SIP profiles and PSTN Interworking standards in 3GPP, ITU-T and IETF

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- Key features
- TS 29.163: "Interworking between the IMS and Circuit Switched networks"
- 3GPP TS 29.165: "Inter-IMS Network to Network Interface (NNI)".

Interworking for 3GPP SIP-I based CS core network

Annex:

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IETF work on SIP

IETF defines SIP

- RFC 3261 defines basic Session Initiation Protocol

- Dozens of drafts and RFCs define extensions to SIP

- several IETF working groups are actively maintaining and expanding SIP related specifications

- The extensions are a kind of "toolbox" from which implementers select

- The fast amount of specifications gave rise to several „profiling" activities to select SIP extensions by other organisations to enhance interoperability

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IETF work on Interworking between SIP and ISUP: SIP-T (1/2)

Architecture and Principles

- SIP Network with both SIP devices and ISUP networks attached is considered.

- Interworking procedures intend to cover both:
  - a call between a SIP phone and an ISUP network
  - A "SIP-bridging" scenario where two ISUP networks are interconnected by a SIP network.

- ISUP transparency is desired for the "SIP-bridging" scenario, but basis SIP lacks some ISUP features.

- Thus, ISUP messages are encapsulated as bodies within SIP messages.

- To rule out that ISUP messages, which are intended for the NNI rather than the UNI, are sent or received or sent by SIP phones, the RFC 3372 recommend authenticating and encrypting the ISUP bodies of SIP messages.

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IETF work on Interworking between SIP and ISUP: SIP-T (2/2)

Significance of work

- RFCs published in 2002 and no related work in IETF since then, although the SIP ecosystem has evolved a lot in the mean time

- very little SIP extensions considered (mostly ones related to ISUP encapsulation); interworking focuses on basic SIP RFC 3261.

- First interworking standard has influenced subsequent work, but is now a bit outdated

Relevant RFCs:

- RFC 3372 "Session Initiation Protocol for Telephones (SIP-T): Context and Architectures"

- RFC 3204 "MIME media types for ISUP and QSIG Objects"

- RFC 3398 "Integrated Services Digital Network (ISDN) User Part (ISUP) to Session Initiation Protocol (SIP) Mapping":

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ITU-T work on Interworking between SIP and ISUP or BICC: Q.1912.5 (1/2)

Rather than defining interworking procedures for all purposes, Q.1912.5 defines procedures that vary between so-called Profiles:

Profile A ("3GPP Profile")

- Was intended for 3GPP IMS, but 3GPP decided to finalize the work itself in TS 29.163.
- Uses SIP extensions in a 3GPP Rel5 IMS, and does not encapsulate ISUP
- Only very limited interworking of supplementary services (CLIP/CLIR, Hold, TP)

Profile B

- Intended for interworking with SIP terminals.
- No encapsulated ISUP
- Relatively similar to Profile A, but some SIP extensions are optional.

Profile C ("SIP-I")

- SIP bridging" scenario also considered by SIP-T
- Like in SIP-T, ISUP messages are embedded in the body of SIP messages in the binary format of RFC 3204.
- encryption or authentication of the ISUP body is not required since no SIP phones are assumed to be directly attached to the SIP network

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ITU-T work on Interworking between SIP and ISUP or BICC: Q.1912.5 (2/2)

Significance of work

- Was published in 2004, and not updated since then
- Profile A Is now historical, although procedures in 3GPP TS 29.163 are still relatively similar
- SIP-I is widely deployed
  - As ITU-T has considerable ISUP expertise and operator involvement, SIP-I rather than SIP-T is likely to be used in carrier-grade networks.
- Q.1912.5 has been endorsed by regional organisations such as ETSI

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3GPP IP Multimedia Subsystem (IMS) (1/3)

Key features:

- Well-defined SIP profile and related network architecture
- Based on IETF protocols, with little additions in 3GPP.
  - Close cooperation with IETF for SIP extensions
- Call scenarios:
  - Focus is on calls between native IMS SIP terminals.
  - Call between native SIP terminal and circuit switched (CS) networks (PSTN, 3GPP CS domain)
  - "SIP-bridging" scenario where two CS networks are interconnected by a SIP network.
  - Calls to non-IMS SIP terminals also supported
  - Interworking with SIP based enterprise networks supported
  - Some support for PES (PSTN emulation subsystem): ISDN or analogue terminals attached via interworking device (defined in TISPAN)
  - Suitable for IMS SIP terminals using fixed and mobile access
- No encapsulated full ISUP
  - PSTN Supplementary services are rather simulated using SIP extensions
  - Some parts of ISUP can be encapsulated, e.g. REL causes in SIP reason header

