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Digital cellular telecommunications system (Phase 2+) (GSM);
Group Call Control (GCC) protocol
(3GPP TS 44.068 version 14.0.0 Release 14)

3GPP A GLOBAL INITIATIVE
GSM® GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

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Contents

Foreword

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1 Scope

The present document specifies the Group Call Control (GCC) protocol used by the Voice Group Call Service (VGCS) on the radio interface.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] Void

[1a] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 42.068: "Voice Group Call Service (VGCS); Stage 1".

[3] 3GPP TS 23.003: "Numbering, addressing and identification".

[4] 3GPP TS 23.067: "enhanced Multi-Level Precedence and Pre-emption service (eMLPP); Stage 2".

[5] 3GPP TS 43.068: "Voice Group Call Service (VGCS); Stage 2".

[6] 3GPP TS 44.006: "Mobile Station - Base Stations System (MS - BSS) Interface; Data Link (DL) Layer Specification ".

[7] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[8] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control Protocol".

[9] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document the terms and definitions given in 3GPP TS 42.068 and the following apply:

attachment of the user connection: See 3GPP TS 24.008, subclause 5.2.

calling user: GCC entity in the Mobile Station (MS) initiating or having initiated a group call.

clearing the context related to the group call establishment: all running GCC timers in the relevant GCC entity are stopped, all attributes in the relevant GCC entity are deleted.

downlink: network to mobile station direction.

group call: is used in the same sense as "voice group call".

group call channel: combined uplink/downlink to be allocated in each cell of the group call area for a particular group call. The uplink can be used by the presently talking service subscriber only. All MSs of the listening service subscribers in one cell shall listen to the common downlink.

group receive mode: See 3GPP TS 44.018.

originating mobile station: mobile station initiating or having initiated the group call.

NOTE 1: In certain situations, a MS assumes to be the originating MS of a group call without actually being the originating MS of that group call.

NOTE 2: There may be one or none originating MS for a given group call.

uplink: mobile station to network direction.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1a] and the following apply:

BSS	Base Station System
eMLPP	enhanced Multi-Level Precedence and Pre-emption service
GCC	Group Call Control
	GPRS General Packet Radio Service
MS	Mobile Station
VGCS	Voice Group Call Service
CM	Connection Management
TI	Transaction Identifier

4 Applicability

Support of the group call protocol is optional in the MS and in the network.

5 Main concepts

The present document describes the group call control (GCC) protocol, which is one of the protocols of the Connection Management (CM) sublayer (see 3GPP TS 24.007).

There is in general more than one MS engaged in a group call. Consequently, there is in general more than one MS with a GCC entity engaged in the same group call, and there is one GCC entity in the network engaged in that group call.

Under which conditions a GCC message is passed from lower (sub-)layers to the GCC entity is defined in the specifications of the sub-layers.

The MS shall ignore GCC messages that it receives which were sent in unacknowledged mode and which explicitly specify as destination a mobile identity which is not a mobile identity of the MS.

Higher layers and the MM sub-layer decide when to accept parallel GCC transactions and when/whether to accept GCC transactions in parallel to other CM transactions.

The group call may be initiated by a mobile user or by a dispatcher. Specification of a protocol for dispatchers is out of the scope of the present document. Hence, in the scope of the present document, there are:

- one GCC entity in the network; and
- one or more than one GCC entities in different MSs;

engaged in a group call, and one ore none of the MSs is the originator of the group call (called the originating MS in the present document). Note that, in certain situations, a MS assumes to be the originator of a group call without being the originator.

The originator of the GCC transaction chooses the Transaction Identifier (TI). A MS not assuming to be the originator of the transaction will chose the transaction identifier received from the network, setting the TI flag to 1+x mod 2 where x is the received TI flag.

The present document describes the group call control protocol only with regard to two peer entities, one in a MS, the other one in the network. The call control entities are described as communicating finite state machines which exchange messages across the radio interface and communicate internally with other protocol (sub)layers. In particular, the GCC protocol uses the MM and RR sublayer specified in 3GPP TS 24.008 and 3GPP TS 44.018. This description in only normative as far as the consequential externally observable behaviour is concerned. For simplicity, instead of using the terms "GCC entity in the MS" and "GCC entity in the network", the present document often uses the terms "MS" and "network" if no confusion may arise.

Certain sequences of actions of the two peer entities compose "elementary procedures" which are used as a basis for the description in the present document. These elementary procedures are defined in clause 6.

The network should apply supervisory functions to verify that the GCC procedures are progressing and if not, take appropriate means to resolve the problems. This, however, is out of the scope of the present document.

