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Technical Specification

**Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
LTE;
TISPAN;
PSTN/ISDN simulation services;
Protocol specification Closed User Group (CUG)
(3GPP TS 24.454 version 8.3.0 Release 8)**

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Foreword

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Contents

Foreword

This Technical Specification (TS) was been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN) and originally published as ETSI TS 183 054 [14]. It was transferred to the 3rd Generation Partnership Project (3GPP) in December 2007.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:

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1 Scope

The present document specifies the, stage three, Protocol Description of the Closed User Group (CUG) service, based on stage one and two of the ISDN Communication diversion supplementary services. Within the Next Generation Network (NGN) the stage 3 description is specified using the IP-Multimedia Communication Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP).

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*.

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI TS 181 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Multimedia Telephony with PSTN/ISDN simulation services".

[2] ETSI ES 283 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 [3GPP TS 24.229, modified]".

[3] ETSI EN 300 356-9 (V4.1.2): "Integrated Services Digital Network (ISDN); Signalling System No.7 (SS7); ISDN User Part (ISUP) version 4 for the international interface; Part 9: Closed User Group (CUG) supplementary service [ITU-T Recommendation Q.735, clause 1 (1993) modified]".

[4] IETF RFC 5621: "Message Body Handling in the Session Initiation Protocol (SIP)".

2.2 Informative references

[14] ETSI TS 183 054 V2.1.0: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services; Protocol specification Closed User Group (CUG)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 181 002 [1] and the following apply:

basic service: bearer or teleservice. Within the scope of SIP based networks the identification of a bearer or teleservice can be derived from the SDP used

Closed User Group (CUG) communication: closed user group communication is a communication which is restricted to a pre-defined group of users

Closed User Group (CUG) member: user who has subscribed to the CUG service and is one of the users in the group formed by a particular closed user group

CUG index: parameter used by the originating user to select a particular CUG when originating a communication

> NOTE: The index is also used by the network to indicate to the terminating user the CUG from which an incoming communication has originated. This index has only local significance, i.e. the index used by the originating user is, in general, different from the index used by the terminating user to identify the same CUG.

CUG interlock code: means of identifying CUG membership within the network

> NOTE: At the originating side, if a CUG match exists, the CUG index identifying a CUG maps to the CUG interlock code for that CUG. If a CUG match exists at the terminating side the CUG interlock code identifying a CUG maps to the CUG index representing that CUG. CUG interlock code has relevance on NN level between AS.

CUG manager: authority representing the interests of all the members of a CUG

> NOTE: By planning and controlling the membership and members' options, the manager can provide the overall CUG service expected by the members as a whole. The CUG manager need not be a CUG member and the concept has no signalling implications.

Incoming access: arrangement which allows a member of a closed user group to receive communications from outside the closed user group

Incoming communications barred within a closed user group: access restriction that prevents a closed user group member from receiving communications from other members of that group

Outgoing access: arrangement which allows a member of a closed user group to place communications outside the closed user group

Outgoing communications barred within a closed user group: access restriction that prevents a closed user group member from placing communications to other members of that group

preferential CUG: user subscribing to preferential CUG nominates a CUG index which the network uses as a default to identify the required CUG in the absence of any CUG information in the outgoing communication request

> NOTE: A preferential CUG applies to a Public ID.

3.2 Abbreviations

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

ACR	Anonymous Call Rejection
AS	Application Server
BGCF	Breakout Gateway Control Function
CDIV	Communication DIVersion
CONF	CONFerence calling
CSCF	Call Session Control Function

CUG	Closed User Group
ECT	Explicit Communication Transfer
HOLD	communication HOLD
IA	Incoming Access
IBCF	Interconnection Border Control Function
ICB	Incoming Communication Barring
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Service Data Network
MCID	Malicious Communication IDentification
MGCF	Media Gateway Control Function
NGN	Next Generation Network
OA	Outgoing Access
OCB	Outgoing Communication Barring
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction
PSTN	Public Switched Telephone Network
S-CSCF	Server-Call Session Control Function
SDP	Session Description Protocol
SIP	Session Initiation Protocol
TIP	Terminating Identity Presentation
TIR	Terminating Identification Restriction
UA	User Agent
UE	User Equipment
URI	Universal Resource Identifier
XML	eXtensible Markup Language

4 Closed User Group (CUG)

4.1 Introduction

The Closed User Group (CUG) service enables users to form groups of members, whose communication profile is restricted for incoming and outgoing communications.