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3GPP IP Multimedia Subsystem (IMS) (2/3)

Significance of work

- IMS has been continuously been developed and improved by 3GPP since around 2000

- Several other standardisation bodies and fora use the IMS, e.g. ETSI TISPAN (focus on fixed deployments), 3GPP2, Cablelabs, Open mobile Alliance (OMA), WIMAX

  – Under the "Common IMS" agreement, some IMS related work of these for a has been transferred to 3GPP

- IMS deployments in the field (For voice, primarily fixed network deployments)

- In 3GPP, the latest generation of the air interface (LTE) uses IMS to provide voice

Relevant Standards (a selection)

- 3GPP TS 22.173: "IMS Multimedia Telephony Service and supplementary services; Stage 1".
- 3GPP TS 23.228: "IP multimedia subsystem; Stage 2".
- 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP".
- 3GPP TS 24.173: "IMS Multimedia telephony service and supplementary services; Stage 3".
- 3GPP TS 29.163: "Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks".
- 3GPP TS 29.165: "Inter-IMS Network to Network Interface (NNI)".

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3GPP IP Multimedia Subsystem (IMS) (3/3)
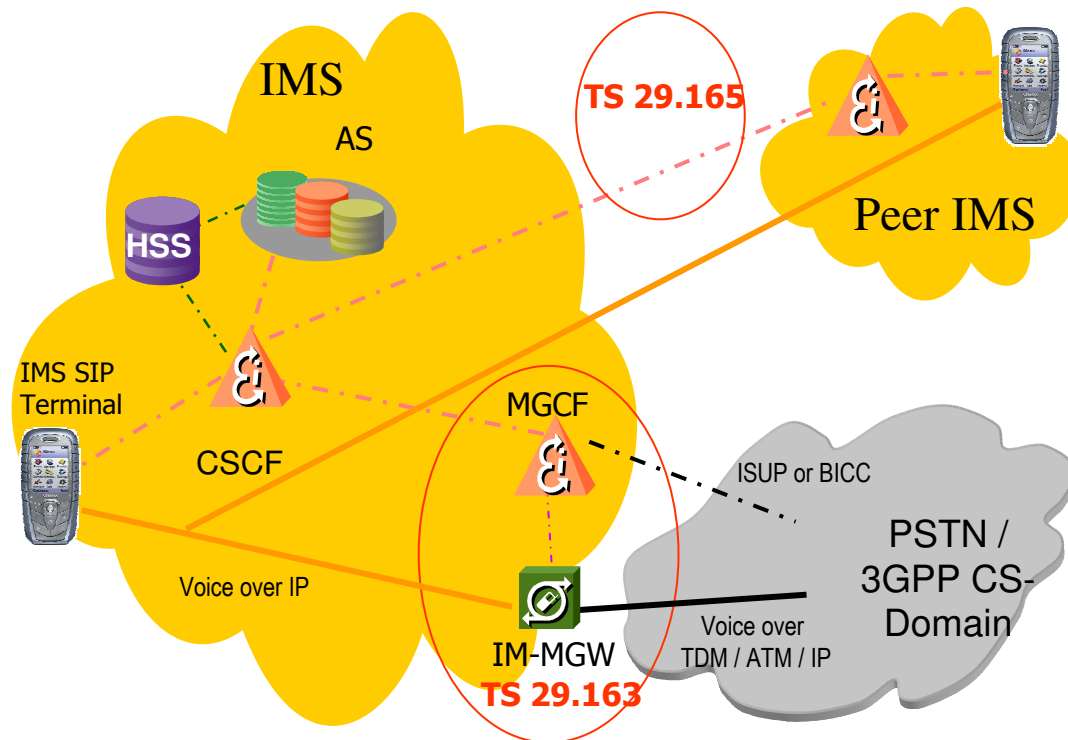
MGCF: Media Gateway Control Function
 - SIP ←→ ISUP/BICC
 - controls the MGW

IM-MGW: IP Multimedia Media Gateway
 - IP transport ←→ TDM, ATM, or IP bearers
 - transcoding e.g. AMR ←→ G.711.
 - Tones/Announcements.

