

Reference

RTS/TSGC-0329164vg00

Keywords

GSM,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 prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

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/CommitteeSupportStaff.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.

© ETSI 2020.

All rights reserved.

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

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

oneM2M™ logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

GSM® and the GSM logo are trademarks registered and owned by the GSM Association.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables 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.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Legal Notice

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. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 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
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	5
1 Scope	6
2 References	6
3 Definitions and abbreviations.....	8
3.1 Definitions	8
3.2 Abbreviations	8
4 Network characteristics	8
4.1 Key characteristics of ISUP/BICC based CS Domain	8
4.2 Key characteristics of external SIP-I network	8
5 Interworking reference model	9
6 Control plane interworking	9
6.1 General	9
6.2 Interworking between CS Domain using ISUP signalling and external network using SIP-I signalling	10
6.2.1 Control Plane Interworking	10
6.2.2 Services performed by network entities in the control plane	11
6.2.2.1 Services of the IWU	11
6.2.2.2 Services of the external SIP-I signalling function	11
6.2.3 Signalling interactions between network entities in the control plane	11
6.2.3.1 Signalling between the IWU and SIP-I signalling function	11
6.2.4 SIP-ISUP protocol interworking	11
6.2.4.1 Incoming call interworking from SIP-I to ISUP at I-IWU	11
6.2.4.1.0 General	11
6.2.4.1.1 Interworking of received ISUP messages to SIP messages	11
6.2.4.1.2 Receipt of encapsulated ISUP information within SIP	12
6.2.4.1.3 Special Procedures for the Reception of SIP INVITE request	12
6.2.4.1.3.1 Propagation of overlap signalling toward the 3GPP CS domain	12
6.2.4.1.3.2 Derivation of TMR, USI and HLC parameters within send IAM message	12
6.2.4.1.3.3 Receipt of SIP INVITE without SDP offer.....	12
6.2.4.2 Outgoing Call Interworking from ISUP to SIP-I at O-IWU	13
6.2.4.2.1 General	13
6.2.4.2.2 Sending of ISUP information to adjacent SIP nodes.....	13
6.2.4.2.3 Receipt of encapsulated ISUP information within SIP-I	13
6.2.4.2.4 Special procedures related to outgoing INVITE.....	14
6.2.4.2.4.1 Overlap Signalling	14
6.2.4.2.4.2 Coding of encapsulated ISUP IAM parameters in outgoing INVITE.....	14
6.2.4.2.4.3 Media offered in SDP of outgoing INVITE.....	14
6.3 Interworking between CS Domain using BICC signalling and external network using SIP-I signalling.....	14
6.3.1 Control Plane Interworking	14
6.3.2 SIP-BICC protocol interworking	15
6.3.2.1 General	15
6.3.2.2 Incoming call interworking from SIP to BICC at I-IWU.....	15
6.3.2.3 Outgoing Call Interworking from BICC to SIP at O-IWU	15
6.4 Supplementary services	15
6.4.1 Special procedures for supplementary service interworking	15
6.4.2 Interworking of CLIP/CLIR supplementary service.....	16
6.4.3 Interworking of Call Hold (HOLD) supplementary service	16
6.4.4 Interworking of Completion of Calls to Busy Subscriber (CCBS) supplementary service to SIP networks.....	16
7 User plane Interworking.....	16

7.1 ISUP based CS Domain 16

7.2 BICC based CS Domain 16

8 Interactions between control node and MGW 17

8.1 Overview 17

8.2 Signalling interactions 17

8.2.1 Backward through-connection for outgoing call interworking from BICC to SIP at O-IWU. 17

8.2.2 Handling of RTP telephone events 17

8.3 Signalling procedures 18

Annex A (normative): Codec Negotiation between a BICC based CS Domain and an external SIP-I network 19

Annex B (informative): Change history 20

History 21

iTeh STANDARD PREVIEW
 (standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/8a95e470-d37c-46db-9d26-f035692a14ae/etsi-ts-129-164-v16.0.0-2020-08>

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.

