# ETSI TS 100 569 V7.0.0 (1999-08)

*Technical Specification*

# Digital cellular telecommunications system (Phase 2+); Closed User Group (CUG) supplementary services; Stage 3 (GSM 04.85 version 7.0.0 Release 1998)


Reference
RTS/SMG-030485Q7 (59o03i03.PDF)

Keywords
Digital cellular telecommunications system,
Global System for Mobile communications (GSM)

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# Contents

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# Foreword

This Technical Specification (TS) has been produced by the Special Mobile Group (SMG).

The present document specifies the procedures used at the radio interface (reference point Um as defined in GSM 04.02) for normal operation, registration, erasure, activation, deactivation, invocation and interrogation of Closed User Group (CUG) supplementary services within the digital cellular telecommunications system.

The contents of the present document is subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of the present document it will be re-released with an identifying change of release date and an increase in version number as follows:

Version 7.x.y

where:

- 7 indicates Release 1998 of GSM Phase 2+
- x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- y the third digit is incremented when editorial only changes have been incorporated in the specification.

The specification from which the present document has been derived was originally based on CEPT documentation, hence the presentation of the present document may not be entirely in accordance with the ETSI/PNE rules.

# 0 Scope

The present document for Mobile communications specifies the procedures used at the radio interface (reference point Um as defined in GSM 04.02) for normal operation, registration, erasure, activation, deactivation, invocation and interrogation of community of interest supplementary services. The provision and withdrawal of supplementary services is an administrative matter between the mobile subscriber and the service provider and causes no signalling on the radio interface.

In GSM 04.10, the general aspects of the specification of supplementary services at the layer 3 radio interface are given.

GSM 04.80 specifies the formats coding for the supplementary services.

Definitions and descriptions of supplementary services are given in GSM 02.04 and GSM 02.8x and GSM 02.9x-series. GSM 02.85 is related to the community of interest supplementary services.

Technical realization of supplementary services is described in technical specifications GSM 03.11 and GSM 03.8x and 03.9x-series. GSM 03.85 is related to the community of interest supplementary services.

The procedures for Call Control, Mobility Management and Radio Resource management at the layer 3 radio interface are defined in GSM 04.07 and GSM 04.08.

Signalling interworking for supplementary services between GSM 09.02 and GSM 04.08 and between GSM 09.02 and GSM 04.80 is defined in GSM 09.11.

The following supplementary services belong to the community of interest supplementary services and are described in the present document:

- Closed User Group (CUG) clause 1.

## 0.1 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

[1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[2] GSM 02.04: "Digital cellular telecommunications system (Phase 2+); General on supplementary services".

[3] GSM 02.81: "Digital cellular telecommunications system (Phase 2+); Line identification Supplementary Services - Stage 1".

[4] GSM 02.82: "Digital cellular telecommunications system (Phase 2+); Call Forwarding (CF) Supplementary Services - Stage 1".

[5] GSM 02.83: "Digital cellular telecommunications system (Phase 2+); Call Waiting (CW) and Call Hold (HOLD) Supplementary Services - Stage 1".

[6] GSM 02.84: "Digital cellular telecommunications system (Phase 2+); Multi Party (MPTY) Supplementary Services - Stage 1".

[7] GSM 02.85: "Digital cellular telecommunications system (Phase 2+); Closed User Group (CUG) Supplementary Services - Stage 1".

[8] GSM 02.86: "Digital cellular telecommunications system (Phase 2+); Advice of Charge (AoC) Supplementary Services - Stage 1".

[9] GSM 02.87: "Digital cellular telecommunications system. (Phase 2+); User-to-User Signalling (UUS) Service description - Stage 1".

[10] GSM 02.88: "Digital cellular telecommunications system (Phase 2+); Call Barring (CB) Supplementary Services - Stage 1".

[11] GSM 02.90: "Digital cellular telecommunications system (Phase 2+); Unstructured Supplementary Service Data (USSD) - Stage 1".