CSCF: Call Session Control Function

- SIP Registrar

- IMS User Authentication

- Session Control

- SIP Routeing

- Charging Records

- Lawful Interception Support

HSS: Home Subscriber Server

- Subscriber Database

AS: Application Server

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3GPP TS 29.163: "Interworking between the IMS and Circuit Switched (CS) networks" (1/2)

Scope:

- Interworking between IMS SIP profile and ISUP or BICC based circuit switched CS network

- CS network is either PSTN or 3GPP CS domain.

- Voice, data and multimedia calls covered

- Both signalling and media interworking

- Interworking is performed in Media Gateway Control Function (MGCF) and attached IP Multimedia Gateway (IM-MGW)

- Interactions between signalling interworking procedures and IM-MGW control procedures in MGCF also covered. (Related H.248 profile is defined in 3GPP TS 29.332)

Initial contents of TS 29.163 were derived from ITU-T Q.1912.5 profile A in 2003 for 3GPP Rel-6.

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3GPP TS 29.163: "Interworking between the IMS and Circuit Switched (CS) networks" (2/2)

Improvements in TS 29.163 compared to ITU-T Q.1912.5 include:

- Interactions with gateway described
- more information about user plane interworking
- Many error corrections
- Support of enhanced features added to 3GPP IMS
  - Many SIP extensions developed by IETF were added to IMS
- Handling of forked SIP responses
- Enhanced Overlap handling
- Optional Transcoder-Free Codec negotiation Interworking procedures with BICC added
- Interworking procedures for many Supplementary Services added (e.g. mapping of SIP history info header for CDIV)
- Optional Interworking procedures for Multimedia calls between inband H.324 in CS network and SIP added
- Enhanced data call interworking procedures (e.g. to support global text telephony)
- Enhanced support for PES and transit scenarios by operator option to encapsulate some parts of ISDN/ISUP information in an XML body (e.g. bearer capability)

TS 29.163 is continuously maintained and enhanced by 3GPP

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3GPP TS 29.165: "Inter-IMS Network to Network Interface (NNI)".

TS 24.229 describes the 3GPP profile for SIP/SDP signalling and media and the related procedures in a general IMS context.

- application of SIP and SDP for equipment and functions in a framework larger than the interconnection

TS 29.165 summarizes the 3GPP IMS profile for SIP/SDP specifically for the II-NNI, e.g.

- Applicable (optional or mandatory) SIP methods
- Applicable (optional or mandatory) SIP Headers
- Applicable (optional or mandatory) SIP extensions
- Supplementary services: Which optional SIP features are required to support a given service?

Strong operator support. Operators aim to base interworking agreements on this specification.

3GPP hopes that national regulatory bodies will also use TS 29.165 as a basis to develop interworking related documents.

TS 29.165 was created in 2008 for 3GPP Rel-8 and has been updated and expanded for Rel-9. For Rel-10, a new WI was agreed to do further enhance this specification.