4.2 Description

Members of a specific CUG can communicate among themselves but not, in general, with users outside the group.

Specific CUG members can have additional capabilities that allow them to initiate outgoing communications to users outside the group, and/or to accept incoming communications from users outside the group. Specific CUG members can have additional restrictions that prevent outgoing communications to other members of the CUG, or prevent incoming communications from other members of the CUG.

A closed user group consists of a number of members from one or more public, and/or private networks. A specific user may be a member of one or more CUGs. Subscription to a closed user group shall be defined for all communication services, or in relation to one, or to a list of communication services.

4.3 Operational requirements

4.3.1 Provision/withdrawal

The CUG service shall be provided after prior arrangement with the service provider.

As a network option based on subscription basis. The CUG service can be offered with several subscription options.

The provisioning of a new CUG shall require a prior arrangement between the CUG Manager and the network provider.

The provision of the CUG service to a new member and also the assignment of the various CUG service options to a new or existing member shall require a prior arrangement between the CUG member and the network provider in coordination with the CUG Manager of the affected CUG.

The CUG Service is provisioned by the operator.

The subscription options can be divided into three groups:

- General Subscription options.

- Per CUG.

- Per Public ID.

General Subscription options:

A user can be a member of several closed user groups as shown in table 4.3.1.1. Each CUG is bind to the members with an individual CUG Index. Each network operator shall define the maximum number of closed user groups which can be allocated to an individual user.

Table 4.3.1.1: General subscription options

Subscription options	Value
Closed user groups	List of one or more closed user group indices

Subscription options per CUG:

- For a particular closed user group, the associated set of general subscription options can apply to one basic service, to a particular set of basic services, or to all basic services (see table 4.3.1.2).

Table 4.3.1.2: Subscription options per CUG

Subscription options	Value
Intra closed user group restrictions (for each closed user group)	None designated _____ Incoming communications barred within a closed user group _____ Outgoing communications barred within a closed user group
Applicability to basic services (for each closed user group)	list of one or more basic services _____ all basic services

Subscription options per Public ID:

- The network shall provide a subscription option in order to enable the user to specify a preferential closed user group (see table 4.3.1.3).

- The user can request that no preferential closed user group exists, or can request that a particular one of the user's closed user groups (or the only one if a single closed user group applies) is used as a preferential closed user group.

- The closed user group indices shall be allocated by prior arrangement with the service provider.

- The choice of preferential closed user group shall be alterable only by service provider action upon request by the served user.

- The CUG service shall be withdrawn at the customer's request, or for administrative reasons.

Table 4.3.1.3: Subscription options per Public ID

subscription options	Value
Preferential closed user group	None designated
	closed user group index
Outgoing access	allowed per communication
	allowed permanent (default)
	not allowed
Incoming access	allowed
	not allowed

4.3.2 Requirements on the originating network side

For correct interactions with other services, it is necessary for the originating network side to store, for the duration of the communication, details of whether a non-CUG, CUG (without outgoing access) or CUG (with outgoing access) communication was requested in the information sent to the destination network side. The CUG identity (if any) requested of the destination network side must also be retained.

4.3.3 Requirements in the terminating network

For correct interactions with other supplementary services, it is necessary for the destination network side to store, for the duration of the communication, details of whether a non-CUG or CUG (with or without outgoing access) communication request was passed to the user. The CUG identity (if any) requested must also be retained.

4.4 Coding requirements

4.4.1 XML definition

This clause defines the XML Schema to be used for providing the CUG Interlock code and the CUGcommunicationindicator.

