assign a temporary block flow.

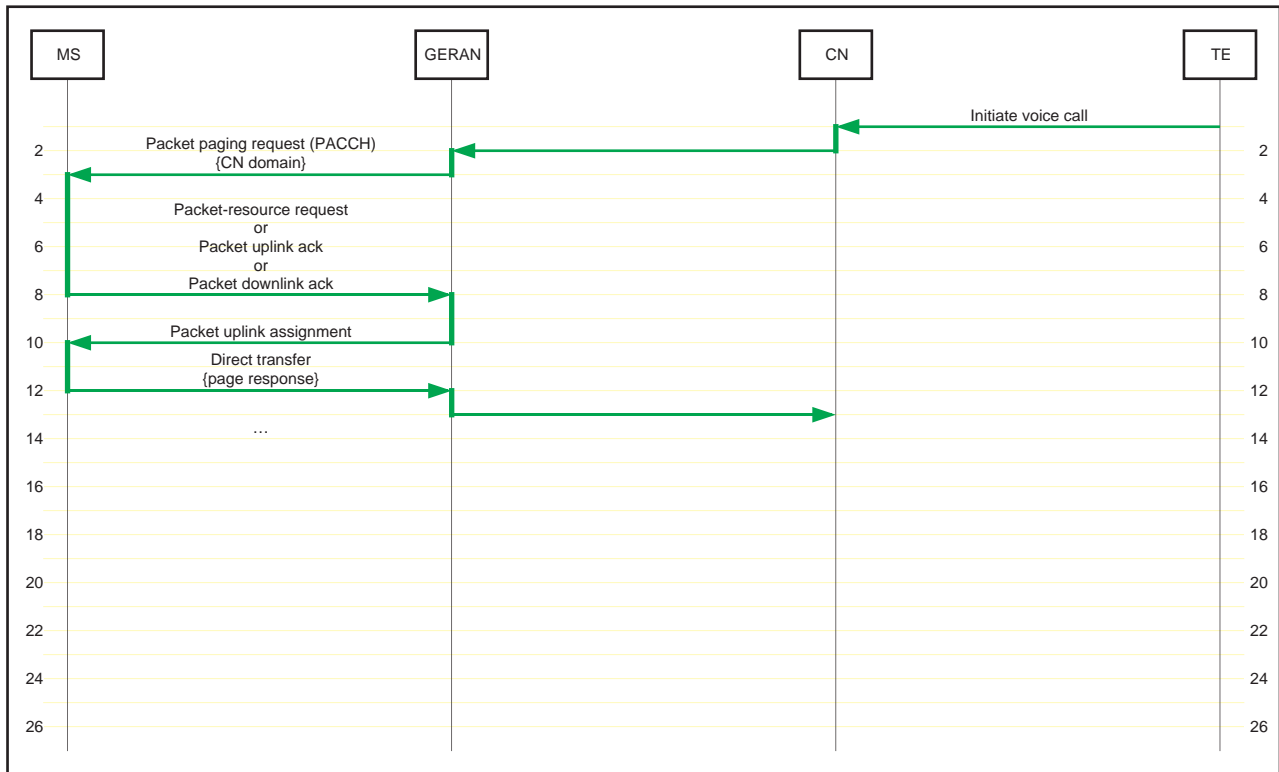
5 **Figure 5: Incoming voice call – *RRC Cell Shared*, PCCCH, assign TBF**



1 Figure 6 shows the paging-related portion of an incoming voice call under the following conditions:

- 2
- RRC is in *RRC Cell Shared* state.
 - 3
 - Mobile station is monitoring a PACCH.
 - 4
 - GERAN will assign a temporary block flow.