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Interworking for 3GPP SIP-I based CS core network
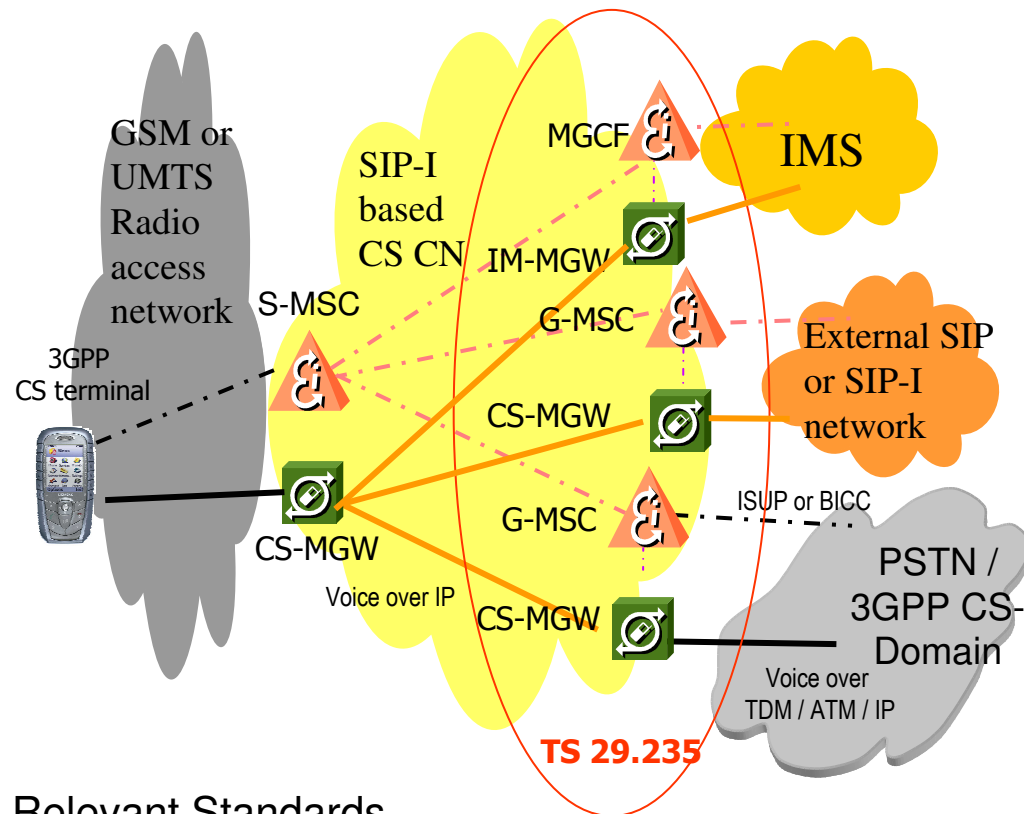
In Rel-8 (2008), 3GPP added option to use SIP-I rather than ISUP or BICC as signaling protocol in its Circuit switched core network (CS CN)

MGCF: Media Gateway Control Function
IM-MGW: IP Multimedia Media Gateway
MSC:: Mobile-services Switching Centre
CS-MGW: Circuit switched Media Gateway
S-MSC:: Serving MSC
G-MSC:: Gateway MSC

Relevant Standards

- 3GPP TS 23.231: "SIP-I based circuit-switched core network; Stage 2".
  – Procedural description
- 3GPP TS 29.231: " SIP-I based circuit-switched core network; Stage 3".
  – Applicable RFCs, own SDP extensions
- 3GPP TS 29.235: "Interworking between SIP-I based circuit-switched core network and other networks"
  – Contains separate interworking procedures for all interworking scenarios depicted in figure
  – Thus, also covers SIP to SIP-I interworking
  – Based upon ITU-T Q.1912.5 and 3GPP TS 29.163

Thank you for your attention
Any questions?

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ANNEX: Interworking to external SIP-I network for 3GPP ISUP or BICC CS core network

In the 3GPP Circuit switched core network (CS CN), ISUP or BICC can be used as signaling protocols.

3GPP added interworking procedures to external SIP-I networks in Rel-7 (2007).