[12] GSM 03.02: "Digital cellular telecommunications system (Phase 2+); Network architecture".

[13] GSM 03.11: "Digital cellular telecommunications system (Phase 2+); Technical realization of supplementary services".

[14] GSM 03.81: "Digital cellular telecommunications system (Phase 2+); Line identification supplementary services - Stage 2".

[15] GSM 03.82: "Digital cellular telecommunications system (Phase 2+); Call Forwarding (CF) supplementary services - Stage 2".

[16] GSM 03.83: "Digital cellular telecommunications system (Phase 2+); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 2".

[17] GSM 03.84: "Digital cellular telecommunications system (Phase 2+); Multi Party (MPTY) supplementary services - Stage 2".

[18] GSM 03.85: "Digital cellular telecommunications system (Phase 2+); Closed User Group (CUG) supplementary services - Stage 2".

[19] GSM 03.86: "Digital cellular telecommunications system (Phase 2+); Advice of Charge (AoC) supplementary services - Stage 2".

[20] GSM 03.88: "Digital cellular telecommunications system (Phase 2+); Call Barring (CB) supplementary services - Stage 2".

[21] GSM 03.90: "Digital cellular telecommunications system (Phase 2+); Unstructured supplementary services operation - Stage 2".

[22] GSM 04.02: "Digital cellular telecommunications system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".

[23] GSM 04.07: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface signalling layer 3; General aspects".

[24] GSM 04.08: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".

[25] GSM 04.10: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3; Supplementary services specification; General aspects".

[26] GSM 04.80: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 supplementary services specification; Formats and coding".

[27] GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".

[28] GSM 09.11: "Digital cellular telecommunications system (Phase 2+); Signalling interworking for supplementary services".

## 0.2 Abbreviations

Abbreviations used in the present document are listed in GSM 01.04.

# 1 Closed User Group (CUG)

## 1.1 Normal operation

### 1.1.1 Mobile originated CUG calls

#### 1.1.1.1 Successful operation

CUG calls may be invoked Implicitly or Explicitly by the calling user.

In the case of Implicit invocation, no CUG information is provided by the user in the call set-up request and a default attribute of CUG is invoked. Normal call establishment procedures are followed over the radio interface and no CUG signalling is required.

In the case of Explicit CUG invocation, CUG information is provided by the user and is included in the SETUP message using the ForwardCUG-Info operation (see figure 1.1). User provided CUG information may consist of any combination of the following parameters:

- CUG Index;
- Suppress Preferential CUG indicator;
- Suppress OA indicator.

NOTE: No more than one of each parameter may be included per call attempt.

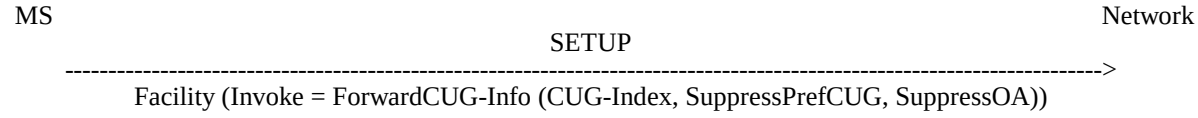


**Figure 1.1: Transfer of CUG information during CUG call set-up**

If the network received a non-zero SS Screening indicator from the calling user's mobile station, the network may optionally indicate to the MS that a CUG has been invoked for a call (see figure 1.2). When a CUG Index is received from the VLR the MSC shall send it immediately to the MS in a FACILITY or CALL PROCEEDING message. If the network did not receive a non-zero SS Screening indicator from the calling user's mobile station, it shall not send this notification.

