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Digital cellular telecommunications system (Phase 2+) (GSM); GSM Cordless Telephony System (CTS), Phase 1; CTS Architecture Description; Stage 2 (GSM 03.56 version 7.1.1 Release 1998)

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# ETSI EN 302 405 V7.1.1 (2000-08)

*European Standard (Telecommunications series)*

**Digital cellular telecommunications system (Phase 2+);  
GSM Cordless Telephony System (CTS), Phase 1;  
CTS Architecture Description;  
Stage 2  
(GSM 03.56 version 7.1.1 Release 1998)**

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# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Introduction .....	6
1 Scope .....	7
2 References .....	7
3 Definitions and abbreviations.....	7
3.1 Definitions .....	7
3.2 Abbreviations .....	8
4 Main concepts .....	8
4.1 CTS definition .....	8
4.2 CTS Network.....	8
4.3 CTS Role models .....	9
4.3.1 CTS FP owner's role model .....	9
4.3.2 CTS MS subscriber's role model .....	9
4.4 CTS Radio interface .....	10
4.4.1 Adaptive Frequency Allocation .....	10
4.4.2 Total Frequency Hopping .....	10
4.4.3 CTS and GSM compatibility issues .....	10
4.5 CTS operational requirements.....	10
4.5.1 GSM coverage from DPLMN.....	11
4.5.2 Limited GSM coverage from DPLMN.....	11
4.5.3 No GSM coverage from DPLMN.....	12
4.6 CTS Reference Model .....	12
4.6.1 General CTS Reference Model.....	12
4.6.2 Simplified CTS reference model (limited enrolment control).....	13
4.6.3 Simplified CTS reference model (Licence exempt CTS band).....	14
4.6.4 CTS connected to PLMN reference model.....	15
4.7 GSM Operator control of CTS service .....	16
4.7.1 CTS System control.....	17
4.7.2 GSM Operator control of CTS frequency list.....	17
4.7.3 CTS system initialisation for license exempt frequency band for CTS operation .....	18
4.7.4 CTS system initialisation with DPLMN coverage and limited coverage .....	18
4.7.4.1 First stage CTS-FP initialisation (Temporary GFL allocation).....	18
4.7.4.2 Second stage CTS-FP initialisation (GFL confirmation) .....	18
4.7.5 CTS system initialisation without DPLMN coverage.....	18
4.7.6 GFL update .....	19
4.7.6.1 CTS FP GFL update.....	19
4.7.7 Erasure of GFL in the CTS FP.....	19
4.8 De-initialisation of CTS FP .....	19
4.8.1 CTS Operator control mode.....	19
4.8.2 Licence exempt mode .....	20
4.9 CTS MS Enrolment .....	20
4.9.1 Enrolment control at the CTS-FP .....	20
4.9.2 Enrolment control at the CTS-SN.....	21
4.9.2.1 Initial enrolment at the CTS-SN.....	21
4.9.2.2 Subsequent enrolment at the CTS-SN.....	21
4.9.3 Agreement between the CTS FP Subscriber and CTS MS subscribers .....	21
4.9.4 CTS authorisation check of enrolment of a CTS MS onto a CTS FP.....	21
4.10 De-enrolment of CTS MS from a CTS-FP .....	21
4.10.1 Mutual authentication .....	22
4.11 CTS MM and CM layers .....	22
4.12 CTS MM and CM layers on the fixed network side.....	22
4.13 CTS Mobility services.....	22