5 **Figure 6: Incoming voice call – *RRC Cell Shared*, PACCH, assign TBF**



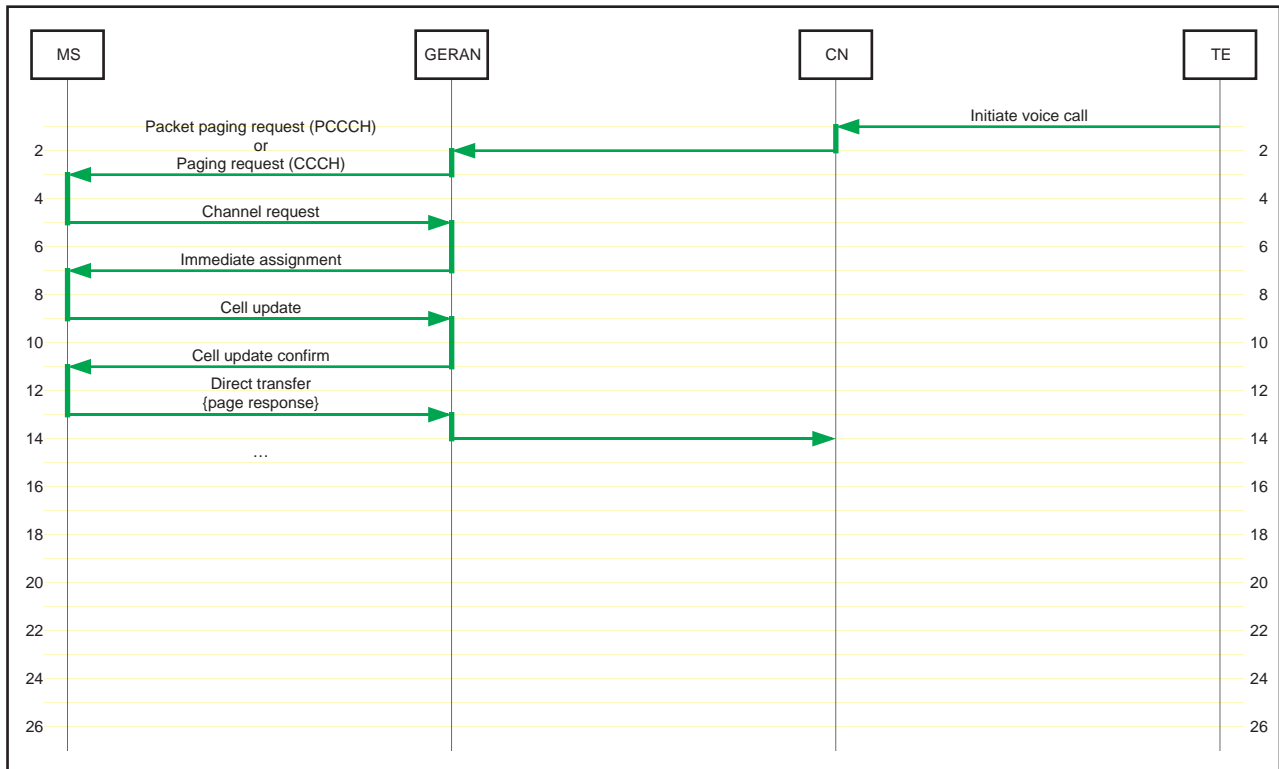
2.1.3 Incoming voice call – *RRC GRA_PCH*

These sequences correspond to the following user-based scenario: Lloyd receives a voice call.

Figure 7 shows the paging-related portion of an incoming voice call under the following conditions:

- RRC is in *RRC GRA_PCH* state.
- Mobile station is monitoring a CCCH or a PCCCH.
- GERAN will assign a dedicated channel.

