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Contents

Foreword	5
1 Scope	7
2 References	7
3 Definitions and abbreviations	7
3.1 Definitions	7
3.2 Abbreviations	8
4 Description	9
5 Normal operation with successful outcome.....	12
5.1 Provision	12
5.2 Withdrawal	12
5.3 Network related service configuration.....	12
5.4 Normal operation for group call establishment	12
5.5 Charging requirements	12
6 Exceptional procedures or unsuccessful outcome.....	13
7 Interaction with other GSM services.....	13
7.1 Calling Line Identification Presentation (CLIP)	13
7.2 Calling Line Identification Restriction (CLIR)	13
7.3 Connected Line Identification Presentation (COLP)	13
7.4 Connected Line Identification Restriction (COLR)	13
7.5 Call Forwarding Unconditional (CFU)	13
7.6 Call Forwarding on mobile subscriber Busy (CFB)	13
7.7 Call Forwarding on No Reply (CFNRy)	13
7.8 Call Forwarding on mobile subscriber Not Reachable (CFNRc)	14
7.9 Call Waiting (CW)	14
7.10 Call Hold (HOLD)	14
7.11 Multi-party Service (MPTY)	14
7.12 Closed User Group (CUG).....	14
7.13 Advice of Charge (AoC).....	14
7.14 Barring of All Outgoing Calls (BAOC)	14
7.15 Barring of Outgoing International Calls (BOIC).....	14
7.16 Barring of Outgoing International Calls except those to the Home PLMN country (BOIC-exHC)	14
7.17 Barring of All Incoming Calls (BAIC).....	15
7.18 Barring of Incoming Calls when Roaming outside the home PLMN country (BIC-Roam) ..	15
7.19 Call Transfer (ECT).....	15
7.20 Completion of Calls to Busy Subscriber (CCBS)	15
[7.21 Enhanced Multi-Level Precedence and Pre-emption service (eMLPP)	15
7.22 Short Message Service (SMS).....	15
8 Interworking considerations.....	15
History.....	16

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Foreword

This Global System for Mobile communications Technical Specification (GTS) has been produced by the TC SMG Technical Committee of the European Telecommunications Standards Institute (ETSI).

This specification defines the stage one description of the Voice Group Call Service (VGCS) within the digital cellular telecommunications system (Phase 2/Phase 2+).

GSM Technical Specifications are produced by TC-SMG to enable the GSM Phase 2+ specifications to become publicly available, prior to submission for the formal ETSI standards approval procedure to become European Telecommunications Standards (ETS). This ensures the earliest possible access to GSM Phase 2+ specifications for all Manufacturers, Network operators and implementors of the Global System for Mobile communications (GSM).

The contents of this specification are subject to continuing work within TC-SMG and may change following formal TC-SMG approval. Should TC-SMG modify the contents of this specification it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 5.x.y

where:

- y the third digit is incremented when editorial only changes have been incorporated in the specification;
- x the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

Reference is made within this specification to GSM-TSs (note).

NOTE: TC-SMG has produced documents which give the technical specifications for the implementation of the digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TSs). These TSs may have subsequently become I-ETTs (Phase 1), or ETs/ETSI Technical Reports (ETRs) (Phase 2). TC-SMG has also produced ETSI GSM TSs which give the technical specifications for the implementation of Phase 2+ enhancements of the digital cellular telecommunications system. These version 5.x.x GSM Technical Specifications may be referred to as GTs.

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1 Scope

This technical specification specifies the stage one description of the Voice Group Call Service (VGCS) which allows speech conversation of a predefined group of service subscribers in half duplex mode on the radio link taking into account multiple mobile service subscribers involved in the VGCS call per cell.

The VGCS is applicable to all mobile stations in a certain network and area which have the technical capability and the corresponding subscription, respectively, to participate in a VGCS call.

NOTE: It is not considered as requirement that normal GSM phase 2 mobile stations will be able to be used for this service.

The service is described from the service subscriber's and user's point of view; in particular:

- the procedure for normal operation with successful outcome;
- the action to be taken in exceptional circumstances;
- the interaction with other GSM services and features.

This specification does not deal with the Man-Machine Interface (MMI) requirements, but makes reference to the appropriate Global System for Mobile Communications (GSM) specifications.

This specification defines a teleservice of the digital cellular telecommunications system GSM. Any interaction with other services and/or networks not dealt with in clauses 8 or 9 are outside the scope of this specification.

