ETSI TS 123 216 V13.2.0 (2016-10)

**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Single Radio Voice Call Continuity (SRVCC);
Stage 2
(3GPP TS 23.216 version 13.2.0 Release 13)**

Reference
RTS/TSGS-0223216vd20

Keywords
GSM,LTE,UMTS

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 2016.
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.
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 6
1 Scope 7
2 References 7
3 Definitions and abbreviations 9
3.1 Definitions 9
3.2 Abbreviations 9
4 High level Principles and Concepts 10
4.1 High level Principles 10
4.1.1 Architectural Principles for 3GPP2 1xCS SRVCC 10
4.1.2 Architectural Principles for SRVCC and vSRVCC to 3GPP UTRAN/GERAN 10
4.1.3 Architectural Principles for SRVCC to 3GPP E-UTRAN/UTRAN (HSPA) 11
4.2 Concepts 11
4.2.1 E-UTRAN to 3GPP2 1xCS SRVCC 11
4.2.2 E-UTRAN to 3GPP UTRAN/GERAN SRVCC 12
4.2.2a E-UTRAN to 3GPP UTRAN vSRVCC 13
4.2.3 UTRAN (HSPA) to 3GPP UTRAN/GERAN SRVCC 14
4.2.4 SRVCC for IMS emergency sessions 15
4.2.4.1 E-UTRAN/UTRAN (HSPA) to 3GPP UTRAN/GERAN 15
4.2.4.2 E-UTRAN to 3GPP2 1xCS 16
4.2.4.3 SRVCC in Limited Service Mode 17
4.2.4.3.1 E-UTRAN/UTRAN (HSPA) to 3GPP UTRAN/GERAN 17
4.2.4.3.2 E-UTRAN to 3GPP2 1xCS 17
4.2.5 Void 18
4.2.6 CS to PS SRVCC 18
5 Architecture model and reference points 18
5.1 General 18
5.2 Reference architecture 19
5.2.1 E-UTRAN to 3GPP2 1xCS SRVCC architecture 19
5.2.2 E-UTRAN to 3GPP UTRAN/GERAN SRVCC architecture 19
5.2.2a 3GPP E-UTRAN to 3GPP UTRAN vSRVCC architecture 20
5.2.3 UTRAN (HSPA) to 3GPP UTRAN/GERAN SRVCC architecture 21
5.2.4 3GPP UTRAN/GERAN to 3GPP E-UTRAN or UTRAN (HSPA) SRVCC architecture 21
5.2.5 3GPP GERAN to 3GPP UTRAN (HSPA) SRVCC architecture 22
5.3 Functional Entities 23
5.3.1 3GPP2 1x CS SRVCC interworking solution function (1xCS IWS) 23
5.3.2 MSC Server enhanced for E-UTRAN/UTRAN (HSPA) to 3GPP UTRAN/GERAN SRVCC 23
5.3.2a MSC Server enhanced for vSRVCC 24
5.3.2b MSC Server enhanced for CS to PS SRVCC 24
5.3.3 MME 24
5.3.3.1 Interworking with 3GPP2 1xCS IWS 24
5.3.3.1.1 Interworking with 3GPP2 1xCS IWS 24
5.3.3.1.2 Selection of 3GPP2 1xCS IWS 25
5.3.3.2 Interworking with 3GPP MSC Server enhanced for SRVCC from E-UTRAN / UTRAN (HSPA) to 3GPP UTRAN/GERAN 25
5.3.3.2.1 Interworking with 3GPP MSC Server enhanced for (v)SRVCC 25
5.3.3.2.2 PS bearer splitting function 25
5.3.3.2.3 Selection of MSC enhanced for SRVCC 25
5.3.3.3 Interworking of Target MME with 3GPP MSC Server enhanced for SRVCC from CS to PS 26
5.3.3A SGSN 26