MGCF: Media Gateway Control Function
IM-MGW: IP Multimedia Media Gateway
MSC:: Mobile-services Switching Centre
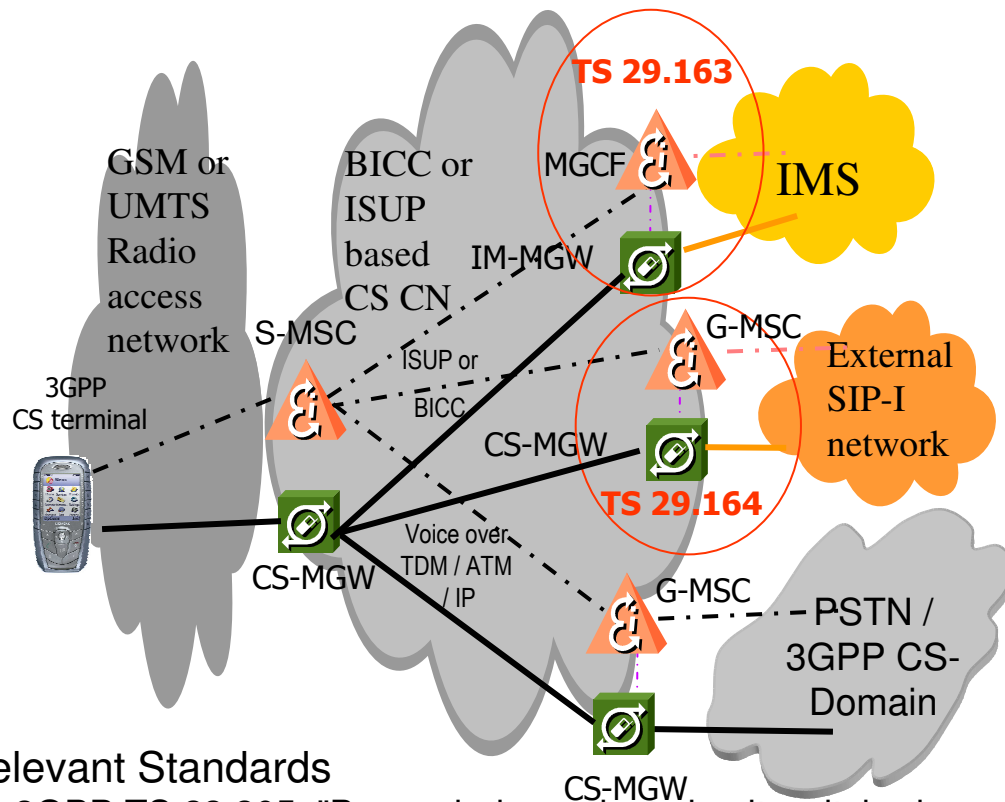**CS-MGW**: Circuit switched Media Gateway
S-MSC:: Serving MSC
G-MSC:: Gateway MSC

Relevant Standards
- 3GPP TS 23.205: "Bearer-independent circuit-switched core network; Stage 2".
    - Procedural description
- 3GPP TS 29.205: "Bearer-independent circuit-switched core network; Stage 3".
    - Applicable ITU-T and IETF Standards
- 3GPP TS 29.164: "Interworking between the 3GPP CS Domain with BICC or ISUP as Signaling Protocol and external SIP-I Networks "
    - Based upon ITU-T Q.1912.5 Profile C

Annex
Comparison of Reason mapping in TS 29.163, Q.1912.5, and RFC 3398

Mapping from ISUP Release Cause to SIP message (1/4):

ISUP REL Cause Value	SIP Message (RFC 3398)	SIP Message (ITU-T Q.1912.5)	SIP Message (TS 29.163)
1 (unallocated (unassigned) number)	404 Not Found	404 Not Found	404 Not Found
2 (no route to network)	**404 Not Found**	500 Server Internal Error	500 Server Internal error
3 (no route to destination)	**404 Not Found**	500 Server Internal Error	500 Server Internal error
4 (Send special information tone)	500 Server internal error	500 Server Internal Error	500 Server Internal error
5 (Misdialled trunk prefix)	**500 Server internal error**	404 Not Found	404 Not Found
8 ("Preemption")	500 Server internal error	500 Server Internal Error (SIP-I only)	**480 Temporarily unavailable (as Class default)**
9 ("Preemption-circuit reserved for reuse")	500 Server internal error	500 Server Internal Error (SIP-I only)	**480 Temporarily unavailable (as Class default)**
17 (user busy)	486 Busy here	486 Busy Here	486 Busy Here
18 (no user responding)	408 Request Timeout	480 Temporarily unavailable	480 Temporarily unavailable
19 (no answer from the user)	480 Temporarily unavailable	480 Temporarily unavailable	480 Temporarily unavailable
20 (subscriber absent)	480 Temporarily unavailable	480 Temporarily unavailable	480 Temporarily unavailable
21 (call rejected), Location = 000 / user (U)	**603 Decline or 403 Forbidden**	480 Temporarily unavailable	**603 Decline**
21 (call rejected) , Location <> 000 / user (U)	**403 Forbidden**	480 Temporarily unavailable	480 Temporarily unavailable
22 (number changed)	410 Gone (for 22 w/o diagnostics) **301 Moved Permanently (for 22 with diagnostics)**	410 Gone	410 Gone

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Annex
Comparison of Reason mapping in TS 29.163, Q.1912.5, and RFC 3398

Mapping from ISUP Release Cause to SIP message (2/4):