2 References

This specification incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this specification only when incorporated in it by the amendment or revision. For undated references, the latest edition of the publication referred to applies.

- [1] GSM 01.04: (ETR 100) "Digital cellular telecommunications system (Phase 2); Abbreviations and acronyms"
- [2] GSM 02.40 (ETS 300 512): "Digital cellular telecommunications system (Phase 2); Procedures for call progress indications".
- [3] GSM 02.67: "Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption (eMLPP) - Stage 1".

3 Definitions and abbreviations

3.1 Definitions

network operator: Entity which provides the network operating elements and resources for the execution of the VGCS.

service provider: Entity which offers the VGCS for subscription. The network operator may be the service provider.

group call: An instance of the VGCS initiated by a subscriber. This term is used synonymously with the term "VGCS call".

service subscriber: Mobile subscriber which subscribes to the VGCS.

group identification (group ID): A numerical classification. There can be up to [tbd] (note) different group IDs in one PLMN. Service subscriber shall be provided with one or up to [tbd] group IDs.

dispatcher: Particular fixed line or mobile users are identified within the network as dispatchers. Dispatchers shall receive all group calls to a certain group ID in a service area (this shall be done automatically by the network). In addition they can initiate group calls to a group ID in a service area.

Dispatchers shall be connected to a group call by means of standard links via radio or via an ISDN. They shall be called by their ISDN or MSISDN number, respectively. When dispatchers initiate group calls, they shall call a particular MSISDN number which is related to a group ID and service area. Dispatchers using the GSM network can be located outside of this service area.

The identities of the dispatchers are exclusively predefined in the network by the service provider. There will be none or up to five dispatchers involved in a particular group call.

destination subscriber: Service subscriber or dispatcher to which the VGCS call is directed.

calling subscriber: Service subscriber or dispatcher which originates the VGCS call.

service area: Predefined area composed of one or a cluster of cells to which a particular VGCS call is distributed. Up to [tbd] (note) different service areas can be defined in one PLMN. The composition of a service area is predefined in the network by the service provider. Changing of cell allocation in the network due to operational reasons will need an adaptation of the service area definition. The service area may include more than one MSC area and cells of more than one PLMN.

[Remark: this requirement is under study and may affect performance and implementation issues.]

group call member: Any service subscriber or dispatcher participating in an on going group call.

NOTE: The maximum number of group IDs which can be defined in one PLMN depends on the maximum number of service areas defined in this PLMN. The maximum number of group IDs and service areas shall be $[10^8-1, tbc]$.

3.2 Abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

4 Description

The VGCS is defined in the following. Figure 1 gives an explanation of the logical concept of the VGCS.

- a) The VGCS enables a calling subscriber to establish a group speech call to destination subscribers belonging to a predefined service area and group ID.

[Remark: the service may be provided by use of half duplex transmission mode.]

Applications for group call services typically involve multiple group members in a small service area, for which the VGCS should provide spectrum efficient solutions.

- b) The calling subscriber as well as the destination subscribers may be any service subscriber which has subscribed to the related group ID or any dispatcher who is entitled to it by his identity which shall be registered in the network.
- c) Destination subscribers are all service subscribers or a group of service subscribers identified by the called group ID which have their present location in the service area, and pre-registered dispatchers. Destination service subscribers shall be notified with the group ID, not by paging the subscriber individually. Dispatchers shall be called individually with their identity. Service subscribers may become late destination subscribers when entering the service area within 500 ms after reception of the first notification message related to the VGCS call. Service subscribers which leave the corresponding service area during an on going VGCS call of which they are member cease to be destination subscribers.
- d) The group call shall be established in a service area which is comprised of one or a cluster of cells. Service areas shall be predefined in the network by the service provider, co-ordinated by the network operator.

In case of a service subscriber initiating a VGCS, the service area is uniquely identified by the actual cell in which the service subscriber resides at the moment of VGCS call initialization and by the group ID they issue.

A dispatcher initiating a VGCS call will be connected to a related predefined service area. The entitlement of the dispatcher is checked by the network element responsible for the group call management by verification of the calling identity. Since a dispatcher may be registered to more than one service area and group ID an indication of the wanted service area and group ID has to be given in form of a dedicated address called by the dispatcher.

- e) The service shall permit only one talking service subscriber at any moment; additionally up to five dispatcher can be talking simultaneously at one time. Dispatchers should hear all combinations of voices other than their own. Listening service subscribers shall hear the combination of all voices. The talking service subscriber shall gain some audible indication if any dispatchers are talking simultaneously.