The application/vnd.etsi.cug+xml MIME type used to provide CUG Interlock code, cugIndex outgoingAccessRequest and the CUGcommunicationindicator the XML used shall be coded as following described:

```xml
<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault=" qualified"
attributeFormDefault="unqualified">

    <xs:annotation>
        <xs:documentation>XML Schema Definition for the closed user group
        parameter</xs:documentation>
    </xs:annotation>
    <xs:include schemaLocation="xcap.xsd"/>
    <!--Definition of simple types-->
    <xs:simpleType name="twobitType">
        <xs:restriction base="xs:string">
            <xs:pattern value="[0-1][0-1]"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="networkIdentityType">
        <xs:restriction base="xs:hexBinary">
            <xs:length value="2"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="sixteenbitType">
        <xs:restriction base="xs:hexBinary">
            <xs:length value="2"/>
        </xs:restriction>
```

```
        </xs:simpleType>
        <xs:simpleType name="cugIndexType">
            <xs:restriction base="xs:integer">
                <xs:minInclusive value="0"/>
                <xs:maxInclusive value="32767"/>
            </xs:restriction>
        </xs:simpleType>
    <!--Definition of complex types-->
    <xs:complexType name="cugRequestType">
        <xs:sequence>
            <xs:element name="outgoingAccessRequest" type="xs:boolean"/>
            <xs:element name="cugIndex" type="cugIndexType"/>
        </xs:sequence>
    </xs:complexType>
    <!--Definition of document structure-->
    <xs:element name="cug" substitutionGroup="ss:absService">
        <xs:complexType>
            <xs:complexContent>
                <xs:extension base="ss:simservType">
                    <xs:sequence>
                        <xs:element name="cugCallOperation" type="cugRequestType" minOccurs="0"/>
                        <xs:element name="networkIndicator" type="networkIdentityType"
                        minOccurs="0"/>
                        <xs:element name="cugInterlockBinaryCode" type="sixteenbitType"
                        minOccurs="0"/>
                        <xs:element name="cugCommunicationIndicator" type="twobitType"
                        minOccurs="0"/>
                    </xs:sequence>
                </xs:extension>
            </xs:complexContent>
        </xs:complexType>
    </xs:element>
</xs:schema>
```

4.4.2   SIP-Messages used for CUG

The following SIP messages are used for the invocation and control of the CUG service.

Table 4.4.1.1: SIP Message used for CUG

SIP Message	SIP URI parameter	Used for
INVITE	xml MIME CUG	
403		rejection because the user does not belongs to the CUG or other failure.
603		rejection because of barring or CUG with call barring.
500		rejection of a CUG communication due to network caused reasons e.g. traversing the communication towards an IMS not supporting the CUG Service.

4.5   Signalling requirements

4.5.1   Activation/deactivation/registration

For activation/deactivation/registration-of the CUG the Ut interface could be used. More detail is described in clause 4.9.

Other possibilities for provisioning could be used too like web based provisioning or pre-provisioning by the operator.

4.5.2 Invocation and operation

4.5.2.1 Actions at the originating UA

Explicit request of CUG service:

- The originating user can explicitly request the CUG service by including in the initial INVITE an xml CUGrequestType containing the preferred CUG and an outgoing access request.

- To indicate outgoing access the user shall set the value of the "outgoingAccessRequest" parameter to TRUE.

Implicit request of CUG service:

- The originating user with CUG service can request the CUG service without including an xml CUGrequestType in the initial INVITE. In this case the procedures according to ES 283 003 [2] shall apply

Call originating from a user without CUG service:

- It is possible for a user without CUG service to make a call to a user with CUG service. In this case the procedures according to ES 283 003 [2] shall apply.

4.5.2.2 Actions at the originating P-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.3 Actions at the originating S-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.4 Actions at the AS of the originating User

Upon receipt of a request for CUG service the AS shall check its validity as shown in table 4.5.2.4.1 in conjunction with the access capabilities contained in the user profile. If a non-valid request is received or the checks cannot be performed, then the network shall reject the communication and return an appropriate indication to the originating user.

A received INVITE may include an xml CUGrequestType containing the preferred CUG and an outgoing access request.

NOTE: In particular, a validation check is performed by verifying that both the originating and terminating parties belong to the CUG indicated by the interlock code.
The data for each CUG that a user belongs to, is stored at the AS of the originating User.

The actions at AS of the originating user at communication set-up from a user belonging to a CUG, depends on the result of the validation checks performed, based on whether the user belongs to one or more CUGs.

a) CUG without outgoing access.

