

ETSI TS 143 129 V14.0.0 (2017-04)



**Digital cellular telecommunications system (Phase 2+) (GSM);
Packet-switched handover for GERAN A/Gb mode;
Stage 2
(3GPP TS 43.129 version 14.0.0 Release 14)**



Reference

RTS/TSGR-0643129ve00

Keywords

GSM

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2017.

All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.

3GPP™ and LTE™ are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

oneM2M logo is protected for the benefit of its Members

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	7
Introduction	7
1 Scope	8
2 References	8
3 Definitions and abbreviations.....	9
3.1 Definitions	9
3.2 Void.....	10
3.3 Abbreviations	10
4 Architecture and principles	12
4.1 Reference architecture	12
4.2 Handover principles	12
4.2.1 General.....	12
4.2.2 PS Handover preparation phase	13
4.2.3 PS Handover execution phase.....	14
4.2.4 PS Handover Network Node Responsibilities	14
4.3 Protocol architecture.....	14
4.3.1 User plane overview	14
4.3.2 Control plane overview.....	14
4.3.3 Physical Layer	15
4.3.3.1 Shared Channels.....	15
4.3.3.1.1 General	15
4.3.4 RLC/MAC	15
4.3.5 Radio Resource (RR).....	16
4.3.6 BSSGP	16
4.3.7 Overview of PS Handover Signalling Messages	16
4.3.7.1 PS handover signalling messages on the Um interface	16
4.3.7.2 PS handover signalling messages on the Gb interface	16
4.3.7.3 PS handover signalling messages on the Gn interface	17
4.3.7.4 PS handover signalling messages on the Up interface	18
4.4 Identifiers	18
4.4.1 NSAPI, PFI, RAB ID relation during inter-RAT, inter-mode UTRAN/GERAN <i>Iu</i> PS handover	19
4.4.2 NSAPI, PFI, EPS Bearer ID relation during inter-RAT GERAN / E-UTRAN PS handover	20
5 Signalling procedures.....	20
5.1 GERAN (<i>A/Gb mode</i>) → GERAN (<i>A/Gb mode</i>) handover.....	20
5.1.1 Intra Cell	20
5.1.2 Intra BSS.....	21
5.1.2.1 General	21
5.1.2.2 Intra BSS HO; Preparation phase.....	21
5.1.2.3 Intra BSS HO; Execution phase	22
5.1.2.4 Intra BSS Handover - Optimised	23
5.1.3 Intra SGSN.....	25
5.1.3.1 Intra SGSN/Inter BSS HO, Preparation phase	25
5.1.3.2 Intra SGSN/Inter BSS HO, Execution phase	26
5.1.4 Inter SGSN.....	28
5.1.4.1 Inter SGSN HO, Preparation phase	28
5.1.4.2 Inter SGSN HO, Execution phase	31
5.2 Inter-RAT/mode handover (GERAN <i>A/Gb mode</i> → UTRAN/ GERAN <i>Iu mode</i>)	35
5.2.1 Intra SGSN.....	35
5.2.1.1 Intra-SGSN GERAN <i>A/Gb mode</i> to UTRAN/GERAN <i>Iu mode</i> HO; Preparation phase	35