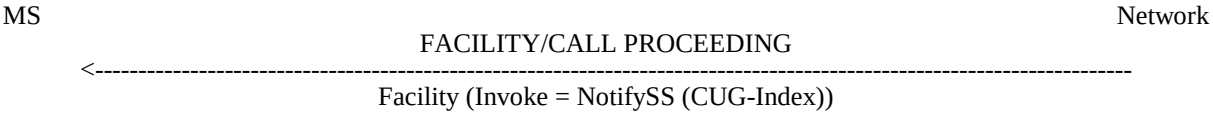


**Figure 1.2: Indication of CUG invocation to the calling subscriber by the network**

#### 1.1.1.2 Unsuccessful operation

When an attempted CUG call is rejected for CUG related reasons, the mobile station is provided with an indication of the reason for failure.

The indication is passed to the calling MS in the first clearing message. The indication may be given in one of two ways:

- Diagnostics information in cause value #29 "Facility Rejected";
- A standard call control cause value.

Diagnostics are used when the rejection is generated locally (the serving VLR has rejected the call), or if they are provided in a cause value from a remote network node (see figure 1.3). Table 1.1 gives the diagnostics information for each potential local rejection case.

A CUG rejection from a remote network node is generally indicated using a standard (CUG related) call control cause value contained in an ISUP clearing message. These cause values are passed to the mobile station in the appropriate radio interface clearing message (see figure 1.4). Table 1.2 gives the cause values in each potential remote rejection case.

All CUG related call rejection cases are defined in GSM 03.85. Cause values are defined in GSM 04.08 and diagnostics in GSM 04.80.

NOTE: Annex A specifies the mapping of cause values between MAP, ISUP and GSM 04.08 for remotely generated CUG rejections.

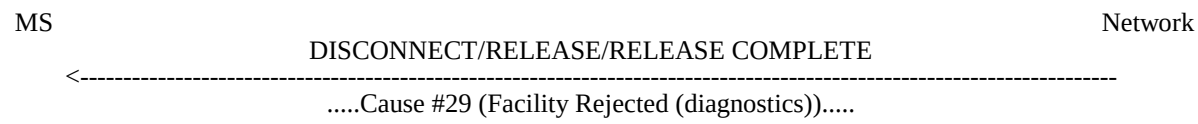


**Figure 1.3: Indication of local CUG call rejection**

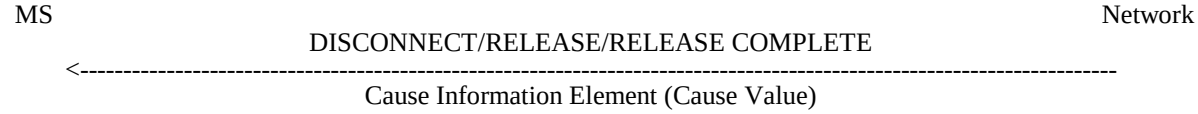


**Figure 1.4: Indication of remote CUG call rejection**

**Table 1.1: Use of diagnostic values for local CUG call failure indications**

| **Reason for rejection See GSM 03.85** | **Facility Rejected #29 Diagnostic Field (Diagnostics)** |
|---|---|
| Outgoing calls barred within the CUG | Outgoing calls barred within the CUG |
| Inconsistent access info - No CUG Selected | No CUG Selected |
| Unknown CUG Index | Unknown CUG Index |
| Inconsistent access info - Index incompatible with requested basic service | Index incompatible with requested basic service |

**Table 1.2: Use of cause values for remote CUG call failure indications**

| Reason for rejection<br>See GSM 03.85 | Cause Information Element<br>(cause value) |
|---|---|
| Called party supplementary service interaction violation | Facility Rejected #29<br>Diagnostic = CUG call failure, unspecified |
| Incompatible Destination<br>(see note) | Facility Rejected #29<br>Diagnostic = CUG call failure, unspecified |
| Incoming calls barred within the CUG | Incoming calls barred within the CUG #55 |
| Interlock mismatch | User not a member of CUG #87 |
| Requested basic service violates CUG constraints | Facility Rejected #29 |
| NOTE: In cases of interworking failures ETSI ISUP V2 clears the call with cause value #29 "Facility Rejected", Diagnostic = "Interlock Code". This is mapped to Facility Rejected with general diagnostic value "CUG call failure, unspecified" since the interlock code has no meaning for a mobile user. | |

### 1.1.2 Mobile terminated calls

If the network received a non-zero SS Screening indicator from the called user's mobile station, when a CUG call is terminated by a CUG subscriber the Index associated with the invoked CUG may be passed to the mobile station (see figure 1.5). If the network did not receive a non-zero SS Screening indicator from the called user's mobile station, it shall not send this notification.