4.13.1	CTS support in idle mode .....	22
4.13.2	CTS attach and detach .....	22
4.14	CTS CM layer .....	22
4.14.1	CTS service indication.....	22
4.15	Subscriber information for CTS .....	23
5	Transmission .....	23
6	Information storage .....	23
6.1	Information managed per CTS-MS subscriber.....	23
6.1.1	Stored in the CTS-MS SIM .....	23
6.1.2	Stored in the HLR .....	23
6.1.3	Stored in the MSC/VLR .....	23
6.2	Information managed per CTS-FP subscriber .....	23
6.2.1	Stored in the CTS-FP SIM.....	23
6.2.2	Stored in the CTS-FPE .....	23
6.2.3	Stored in the CTS-SN .....	23
6.2.4	Stored in the CTS-HLR .....	24
7	Identities .....	24
7.1	Identification of the CTS-FP .....	24
7.1.1	IFPSI.....	24
7.1.2	IFPEI.....	24
7.1.3	FPBI.....	24
7.2	Addressing parameters .....	24
7.2.1	Addressing the CTS-FP .....	24
7.2.1.1	CTS-FP Fixed Network dialling number .....	24
7.2.1.2	CTS FP name .....	24
7.2.2	Addressing the CTS-MS subscriber.....	24
7.2.2.1	MSISDN .....	24
7.2.2.2	CTS-MS Subscriber Identity(CTS-MSI).....	25
8	Operation and maintenance aspects.....	25
9	Function and information flows.....	25
9.1	CTS FP management.....	25
9.1.1	CTS FP Initialisation .....	25
9.1.2	Update of CTS FP frequencies .....	26
9.2	CTS management for CTS MS.....	27
9.3	CTS integration to Fixed Mobile Convergence applications.....	27
9.4	Functions related to MS in idle mode for support of CTS.....	27
9.4.1	Cell selection and reselection.....	27
9.4.2	DPLMN Cell information gathering .....	27
9.4.3	CTS local mobility.....	28
9.4.3.1	CTS attachment .....	28
9.4.3.2	CTS detachment .....	29
9.5	Functions related to active mode support of CTS .....	29
9.5.1	MS connection establishment for MT and MO calls .....	29
9.5.2	Handover .....	29
9.6	Overview of signalling .....	30
10	CTS Architecture.....	30
10.1	CTS Elements.....	30
10.1.1	CTS Fixed Part .....	30
10.1.2	CTS Mobile Station .....	30
10.1.3	CTS controlling and supporting network entities .....	31
10.2	CTS Interfaces.....	32
10.2.1	CTS Radio Interface (Um*).....	32
10.2.2	GSM Radio Interface (Um) .....	32
10.2.3	CTS Access Network Interface.....	32
10.2.3.1	Physical characteristics of the CTS Fixed Network Interface.....	32
10.2.3.2	Physical characteristics of the CTS GSM Network Interface .....	32
10.2.4	Network internal interfaces.....	32
10.2.4.1	Interface CTS SN/CTS HLR (Cd) .....	32

10.2.4.2	Interface CTS SN/CTS HLR (Cd).....	32
10.2.4.3	Interface CTS SN/CTS FRA.....	32
10.2.4.4	Interface CTS FRA/BSC.....	32
10.3	CTS sub-systems.....	33
10.4	Network Access.....	33
11	CTS main parameters.....	33
11.1	Radio Resource Management parameters.....	33
11.2	Identification parameters.....	34
11.3	Security specific parameters.....	34
12	The local CTS.....	34
12.1	Transmission and Signalling Planes.....	34
12.1.1	Transmission Plane.....	34
History	.....	35

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## Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Special Mobile Group (SMG).

The present document was submitted to Public Enquiry with the ETSI number 301 405. For Vote the number was changed to 302 405 because the number 301 405 is reserved and was allocated accidentally.

The present document specifies the stage 2 description of the CTS service within the digital cellular telecommunications system.

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

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- 7 Indicates GSM Phase 2+ Release 1998,
  - x the second digit is incremented for technical enhancements, corrections, updates, etc
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## Introduction

This system architecture stage 2 description is part of the overall standard for a GSM based Cordless Telephony System (GSM-CTS).

The system is intended to provide a cordless connection between the PSTN/ISDN network or a GSM network and GSM-based CTS Mobile Stations (GSM-MS) via a private CTS Fixed Part (CTS-FP).