ISUP REL Cause Value	SIP Message (RFC 3398)	SIP Message (ITU-T Q.1912.5)	SIP Message (TS 29.163)
23 (redirection to new destination)	**410 Gone**	-	**480 Temporarily unavailable (as Class default)**
24 (call rejected due to ACR supplementary service)	**500 Server internal error**	No mapping	**433 Anonymity Disallowed**
25 (Exchange routing error)	**500 Server internal error**	480 Temporarily unavailable	**483 Too Many Hops**
26 (non-selected user clearing) ANSI ISUP only	**404 Not Found**	-	**480 Temporarily unavailable (as Class default)**
27 (destination out of order)	502 Bad Gateway	502 Bad Gateway	502 Bad Gateway
28 invalid number format (address incomplete)	484 Address incomplete	484 Address Incomplete	484 Address Incomplete
29 (facility rejected)	**501 Not implemented**	500 Server Internal Error	500 Server Internal error
31 (normal unspecified) (class default)	480 Temporarily unavailable	480 Temporarily unavailable	480 Temporarily unavailable
34 (No circuit/channel available)	**503 Service unavailable**	486 Busy here if Diagnostics indicator includes the (CCBS indicator = CCBS possible) else 480 Temporarily unavailable	486 Busy here if Diagnostics indicator includes the (CCBS indicator = CCBS possible) else 480 Temporarily unavailable
Cause value in the Class 010 (resource unavailable, Cause value No's. 38, 41, 42, 43, 44, & 47) (47 is class default)	**503 Service unavailable (38, 41 42, 47 only)**	500 Server Internal Error	500 Server Internal error
50 (requested facility no subscribed)	**-**	500 Server Internal Error	500 Server Internal error

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Annex
Comparison of Reason mapping in TS 29.163, Q.1912.5, and RFC 3398

Mapping from ISUP Release Cause to SIP message (3/4):

ISUP REL Cause Value	SIP Message (RFC 3398)	SIP Message (ITU-T Q.1912.5)	SIP Message (TS 29.163)
55 (Incoming class barred within Closed User Group (CUG))	**403 Forbidden**	500 Server Internal Error (SIP-I only)	**603 Decline**
57 (bearer capability not authorised)	**403 Forbidden**	500 Server Internal Error	**403 Forbidden**
58 (bearer capability not presently available)	**503 Service unavailable**	500 Server Internal Error	500 Server Internal error
63 (service option not available, unspecified) (class default)	-	500 Server Internal Error	500 Server Internal error
Cause value in the Class 100 (service or option not implemented, Cause value No's. 65, 70 & 79) 79 is class default	**65+70:** **488 Not Acceptable Here** **79:** **501 Not implemented**	500 Server Internal Error	500 Server Internal error
87 (User not member of Closed User Group(CUG))	**403 Forbidden**	500 Server Internal Error (SIP-I only)	**403 Forbidden**
88 (incompatible destination)	**503 Service unavailable**	500 Server Internal Error	500 Server Internal error
90 ("Non‑existent CUG")	**-**	500 Server Internal Error (SIP-I only)	500 Server Internal error (as class default)
91 (invalid transit network selection)	**-**	404 Not Found	**500 Server Internal error**
95 (invalid message) (class default)	**-**	500 Server Internal Error	500 Server Internal error

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Annex
Comparison of Reason mapping in TS 29.163, Q.1912.5, and RFC 3398

Mapping from ISUP Release Cause to SIP message (4/4):

ISUP REL Cause Value	SIP Message (RFC 3398)	SIP Message (ITU-T Q.1912.5)	SIP Message (TS 29.163)
97 (Message type non-existent or not implemented)	-	500 Server Internal Error	**501 Not Implemented**
99 (information element/parameter non-existent or not implemented))	-	500 Server Internal Error	**501 Not Implemented**
102 (recovery on timer expiry)	**504 Gateway timeout**	480 Temporarily unavailable	480 Temporarily unavailable
110 (Message with unrecognised Parameter, discarded)	-	500 Server Internal Error	**501 Not Implemented**
111 (protocol error, unspecified) (class default)	500 Server internal error	500 Server Internal Error	500 Server Internal error
127 (interworking unspecified) (class default)	**500 Server internal error**	480 Temporarily unavailable	**500 Server Internal error**