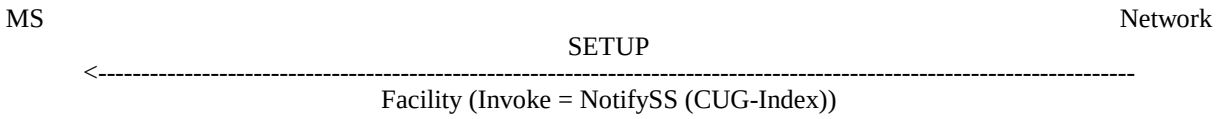


**Figure 1.5: Presentation of the CUG Index to a CUG subscriber during reception of a CUG call**

## 1.2 Activation, deactivation, interrogation, registration and erasure

Activation, deactivation, interrogation, registration and erasure of the supplementary service closed user group are not applicable.

# Annex A (normative): CUG rejection cause value mapping

Table A.1 indicates how MAP, ISUP and GSM 04.08 cause values are mapped to enable a rejection indication to be passed from the remote rejecting node to the calling user.

**Table A.1: Protocol mapping for CUG call rejection cause values**

| GSM MAP CUG reject cause value | CCITT ISUP cause value | GSM 04.08 cause value |
|---|---|---|
| calledPartySupplementary-ServiceInteractionViolation | #29 Facility Rejected Diagnostic = IC (see note 1) | #29 Facility Rejected Diagnostic = CUG call failure, unspecified |
| incomingCallsBarredWithinCUG | #55 I/C calls barred within CUG | #55 I/C calls barred within CUG |
| subscriberNotMemberOfCUG | #87 User not member of CUG | #87 User not member of CUG |
| requestedBasicService-ViolatesCUGConstraints | #29 Facility Rejected (see note 2) | #29Facility Rejected (no diagnostic) |

NOTE 1: There is no specific cause value in ISUP for this rejection case. Therefore it is proposed that Cause Value #29 "Facility Rejected" is used with the diagnostic equal to the interlock of the call. This approach has been used in ISUP for interworking problems.

NOTE 2: There is no specific cause value in ISUP for this rejection case. It is therefore proposed to use cause value #29 "Facility Rejected" to indicate a general supplementary service failure.

# Annex B (informative): Change Request History

| Status of Technical Specification GSM 04.85 | | |
|---|---|---|
| **Date** | **Version** | **Remarks** |
| | | No Phase 1 version |
| June 1992 | version 4.0.0 | TS approved by SMG#03<br>Reference to PNP removed<br>TS frozen for Phase 2 by SMG#05 |
| October 1993 | version 4.0.1 | TS changed to draft prETS 300 569 |
| October 1994 | version 4.0.2 | TS changed to final draft prETS 300 569 |
| January 1995 | version 4.0.3 | TS changed to ETS 300 569 First edition |
| April 1996 | version 4.1.0 | CR 04.85-A001 rev 1 (category F) agreed by SMG#18 |
| November 1996 | version 4.1.1 | TS changed to ETS 300 569 Second edition |
| December 1996 | version 5.0.0 | ETS changed to GTS for release '96 |
| January 1999 | version 6.0.0 | Release 1997 version |
| August 1999 | version 7.0.0 | Release 1998 version |
| **Text and flows**: WinWord6<br>**Stylesheet**: etsiw_70.dot | | |

# History

| Document history | | |
|---|---|---|
| V7.0.0 | August 1999 | Publication |
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ISBN 2-7437-3346-2
Dépôt légal : Août 1999