5.3.3A.1 Interworking with 3GPP MSC Server enhanced for SRVCC from E-UTRAN / UTRAN (HSPA) to 3GPP UTRAN/GERAN 26
5.3.3A.1.1 Interworking with 3GPP MSC Server enhanced for SRVCC 26
5.3.3A.1.2 PS bearer splitting function 26
5.3.3A.1.3 Selection of MSC enhanced for SRVCC 26
5.3.3A.2 Interworking of Target SGSN with 3GPP MSC Server enhanced for SRVCC from CS to PS 26
5.3.4 UE enhanced for SRVCC 27
5.3.4.1 Interworking with 3GPP2 1xCS 27
5.3.4.2 Interworking with 3GPP UTRAN/GERAN for SRVCC from E-UTRAN / UTRAN (HSPA) to 3GPP UTRAN/GERAN 27
5.3.4.3 Interworking of UE with 3GPP UTRAN/GERAN for SRVCC from CS to PS 27
5.3.4a UE enhanced for vSRVCC 27
5.3.5 Serving/PDN GW 27
5.3.6 E-UTRAN 28
5.3.6.1 Interworking with 3GPP2 1xCS 28
5.3.6.2 Interworking with 3GPP UTRAN/GERAN for SRVCC from E-UTRAN to 3GPP UTRAN/GERAN 28
5.3.6.2a Interworking with 3GPP UTRAN for vSRVCC 28
5.3.6A UTRAN (HSPA) 28
5.3.6B GERAN/UTRAN CS 29
5.3.7 HSS 29
5.3.7.1 Interworking with 3GPP UTRAN/GERAN for SRVCC or vSRVCC from E-UTRAN / UTRAN (HSPA) to 3GPP UTRAN/GERAN 29
5.3.7.2 Interworking with 3GPP UTRAN/GERAN for SRVCC from CS to PS 29
5.3.8 PCC 29
5.4 Reference points 29
5.4.1 MME – 3GPP2 1xCS IWS (S102) 29
5.4.2 MME/SGSN – MSC Server (Sv) 30
5.4.3 E-UTRAN – MME (S1-MME) 30
5.4.3A UTRAN (HSPA) – SGSN (Iu-ps) 30
5.4.4 HSS – MME (S6a) 30
5.4.5 HSS – SGSN (Gr, S6d) 30
5.4.6 HSS - MSC (MAP D) 30

6 Procedures and flows 30
6.1 SRVCC from E-UTRAN to 3GPP2 1xCS 30
6.1.1 E-UTRAN Attach procedure for SRVCC 30
6.1.2 Service Request procedures for SRVCC 31
6.1.2A PS Handover procedures for SRVCC 31
6.1.3 Call flows for SRVCC from E-UTRAN 31
6.2 E-UTRAN and 3GPP GERAN/UTRAN (v)SRVCC 34
6.2.1 E-UTRAN Attach procedure for (v)SRVCC 34
6.2.1A Service Request procedures for (v)SRVCC 34
6.2.1B PS Handover procedures for (v)SRVCC 34
6.2.1C Dedicated Bearer Establishment and Modification procedures for vSRVCC 35
6.2.2 Call flows for (v)SRVCC from E-UTRAN 35
6.2.2.1 SRVCC from E-UTRAN to GERAN without DTM support 35
6.2.2.1A SRVCC from E-UTRAN to GERAN with DTM but without DTM HO support and from E-UTRAN to UTRAN without PS HO 39
6.2.2.2 SRVCC from E-UTRAN to UTRAN with PS HO or GERAN with DTM HO support 39
6.2.2.3 vSRVCC from E-UTRAN to UTRAN with PS HO support 44
6.2.2.4 vSRVCC from E-UTRAN to UTRAN without PS HO support 47
6.2.3 Returning back to E-UTRAN 47
6.3 UTRAN (HSPA) and 3GPP GERAN/UTRAN SRVCC 48
6.3.1 GPRS Attach procedure for SRVCC 48
6.3.1A Service Request procedures for SRVCC 48
6.3.1B PS Handover procedures for SRVCC 48
6.3.2 Call flows for SRVCC from UTRAN (HSPA) 49
6.3.2.1 SRVCC from UTRAN (HSPA) to GERAN without DTM support 49
6.3.2.1A SRVCC from UTRAN (HSPA) to GERAN with DTM but without DTM HO support and from UTRAN (HSPA) to UTRAN without PS HO 52
6.3.2.2 SRVCC from UTRAN (HSPA) to UTRAN or GERAN with DTM HO support 52