If the result of the validation check indicates that the communication should be dealt with as a CUG communication, the interlock code of the selected CUG is obtained. The INVITE forwarded towards the terminating network then includes the cugInterlockBinaryCode, networkIndicator and cugCommunicationIndicator.

b) CUG communication with outgoing access.

If the result of the validation check indicates that the communication should be dealt with as a CUG communication with outgoing access, the communication shall be treated as a Non-CUG communication.

c) Non-CUG.

If the result of the validation check indicates that the communication should be dealt with as a non-CUG communication, the INVITE message forwarded towards the terminating network then does not include a cugInterlockBinaryCode, networkIndicator and cugCommunicationIndicator

d) Communication rejected.

If the result of the validation check indicates that the communication is to be rejected, the communication set-up is not initiated. A 403 Response with a Reason header included shall be sent back as shown in table 4.5.2.4.1.

Table 4.5.2.4.1: Validation check of CUG communication concerning the originating user

Calling user class defined within the user profile	Indication from originating user sent within an INVITE				
	INVITE for CUG with CUGIndex	INVITE for CUG with CUGIndex & outgoingAccessRequest	INVITE for CUG communication without CUGIndex	INVITE for CUG communication without CUGIndex & with outgoingAccessRequest	INVITE for Non-CUG communication
CUG without preference	CUG communication (*1) (*3) IC: spec. CUG	CUG communication (*1) (*3) IC: spec. CUG	Return 403	Return 403	403
CUG+OAE without preference	CUG communication (*1) (*3) IC: spec. CUG	CUG+OA (*2) (*3) IC: spec. CUG	Return 403	Non-CUG communication	Return 403
CUG+OAI without preference	CUG+OA (*2) (*3) IC: spec. CUG	CUG+OA (*2) (*3) IC: spec. CUG	Non-CUG communication	Non-CUG communication	Non-CUG communication
CUG with preference	CUG communication (*1) (*3) IC: spec. CUG	CUG communication (*1) (*3) IC: spec. CUG	CUG (*4) communication IC: pref. CUG	403	CUG communication IC: pref. CUG (*4)
CUG+OAE with preference	CUG communication (*1) (*3) IC: spec. CUG	CUG+OA (*2) (*3) IC: spec. CUG	CUG (*4) IC: pref. CUG	Non-CUG communication	CUG communication (*4) pref. CUG
CUG+OAI with preference	CUG+OA (*1) (*2) (*3) IC: spec. CUG	CUG+OA (*2) (*3) (*1) IC: spec. CUG	(*4) (*5)	CUG+OA (*1) (*4) IC: pref. CUG	(*4) (*5)
No CUG	Return 403	Return 403	Return 403	Return 403	Non-CUG communication

OAE	Outgoing access, explicit request required.
OAI	Outgoing access, implicit outgoing access for all communications.
IC	Interlock code of the CUG selected.
spec. CUG	specific CUG indicated within the CUCIndex
pref. CUG	preferred CUG indicated by the user profile

NOTE: As IA (incoming access) attribute of the calling user is of no concern for this validation check, CUG+OA/IA is equivalent to CUG+OA in this table.

(*1) In case of OCB (outgoing communications barred) return 603.

(*2) In case of OCB within the CUG, the communication is interpreted as a non-CUG communication. An INVITE without a cugInterlockBinaryCode, networkIndicator and cugCommunicationIndicator shall be sent towards the terminating user.

(*3) In case the specified index does not match any of the registered indices, 403

(*4) In the case of OCB within the CUG, this combination is not allowed.

(*5) Both 'Preferential CUG' and 'implicit' outgoing access options imply that no subscriber procedures are needed to invoke either option when placing a communication. When a user subscribes to both options, the network does not know which option the user is invoking, if no additional procedures are used when placing the communication. Then one of the following operations are recommended:

a) if no information is given, the preferential CUG will be assumed, this shall be included in the INVITE sent towards the terminating user.

b) the network will route the communication with preferential CUG with outgoing access. The communication will therefore be connected if the terminating access is:

- a member of preferential CUG; or

- a member of another CUG with incoming access; or

- a non-CUG user.

When a vnd.etsi.cug+xml MIME body is included in the outgoing INVITE request the AS shall set the handling parameter in the Content-Disposition for this MIME body to "required" as described in RFC 5621 [4] if outgoing access is not allowed.

