

Source: TSG CN WG 1

Title: CR to Rel-5 on Work Item Alignment of 3G functional split and lu towards 23.009

Agenda item: 9.13

Document for: APPROVAL

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**Introduction:**

This document contains 1 CR on **Rel-5 to Work Item " Alignment of 3G functional split and lu"**, that have been agreed by **TSG CN WG1**, and are forwarded to TSG CN Plenary meeting #14 for approval.

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level
23.009	061	4	Rel-5	Reflection of RRC changes in 44.018 to 23.009	B	4.2.0	5.0.0	N1-012055

3GPP TSG-CN1 Meeting #21  
Cancun, Mexico, 26.- 30. November 2001

**Tdoc N1-012055**

3GPP TSG-CN4 Meeting #11  
Cancun, Mexico, 26.- 30. November 2001

**Tdoc N4-011450**

3GPP TSG-CN1 Meeting #21  
Cancun, Mexico, 26.- 30. November 2001

**Tdoc N1-011446**

3GPP TSG-CN1 Meeting #21  
Cancun, Mexico, 26.- 30. November 2001

**Tdoc N1-012043**

<small>CR-Form-v4</small>	
<b>CHANGE REQUEST</b>	
⌘ <b>23.009 CR 061</b> ⌘ ev <b>r4</b> ⌘ Current version: <b>4.2.0</b> ⌘	

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Reflection of RRC changes in 44.018 to 23.009	
<b>Source:</b>	⌘ Nokia	
<b>Work item code:</b>	⌘ Alignment of 3G functional split and lu.	<b>Date:</b> ⌘ 30.11.2001
<b>Category:</b>	⌘ <b>B</b> Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.	<b>Release:</b> ⌘ <b>REL-5</b> Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

<b>Reason for change:</b>	⌘ Draft CR related to modifications to include support for GERAN
<b>Summary of change:</b>	⌘ The original CR from GERAN (N1-011435) has been modified so that the changes to the specification are minimized.  The reference to 084.08 is changed to 48.008.  Chapter 3 has been modified to add a new subchapter, 3.2, with includes the relevant definitions.  Chapter 3.1 includes now new abbreviations: SBSS and SRNC. Chapter 6 includes the hard handover when it is performed within GERAN or between GERAN and UTRAN.
<b>Consequences if not approved:</b>	⌘

<b>Clauses affected:</b>	⌘ 1;3.1, 3, 6
<b>Other specs</b>	⌘ <input type="checkbox"/> Other core specifications ⌘

**Affected:**

- Test specifications  
 O&M Specifications

**Other comments:** ☞

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# 1 Scope

The present document contains a detailed description of the handover procedures to be used in PLMNs. The purpose of the handover procedures, as described in the present document, are to ensure that the connection to the Mobile Station (MS) or User Equipment (UE) is maintained as it moves from one cell or radio network to another. The document defines the circuit switched handover functionality based on the service requirements in 3GPP TS 22.129 [9].

The present document considers the following four cases:

- i) handover between Base Stations connected to the same MSC, this is termed an Intra-MSC handover;
- ii) handover between Radio Network Subsystems connected to the same 3G\_MSC, this is termed an Intra-3G\_MSC handover/relocation. This case also includes inter-system handover between RNS and BSS if the 3G\_MSC supports the A-interface. In the context of this specification the term RNS refers also to a BSS when serving a mobile station in Iu mode;
- iii) handover between Base Stations connected to different MSCs, this is termed an Inter-MSC handover. This category can be sub-divided into three further procedures:
  - a) the Basic Inter-MSC Handover procedure, where the MS is handed over from a controlling MSC (MSC-A) to another MSC (MSC-B);
  - b) the Subsequent Inter-MSC Handover procedure, where the MS is handed over from MSC-B to a third MSC (MSC-B');
  - c) the Subsequent Inter-MSC handback, where the MS is handed back from MSC-B to MSC-A.
- iv) handover between Radio Network Subsystems connected to different 3G\_MSCs, this is termed an Inter-3G\_MSC handover/relocation. In the context of this specification the term RNS also refers to a BSS when serving a mobile station in Iu mode. This category can be divided into three further sub-procedures:
  - a) the Inter-3G\_MSC Handover procedure from UMTS to GSM, where the UE/MS is handed over from a controlling 3G\_MSC (3G\_MSC-A) to an MSC (MSC-B);
  - b) the Inter-3G\_MSC Handover procedure from GSM to UMTS, where the UE/MS is handed over from a controlling MSC (MSC-A) to a 3G\_MSC (3G\_MSC-B);
  - c) the Inter-3G\_MSC Relocation procedure, where the UE is relocated from 3G\_MSC-A to 3G\_MSC-B. This procedure can also be combined with a hard change of radio resources (Hard Handover with switch in the core network).