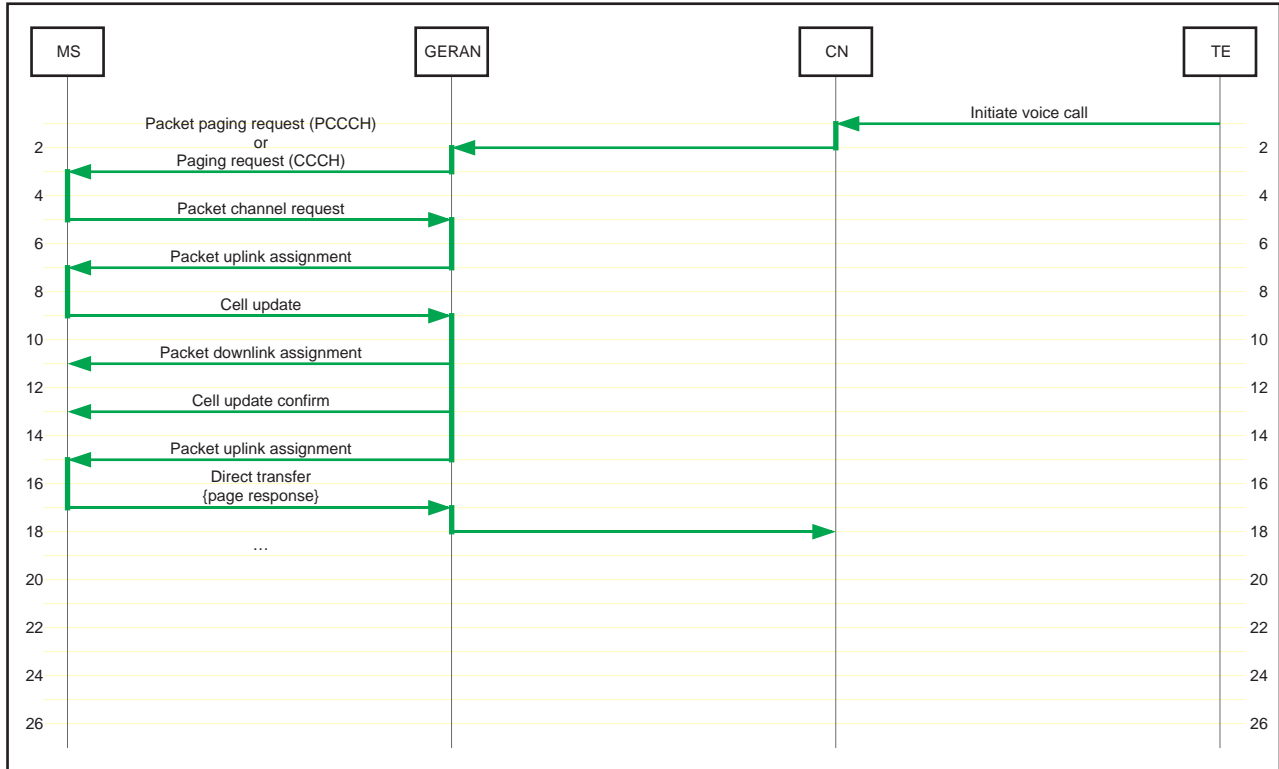
Figure 7: Incoming voice call – *RRC GRA_PCH*, assign dedicated channel



1 Figure 8 shows the paging-related portion of an incoming voice call under the following conditions:

- 2
- RRC is in *RRC GRA_PCH* state.
 - 3 • Mobile station is monitoring a CCCH or a PCCCH.
 - 4 • GERAN will assign a temporary block flow.

5 **Figure 8: Incoming voice call – *RRC GRA_PCH*, assign TBF**



6

7 2.1.4 Incoming data transfer – *RRC Idle*

8

9 2.1.5 Incoming data transfer – *RRC Dedicated*

10

11 2.2 System-based sequences

12 These sequences derive from the system-based requirements of § 1.3 and the scenarios of § 1.5. This section only
13 includes sequences that do not directly derive from user-based scenarios.

14 2.3 Miscellaneous

15 Clarify Network Operation Mode I and II in *Iu mode*. Mode II implies no PBCCH and coordinated paging between
16 MSC and SGSN. In *Iu mode*, we have a PBCCH and the BSS coordinates paging, so if we want to keep Network
17 Operation Mode II in *Iu mode*, we will have to redefine it. One option may be to exclude Network Operation Mode II in
18 *Iu mode*.

1 **3. Impact on Specifications**

2 <td>

3 **4. References**

- 4 1. Cooper, Alan. *The Inmates are Running the Asylum – Why High-Tech Products Drive Us Crazy and How*
5 *to Restore the Sanity*. Indianapolis: SAMS, 1999.