4.5.2.5 Actions at the incoming I-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.6 Actions at the outgoing IBCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.7 Actions at the incoming IBCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.8 Actions at the BGCF

Basic call procedures according to ES 283 003 [2] shall apply.

The interworking with other NGN is described in clauses 4.7.3 and 4.7.4.

4.5.2.9 Actions at the MGCF

Procedures according to ES 283 003 [2] shall apply.

The interworking is described in clause 4.7.1.

4.5.2.10 Actions at the AS of the terminating user

Table 4.5.2.10.1: Handling of a CUG communication at the AS of the terminating user

CUG cugCommunicationIndicator in INVITE	CUG match check	Class of terminating user				
		CUG		CUG+IA		No CUG
		No ICB	ICB	No ICB	ICB	
CUG with OA not allowed	Match	CUG call	Sent 603	CUG call	Sent 603	Sent 403
	No match	Sent 403		Sent 403		
CUG with OA allowed	Match	CUG call	Sent 603	CUG+OA call	Non-CUG call	Non-CUG call
	No match	Sent 403		Non-CUG call		
Non-CUG	–	Sent 403		Non-CUG call		

IA   Incoming access Non-CUG call
OA   Outgoing access
ICB   Incoming communications barred
Match   The interlock code in the received INVITE matches one of the CUGs to which the user belongs.
No match The interlock code does not match any of the CUGs to which the terminating user belongs.
NOTE: As OA attribute of the terminating user is of no concern at the AS of the terminating User , CUG+OA class is equivalent to CUG, and CUG+IA class is equivalent to CUG+IA in this table. Subscription of preferential CUG by the terminating user is also of no concern in this table.

In case of each successful CUG Check an INVITE without a CUG xml MIME shall be sent towards the terminating user. Therefore the received CUG xml MIME shall be discarded.

4.5.2.11 Actions at the destination P-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.12 Actions at the terminating UA

Procedures according to ES 283 003 [2] shall apply.

4.6 Interaction with other services

4.6.1 Communication Hold (HOLD)

No impact, i.e. neither service shall affect the operation of the other service.

4.6.2 Terminating Identification Presentation (TIP)

No impact, i.e. neither service shall affect the operation of the other service.

4.6.3 Terminating Identification Restriction (TIR)

No impact, i.e. neither service shall affect the operation of the other service.

4.6.4 Originating Identification Presentation (OIP)

No impact, i.e. neither service shall affect the operation of the other service.

4.6.5 Originating Identification Restriction (OIR)

No impact, i.e. neither service shall affect the operation of the other service.

4.6.6 Conference calling (CONF)

When the communication involving the first conferee is added to the conference, then the conference shall assume the CUG of that communication.
In order to add a subsequent communication to the conference, then the CUG of that communication shall be checked against the CUG of the conference.

4.6.7 Communication Diversion Services (CDIV)

4.6.7.1 Communication Forwarding Unconditional (CFU)

CUG restrictions shall be checked and met for the communication between the originating party and the forwarding party. The information of a CUG applied by the NGN on the original communication shall be used for the communication forwarding and by this means CUG restrictions shall be checked and met for the communication between the originating party and the forwarded-to party.
In the case of multiple forwarding, CUG restrictions between the originating party and the forwarding party have to be checked and met at each intermediate forwarding point. In addition, CUG restrictions between the originating party and forwarded-to party shall be met end-to-end.

The outgoing communication barring information of the forwarding party shall not be used to determine whether the communication can be forwarded.

The CUG information sent to the "forwarded-to" destination shall the same CUG information of the originating party that was sent from the originating network.

4.6.7.2　　　Communication Forwarding Busy (CFB)

See interactions with CFU in clause 4.6.7.1.

4.6.7.3　　　Call Forwarding No Reply (CFNR)

See interactions with CFU in clause 4.6.7.1.

> NOTE:　　CUG restrictions were checked and met for the communication between the originating party and the forwarding party when the communication was offered to the forwarding party.

4.6.7.4　　　Communication Forwarding on Not Logged-in (CFNL)

See interactions with CFU in clause 4.6.7.1.