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Annex
Comparison of Reason mapping in TS 29.163, Q.1912.5, and RFC 3398

Mapping from SIP message 4xx,5xx, or 6xx to ISUP Release Cause (1/3):

4xx/5xx/6xx SIP Message	ISUP REL Cause Value (RFC 3398) NOTE 4	ISUP REL Cause Value (Q 1912.5) NOTE 4, NOTE 5	ISUP REL Cause Value (TS 29.163) NOTE 5
400 Bad Request	**41 (Temporary Failure)**	127 (Interworking unspecified)	127 (interworking unspecified)
401 Unauthorized	**21 (Call rejected)**	127 (Interworking unspecified)	127 (interworking unspecified)
402 Payment Required	**21 (Call rejected)**	127 (Interworking unspecified)	127 (interworking unspecified)
403 Forbidden	**21 (Call rejected)**	127 (Interworking unspecified)	127 (interworking unspecified)
404 Not Found	1 (Unallocated number)	1 (Unallocated number)	1 (Unallocated number)
405 Method Not Allowed	**63 (Service or option unavailable)**	127 (Interworking unspecified)	127 (interworking unspecified)
406 Not Acceptable	**79 (Service or option not implemented)**	127 (Interworking unspecified)	127 (interworking unspecified)
407 Proxy authentication required	**21 (Call rejected)**	127 (Interworking unspecified)	127 (interworking unspecified)
408 Request Timeout	**102 (Recovery on timer expiry)**	127 (Interworking unspecified)	127 (interworking unspecified)
410 Gone	22 (Number changed) (without diagnostic)	22 (Number changed) (without diagnostic)	22 (Number changed)
413 Request Entity too long	127 (Interworking unspecified)	127 (Interworking unspecified)	127 (interworking unspecified)
414 Request-URI too long	127 (Interworking unspecified)	127 (Interworking unspecified)	127 (interworking unspecified)
415 Unsupported Media type	**79 (Service or option not implemented)**	127 (Interworking unspecified)	127 (interworking unspecified)
416 Unsupported URI scheme	127 (Interworking unspecified)	127 (Interworking unspecified)	127 (interworking unspecified)
417 Unknown Resource-Priority	-	-	79 (Service or option not implemented, unspecified)

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Annex
Comparison of Reason mapping in TS 29.163, Q.1912.5, and RFC 3398

Mapping from SIP message 4xx,5xx, or 6xx to ISUP Release Cause (2/3):

4xx/5xx/6xx SIP Message	ISUP REL Cause Value (RFC 3398) NOTE 4	ISUP REL Cause Value (Q 1912.5) NOTE 4, NOTE 5	ISUP REL Cause Value (TS 29.163) NOTE 5
420 Bad Extension	127 (Interworking unspecified)	127 (Interworking unspecified)	127 (interworking unspecified)
421 Extension required	127 (Interworking unspecified)	127 (Interworking unspecified)	127 (interworking unspecified)
422 Session Interval Too Small	-	-	31 (Normal, unspecified)
423 Interval Too Brief	127 (Interworking unspecified)	127 (Interworking unspecified)	127 (interworking unspecified)
433 Anonymity Disallowed (NOTE 1)	-	-	24 (call rejected due to ACR supplementary service)
440 Max-Breadth Exceeded	-	-	127 (interworking unspecified)
480 Temporarily Unavailable	**18 (No user responding)**	20 (Subscriber absent)	20 (Subscriber absent)
481 Call/Transaction does not exist	**41 (Temporary Failure)**	127 (Interworking unspecified)	127 (interworking unspecified)
482 Loop detected	**25 (Exchange - routing error)**	127 (Interworking unspecified)	127 (interworking unspecified)
483 Too many hops	**25 (Exchange - routing error)**	127 (Interworking unspecified)	**25 (Exchange routing error)**
484 Address Incomplete	28 (Invalid Number format)	28 (Invalid Number format)	28 (Invalid Number format)
485 Ambiguous	**1 (unallocated (unassigned) number)**	127 (Interworking unspecified)	**1 (unallocated (unassigned) number)**
486 Busy Here	17 (User busy)	17 (User busy)	17 (User busy)
487 Request terminated	**No mapping**	127 (Interworking unspecified) or no mapping (Note 2)	127 (Interworking unspecified) or not interworked. (NOTE 2)
488 Not acceptable here	**31 (Normal, unspecified) or derived from Warning header**	127 (Interworking unspecified)	127 (interworking unspecified)