Dispatchers shall be able to talk at any moment without any need to signal the wish to talk. Service subscribers who wish to talk shall indicate this. They shall only be able to become talking subscribers if there is no other talking service subscriber. The right to be a talking service subscriber is allocated on a first come first served basis without queuing. Once a service subscriber has become a talking subscriber they shall eventually indicate their wish to become a listening subscriber, or the network may detect that they are no longer a talking subscriber due to time-out or other mechanisms.

SMS, CW and procedures for supplementary service actions are not possible for a talking service subscriber.

- f) The calling subscriber shall be informed by the network with a suitable indication about the successful establishment of the group call so that he can start to speak.

NOTE 1: a successful establishment means that all group call downlink channels are allocated, whether somebody is listening or not, and the related dispatchers are alerted.

For an established group call the uplink assignment to a service subscriber who wishes to talk shall be performed in <300 ms after a request to talk is made. The service subscriber wishing to talk shall be given an audible indication that he can speak.

As a network option the mobile station of the talking service subscriber can be requested to send its IMSI to the network in order so that the talker's IMSI be stored in the event records.

- g) Authentication of calling subscribers at VGCS invocation is optional. Authentication of the talking service subscriber is optional.

Confidentiality on the radio path is optional.

- h) Different levels of priority and pre-emption shall be applied as defined in the stage 1 description on the enhanced Multi-Level Precedence and Pre-emption Service (eMLPP), GSM 02.67.

- i) A number of group calls may exist simultaneously intended for different groups of destination users in the same service area.

Parallel group calls are possible to the same group of destination subscribers in different, possibly overlapping, service areas.

- j) A group call shall be released on demand of the calling subscriber or by a dispatcher or by the network.

NOTE 2: It is acceptable that the release by the calling subscriber is only possible if the uplink is assigned to the calling subscriber.

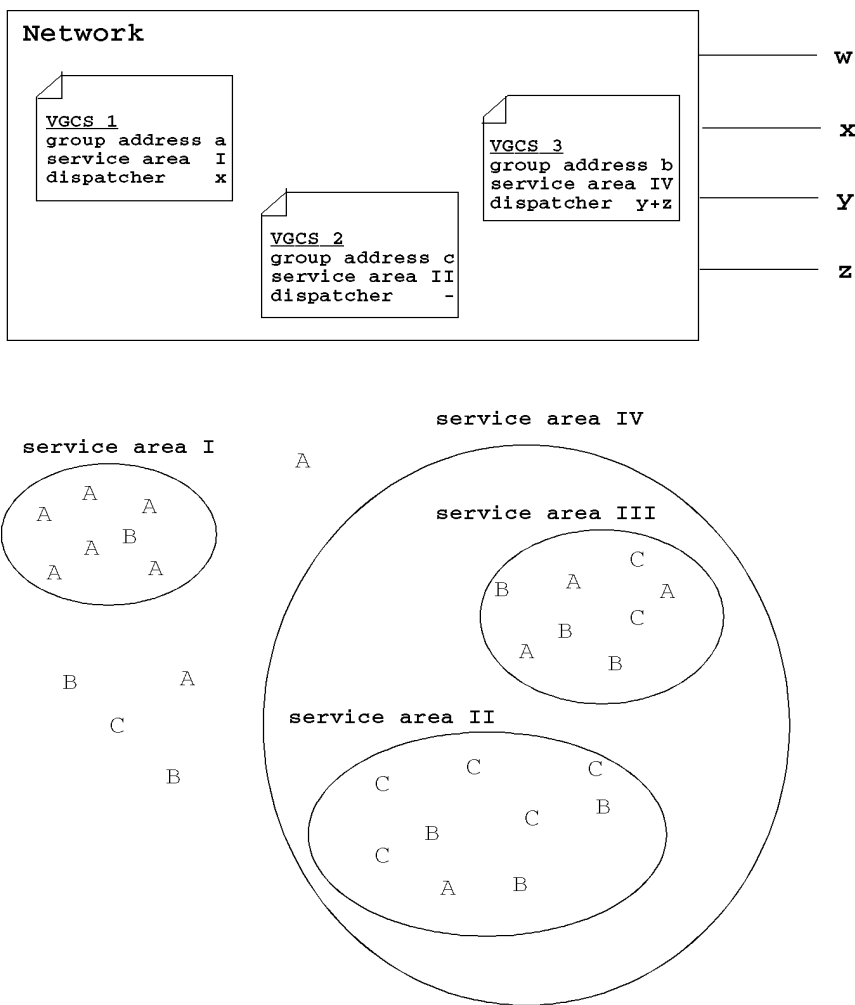
Automatic release of a group call after a selectable time of no voice activity by any service subscriber is required.