4.6.7.5　　　Communication Forwarding on Subscriber Not Reachable (CFNRc).

See interactions with CFU in clause 4.6.7.1.

4.6.7.6　　　Communication Deflection (CD)

The information of a CUG applied by the NGN on the original communication shall be used for the deflected part of the communication and by this means CUG restrictions shall be checked and met for the communication between the originating party and the deflected-to party.

In the case of multiple deflections, CUG restrictions between the originating party and the deflecting party have to be checked and met at each intermediate deflecting point. In addition, CUG restrictions between the originating party and deflected-to party shall be met end-to-end.
When a communication is deflected, a new check of the CUG restrictions between the originating party and the deflected-to party is made at the "deflected-to" destination. The CUG information sent to the 'deflected-to' destination is the same CUG information of the originating party that was sent from the originating network.

The outgoing communication barring information of the deflecting party shall not be used to determine whether the communication can be deflected.

> NOTE:　　CUG restrictions were checked and met for the communication between the originating party and the deflecting party when the communication was offered to the deflecting party.

4.6.8　　　Malicious Communication Identification (MCID)

No impact, i.e. neither service shall affect the operation of the other service.

4.6.9　　　Anonymous Communication Rejection and Communication Barring (ACR/CB)

No impact, i.e. neither service shall affect the operation of the other service.

4.6.10　　Explicit Communication Transfer (ECT)

The two communications shall use the same CUG for the transfer to be successful.

> NOTE:　　CUG restrictions between users will have been checked when the first communication is established. Similarly, CUG restrictions between users will have been checked when establishing the second communication.

4.6.11　　Closed User Group (CUG)

No impact, i.e. neither service shall affect the operation of the other service.

4.6.12   Three-Party (3PTY)

For the successful invocation of the three party simulation service any CUG restrictions applied to one communication shall match with any CUG restrictions applied to the other communication.

4.7   Interactions with other networks

4.7.1   Interaction with PSTN/ISDN

4.7.1.1   Interworking at the I-MGCF

Tables 4.7.1.1.1 and 4.7.1.1.2 show the mapping of CUG relevant messages at the I-MGCF.

Table 4.7.1.1.1: Mapping of SIP messages to ISUP messages

SIP Message	ISUP Message
INVITE containing a XML CUG body with CUG XML schema	*IAM* containing the Closed **user group interlock code Parameter and the** *closed user group call indicator* of the Optional Forward Call Indicator Parameter

Interworking of the CUG XML schema with the ISUP Closed user group interlock code parameter and the *Closed user group call indicator* of the optional forward call indicator parameter is shown in tables 4.7.1.1.3 and 4.7.1.1.4.

Table 4.7.1.1.2: Mapping of the SIP XML CUG Element to the ISUP closed usergroup interloccode parameter

CUG XML Element	Source component value	ISUP Closed user group interlock code Parameter	derived value of parameter field
NetworkIdenticator	networkIdentityType = 4 hexbinary coded digits	*"Network Identity"*	Octet 1 & Octet 2 including 4 binary coded digits deviated from XML Network Identity
CUGInterlockBinaryCode	sixteenbitType = 16 bit coded value	*"Binary Code"*	Octet 3 & Octet 4 including a 16 bit Binary Code deviated from the XML Binary Code
NOTE: ISUP Closed user group interlock code Parameter Octet 1 contains "Network Identity" (NI) digits 1 & 2 and Octet 2 contains "Network Identity" digits 3 & 4.The networkidentityType is filled with "Octet1 & Octet 2" = "NI digit 1, NI digit 2, NI digit 3, NI digit 4". Example: Digit 1=0, Digit 2=4, Digit 3=9, Digit 4=0 so the networkidentityType is encoded with "0490".			

Table 4.7.1.1.3: Mapping of the SIP XML CUG Element to the ISUP *closed user group call indicator* included in the optional Forward Call Indicator Parameter

CUG XML Element	Source component value	ISUP *"Optional Forward Call Indicator"* Parameter	derived value of parameter field
cugCommunicationIndicator	Type=00	*"closed user group call"* indicator	non-CUG call
	Type=01		spare
	Type=10		closed user group call, outgoing access allowed
	Type=11		closed user group call, outgoing access not allowed

If an INVITE with the MIME including a cug XML element is received and the terminating network is not supporting CUG then the I-MGCF shall behave as shown in table 4.7.1.1.4.