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## 1 Scope

The present document defines the stage 2 description for the Cordless Telephony System (CTS) based on GSM radio. As the second stage of a three-level structure, it is derived from the stage 1 service description.

As mentioned already in the stage 1 description, a phased approach is indispensable to have an early first specification ready for market needs. The first phase focuses on the requirements necessary to elaborate the radio interface and the security aspects for an application supporting the speech tele-service (including DTMF support) in a residential single cell environment.

The standardisation of the physical layers of the GSM-CTS fixed network interface is not in the scope of the present document.

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## 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.
  - 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).
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- [1] GSM 01.04: "Abbreviations and Acronyms" Version 5.0.0.
- [2] GSM 02.56: "Digital cellular telecommunications system (Phase 2+), Phase 1; GSM Cordless Telephony System (CTS), Phase 1; Service Description; Stage 1".
- [3] GSM 03.03 "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".
- [4] GSM 03.20: "Digital cellular telecommunication system (Phase 2+); GSM Cordless Telephony System (CTS), Phase 1, Security related network functions; stage 2".
- [5] GSM 03.52 "Digital cellular telecommunication system (Phase 2+); GSM Cordless Telephony System (CTS), Phase 1, Lower layers of the CTS radio interface".
- [6] GSM 03.40: " Digital Cellular Telecommunications System (Phase 2+); Technical Realisation of the Short Message Service (SMS) Point-to-Point (PP)".

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## 3 Definitions and abbreviations

### 3.1 Definitions

Besides the definitions according to the CTS stage 1 service description [2] the following definitions are applicable to the present document:

**Fixed network:** A PSTN or ISDN network.

**Access network:** the network on which the CTS-FP is connected and which carries the incoming and outgoing calls to the CTS-FP. It could be either a fixed network or a GSM network.

**CTS radio interface:** The radio interface between CTS-MS and CTS-FP.

**CTS-MSIx:** CTS Local Mobile Subscriber Identity related to the xth CTS-MS initialised on a CTS-FP

**CTS-MS attachment:** CTS-MS attachment is a procedure which a CTS-MS initiates when the CTS-MS detects that it is within coverage of a CTS-FP to which the CTS-MS is enrolled.

**CTS-MS detachment:** CTS-MS detachment is a procedure that the CTS-MS initiates, and indicates to the CTS-FP that the CTS-MS will be no longer reachable by the CTS-FP.

**Enrollment:** The procedure by which a CTS-MS is made known to a CTS-FP in order that the CTS-FP can provide CTS service.

## 3.2 Abbreviations

The following list describes the abbreviations and acronyms used in the present document. The GSM abbreviations explained in GSM 01.04 [1] are not included below.

CTS	Cordless Telephony System
CTS FRA	CTS Frequency allocation functional entity
CTS HLR	CTS Home Location Register Functional entity
CTS-FP	CTS-Fixed Part
CTS-MS	CTS-Mobile Station
CTS-MSI	CTS Mobile Subscriber Identity in the CTS-FP
CTS-MSN	CTS Mobile Station Number
CTS-SAP	CTS Service Access Point
CTS-SIM	CTS Subscriber Identity Module
DPLMN	Donor PLMN
GFL	Generic Frequency List

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## 4 Main concepts

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### 4.1 CTS definition

The CTS operator can provide a CTS service which allows (using a modified GSM radio interface) to provide a cordless telephone service attached to the fixed network or to a cellular network. The services offered by CTS are limited to the type of network to which the CTS-FP is connected. In order to offer this service the CTS operator needs to have an agreement with a GSM operator in order to use the frequencies belonging to his PLMN by the CTS FP. This type of PLMN is termed to be a Donor PLMN (DPLMN).

NOTE: The CTS operator may be a GSM operator.