5.2.1.2	Intra-SGSN GERAN A/Gb <i>mode</i> to UTRAN/GERAN Iu <i>mode</i> HO; Execution phase	37
5.2.2	Inter SGSN.....	40
5.2.2.1	Inter-SGSN GERAN A/Gb <i>mode</i> to UTRAN/GERAN Iu <i>mode</i> HO; Preparation phase	40
5.2.2.2	Inter-SGSN GERAN A/Gb <i>mode</i> to UTRAN/GERAN Iu <i>mode</i> HO; Execution phase	42
5.3	Inter-RAT/ <i>mode</i> Handover (UTRAN/GERAN Iu <i>mode</i> → GERAN A/Gb <i>mode</i>).....	46
5.3.1	Intra SGSN.....	46
5.3.1.1	Inter RAT/ <i>mode</i> UTRAN/GERAN Iu <i>mode</i> to GERAN A/Gb <i>mode</i> PS HO; Preparation phase	46
5.3.1.2	Inter RAT/ <i>mode</i> UTRAN/GERAN Iu <i>mode</i> to GERAN A/Gb <i>mode</i> PS HO; Execution phase	48
5.3.2	Inter SGSN.....	51
5.3.2.1	Inter RAT/ <i>mode</i> UTRAN/GERAN Iu <i>mode</i> to GERAN A/Gb <i>mode</i> PS HO; Preparation phase	51
5.3.2.2	Inter RAT UTRAN/GERAN Iu <i>mode</i> to GERAN A/Gb <i>mode</i> PS HO; Execution phase	53
5.3a	Inter-RAT Handover (GERAN A/Gb <i>mode</i> to E-UTRAN).....	56
5.3a.1	General.....	56
5.3a.2	Preparation phase	56
5.3a.3	Execution phase	57
5.3b	Inter-RAT Handover (E-UTRAN to GERAN A/Gb <i>mode</i>).....	57
5.3b.1	General.....	57
5.3b.2	Preparation phase	57
5.3b.3	Execution phase	57
5.4	Handover reject	58
5.4.1	General.....	58
5.4.2	Inter-SGSN HO Reject; Signalling procedure	58
5.5	Handover cancel	58
5.5.1	General.....	58
5.5.2	Signalling procedures	59
5.5.2.1	Inter-SGSN case, GERAN A/Gb <i>mode</i> → GERAN A/Gb <i>mode</i>	59
5.5.2.2	Inter-SGSN case, GERAN A/Gb <i>mode</i> → UTRAN/GERAN Iu <i>mode</i>	60
5.5.2.3	Inter-SGSN case, UTRAN/GERAN Iu <i>mode</i> → GERAN A/Gb <i>mode</i>	61
5.5.2.4	Inter-SGSN, GERAN A/Gb <i>mode</i> → E-UTRAN	61
5.5.2.5	Inter-SGSN case, E - UTRAN→ GERAN A/Gb <i>mode</i>	61
5.6	Container handling	61
5.6.1	Contents of the containers.....	63
5.6.1.1	Contents of the GERAN A/Gb <i>mode</i> or GAN <i>mode</i> → GERAN A/Gb <i>mode</i> Transparent Containers	64
5.6.1.1.1	Source BSS to Target BSS Transparent Container.....	64
5.6.1.1.2	Target BSS to Source BSS Transparent Container.....	64
5.6.1.2	Contents of the GERAN A/Gb <i>mode</i> or GAN <i>mode</i> → UTRAN Transparent Containers.....	64
5.6.1.2.1	Source to Target Transparent Container.....	64
5.6.1.2.2	Target to Source Transparent Container.....	65
5.6.1.3	Contents of the UTRAN → GERAN A/Gb <i>Mode</i> or GAN <i>mode</i> Transparent Containers	65
5.6.1.3.1	Source BSS to Target BSS Transparent Container.....	65
5.6.1.3.2	Target BSS to Source BSS Transparent Container.....	65
5.6.1.4	Contents of the GERAN A/Gb <i>mode</i> → GERAN Iu <i>mode</i> Transparent Containers	66
5.6.1.4.1	Source to Target Transparent Container.....	66
5.6.1.4.2	Target to Source Transparent Container.....	66
5.6.1.5	Content of GERAN Iu <i>mode</i> → GERAN A/Gb <i>mode</i> Transparent Containers	66
5.6.1.5.1	Source BSS to Target BSS Transparent Container.....	66
5.6.1.5.2	Target BSS to Source BSS Transparent Container.....	66
5.6.1.6	Contents of the GERAN A/Gb <i>mode</i> → GAN <i>mode</i> Transparent Containers	67
5.6.1.6.1	Source BSS to Target BSS Transparent Container.....	67
5.6.1.6.2	Target BSS to Source BSS Transparent Container.....	67
5.6.1.7	Contents of the GERAN A/Gb <i>mode</i> → E-UTRAN Transparent Containers	67
5.6.1.7.1	Source to Target Transparent Container.....	67
5.6.1.7.2	Target to Source Transparent Container.....	67
5.6.1.8	Contents of the E-UTRAN → GERAN A/Gb <i>mode</i> Transparent Containers	68
5.6.1.8.1	Source BSS to Target BSS Transparent Container.....	68
5.6.1.8.2	Target BSS to Source BSS Transparent Container.....	68
5.7	PS Handover Failure	68
5.7.1	Preparations Phase Failure Scenarios	69
5.7.1.1	PS Handover preparation phase failure scenarios on the Um interface.....	69
5.7.1.2	PS Handover preparation phase failure scenarios on the Gb interface.....	69
5.7.1.3	PS Handover preparation phase failure scenarios on the Gn interface.....	69