ITeH STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/8a953170-d37c-46db-9d26-f035692a14ae/etsi-ts-129-164-v16.0.0>
2020-08

1 Scope

The present document defines interworking procedures between a 3GPP CS domain (see 3GPP TS 23.205 [2]) which applies either BICC or ISUP as signalling protocol, and external networks that use SIP-I (see ITU-T Q.1912.5 [20], Profile C) as signalling protocol. The document also describes the related interworking architecture. The control plane interworking is performed by an interworking unit at the interconnection between the 3GPP CS domain and an external SIP-I network. The user plane interworking is performed by an MGW. The present document defines stage 2 procedures for the control of the MGW.

The present specification reuses existing interworking procedures of 3GPP TS 29.163 [4] and ITU-T Q.1912.5 [20], Profile C, as far as possible.

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 23.205: "Bearer-independent circuit-switched core network; Stage 2".
- [3] 3GPP TS 26.102: "Adaptive Multi-Rate (AMR) speech codec; Interface to Iu and Uu".
- [4] 3GPP TS 29.163: "Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks".
- [5] 3GPP TS 29.205: "Application of Q.1900 series to Bearer Independent CS Network architecture; Stage 3".
- [6] 3GPP TS 29.332: "Media Gateway Control Function (MGCF) – IM-Media Gateway (IM-MGW) interface, Stage 3".
- [7] 3GPP TS 29.414: "Core network Nb data transport and transport signalling".
- [8] 3GPP TS 29.415: "Core network Nb interface user plane protocols".
- [9] ITU-T Recommendation E.164 (05/1997): "The international public telecommunication numbering plan".
- [10] ITU-T Recommendation G.711 (11/98): "Pulse Code Modulation (PCM) of voice frequencies".
- [11] ITU-T Recommendation H.248.1 (05/02): "Gateway control protocol: Version 2".
- [12] ITU-T Recommendation I.363.5 (1996): "B-ISDN ATM Adaptation Layer specification: Type 5 AAL".
- [13] ITU-T Recommendation Q.701 (03/93), Q.702 (11/88), Q.703 (07/96), Q.704 (07/96), Q.705 (03/93), Q.706 (03/93), Q.707 (11/88), Q.708 (03/99), Q.709 (03/93): "Functional description of the message transfer part (MTP) of Signalling System No. 7".

- [14] ITU-T Recommendation Q.730 (12/99), Q.731.1 (07/96), Q.731.3 (03/93), Q.731.4 (03/93), Q.731.5 (03/93), Q.731.6 (03/93), Q.731.7 (06/97), Q.731.8 (02/92), Q.732.5-2 (12/99), Q.732.7 (07/96), Q.733.1 (02/92), Q.733.2 (03/93), Q.733.3 (06/97), Q.733.4 (03/93), Q.733.5 (12/99), Q.734.1 (03/93), Q.734.2 (07/96), Q.735.1 (03/93), Q.735.3 (03/93), Q.735.6 (07/93), Q.736.1 (10/95), Q.736.3 (10/95), Q.737.1 (06/97): "ISDN user part supplementary services".
- [15] ITU-T Recommendations Q.761 to Q.764 (12/99): "Signalling System No.7 ISDN User Part".
- [16] ITU-T Recommendation Q.765 (2000): "Signalling System No. 7 – Application transport mechanism".
- [17] ITU-T Recommendation Q.765.5 (2000): "Signalling system No. 7 – Application transport mechanism: Bearer Independent Call Control (BICC)".
- [18] ITU-T Recommendation Q.850 (1998): "Usage of cause and location in the Digital Subscriber Signalling System No. 1 and the Signalling System No. 7 ISDN User Part".
- [19] ITU-T Recommendations Q.1902.1 to Q.1902.6 (07/2001): "Bearer Independent Call Control".
- [20] ITU-T Recommendation Q.1912.5 (03/04): "Interworking between Session Initiation Protocol (SIP) and Bearer Independent Call Control Protocol or ISDN User Part".
- [21] ITU-T Recommendation Q.2110 (1994): "B-ISDN ATM adaptation layer - Service Specific Connection Oriented Protocol (SSCOP)".
- [22] ITU-T Recommendation Q.2140 (1995): "B-ISDN ATM adaptation layer - Service specific coordination function for signalling at the network node interface (SSCF AT NNI)".
- [23] ITU-T Recommendation Q.2210 (1996): "Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140".
- [24] IETF RFC 791: "Internet Protocol".
- [25] IETF RFC 768: "User Datagram Protocol".
- [26] IETF RFC 793: "Transmission Control Protocol".
- [27] IETF RFC 2460: "Internet Protocol, Version 6 (IPv6) Specification".
- [28] IETF RFC 4733: "RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals".
- [29] IETF RFC 2960: "Stream Control Transmission Protocol".
- [30] IETF RFC 2976: "The SIP INFO Method".
- [31] IETF RFC 3204: "MIME media types for ISUP and QSIG Objects".
- [32] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [33] IETF RFC 3262: "Reliability of provisional responses".
- [34] IETF RFC 3264: "An Offer/Answer Model with the Session Description Protocol (SDP)".
- [40] IETF RFC 3311: "SIP UPDATE method".
- [35] IETF RFC 3312: "Integration of Resource Management and Session Initiation Protocol (SIP)".
- [36] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".
- [37] 3GPP TS 29.202: "Core Signalling System No. 7 (SS7) signalling transport in core network; Stage 3".
- [38] 3GPP TS 29.231: "Application of SIP-I Protocols to Circuit Switched (CS) core network architecture; Stage 3".
- [39] 3GPP TS 29.235: "Interworking between the 3GPP CS domain with SIP-I as signalling protocol and other networks".