Depending upon the operator agreements a person wanting to operate a CTS-FP (the CTS FP subscriber) may be required to have at least three subscriptions: one with the CTS operator, and one with the GSM operator; and in addition to these subscriptions the CTS FP subscriber needs to have either a subscription to a fixed or GSM operator to which the CTS FP is to be connected or access to a fixed line interface.

The frequencies which the CTS service uses may be controlled by the operator which holds the license for the GSM frequency band used for the service.

The CTS FP subscriber can have agreements with other CTS MS subscribers to use his base station.

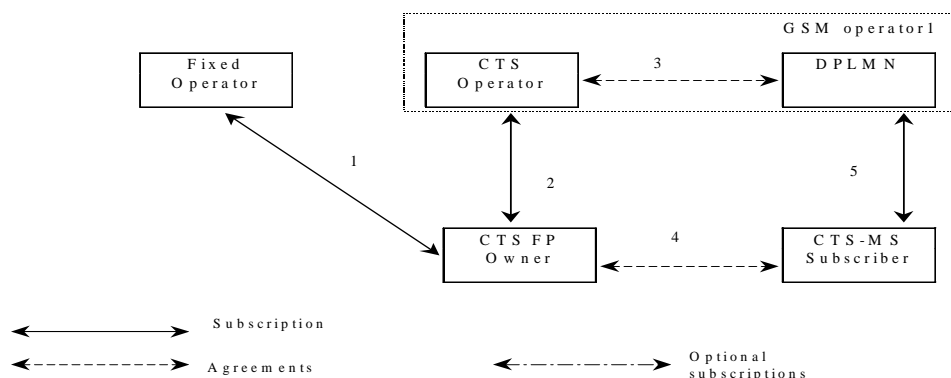
The role model is described in [2].

### 4.2 CTS Network

A CTS network is defined to be made up of one or more CTS cells. When a CTS network has more than one cell these cells are synchronised (in frequency, at TDMA frame edges and TDMA frame number) on the radio interface.

## 4.3 CTS Role models

### 4.3.1 CTS FP owner's role model



#### CTS role model for a CTS FP subscriber

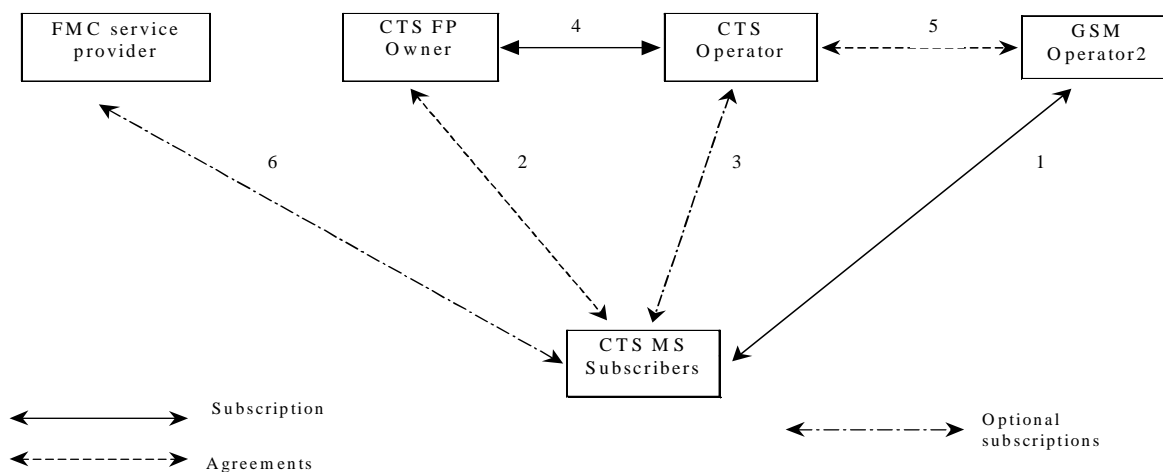
In order to receive a valid CTS-GFL the CTS-FP owner needs to have a subscription (2) with a CTS operator. This subscription is materialised by a CTS-SIM card stored in the CTS-FP. The CTS operator has an agreement (3) with a DPLMN part of a GSM operator1 to use its frequencies for CTS allocation.