- k) VGCS shall also be provided in case of roaming. For this, certain group IDs shall be defined as supra-PLMN group IDs which have to be co-ordinated between the network operators and which shall be known in the networks and in the SIM. A service subscriber which is entitled by his subscription to establish group calls while roaming shall only be able to use supra-PLMN group IDs in case of roaming.

- l) For certain levels of priorities an acknowledgement of receipt of a group call can be required as an application option (e.g. for railways emergency calls) from all or from nominated destination subscribers (nomination is recorded on the SIM). The acknowledgement itself shall be performed at the end of the group call. The acknowledgement shall indicate the time the reception started and the time the reception terminated. The acknowledgement has to be given to a predefined recipient.

- m) It shall be possible for a service subscriber to activate or deactivate the group call reception for different group IDs. The selection list is stored on the SIM corresponding the subscribed group IDs. It shall be possible to prohibit the deactivation of group IDs used for high priority calls.

Dispatcher which are registered for a certain group call and which have also a subscription for VGCS with the same group ID as the group call for which they are dispatcher shall deactivate this group ID when they are located in the corresponding service area in order to avoid conflicts between paging for the dispatcher and notifications for the group ID.



NOTE: VGCS1, VGCS2, VGCS3 = particular group calls with the attributes pre-registered in the network

A, B, C, D = service subscriber with group ID a, b, c or d, respectively

I, II, III, IV = service areas

w, x, y, z = dispatchers connected via normal GSM links or external networks

Figure 1: Logical concept of the VGCS

5 Normal operation with successful outcome

5.1 Provision

The VGCS is provided to be used by the service subscriber after prior arrangements with the service provider. The provision includes the assignment of group IDs to the service subscriber. A subscription shall not provide more than [tbd] group IDs to the service subscriber.

The service can be offered with one subscription option:

Subscription option	Value
- subscriber has the capability of initiating group calls in case of roaming-	No - Yes.

5.2 Withdrawal

The VGCS is withdrawn at the service provider's request or for administrative reasons.

5.3 Network related service configuration

The network related service configuration defines the attributes of a particular group call which shall be pre-registered in the network by the service provider. This is not related to one specific service subscriber.

The attributes of a particular group call are group ID, service area composition, a list of dispatcher identities to be connected to this area, a list of dispatchers allowed to initiate group calls to this area, the dispatcher identity which shall be used in case of COLP (see subclause 7.3) and dispatcher identities to which an optional acknowledgement can be routed. Changes to the service area composition shall be coordinated with the network operator.

5.4 Normal operation for group call establishment

The VGCS shall be automatically initiated by the network when a service subscriber or dispatcher dials a particular short code or address at call set-up.

On successful initiation of the VGCS, the group call shall be established between the calling subscriber and the destination subscribers. The destination subscribers are

- all service subscribers at any time during the group call with the corresponding group ID when located in the service area where the service area is uniquely defined by
- the location (radio cell) of the calling subscriber at invocation if the calling subscriber is a service subscriber,
- the addressed service area if the calling subscriber is a dispatcher;
- the pre-registered dispatchers related to that service area and group ID.

The calling subscriber shall be informed by the network with a suitable indication about the successful establishment of the group call so that the user can start to speak.

The call can be released by the calling subscriber or by the network or by dispatchers predefined in the network.

Destination subscribers may exit the group call separately without releasing the complete group call.

5.5 Charging requirements

No additional requirements are specified. Event data may be recorded as a network option for all VGCS calls to one group ID in a specific service area.

6 Exceptional procedures or unsuccessful outcome

If a service subscriber wants to establish a group call while not subscribed to the service or the network cannot provide the service for some reason, an indication will be provided to the calling subscriber to notify him of the reason of failure.

If a dispatcher wants to establish a group call while not entitled to do it or the network cannot provide the service for some reason, the call shall be rejected. The network shall give an appropriate standard indication according to GSM 02.40 to dispatchers who are GSM subscribers.