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Annex
Comparison of Reason mapping in TS 29.163, Q.1912.5, and RFC 3398

Mapping from SIP message 4xx,5xx, or 6xx to ISUP Release Cause (3/3):

4xx/5xx/6xx SIP Message	ISUP REL Cause Value (RFC 3398) NOTE 4	ISUP REL Cause Value (Q 1912.5) NOTE 4, NOTE 5	ISUP REL Cause Value (TS 29.163) NOTE 5
493 Undecipherable	-	127 (Interworking unspecified)	127 (interworking unspecified)
500 Server Internal error	**41 (Temporary failure)**	127 (Interworking unspecified)	127 (interworking unspecified)
501 Not implemented	**79 (Not implemented, unspecified)**	127 (Interworking unspecified)	127 (interworking unspecified)
502 Bad Gateway	**38 (Network out of order)**	127 (Interworking unspecified)	127 (interworking unspecified)
503 Service Unavailable	**41 (Temporary failure)**	127 (Interworking unspecified)	127 (interworking unspecified)
504 Server timeout	**102 (Recovery on timer expiry)**	127 (Interworking unspecified)	127 (interworking unspecified)
505 Version not supported	127 (interworking unspecified	127 (Interworking unspecified)	127 (interworking unspecified)
513 Message too large	127 (interworking unspecified	127 (Interworking unspecified)	127 (interworking unspecified)
580 Precondition failure	-	127 (Interworking unspecified)	127 (interworking unspecified)
600 Busy Everywhere	17 (User busy)	17 (User busy)	17 (User busy)
603 Decline	21 (Call rejected)	21 (Call rejected)	21 (Call rejected)
604 Does not exist anywhere	1 (Unallocated number)	1 (Unallocated number)	1 (unallocated number)
606 Not acceptable	**31 (Normal, unspecified) or derived from Warning header**	127 (Interworking unspecified)	127 (interworking unspecified)

NOTE 1:   Anonymity Disallowed, IETF RFC 5079 [77] refers.
NOTE 2:   No interworking if the O-MGCF previously issued a CANCEL request for the INVITE.
NOTE 3:   The 4xx/5xx/6xx SIP responses that are not covered in this table are not interworked.
NOTE 4:   For Q.1912.5 Profile C (SIP-I) and for SIP-T, ISUP Causes from encapsulated ISUP REL are used if present.
NOTE 5:   ISUP Causes from encapsulated SIP Reason header are used if present.

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Annex
Possibility to Update ISUP Cause Information in SIP Reason Header

The I3 Forum White Paper "*Mapping of Signalling Protocols*

ISUP to/from SIP, SIP-I" highlights missing ISUP Location information in the SIP Reason header as a problem.

RFC 3326 would allow an extension of the SIP Reason header to transport such Location information:

```
reason              =  "Reason" HCOLON reason-value *(COMMA reason-value)
reason-value        =  protocol *(SEMI reason-params)
protocol            =  "SIP" / "Q.850" / token
reason-params       =  protocol-cause / reason-text / reason-extension
protocol-cause      =  "cause" EQUAL cause
cause               =  1*DIGIT
reason-text         =  "text" EQUAL quoted-string
reason-extension    =  generic-param
```

Example of Reason header with such an extension:

```
Reason: Q.850 ;cause=34 ;text="No Circuit/channel Available" ;location="user"
```

Extension would need to be defined by IETF in a new RFC

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Annex:
How to contribute to 3GPP

I3Forum can not directly contribute to 3GPP.

- However, I3Forum member companies can contribute if they are also members of 3GPP

- Co-signed contribution of several companies may enhance chances of success

3GPP is currently developing Rel-10

- Corrections to earlier Releases are only permissible if they correct „frequent and serious miss-operation"

- Major additions to Rel-10 require a dedicated Work Item

Before stage 3 specifications are updated, corresponding changes to stage 2 and possibly stage 1 specifications may be required.

Interworking procedures in TS 29.163 and changes to NNI description in TS 29.165 need to be aligned with IMS SIP profile in TS 24.229

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