5.7.1.4	PS Handover preparation phase failure scenarios on the Up interface.....	69
5.7.2	Execution Phase Failure Scenarios	70
5.7.2.1	Execution phase failures on the Um interface.....	70
5.7.2.1.1	Initial Access Failure in the Target Cell during PS handover.....	70
5.7.2.1.2	Radio contact with the MS is lost:.....	71
5.7.2.2	Execution phase failures on the Gb interface.....	73
5.7.2.3	Execution phase failures on the Gn interface.....	74
5.8	GAN Handover	74
5.8.1	Intra-SGSN Handover (GERAN A/Gb mode → GAN mode handover).....	74
5.8.1.1	Intra SGSN PS Handover, Preparation phase	74
5.8.1.2	Intra SGSN PS Handover, Execution phase.....	75
5.8.2	Intra-SGSN Handover (GAN mode → GERAN A/Gb mode handover).....	75
5.8.2.1	Intra SGSN PS Handover, Preparation phase	75
5.8.2.2	Intra SGSN PS Handover, Execution phase.....	76
5.8.3	Inter-SGSN Handover (GERAN A/Gb mode → GAN mode handover).....	76
5.8.3.1	Inter SGSN PS Handover, Preparation phase	76
5.8.3.2	Inter SGSN PS Handover, Execution phase.....	76
5.8.4	Inter-SGSN Handover (GAN mode → GERAN A/Gb mode handover).....	76
5.8.4.1	Inter SGSN PS Handover, Preparation phase	76
5.8.4.2	Inter SGSN, Execution phase.....	77
5.8.5	Inter RAT Handover; Intra SGSN (UTRAN → GAN mode handover)	77
5.8.5.1	Intra SGSN PS Handover, Preparation phase	77
5.8.5.2	Intra SGSN PS Handover, Execution phase.....	78
5.8.6	Inter RAT Handover; Intra SGSN (GAN mode → UTRAN handover)	78
5.8.6.1	Intra SGSN PS Handover, Preparation phase	78
5.8.6.2	Intra SGSN, Execution phase.....	78
5.8.7	Inter RAT Handover; Inter SGSN (UTRAN → GAN mode handover)	79
5.8.7.1	Inter SGSN PS Handover, Preparation phase	79
5.8.7.2	Inter SGSN PS Handover, Execution phase.....	79
5.8.8	Inter RAT Handover; Inter SGSN (GAN mode → UTRAN handover)	79
5.8.8.1	Inter SGSN PS Handover, Preparation phase	79
5.8.8.2	Inter SGSN PS Handover, Execution phase.....	79
6	Radio interface Signalling	79
6.1	PS Handover Signalling (Um).....	79
6.1.1	General.....	79
6.1.2	Overview of PS Handover messages	80
6.1.2.1	GERAN A/Gb mode/GAN mode to GERAN A/Gb mode PS Handover	80
6.1.2.2	UTRAN/GERAN Iu mode to GERAN A/Gb mode/GAN mode PS Handover	80
6.1.2.3	GERAN A/Gb mode to GERAN Iu mode PS Handover	81
6.1.2.4	GERAN A/Gb mode/GAN mode to UTRAN mode PS Handover	82
6.1.2.5	GERAN A/Gb mode to GAN mode PS Handover.....	82
6.1.2.6	GERAN A/Gb mode to E-UTRAN PS Handover.....	82
6.1.2.7	E-UTRAN to GERAN A/Gb mode PS Handover.....	83
6.1.3	RLC/MAC segmentation	83
6.1.4	Inter RAT/mode PS Handover to GERAN A/Gb	83
6.1.5	Inter RAT/mode PS Handover from GERAN A/Gb.....	83
6.2	Mechanisms for Initial Access in the Target Cell	83
6.2.1	General.....	83
6.2.2	Synchronisation of handovers.....	84
6.2.3	Option 1 - Downlink Data sent after performing access in the target cell	84
6.2.3.1	Unsynchronised Networks Call Flow.....	84
6.2.3.2	Synchronised Networks Call Flow.....	85
6.2.4	Option 2 - Downlink Data sent before performing access in the target cell (Blind Transmission)	85
6.2.4.1	Unsynchronised Networks Call Flow.....	86
6.2.4.2	Synchronised Network Call Flow	86
6.3	Methods for triggering PS Handover.....	87
Annex A (normative):	Agreed handover principles.....	88
A.1	Agreed handover principles.....	88
Annex B (informative):	PS Handover Primitives	90

