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TECHNICAL SPECIFICATION

Digital cellular telecommunications system (Phase 2+) (GSM);
Packet-switched handover for GERAN A/Gb mode;
Stage 2
(3GPP TS 43.129 version 14.1.0 Release 14)

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

A GLOBAL INITIATIVE

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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
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Contents

Foreword

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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.
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- 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] Void.

[17] 3GPP TS 25.331: "Radio Resource Control (RRC) protocol specification".

[18] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General Aspects".

[19] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[20] 3GPP TS 23.108: "Mobile radio interface layer 3 specification core network protocols; Stage 2 (structured procedures)".

[21] 3GPP TS 44.064: "Mobile Station - Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) Layer Specification".

[22] 3GPP TS 23.236: "Intra-domain connection of Radio Access Network (RAN) nodes to multiple Core Network (CN) nodes".

[23] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[24] Void.

[25] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control (RRC) protocol".

[26] 3GPP TS 45.010: "Radio subsystem synchronization".

[27] 3GPP TS 33.102: “Security architecture”.

[28] 3GPP TS 44.318: “Generic access to the A/Gb interface; Mobile GA interface layer 3 specification”.

[29] 3GPP TS 43.318: “Generic access to the A/Gb interface; Stage 2”.

[30] 3GPP TS 36.300: “Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRAN); Overall description; Stage 2”.

[31] 3GPP TS 36.331:” Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification”.

[32] 3GPP TS 36.401: “Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Architecture description”.

[33] 3GPP TS 23.401: “General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access”.

[34] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access (E-UTRA); S1 Application Protocol (S1AP)".

[35] 3GPP TS 24.301: “Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3”.

[36] 3GPP TS 22.220: "Service requirements for Home NodeBs and Home eNodeBs".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply:

Active PFCs: that subset of the PFCs to be handed over, for which the source BSS has determined that resources should be allocated in the target cell during the PS Handover preparation phase.

A/Gb *mode*: MS mode operation where the MS is connected to the Core Network via GERAN and the A and/or Gb interfaces.

Blind Transmission: refers to the decision made by the SGSN to start the transmission of downlink N-PDUs or by the target BSS/GANC to start the transmission of downlink LLC PDUs for a given mobile station before receiving confirmation that the PS handover procedure has been successfully completed.

GAN Mode: MS mode of operation where the MS is connected to the Core Network via a GANC and the A and/or Gb interfaces.

PFC subject to handover: refers to an MS's PFC for which the packet switched handover procedure is to be initiated when a cell change is required. Whether a PFC needs handover or not is decided by the BSS. This decision criteria is not standardized.

Source to Target Transparent Container: This container is encoded as "Source RNC to Target RNC transparent container" in case of PS handover to UTRAN and as "Source eNB to Target eNB transparent container" in case of PS handover to E-UTRAN. It replaces the "Source RNC to Target RNC Transparent container" used in previous releases.

Target to Source Transparent Container: This container is encoded as "Target RNC to Source RNC transparent container" in case of PS handover to UTRAN and as "Target eNB to Source eNB transparent container" in case of PS handover to E-UTRAN. It replaces the "Target RNC to Source RNC Transparent container" used in previous releases.

CSG Cell: A UTRAN or E-UTRAN cell for which the reported access mode indicates "Closed access mode" (see [36]).

Hybrid Cell: A UTRAN or E-UTRAN cell for which the reported access mode indicates "Hybrid access mode" (see [36]).