When the CTS-FP is used in licence exempt mode, the CTS-FP owner does not need to have a subscription (2) with a CTS operator. In this case the frequency allocation to CTS usage is made directly by national authorities.

CTS-FP owner shall also enrol (4) at least one CTS-MS, which has a valid GSM subscription (5) with the GSM operator1.

In parallel, CTS-FP owner needs a subscription (1) with an access network operator in order establish communication over the network. This access network could be either a fixed network or a GSM network depending of CTS-FP capabilities. When the CTS-FP is connected to a GSM network, this GSM operator does not need to have any relation with the GSM operator1 who provides CTS frequencies (DPLMN).

### 4.3.2 CTS MS subscriber's role model



#### CTS MS subscriber's role model

The CTS-MS subscriber has a valid subscription (1) with a GSM operator who allows CTS operations. In case of roaming, the VPLMN shall confirm the authorisation to do CTS operations to this CTS-MS.

The CTS MS subscriber has agreement (2) with one CTS-FP owner that allows him to enrol on his CTS FP.

In order to enrol on a CTS-FP, a CTS-MS subscriber may need a subscription (3) with the CTS-operator who control (4) this CTS-FP. This CTS-operator may have an agreement (5) with the GSM-operator of this CTS-MS.

NOTE: this GSM operator may be different from the one who provides frequencies to the CTS-operator.

In order to have access to value added Fixed Mobile Convergence services (e.g. unified number), the CTS-MS subscriber needs a subscription (6) with a FMC service provider. These services and this subscription are outside of the scope of the GSM-CTS standard.

## 4.4 CTS Radio interface

The CTS radio interface is based on the use of a modified GSM radio interface as specified in [5].

The concept is to construct a modified GSM radio interface which requires no change of ME hardware, only software need be changed. The modified GSM radio interface shall (on both uplink and downlink) only cause minimal disturbance to the DPLMN.

In order to achieve this, three concepts have been adopted:

- A modified low power radio interface using GSM burst formats that cause limited disturbance to present GSM mobiles and infrastructure, see [5];
- Adaptive Frequency Allocation (AFA), see [5];
- Total Frequency Hopping (TFH), see [5].

### 4.4.1 Adaptive Frequency Allocation

In order to minimise interference between CTS networks and GSM networks, an Adaptive Frequency Allocation (AFA) mechanism is adopted, where by the CTS FP chooses frequencies within a valid GFL where the up link and down link is interfered the least. The concept and the mechanisms used are described in more detail in [5].

### 4.4.2 Total Frequency Hopping

To reduce further the possibility of interference (with the GSM PLMNs and others CTS-FP/MS pairs) a Total Frequency Hopping (TFH) mechanism is adopted. The concept of TFH and the mechanisms used are described in more detail in [5].

### 4.4.3 CTS and GSM compatibility issues

CTS service cannot be offered to existing mobile implementations without a change of software.

Compatibility issues for GSM mobiles which are not operating in CTS mode may be solved by two ways:

- the CTS radio interface is designed in order to create minimum disturbance to existing mobile implementations as specified in [5];
- and by offering the GSM operator control over the frequencies used for CTS operation.

## 4.5 CTS operational requirements

The CTS operator together with agreements from the GSM operator can define the coverage conditions under which CTS service can be offered to the subscriber. The following coverage conditions are identified:

- GSM coverage from the DPLMN. That is to say where the coverage of the DPLMN meets the cell (re)selection criteria for obtaining DPLMN service.
- Limited coverage from the DPLMN. That is to say where the coverage of the DPLMN doesn't meet cell (re)selection criteria for obtaining service where the CTS-FP is installed.
- No GSM coverage from the DPLMN.