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], in 3GPP TS 29.163 [4], in ITU-T E.164 [9], in ITU-T Q.1912.5 [20] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in any other of the specifications listed above.

Interworking Unit (IWU): Logical entity that interworks SIP-I signalling with BICC or ISUP signalling in the 3GPP CS Domain.

Incoming Interworking Unit (I-IWU): Logical entity that terminates incoming calls from the external SIP-I network side and originates outgoing calls towards the CS Domain side using the BICC or ISUP protocols.

Outgoing Interworking Unit (O-IWU): Logical entity that terminates incoming BICC or ISUP calls from the CS Domain side and originates outgoing calls towards external SIP-I network.

External SIP-I signalling function: function in the external network, which has the capabilities to process SIP with encapsulated ISUP messages.

For references to 3GPP TS 29.163 [4] procedures within the present specification, the MGCF in 3GPP TS 29.163 [4] is to be understood as IWU. The IM-MGW is to be understood as MGW. The Mn interface is to be understood as interface between IWU and MGW. The IM CN subsystem is to be understood as external SIP-I network. The CS network is to be understood as 3GPP CS domain.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1], in 3GPP TS 29.163 [4], in ITU-T E.164 [9], in ITU-T Q.1912.5 [20], and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in any other of the specification listed above.

IW-MGW	Interworking Media Gateway Function
--------	-------------------------------------

4 Network characteristics

4.1 Key characteristics of ISUP/BICC based CS Domain

The 3GPP CS domain uses either BICC Capability Set 2 (see ITU-T Q.1902.1 to Q.1902.6 [19] and Q.765.5 [17]) with 3GPP specific extensions, as specified for the 3GPP Nc interface in 3GPP TS 29.205 [5], or ISUP (see ITU-T Q.761 to Q.764 [15]), as signalling protocol.

If BICC is used as signalling protocol, the 3GPP Nb interface, as specified in 3GPP TS 29.414 [7] and 3GPP TS 29.415 [8], is used for the user plane transport. If ISUP is applied as signalling protocol, TDM transport of the user plane is applied.

4.2 Key characteristics of external SIP-I network

The external SIP-I network applies SIP, IETF RFC 3261 [32], with ISUP encapsulated according to IETF RFC 3204 [31], as specified in ITU-T Q.1912.5 [20] Profile C. The SIP Signalling Profile defined for Profile C in Annex C of Q.1912.5 is applied.