3.2 Void

3.3 Abbreviations

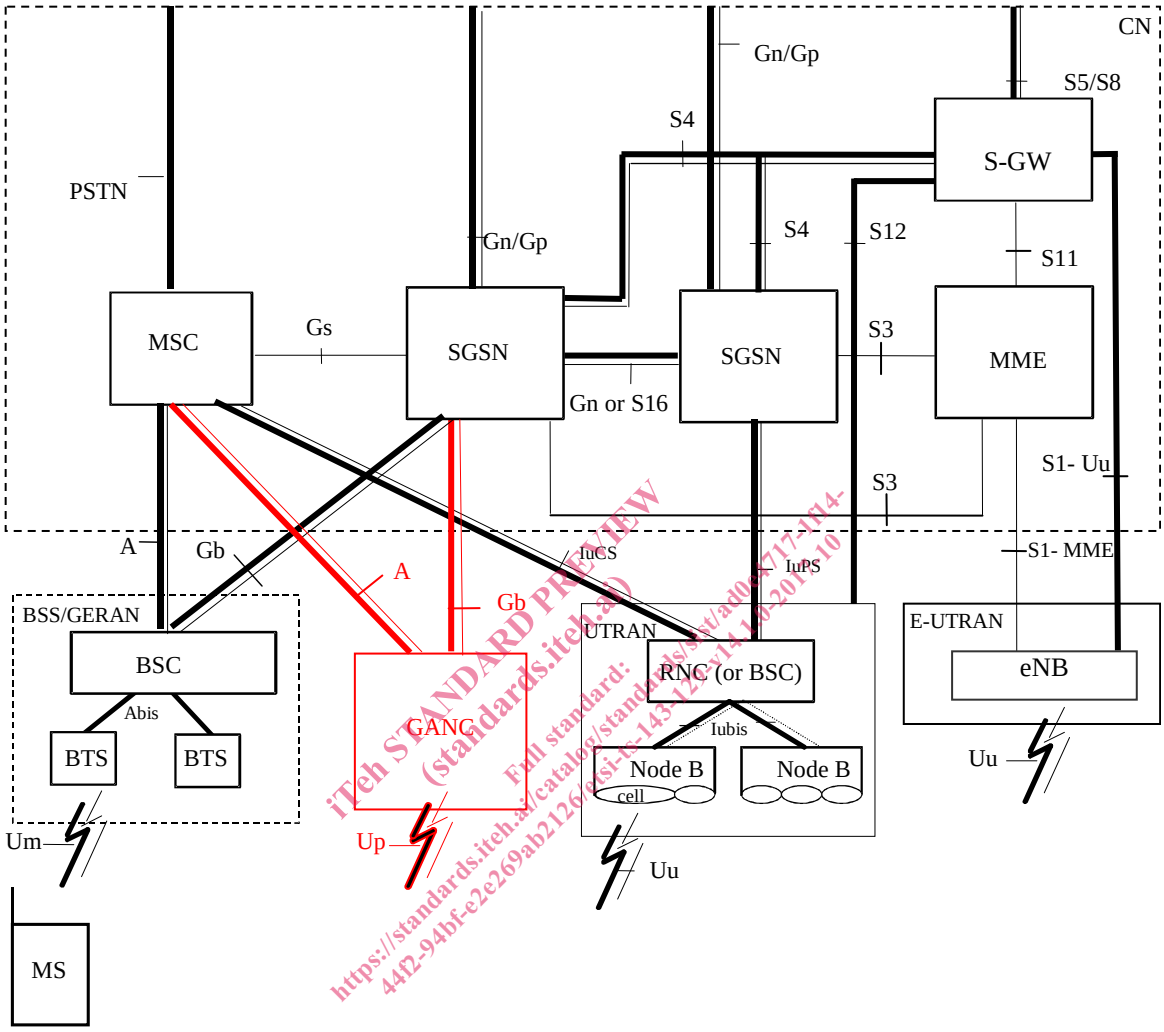
For the purposes of the present document, the following abbreviations apply:

ATM	Asynchronous Transfer Mode
BSC	Base Station Controller
BSS	Base Station Sub-system
BSSGP	Base Station Subsystem GPRS Protocol
BTS	Base Transceiver Station
CN part	Core Network part
CN	Core Network
CS	Circuit Switched
CSG	Closed Subscriber Group
DTI	Direct Tunnel Indicator
DTM	Dual Transfer Mode
EDGE	Enhanced Data rates for GSM Evolution
eNB	E-UTRAN NodeB
EPC	Evolved Packet Core
EPS	Evolved Packet System
E-UTRA	Evolved UTRA
E-UTRAN	Evolved UTRAN
FLO	Flexible Layer One
GAN	Generic Access Network
GANC	Generic Access Network Controller
GboIP	Gb over IP
GCSI	GPRS CAMEL Subscriber information indicator
GERAN	GSM/EDGE Radio Access Network
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
GTP	GPRS Tunnelling Protocol
IMS	IP Multimedia Subsystem
IP	Internet Protocol
LLC	Logical Link Control
MAC	Medium Access Control
MME	Mobility Management Entity

MS	Mobile Station
MSC	Mobile Switching Centre
MTU	Maximum Transfer Unit
PDP	Packet Data Protocol
PDTCH	Packet Data Traffic CHannel
PFC	Packet Flow Context
PFM	Packet Flow Management
PS	Packet Switched
PTCCH	Packet Timing advance Control CHannel
QoS	Quality of Service
RAB	Radio Access Bearer
RAN	Radio Access Network
RAT	Radio Access Technology
RAU	Routeing Area Update
RLC	Radio Link Control
RN part	Radio Network part
RNC	Radio Network Controller
RNS	Radio Network Subsystem
ROHC	RObust Header Compression
RRM	Radio Resource Management
RTP	Real Time Protocol
SABM	Set Asynchronous Balanced Mode
SACCH	Standalone Associated Control CHannel
SAPI	Service Access Point Identifier
SGSN	Serving GPRS Support Node
S-GW	Serving Gateway
SIP	Session Initiated Protocol
SNDCP	Sub-Network Dependent Convergence Protocol
TBF	Temporary Block Flow
TF	Transport Format
TFC	Transport Format Combination
TFCI	Transport Format Combination Indicator
TR	Technical Report
TS	Technical Specification
UA	Unnumbered Acknowledgement
UDP	User Datagram Protocol
UE	User Equipment
UMTS	Universal Mobile Telephony System
UTRAN	UMTS Terrestrial Radio Access Network
VoIP	Voice over IP
XID	eXchange IDentification

4 Architecture and principles

4.1 Reference architecture



NOTE 1: The Iu interface is also supported by a GERAN BSS supporting Iu mode.

NOTE 2: If both SGSNs support S4 interface then it is S16 otherwise Gn

Figure 1: Reference Architecture for PS handover in GERAN A/Gb *mode*

4.2 Handover principles

4.2.1 General

The PS Handover procedure is used to handover an MS with one or more packet flows from a source cell to a target cell. The source and target cells can be located within either the same BSS (Intra BSS HO), different BSSs within the same SGSN (Intra SGSN HO) or belonging to different SGSNs (Inter SGSN HO), or systems with different radio access types (Inter RAT HO, Inter mode HO). In addition, PS handover may occur between a GAN cell and a GERAN A/Gb mode cell or between a GAN cell and a UTRAN cell.