The MSC in this category can optionally be a 3G\_MSC supporting the A-interface. The three sub-procedures do also cover subsequent handover/relocation to a third MSC-B' or 3G\_MSC-B' and subsequent handover/relocation back to MSC-A or 3G\_MSC-A.

In both cases i) and iii) the same procedures as defined in the 3GPP TS 048.008 [5] and the 3GPP TS 24.008 [10] shall be used on the A-interface and on the Radio Interface, respectively.

In case ii) the same procedures as defined in the 3GPP TS 25.413 [11] and the 3GPP TS 24.008 [10] shall be used on the Iu-interface. If the 3G\_MSC in case ii) also supports the A-interface, the 3GPP TS 048.008 [5] and the 3GPP TS 24.008 [10] shall be used on the A-interface.

In case iii) the handover procedures shall transport the A-interface messages between MSC-A and MSC-B described in the Mobile Application Part (MAP), 3GPP TS 29.002 [12].

In case iv) the handover procedures shall transport the A-interface messages between 3G\_MSC and MSC described in the Mobile Application Part (MAP), 3GPP TS 29.002 [12].

In case iv) the relocation procedure shall transport the Iu-interface messages between 3G\_MSC-A and 3G\_MSC-B described in the Mobile Application Part (MAP), 3GPP TS 29.002 [12].

The interworking between the 3GPP TS 29.002 [12] protocol and the 3GPP TS 048.008 [5] protocol is described in the 3GPP TS 29.010 [8].

Handovers, which take place on the same MSC are termed Intra-MSC handovers; this includes both Inter-BSS and Intra-BSS handovers.

Handovers, which take place on the same 3G\_MSC are termed Intra-3G\_MSC handovers; this includes Inter-RNS handovers and optionally RNS to BSS and BSS to RNS handovers.

In the context of this specification the term InterSystem handover can also refer to a handover which takes place between a Base Station serving a mobile station in Iu mode and a Base Station serving a mobile in A/Gb mode.

"Flexible Iu interface for handover/relocation" Option: Up to release 99 an RNS can be connected only to one 3G\_MSC. From release 4 onwards, as a network option, an RNS can have Iu interfaces to more than one MSC. Such an additional Iu interface may be selected by an MSC during an intra-PLMN relocation or intra-PLMN BSS to RNS handover procedure. This allows the MSC to use an Intra-3G\_MSC handover procedure according to case ii) instead of an Inter-3G\_MSC handover procedure according to case iv). The decision whether to use the Intra-3G\_MSC handover procedure is implementation and configuration dependent. In a network implementing this option, a global title based on the Global RNC-Id may optionally be used for the addressing of the Iu interface messages.

The present document also covers the requirements for handover in ongoing GSM\_voice group calls, directed retry and handover without a circuit connection between (U)MSCs. The present document does not consider the case of handovers between radio channels on the same BSS (Intra-BSS handover) or the handover of packet radio services. The Inter-RNS handover case that results in a relocation is covered by the present document but not other Inter-RNS or Intra-RNS handover cases.

For voice broadcast calls in GSM, the speaker uses normal point-to-point handover procedures, whilst the listeners use idle mode cell reselection procedures, as for the voice group call listeners.

Voice group calls is only applicable to GSM and handover of voice group calls is therefore only possible in GSM.

Inter-MSC hand-over imposes a few limitations on the system. After inter-MSC hand-over:

- call re-establishment is not supported.

The list of 3GPP TS 048.008 [5] features supported during and after Inter-MSC handover is given in 3GPP TS 09.08 [7].

In the Inter-MSC handover case, the interworking between a Phase 1 BSSMAP protocol possibly used by one MSC and the Phase 2 BSSMAP protocol used in the Phase 2 MAP protocol on the E-interface is performed by this MSC.

NOTE: The message primitive names used in the SDL diagrams and message flows in the present document do not represent the actual messages specified in the GSM or 3GPP stage 3 technical specifications. The primitive names are only intended to be indicative of their use in the present document.

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## 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] ITU-T Recommendation Q.118: "Abnormal conditions - Special release arrangements".
- [2] 3GPP TS 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2a] 3GPP TS 21.905: "3G Vocabulary".