Table 4.7.1.1.4: Action at the I-MGCF with a PSTN/ISDN network without CUG capability

cugCommunicationIndicator in INVITE	Action at the I-MGCF
Type=11 (CUG without outgoing access)	Release the communication with 403
Type=10 (CUG with outgoing access)	Treat the communication as an ordinary call NOTE
Non-CUG	Treat the communication as an ordinary call
NOTE: The cugCommunicationIndicator shall not be mapped if appropriate or include the CUG call indicator of the optional forward call indicator to non-CUG call.	

4.7.1.2 Interworking at the O-MGCF

Tables 4.7.1.2.1 and 4.1.2.2 show the mapping of CUG relevant messages at the O-MGCF.

Table 4.7.1.2.1 Mapping of ISUP messages to SIP messages

ISUP Message	SIP Message
IAM containing the **Closed user group interlock code Parameter and the** closed user group call indicator of the Optional Forward Call Indicator Parameter	INVITE containing a XML CUG body with CUG XML schema

Table 4.7.1.2.2: Mapping of the ISUP closed usergroup interloccode to SIP XML CUG element

ISUP Closed user group interlock code Parameter	Source component value	CUG XML Element	derived value of parameter field
"Network Identity"	Octet 1 & Octet 2 including 4 binary coded digits	NetworkIdenticator	networkIdentityType = 4 hexbinary coded digits deviated from Network Identity (NOTE)
"Binary Code"	Octet 3 & Octet 4 including a 16 bit Binary Code	CUGInterlockBinaryCode	sixteenbitType = 16 bit coded value deviated from Binary Code
NOTE: ISUP Closed user group interlock code Parameter Octet 1 contains "Network Identity" (NI) digits 1 & 2 and Octet 2 contains "Network Identity" digits 3 & 4.The networkidentityType shall be filled with "Octet1 & Octet 2" = "NI digit 1, NI digit 2, NI digit 3, NI digit 4". Example: Digit 1=0, Digit 2=4, Digit 3=9, Digit 4=0 so the networkidentityType is encoded with "0490".			

Table 4.7.1.2.3: Mapping of the ISUP *Closed user group call indicator* to SIP XML CUG element

ISUP Optional Forward Call Indicator Parameter	Source component value	CUG XML Element	derived value of parameter field
closed user group call indicator	non-CUG call	cugCommunicationIndicator	Type=00
	spare		Type=01
	closed user group call, outgoing access allowed		Type=10
	closed user group call, outgoing access not allowed		Type=11

If the IMS network is not supporting CUG the procedures described within ETSI EN 300 356-9 [3] shall apply if an INVITE with the MIME including a cug XML element is received.

4.7.2 Interaction with PSTN/ISDN Emulation

An interworking is only possible if the XML and AS procedures for cug defined within the present document are supported by the emulation domain (AS of the terminating/originating user) connected to.

4.7.3 Interaction with external IP networks

ES 283 003 [2] specifies the procedures used by a UE compliant to the TISPAN SIP profile to communicate with an external SIP device possibly lacking TISPAN SIP profile capabilities.

Annex A (informative):
Bibliography

ETSI TS 183 028: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Common Basic Communication procedures; Protocol specification".

ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture Release 1".

ETSI ES 283 027: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Endorsement of the SIP-ISUP Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks[3GPP TS 29.163 (Release 7), modified]".

Annex B (informative):
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2007-11					Publication as **ETSI TS 183 054**		2.1.0
2007-12					Conversion to **3GPP TS 24.454**		2.1.1
2008-03	CT#39	CP-080094			Based on the decision in CT#39 version 8.0.0 created by MCC	2.1.1	8.0.0
2010-03	CT#47	CP-100114	0001		Clarification of the use of Content-Disposition in CUG.	8.0.0	8.1.0
2012-03	CT#55	CP-120097	0002	1	Incorrect XSD for CUG	8.1.0	8.2.0
2012-06	CT#56	CP-120291	0003	1	Wrong xml NetworkIndicator element	8.2.0	8.3.0

History

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V8.2.0	March 2012	Publication
V8.3.0	July 2012	Publication