If a group call cannot be established to all cells and dispatchers in a pre-set time, the call will be considered established provided that at least the originating cell in case of a service subscriber originated group call or any one cell within the service area in case of a dispatcher originated group call has been included within this specified time.

If a cell is excluded from the service area because of pre-emption, the group call shall be maintained.

7 Interaction with other GSM services

7.1 Calling Line Identification Presentation (CLIP)

If CLIP is applied, the VGCS call number (E.164) - including a VGCS indication, the service area ID and the group ID - shall be presented to the dispatchers. In addition the subaddress of the calling party may be used to identify the calling subscriber to the dispatchers.

The receiving mobile stations of the destination service subscribers shall display the paged group ID.

7.2 Calling Line Identification Restriction (CLIR)

CLIR shall be supported.

The network shall have the possibility to override CLIR or reject a calling subscriber with CLIR activated in case of group calls.

7.3 Connected Line Identification Presentation (COLP)

If COLP is applied, the VGCS call number (E.164) - including a VGCS indication, the service area ID and the group ID - shall be presented to the calling subscriber. No destination subscriber identities will be presented.

7.4 Connected Line Identification Restriction (COLR)

COLR shall be supported. The network shall have the possibility to override COLR in case of group calls.

7.5 Call Forwarding Unconditional (CFU)

CFU is not applicable to group calls of service subscribers when activated, i.e. CFU shall be ignored.

CFU is applicable for dispatchers.

7.6 Call Forwarding on mobile subscriber Busy (CFB)

CFB is not applicable to group calls of service subscribers with CFB active.

CFB is applicable for dispatchers if the group call does not have a higher priority than the present call.

7.7 Call Forwarding on No Reply (CFNRy)

CFNRy is not applicable to group calls of service subscribers with CFNRy active.

CFNRy is applicable for dispatchers.

7.8 Call Forwarding on mobile subscriber Not Reachable (CFNRc)

CFNRc is not applicable to group calls of service subscribers with CFNRc active.

CFNRc is applicable for dispatchers.

7.9 Call Waiting (CW)

CW is not applicable for service subscriber. Instead, as a network option, a notification of paging for other calls shall be given to the service subscribers involved in the group call.

CW is applicable for dispatcher.

7.10 Call Hold (HOLD)

Call hold is not applicable for service subscriber. Instead, a service subscriber can leave an on-going group call at any time and return to it later-on by user action as defined in item i) of clause 4.

The acceptance of a group call by a service subscriber while being in a point-to-point call shall release the point-to-point call.

If a group call is requested by a service subscriber while being in a point-to-point call, the point-to-point call shall be released.

Call hold is applicable for dispatcher.

7.11 Multi-party Service (MPTY)

MPTY is not applicable.

7.12 Closed User Group (CUG)

CUG is not applicable. Being a member of a CUG has no impact on receiving group calls.

7.13 Advice of Charge (AoC)

There is no specific requirement.

7.14 Barring of All Outgoing Calls (BAOC)

BAOC is applicable, if subscribed to, with the possible exception of high priority group calls.

7.15 Barring of Outgoing International Calls (BOIC)

BOIC is not applicable for group calls of service subscribers.

BOIC is applicable for dispatcher.

7.16 Barring of Outgoing International Calls except those to the Home PLMN country (BOIC-exHC)

BOIC-exHC is not applicable for group calls of service subscriber (see subclause 7.15).

BOIC-exHC is applicable for dispatcher.

7.17 Barring of All Incoming Calls (BAIC)

VGCS calls shall override BAIC if the corresponding group ID is activated on the SIM.

7.18 Barring of Incoming Calls when Roaming outside the home PLMN country (BIC-Roam)

VGCS calls shall override BIC-Roam if the corresponding group ID is activated on the SIM.

7.19 Call Transfer (ECT)

Call transfer is not applicable for service subscribers.

Call transfer is applicable for dispatchers.

7.20 Completion of Calls to Busy Subscriber (CCBS)

CCBS is not applicable for group calls towards busy subscribers.

CCBS is applicable if a dispatcher or a calling subscriber involved in a group call is called.

[7.21 Enhanced Multi-Level Precedence and Pre-emption service (eMLPP)

Different priorities with corresponding set-up procedures are applicable as defined in the stage 1 description of eMLPP, GSM 02.67.]

7.22 Short Message Service (SMS)

Sending or reception of short messages is not possible for service subscribers involved in a group call.

8 Interworking considerations

No specific requirements are identified.

History

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