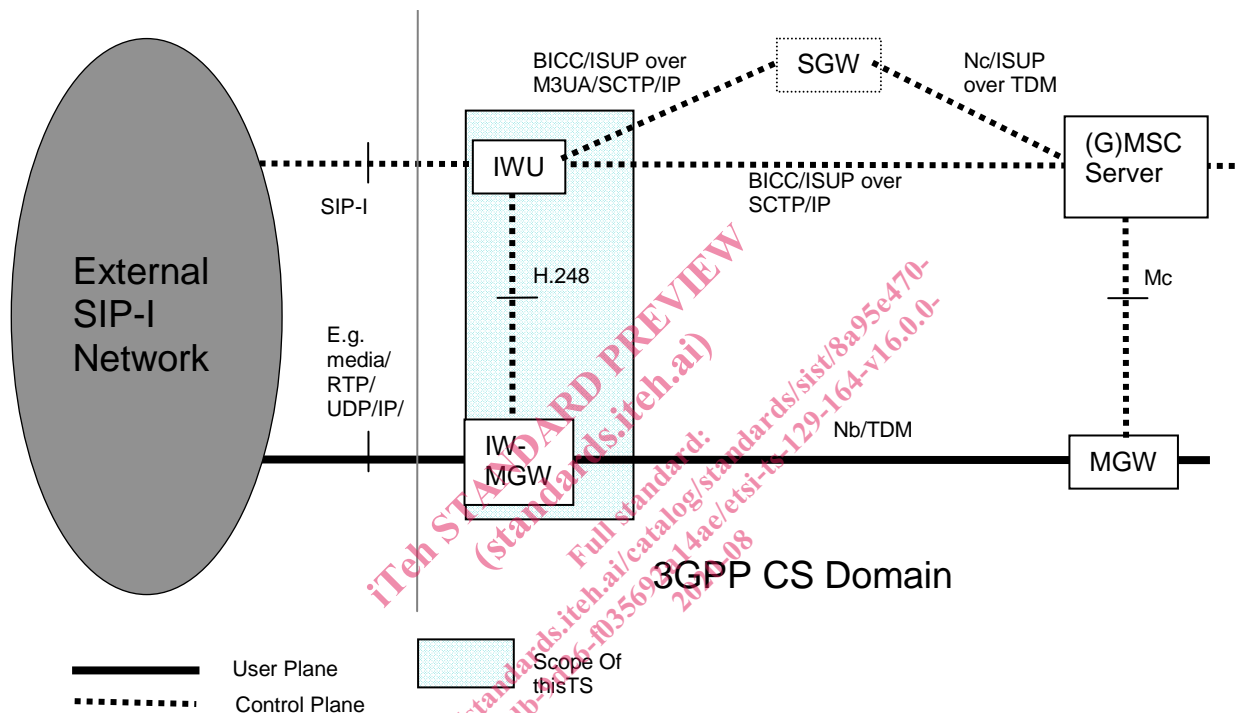
The network uses either IPv4 (IETF RFC 791 [24]) or IPv6 (IETF RFC 2460 [27]).

For the transport of most media, RTP (IETF RFC 3550 [36]) over UDP (IETF RFC 768 [25]) is applied.

For the transport of control signalling, UDP (IETF RFC 768 [25]), TCP (IETF RFC 793 [26]) or SCTP (IETF RFC 2960 [29]) can be used.

5 Interworking reference model

Figure 5.1 details the interworking reference model for the present specification



NOTE 1: If needed a SGW is applied for conversion (both ways) of the transport level between the IWU and the (G)MSC. The SGW may be implemented as a stand-alone entity or it may be located in another entity of the CS Domain. A SGW function is not required for certain signalling transports, where M3UA+SCTP+IP is used in CS network and IWU. The implementation options are not further discussed in the present document.

NOTE 2: The IWU is a logical function that may reside with other 3GPP logical functions in the same physical nodes, e.g. in an (G)MSC Server. The figure shows only the logical separation.

Figure 5.1: interworking reference model

6 Control plane interworking

6.1 General

The following sub-clauses define the signalling interworking between the Bearer Independent Call Control (BICC) or ISDN User Part (ISUP) protocols and Session Initiation Protocol (SIP) with its associated Session Description Protocol (SDP) and encapsulated ISUP at an IWU.

The IWU shall act as a Type A or Type B exchange (ITU-T Q.764 [15]) for the purposes of ISUP and BICC compatibility procedures.