- [3] 3GPP TS 03.68: "Digital cellular telecommunications system (Phase 2+); Voice Group Call Service (VGCS); Stage 2".
- [4] 3GPP TS 05.08: "Digital cellular telecommunications system (Phase 2+); Radio Subsystem Link Control".
- [5] 3GPP TS 048.008: "Digital cellular telecommunications system (Phase 2+); Mobile Switching Centre - Base Station System (MSC-BSS) Interface Layer 3 specification".
- [6] 3GPP TS 08.58: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC-BTS) Interface Layer 3 specification".
- [7] 3GPP TS 09.08: "Digital cellular telecommunications system (Phase 2+); Application of the Base Station System Application Part (BSSAP) on the E-interface".
- [8] 3GPP TS 29.010: "Information Element Mapping between Mobile Station - Base Station System (MS-BSS) and Base Station System - Mobile-services Switching Centre (BSS-MSC); Signalling procedures and the Mobile Application Part (MAP)".
- [9] 3GPP TS 22.129: "Handover Requirements between UMTS and GSM or other Radio Systems".
- [10] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".
- [11] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".
- [12] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [13] 3GPP TS 25.303: "UE functions and inter-layer procedures in connected mode".
- [14] 3GPP TS 25.331: "Radio Resource Control (RRC) Protocol Specification".
- [15] 3GPP TS 29.108: "Application of the Radio Access Network Application Part (RANAP) on the E-interface".
- [16] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
- [17] 3GPP TS 23.135: "Multicall supplementary service; Stage 2".

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## 3 Abbreviations and definitions

### 3.1 Abbreviations

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

3G_MSC	A third generation MSC that supports the Iu interface and optionally the A interface
3G_MSC-A	The controlling 3G_MSC on which the call was originally established
3G_MSC-B	The 3G_MSC to which the UE is handed over in a Basic Handover
3G_MSC-B'	The 3G_MSC to which the UE is handed over in a Subsequent Handover
BSC	Base Station Controller
BSS	Base Station System
BSS-A	The BSS from which the MS is being handed over
BSS-B	The BSS to which the MS is being handed over
BTS	Base Transceiver Station
<u>GERAN</u>	<u>GSM EDGE Radio Access Network</u>
ISC	International Switching Centre
MS	Mobile Station
MSC	A second generation Mobile Services Switching Centre that only supports the A interface
MSC-A	The controlling MSC on which the call was originally established
MSC-B	The MSC to which the MS is handed over in a Basic Handover
MSC-B'	The MSC to which the MS is handed over in a Subsequent Handover
RNC	Radio Network Controller

RNS	Radio Network Subsystem
<u>SBSS</u>	<u>Serving BSS</u>
<u>SRNS</u>	<u>Serving RNS</u>
UE	A User Equipment is a terminal that supports USIM and the UMTS Uu interface
UE/MS	A terminal that supports USIM, SIM, the Uu interface and the Um interface
USIM	UMTS Subscriber Identity Module

Other abbreviations used in the GSM specifications are listed in 3GPP TS 01.04 [2] and 3GPP TS 21.905[2a].

## 3.2 Definitions

The following terms are used in this Technical Specification:

**A/Gb mode:** mode of operation of the MS when connected to the Core Network via GERAN and the A and/or Gb interfaces. Throughout this specification the term GSM refers to GERAN A/Gb mode.

**Iu mode:** mode of operation of the MS when connected to the Core Network via GERAN or UTRAN and the Iu interface. Throughout this specification the term UMTS refers to UTRAN or GERAN Iu mode.

**Iur interface:** the logical interface between two UTRAN RNSs.

**Iur-g interface:** the logical interface between two BSSs or a BSC and an RNC and it is only considered in Iu mode.

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# 6 General description of the procedures for intra - MSC handovers

This clause gives a brief overview of the procedures that shall be followed when performing Intra-MSC handovers. Detailed explanation of these procedures can be found in 3GPP TS 048.008 [5] and 3GPP TS 24.008 [10].

There are two types of handover that can be considered which involve a BSS and single MSC. These are Internal Handover and External Handover. An Internal Handover is a handover which takes place between channels on a cell or cells controlled by a single BSS, without reference to the MSC, although the MSC maybe informed of its occurrence. This case is not considered in the present document.

Handovers between channels on the same cell or between cells on the same BSS which are controlled by the MSC are termed External Handovers and use identical procedures to those for Intra-MSC handovers. Only the Intra-MSC handover case will be considered in the present document.

Handovers from a BSS to an RNS controlled by the same 3G\_MSC are intra-3G\_MSC GSM to UMTS handovers. Handovers from an RNS to a BSS controlled by the same 3G\_MSC are intra-3G\_MSC UMTS to GSM handovers.

There are two types of handover in UMTS: soft handover and hard handover. The first one is fully performed within UTRAN, without involving the core network. The second one may be also performed within UTRAN or GERAN, or between GERAN and UTRAN, or the core network may be involved if the Iur or Iur-g interface between RNSs does not exist. This case of hard handover involving the core network is the only one that is covered in the present document, together with SRNS relocation with Iur or Iur-g interface.