6.4 CS to PS SRVCC 56
6.4.1 GPRS Attach procedure for SRVCC 56
6.4.2 E-UTRAN Attach procedure for SRVCC 56
6.4.3 Call flows for SRVCC to E-UTRAN/UTRAN (HSPA) 56
6.4.3.1 SRVCC to E-UTRAN/UTRAN (HSPA) from GERAN without DTM/PS HO support 56
6.4.3.2 SRVCC to E-UTRAN/UTRAN (HSPA) from GERAN with DTM support but without DTM HO support and SRVCC to E-UTRAN from UTRAN without PS HO support 59
6.4.3.3 SRVCC to E-UTRAN/UTRAN (HSPA) with DTM/PS HO support 59

7 Charging 59

8 Handover Failure 59
8.1 Failure in EUTRAN/UTRAN (HSPA) to 3GPP UTRAN/GERAN (v)SRVCC 59
8.1.1 Failure before MSC Server initiates Session Transfer 59
8.1.1a Failure after MSC Server initiates Session Transfer 59
8.1.1a.1 Failure before responding to PS to CS HO request 59
8.1.1a.2 Failure after responding to PS to CS HO request 60
8.1.2 Failure after UE receives HO command 61
8.1.3 Handover Cancellation 61
8.2 Failure in CS to PS SRVCC 62
8.2.1 Failure before UE initiates Session Transfer detected by MSC Server 62
8.2.2 Failure before UE initiates Session Transfer detected by MME 63
8.2.3 CS to PS Handover Cancellation 64

9 Security 64
9.1 Network Domain Security with 3GPP2 1xCS IWS 64
9.2 Network Domain Security with 3GPP UTRAN/GERAN MSC Server 65

Annex A (informative): Determination of Neighbour Cell List 66

A.1 SRVCC from E-UTRAN to 3GPP2 1xCS 66

A.2 SRVCC from E-UTRAN to GERAN / UTRAN 66

A.3 SRVCC from UTRAN (HSPA) to GERAN / UTRAN 66

A.4 SRVCC from GERAN / UTRAN to E-UTRAN / UTRAN (HSPA) 67

Annex B (informative): Change history 68

History 73

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.

1 Scope

This document specifies the architecture enhancements for Single Radio Voice Call Continuity (SRVCC) between the following access systems for voice calls that are anchored in the IMS:

- from E-UTRAN to 3GPP2 1xCS;
- from E-UTRAN to UTRAN/GERAN;
- from UTRAN (HSPA) to UTRAN/GERAN.
- from UTRAN/GERAN to E-UTRAN.
- from GERAN to UTRAN (HSPA).

This document will not describe 3GPP2 functional entities. However, interfaces between both 3GPP and 3GPP2 functional entities are described in this specification.

SRVCC from E-UTRAN access to 3GPP2 1xCS is covered in this specification, including the handling of IMS emergency call continuity. Handling of non-voice component and SRVCC from 3GPP2 1xCS to E-UTRAN direction is not specified in this release.

SRVCC from E-UTRAN/UTRAN (HSPA) access and 3GPP UTRAN/GERAN CS accesses for voice calls that are anchored in the IMS, as well as the coordination between the SRVCC for voice call and the handover of non-voice PS bearers are covered in this specification. SRVCC with IMS emergency call continuity from E-UTRAN/UTRAN (HSPA) to 3GPP UTRAN/GERAN CS accesses for voice calls is covered in this specification. SRVCC with priority handling from E-UTRAN to 3GPP UTRAN/GERAN CS accesses for voice or voice and video calls is also covered in this specification. The handover of non-voice PS bearer from E-UTRAN is specified by the procedures defined in TS 23.401 [2], TS 23.060 [10], TS 25.413 [11] and TS 43.129 [12]. The handover of non voice PS bearer from UTRAN (HSPA) is specified by the procedures defined in TS 23.060 [10], TS 25.413 [11] and TS 43.129 [12].

This document specifies the architecture enhancements for Single Radio Video Call Continuity (vSRVCC) from E-UTRAN to UTRAN-CS access for Video Calls that are anchored in the IMS.

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 23.401: "GPRS enhancements for E-UTRAN access".

[3] 3GPP TS 23.402 "Architecture enhancements for non-3GPP accesses".

[4] 3GPP2 X.S0042-0: "Voice Call Continuity between IMS and Circuit Switched System".

[5] Void.

[6] Void.

[7] 3GPP TR 36.938: "Improved Network Controlled Mobility between E-UTRAN and 3GPP2/Mobile WiMAX Radio Technologies".