6 Elementary procedures for Group Call Control

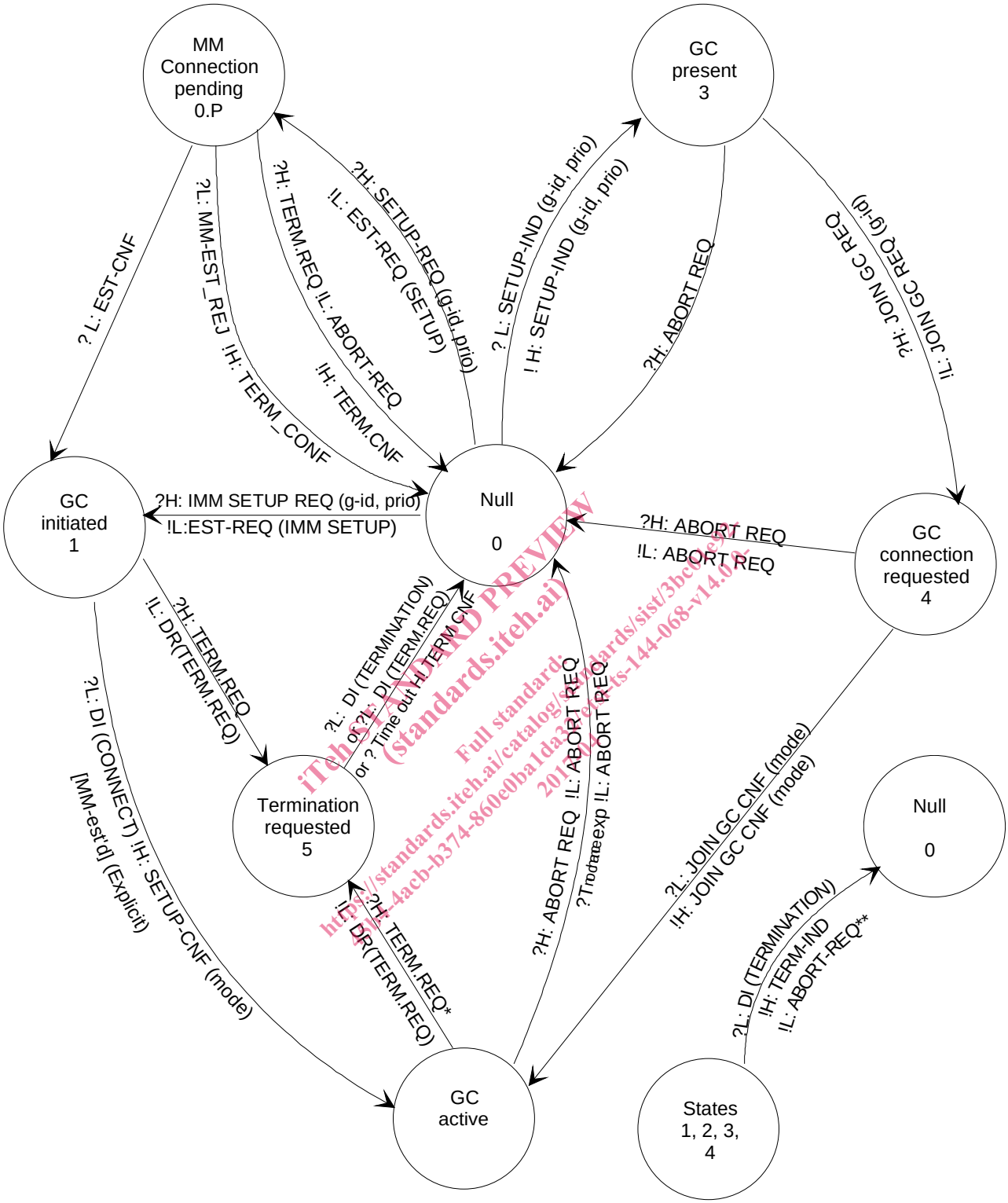
6.1 Overview

6.1.1 General

The elementary procedures may be grouped into the following classes:

- group call establishment procedures;
- group call termination procedures;
- call information phase procedures;
- miscellaneous procedures.

Figure 6.1 gives an overview of the main states and transitions on the MS side.



NOTE 1: * if MS assumes to be the originator of the group call.
NOTE 2: ** if not in RR connected mode.

Figure 6.1: Overview group call control protocol/MS side

6.1.2 Group call control states

6.1.2.1 Group call control states at the MS side of the interface

The GCC entity of the MS is described as an extended finite state machine. It performs transitions between (main) states, and in main state GROUP CALL ACTIVE (U3) it performs transitions between sub-states. It has certain parameters and attributes, e.g. configuration parameters and behaviour parameters, which it sets and changes based on interaction with higher and lower (sub-)layers and on message exchange with its peer entity. If a configuration parameter is set to a certain value, the MS shall also adapt the configuration accordingly. Behaviour parameters decide on (part of) the behaviour of the GCC entity. When the GCC entity in the MS receives a message, it shall first analyse whether it shall ignore the message, see clauses 5 and 7.

6.1.2.1.1 Attributes and parameters of GCC in the MS

For the following behaviour parameters, the description is informative.

Parameter	Description
ORIG	Depending on the context, the MS assumes to be the originator of the call (ORIG = T) or not to be the originator of the call (ORIG = F).
COMM	Depending on the context, the MS assumes that communication with its peer entity is enabled in both directions (COMM = T) or not (COMM = F).

For the following configuration parameters the MS shall adapt its configuration according to the parameter value and parameter definition.

Parameter	Definition
D-ATT	D-ATT = T means that the MS attaches the user connection for the group call in the downlink. D-ATT = F means that the MS does not attach the user connection for the group call in the downlink.
U-ATT	U-ATT = T means that the MS attaches the user connection for the group call in the uplink. U-ATT = F means that the MS does not attach the user connection for the group call in the uplink.

6.1.2.1.2 NULL (U0)

No group call exists for the GCC entity. When entering the state, parameters shall be set to the following values, and configuration shall be adapted to the new values of configuration parameters: ORIG = F, COMM = F, D-ATT = F, U-ATT = F.

6.1.2.1.3 MM CONNECTION PENDING (U0.p)

The GCC entity has requested the explicit establishment of an MM connection. When entering the state, parameters shall be set to the following values, and configuration shall be adapted to the new values of configuration parameters: ORIG = T, COMM = F, D-ATT = F, U-ATT = F.

6.1.2.1.4 GROUP CALL INITIATED (U1)

The GCC entity has requested the peer entity in the network to establish a group call. When entering the state, parameters shall be set to the following values, and configuration shall be adapted to the new values of configuration parameters: ORIG = T, COMM = T, D-ATT = F, U-ATT = F.