B.1	Overview	90
B.2	Primitives in Source BSS	90
B.3	Primitives in Old SGSN	91
B.4	Primitives in New SGSN.....	92
B.5	Primitives in Target BSS.....	93
B.6	Primitives in MS.....	93
Annex C (informative):	Change history	94
History		97

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Packet Switched (PS) handover is introduced in order to support real-time packet-switched with strict QoS requirements on low latency and packet loss. Packet switched handover reduces the service interruption of the user plane information at cell change compared to the cell-reselection and enables methods to improve buffer handling of user plane data in order to reduce packet loss at cell-change.

1 Scope

The present document defines the stage-2 service description for packet switched handover in GERAN *A/Gb mode* and GAN mode. ITU-T Recommendation I.130 [8] describes a three-stage method for characterisation of telecommunication services, and ITU-T Recommendation Q.65 [9] defines stage 2 of the method. The present document refers to packet switched handover in GERAN *A/Gb mode/GAN mode*, and therefore focuses on the corresponding radio protocol enhancements to the packet switched domain only i.e. when services are provided through the Gb interface.

2 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 TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 22.105: "Services and service capabilities".
- [3] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service description; Stage 1".
- [4] 3GPP TS 43.064: "Overall description of the GPRS radio interface; Stage 2".
- [5] 3GPP TS 25.922: "Radio Resource Management strategies".
- [6] 3GPP TS 23.107: "Quality of Service (QoS) concept and architecture".
- [7] 3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".
- [8] ITU-T Recommendations I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [9] ITU-T Recommendation Q.65: "The unified functional methodology for the characterization of services and network capabilities".
- [10] 3GPP TS 48.018: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN); BSS GPRS Protocol".
- [11] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".
- [12] 3GPP TS 23.003: "Numbering, addressing and identification".
- [13] 3GPP TS 25.401: "UTRAN overall description".
- [14] 3GPP TS 43.051: "GSM/EDGE Radio Access Network (GERAN) overall description; Stage 2".
- [15] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".
- [16] 3GPP TS 44.118: "Mobile radio interface layer 3 specification, Radio Resource Control (RRC) protocol; Iu mode".
- [17] 3GPP TS 25.331: "Radio Resource Control (RRC) protocol specification".